WORLD METEOROLOGICAL ORGANIZATION

THE WMO TECHNICAL CO-OPERATION PROGRAMME 1988-1997

SECOND WMO LONG-TERM PLAN PART II

Volume 7

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Secretariat of the World Meteorological Organization - Geneva - Switzerland

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NOTE

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FOREWORD

The Second WMO Long-term Plan, for the period 1988 to 1997, was approved by Tenth Congress by its Resolution 25 (see annex). The Plan comprises Part I - Overall policy and strategy - and Part II, in seven volumes, covering the plans for the scientific and technical Programmes of the Organization.

This, the seventh volume of Part II, contains the outline of the plans for the Technical Co-operation Programme of the Organization. It was developed through direct contributions by many WMO Member countries under the auspices of the WMO Executive Council, with the participation of all regional associations.

The Technical Co-operation Programme is different from other WMO programmes in that it does not have separate scientific and technical objectives. Its fundamental purpose is to assist developing countries to participate fully in the other programmes of the Organization such as the World Weather Watch or the World Climate Programme. Furthermore, the detailed agenda for the Technical Co-operation Programme is not set by the Organization, but rather by the donors and recipients who participate in the specific projects. The Organization can only provide an overall framework for the strategic planning of these activities.

The Plan was adopted under the provision of Article 9 of the WMO Convention by which Tenth Congress:

- Approved the general policies stated in this Plan for the fulfilment of the purposes of the Organization;
- Recommended to all Members that they should fully take into account the plan in developing and carrying out their national programmes in meteorology and operational hydrology, as well as in their participation in the Programmes of the Organization;
- Referred to the constituent bodies of the Organization those tasks within their terms of reference for appropriate action in order to achieve the objectives of the Plan.

Thus, the Plan has the status of a recommendation as far as Members are concerned. Nevertheless, it is understood that only with the full participation of all Members of the Organization will the long-term objectives of the programme be achieved. Therefore, the Plan is commended to all Members as a basis for mobilizing efforts towards achieving the objectives of the Organization.

(G.O.P. Obasi)
Secretary-General

TECHNICAL CO-OPERATION PROGRAMME

INTRODUCTION

Purpose and scope

1. The purpose of the Technical Co-operation (TCO) Programme is to advise and assist in the strengthening of the national Meteorological and Hydrological Services of developing countries, through the transfer of knowledge and proven methodology, in order to improve the effectiveness of these services in support of economic and social progress.

2. Without the assistance provided within the framework of this Programme many Members would find it impossible to contribute fully to the agreed international systems and programmes of WMO as well as to derive full benefit from them nationally.

3. The TCO Programme involves the provision of advice to developing countries on the preparation of requests for assistance while donor countries and agencies are advised of their requirements. It also works closely with potential donors in obtaining financial and expert help, and with the other WMO programmes in identifying the areas of greatest need in accordance with the priorities of the Organization. Emphasis is placed upon the basic elements of the WWW system, applications to the safety of life and property, the well-being of the public, and national economic development, planning and decision-making.

Overall objectives

4. The overall long-term objectives of WMO's Technical Co-operation Programme are:

(i) To assist Members in the development of a wide range of services (weather prediction, climatology and hydrology) in support of social and economic activities of vital importance, such as disaster preparedness (e.g. tropical cyclones and floods), food and fibre production, drought monitoring and combat against desertification, management of water and energy resources;

(ii) To contribute to and assist Members in the further development of the WWW through national, regional or sub-regional projects;

(iii) To assist in strengthening the scientific and technical staff of the national Meteorological and Hydrological Services in developing countries through monitoring training requirements, supporting national and regional training centres, providing advice and organizing training events, as well as through the provision of short-term and long-term fellowships.

5. Through these objectives the developing countries seek to attain self-reliance by building the capability needed for the effective and efficient provision of meteorological and hydrological services.

6. One of the fundamental obstacles to development is that the internal support provided by the national governments for their Meteorological and Hydrological Services falls short of meeting even the most modest requirements in many developing countries. For more internal support to be achieved, it will be necessary to demonstrate that substantial benefits can be gained through improved meteorological and hydrological services.

7. The main problems facing the national Meteorological and Hydrological Services of many developing countries - closely linked with the prevailing situation mentioned above - are summarized in paragraph 35. These problems emerge in widely varying forms and with varying gravity in the individual developing countries depending on the actual situation. Thus, the assistance required may be very different, falling under one or more of the following three categories:

- Emergency assistance to ensure the operation and maintenance of essential World Weather Watch facilities;
- Assistance for consolidation activities including replacement of ageing equipment and improvements needed for data collection and exchange;
- Support for improving the level of meteorological services.

Programme organization

8. The Programme is structured, planned and implemented on a regional basis, taking into account the characteristics of the main funding sources:

- The United Nations Development Programme (UNDP)

  The Country Programme
  The Inter-country Programme
  Sectoral support
  Technical Co-operation among Developing Countries (TCDC);

- Voluntary Co-operation Programme (VCP);
- Trust Funds;
- Support from the WMO Regular Budget.

9. Other funding sources, such as the World Bank, the regional development banks and funds, the European Economic Commission (EEC), economic groupings like the Southern African Development Co-ordination Conference (SADCC) and other potential sources, will be developed to augment the assistance provided. Assistance, funded from any of these sources, is directed towards specific projects with each project being managed and executed independently. There is, however, a high level of co-ordination internally between different projects in the TCO Programme. At the same time, there is co-ordination with the scientific and technical programmes of WMO to assure that the assistance is directed towards meeting the objectives of those programmes. Thus, to the extent that donors and recipients agree, the requirements and priorities of the WMO programmes govern the allocation of available resources to technical co-operation projects.

10. Within the UN system, co-ordination also could be required and support sought from other specialized agencies such as FAO, UNEP, Unesco, UNSO, ICAO, etc., which may participate in a particular aspect of a UNDP/WMO project. In addition, governmental or non-governmental assistance organizations may be sources of support for either national or regional projects. Thus, there are a range of possibilities to be considered for providing assistance to developing countries.

United_Nations_Development_Programme_(UNDP)

11. The primary objective of UNDP is to support the efforts of the developing countries to accelerate their economic and social development by providing them with systematic and sustained assistance in the field of technical co-operation, geared to their national development plans and for the benefit of their entire population. In more specific terms, the assistance provided by UNDP is for the promotion of increasing self-reliance in the managerial, administrative, technical and research capabilities required for the formulation and implementation of economic and social development plans and policies in developing countries. To this end, the UNDP is currently providing financial and technical support to numerous projects in agriculture, industry, education, power production, transport, communication, public administration, health, housing, trade and related fields.

12. The Programme is funded by voluntary contributions from developed and developing nations alike. The technical assistance provided by UNDP is based on the concept of a tripartite relationship between the participating Government, the UNDP and the organizations of the UN system. These organizations, called "Executing Agencies" or "Participating Agencies", depending on their involvement, have primary responsibility from the UN side, for carrying out UNDP-assisted project activities.

13. The UNDP is headed by an Administrator, who is responsible to a 48-nation Governing Council for all aspects of programme operations. The Council, representing every geographical region and both recipient and donor countries, reports to the United Nations General Assembly through the Economic and Social Council (ECOSOC). In addition to setting policy guidelines, the Governing Council approves the volume of assistance allocated to each country (country programme) as well as all inter-country programmes. Its headquarters are in New York and it maintains 110 field offices in various parts of the world grouped into four Regional Bureaux (Africa, Asia and the Pacific, Arab States, Latin America) and a unit for Europe.

14. The field office is responsible for:

(a) Assisting the government in the formulation of the country programme and in the formulation, appraisal, approval, implementation, evaluation and follow-up of projects which UNDP assists; and

(b) Management of the UNDP programme of technical co-operation with the country covered by that office and supervision of projects in consultation with the Executing Agencies involved.

Each field office functions under the direction of a Resident Representative, who is appointed by the Administrator with the prior approval of the government concerned.

15. Governments usually designate a central authority to co-ordinate their participation in UNDP. This authority might be a unit in the Ministry of Planning or Foreign Affairs, or in other governments it may be attached directly to the Prime Minister's Office. If a Meteorological or Hydrological Service wishes to request UNDP assistance, it should address its request through its own Ministry to this co-ordinating authority.

The Country Programme

16. The UNDP Country Programme operates within a five-year framework called the programme cycle. The cycles of interest to the Long-term Plan cover the periods 1987-1991 and 1992-1996. The Country Programme is prepared by the government of the country receiving UNDP assistance in collaboration with the Resident Representative and the Executing Agencies and indicates the proposed use of UNDP resources towards the achievement or furtherance of selected national development objectives during the period covered by the programme.

17. Country Programmes are approved by the Governing Council of UNDP. The approval of a Country Programme signifies the Governing Council's agreement to the application of UNDP resources towards the achievement of the development objectives indicated in the given programme.

18. The Indicative Planning Figure (IPF) gives the order of magnitude of the resources expected to be available from UNDP to the country during the five-year period. In some instances, additional resources may be available for a Country Programme, such as a cost-sharing contribution made by the government concerned or by a third party. Government cost-sharing means that the government shares with UNDP the costs of some project inputs that would normally be borne by UNDP.

The Inter-country Programme

19. In addition to the technical co-operation extended to individual countries under the Country Programme, the UNDP is able to assist more than one country simultaneously under its Inter-country Programme. When two or more countries agree to participate in a single project of mutual interest, they may request assistance from UNDP. Such requests are forwarded to the Regional Bureaux at UNDP headquarters for their consideration and approval. Projects in this category include assistance to countries with common problems, such as mitigation of tropical cyclone damage, combat of droughts and agricultural development. While the country programmes reflect an individual country's priorities over which WMO has limited influence, the "inter-country programmes" offer an opportunity for projects to be approved in the fields of activity which have priority within WMO.

Sectoral support

20. UNDP also allocates limited funds to smaller agencies such as WMO for sectoral support. The purpose of this support is to respond to requests from the Resident Representatives and the governments for short-term missions by consultants or Secretariat staff to provide advice and assistance on the formulation of projects or programmes and to assess existing services, identify needs and suggest improvements in services, staffing, facilities and organizational structure.

Technical Co-operation among Developing Countries (TCDC)

21. A special feature, introduced in recent years, is the support which UNDP provides to the efforts of developing countries to share their capacity and experiences with other developing countries, a concept referred to as TCDC. Under such a scheme, experts could be provided free of charge by one developing country to another and the UNDP contribution may be used to pay travel and per diem. Also equipment or spares, perhaps no longer needed in one country, could be donated to another developing country which might still use this type of equipment and UNDP might pay for the transportation and other related costs. TCDC arrangements are, however, not limited to these two examples and many innovative ideas can be worked between the countries involved.

Voluntary Co-operation Programme (VCP)

22. Unique in the UN system, the Voluntary Co-operation Programme (VCP) is a highly successful WMO activity designed primarily to provide assistance in support of the implementation of the World Weather Watch. The VCP depends upon voluntary contributions from the Members of WMO to provide equipment, long- and short-term fellowships and short-term training such as seminars, equipment operation and maintenance courses, and on-the-job training conducted by seconded experts.

23. The VCP can be thought of as two sub-programmes which are:

- VCP national projects and
- VCP co-ordinated programmes.

By definition the co-ordinated programmes combine support from several donor sources and assist several recipient countries. The major problem facing the VCP is the inability of recipient countries to operate financially and maintain high technology equipment under the current economic situation.

24. Contributions are made in the form of cash (VCP(F)) or as equipment and services (VCP(ES)). In the latter case the donor country designates the recipient country.

25. Management of the VCP is provided by the EC Panel of Experts on the VCP which meets annually. VCP projects are approved for circulation to WMO Member countries by the EC panel or by the President of the WMO acting on behalf of the panel. The EC panel also authorizes the use of funds from the VCP(F) fund.

26. A major need is to strengthen the VCP both in terms of the total dollar level of support and in terms of the number of donor countries. Because of the special and different nature of the VCP, it is necessary to promote the merits of the programme to potential donors on a continuing basis.

27. Support from developed countries to assist developing countries will continue to be required throughout the period of the Second Long-term Plan. Given the present level of technical assistance (UNDP and trust funds as well as VCP), the need far exceeds the potential assistance.

28. The introduction of VCP co-ordinated programmes provides an opportunity to focus VCP support on high priority WWW requirements. Because of the regional nature of co-ordinated programmes, the WMO Secretariat plays more of a planning role in defining the requirements. This in turn allows for standardization of equipment, development of regional facilities, and co-ordinating support from several donors and between VCP and UNDP projects.

29. The standardization of computer hardware among developing countries offers the possibility of creating a WMO library of software programmes. This software could be donated by developed countries and then integrated into a purchase that would work with one or more of the common brands of computers donated to developing countries. This is very important because of the high cost of software.

30. In the case of VCP co-ordinated programmes the initial focus has been placed on upgrading the Global Telecommunication System (GTS) on a regional basis. This will be followed by programmes to further develop and revitalize the Global Observing System (GOS). Improvements to the Global Data-processing System (GDPS) are co-ordinated with automation of GTS facilities. Regional centres for data processing and maintenance will be the subject of co-ordinated programmes in the later years of the period. The duration of individual co-ordinated programmes depends on the complexity of the programme and donor response.

Other factors

31. It is essential that more support be directed towards regional facilities. Such facilities may be developed for data processing and maintenance. Regional, or sub-regional centres may be established to serve as high technology linkages between highly sophisticated international systems (telecommunication and data-processing networks, satellites, etc.) and groups of developing countries which alone cannot yet afford to establish comparable facilities.

Trust Fund arrangements

32. Trust Funds for financing and implementing technical co-operation activities may be in any of three forms: (a) the donor country and the recipient country are one and the same, (b) a single donor country finances a project in another country or (c) a number of donors either bilaterally or multilaterally combine to provide co-ordinated assistance to one or more countries. WMO's role in (a) and (b) is largely one of administrative support and guidance for project execution while, for (c), WMO may be involved in project design and orientation, in co-ordinating donor inputs and in directing project activities. As an example, the AGRHYMET programme in the Sahelian countries is composed of a regional project and eight national projects financed annually by UNDP resources and complemented by Trust Funds from five donors and direct bilateral assistance from several countries.

Support from the Regular Budget

33. Funding from the Regular Budget is used for training in the form of fellowships and of seminars and workshops directly related to WMO's scientific and technical programmes. Although not large in financial terms, it plays an important role as the WMO determines the priorities and can help in filling the most urgent gaps in assistance being provided from other sources or where

the needs are most critical. The regular budget also funds the management of the VCP office.

Current status

34. During the early to mid-1980s, the country and regional programmes executed by WMO for the UNDP had not suffered very much from the dramatic reductions in overall UNDP finances. However, developing countries faced great difficulties in obtaining "hard currencies" with which to purchase spare parts, consumables, training and new or replacement equipment not available locally. This resulted in deficiencies in the operation and maintenance of the basic WWW system. They also could not meet the demands for improved and expanded meteorological and hydrological services related to the occurrence of disastrous events such as widespread droughts or devastating storms and floods, and the emphasis being placed on increasing agricultural production as well as on the development, conservation and wise use of resources, including water and energy.

MAJOR INFLUENCES 1988-1997

Needs and opportunities

35. The main problems facing many developing countries are:

(a) Inability to operate and maintain existing WWW equipment because of a lack of spare parts, of consumables and of trained personnel;

(b) Deficiencies in telecommunications due to inadequate national communications infrastructure, poor or missing links between the national meteorological centres and the PTTs, lack of modern terminal equipment and lack of adherence to standardized operating and monitoring procedures;

(c) Pressing need for trained specialists at all levels to plan, direct, organize and carry out the programmes in meteorology, operational hydrology and related fields;

(d) Lack of capability to produce the specialized services needed by potential users within the countries which results in the inability to effectively demonstrate the usefulness of the services and ultimately to insufficient recognition on the part of governmental authorities and the public.

36. The Second WMO Long-term Plan offers an approach to solving the complex problems listed above with the Technical Co-operation Programme playing a key role.

37. The needs to be met over the next decade are thus related to improving the capabilities of the Meteorological and Hydrological Services of many developing countries so that they can effectively satisfy demands for services nationally, participate more fully in the collection, exchange and application of national and international data and products and benefit from advances in science and technology. Within the three categories of assistance defined in paragraph 7 cost estimates of the needs can be made as follows:

- Emergency assistance for operating, repairing and maintaining basic WWW facilities amounts to at least a few million US dollars annually with the focus on parts of Africa, Central and South America and Asia and the South-West Pacific;

- Consolidation costs, which includes rehabilitation or replacement of equipment and facilities for operation of the WWW system, for essential improvements in data collection and processing and the introduction of new technology, will range from 20 to 25 million US dollars annually;

- Development and improvements in the capabilities of National Meteorological Centres and Regional Specialized Meteorological Centres to provide tailored user products and regional guidance products will cost from 20 to 25 million US dollars annually.

Scientific and technological advances

38. Technological advances, and the related impacts on the needs for knowledge and skills, will play an increasingly important role in the development and strengthening of the Meteorological and Hydrological Services of the developing countries during the next decade. The newer or more complex technologies expected to have the most impact are computers, remote sensing techniques including advanced meteorological satellites and weather radars and microwave sounders, telecommunications systems including enhanced capabilities of meteorological satellites for data collection and for distribution of both data and a variety of meteorological information (including the timely dissemination of forecasts and warnings), and new or improved data acquisition systems such as Aircraft-to-Satellite Data Relay Systems (ASDAR), Automated Upper-air Observing Systems (ASAP), fixed and drifting buoys, and automatic weather stations.

39. The availability of relatively low cost but powerful microcomputer and minicomputer systems and their ability to handle efficiently such tasks as climatological data processing and communications switching is well recognized and in use at the national level in some developing countries and at a few RMC/RTH locations. Expanding use of minicomputer systems for monitoring widespread drought and for running analytical and dynamical weather and river analysis and prediction models, primarily at the regional or specialized centres, can be anticipated.

40. With regard to the installation of advanced equipment technologies, it must be emphasized that an adequate infrastructure is required in terms of training for operations and maintenance and of physical facilities. Provision must be made for related equipment such as voltage stabilizers, backup power supply and air conditioning where required, and for spare parts and consumables. It would be advantageous if support at the regional level could be provided, perhaps by commercial firms or on a co-operative basis among the countries concerned, for the repairing and stocking of spare parts for large equipment items common to several countries.

41. In the scientific area, research on weather prediction for all time ranges is underway in a number of developed countries and through WMO programmes. This research will result in a wide range of new or improved outputs from advanced NWP centres, eventually including monthly and seasonal predictions. Such products will benefit the developing countries but the

means for transmitting them in specified formats for the use of regional and national centres will need to be defined and implemented.

Existing plans of Members and other donor organizations

42. From the Technical Co-operation Programme viewpoint, it is not possible to be definitive about the assistance plans for developing countries on the part of Members and donor organizations over the decade. However, the assumption is that the funding sources will not undergo any substantive changes. If no major new development takes place, the foreseeable situation is the following:

- The UNDP project support should continue around the level of US $12 million per year or perhaps increase to some extent;
- VCP contributions probably will remain at about US $5 to 6 million per year but with some possibility for an increase if the economic situation improves and/or if additional donors decide to participate;
- Trust Fund projects are less predictable; they tend to vary considerably in the case of one country funding a project for itself or for another country while some UNDP/WMO regional projects attract continuing multilateral assistance for a number of years;
- Regular Budget funding is expected to remain about the same at least for the tenth financial period.

Other relevant factors

43. It should be noted that UNDP policy generally limits the equipment component costs to no more than 50 per cent of the total UNDP contribution to a project. In addition and where possible, national cost sharing of projects is encouraged when the country would fund a part of the external financing required, for example, to purchase an expensive item of equipment or, alternatively, the country would seek bilateral assistance for such an item in connection with the project. The increasing cost of project experts from abroad also suggests that consideration be given to using TCDC (Technical Co-operation among Developing Countries) through which expert and consultant services are provided at a lower cost to the country receiving the services, to using UNVs (United Nations Volunteers) who receive a nominal salary and living costs, and to obtaining expert advice and assistance where appropriate from a Meteorological or Hydrological Service of a neighbouring developing country at less cost.

44. In a related effort, the WMO Volunteer Consultant Service established in 1986 offers the opportunity of providing short-term advice and assistance by highly qualified individuals. The concept is based upon Members maintaining a file of potential candidates willing to volunteer their services to developing countries with the cost of travel and per diem being funded primarily under VCP(F). This service has been designed to supplement other existing mechanisms and, as is the case with any consultant or expert, the recipient countries would reserve the right to accept or reject candidates.

45. The economic difficulties faced by many developing countries must be recognized and understood not only in terms of reductions in national budgets for the operation of the services but also by the serious limitations imposed on the procurement with hard currency of any new or replacement equipment, spare parts, vehicles, common supplies, etc., from abroad. The result is that external assistance has become almost essential if some Meteorological and Hydrological Services are to continue to operate and maintain their basic observational and telecommunication networks or to improve or expand their services in response to increasing demands.

46. Within the constraints outlined above, the challenge is to find new and innovative ways of increasing support to developing countries in the future. In this regard some encouraging developments are underway mainly in the African region. In 1985, Italy began contributing to the AGRHYMET project for a planned 5-year period joining several other donors who have been contributing to the project for over a decade. The UNDP/WMO project "Assistance to drought-stricken Eastern and Southern African countries in the field of agrometeorology and hydrology" is also attracting multilateral assistance following a detailed survey conducted by the Government of Finland and WMO on the needs of the nine SADCC countries participating in the project. In addition, the WMO is actively engaged with the World Bank which has expressed strong interest in developing a large multi-donor project focused on increasing agricultural production in the sub-Saharan region of Africa.

47. Other steps taken to help in maximizing the limited resources available include:

- Use of local currency where possible to repay loans from the VCP revolving fund for the purchase of spare parts and consumables to the UNDP office in the country which in turn reimburses the WMO in dollars;
- Assignment of high priority to regional projects that will fund experts and fellowships in support of VCP equipment donations;
- Arranging for the establishment of centralized regional maintenance facilities, operated either commercially or by the Members concerned, and the obtaining of the lowest prices for spare parts and consumables in connection with common equipment items;
- Encouraging developing countries to use expertise from within other branches of their Governments;
- Ensuring to the extent possible adequate operator and maintenance training for technical equipment provided by donors.

SPECIFIC OBJECTIVES 1988-1997

48. The specific long-term objectives of the Technical Co-operation Programme are closely related to those aspects of WMO's scientific and technical programmes in which developing countries are primarily interested. These are:

(a) Implementation of key WWW facilities

To assist developing countries in the full implementation within their territories of the three essential elements of the World Weather Watch - the Global Data-processing System (GDPS), the Global Observing System (GOS), and the Global Telecommunication System (GTS). Under this heading falls not only assistance aimed at installing new, or the rehabilitation of, existing surface and upper air observing stations and telecommunication links but also the creation of modern computerized message switching systems and meteorological satellite receiving ground stations.

(b) Development of services related to disaster prevention and preparation

To assist developing countries in areas prone to tropical cyclones by improving facilities and skills required for detecting, tracking and warning of the associated strong winds, storm surges and flooding; about fifty WMO Members require such assistance which is generally given through regional UNDP projects. Through association with other agencies of the UN family, WMO is trying to promote Disaster Prevention and Preparedness (DPP) measures.

(c) Development of meteorological support to food and fibre production

To develop facilities and capabilities for the provision of meteorological services applied to agriculture. This includes the provision of facilities for statistical analysis of data, for improved advice on decisions related to land-use planning, protection against frost, plant diseases and pests, crop monitoring, management in forestry, animal husbandry and fisheries.

(d) Development of services related to climatology and drought monitoring

To provide support to developing countries with dry marginal areas by improving the capability for the early warning of drought and for combating desertification.

(e) Development of services in hydrology and water resources

To undertake projects designed to assist developing countries to improve their hydrological networks and services as well as flood forecasting and warning systems. It also includes assistance to the assessing and managing of the country's water resources.

(f) Development of national Meteorological and Hydrological Services

To assist developing countries in building up their Meteorological and Hydrological Services in an adequate way. This objective generally includes projects where a Meteorological or Hydrological Service has to be established ab initio or Services have to be assisted that are still in a very early stage of development. These projects comprise practically all aspects

of the functioning of a national Meteorological or Hydrological Service.

(g) Education and training

To assist in strengthening the staffing structure of the Meteorological and Hydrological Services through the provision of education and training opportunities. This includes the organization of workshops and seminars to facilitate the transfer of knowledge and proven methodologies to enable developing countries to take advantage of technological advance for improving the services provided.

(h) Assistance to specialized regional and sub-regional centres

To provide support to co-operative arrangements for the pooling of resources on a regional basis to create centres which will serve a number of Meteorological and Hydrological Services in order that they reap full benefit of the processed information provided by world and regional centres.

49. In a programmatic sense the WMO Technical Co-operation Programme may be conceived of as a continuing activity throughout the 1988 to 1997 time period covered by this Long-term Plan. The level of effort of the Technical Co-operation Programme will continue to be dependent on the level of support from donor countries and agencies. The UNDP element of Technical Co-operation is, of course, dependent on a decision process independent of WMO planning except for part of the regional programme. Most UNDP projects are of three to five years duration which means that very few projects under implementation in 1988 will still be underway at the end of the planning period.

50. Considerable emphasis is being given to co-ordinated programmes in which large projects are executed through donations from various sources such as UNDP, VCP, and bilateral aid, with the co-ordination being done in the WMO Secretariat. Considerable effort is also being made to attract more donors to the VCP. It is expected that the major focus of technical co-operation activities will continue to be on the implementation of the World Weather Watch and here VCP will play a major role.

51. Attention will be given to the evaluation of completed projects to see whether the results obtained are still valid and the project inputs have been adequate. UNDP also attaches great importance to these efforts and has introduced the internal self-evaluation of projects. This is to take place once a year for all projects of over US $400,000 and could in principle be carried out during the tripartite reviews foreseen for most projects. Mid-term evaluation in UNDP projects is also quite common and will permit the detection of inadequacies and rectification at the right time.

INTERACTIONS WITH OTHER WMO SCIENTIFIC AND TECHNICAL PROGRAMMES

World Weather Watch Programme

52. WMO technical co-operation projects related to the World Weather Watch (WWW) are directed to the following objectives:

(a) To ensure operation and maintenance of WWW components on national territories, in particular those components of specific importance for regional and global operations;

(b) To ensure continued operation of WWW facilities in extra-territorial areas and possible establishment of new facilities, particularly in data-sparse areas.

53. Developments in technology and advances in atmospheric sciences demand increased co-ordination between Members with a view to bringing about a certain level of WWW system performance in all parts of the globe. The role of technical co-operation is to raise the ability of developing countries to the level required for them to reap full benefit from the WWW and raise the WWW systems performance required by the approved WWW Plan.

54. The support to the WWW programme through the WMO Technical Co-operation Programme falls within the following main categories:

(a) Establishment, operation and maintenance of GDPS, GOS, AND GTS facilities and services. This may include maintenance and repair facilities, spare parts and test equipment and calibration facilities;

(b) Training of personnel engaged in WWW activities at all levels, including seminars, workshops and technical conferences;

(c) Co-operative regional or sub-regional programme activities through provision of expert services and other institutional support;

(d) Development of the infrastructure of national meteorological services to be able to implement WWW on their own territories and also allow participation in extra-territorial WWW activities.

Global Data-Processing System (GDPS)

55. Technical Co-operation Programme support for GDPS projects generally falls into one of these categories:

(a) Small micro-processors such as personal computers;

(b) Minicomputers that can also be used for telecommunications;

(c) Regional GDPS centres.

Global Observing System (GOS)

56. This element of the WWW requires significant support from the WMO Technical Co-operation Programme. WMO technical co-operation projects in the field of instruments may fall within any of the following main categories:

(a) Establishment or strengthening of national and regional observing networks and maintenance facilities;

(b) Instrument intercomparisons and calibrations on a global, regional and national level;

(c) Specialized training in the field of meteorological instruments and methods of observation.

57. Projects in this field are essential for obtaining a homogeneous data base of use to WMO Programmes. The need for high quality data calls for uniformity of the methods of observation, including quality control, calibrated and well-maintained instruments and observing systems, as determined by the different WMO Programmes.

Global Telecommunications System (GTS)

58. Technical Co-operation Programme support to this part of the WWW includes equipment, training and expert services. A high degree of co-ordination is required with GTS projects because of the networking aspects of telecommunications. The WWW department and the TCO department work closely together to develop recommendations for GTS installations to ensure that the requirements of the developing countries are met in a cost-effective manner. One example of this co-ordination was the development of a new computer message switching system which has been delivered to a number of countries.

Tropical Cyclone Programme

59. The Tropical Cyclone Programme, a specialized WWW programme concerning about 50 Members of the Organization, is heavily dependent upon WMO technical co-operation projects in respect of all three components, i.e.:

- meteorological component
- hydrological component
- disaster preparedness and prevention (DPP) component.

60. The meteorological and hydrological components are closely related to the WWW and their implementation has to be considered in this context. Technical co-operation projects in the field of tropical cyclones may fall within any of the following main categories:

(a) Support to regional tropical cyclone bodies;

(b) Establishment and/or strengthening of meteorological and hydrological networks and services;

(c) Tropical cyclone advisory and warning services;

(d) Support to the establishment and/or strengthening of DPP, in collaboration with United Nations Disaster Relief Co-ordinator (UNDRO), League of Red Cross Societies (LRCS) and other appropriate bodies;

(e) Risk assessments;

(f) Planning in meteorology and hydrology as required under this programme.

World Climate Programme

61. WMO technical co-operation projects related to the World Climate Data and Applications Programmes are generally associated with the following areas:

(a) Establishment and/or strengthening of station networks for climate observations;

(b) Promoting computerized climate data management systems and user services through CLICOM (see paragraph 62);

(c) Development of climate data banks;

(d) Assisting Meteorological and Hydrometeorological Services to develop capabilities for climatic applications in food production, water resource management and the use of renewable sources of energy (such as solar and wind energy) as well as applications to conventional energy sources;

(e) Promoting applications of urban and building climatology as well as land-use planning for human settlements;

(f) Promoting the application of climate knowledge and information in the interest of human health.

62. The World Climate Data Programme is aimed at achieving a transfer of technology in climate data management and user services through the provision of comprehensive specifications for microcomputer systems. CLICOM emphasizes a "package" concept which includes computer hardware (including peripherals), user-friendly software (for data entry, quality control, statistical processing, storage/retrieval, and the preparation of summaries and user products) and training. As a goal it is planned to deploy CLICOM systems within 10 years in all Meteorological Services which need them and for which extra-budgetary resources become available. These primary activities are planned:

- To periodically compile and disseminate information on microcomputer hardware and software developed under CLICOM;

- To deploy or upgrade computer systems (as funds are available) for:

  Climate data entry and quality control;
  Data storage/retrieval and data base management;
  Statistical data processing;
  User services (through regular reports and a capability to respond to routine queries); drought monitoring and assessment; and products to aid planning and management decisions in climate sensitive economic sectors;
  The preparation of data sets for climate diagnostics, monitoring, research, and applications;

- To organize and co-ordinate education and training activities:

  Intensive workshops for countries receiving CLICOM systems;
  Regional training seminars/workshops on climate data management and user services.

63. While CLICOM emphasizes automated climate data management and user services, an important component involves the transfer of technology of applications software including models to assist agricultural and water resource management user sectors, among others.

Research and Development Programme

64. The exchange of information on scientific results and its operational application through the publication of technical reports provides a major thrust to technical co-operation activities. The organization of workshops, symposia and conferences also serves in the transfer of research results amongst countries. The provision of advice on the use of research results by the meteorological services aimed at strengthening their own research capabilities and fostering collaborative research programmes is also of importance.

65. As regards activities under the Environmental Pollution Monitoring and Research Programme, the assistance provided to Members in developing countries towards the operation of BAPMoN stations in terms of equipment, guidance material, training, visits of consultants and support for participation at relevant meetings, seminars and training courses helps to initiate or improve national activities in air pollution monitoring. In addition, the provision of guidance material to estimate by means of more or less complex models the dispersion of air pollution in various time and space scales constitutes a valuable assistance in land use planning and the preparation of air pollution control measures.

Applications of Meteorology Programme

Agricultural Meteorology Programme

66. The main objective of the technical co-operation projects in the field of agricultural meteorology is to develop and strengthen the Member's capabilities to provide comprehensive agrometeorological services to agriculture. The projects include:

(a) Strengthening of agrometeorological observing networks and services (including maintenance);

(b) Development of climatological and agronomical data banks;

(c) Training in agricultural meteorology;

(d) Crop-weather modelling, monitoring and forecasting the yields of crops;

(e) Agrometeorological aspects of crop protection (e.g. pests and diseases, frost, flood, drought);

(f) Conservation and protection of natural resources (e.g. use of meteorological information to help control forest fires);

(g) Animal health and diseases;

(h) Remote-sensing techniques in agrometeorology.

67. Projects in agricultural meteorology are implemented taking into account the level of development of agricultural meteorology in each country, the requirements of the country and the resources available. They generally cover one or more activities mentioned above. They are implemented jointly with other international organizations. Technical co-operation projects in

agricultural-meteorology are numerous, especially in developing countries. In addition to implementing many UNDP-financed technical co-operation projects, WMO acts as an executing agency for the meteorological component in several national development projects of other organizations (FAO, Unesco, UNEP) and in bilateral projects.

Aeronautical Meteorology Programme

68. The technical co-operation projects in the field of aeronautical meteorology may fall within the following main categories:

(a) Establishment and strengthening of meteorological aeronautical offices at aerodromes (see WMO Technical Regulations ICAO, Annex 3);

(b) Establishment and strengthening of meteorological watch in support of air operations (see WMO Technical Regulations ICAO, Annex 3);

(c) Establishment and strengthening of meteorological aeronautical observing stations;

(d) Specialized training of personnel engaged in meteorological aeronautical activities (including refresher courses);

(e) Regional or global seminars, symposia and workshops in the field of aeronautical meteorology.

69. Projects in aeronautical meteorology are very important for the provision of meteorological services to support the safety, regularity and efficiency of air operations, including commercial and general aviation, helicopter and other light aircraft operations. The need for information, procedures and application of international standards in the provision of meteorological services to aviation requires particular attention for the operation of aeronautical meteorological centres and stations. The selection and training of personnel is an important aspect of technical co-operation in support of aeronautical meteorology. The establishment and operation of aeronautical meteorological services is, in general, closely related to WWW; therefore basic support to aeronautical meteorology is foreseen under the WWW.

Marine meteorology, IGOSS and other ocean-related activities

70. WMO technical co-operation projects in the field of marine meteorology, IGOSS and other ocean-related activities may fall within any of the following main categories:

(a) Establishment and/or strengthening of marine meteorological services for all types of marine users (coastal zone, coastal waters and on the high seas);

(b) Development and improvement of marine meteorological prediction and forecasting including storm surges;

(c) Development and/or strengthening of the Integrated Global Ocean Services System (IGOSS);

(d) Development or strengthening of ocean observing systems;

(e) Development and strengthening of marine climatology;

(f) Specialized training in marine meteorology, IGOSS and other ocean-related activities, including fellowships, seminars and workshops;

(g) Support to regional marine meteorological and oceanographic programmes.

71. The Plans of WMO on Marine Meteorology and the joint WMO/IOC IGOSS programmes are aimed at providing services in support of marine and other ocean-related economic activities. Thus a major effort is made to set up national programmes providing relevant information to users. In respect of the high seas, major international efforts in providing meteorological information, and forecast and warning services are to be operated in a co-ordinated fashion by Members of WMO.

72. The need for international co-operation in the field has been a long standing feature and the participation of maritime countries in the effort is important to the overall success of international and national activities. International support to bring the services to an adequate level is essential. The co-operation between Members to provide the support under bi- or multi-lateral co-operation programmes should be well planned and co-ordinated to reap optimum benefits by all concerned.

Hydrology and Water Resources Programme

73. WMO technical co-operation projects in the field of hydrology may fall within any of the following main categories:

(a) Establishment and/or strengthening of networks and services;

(b) Development of hydrological data banks;

(c) Hydrological forecasting and warnings;

(d) Training in hydrology;

(e) Support to global or regional WMO programmes.

74. Projects in operational hydrology commonly represent a significant proportion of the total of technical co-operation projects executed by WMO. They benefit directly from the information and expertise available through the Organization in general (the technical backstopping being provided by the WMO Secretariat) and through the Hydrological Operational Multipurpose Sub-programme (HOMS) in particular. HOMS provides technology including manuals, specific guidance material, instrument specifications, computer software, and training aids operationally used by Members and kept up-to-date by them. The HOMS Reference Manual and HOMS user requirements facilitate provision of technology appropriate for use in technical co-operation projects and in this process also helps to identify sources of technical support and suitably qualified experts for projects. The network of HOMS National Reference Centres provides scope for increasing technical co-operation among developing countries (TCDC) in operational hydrology. The main thrust of

technical co-operation will be to assist the development of Members' Hydrological Services so that they are able to provide the information and forecasts needed by their countries for water resources development, conservation and management, and for the mitigation of natural hazards of a hydrological nature. To support this technical co-operation, HOMS will continue to be developed to provide a complete coverage of the field of operational hydrology with modern technology appropriate to Members' needs. In return, technical co-operation projects of Members will be an important source of new technology for inclusion in HOMS. Strengthening of the institutional framework of HOMS by means of additional regional and national reference centres will ensure that all Members have ready access to this technology. HOMS will exploit advances in information technology so that Member's requirements are identified and satisfied in an efficient and cost-effective manner.

Education and Training Programme

75. As indicated in Volume 6, there is a significant area of co-ordination between the Education and Training Programme and the Technical Co-operation Programme in connection with the provision and utilization of external financial and other resources from all relevant sources for education and training activities. Such activities include the arranging of study programmes and the award and implementation of training fellowships, participation in training events, the development or strengthening of RMTCs and national training facilities, and activities of training experts or instructors, all under various technical co-operation projects.

76. Technical co-operation activities should develop a capability to provide increased support to national Meteorological and Hydrological Services for the above education and training activities, and should in particular address the areas now under development by the WMO Secretariat such as fellowship provisions for training personnel by correspondence courses and equipment and materials for training methods using computer-assisted learning techniques and training information on video-cassettes.

77. Accordingly, the main thrust of technical co-operation within the Education and Training Programme should be to ensure that strong training components for manpower development to fufil staffing needs are properly planned and integrated into the structure and, hence, the documentation of technical co-operation projects. The training components should contain adequate provisions for the fellowship training of counterpart personnel for such functions as the continuation of duties carried out by project experts, the operating and repairing of equipment and facilities provided under the project, and becoming instructors so as to train personnel and so ensure the continued performance of the service without retrogression or loss of benefit from the outputs of the project. Other important items of the training components should include provision of modern educational equipment and materials to enable services to establish training facilities with the aim of becoming self-sufficient in meeting their national training requirements, even if on a phased basis, for the Class IV, III, II and I categories of meteorological personnel.

A N N E X

Res. 25 (Cg-X) - SECOND WMO LONG-TERM PLAN

THE CONGRESS,

NOTING Resolution 34 (Cg-IX) - WMO Long-term Plan, that implemented the long-term planning process in the WMO system,

CONSIDERING:

(1) That the challenges facing the world today - such as the rapidly increasing world population requiring ever-increasing supplies of food, water and energy; the devastating effects of tropical cyclones, floods, droughts and desertification; the potential effects of the changing balance of minor constituents of the atmosphere; the threat of climate changes; and the environmental effects impinging on a variety of human activities - place increasing demands upon Members to provide more extensive, more effective and more diverse meteorological and hydrological services,

(2) That, because the atmosphere and hydrosphere are global in extent, the services that are needed to enable nations to meet those challenges require the co-ordinated efforts of Members within a framework of strengthened international co-operation in meteorology and operational hydrology,

(3) That the introduction of long-term planning is enabling WMO to play a more active and effective role in the international co-ordination of activities and facilities needed to provide the services that will assist Members to meet these challenges,

ADOPTS, under the provisions of Article 8 (a), (b) and (c) of the WMO Convention, the Second WMO Long-term Plan (hereinafter called "the Plan") for the period 1988-1997 consisting of:

Part I - Overall policy and strategy;

Part II - Programme plans:

Vol. 1 - The World Weather Watch Programme;
Vol. 2 - The World Climate Programme;
Vol. 3 - The WMO Research and Development Programme;
Vol. 4 - The WMO Applications of Meteorology Programme;
Vol. 5 - The WMO Hydrology and Water Resources Programme;
Vol. 6 - The WMO Education and Training Programme;
Vol. 7 - The WMO Technical Co-operation Programme;

REQUESTS the Secretary-General to arrange for the publication and distribution to all Members and constituent bodies of WMO - and to other international organizations as appropriate - of Parts I and II of the Plan;

STRONGLY URGES Members to take the Plan into account in developing and carrying out their national programmes in meteorology and operational hydrology, as well as in their participation in the programmes of the Organization;

REQUESTS the Executive Council, the regional associations, the technical commissions and the Secretary-General to adhere to the policies and strategies set forth in the Plan and to organize their activities to achieve the main long-term objectives as defined in the Plan;

FURTHER REQUESTS the Executive Council to use the Plan as a benchmark to monitor progress and performance in the implementation of the scientific and technical programmes of the Organization and to submit a report to Eleventh Congress.