

cl

8 2 4

A A F 8 9

ACC/ISGW/1989/8

ACC Intersecretariat Group for Water Resources
Tenth session
UNDP headquarters
New York 25-27 October 1989

Item 5(a) of the provisional agenda

INTERNATIONAL REFERENCE CENTRE
FOR COMMUNITY WATER SUPPLY AND
SANITATION (IRC)

THE WATER SITUATION IN AFRICA

Note by the Economic Commission for Africa

- cost recovery p. 7 & 20.
- river basins as basis
of regional water resources dev &
management p. 9
- env. p. 12
- harvest p. 13

NRD/WEMS/3/1989

THE WATER SITUATION IN AFRICA

**Report to the 10th Session
By the Economic Commission for Africa**

**ACC Intersecretariat Group for Water
Tenth Session
New York, 24-27 October 1989**

INTERNATIONAL REFERENCE
COMMUNITY WATER SUPPLY
P.O. Box 1700
P.O. Box 1700 AD The Hague
Tel. (070) 340 11 ext 141/142

RN: 15N 7021
LO: 024 AAF09

A0481-10 p3/27

THE WATER SITUATION IN AFRICA

	Page
INTRODUCTION	1
I. PROGRESS ACHIEVED WITH MEASURES ADOPTED	1
A. Emergency Measures	1
B. Medium and Long Term Measures	3
1. Water and Food Production	4
2. Drinking Water Supply & Sanitation	6
3. Energy Production for household needs	7
4. Water Sector Planning	8
5. Water Resources Assessment	9
6. Environmental Degradation	12
7. Mobilisation of Financial Resources	15
8. Manpower Development	17
II. CONCLUSIONS	19
III. REFERENCES	22

THE WATER SITUATION IN AFRICA

INTRODUCTION

1. Following the 1981-1986 Drought the ECA presented a paper 1 to the committee on Natural Resources at its tenth session in April 1987 on the development of water resources in the drought stricken countries of the African region. In that paper the ECA reviewed the impact of the drought on food production and food security in the region and also on the health of the population.
2. It reviewed the emergency measures that had been taken to supply food and accelerate the supply of good drinking water through aid in order to safeguard the health of those affected. It also outlined medium term measures to be taken within the framework of the United Nations Programme of Action for Africa's Economic Recovery and Development (UNPAERD), and long term measures based on the Mar del Plata Action Plan and the recommendations of the African Ministerial Conference the Environment.
3. Since then the ACC Intersecretariat Group for Water Resources has kept the subject of the water situation in Africa on its agenda to be reported upon at its annual meetings. This paper, therefore, reports on progress made since the 1987 report. At the end it draws some conclusions from the experiences.

I. PROGRESS ACHIEVED WITH EMERGENCY MEASURES ADOPTED

4. In the following paragraphs the current status of the emergency measures adopted to deal with the situation is first presented. This is followed by a presentation of the progress made and constraints encountered within the medium term and long term frameworks to develop and manage water resources to achieve food self-sufficiency and security, a satisfactory health standard and meet primary energy needs for household uses.

A. Emergency Measures

5. The emergency assistance provided by the international community and co-ordinated by the UN Office for Emergency Operations for Africa (OECA) provided relief in terms of food, water, medicines and logistic support, until the rains began to recover in 1985. The office was closed down in the latter part of 1987. At the height of the drought 21 countries in the region with a population of 150 million people were designated as being dependent on food aid. Some 30 million of these were identified as being seriously affected with 10 million forced to leave their homes and land in search for food, water and pasture for their livestock.

R 0481-10 p 1/27

6. With the return of the rains in 1985 and the good harvest that were reported in almost all countries in 1986 the emergency situation subsided even though there were pockets of lingering hunger here and there. It is only in 4 countries, Angola, Mozambique, Ethiopia and Sudan that it can be said that the emergency situation is not over. However this is not due so much to drought as to civil strife.

7. The level and extent of the rainfall recovery in the Sahel was assessed with data analysed for 27 stations in the region. The total rainfalls for 1985, 1986, 1987 and 1988 were compared with the long term annual averages (1951 to 1980). The results are presented below.

Table 1

Number of stations in Sahel that recorded rainfalls within various percentages of long-term annual averages (1985-1988)

<u>Year</u>	<u>0 - 50%</u>	<u>51 - 75</u>	<u>76 - 100</u>	<u>above 100</u>
1985	7	10	9	1
1986	5	16	4	2
1987	9	10	6	2
1988	1	5	9	12

Data from Meteorological Office, U.K. The stations lie within latitudes 18° 26'N to 13° 10'N and longitudes 33° 29'E to 16° 27'W

It is seen that from 1985 to 1987 most rainfall in the region recovered within 50 to 100% of the long-term annual average. The recovery in 1988 was very strong since 12 out of 27 stations recorded rainfall over 100 per cent of the long-term averages. Data is being collected to carry out a more comprehensive assessment of the recovery.

8. The recovery was such that in 1988 there were serious floods in Kenya, Nigeria, Gabon and the Sudan leading to loss of life and dislocation of economic activities. This called for another form of emergency relief assistance as was demonstrated in the case of the Sudanese floods. So far in 1989 while floods have occurred in West Africa (Mali, Senegal and Ghana) there has been drought in parts of Zimbabwe, resulting in crop failure and drying up of drinking water supply sources.

9. As part of the emergency effort to alleviate the drinking water shortage a number of missions were undertaken by DTCD to the drought affected countries in the Sudano-Sahelian zone, Liberia, Zambia, Benin, Tanzania, Gambia, Gabon, Congo, Madagascar, Kenya and Equatorial Guinea. 2/ As a result of these missions a number of project documents were prepared to provide assistance to procure spare parts for drilling equipment, procure new equipment, improve the performance of national drilling organisations, drill more boreholes and generally to strengthen the national institutions. These documents formed the basis for request for aid from multilateral and bilateral sources. The extent to which these requests succeeded is yet to be surveyed. However, they are likely to have been incorporated within the framework of the national plans for the IDWSSD.

10. Many water resource systems were adversely affected during the drought. Reservoirs were drawn down to very low levels for lack of adequate inflows. Consequently water supplies to meet drinking, irrigation and hydropower demand could not be met. As part of the emergency measures to conserve water, drinking water had to be rationed, less areas were put under irrigation and hydropower had to be curtailed or in some cases completely cut to either or both industrial and domestic consumers. These resulted in considerable social and economic losses to the affected countries. With the recovery of the rains almost all of these reservoirs like Kossou, Akosombo, Kianji, Tana and Aswan had by 1988 recovered and water supplies were back to normal.

11. During the drought many countries established Emergency Relief bodies to co-ordinate the delivery of assistance to combat or mitigate the effects of the drought. It is necessary that Governments do not disband these bodies with the end of the emergency situation. Rather they should be made permanent strengthened and assigned responsibility to handle in addition to drought, floods, earthquake and man-made hazards. The flooding in Senegal, Mali and Ghana and the earthquake in Ethiopia so far in 1989 provide ample justification for this. They will have to monitor the weather situation and other phenomena which lead to hazards and be ready with contingency plans to respond to these emergencies. The experiences which have been gained in the countries should be built upon for the natural and man-made disasters are bound to recur.

B. Medium and Long Term Measures

12. With the recovery of the rains, there has been a shift from emergency measures to concentration on medium and long-term measures. These measures are aimed at developing and managing water resources to meet the basic needs of food, health, household energy on a sustainable basis for a population which in 1987 was 557 million and growing at the fast average annual rate of 3.1% which is among the fastest in the world. The development challenges and the constraints to be overcome are the

peculiarities in the extreme variation and geographical distribution of climate, land and water resources environmental degradation, insufficient capital, low literacy rates and insufficiently trained manpower.

1. Water and Food Production

13. With the recovery of the rains Africa has been restored to its "normal" water supply regime which is characterised by abundant rainfall over the equatorial zone with moisture enough to sustain crop growth over 270 days in contrast with the extensive and extreme aridity of the Sahara desert in the north and Kalahari desert in the south. In between these extremes of humidity and aridity are the semi arid zones where rainfall shows wide fluctuations from year to year and even within seasons in the year. These areas cover about 57% of the land surface area, and the soils can hold moisture to support crop growth up to 180 days.3/

14. With 93.5% of the cultivated area under rainfed conditions the annual fluctuations in the size of African food and agricultural production can largely be attributed to this variability in the rainfall regime. This has been amply demonstrated since the recovery. In 1985, there was a marked regional recovery in food production of 10%. This was followed by a further increase of 4% in 1986. In 1987 agricultural output increased by only 0.5%. All the subregions were reported to have performed poorly during the year. The poor harvests were due to prolonged dry spells and unusually late rains.4/

15. In the particular case of food production cereal production in the region fell by 8% in 1987. At the same time, production of pulses decreased by 5.3% and that of tubers rose by a mere 1.6% with cassava production stagnating at 106 million tons. The situation was not uniform throughout the region however. In North Africa for instance food production was generally considered satisfactory except in Morocco and Sudan which continued to be affected by drought. In Central Africa although rains were below normal in 1987, prospects for coarse grains were satisfactory. However, in East Africa, the situation was mixed. While the United Republic of Tanzania had a main season record crop in 1987, the food situation in Ethiopia deteriorated further following continued below-normal late-season rainfall. In West Africa, unusually prolonged and abundant late rains benefited late-planted crops and improved harvest prospects. However, food production in the Sahel was estimated to have been more than 10% below that of the record production registered in 1986.

16. It is obvious from the above that the fundamental problem of stabilising and sustaining food production which existed before the drought persists. It is recognized that to save the situation a wide range of policy measures will have to be adopted e.g production inputs, price incentives, credit, assured markets, transportation and extension services. including the control of water to make it available for irrigation in the dry season. The

contribution of irrigation to food production since the drought can be assessed from cereal production, as about 53% of the land area under irrigation in the African region is devoted to cereal production (viz rice, wheat, maize, barley, millet and sorghum).5/

17. The following table presents the production, exports and imports of cereals over the period 1987 to 1989 in Africa.

Table 2

Cereal production, exports & imports in African region (1987-1989)

	1987	1989 estimate	1989 forecast
	in millions tons		
<u>Coarse Grain</u>			
Production	55.1	68.2	66.3
Exports	3.3	2.9	5.3
Imports	6.2	6.4	6.5
<u>Rice</u>			
Production	10.0	9.7	10.3
Exports	0.1	0.1	-
Imports	3.1	2.5	3.1
<u>Wheat</u>			
Production	12.6	13.7	13.8
Exports	0.3	0.6	0.3
Imports	18.7	18.0	17.6
<u>TOTAL CEREALS</u>			
Production	77.7	91.5	90.4
Exports	3.7	3.6	5.6
Imports	28.0	26.9	27.2

Source: Food Outlook (FAO). August 1989

It is clear from the above that Africa has continued to be a net importer of cereal since the rainfall recovery. Hence irrigation is yet to contribute to bring about self-sufficiency in this important item of food.

18. The regional distribution of land under irrigated agriculture remains largely unchanged since the drought at about 9.5 million hectares, with some 50% of this area in Egypt, Sudan and Morocco. Of this area 6.1 million ha. is classified as

modern with the remaining 3.4 million ha. constituting traditional small scale-projects.5/

19. Presently emphasis seem to be on rehabilitation and expansion of old schemes which because of improper management have not made the required contribution to food production. This is particularly the case with schemes in Botswana, Burkina Faso, Ghana, Kenya, and Somalia. In the north African countries particularly Egypt considerable efforts are being made to improve irrigation efficiency in view of the current limiting water supply from the Nile River.

20. For the future it is planned by the CILSS countries in the Sahel region to bring 905,000 hectares under irrigation by 1998 in order to increase food and agricultural production. The irrigated land will be developed mainly in Senegal and Mauritania

will make possible the irrigation 400,000 ha.6/ Another 300,000 ha are expected to be developed in Mali in the Niger River Valley. In the north African region where there is already a tradition with irrigated agriculture (Egypt and Sudan) it is planned to bring an additional 2 million hectares under irrigation in the Nile Valley to meet the food needs of the growing populations. It is expected also that in the upstream countries of the Nile Valley some 400,000 ha will be brought under irrigation to augment food production in Uganda, Tanzania and Kenya.7/

21. The economic viability of modern irrigation schemes continue to be constrained by high costs of construction, operation and maintenance and by poor production performance leading to a low overall profitability of irrigation.8/ In view of these experience it is necessary for each country to critically review the role irrigation should play in its food and agricultural production strategies having regard to its climate, land, water and human resources.

22. Over the whole of the region, it is anticipated that provided that reasonable progress can be made in bringing about fundamental changes and that adequate external support will be forthcoming then up to the year 2010 9/ (a) modern schemes will be developed at an average rate of 50,000 hectares per year, (b) rehabilitation of existing schemes will be at 25,000 hectares per year, and (c) expansion of traditional and small scale irrigation areas at 150,000 hectares per year. It is apparent from recent trends in funding that these rates will have to be revised downwards.

2. Drinking Water Supply

23. The latest available evaluation of the progress of implementing the IDWSSD by WHO was in 1988.19/ The decade has been on since 1981. By the end of 1988, an additional 40 million urban residents in the African region were supplied with adequate and safe water supply, while 52 million were provided with

appropriate sanitation. These additional supplies brought the percentage coverage of urban water supply and sanitation to 77 and 79% respectively. For the rural areas an additional 87 million people were supplied with good drinking water and another 1 million people supplied with access to suitable sanitation facilities. These achievements brought the rural coverages to 26 and 17 percent for water supply and sanitation respectively.

coverage

24. ECA estimates that the present annual rate of coverage is only 25% and 18% of the rates required to achieve the objective of the IDWSSD (100% coverage) for drinking water and sanitation respectively in the urban areas of Africa by 2000. In the case of the rural areas the present annual rate of progress is only 16% and 0.5% of the rates required to achieve the objectives for water supply and sanitation respectively by year 2000. There is therefore a considerable amount of unfinished business which must engage the attention of Governments in the medium term period and beyond.

25. A number of factors are responsible for constraining progress. The question of financial resources continues to be one of the serious constraints. Partly as a result of the Structural Adjustment Programmes, Government expenditures in social services have been reduced. Consequently they are less able to provide the investment funds needed. In cases where currencies have been devalued the situation is worse. This is one of the negative side effects on social services to which the African Alternative Framework for Structural Adjustment that the ECA has drawn attention.^{11/} External investment funds have also reduced, because of the debt burden which the countries are finding difficult to service. Systems which depend upon central government subsidies to meet their operation and maintenance costs have had these already inadequate subsidies either reduced or completely removed.

finance

26. Cost recovery policies are badly needed that will transfer the burden of operation and maintenance and also capital costs to the beneficiaries. These policies will have to look at the ability to pay the economic tariffs. A tariff policy which will be adjusted up progressively until the full costs can be recovered over time from the beneficiaries seems to be the best approach. Consequently more and more emphasis is being placed on community participation particularly in the rural areas where the need is greatest. Within its work programme for the 1990/1991 biennium ECA will undertake a survey of cost-recovery policies in its member States.

3. Energy production for household needs

27. The cutting down of vegetation to meet rural and urban household energy needs among other needs with its attendant land degradation effect continues to diminish the woody vegetation resources. There is at present a deficit of fuelwood supply in the north Africa and sub-humid and mountainous East African

countries of 28.5 million cubic meters. This deficit is expected to increase to 309 million cubic meters to cover all the countries of the region with the exception of those in the humid central African sub-region by year 2010.^{3/}

28. As part of the effort to conserve the vegetation, various forms of renewable energy sources are being promoted at the country, sub-regional and regional levels. For instance tree planting is being promoted in the countries of the Sahel region, Botswana, Tanzania Burkina Faso, Ghana, the Sudan, Ethiopia and Kenya. Also agro-forestry which will enable food and agricultural production to be carried out and at the same time enable trees to be grown for fuel and other uses is being promoted in a number of countries. Energy conservation measures through the use of improved stoves that prevent loss of heat during cooking are also being promoted in countries in the Sahel, Kenya, Tanzania and Ghana. Also research and development in the use of solar energy is being encouraged. Leading in this field is the ECA sponsored African Regional Centre for Solar Energy based in Bujumbura and the EEC sponsored Centre Regionale de Energie Solaire based in Niamey. These institutions need to be strengthened so as to be effective. Yet again other sources of energy being used are crop and animal residues and industrial wastes like saw dust.

4. Water Sector Planning

29. More and more countries are recognising the uniqueness of the varied role of water resources in sustainable socio-economic development. As such water master plans are being prepared to match the water requirements of development against the available water resources. These plans are bringing to the fore the limitation that can be put on development by water resources availability taking into account the technological content of the development. The situation in the Sahelian countries and in Egypt, demonstrate this point. Some effective population policies are therefore required as part of the strategies to deal with the emerging situations.

30. The weaknesses which had attended the preparation and implementation of the water master plans before 1987 have continued to persist. They relate to insufficient cross-sectoral harmonisation, and reconciliation with the national development targets at the macro-economic level. The result is that the projects selected from perspective water sector plans to form the water programmes of the 3 or 5-year National Development Plans are too ambitious without the absorptive capacity to handle them.

31. In the past few years the attempts to correct the ills of the economies of a number of African countries, through Structural Adjustment Programmes (SAP) of the IMF and the World Bank have provided an indirect opportunity to deal with some of the weaknesses of the water sector plans. Among the measures of the SAP are the arresting of the balance of payments deficits, and the pruning down of government expenditures to levels that

population
no. es

can be sustained by resources. Consequently the water sector like the other sectors are being reviewed in terms of objectives, targets, plans and resources in order to determine what can be funded having regard to the national resources and investment funds that can be expected from external sources. This has resulted in a number of water development plans being scaled down. In the case of the IDWSSD the adjustment exercise is contributing to the review of the decade plans and the holding of consultative meetings with bilateral and multilateral aid agencies to agree on realistic plans and funding levels.

32. The area of project preparation at the micro level continues to be another weak area in planning. Again the SAP and the consultative meetings are helping to bring about improvements.

33. In October 1988 ECA organised an interregional meeting on River and Lake Basin Development with particular emphasis on Africa which helped to focus attention among other things on planning deficiencies in the water sector at the national and subregional levels. 12/ Issues related to macro-economic planning, sector planning, project identification and preparation, project financing, implementation and evaluation, were discussed and appropriate recommendations made to overcome the deficiencies.

34. At the sub-regional level ECA with UNDP is assisting with pre-investment activities to develop shared water resources for socio-economic development of riparian countries. Following an ECA/UNDP mission to the Lake Chad Basin in 1987, a project document was prepared to enable the Lake Chad Basin Commission develop a capacity for the planning and management of water resources in the basin. 13/ The project was approved by UNDP for funding early in 1989 and execution is expected to start before the end of the year. A second project concerns the Nile Basin Integrated Development. As a result of preparatory meetings held between 1986 and 1989 in Bangkok, Niamey, Addis Ababa and Kampala arranged by ECA and UNDP a fact finding mission to the riparian countries, was fielded between May and June 1989. The mission identified the development interests of each riparian country within the basin, specific regional development activities, schemes, and programmes including avenues and modalities for regional co-operation and also the external assistance required on regional and national basis by each member State in order to achieve the full capability required by a joint regional effort to develop the Nile water resources. A draft report 7/ proposing 15 separate projects has been prepared and a workshop has been scheduled for the end of October 1989 in Addis Ababa to finalise it. After that it will be submitted to a ministerial meeting for approval and eventual implementation.

Nilebasin based data & maps

5. Water Resources Assessment

35. Since the drought a number of activities have been carried out to improve the assessment of water resources as a prerequisite for planning development and management to meet the needs of sustainable socio-economic development.

36. Two major scientific meetings have been held in 1989 towards a better understanding of the water resources of the continent. Both were organised within the framework of UNESCO's IHP. The first was the International Seminar on the State of the Art of Hydrology and HYdrogeology in the Arid and Semi-arid Areas of Africa, held in Ouagadougou, Burkina Faso in March 1989. 14/ One of its objectives was to describe the present situation, identify gaps and weaknesses, and to suggest and eventually initiate well-founded research projects on the basic processes involved in surface and groundwater availability, movement and storage. The second was the International Colloquium on the Development of Hydrologic and Water Management strategies in the Humid Tropics. 15/ It was held in Townsville Australia from November 15 to July 22, 1989. The purpose was to consider the special hydrological and water management problems and issues expected to arise in the humid tropics due to population increase which is expected to be 6.2 billion by 2000 with 50% located in the tropics, almost all of which are developing countries. A paper on The Regional Hydrology and Water Management Problems in the African Humid Tropics was one of the background papers prepared for the colloquium. The implementation of the outcomes of the Seminar and Colloquium should lead to a better assessment of the water resources in both the water deficit and water surplus areas of the continent.

37. The meteorological and hydrological services which are responsible for basic water resources assessment activities have suffered serious deterioration in the past ten years or so. This is due to inadequate budgetary resources being made available to them. To assess the areas and extent of the deterioration so as to establish a basis for assistance to arrest and reverse the situation, UNESCO and WMO convened two meetings in 1988 for the African hydrological services. The first was held in September in Malawi for English speaking countries and the second in November in Conakry for French speaking countries. The purpose was to introduce them to the methodology contained in the handbook on Evaluation of National Water Resources Assessment Activities. 16/ The handbook will enable countries evaluate their activities and recommend measures for filling gaps and strengthening:

- i) Institutional framework for water resources assessment
- ii) Data collection, processing, storage and retrieval
- iii) Areal assessment of water balance components
- iv) Data for water resources planning
- v) Manpower, education and training
- vi) Research

The participants are currently expected to be evaluating the situation in their countries. Further meetings are expected in 1990, to assess progress. The results will enable funds to be sought to rehabilitate, strengthen and expand the services as appropriate.

38. In 1987 the World Bank started almost a similar project with UNDP funding under the Sub-Saharan Africa Hydrological Assessment project.^{17/} While the UNESCO/WMO initiated evaluation is being carried out by national experts in the various countries the World Bank/UNDP project is being executed by consultants.

39. Within the framework of the Operational Hydrology Programme of WMO the Regional Association I (AFRICA) Working Group on Hydrology held its fifth session in Conakry in November 1988.^{18/} The meeting reviewed among other things national reports dealing with various aspects of water resources assessment activities. It also considered reports by two sub-regional centres - CIEH and AGRHYMET - which are based in Ouagadougou (Burkina Faso) and Niamey (Niger) respectively. Further the reports of Rapporteurs assigned various tasks on operational hydrology problems such as hydrological networks, hydrological forecasting, water quality and sediment transport measurements and hydrological data and services, were reviewed.

40. On groundwater in Africa the United Nations Department of Technical Co-operation for Development issued a report in 1988 based on data upto about 1982. The report is in two parts. The first part covers North and Western Africa and the second part East, Central and Southern Africa.^{19 & 20/} With funding from the EEC a Hydrogeological Map of West Africa was prepared in 1986. Also UNESCO and OAU are funding the preparation of a hydrogeological Map of Africa. Most of the groundwater occurs in non sedimentary precambian crystalline rock formations, whose water holding capacities are not good except where there are fissures, joints, faults and weathering. The aquifer yields are sufficient for rural water supply for domestic use and livestock watering. They are also used for small scale vegetable farming in the Sahelian countries. Sedimentary formations occur along the coasts in West, Central and Eastern Africa. They have better yields, but are affected in some cases by intrusions of saline water. Groundwater with an extensive aquifer is found in the Nubian Sandstone which occurs in Egypt, Sudan, Libya and Chad. The yields are considerable and are used for drinking water supply, livestock watering and extensive irrigation particularly in Egypt.

41. Since 1981 a number of assistances from bilateral and multilateral sources have been provided to African governments to drill boreholes for drinking water supply in connection with the IDWSSD. A large number of data has been generated in the process. Analyses of these data should help update groundwater knowledge first at the national level, and secondly at the sub-regional and regional levels.

ADY81-10 PN/27

6. Environmental Degradation

42. The causes and effects of land degradation in Africa and the pressure of population on the land to meet their basic needs of food, health and energy was outlined by the African Ministerial Conference on the Environment held in Cairo Dec. 1985. Also the policies and strategies to be adopted to reverse the trend were set out in the report of the Conference. Since then a number of actions have been taken to implement the water related recommendations. First the River and Lake Basin Committee has been established. It is to ensure that environmental concerns are taken care of in the development of in river basins particularly those shared by two or more countries. The main mechanism for promoting this is UNEP's recommended approach of Environmentally Sound Management of River and Lake Basins. Among the basins where these principles are being promoted are the Zambezi and Nile River Basins and the Lakes Chad and Victoria Basins. The Committee has met twice; one in 1987 and the second in 1989.^{21/} Secondly the Water Resources Networks consisting of national focal points and a Regional Co-ordinating Unit located in Cairo was established in 1988, following preliminary meetings in 1987.^{22/} It will co-ordinate and exchange information and experiences in promoting the development of water resources in an environmentally sound manner. Thirdly in 1988 the establishment of Village Pilot and Stock Raising projects in a number of countries were started. Food, energy and livestock production will be tried on a sustainable basis in these project areas, and the results replicated in other parts of the countries.

43. With 93.5% of the land area for food and agricultural production under rainfed conditions, climate variability has profound impact on the harvests in Africa. In order to mitigate the adverse impacts of this variability, the countries in the region are establishing Early Warning systems with the assistance of FAO, where-by data on agro-meteorological parameters are collected analysed and the information disseminated to farmers to help them plan their food and agricultural production activities more effectively. Significant progress has been made in about 30 countries to establish these systems in the ministries of agriculture with the co-operation of the national meteorological services.

44. Following the drought the ECA Conference of Ministers took a decision in 1985, to establish the African Centre of Meteorological Application for Development (ACMAD).^{23/} The objective of the Centre is to contribute to the socio-economic development of the African countries, through the use of meteorological products and the creation of a new meteorological assistance system in Africa with a view to:-

- (a) Mitigating the effects of droughts and other weather related disasters such as floods, cyclons and tropical storms,
- (b) Promoting any activities leading to an improved knowledge of weather and climate anomalies in Africa,

- (c) Conserving by rational use and management the natural resources of the African countries, particularly vegetation, water, marine and energy resources.

The constitution and location of the headquarters of the centre in Niamey was approved by the ECA Conference of Ministers in 1988. Also the 1st Board of Governors has been appointed and they have met twice, one in 1988 and the other in 1989. The Centre was expected to start operations in January 1989 but could not do so because of delays in ratifying the constitution and the payment of contributions by member States. It is now scheduled to start in October 1990.^{24/} ECA and WMO are co-operating to establish the centre.

45. The fight against land degradation desertification continues. One of the contributing factors is the cutting down of vegetation for food, farmland, medicine, building materials and household and industrial energy needs for the fast growing population. The impact of the fuelwood and other demand on the vegetation together with overgrazing from the fast growing livestock population continue to constitute serious environmental constraints to agriculture and water resources.

46. As part of the effort to conserve the vegetation and thereby conserve soil and water resources to improve the productivity of the land for food and agricultural production, various forms of renewable energy sources are being promoted at the country, sub-regional and regional levels. For instance there is tree planting being promoted in the countries of the Sahel region, Tanzania, Burkina Faso, Ghana, Ethiopia and Kenya. Similarly agro-forestry is being promoted in a number of countries. This year Nigeria has been granted Ecu 9.4m under the Lome II convention to support an afforestation project in Katsina State in the north of the country. The project will cover an area of 1600 sq.km and it is designed to increase agricultural productivity and improve the ecology while drawing on the active participation of the local people.

47. Another effort to check land degradation and increase the productivity of the land is also reported in Burkina Faso where villagers have developed a technique which uses stones to check soil erosion and conserve water for crop production. The village of Doble with about 7000 inhabitants have used the technique to increase yields considerably. In 1988 they achieved a cereal surplus of 380 tonnes which was 15% higher than their previous record. In the Sahel countries sand dune fixation and the planting of shelter belts are among the techniques being used to check the encroachment of the Sahara desert.

48. In May 1989, Governmental agencies and representatives of local communities in the CILSS countries of the Sahel met in Mali with representatives of the donor community to review their progress and iron out some of the problems that they have encountered in the fight against desertification in the past years.^{24/} These problems relate to mobilisation of popular

rainwater harvesting

participation, promotion of local level natural resource management and a global approach to development at the local level. It was revealed that successful cases of rural organisation in the agro-ecological field had not spread on a larger scale to be utilised by others. Donors complained that their aid was having little effect in promoting sustained development. Meanwhile the effects of desertification continued. The meeting finally outlined a frame of reference within which the success of future endeavours were to be measured. This framework consists of:-

- Ecological Rehabilitation to restore the degraded land asset.
- Local level natural resources management in which responsibility will be shared with local communities //
- Decentralised management to increase efficiency
- Land Tenure Reform to hedge local investments
- Local credit and savings to increase local investment //
- Women's participation to ensure the success of projects //
- Information and training to share experiences
- Population and development with the aim of controlling the future.

The three actors - viz local communities, government agencies and the donors - agreed that they needed to work together in partnership for success to be achieved, and that none could go it alone.

49. Following the report "Our Common Future of the World Commission on Environment and Development and the Environmental Perspectives to the year 2000 and Beyond" adopted by the UN General Assembly in 1987, ECA and UNEP convened an African Regional Conference on Environment and Sustainable Development in Uganda in June 1989. The purpose of the Conference was to consider the implications to Africa of the report. The conference concluded that to achieve sustainable social and economic development through environmental conservation, environmental degradation must be reversed by adopting strategies for restructuring the current structure of national economic production.^{26/} It called for special attention to the rural sector with focus on:-

- Managing demographic change and pressure
- Achieving food self-sufficiency and food security
- Encouraging efficient and equitable use of water resources
- Securing greater energy self-sufficiency
- Optimising industrial production
- Maintaining species and ecosystems
- Preventing and reversing desertification

Under each of the above the key issues were identified and the goals towards which remedies should be sought and the priorities for immediate action were spelt. This resulted in the Kampala Declaration by which the ministers committed themselves to achieving sustainable development within and among the countries of Africa.

50. Another initiative to protect the environment has come from the World Bank. Since 1986 it has offered assistance to countries to prepare National Environmental Action Plans. These plans are the frameworks within which socio-economic development projects will have to be planned, implemented and operated to ensure their sustainability. Among the countries that have received this assistance are Ghana and Madagascar.

51. Under the World Climate Programme-Water, a study of the impact of climate variation and expected change from the "Green house" effect and other man-made activities was started in the African region in 1988. At the 5th session of the Working Group on Hydrology of Regional Association I (Africa) held in Conakry in November 1988, it was reported that a methodology for testing long-time series of hydrological data had been developed and tested and was being distributed to national institutions to apply and take part in an international investigation.^{18/} The results will enable the impact on water resources to be assessed and help develop appropriate policy responses to minimise or eliminate any likely adverse effects on socio-economic activities.

7. Mobilisation of Financial Resources

52. The Implementation of Structural Adjustment Programmes by most countries in the region to correct their economic problems continued, in order to bring about some balance in both their external and internal accounts. These invariably have resulted in cuts in government expenditures. The implication is that both planned investment and operation and maintenance funds cannot be realised with the result that new projects are either delayed or cannot take off and existing systems are running down because of inadequate maintenance. The situation is so critical that in some cases Government investment counterpart funds are being provided from external sources and in other cases external funds are being used to meet operation and maintenance costs. On the external side UN has analysed the flow of funds for water resources development projects from the UN system of organisations between the period 1973 to 1985.^{27/} The UN system of organisations increased their disbursements from \$31 million in 1973 to \$184 million 1985. This represented an annual rate of growth of 16.9% over the period. The highest rate of growth was in Africa, Asia and the Pacific. The lion's share of the disbursement went to drinking water supply and sanitation (50%) followed by irrigation (24%).

53. In the African region while disbursements for drinking water supply increased steadily from 1973 to 1983, it decreased at an annual rate of about 5% between 1983 and 1985.

54. In the case of irrigation highest disbursements on regional basis took place in Africa north of the Sahara where there was an annual rate of increase of 28.7%. This is to be expected since irrigation in Africa is concentrated in the north African countries.

55. It is very significant to note that disbursements for water resources assessment from 1973 to 1983 amounted to 7.6% per annum which is reported at best to be barely enough to keep up with the rate of inflation. In real terms the disbursements decreased at an average rate of 1.4% between 1975 and 1985. This shows that the fight to improve water resources assessment activities is not being won and unless the trend changes the national data collection, transmission, processing, storage and dissemination activities will continue to deteriorate.

56. With regard to loans and credits from the World Bank, International Development Association, and the International fund for Agricultural Development total funding for water projects increased from \$504 million in 1976 to 1748 million in 1985. Of the total disbursements of \$10,956 million over the 1976-85 period 54.6% went to agriculture, 28.7% went to drinking water supply sanitation, 15.4% to hydropower and 1.3% to navigation.

57. Loans and credits to African countries for irrigation projects were more to countries north of the Sahara than to countries south of the Sahara because of the less viable nature of irrigated agriculture in the south. In the area of drinking water supply disbursements to Africa were more to urban water supply and sanitation projects in countries where sufficient returns could be generated (e.g. Cote d'Ivoire, Kenya and Nigeria) than to rural areas where the socio-economic viability and cost recovery were questionable.

58. The UN study concluded that globally in spite of the increase in disbursements from the international community, the levels are much below what was estimated at the time of the UN Water Conference. Investment in water resource assessment is estimated at only 2% of what is required while that for drinking water and sanitation is 5% of requirements. In the case of irrigation and drainage funding requirements are 15 times the current levels of annual disbursements.

59. It is obvious that the ability of African governments to increase their investment in the water sector cannot be expected to take place in the near future in view of the economic difficulties and the structural adjustment programmes which they are going through. It is therefore necessary that Governments begin to implement a gradual but determined policy of cost recovery in the water sector. This cannot be achieved overnight but should be an ultimate objective to be attained over a period of about 5 to 10 years. This will require that beneficiaries pay

increasing levels of tariffs as their incomes improve till the full economic tariffs can be paid. To assess the situation on the ground ECA will carry out a survey of cost recovery policies in the African regional in the 1990/1991 biennium.

8 Manpower Development

60. The fields of civil engineering, geology, agricultural engineering and geography at first degree level continue to be the leading disciplines providing the material for special training in water resources at the professional level. In recent years the fields have been widened so that chemists, biologists, physicists, mathematicians and social scientists are adding to the pool from which specialised manpower is being trained. Consequently the health of the undergraduate courses in the countries is most important for this specialised manpower development effort. Unfortunately this is threatened, because of dwindling resources being made to the universities. This is partly to be blamed on the structural adjustment programmes which calls for cuts in government recurrent and capital spending. It could be said that the problem even goes deeper as the first and second cycle institutions have equally been affected.

61. There is no doubt that spending on education is highest in almost every country in the region.^{28/} In 1981 and 1982, 20% of the recurrent expenditure in the region was spent on education. This started to fall in 1983 and except for a brief recovery in 1985 it went down to 9.9% of the expenditure in 1988. The impact of this is reflected on the school enrollment rate in the region. For the first cycle level (primary education) the annual growth rate of enrollment of 7.3% which was recorded in 1970-1980 fell to 2.6% over the period 1980-1987. For the secondary levels the enrollment growth rate over the same period fell from 11.9% to 8.5% and for the tertiary or university level the growth rate fell from 13.1% to 7.7%. The trend does not auger well for manpower development at the professional and technician levels in water resources and other specialisations.

62. Training of professional staff continued to be undertaken at post-graduate courses of various durations mostly in countries outside the region. The UNESCO sponsored post graduate courses in various countries continued to provide ready avenues. The two regional training courses at the Universities of Dar es Salaam and Burkina Faso continued to be supported under twinning arrangements with the University of Galloway in Ireland and the Free University of Belgium to train water resources professionals. To assist countries in the region to introduce hydrology and water subjects in their undergraduate courses and also establish post graduate courses model circular and syllabi have been developed under the UNESCO IHP for the benefit of the countries which want to establish such courses.

63. One of the most urgent training needs to which attention should be directed is in project planning and preparation at the micro-economic level, water resources sector planning and their relation to national development planning at macro-economic level.

64. Technician training continued to lag behind in development as compared with professional training. While a few countries like Nigeria, Tanzania and Zambia have well established schools, others like Ghana operate ad hoc training schools attached to hydrological and meteorological services or water supply agencies. The difficulty in running these schools on a permanent basis is due to the limited employment positions. As such a continuous stream of trainees is difficult to maintain.

65. Presently a few regional training courses are organised. The notable ones are the UNESCO/NORAD courses for hydrological technicians and the WMO training courses for meteorological and hydrometeorological technicians. The regional courses are for a few weeks to about 2 to 4 months. They are meant for those who have previous knowledge in the field. The next UNESCO/NORAD course will be held in Harare in the first half of 1990.

66. While the regional courses for technicians can be continued particularly for countries with the same hydrological and cultural background, the ultimate objective will be for each country to establish its own training course, while at the same time it takes advantage of external courses. The question of continuous stream of students as mentioned above may prove a hinderance. This could be overcome by adopting the Nigerian, Ethiopian or Tanzanian approach. Instead of establishing a number of schools to meet the technician needs of different water agencies which could prove very expensive, one national school can be established to train technicians with options to become:-

- hydrometeorological technicians
- hydrological "
- hydrogeological "
- water quality "
- water supply "
- irrigation "
- hydropower "
- river navigation "
- etc.

67. Such a school would have the flexibility to adapt its training programme to respond to the demand in any particular area of the water sector in any given period. It can also be used for continuing education programmes whereby already trained technicians can be brought back to upgrade their knowledge with new techniques, and for management training for the senior technicians who will be assigned responsibility for junior ones.

68. At the informal level the need to involve people at the community level so that planning will be bottom up and also help spread the load of implementing development projects continue to

gain momentum particularly as a result of the failures of governments in the 1980s to foot the operation and maintenance cost of water projects. Consequently mass literacy schemes continue to gain ground in many countries to educate local people in various matters affecting them so as to mobilise and assure their participation. These are led by the departments of community development, health, and education, particularly in connection with rural development projects like water supply agriculture, schools, clinics and cottage industrial projects. Progress is constrained by the lack of adequate resources like transport and audio visual aids.

II. CONCLUSIONS

69. Since 1985 rainfall in the Africa region has been restored to its "normal" regime. In the Sahel for instance between 1985 to 1987 the recovery was generally between 50-100% of the long term averages. The recovery was strongest in 1988 when most stations recorded falls greater than the long term averages. Data is being collected to carry out a more comprehensive assessment of the recovery.

70. Governments need to establish the Emergency Relief Organisations which were set up during the drought on a permanent basis and be ready to act in other kinds of disasters like floods and earthquakes as the experience of the floods in West Africa and the earthquake of Ethiopia have shown in 1989.

71. The fluctuation in food and agricultural production due to weather variations persists. The most active current project aimed at contributing to stabilising production is the Early Warning System which is being installed in the countries. The present distribution and contribution of irrigation to food and agricultural production has not changed, as the region is still a net importer of cereals the one crop to which 53% of the land under irrigation is devoted. Current funding is going into rehabilitation and expansion of existing schemes. The economic viability of modern irrigation schemes is constrained by high costs of construction, operation and maintenance, and by poor production performance leading to low overall profitability of irrigation. It is necessary for each country to critically review the role which irrigation should play in its strategies for food and agricultural production having regard to its climate, land, water and human resources.

72. By the end of 1988 an additional 40 and 52 million people have been supplied with good drinking water and suitable sanitation facilities respectively in the urban areas of Africa. These brought the coverages for urban water supply and sanitation to 77% and 79% respectively. For the rural areas an addition 87 and 1 million people have been supplied with good drinking water and suitable sanitation facilities respectively. These brought the coverage of rural water supply and sanitation to 26% and 17% respectively. Financial resources for the IDWSSD are dwindling

and Governments need to mobilize additional funds through tariff policies which will recover full costs over time.

73. The weaknesses in the linkages between water sector planning and national planning at the macro level and project planning at the micro level persists. However the Structural Adjustment Programme (SAP) which most countries in the region are implementing is putting pressure on them to appropriately relate the water plans with National development plans in view of the SAPs requirement to balance the internal and external accounts.

74. The outcomes of the two scientific meetings held in 1989 within the framework of the IHP International Seminar on the State of the Art of Hydrology and Hydrogeology in the arid and semi-arid areas of Africa and the International Colloquium on the Development of Hydrologic and Water Management Strategies in the Humid Tropics - have provided information to update knowledge on the water resources of the water deficit and water surplus areas of the region.

75. The meteorological and hydrological services have run down badly in the past 10 years for lack of adequate funding. They are in urgent need of rehabilitation and expansion. The UNESCO/WMO National Evaluation of Water Resources Assessment Activities and the UNDP/World Bank Sub-Sahara Africa Hydrological Assessment currently under execution, will identify the particular actions that should be taken in each country.

76. The pressure of the increasing population on the land continues. But so also has the awareness of the impact of environmental degradation on sustainable socio-economic development continued to grow as illustrated by the Kampala Declaration of June 1989, following the African Regional Meeting on Environment and Sustainable Development. A key issue to halt and reverse the degradation of the land, is the management of natural resources at the local level within the global development framework at that level. The few successful cases as in Burkina Faso where a solution has been found to water erosion needs to be made better known so that they can be applied in more countries. Better co-ordination and understanding must be established among local communities, government organisations and aid agencies.

77. As a result of the debt burden and the economic difficulties of the African countries investment funds for water projects have diminished. Operation and maintenance funds have either been curtailed or removed under the structural adjustment programme. The flow of external investment funds which showed considerable growth from 1978 to 1983, have since been slowing down partly as a result of the difficulties of meeting debt service obligations. Part of the external funds are now being used as local counterpart investment funds which should have been contributed by national governments. Part are also being used to meet operation and maintenance costs for drinking water supply and sanitation schemes in the rural areas. The governments have to put in place effective cost recovery policies if investments

in water projects are to continue. ECA will carry out a survey of the current policies in its member States during the 1990/1991 biennium.

78. The share of education in the national recurrent budget has been falling since 1981. The regional average fell for 20% in 1981 to 9.9% in 1988. Subsequently the annual rate of growth of enrolment in the primary, secondary and tertiary levels have fallen over the 1980-87 period as compared with the period 1970-80. These trends should be reversed so that sufficient basic material would be available for training at the professional and technician levels. Professional training is better organised than technician training. There is need for training in planning, project identification and preparation, project implementation, project monitoring and evaluation. A cost effective way to train technician on a continuous basis will be to set up training schools which can train technicians for the various subsectors of the water sector.

79. The resources of the departments of community development, health and education need to be increased to enable them intensify their mass education campaigns at the local levels and thereby secure the participation of local communities in water and other development projects.

A0481-10 p25/27

III. REFERENCES

1. ECA (1987) - Review of the situation with regard to the development of water resources in the drought stricken countries of the African region. Water Resources: Progress in the implementation of the Mar del Plata Action Plan. 10th Session Committee on Natural Resources Doc. No. E/C.7/1987/6.
2. UN - DTCD (1982-1984) - Mission Reports (various) to Central African, Comoros Islands, Senegal, Niger Basin Authority, Liberia, Zambia, Benin, Tanzania, Gambia, Guinea, Equatorial Guinea, Djibouti, Burkina Fasso, Gabon, Congo, Madagascar, Kenya. United Nations - DTCD, New York.
3. FAO (1986) - Atlas of African Agriculture: African Agriculture: the next 25 years. Rome
4. ADB/ECA (1988) - Economic Report on Africa 1988. A report of the staffs of ADB and ECA, Abidjan, Addis Ababa
5. FAO (1987) - Irrigated areas in Africa. Extent and distribution, Rome.
6. ECA/CILSS (1985) - Economic Development Achievement of the CILSS countries and prospects - Studies and works of USED No. 2-1985, Addis Ababa.
7. UNDP (1989) - Nile Basin Integrated Development. Draft Report of Fact Finding Mission. New York
8. FAO (1988) - Irrigated Agriculture and River Basin Development - Problems and Prospects. Paper presented at the Interregional Meeting on River and Lake Basin Development with emphasis on the African Region. Addis Ababa, Oct. 1988.
9. FAO (1987) Conference on Agriculture towards 2010, Rome.
10. WHO (1988) - Review of progress of the International Drinking Water Supply and Sanitation Decade (1981-1990): Eight years of implementation Report by the Director-General Doc. EB 83/3. Geneva.
11. ECA (1989) - African Alternative Framework to Structural Adjustment Programmes for Socio-Economic Recovery and Transformation. Addis Ababa
12. ECA (1988) - Report of the Interregional Meeting on River and Lake Basin Development with emphasis on Africa held in Addis Ababa, on October 1988.

AD481-10 926/27

13. UNDP (1988) - Planning and management of the Water Resources of the Lake Chad Basin. Project of the Lake Chad Basin Commission. Project Document No. RAF/88/029. New York, Addis Ababa
14. UNESCO/IWRA (1989) - Proceedings of the International Seminar on the State of the Art of Hydrology and Hydrogeology in the Arid and Semi Arid Areas of Africa. Paris
15. UNESCO (in preparation) - Report of the International Colloquium on the Development of Hydrologic and Water Management Strategies in the Humid Tropics. Paris.
16. UNESCO/WMO (1988) - Water Resources Assessment Activities. Handbook for National Evaluation. Paris and Geneva
17. UNDP (1987) - Sub-Saharan Africa Hydrological Assessment Project No. RAF/87/030/C/01/42. New York
18. WMO (1988) - Report of the 5th Session of the Working Group on Hydrology of Regional Association I (Africa) held in Conakry - Guinea, 21-25 November 1988. Geneva
19. UN (1988) - Groundwater in North and West Africa Natural Resources/Water Series No. 18. New York
20. UN (1988) - Groundwater in East, Central and Southern Africa. Natural Resources/Water Series No. 19. New York
21. UNEP (1988) - Report of the 2nd meeting of the River and Lake Basin Committee of the African Ministerial Conference of the Environment, held in Harare, May 1989.
22. UNEP (1988) - Report of the 2nd meeting of the Regional Co-ordinating Unit of the Water Resources Networks of the African Ministerial of the African Ministerial Conference on the Environment, in Cairo, Dec. 1988.
23. ECA/WMO (1988) - Programme Document. African Centre of Meteorological Application for Development (ACMAD). Addis Ababa, Geneva.
24. ECA (1989) - Report of the 2nd meeting of the Board of Governors of the African Centre of Meteorological Applications for Development. Addis Ababa, June 1989. Doc ECA/NRD/ACMAD/II/L
25. CILSS/CLUB DUSAHEL (1989) - Newsletter No. 5. June 1989, Paris.
26. ECA (1989) - Report of the first Regional Conference on Environment and Sustainable Development in Africa, held in Kampala, June 1989.

A 04 81-10 707/27

27. UN (1987) - The Role of International Agencies in Financing Water Resource Development Projects. Natural Resources Forum. United Nations, New York.
28. ECA (1988) - Survey of Economic and Social Conditions in Africa 1987-88.