



UNITED NATIONS ECONOMIC AND SOCIAL COMMISSION

FOR ASIA AND THE PACIFIC

AND

WORLD METEOROLOGICAL ORGANIZATION

REPORT OF THE TYPHOON COMMITTEE

ON ITS TWELFTH SESSION

**Bangkok, Thailand
13 - 19 November 1979**

19 November 1979

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

TYPHOON COMMITTEE

Twelfth session
13-19 November 1979
Bangkok

DRAFT REPORT OF THE TYPHOON COMMITTEE
ON ITS TWELFTH SESSION

I. ORGANIZATION OF THE SESSION

1. The twelfth session of the Typhoon Committee was held at Bangkok from 13 to 19 November 1979.

Attendance

2. The session was attended by representatives of China, Democratic Kampuchea, Hong Kong, Japan, Lao People's Democratic Republic, Malaysia, the Philippines, the Republic of Korea, Thailand and the Socialist Republic of Viet Nam and by observers from the United States of America. Observers were also present from the United Nations Office of the Disaster Relief Co-ordinator (UNDRO), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the International Civil Aviation Organization (ICAO), the International Telecommunication Union (ITU), the League of Red Cross Societies (LRCS), the Committee for Co-ordination of Investigations of the Lower Mekong Basin, and the Technical Support Unit of the WMO/ESCAP Panel on Tropical Cyclones.

Opening addresses

3. Opening addresses were made by the Deputy Executive Secretary of ESCAP and the representative of the Secretary-General of WMO.

4. The Deputy Executive Secretary welcomed the participants and in particular the representatives of the Socialist Republic of Viet Nam who had just joined as the tenth member of the Committee. He stressed the urgent need for all the countries in the ESCAP region to attack one of the basic problems of the region - that of mass poverty and unemployment. The Typhoon Committee had a basic role in this drive because much of the enormous annual typhoon losses was borne mainly by the rural poor. He congratulated some of the members for their willingness to increase their commitments in replacing, in part, some of the institutional support previously provided by UNDP and commended the Committee for its initiative in embarking upon the Typhoon Operational Experiment. He concluded by assuring the Committee of the full support of ESCAP.

5. In his statement the Secretary-General of WMO recalled that serious tropical cyclones had affected Sri Lanka, the Caribbean and the United States; and the Western Pacific since the Committee's last session a year before. The damage and loss of life they had caused showed that there was no room for complacency. He considered that the public was often not adequately apprised of the danger or lacked the means to protect itself. The warning dissemination and information exchange component of the Typhoon Operational Experiment (TOPEX) would provide the Committee with a new opportunity to rectify this situation

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and he expressed the hope that the session would give special attention to developing this aspect of the experiment.

6. The representative of the Socialist Republic of Viet Nam thanked the Committee for accepting his country as a full member and pledged that his country would exert its best efforts to co-operate with the members. The delegations of the Socialist Republic of Viet Nam and the Lao People's Democratic Republic declared their non-recognition of the representatives of Democratic Kampuchea.

7. The delegation of Democratic Kampuchea decisively and categorically rejected the allegations of the delegations of the Socialist Republic of Viet Nam and the Lao People's Democratic Republic.

8. The delegation of China protested against the bringing of this issue into the session.

9. The Committee noted the information provided by the secretariat to the effect that this issue had been resolved at the thirty-fourth session of the General Assembly.

Election of officers

10. The session elected Mr. P. Sham (Hong Kong) as Chairman of the Committee for the year 1979/1980 and Mr. Twee Montrivade (Thailand) as Vice-Chairman, and Mr. Cheang Boon Khean (Malaysia) as Chairman of the Drafting Committee.

/Agenda

Agenda

11. The Committee adopted the following agenda:
1. Opening of the session
 2. Election of the Chairman and Vice-Chairman
 3. Adoption of the agenda
 4. The Committee's activities during 1979:
 - (a) Meteorological component
 - (b) Hydrological component
 - (c) Disaster prevention and preparedness
 - (d) Training
 - (e) Research
 5. Typhoon Operational Experiment (TOPEX)
 6. Support for the Committee's programme
 7. Programme for 1980
 8. Co-ordination with the WMO tropical cyclone project and regional programmes
 9. Consideration of the agenda for the thirteenth session of the Committee

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10. Date and place of the thirteenth session
11. Scientific lectures
12. Adoption of the report

II. THE COMMITTEE'S ACTIVITIES DURING 1979
(WRD/TC.12/1)
(Agenda item 4)

12. The Committee reviewed the progress made in implementing its programme during 1979. Specific mention was made of new observing and telecommunication facilities, services of consultants on disaster prevention and preparedness, training courses, and of joint collaboration in research activities. The Committee was also informed of further progress made in the expansion of flood forecasting systems.

A. IMPROVEMENT OF METEOROLOGICAL FACILITIES

13. The Committee was pleased to learn that five additional 10-cm radars were being procured in early 1980 by PAGASA and were expected to be installed later in 1980. These radars were also expected to play a significant role during TOPEX. A survey of the current performance of the existing radars and requirements for spare parts for the radar stations in the Philippines had been undertaken by PAGASA and the TCS.

14. The Committee was informed that the 10-cm radar at Seoul (Republic of Korea), which has been in use for 10 years, would be overhauled by the end of 1979 and that Osaka and Matsue radars (Japan) are to be replaced by March 1980. The representative of the Republic of Korea informed the Committee that establishment of a 10-cm radar at Cheju is under consideration.

15. The Committee was pleased to learn that the 10-cm radar transferred from Khon Kaen to Chumphon (Thailand) became operational in December 1978. The TCS assisted in the calibration and adjustment of the Chumphon radar and also in repairing the defective 10-cm radar at Bangkok.

16. The Committee was also informed a new 10-cm radar was installed in Penang (Malaysia) and became operational in the middle of 1979. The installation of another radar at Kluang was expected to be completed in 1980. Radar test equipment worth \$14,000 provided by UNDP was received by Malaysia. Assistance was given in the calibration of radars at Kuala Lumpur, Kuantan and Kota Baru.

17. The Committee was pleased to learn that the Tokyo-Bangkok direct satellite link was expected to be established by early 1980. The Hong Kong-Beijing link was functioning satisfactorily and Hong Kong-Bangkok link was expected to improve with the installation of a computer switching system at Bangkok RTH.

18. In Japan, the automatic meteorological data acquisition system (AMED) linking JMA with about 1300 stations throughout Japan was established in June 1979.

19. The representative of the Philippines informed the Committee that with a view to improving the national data collection in the Philippines, new antenna and low frequency band crystals have been

installed at some of the observing stations. In this connexion, after consultation with the TCS, PAGASA had sent a request for assistance to the Government of Japan for a survey of the existing telecommunication facilities and additional requirements.

20. The Committee was informed that the TCS continued to receive quarterly statistics on the monitoring of national data collection and retransmission from the Philippines, Malaysia, the Republic of Korea, and Thailand. Results of analysis of these statistics had been circulated to the members concerned.

21. The Committee noted that the Hong Kong coastal radio station was accepting weather reports from ships equipped with ship-shore telex facilities since 1 April 1979. It was reported that 15 additional ships observations per month had been received under this arrangement.

22. The representative of ITU expressed his organization's interest and concern in developing telecommunication facilities needed in connection with natural disasters including typhoons. He expressed ITU's readiness to collaborate with WMO and the Typhoon Committee in the improvement of national or inter-country telecommunication by providing consultant services or training facilities within the framework of UNDP.

The Committee note with interest ITU's proposal to undertake

23. The Committee examined the priority list established by the eleventh session and revised it as given below:

Observing facilities

(i) Upper-air stations

98223 Laoag (Philippines))	
	)	12 GMT RS/RW National projects
98645 Cebu (Philippines))	

(ii) Weather radar

Cheju (Republic of Korea))	
)	
Tanay (near Manila, Philippines)	)	National projects
)	
Kluang (Malaysia))	

(iii) Satellite receiving equipment

(GMS/TIROS-N satellite)

Manila)	
	)	National projects
Bangkok, Kuala Lumpur, Hanoi)	

(iv) Ocean weather station

Ship at 16°N, 135°E (offered by the USSR) in 1978
but no information in 1979

Telecommunication facilities

(i) Improvement of national data collection facilities

Lao People's Democratic Republic)	
)	
Philippines)	
	)	National/bilateral projects
Thailand (night time reception))	
)	
Viet Nam)	

(ii) Regional telecommunication links

Bangkok-Phnom Penh)	
)	
Bangkok-Hanoi (1980)	)	National projects
)	
Bangkok-Tokyo (1980))	

(iii) Other telecommunication facilities

Thailand - Strengthening of RTH Bangkok
 - National/bilateral project

Ocean Weather Ships

24. The Committee was informed that a Japanese Ocean Weather Station "Tango" (29°N, 135°E) was in operation from May to October 1979. JMA's research vessel "Keifu-Maru" at 20°N, 130°E had made surface and upper-air observation during September-October 1979. Japan also continued to maintain ocean buoys Nos. 3, 4, 6 and 7 at the former locations.

Exchange of radar fixes

25. Radar fix messages continued to be exchanged between members as in previous years. The Committee urged members to ensure the regular and prompt exchange of radar messages.

Meteorological Satellites

26. The Committee noted with appreciation that the Japanese Geostationary Meteorological Satellite (GMS) had continued to operate satisfactorily in 1979. Cloud imagery was being regularly transmitted in HR and LR formats and other data were being transmitted via the GTS.

27. The Committee was informed of members' plans for procurement of satellite ground receiving equipment. It noted that high resolution satellite receivers were in operation at Beijing, Shanghai and Guangzhou. A high resolution receiver became operational in Hong Kong in November 1979. The Republic of Korea had completed the installation of a satellite receiver with dual antenna and computer system for receiving both GMS and TIROS-N high resolution imagery. The Philippines, Thailand and Malaysia planned to install HR receivers for GMS and/or TIROS-N satellites during 1980.

28. The representative of USA informed the Committee that USA will continue to issue bulletins containing information on the locations of tropical disturbances based on satellite imagery for dissemination over the GTS.

Meteorological reconnaissance flights

29. The Committee noted with appreciation that US reconnaissance flights in the West Pacific continued to provide valuable data for typhoon warning services. The representative of the United States reiterated that such reconnaissance flights would be continued in the years ahead.

The First GARP Global Experiment (FGGE)

30. The Committee was informed of members participation in the FGGE (1 December 1978 - 30 November 1979) and in the winter MONEX (December 1978 - February 1979). The additional contributions made by members of the Committee include two ocean weather ships (China), ships for the tropical wind observing system (Hong Kong and the Philippines), GMS system, additional ships and FGGE data management sub-centre (Japan) and the winter MONEX management centre (Malaysia).

31. The Committee was pleased to learn that the data sub-centre in Japan had collected and stored the level II-b data on magnetic tape *after* quality control. Wind vector and sea surface temperatures from GMS had been processed from April 1978 to November 1979 and stored on magnetic tape. In the preparation of the winter MONEX level II-b data set, some of the member countries had undertaken responsibility as data sub-centres as stated below:

Hong Kong : Commercial ships' data;

Malaysia : Special synoptic data, precipitation data and satellite imagery;

Philippines : Radar imagery;

Thailand : Agrometeorological data.

B. HYDROLOGICAL COMPONENT

32. The Committee was informed that work was continuing on the development of flood forecasting systems in the Agno, Bicol and Cagayan River basins in the Philippines and in the Kinabatangan River basin in Sabah and Sadong River basin in Sarawak, Malaysia. In the

the Philippines and the Republic of Korea, efforts were made to improve the flood forecasting systems in the Pampanga and Han River basins respectively. It was noted that a new telemetering system was being installed in the Dae-chung dam watershed in the Geum River basin in the Republic of Korea, and a VHF system was being installed in the Johore River basin in Malaysia. China also had plans for the installation of telemetering networks in some small watersheds.

TCS 33. A flood risk map was prepared for the Pampanga River basin based on historical records of inundated areas during past floods. These maps were needed for the risk analysis and economic analysis of flood mitigation works.

34. In Japan, 743 rain gauging stations, 698 stream gauging stations and 173 combined rainfall and river gauging stations had been set up by the Ministry of Construction all linked in telemetered networks; most of them were used for flood forecasting and warning systems already operational in seventeen major river basins in the country.

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TCS 35. The Committee noted that there was a need for the development of hydrological forecasting systems as an aid for dam operations. As an example in the Philippines, damage was suffered in October 1978 following typhoon "Kading" when the flooding in an already swollen stream downstream from a dam was further exacerbated by the releases from the dam to draw down the reservoir level. It was felt that this problem should be considered by all members to ensure that existing operating procedures did not result in untimely major releases from dams during typhoons. The Government of Japan sent a survey team to the Philippines in connexion with the development of flood forecasting and warning systems for the watersheds of all dams.

36. The attention of the Committee was invited to the improvement made in Japan in the measurement of precipitation by radar equipped with a colour display and linked with a minicomputer. One such radar system would be able to simultaneously monitor rainfall over several adjacent small watersheds. The Committee expressed interest in this system and requested the TCS to disseminate relevant information about this and other similar systems to the members.

37. The Committee noted with concern that no progress had been made in 1979 in implementing the pilot flood forecasting system in the Se Bang Hien River basin in the Lao People's Democratic Republic. The country had suffered from catastrophic floods during August 1978. It was noted that Laos was reorganizing its hydrological and meteorological services and it was hoped that the country could now make effective use of possible assistance from the Typhoon Committee, the UNDP and the Mekong Committee in the coming year.

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38. The Committee was informed that Thailand had submitted a request to the Government of Japan for assistance on a number of development projects including the implementation of the Maeklong River basin flood forecasting system. It also learned that subject to the assignment of priority to this project by Thailand the Government of Japan was prepared to consider the possibility of such assistance.

Flood loss prevention and management

39. It was noted that none of the members had been able to select pilot areas or basins for which comprehensive plans for flood loss prevention and management could be prepared as called for in the programme adopted by the Committee at its eleventh session. It was agreed that there was a need for organizing a mission to advise members in the selection of pilot areas or basins for comprehensive flood loss and management. It therefore recommended that such a mission be mounted, if possible, with the following terms of reference.

- (i) Advise and assist in the selection of a pilot basin for flood loss prevention and management.
- (ii) Advise on information and data required for the formulation of comprehensive plans for flood loss prevention and management for the selected pilot basin.

/(iii)

- (iii) Provide general guidelines and procedures for the formulation of the comprehensive plans mentioned in item (ii) above.

C. DISASTER PREVENTION AND PREPAREDNESS

40. The developments under this component during 1979 are summarised below:

Philippines

41. The PAGASA-OCD broadcast station, dedicated to weather and allied information, was expanded and improved through the acquisition of studio equipment and accessories, erection of the transmitter tower and the installation of a radio link from the studio to the transmitter. The Emergency Broadcast System (EBS) was extended to several regions.

42. In connection with the proposed establishment of a training and research centre for disaster prevention and preparedness, an UNDRO consultant made a survey in the Philippines during June-July 1979. His report, which included a recommendation for establishment of a Disaster Research and Training Centre in the Philippines, was under consideration by the Government.

Republic of Korea

43. A pamphlet published by the Ministry of Construction in May 1979 shows the latest organization of the Disaster Prevention Centre. The

/work assigned

work assigned to the centre includes implementation and supervision of flood control projects, conduct and supervision for disaster rehabilitation, establishment, management and supervision of communication facilities.

Thailand

44. At the request of the Government of Thailand, WMO arranged the services of a consultant from the National Disasters Organization of Australia for one month during February-March 1979. He assisted the Department of Local Administration in organizing special courses in disaster prevention and preparedness in Thailand. The representative of Thailand reported that the first Civil Defence Law had been promulgated in March 1979.

Malaysia

45. With reference to the survey conducted by the LRCS Consultant in 1978, the representative of Malaysia informed the Committee that some of the recommendations made by the Consultant had already been implemented.

The Proceedings of the Regional Seminar on Community Preparedness and Disaster Prevention

46. The proceedings of the Regional Seminar held at Tokyo in June 1976 were printed by ESCAP (Water Resources Series No. 49) and arrangements were made for distribution to all concerned.

Disaster Consultant ?

/Guidelines for

Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas

47. In pursuance of the eleventh session's recommendation, additional copies of the Guidelines were supplied to the Directors of the Meteorological Services for distribution to the agencies concerned.

ARTIC Seminar Report

48. Following the cyclone and storm surge disaster in Andhra Pradesh (India) in November 1977, the Appropriate Reconstruction Training and Information Centre (ARTIC) held a seminar in August 1978 to discuss the success and failures in the relief operation. At the suggestion of UNDRO, the proceedings of the Seminar were distributed to members through the TCS.

D. TRAINING

49. The Committee noted with appreciation that, in pursuance of the offer made at the eleventh session, the Government of Japan organized group training courses in river engineering from 3 August to 4 December 1979 and another course in meteorology (radar operation and maintenance) from 4 October 1979 to 3 February 1980. It was noted with satisfaction that a TCS expert had given lectures to the training course in meteorology for one week.

50. The Committee also noted with appreciation that Japan organized two additional group training courses, namely on (1) flood loss prevention and management from 27 September to 2 November 1979 and (2) on technology

/for disaster

for disaster prevention from 3 October to 17 December 1979.

51. The Committee noted with satisfaction that a WMO/United Nations Regional training seminar on the Interpretation, Analysis and Uses of Meteorological Satellite data was held at Tokyo from 23 October to 2 November 1978 and that participants from most members attended the seminar. The Committee was also pleased to note that a UNDP/WMO regional training seminar on Flood forecasting was organized at Nanjing (China) from 8 October to 8 November 1979. Malaysia, Philippines and Thailand each sent 3 participants to this seminar.

52. The Committee noted with satisfaction that the RA II - RA V Roving Seminar on "Intense precipitation and Floods" organized by WMO had visited six countries during November 1978 to March 1979, including two members of the Typhoon Committee (Philippines and Malaysia).

53. The Committee was informed that the WMO Training Seminar on Tropical Cyclone Hydrology and Flood Forecasting would be held at Miami (USA) from 11 February to 4 May 1980 and that a similar seminar might be repeated in 1981 or 1982.

✓ 54. With reference to the proposed regional training seminars listed for 1980 and 1981 under the hydrology component of the short-term programme endorsed by the eleventh session, a proposal was sent by ESCAP and WMO to UNDP for support for these seminars. The topics of the seminars are (i) Flood Loss Prevention and Management, (ii) Urban

/Hydrology

Hydrology and (iii) Repair and maintenance of electronic equipment used in flood forecasting and warning systems. UNDP gave advance authorization for support for these seminars.

✓ 55. The Committee was informed that the proposal sent by ESCAP and WMO to UNDP for support to the Regional Typhoon Programme during 1980-1981 included (1) Support for a symposium on typhoons to be held in China in October 1980 and (2) Support for study group visits to China on (a) flood control in 1980 and on (b) watershed management for flood loss prevention and management in 1981. UNDP gave advance authorization for item (1), while item (2) was still under consideration.

would be approved on receipt of official confirmation from the Govt. of China. (The Peoples Republic of)

TCS 56. In connexion with the establishment of an automatic switching system at Bangkok RTH, the Committee noted with satisfaction that arrangements were being made for the Royal Observatory, Hong Kong to provide training to four members of the Thai Meteorological Department on message switching programmes and techniques.

57. The Committee noted with satisfaction that the telecommunication and electronics expert of TCS had provided on-the-job training in radar calibration and maintenance to radar technicians in Malaysia and Thailand. He also conducted an intensive one-month training course on radar theory and circuit analysis at Manila for PAGASA.

/58.

58. The representative of USA renewed his country's offer of assistance in the field of training through WMO/VCP, in particular for short-term courses in meteorology. A 3-months' training course in uses of satellite data for operational purposes in the University of Colorado was cited as an example.

59. The Committee was informed that USAID would sponsor a seminar on disaster preparedness at Manila in 1980, which would in particular be meant for disaster mitigation planners.

60. The representative of the Philippines drew attention to the availability of facilities for training in meteorology for Master's degree in the University of the Philippines and informed the Committee that candidates from members would be welcome for such training. Fellowships could be sought either through the WMO/VCP or from other sources.

E. RESEARCH

61. The Committee noted with satisfaction that the Royal Observatory, Hong Kong, continued to produce objective forecasts of typhoon tracks by computer programming of selected techniques and that those forecasts were disseminated to members for operational use. The Committee was further informed that multiple regression equations based on space mean charts at several levels were being developed by the Royal Observatory for forecasting the movement of tropical cyclones.

/62.

62. The Committee was informed that the barotropic model for typhoon track forecasting in the Philippines was further improved and statistics were being compiled for performance verification. A technical report was expected to be available in the near future. A two-layer primitive equation baroclinic model was also being programmed for forecasting typhoon tracks.

63. Regarding the typhoon moderation research programme in the Philippines, the Committee was informed that a feasibility study had been completed with the help of a group of experts from the United States. The scientific basis for such a programme was studied and a detailed experiment design was formulated. The Committee was further informed that, initially, the emphasis will be on monitoring of relevant parameters before undertaking an actual experiment.

64. The Committee noted with satisfaction that a technical paper by Mr. Patipat Patvivatsiri (Thailand) on heavy rainfall over Thailand related to tropical cyclones in 1975 had been published. A study of the precipitation patterns in the Philippines associated with different types of typhoon tracks was completed by the TCS. Papers on both these studies would soon be available for distribution.

65. Mr. P. Sham (Hong Kong), co-ordinator for the joint study on tropical cyclone prediction by objective techniques, presented a progress report on the study carried out for selected tropical cyclones during 1978. The Committee was informed

/that after

that after consultations between the co-ordinator, research correspondents and the TCS, it was agreed that this joint study be suspended from 1979 as similar studies could be resumed later with the more extensive data coverage expected during TOPEX. The co-ordinator made several recommendations in his progress report regarding the further planning of comparisons of objective techniques. The Committee recommended that the two progress reports on the joint studies on tropical cyclones during 1977 and 1978 be passed on to the co-ordinator of the Preparatory Committee for TOPEX (Meteorological component).

66. Extracts were presented from a progress report prepared by Dr. M. Miyazaki (Japan), co-ordinator for the joint study on storm surges. The Committee was informed that a technical Report prepared by Arafiles and Alcances on storm surges in the Philippines was printed and distributed to members. A report entitled Progress in Storm Surge studies in Hong Kong was also circulated. The Committee was further informed that forecasting of storm surges in Victoria Harbour (Hong Kong) based on improved numerical models was computerized for operational use.

67. The Committee was informed that in the Republic of Korea, the collection and analysis of storm surge data were made for the period 1960-1978 by using the data of tidal stations and related weather maps. During this period, maximum peak surges exceeded one metre in six cases only.

68. Reference was made to the study of storm surges undertaken in the Bay of Bengal area, which was considered by the sixth session of the Panel on Tropical Cyclones held in February-March 1979. The Committee supported the Panel's recommendation for a technical conference on storm surge prediction.

69. The representative of Viet Nam informed the Committee that studies on forecasting typhoon movement were undertaken in his country. A statistical model based on multiple regression equations was being tested at present.

70. In pursuance of the eleventh session recommendation that at future sessions of the Committee members should bring with them lists of papers published since the previous session, the representative of Japan distributed a list of meteorological papers related to typhoons, which had been published in Japan during 1978-1979.

/III. TYPHOON

III. TYPHOON OPERATIONAL EXPERIMENT (TOPEX)
(WRD/TC.12/2 and WRD/TC.12/3)
(Agenda item 5)

71.. The Committee recalled that the Typhoon Operational Experiment (TOPEX) was the outcome of a proposal made by China and supported by Japan at the eleventh session. It had been decided that TOPEX would be carried out as part of the Typhoon Committee's programme and as a sub-project of the WMO Tropical Cyclone Programme. The Eighth World Meteorological Congress (May 1979) commended the Committee for its initiative in planning TOPEX and urged Members of WMO, especially those participating in the programmes of the Committee, to support the Experiment to the maximum extent possible and requested the Secretary-General to assist in the planning and execution of TOPEX in co-operation with ESCAP.

72.. As requested by the Committee, WMO organized a Preparatory Meeting on TOPEX in Tokyo (July 1979). The Preparatory Meeting defined the objective of TOPEX as being the reduction of the loss of life and damage from typhoon wind, flood and storm surge by improving the forecasting and warning capabilities of members of the Typhoon Committee. It set forth the aims whereby the Experiment might achieve this objective. It further determined the composition of TOPEX, stated the benefits that might be expected, and defined the experimental area and a time schedule for its conduct. The Preparatory Meeting began the initial planning of the three components of TOPEX and made interim arrangements for the management of the further planning and execution of the Experiment.

73.. The Committee examined the report of the Preparatory Meeting

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as well as information on the measures taken since that Meeting. The Committee decided to endorse the report of the Preparatory Meeting and wished to record its appreciation for the progress made in the year since its eleventh session. One of the major points discussed by the Committee was the future arrangements for the management and co-ordination of TOPEX activities and the scope of participation in the Experiment.

74.. The Committee agreed to establish a Management Board for TOPEX comprised of a representative of each member of the Typhoon Committee wishing to participate in the management of the Experiment. It approved the following terms of reference for the Management Board:

- (i) The Management Board should manage all phases of TOPEX from planning to evaluation of the results of the Experiment;
- (ii) The Management Board should take all decisions necessary to achieve the objective of TOPEX without need to refer to the Typhoon Committee;
- (iii) The Management Board may set up sub-committees to plan and manage various aspects of the Experiment and invite non-Typhoon Committee members to co-operate and participate in TOPEX without need to refer to the Typhoon Committee;
- (iv) The Management Board should report on progress to the Committee at its annual session.

75.. The Committee further agreed that steps should be taken by members so that their designees to the Management Board might attend

/the First

the First Planning Meeting on TOPEX when the Board would be formally established and its work programme finalized. WMO was requested to take urgent action through the Permanent Representatives with WMO to secure member's designations to the Management Board. The Committee requested ESCAP, WMO and TCS to arrange for their representatives to participate in all meetings of the TOPEX Management Board. It was decided that the Preparatory Committee for TOPEX (Meteorological Component) and the system of focal points should continue until such time as the Management Board had been formally established. The First Planning Meeting on TOPEX, scheduled to take place in Tokyo from 5 to 14 June 1980, would then decide on the arrangements required to ensure co-ordination of each of the three components of TOPEX.

76. In this context the Committee also considered the desirability of inviting experts to attend the First Planning Meeting in order that advantage might be taken of the experience available in other parts of the world in conducting similar experiments. It decided to request WMO, after consultation with the Co-ordinator of the Preparatory Committee (Meteorological Component), to extend invitations to suitable experts. Attention was also drawn to the need to invite representatives of international organizations supporting the TOPEX programme, such as UNDP, UNDRO, UNEP and LRCS, to attend the Meeting.

77. Reference was further made to the benefits of experts participating in the planning work for TOPEX through periods of secondment by their national services. The Committee considered that this possibility should be considered by the Management Board at the time of the First Planning Meeting.

78. Advantage was taken of the presence at the session of the Co-ordinator and most of the focal points forming the Preparatory Committee (Meteorological Component) to hold a short informal meeting. As a result of these discussions a draft provisional agenda for the First Planning Meeting was drawn up as a basis for the further preparations.

79. The Committee endorsed the principles stated in the report of the Preparatory Meeting on TOPEX concerning the hydrological component and was of the opinion that TOPEX was important for improving hydrological forecasting in the region. In particular, TOPEX, through its intensive observing system, should be able to provide meteorological forecasts including forecasts of quantity, intensity, time and location of precipitation associated with the selected typhoons. These forecasts would provide the needed input to hydrological forecasts, thus ensuring the desirable link between the meteorological and the hydrological components. This would also demonstrate one of the benefits to be derived from TOPEX. It would therefore be necessary to make provision in TOPEX to meet such requirements of hydrological forecasting as quantitative precipitation forecasts (QPF).

80. It was also noted that WMO had already requested the hydrological focal points to submit specific proposals before the end of 1979 for the development of the hydrological component of TOPEX, so that it could be submitted to the First Planning Meeting on TOPEX in 1980.

81. The Committee recognized that, as the hydrological component

was principally a national activity, the preparation of detailed specifications would depend on the information to be furnished by members. On the basis of the available information the Committee endorsed some guidelines for further planning, which are given in the Annex.

82. The steps taken by WMO to initiate a TOPEX Newsletter in response to the request of the Preparatory Meeting were noted with satisfaction. The Committee further noted that the first issue was expected in early 1980 and requested WMO to arrange for the distribution of subsequent issues at regular intervals. It suggested that members should communicate developments in national preparations for TOPEX to the WMO Secretariat to facilitate the up-to-date dissemination of information on TOPEX to a wide audience. It drew attention to the role of the Newsletter as a means of securing additional support for the execution of TOPEX.

83. The representative of the United States pointed out that TOPEX was an ambitious undertaking which would require the use of expertise from other parts of the world. He considered that care should be taken not to duplicate work already carried out elsewhere in order to conserve the resources available for the Experiment. It would also be necessary to promote to the maximum extent TOPEX activities in order to secure assistance from as many sources as possible.

84. The representatives of the United Nations Office of the Disaster Relief Co-ordinator (UNDRO) and of the League of Red Cross

Societies (LRCS) expressed their pleasure at the invitation they had received to participate in TOPEX, especially in the warning dissemination and information exchange component. Both indicated their readiness to support TOPEX within the resources available to them. At the suggestion of LRCS, it was agreed that discussions should be held between WMO, UNDRO and LRCS with the object of preparing by early 1980 a draft programme of the activities to be pursued under the warning dissemination and information exchange component of TOPEX. UNDRO proposed that members participating should submit, prior to the First Planning Meeting, papers outlining the present situation and presenting proposals for the pre-experiment.

IV. SUPPORT FOR THE COMMITTEE'S PROGRAMME
(WRD/TC.12/4)
(Agenda item 6)

85. The Committee had before it document WRD/TC.12/4 which reviewed the known requirements to implement the Committee's programme and the possible sources of support. These were: the members themselves under national programmes and TCDC; non-member co-operating countries, the WMO Voluntary Co-operation Programme (VCP), UNDP, UNDRO, UNEP, and LRCS, and assistance from bilateral and multilateral sources.

86. The items already identified as requiring support were:
(i) TCS co-ordinator/manager; (ii) TCS meteorologist; (iii) TCS hydrologist; (iv) TCS flood control expert; (v) disaster preparedness expert on short-term assignment; (vi) revolving fund for the purchase of urgently needed equipment and spare parts; and (vii) experts for an advisory mission on comprehensive flood loss prevention and management.

87. In addition, a project proposal had been submitted to UNDP for its assistance in financing during 1980-1981 the following items: (a) a two-year extension of the support provided by UNDP; (b) continuation of the WMO expert in meteorological telecommunication and electronics; (c) increased funds for travel; (d) a limited number of short-term fellowships; (e) a symposium on typhoons to be held in China; (f) participation of certain countries in TOPEX; (g) equipment; (h) regional training seminars; (i) two study group visits to China (one each for 1980 and 1981); and (j) additional consultant services in connexion with the TOPEX programme.

88. It was pointed out that in addition to the requirements enumerated in paragraphs 86 and 87 there could be additional ones which the Committee might identify arising from new developments such as the

admission of Viet Nam as a new member. The representative of the Socialist Republic of Viet Nam requested UNDP assistance in the procurement of equipment and the representative of Lao People's Democratic Republic requested WMO assistance in the reactivation of the Vientiane - Bangkok point-to-point circuit and the provision of a 10-cm weather radar at Vientiane for which agreement had previously been reached.

89. The Committee expressed the view that there was a need for an overall co-ordinator for TOPEX which should be provided by UNDP. It therefore suggested that the period for consultant services requested under item (j) in paragraph 87 be increased from 12 man-months to 24 man-months starting from the beginning of 1980 to enable a full-time overall co-ordinator for TOPEX to be recruited. It requested WMO to approach UNDP and seek an early decision on the matter.

90. The representative of the UNDP reaffirmed the continued interest of UNDP in the important work of the Committee. He announced that UNDP had already issued an advance authorization covering items (a) to (h) mentioned in paragraph 87. *(with the addition of consultant services)* This authorization covered all the components announced at the eleventh session as consisting UNDP support for the years 1980 and 1981 with the exception of two

for a study 2 months in disaster preparation, risk reduction and storm surge prediction.

/study

study tours in China which would be added to the project on receipt of official confirmation from the Chinese Government.

91. With reference to the twelve man months of consultant services for work connected with TOPEX (item j) requested by WMO, the representative of UNDP said that UNDP would prefer the work to be undertaken along TCDC lines. In any case, support for TOPEX could not be considered by UNDP until the programme had been planned in more detail and the inputs by participating governments had been decided. Furthermore UNDP did not support basic research or experiments; the Sub-Experiment appeared to be sophisticated and much of the area selected fell outside the jurisdiction of Committee members. With regard to the suggestion that the Co-ordinator of TOPEX should be financed by UNDP, he pointed out that such a Co-ordinator had not been foreseen in the report of the TOPEX meeting. He appealed to the Committee members to look more to TCDC arrangements for which UNDP support could be requested; he felt confident that members could provide qualified and able people.

/92.

92. The Committee responded to the views of the representative of UNDP by clarifying that both the Core and Sub-Experiments were not the basic research type of experiment but they were of definite operational application. The Core and Sub-Experiments were designed to help members to understand the structure and behaviour of typhoons and to improve forecasting of typhoons and risk of floods for the mitigation of damage. The Committee was strongly of the view that the services of a consultant as a co-ordinator were necessary at the earliest possible date, and preferably from the beginning of 1980, in order to undertake the co-ordination of the large amount of planning work required under the different components of TOPEX.

93. The UNDP representative assured the members that he would convey the views of the Committee to UNDP.

94. The representative of the UNDP requested members to expedite endorsement of the budget revision submitted to their Governments through the regional or resident representatives of UNDP. He thanked the Government of Japan and non-members of the Typhoon Committee *members* for the valuable support extended to the work programme.

/95.

95. The Committee expressed appreciation to the Philippines for its readiness to provide the TCS Co-ordinator/manager and meteorologist as well as office facilities and supporting staff. It was understood that official external travel and per diem expenses of these staff would be charged to the UNDP project.

96. It also welcomed the information that Japan would provide a replacement for the TCS hydrologist when his contract expired. It noted that the provision of a flood control expert for TCS was still under consideration.

✓ 97. The Committee also welcomed the offer of China to provide the services of a meteorologist to the TCS on a short-term basis (six months) in 1980 whose official travel and per diem expenses would be charged against the UNDP budget.

✓ 98. The Committee welcomed the statement of the representative of Japan that if it received a request from ESCAP it would be prepared to provide three experts for an advisory mission to assist members in the selection of pilot basins for comprehensive flood loss prevention and management for a total duration of one month during the period January/February 1980.

99. Following the Eighth World Meteorological Congress (May 1979) where TOPEX was warmly received, the support to the TCP would be strengthened for the period 1980-1983. In addition to this, the

/services of

services of two sectoral advisers were available on request for short visits to members to help initiate new technical co-operation projects.

100 & 101 The Committee noted with appreciation that LRCS ^{and UNDP have} was prepared to support the activities of the Committee in disaster preparedness and prevention ^{101. The Committee noted with appreciation} and that UNEP was ready to assist the Committee in its work concerning dissemination of early warnings of natural disasters.

102. The Committee recorded its warm appreciation to UNDP for its continued support and for the valuable advice of its representative.

/V. PROGRAMME

V. PROGRAMME FOR 1980
(WRD/TC.12/5 and WRD/TC.12/CRP.1)
(Agenda item 7)

103. In considering its programme for 1980, the Committee took into account the latest developments under each component of its activities and expected assistance from external sources. The fact that the execution of the Typhoon Operational Experiment (TOPEX) would bring new activities in the years ahead was fully considered. Recognizing that a number of national activities of particular interest to the Committee would be carried out by its members, the Committee directed that special attention be given, with the assistance of its secretariat, to the following items of work in 1980:

Meteorological component

- (a) Operation and maintenance of electronic equipment (RS/RW, radar, radar picture transmission, satellite receiving and telecommunication equipment);
- (b) Establishment of new radar stations in Malaysia, the Philippines and the Republic of Korea;
- (c) Provision of test equipment and spare parts and training of technicians for calibration and maintenance of weather radars;
- (d) Improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;
- (e) Establishment of suitable receiving equipment for reception of cloud imagery and other data from GMS and TIROS-N satellites;

- (f) Review of national data collection facilities and data exchanges needed for typhoon warning services, including periodical monitoring, and taking of remedial measures, where necessary;
- (g) Preparations for TOPEX, including those for the First Planning Meeting, on the basis of the tentative programme recommended by the Preparatory Meeting in July 1979;
- (h) Introduction of a common system of identification of tropical cyclones in the Western North Pacific and the South China Sea;
- (i) Organization of the Symposium on Typhoons to be held in China in October 1980.

Hydrological component

- (a) Establishment of a pilot flood forecasting system in Thailand, with possible assistance from the Government of Japan;
- (b) Establishment of flood forecasting systems in the Agno, Bicol and Cagayan River basins in the Philippines and in the Kinabatangan river basin in Sabah and the Sadong river basin in Sarawak (Malaysia), with further assistance from the Government of Japan;
- (c) Further improvement in the operation of flood forecasting systems in the Pampanga River basin (Philippines) and in the Han River basin (Republic of Korea) and expansion of flood forecasting in the Nagdong and Geum River basins (Republic of Korea);

- (d) Development of flood forecasting and warning systems for dam operation;
- (e) Selection, investigation and survey of the pilot areas yet to be chosen by members for comprehensive flood loss prevention and management; organization of an advisory mission in this connection with assistance from the Government of Japan;
- (f) Continuation of determination of magnitudes and frequency of floods in flood-prone zones subject to heavy damage, and preparation of flood-risk maps;
- (g) Preparations for activities under the hydrological component of TOPEX;
- (h) Organization of a study group visit to China.

Disaster prevention and preparedness

- (a) Promotion of studies and exchange of experience to develop more efficient methods of assessment and reporting of damage and consequent needs;
- (b) Advice and assistance with training in techniques of community preparedness, through consultancy services where appropriate;
- (c) Promotion of studies and exchange of experience on human response to warnings;

/(d)

- (d) Follow-up action on the joint LRCS/WMO/ESCAP missions (1973-1976), the recommendations of the Regional Seminar held at Tokyo in 1976, ^{Review missions & community in 1978} and the consultants' reports on Malaysia, the Philippines and Thailand in 1978-1979;
- (e) Improvements in the dissemination of typhoon and flood warnings, exchange of information on disaster situations between concerned agencies and related measures to minimize damage (This refers to the warning dissemination and information exchange component of TOPEX).

Training

- (a) Training of personnel through group training courses in Japan and other fellowships through bilateral and VCP assistance. Short-term training courses on maintenance of radar, satellite receiving equipment and telemetering equipment might be given special considerations;
- (b) Participation in seminars on Principles of Flood loss prevention and management and on Urban hydrology, and other seminars relevant to the Committee's programme;
- (c) On-the-job training by TCS experts, particularly in the operation and maintenance of radar (including measurement of precipitation by radar), satellite receivers, and telecommunication equipment.

/Research

Research

- (a) Stimulation of research activities through advisory services, visits of study groups and exchange visits by research personnel;
- (b) Encourage members to undertake research on typhoons, especially on topics relating to their particular area, and promotion of joint collaboration on selected topics, such as studies directed towards the development of improved storm surge prediction methods;
- (c) Promotion of exchange of information on typhoon research activities, including developments on related matters outside the region;
- (d) Initiation of provisional studies on disaster risk evaluation in typhoon-prone areas, including flood risk mapping.

104. The Committee welcomed the statement made by the representative of Japan that his Government was considering the provision of the following assistance in the field of training during 1980:

- (1) Group training courses in meteorology (weather prediction techniques) and in River engineering to be organized in Japan with the support of JICA;
- (2) One or two experts from JMA likely to be sent to one member to hold a seminar on forecasting techniques for a period of about one month;

- (3) If requested and financially supported by WMO, JMA would be ready to send an expert on satellite data collection and reception systems for field service to some members

Common System of identification of tropical cyclones

105. Noting that different systems were being used by members to identify tropical cyclones in the Western North Pacific and the South China Sea, often leading to confusion and difficulties to users, the Committee endorsed the proposal by Hong Kong to introduce a common system. It agreed:

- (i) That a number in closed parentheses composed of 4 digits (The first two digits to indicate the year and the last two digit to indicate the sequential number of the tropical cyclone in that year: thus (8005), being the fifth tropical cyclone in 1980), should be adopted as a common system of identification;
- (ii) That the common system should come into effect on 1 January 1981;
- (iii) That the first Planning Meeting for TOPEX should propose to TC 13 a minimum wind speed required for assigning a number to a tropical cyclone and suggest the name of a member which would be responsible for assigning and maintaining a record of such numbers.

VI. CO-ORDINATION WITH THE WMO TROPICAL CYCLONE
PROJECT AND REGIONAL PROGRAMMES
(WRD/TC.12/6 and WRD/TC.12/7)
(Agenda item 8)

106. The Committee examined the information submitted on the progress achieved in the implementation of the WMO Tropical Cyclone Project as given in the fifth status report on activities up to 30 June 1979. Later developments were also outlined.

107. The steps taken by the Eighth Congress to strengthen the support to these activities and to upgrade the project to the new WMO Tropical Cyclone Programme in the period 1980-1983 were welcomed by the Committee. The Committee noted that Congress had unanimously decided that it was essential to strengthen and intensify the programme in the years ahead and considered that this decision largely met the requests made by Committee members following the eleventh session. It further noted that Eighth Congress had expressed great interest in the Typhoon Operational Experiment (TOPEX) and had commended the Committee for its initiative in planning the Experiment by adopting Resolution 9 (Cg-VIII).

108. The Committee was informed that the Tropical Cyclone Programme (TCP) for the years 1980-1983 would consist of three main components - meteorological, hydrological, and prevention and preparedness. In addition, the present division into general (formerly global) and regional components would continue, the first dealing with activities of application to all WMO Members in tropical cyclone areas, whilst the second would be devoted to activities of more restricted application, normally those directly related to the programmes of the regional cyclone bodies.

109. Under the general component, the Committee noted that a new publication - "Operational techniques for forecasting tropical cyclone intensity and movement", had recently been issued. It recalled that this publication was the outcome of a sub-project in which Hong Kong, Japan and the TCS had participated. The Committee expressed its view that this publication, as well as others already issued under the TCP, would be valuable to its members in relation to their participation in TOPEX.

110. The Committee considered that the guidance material produced under the general component of the TCP was of great value to developing countries affected by tropical cyclones. It recorded its gratitude to all who had taken part in the preparation of the publications, expressing its conviction that this work was an important feature of the TCP which should be pursued with vigour.

111. It further noted with interest the progress being made by the other cyclone bodies under the regional component. It reiterated its previous request for the regular exchange of information on these activities through the TCP. The need for continued co-ordination of regional activities with all the WMO Members concerned and with international organizations such as UNDP, UNDRO, UNEP and LRCS was stressed. It was also suggested that good co-ordination of the Committee's programme with those of the other regional cyclone bodies might be ensured if, to the maximum extent possible, the same WMO secretariat staff were to be responsible for support to all the bodies.

112. The Committee also considered information on the work of interest to its members being carried out under the WMO Programme on Research in Tropical Meteorology. It noted in particular that the various recommendations originating from an expert meeting held at Fort Collins, USA, in July 1979 dealt mainly with the compilation and archiving of tropical cyclone data for research purposes. The Committee agreed on the desirability of initiating projects for this purpose and stressed the need for its members to co-operate closely with the Commission for Atmospheric Sciences (CAS) in promoting these objectives.

113. The Committee further stressed that its own long-term programme, as adopted at the eleventh session, was directed essentially at improving the operational capability of its members to combat the direct effects of tropical cyclones. The research aspects of that programme were limited and oriented to specific operational activities. It was of the opinion that adequate arrangements already existed through WMO for members to participate in the work of CAS and that it would not be appropriate to expand its own programme by undertaking large-scale research projects for which it could not furnish the necessary resources.

/114.

114. On the general subject of research on tropical cyclones the Committee drew attention to the need to keep in mind the priorities given to the various activities to ensure that the major effort was devoted to the operational aspects directly related to the safety of human life and property. It was felt that TOPEX would help by giving an indication of the minimum data requirements for tropical cyclone forecasting by numerical methods.

115. There remained major problems such as the lack of progress in techniques for forecasting tropical cyclones and in the present inability of the GTS to handle ^{large amounts of} high resolution synoptic data, ^{to cope with} ~~small scale weather phenomena in the region~~.

116. The Committee welcomed the efforts being made by the Commission for Basic Systems (CBS) towards an integrated observing system and the reconsideration being given to the technical structure of WMO. In this connexion, the Committee proposed that members should put forward their ideas through participation in related WMO activities.

VII. CONSIDERATION OF THE AGENDA FOR
THE NEXT SESSION OF THE COMMITTEE
(Agenda item 9)

117. The Committee requested the ESCAP and WMO secretariats, in consultation with the TCS, to prepare the detailed agenda for the thirteenth session which should include a scientific lecture on the scientific plan for TOPEX. It was agreed that members would inform ESCAP, WMO and the TCS at an early date of any appropriate subjects which they might wish to propose for the next session.

/VIII. DATE

VIII. DATE AND PLACE OF MEETING ON THE
THIRTEENTH SESSION
(Agenda item 10)

118. The Committee welcomed with appreciation the tentative offer of the representative of the Philippines to provide, subject to confirmation, host facilities for the thirteenth session of the Committee. It noted his suggestion that the thirteenth session be held sometime between the last half of November and the first week of December 1980.

IX. SCIENTIFIC LECTURE
(Agenda item 11)

119. The following scientific lecture was presented by
Dr. T. Nitta of Japan:

"Scientific and Technological Background of the
Typhoon Operational Experiment (TOPEX)".

120. The Committee recorded its thanks to Dr. Nitta for his presentation and to the Government of Japan for providing the services of Dr. Nitta as a consultant to the meeting. The Committee also thanked the United States and Hong Kong for showing motion pictures on typhoons.

X. ADOPTION OF THE REPORT
(Agenda item 12)

121. The Committee adopted its report on 19 November 1979.

/Annex

Annex

GUIDELINES FOR FURTHER PLANNING OF THE
HYDROLOGICAL COMPONENT OF TOPEX

1. Proposed pilot river basins:

Han (Republic of Korea)
Se Bang Hieng)
Nam Ngum) (Lao People's Democratic Republic)
Kelantan (Malaysia)
Pampanga (Philippines)
Maeklong (Thailand)
Puyang)
(to be provided)) (China)

Other members should designate the basins as soon as possible.

2. WMO in co-operation with the TCS should circulate a questionnaire to obtain the following information on the basins:

- (a) Basin area, location and other characteristics
- (b) Existing hydrological and meteorological observing stations. (To provide catchment maps if not already available with TCS)
- (c) Data collection and transmission facilities
- (d) Description of existing hydrological forecasting system
- (e) Description of the hydrological model being used
- (f) Availability of computer facilities
- (g) Whether affected by storm surges
- (h) Available flood risk studies and maps.

/In addition

In addition information should be obtained on the availability of expertise in hydrological forecasting and the need for consultant services.

3. As far as possible the need for expert services should be satisfied from within the Typhoon Committee. TCS or WMO may be requested to provide short-term consultant services if necessary.

4. The experts designated to the TOPEX Management Board should be accompanied to planning meetings by the hydrological experts responsible for the pilot basins as far as possible.

5. The existing or new models should be calibrated in each basin prior to the experimental phase (1 August-15 October) so that the best use can be made of the information which would be generated by the meteorological component.

6. Proposals for the hydrological component made by Japan should be taken into account as appropriate, especially with respect to the strategy to be adopted for the step-by-step improvement of flood forecasting and warning services in the pilot basins.

FOR PARTICIPANTS ONLY

WRD/TC.12/CRP.1
15 November 1979

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
Bangkok

PROGRAMME FOR 1980

(Item 7 of the provisional agenda)

COMMON SYSTEM OF IDENTIFICATION OF TROPICAL CYCLONES
IN THE WESTERN NORTH PACIFIC AND
THE SOUTH CHINA SEA */

*/

This paper is being circulated as submitted by the delegation of Hong Kong. The views expressed in it are those of the delegation and do not necessarily reflect those of the United Nations.

OTHER MATTERS

(an additional item to the provisional agenda)

Common System of Identification of Tropical Cyclones
in the Western North Pacific and the South China Sea

(a proposal by Hong Kong)

Introduction

1. Different systems are being used by meteorological services within the Region to identify tropical cyclones in the Western North Pacific and the South China Sea. For example, China and Japan use the numbering system, while Philippines, U.S.A. and others use names. Because of this, warnings on the same tropical cyclone issued by different forecasting offices bear different identifications and therefore cause confusion and difficulties to ships at sea, aircraft in flight and other recipients. The situation is aggravated often when there are more than one tropical cyclones. Furthermore, record and data for the same tropical cyclone are stored under different identifications in various meteorological services, and this creates difficulties in the collation of data for research and investigation purposes.

2. The Seventh Session of WMO Regional Association V considered a proposal by U.S.A. which aimed at adopting a single list of names for tropical cyclones in the portion of the Pacific in the northern hemisphere in WMO Regions II and V. In accordance with para. 4.5.9 and 4.5.10 of General Summary of RA-V Seventh Session, RA-II members were consulted on the U.S.A. proposal with a view to arriving at a common agreement on this matter.

Purpose of Hong Kong's Proposal

3. The purpose of Hong Kong's proposal is the immediate introduction of an agreed system of identification of tropical cyclones for use by the Typhoon Committee Members, taking the following into consideration :-

- (i) It will be some time before RA-V and RA-II can come to a common agreement on this matter and there is an urgent need to remove the difficulties which are being experienced by the users.
- (ii) The TOPEX and its core- and sub-experiments will call for a proper system of identification of tropical cyclones in order that participating members will know on which tropical cyclone they will conduct the experiments. A common system of identification is essential for the success of TOPEX not only in the operational aspect but also in the data management and research aspect.
- (iii) The agreed system, if found suitable by Typhoon Committee Members, will be recommended for use by all RA-II and RA-V members concerned.

The Hong Kong Proposal

4. The system proposed is a combined Name-Number system.

- (i) The name is taken from the list of names proposed by U.S.A. (see Annex I of Abridged Final Report of RA-V (VII)) (Note - this list is identical with the one being used by the Joint Typhoon Warning Centre at Guam). Names should be used in sequence each new year starting where the last year left off. For example, if the last tropical cyclone occurring in 1979 is HERBERT (in column 2), then the first name in 1980 will be

(ii) The number is a 4-digit number with the first two digits to indicate the year and the last two digits to indicate the number of the tropical cyclone in that year. Thus, '8005' is the identification for the 5th tropical cyclone in the year 1980. The last two digits should start from 01 each new year. (Note :- It is highly unlikely that the number of tropical cyclones in any one year would exceed 99.)

(iii) The number should be in parenthesis and should immediately follow the name. Thus taking the example in (i), the first tropical cyclone in 1980 will be identified as 'IDA (8001)'.

5. All tropical cyclones originating north of the equator and within the area of the western North Pacific (west of 170°E) and the China Seas should be named by this system. Once a tropical cyclone is identified, it will retain its identification throughout its lifetime.

6. Only one centre with good telecommunication facilities within the Typhoon Committee Region should have the responsibility of assigning the name and the number so that other forecasting offices within the Region will use the same identification when referring to the tropical cyclone. This Centre should maintain an up-to-date list of identification names (numbers).

7. When issuing a warning on a tropical cyclone which has as yet no identification name (number), for example, a newly-developed tropical cyclone within the area of responsibility of a forecasting office, the forecasting office should immediately request the Centre to allocate the next available name (number). This will avoid duplication in case two tropical cyclones in two different areas of responsibility develop at approximately the same time. All other forecasting offices within the Region will then become aware of the identification of the tropical cyclone through receipt of warnings and will use the same identification when referring to that particular tropical cyclone in subsequent warnings which they need to issue.

8. A tropical depression with a closed circulation and maximum sustained winds of 22 knots (Beaufort force 6) or more should be allocated an identification name (number), and it should be warned. Tropical depressions with maximum sustained winds of less than 22 knots (Beaufort force 6) should not be allocated an identification name (number) even though warnings on them may be issued to shipping.

Action proposed

9. The Committee is invited to :-

- take note of the immediate requirement for a common system of identification for tropical cyclones within the Typhoon Committee Region, as explained in paragraph 3,
- discuss the Hong Kong proposal as described in paragraphs 4 to 8, and
- adopt an agreed system for use with effect from 1980 onwards.

15 November 1979

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC AND WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee

Twelfth session
13-19 November 1979
Bangkok

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International Telecommunication Union (ITU)	Mr. B.Y. Nerurkar, Co-ordinator and Senior Regional Expert, ESCAP/ITU Unit, Transport and Communications Division, ESCAP, Bangkok

NON-GOVERNMENTAL ORGANIZATION

Category I

League of Red Cross Societies (LRCS)	Dr. Kingsley J. Seevaratnam, Regional Officer for Asia and the Pacific, LRCS, Geneva
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SECRETARIAT

Mr. J.B.P. Maramis	Executive Secretary
Mr. Princy H. Siriwardene	Deputy Executive Secretary
Mr. H. Rudy Gontha	Special Assistant to the Executive Secretary

Mr. A.S. Manalac	Officer-in-Charge, Natural Resources Division
Mr. C.D. Wang	Senior Economic Affairs Officer, Water Resources Section, Natural Resources Division
Mr. E.F. Schulz	Economic Affairs Officer, Water Resources Section, Natural Resources Division
Dr. T. Nitta	Consultant, Natural Resources Division

Mr. S. Ghazarbekian	Chief, Programme Co-ordination and Monitoring Office
Miss S. Takahashi	Economic and Social Affairs Officer, Programme Co-ordination and Monitoring Office
Mr. Khin Maung Lwin	Economic Affairs Officer, Programme Co- ordination and Monitoring Office

Mr. C. Roy Smith	Chief, Division of Administration
Mr. S.F. Tsao	Chief, Conference and General Services Section, Division of Administration

Mr. Satis Indrakamhaeng	Officer-in-Charge, Information Service

Mrs. Nicole Suthimai	Chief, Language Services
Mr. A. Archambault	Interpreter
Mr. C. Lamarche	Interpreter
Mr. C. Massaux	Interpreter
Miss K. Cohen	Interpreter

COMMITTEE FOR CO-ORDINATION OF INVESTIGATIONS OF THE
LOWER MEKONG BASIN

Mr. Somnook Sudhampun	Hydrometeorologist
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WORLD METEOROLOGICAL ORGANIZATION (WMO)

Mr. Peter Rogers Special Projects Officer,
World Weather Watch Department,
WMO, Geneva

Mr. N.S. Sehmi Scientific Officer, Hydrology and Water
Resources Department, WMO, Geneva

Mr. M. Samiullah Regional Director for Asia, WMO, Geneva

TYPHOON COMMITTEE SECRETARIAT (TCS)

Dr. S.N. Sen Chief Technical Adviser, c/o UNDP, Manila

Mr. C.H. Tang Telecommunication and Electronics Expert,
c/o UNDP, Manila

Mr. H. Oi Hydrologist and Flood Forecasting Expert,
c/o UNDP, Manila

TECHNICAL SUPPORT UNIT (TSU)

Mr. B.M. Padya Chief Technical Adviser,
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LIMITED

WRD/TC.12/L.1
30 July 1979

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
Bangkok

PROVISIONAL AGENDA

1. Opening of the session
 2. Election of the Chairman and Vice-Chairman
 3. Adoption of the agenda
 4. The Committee's activities during 1979:
 - (a) Meteorological component
 - (b) Hydrological component
 - (c) Disaster prevention and preparedness
 - (d) Training
 - (e) Research
 5. Typhoon Operational Experiment (TOPEX)
 6. Support for the Committee's programme
 7. Programme for 1980
 8. Co-ordination with the WMO tropical cyclone project and regional programmes
 9. Consideration of the agenda for the thirteenth session of the Committee
 10. Date and place of the thirteenth session
 11. Scientific lectures
 12. Adoption of the report
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FOR PARTICIPANTS ONLY

WRD/TC.12/1
2 October 1979

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
Bangkok

THE COMMITTEE'S ACTIVITIES DURING 1979

(Item 4 of the provisional agenda)

Note by the Typhoon Committee secretariat

CONTENTS

	Page
General	3
A. Meteorological component	4
RS/RW and radar stations	4
Telecommunication system	4
Other meteorological activities	5
Action proposed	7
B. Hydrological component	8
General activities	8
Flood loss prevention and management	10
Action proposed	11
C. Disaster prevention and preparedness	11
Action proposed	12
D. Training	13
Action proposed	14
E. Research	14
General activities	15
Joint collaboration in typhoon research	15
Action proposed	15

GENERAL

1. At its thirty-fifth session, held at Manila in March 1979, ESCAP was pleased to note the progress in the activities of the Typhoon Committee. The Commission commended UNDP on its support, which had contributed significantly to the accomplishments of the Typhoon Committee. It also supported the request of the Committee that ESCAP and WMO seek additional support for its programme. The Eighth WMO Congress, held at Geneva in May 1979, considered that the programmes being conducted by regional bodies like the Typhoon Committee had resulted in important achievements.

2. The members of the Committee jointly submitted a document to the Eighth WMO Congress requesting greater support under the WMO tropical cyclone project to meet the requirements of the expanded programme undertaken by the Committee, including the Typhoon operational experiment (TOPEX). Japan submitted an additional document on tentative plans for TOPEX. The Congress expressed its deep interest in the experiment and commended the members of the Committee on their initiative in undertaking that work.

3. A preparatory meeting on TOPEX was held at Tokyo in early July 1979. The meeting was attended by the representatives of seven members of the Typhoon Committee and ESCAP, WMO and TCS. The report of that meeting (WRD/TC.12/2) and another document (WRD/TC.12/3) on further action taken on TOPEX will be considered under agenda item 5.

4. On the basis of the recommendations made by the Committee at its eleventh session on future support for the Committee's activities, a project document was submitted to UNDP for further assistance during 1980-1981. UNDP's response to this request and other sources of support will be discussed under agenda item 6 (WRD/TC.12/4).

5. Official missions undertaken or planned by TCS experts in the period between the eleventh and twelfth sessions are indicated below:

Chief Technical Adviser	:	Bangkok (April); Beijing, Shanghai, Guangzhou and Hong Kong (May); Seoul and Tokyo (June-July); Bangkok (November)
Telecommunication and electronics expert	:	Kuala Lumpur, Kuantan, Kota Baru, Bangkok and Chumphon (November-December 1978); Tokyo, Seoul (July); Tokyo (October); Bangkok (November)

/Hydrologist and

Hydrologist and flood forecasting expert : Kuala Lumpur, Kuching, Kota Kinabalu (November-December 1978); Beijing, Shanghai and Guangzhou (May); Bangkok, Kuala Lumpur, Seoul (September); Bangkok (November)

A. METEOROLOGICAL COMPONENT

RS/RW and radar stations

6. RS/RW stations at Laoag, Mactan, Puerto Princesa and Zamboanga (Philippines) were provided with hydrogen generators to relieve the difficulty arising from shortage of hydrogen gas. PAGASA (Philippines) placed orders for five additional 10-cm radars, Model WSR-77 with colour display and digital video integrator units. These new radars are expected to be installed in 1980 for strengthening typhoon warning services in the Philippines.

7. A survey of the radar stations in the Philippines will soon be undertaken jointly by the TCS expert and PAGASA officials with a view to examining the current performance of the radars and assessing the requirements for additional spare parts.

8. The radar at Seoul (Republic of Korea), which has been in use for more than 10 years, is expected to be overhauled by the end of 1979. Radars at Osaka and Marsue (Japan), which were established in 1968 and 1969 respectively, are to be replaced by new ones by March 1980.

9. The 10-cm radar transferred from Khon Kaen to Chumphon (Thailand) became operational in December 1978. The TCS telecommunication/electronics expert assisted in its calibration and adjustment. He also assisted in repairing the defective 10-cm radar at Bangkok.

10. Two 10-cm radars for Penang and Kluang in Malaysia were expected to be operational before the end of 1979. Malaysia received radar test equipment worth \$US 14,000 purchased with UNDP funds under the regional typhoon project.

Telecommunication system

11. The Tokyo-Melbourne point-to-point circuit was expected to be upgraded from 75 to 200 baud by the end of 1979. The Tokyo-Bangkok direct satellite link was expected to be established in 1980. The Hong Kong-Bangkok link was

expected to improve with the automation of the Bangkok RTH by the end of 1979. The Hong Kong-Beijing link was functioning satisfactorily.

12. The establishment of the automatic meteorological data acquisition system (AMEDAS) at more than 1,300 stations throughout Japan was completed in June 1979. The system ensures prompt collection at JMA of selected meteorological data, including wind and rainfall.

13. With a view to improving the national data collection and dissemination of typhoon warnings in the Philippines, the possibility of obtaining assistance from Japan was under consideration. Meanwhile, 12 provincial stations were provided with low frequency band crystals and modified antenna to improve night-time data collection.

14. A computer automatic switching system which would cost about \$US100,000 was expected to be installed at the Bangkok RTH by the end of 1979. Procurement of software from the Royal Observatory, Hong Kong, and training of two Thai technicians in the operation of the automatic switching system at Hong Kong were under consideration.

15. To review the efficiency of national data collection and retransmission to the associated RTH, TCS continues to receive quarterly statistics from the Philippines, the Republic of Korea, Malaysia and Thailand. The statistics are being analysed and summarized results will be circulated to the members concerned.

16. With effect from 1 April 1979, the Hong Kong coastal radio station accepted weather reports from ships equipped with ship-shore telex facilities. This arrangement was introduced on trial basis for one year.

Other meteorological activities

(a) Ocean weather ships in the western Pacific

17. The eleventh session recorded its appreciation to the Soviet authorities for the valuable assistance provided by operating research vessels in the western Pacific in 1978. Two officers from the Philippines participated in the programme of observations and data analysis on board the Soviet ships. The Committee was informed that the USSR would continue similar programmes in future years. Details of the 1979 programme were awaited.

18. Japan announced that Ocean Weather Station "TANGO" (29°N, 135°E) would operate from May to October 1979 and would record 3-hourly surface weather observations and twice-daily RS observations. Japan maintained ocean buoys Nos. 3, 4, 6 and 7 at the former locations.

(b) Priorities for the implementation of observing and telecommunication facilities

19. TCS maintained contact with members to expedite implementation of the recommended facilities. The possibility of bilateral assistance was explored where necessary.

(c) Exchange of radar fixes

20. The eleventh session urged members to ensure regular and prompt exchange of radar fixes. TCS issued a circular letter to the meteorological services of the members drawing attention to this recommendation and emphasizing the importance of regular calibration and maintenance of the radars.

(d) Meteorological satellites

21. The Japanese Geostationary Meteorological Satellite (GMS) continued to operate satisfactorily in 1979. Cloud imagery is being regularly transmitted in HR and LR formats. Computed sea temperature and wind vector data are being disseminated via GTS. Nephanalysis and sea temperature charts are being broadcast in facsimile formats from JMA.

22. High-resolution Satellite receivers made in China are in operation at Beijing, Shanghai and Guangzhou. A Canadian-made (MDA) receiver for GMS high-resolution imagery was expected to be operational at Hong Kong by the end of 1979. A TIROS-N LR Fax satellite receiver was installed at Hong Kong, in 1978. At Bangkok, the LR Fax satellite receiver donated by the United States of America in 1978 continued to function satisfactorily.

23. A satellite receiver with dual antenna and computer system for receiving both GMS and TIROS-N imagery was ordered by the Meteorological Service of the Republic of Korea. Thailand and the Philippines expect to obtain MDUS-type satellite receivers for interception of GMS HR imagery by the end of 1980. The Malaysian Meteorological Service also plans to procure an HR receiver for both GMS and TIROS-N. The TCS expert provided technical information relating to the GMS and TIROS-N receivers to interested members.

/(e)

(e) Meteorological reconnaissance flights

24. Reconnaissance flights by United States aircraft continued to provide valuable information for typhoon warning purposes. The eleventh session welcomed the information that the United States would continue its programme of typhoon reconnaissance in the years ahead.

(f) The First GARP Global Experiment (FGGE)

25. The members of the Committee participated in FGGE (1 December 1978-30 November 1979) and in MONEX (December 1978-February 1979) through the World Weather Watch (WWW) and by special additional contributions. These include ships for the tropical wind observing system (Hong Kong and the Philippines), GMS system, additional ships and FGGE data management subcentre (Japan) and the winter MONEX management centre (Malaysia).

26. The data subcentre in Japan has been collecting and storing level 11-b data in magnetic tape after quality control. Wind vector and sea surface temperatures from April 1978 to November 1979 processed from GMS data are being stored on magnetic tape.

27. Regarding additional observations requested for MONEX, 0000 GMT RS/RW observation was implemented at Tawau (6°N, 117°E) in Malaysia; the Philippines implemented 12 GMT RS/RW observations at Laoag, Mactan and Zamboanga and RW observation at Davao and Puerto Princesa (in addition to 0000 GMT observations) during December 1978 to March 1979. RS/RW observations (0000 and 1200 GMT) were also implemented at PAGASA Island during the same period.

(g) Manual on typhoon forecasting

28. The manual on "Operational Techniques for Forecasting Tropical Cyclone Intensity and Movement" prepared by experts from the United States, Hong Kong, Japan, India and TCS under a subproject of the WMO tropical cyclone project was completed. Copies were distributed in August 1979.

Action proposed

29. It is suggested that the Typhoon Committee may wish to:

- (a) Revise the list of priorities;
- (b) Recommend further measures to expedite implementation of the required meteorological observing and telecommunication facilities;

/(c)

- (c) Urge members to take all possible steps to secure radar test equipment, adequate spare parts and trained technicians to ensure effective maintenance of weather radars;
- (d) Review the arrangements for reception of information from GMS and TIROS-N satellites and make recommendations for early procurement of suitable receiving equipment.

B. HYDROLOGICAL COMPONENT

General activities

30. Continued efforts were made for the improvement of the pilot flood forecasting systems established in the Pampanga River basin of the Philippines and in Han River basin in the Republic of Korea. Establishment of a pilot flood forecasting system in the Maeklong River basin of Thailand with assistance from Japan has been under consideration. Further progress has been made towards the establishment of flood forecasting systems in other major river basins in the Philippines. Preparations were also being made for the expansion of similar systems in the Republics of Korea and in Malaysia. Developments during 1979 are summarized below:

(a) China

31. The TCS experts during their visit to China in May 1979 had a useful exchange of information with the officials concerned. Floods constitute a major natural hazard in China. However, as a result of flood control works extensively undertaken since 1949, the disastrous floods have been controlled to a large extent.

32. The flood forecasting method used at present is called the "Xinanjian" model, which is primarily based on the unit hydrograph and the Muskingum flood routing method with suitable adjustments. Telephone and telegrams are used for data collection and flood forecast disseminations for operational purposes. China has plans to install a telemetering network initially in small river basins.

(b) Hong Kong

33. A remote-recording rain gauge network for monitoring heavy rain over some potentially dangerous slopes was installed. Real-time rainfall information from the network is used for warning the probable occurrence of moderate to severe landslips.

/(c) Lao People's

(c) Lao People's Democratic Republic

34. No progress has been reported since the eleventh session of the Committee.

(d) Malaysia

5. A preliminary survey for the establishment of flood forecasting systems in the Kinabatangan River basin in Sabah and Sadong River basin in Sarawak was carried out during November-December 1978 by a team of three Japanese experts. The TCS hydrologist participated in the survey for part of the period. A second survey to finalize the plan is expected to be organized with further assistance from Japan towards the end of 1979.

36. Flood forecasting systems with telemetering equipment are already in operation in four river basins in Peninsular Malaysia. The Government has also initiated action to install a hydrometeorological network for a flood forecasting system in the Johore River basin.

(e) Philippines

37. In connexion with the improvement of the Pampanga flood forecasting system, Dr. Takenouchi (Japan) visited the Philippines in March 1979 and explained his data book on the Pampanga flood forecasting system. He made several recommendations after a review of the records of observations and comparison of computed and observed water levels of the past floods.

38. Satisfactory progress has been made in the project for the expansion of flood forecasting systems in the Agno, Bicol and Cagayan River basins. The required equipment was being shipped by Japan to the Philippines and the related facilities were being constructed by local firms. The system was expected to be partially operational during the rainy season of 1979.

39. In view of the serious damage caused by Typhoon "Kading" in October 1978, the Government of the Philippines made an over-all review of the existing disaster mitigation schemes and worked out a plan which included, among other things, establishment of flood forecasting and warning systems for efficient operation of all major dams. The plan is proposed to be integrated into the nation-wide flood forecasting system. The Government of Japan sent a team of experts to the Philippines for three weeks during July-August 1979 to assist the agencies concerned in developing the plan. The proposed plan was expected to be finalized by the end of 1979.

/(f) Republic of

(f) Republic of Korea

40. Continued efforts were made to improve the accuracy of flood forecasting in the Han River basin, with special attention on the section between Paldang Dam and Indogyo downstream. The Japanese experts are expected to visit Seoul before the end of 1979 and assist the government officials in these activities.

41. A telemetric network for the Dae-chung Dam area in the Geum River basin is proposed to be implemented in the near future in addition to a similar system in the Andong Dam area of the Nagdong River basin, which was set up in September 1978. Expansion of the flood forecasting system to cover the entire basins of the Nagdong and the Geum has been planned to be completed during 1980-1981.

(g) Thailand

42. Based on the report of the second survey team sent by Japan for the improvement of the Maeklong flood forecasting system, Thailand submitted a request to the Government of Japan for further assistance. The TCS expert had several consultations on the subject with ESCAP and the officials concerned in Thailand and in Japan.

Flood loss prevention and management

43. In accordance with the decision of the eleventh session to include flood loss prevention and management within the Committee's activities, TCS issued a circular letter to member countries in March 1979 giving relevant background information and indicating possible assistance from Japan. A list of reference materials prepared by ESCAP and copies of some publications obtained from Japan were also distributed. The subject has since been under consideration by the representatives of Japan, ESCAP, WMO and TCS.

44. Japan decided to organize a group training course on flood loss prevention during September-November 1979. A roving mission was also being organized by ESCAP in co-operation with the Government of Japan and a schedule for five weeks was under consideration in consultation with the member countries proposed to be visited.

45. Flood risk mapping. A flood risk map of the Pampanga River basin (Philippines) was prepared based on historical records of inundated areas during past floods. Risk evaluation by means of hydrological analysis was under study.

Action proposed

46. It is suggested that the Typhoon Committee may wish:

(a) To record its appreciation of the valuable assistance provided by the Government of Japan in:

(i) Sending a preliminary survey team to Malaysia in connexion with the establishment of flood forecasting systems in Sabah and in Sarawak;

(ii) Sending Dr. Takenouchi to the Philippines to explain the hydrological data book on the Pampanga River basin and to make useful recommendations for further improvement of the flood forecasting system;

(iii) Sending a survey team to the Philippines in connexion with the flood forecasting and warning systems for dam operation.

(b) To consider further steps for the establishment of pilot flood forecasting systems in Thailand and the Lao People's Democratic Republic and for the proposed extension of flood forecasting systems to Sabah and Sarawak in Malaysia;

(c) To consider the steps taken in the Philippines for flood forecasting and warning systems for dam operation and the desirability of similar measures for major dams in other countries;

(d) To note the action initiated for the development of comprehensive flood loss prevention and management and to suggest follow-up action.

C. DISASTER PREVENTION AND PREPAREDNESS

46. In the Philippines, PAGASA and OCD expanded and improved the broadcast station dedicated to the dissemination of weather warnings and allied information through the acquisition of studio equipment and accessories, erection

of transmitter tower and installation of radio linkage from studio to transmitter. The emergency broadcast system has been further extended to several regions in the country.

48. In connexion with the proposed establishment of a training and research centre for disaster prevention and preparedness, an UNDRO consultant (Mr. Wilfred Carter) made a survey mission in the Philippines during June-July 1979. His report was submitted to the Government for consideration.

49. At the request of the Government of Thailand, WMO arranged for a consultant Mr. Roger T. Jones, Natural Disaster Organisation, Australia for a period of one month during February-March 1979. Mr. Jones assisted the Department of Local Administration in Thailand in organizational and training questions relating to disaster prevention and preparedness.

50. In connexion with the survey conducted by the LRCS consultant on disaster prevention and preparedness (Mr. M. Konoye) in 1978, Malaysia and the Philippines were requested to report on the follow-up action taken on the consultant's recommendations.

51. The Proceedings of the Regional Seminar on Community Preparedness and Disaster Prevention (Water Resources Series No. 49) were printed by ESCAP and arrangements made for distribution to all concerned.

52. Additional copies of Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas were supplied to the directors of the meteorological services in Hong Kong, Japan, the Philippines and Thailand for distribution to the agencies concerned.

Action proposed

53. It is suggested that the Committee may wish to:

- (a) Note the above information;
- (b) Express appreciation to WMO and UNDRO for having provided consultants to advise Thailand and the Philippines respectively on matters relating to disaster prevention and preparedness.

/D. TRAINING

D. TRAINING

54. In 1979 the Government of Japan is organizing the following Group training courses: (a) river engineering, from 2 August to 3 December 1979, (b) flood loss prevention and management, from 27 September to 2 November 1979, (c) meteorology (radar operation and maintenance), from 4 October 1979 to 3 February 1980 and (d) technology for disaster prevention, from 3 October to 17 December 1979. Invited members have been requested to send timely nominations for the training courses as prescribed in the respective brochures.

55. A WMO/United Nations Regional Training Seminar on the Interpretation, Analysis and Use of Meteorological Satellite Data was held at Tokyo from 23 October to 2 November 1978. Participants from most of the member countries attended the Seminar. A UNDP/WMO regional training seminar on flood forecasting will be organized at Nanjing (China) in October 1979.

56. Regarding China's offer to receive visits of study groups, specific subjects for organizing such study groups were under consideration in consultation with China and other member.

57. At the eleventh session, China suggested that a symposium on typhoon forecasting should be organized in China during 1980. The proposed arrangements for the symposium were discussed by the representatives of WMO, TCS and China at the time of the TOPEX meeting at Tokyo in July. Provision for this symposium has been requested as part of the UNDP support to the regional typhoon programme for 1980-1981.

58. In accordance with the short-term programme approved by the eleventh session, proposals for regional training seminars in the field of hydrology during 1980-1981 were included in the project document submitted by WMO and ESCAP to UNDP for support.

59. The telecommunication and electronics expert of TCS provided on-the-job training in radar calibration and maintenance at Kuala Lumpur, Kuantan and Kota Bharu (Malaysia), at Chumphon (Thailand) and at Seoul (Republic of Korea). He also was scheduled to give some lectures at the group training course on radar operation and maintenance to be organized by Japan commencing in October 1979.

/Action

Action proposed

60. The Committee may wish to:
- (a) Record its appreciation of the valuable assistance provided by the Government of Japan in organizing group training courses during 1979 for the benefit of the members;
 - (b) Advise members to avail themselves of the training facilities offered by the developed countries and those obtainable under WMO VCP, including short-term fellowships;
 - (c) Consider the further action necessary in arranging for study groups to visit China.

E. RESEARCH

General activities

61. The Royal Observatory, Hong Kong, continued to produce objective forecasts of typhoon tracks by computer. These were disseminated to members for operational use. Multiple regression equations based on space mean charts were being developed for forecasting typhoon movement.
62. The barotropic model for typhoon track forecasting developed in the Philippines has been further improved, and statistics are being compiled for performance verification. A two-layer primitive equation Baroclinic model is also being programmed for forecasting and typhoon tracking.
63. Regarding the typhoon moderation programme in the Philippines, an intensive feasibility study was completed with the help of a group of experts from the United States. The scientific basis for such a programme, including the technology and instrument systems, was studied and a detailed experiment design formulated. Initially, the emphasis will be on monitoring of relevant parameters before undertaking an actual experiment.
64. A technical paper by Mr. Patipat Patvivatsiri (Thailand) on heavy rainfall over Thailand related to tropical cyclones in 1975 was published. A study of the precipitation patterns in the Philippines associated with different types of typhoon tracks was completed by the TCS meteorologist seconded by the Philippines.

/Joint collaboration

Joint collaboration in typhoon research

65. The joint study on "Tropical cyclone prediction by objective techniques" was continued for 1978 typhoons. A progress report was expected to be prepared by Mr. P. Sham (Hong Kong), who replaced Dr. P.C. Chin as the project's co-ordinator. After consultation between the co-ordinator, research correspondents and TCS, it was agreed that that joint study might be suspended from 1979, as similar studies could be resumed later with more extensive data coverage derived from TOPEX.
66. The Final Technical Report on Storm Surges prepared by Arafiles and Alcances (Philippines) was printed and distributed. A report entitled Progress in Storm Surge Studies in Hong Kong prepared by Robert Lau was also circulated. Forecasting of storm surges in Victoria Harbour (Hong Kong) based on improved numerical models was computerized for operational use. A progress report is expected to be submitted to the twelfth session by Dr. Miyazaki (Japan), co-ordinator for the joint study on storm surge.

Action proposed

67. The Committee may wish to:
- (a) Note the above information;
 - (b) Consider the further action necessary to ensure effective collaboration in typhoon research.
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LIMITED

WRD/TC.12/L.2
27 July 1979

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
Bangkok

ANNOTATED PROVISIONAL AGENDA

1. Opening of the session

The twelfth session of the Typhoon Committee will begin at Bangkok on 13 November 1979.

2. Election of the Chairman and Vice-Chairman

Rule 6 of the rules of procedures of the Typhoon Committee states: "The Committee shall, at its first meeting of the year, elect from among its representatives a chairman and a vice-chairman, who shall hold office until their successors are elected. They shall be eligible for re-election."

3. Adoption of the agenda

The provisional agenda has been prepared by ESCAP and WMO in close consultation with the Typhoon Committee secretariat (TCS). Representatives of participating Governments may propose additions or changes to the agenda if they so desire.

4. The Committee's activities during 1979

A review of the activities of the Committee since the eleventh session will be made under this item (WRD/TC.12/1). The review will cover each of the five components of the programme, namely, (a) meteorological component, (b) hydrological component, (c) disaster prevention and preparedness, (d) training and (e) research. The Committee is invited to assess the progress made since its eleventh session, comment on the activities undertaken in 1979 and offer suggestions for accelerating those not completed.

/The members

The members may also wish to report on the establishment in their countries in 1979 of any relevant facilities not covered by the report.

5. Typhoon Operational Experiment (TOPEX)

At its eleventh session the Committee proposed that a typhoon experiment should be undertaken as part of its programme. In response to the request of that session, WMO in consultation with ESCAP made arrangements for a Preparatory Meeting on the Typhoon Operational Experiment to be held at Tokyo in early July 1979. The Meeting was attended by representatives of seven members of the Typhoon Committee and ESCAP, WMO and TCS. The outcome of this preliminary planning exercise will be submitted to the twelfth session (WRD/TC.12/2).

The Preparatory Meeting considered that there was a need for further action to be taken on TOPEX in the interval between that meeting and the twelfth session. A second document on this item (WRD/TC.12/3) will therefore report on the developments since the Preparatory Meeting.

The session is invited to review the steps taken to initiate the Experiment and the plans for its further planning and execution, and to express its views on the future conduct of this important part of the Committee's programme.

6. Support for the Committee's programme

At the eleventh session of the Committee careful consideration was given to the resources needed to carry out the Committee's short- and long-term programmes formulated following the Typhoon Committee Review Mission to members in 1978. At that session members indicated their readiness to assume responsibility for a large part of the institutional support previously borne by UNDP. However, UNDP had indicated its willingness to consider further support for items in the programme of the Committee and had requested that a project document be formulated and submitted covering further assistance for the years 1980 and 1981.

This request was submitted to UNDP in June 1979 and it is expected that by the time the Committee holds its twelfth session a decision will have been made on the extent of UNDP support for this period.

/Other sources

Other sources of support, such as the WMO Voluntary Co-operation Programme (VCP), bilateral aid, UNDR0, UNEP and LRCS, and the possible establishment of an ESCAP revolving fund may also be considered under this item. Support to TCS for the execution of the Committee's programme, including TOPEX, will no doubt also be discussed under this item. Information will be provided on the steps so far taken and on the outlook for support from these various sources (WRD/TC.12/4). Requirements of members for assistance for TOPEX should be given special attention by the twelfth session under agenda item 5.

7. Programme for 1980

The Committee will make a selection of specific items of work on which it wishes to concentrate, with the assistance of TCS, during the following year. For this purpose, it will consider the short-term programme of work recommended by the Typhoon Committee Review Mission and endorsed by the eleventh session. The activities relating to the Typhoon Operational Experiment (TOPEX), including the proposed First Planning Meeting for TOPEX, will no doubt feature in the consideration of the programme for 1980.

8. Co-ordination with the WMO tropical cyclone project and regional programmes

The developments in the WMO tropical cyclone project and its associated regional programmes will be reported to the Committee under this item. A status report on the implementation of the WMO tropical cyclone project is issued each year and the report up to 30 June 1979 will form the basis of a document submitted to the twelfth session (WRD/TC.12/6) giving further information on the global and regional activities under the project. Reference is also made to the plans and activities of the WMO/ESCAP Panel on Tropical Cyclones and to similar activities in other tropical cyclone areas. The Committee may wish to review the effectiveness of the present arrangements for the co-ordination of such activities and the exchange of information thereon. A separate document (WRD/TC.12/7) will be submitted on WMO research activities related to tropical cyclones.

9. Consideration of the agenda for the thirteenth session of the Committee

To conform to the ESCAP conference requirements as laid down by the Advisory Committee of Permanent Representatives, the Committee is requested to draw up a provisional version of the agenda it would wish to consider at its thirteenth session, it being understood that additions or changes may be made to this agenda at any time.

10. Date and place of the thirteenth session

Rule 1 of the Committee's rules of procedure states: "The Committee shall hold at least one session annually. The venues and dates of its sessions shall be decided by the Committee."

11. Scientific lectures

As suggested at previous sessions of the Committee, a programme of scientific lectures will be arranged during the twelfth session. Details will be announced later.

12. Adoption of the report

The Committee's report on its twelfth session should be adopted at the final meeting.

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ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
Bangkok

TYPHOON OPERATIONAL EXPERIMENT (TOPEX)
(Item 5 of the provisional agenda)

RECENT ACTIVITIES

Note by the WMO secretariat

Introduction

1. Document WRD/TC.12/2, submitted to the twelfth session of the Committee, contains the report of the Preparatory Meeting on the Typhoon Operational Experiment (TOPEX) which took place in Tokyo, Japan, from 3 to 6 July 1979. In a footnote to that document it was stated that a second document would be submitted to the session reviewing TOPEX activities in the period since the Preparatory Meeting, and that it would also contain some proposals for further action. The present document reviews the latest developments in the planning of TOPEX.

Follow-up on decisions of Preparatory Meeting

2. During its consideration of the organizational and management aspects of the Experiment, the Preparatory Meeting decided to establish, as an interim measure, a Preparatory Committee for TOPEX (Meteorological Component). It was further agreed that the Preparatory Committee should consist of a Co-ordinator designated by Japan and focal points designated by individual participating members. One of the first tasks undertaken in following up the Preparatory Meeting's decisions was therefore to invite members to make

/these

these designations and a circular letter was dispatched for that purpose on 3 August 1979. At the time of preparing this document seven members had designated focal points to the Committee, including the Co-ordinator (Dr. T. Nitta, Japan). Thus all members present at the Preparatory Meeting will participate in the further planning of this component.

3. The Meeting had similarly decided that members would be invited to designate focal points for the other two components of TOPEX - the hydrological component and the warning dissemination and information exchange component. Six nominations to the first of these and five to the second had been received by the end of September 1979. The appendix to this document shows the latest position in more detail.

4. It may be recalled that the function of the Preparatory Committee for TOPEX (Meteorological Component) was foreseen as the continuous study of the scientific and technical aspects of the planning and execution of the Core Experiment in the period up to the First Planning Meeting. At that time it is expected that a more permanent arrangement of higher status covering the entire Experiment will be set up.

5. The Co-ordinator of the Preparatory Committee visited the WMO Secretariat early in October, thereby providing an opportunity for discussions on the initiation of the Committee's work. Given that little more than one month remained before the opening of the twelfth session, it was decided that the best course of action would be to inform members of the formal constitution of the Preparatory Committee and to seek their advice on a number of questions which could be discussed in further depth at the session.

6. The Co-ordinator therefore addressed a letter to each of the focal points for the Meteorological Component soliciting views on the conduct of the Preparatory Committee's work over the next 6-8 months. Views were sought on the organization and conduct of the Core Experiment itself, covering in particular the national position with respect to the implementation of WWW facilities, and plans for augmented observing programmes. It was suggested that the situation be surveyed to reveal any likely problems and probable needs for assistance in extending these facilities to meet the TOPEX requirements. As TOPEX also calls for the establishment of Experiment Sub-Centres (ESCs) by each participating member, information on the arrangements being made for this purpose were also requested. Finally it was suggested that focal points should ensure that their national delegations to the Twelfth Session are fully briefed on these matters.


March 3, 1980

The Director-General
Philippine Atmospheric, Geophysical and
Astronomical Services Administration
Quezon City

S i r:

We are pleased to furnish you, for your information and comments, a copy of the report of the Typhoon Committee on its Twelfth Session which was held in Bangkok from 13 to 19 November 1979.

Very truly yours,


B. G. VILLAVICENCIO
Director, External Assistance Staff



ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

Thirty-sixth session
18-29 March 1980
Bangkok

March 3, 1980

The Director-General
Philippine Atmospheric, Geophysical and
Astronomical Services Administration AND
Quezon City REGIONAL INSTITUTIONS

S i r: (Item 6 of the provisional agenda)

We are pleased to furnish you, for your infor-
mation and comments, a copy of the report of the

Typhoon Committee on its Twelfth Session which was

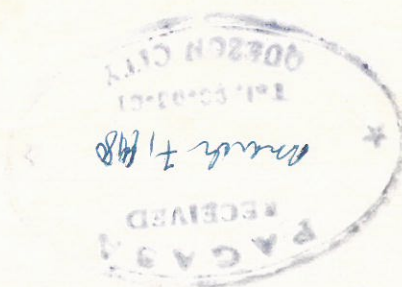
1. held in Bangkok from 13 to 19 November 1979.

Attendance

2. The session was attended by representatives of China, Democratic Kampuchea, Hong Kong, Japan, the Lao People's Democratic Republic, Malaysia, the Philippines, the Republic of Korea, Thailand and Viet Nam and by observers from the United States of America. Observers were also present from the Office of the United Nations Disaster Relief Co-ordinator (UNDRO), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the International Civil Aviation Organization (ICAO), the International Telecommunication Union (ITU), the League of Red Cross Societies (LRCS), the Committee for Co-ordination of Investigations of the Lower Mekong Basin and the Technical Support Unit of the WMO/ESCAP Panel on Tropical Cyclones.

Opening EDDL/cghs

3. Opening addresses were made by the Deputy Executive Secretary of ESCAP and the representative of the Secretary-General of WMO.



UNITED NATIONS
ECONOMIC
AND
SOCIAL COUNCIL



GENERAL

E/ESCAP/172
3 January 1980

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

Thirty-sixth session
18-29 March 1980
Bangkok

PROGRESS REPORTS ON SPECIAL REGIONAL PROJECTS AND
REGIONAL INSTITUTIONS

(Item 6 of the provisional agenda)

REPORT OF THE TYPHOON COMMITTEE ON ITS
TWELFTH SESSION

I. ORGANIZATION OF THE SESSION

1. The twelfth session of the Typhoon Committee was held at Bangkok from 13 to 19 November 1979.

Attendance

2. The session was attended by representatives of China, Democratic Kampuchea, Hong Kong, Japan, the Lao People's Democratic Republic, Malaysia, the Philippines, the Republic of Korea, Thailand and Viet Nam and by observers from the United States of America. Observers were also present from the Office of the United Nations Disaster Relief Co-ordinator (UNDRO), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the International Civil Aviation Organization, the International Telecommunication Union (ITU), the League of Red Cross Societies (LRCS), the Committee for Co-ordination of Investigations of the Lower Mekong Basin and the Technical Support Unit of the WMO/ESCAP Panel on Tropical Cyclones.

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March 3, 1980

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Very truly yours,

B. G. VILLAVICENCIO
Director, External Assistance Staff

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4. The Deputy Executive Secretary welcomed the participants and in particular the representatives of Viet Nam, which had just joined as the tenth member of the Committee. He stressed the urgent need for all the countries in the ESCAP region to attack one of the basic problems of the region - that of mass poverty and unemployment. The Typhoon Committee had a basic role in that drive because many of the enormous annual typhoon losses were borne mainly by the rural poor. He congratulated some of the members for their willingness to increase their commitments in replacing, in part, some of the institutional support previously provided by UNDP and commended the Committee for its initiative in embarking upon the Typhoon Operational Experiment (TOPEX). He concluded by assuring the Committee of the full support of ESCAP.

5. In his message, the Secretary-General of WMO recalled that serious tropical cyclones had affected Sri Lanka, the Caribbean, the United States and the Western Pacific since the Committee's previous session a year before. The damage and loss of life they had caused showed that there was no room for complacency. He considered that the public was often not adequately apprised of the danger or lacked the means to protect itself. The warning dissemination and information exchange component of TOPEX would provide the Committee with a new opportunity to rectify that situation, and he expressed the hope that the current session would give special attention to developing that aspect of the experiment.

6. The representative of Viet Nam thanked the Committee for accepting his country as a full member and pledged that his country would exert its best efforts to co-operate with the other members. The delegations of Viet Nam and the Lao People's Democratic Republic declared their non-recognition of the representatives of Democratic Kampuchea.

7. The delegation of Democratic Kampuchea decisively and categorically rejected the allegations of the delegations of Viet Nam and the Lao People's Democratic Republic.

8. The delegation of China protested against the introduction of that issue into the session.

9. The Committee noted the information provided by the secretariat to the effect that the issue in question had been resolved at the thirty-fourth session of the General Assembly.

/Election of

Election of officers

10. The session elected Mr. P. Sham (Hong Kong) as Chairman of the Committee for the year 1979/80, Mr. Tweek Montrivade (Thailand) as Vice-Chairman and Mr. Cheang Boon Khean (Malaysia) as Chairman of the Drafting Committee.

Agenda

11. The Committee adopted the following agenda:

1. Opening of the session
2. Election of the Chairman and Vice-Chairman
3. Adoption of the agenda
4. The Committee's activities during 1979
 - (a) Meteorological component
 - (b) Hydrological component
 - (c) Disaster prevention and preparedness
 - (d) Training
 - (e) Research
5. Typhoon Operational Experiment (TOPEX)
6. Support for the Committee's programme
7. Programme for 1980
8. Co-ordination with the WMO tropical cyclone project and regional programmes
9. Consideration of the agenda for the thirteenth session of the Committee
10. Date and place of the thirteenth session
11. Scientific lecture
12. Adoption of the report

II. THE COMMITTEE'S ACTIVITIES DURING 1979 (WRD/TC.12/1) (Agenda item 4)

12. The Committee reviewed the progress made in implementing its programme during 1979. Specific mention was made of new observing and telecommunication facilities, services of consultants on disaster prevention and preparedness, training courses and joint collaboration in research activities. The Committee was also informed of further progress made in the expansion of flood forecasting systems.

A. IMPROVEMENT OF METEOROLOGICAL FACILITIES

13. The Committee was pleased to learn that five additional 10-cm radars were being procured in early 1980 by PAGASA and were expected to be installed later in 1980. Those radars were also expected to play a significant role during TOPEX. A survey of the current performance of the existing radars and requirements for spare parts for the radar stations in the Philippines had been undertaken by PAGASA and the Typhoon Committee secretariat (TCS).

14. The Committee was informed that the 10-cm radar at Seoul (Republic of Korea), which had been in use for 10 years, would be overhauled by the end of 1979 and that Osaka and Matsue radars (Japan) were to be replaced by March 1980. The representative of the Republic of Korea informed the Committee that establishment of a 10-cm radar at Cheju was under consideration.

15. The Committee was pleased to learn that the 10-cm radar transferred from Khon Kaen to Chumphon (Thailand) had become operational in December 1979. TCS had assisted in the calibration and adjustment of the Chumphon radar and also in repairing the defective 10-cm radar at Bangkok.

16. The Committee was also informed that a new 10-cm radar had been installed in Penang (Malaysia) and had become operational in the middle of 1979. The installation of another radar at Kluang was expected to be completed in 1980. Radar test equipment worth \$14,000 provided by UNDP had been received by Malaysia. Assistance was given in the calibration of radars at Kuala Lumpur, Kuantan and Kota Baru.

17. The Committee was pleased to learn that the Tokyo-Bangkok direct satellite link was expected to be established by early 1980. The Hong Kong-Beijing link was functioning satisfactorily and the Hong Kong-Bangkok link was expected to improve with the installation of a computer switching system at Bangkok RTH.

18. In Japan, the automatic meteorological data acquisition system (AMEDAS) linking JMA with about 1,300 stations throughout Japan had been established in June 1979.

19. The representative of the Philippines informed the Committee that, with a view to improving the national data collection in the Philippines, new antennae and low frequency band crystals had been installed at some of the observing stations. In that connexion, after consultation with TCS, PAGASA had sent a request for assistance to the Government of Japan for a survey of the existing telecommunication facilities and additional requirements.

20. The Committee was informed that TCS continued to receive quarterly statistics on the monitoring of national data collection and retransmission from the Philippines, Malaysia, the Republic of Korea and Thailand. Results of analysis of those statistics had been circulated to the members concerned.

21. The Committee noted that the Hong Kong coastal radio station had been accepting weather reports from ships equipped with ship-shore telex facilities since 1 April 1979. It was reported that 15 additional ship observations per month had been received under that arrangement.

22. The representative of ITU expressed his organization's interest and concern in developing telecommunication facilities needed in connexion with natural disasters, including typhoons. The Committee noted with interest ITU's proposal, in consultation with WMO, to:

- (a) Undertake a survey and establish a telecommunication map relevant to typhoon operation - both routine as well as to meet an actual disaster situation;
- (b) Undertake or initiate with bilateral or multilateral support, appropriate case studies, projects or pilot projects to remedy deficiencies or inadequacies in telecommunication facilities relevant to typhoon operations.

23. The Committee examined the priority list established by the eleventh session and revised it as given below:

Observing facilities

- (i) Upper-air stations
 - 98223 Laoag (Philippines))
 - 98645 Cebu (Philippines)) 12 GMT RS/RW national projects
- (ii) Weather radar
 - Cheju (Republic of Korea))
 - Tanay (near Manila, Philippines)) National projects
 - Kluang (Malaysia))
- (iii) Satellite receiving equipment
 - (GMS/TIROS-N satellite)
 - Manila)
 - Bangkok, Kuala Lumpur, Hanoi) National projects

(iv) Ocean weather station

Ship at 16°N, 135°E (offered by the USSR in 1978 but no information in 1979)

Telecommunication facilities

(i) Improvement of national data collection facilities

Lao People's Democratic Republic)	
Philippines)	
Thailand (night-time reception)	)	National/bilateral projects
Viet Nam)	

(ii) Regional telecommunication links

Bangkok-Phnom Penh)	
Bangkok-Hanoi (1980)	)	National projects
Bangkok-Tokyo (1980))	

(iii) Other telecommunication facilities

Thailand - Strengthening of RTH Bangkok
- National/bilateral project

Ocean weather ships

24. The Committee was informed that the Japanese ocean weather station "Tango" (29°N, 135°E) had been in operation from May to October 1979. JMA's research vessel "Keifu-Maru" at 20°N, 130°E had made surface and upper-air observations during September-October 1979. Japan had also continued to maintain ocean buoys Nos. 3, 4, 6 and 7 at the former locations.

Exchange of radar fixes

25. Radar fix messages had continued to be exchanged between members as in previous years. The Committee urged members to ensure the regular and prompt exchange of radar messages.

Meteorological satellites

26. The Committee noted with appreciation that the Japanese Geostationary Meteorological Satellite (GMS) had continued to operate satisfactorily in 1979. Cloud imagery was being regularly transmitted in high- and low-resolution formats and other data were being transmitted via GMS.

27. The Committee was informed of members' plans for procurement of satellite ground receiving equipment. It noted that high-resolution satellite receivers were in operation at Beijing, Shanghai and Guangzhou. A high-resolution receiver had become operation in Hong Kong in November 1979. The Republic of Korea had completed the installation of a satellite receiver with dual antenna and computer system for receiving both GMS and TIROS-N high-resolution imagery. The Philippines, Thailand and Malaysia planned to install HR receivers for GMS and/or TIROS-N satellites during 1980.

28. The representative of the United States informed the Committee that his country would continue to issue bulletins containing information on the locations of tropical disturbances based on satellite imagery.

Meteorological reconnaissance flights

29. The Committee noted with appreciation that United States reconnaissance flights in the West Pacific continued to provide valuable data for typhoon warning services. The representative of the United States reiterated that such reconnaissance flights would be continued in the years ahead.

First GARP global experiment (FGGE)

30. The Committee was informed of members' participation in FGGE (1 December 1978-30 November 1979) and in the winter Monsoon Experiment (MONEX) (December 1978-February 1979). The additional contributions made by members of the Committee included two ocean weather ships (China), ships for the tropical wind observing system (Hong Kong and the Philippines), GMS system, additional ships and FGGE data management subcentre (Japan) and the winter MONEX management centre (Malaysia).

31. The Committee was pleased to learn that the data subcentre in Japan had collected and stored the level II-b data on magnetic tape after quality control. Wind vector and sea surface temperatures from GMS had been processed from April 1978 to November 1979 and stored on magnetic tape. In the preparation of the winter MONEX level II-b data set, some of the member countries had undertaken responsibility as data subcentres as stated below:

Hong Kong	:	Commercial ships' data
Malaysia	:	Special synoptic data, precipitation data and satellite imagery
Philippines	:	Radar imagery
Thailand	:	Agrometeorological data

B. HYDROLOGICAL COMPONENT

32. The Committee was informed that work was continuing on the development of flood forecasting systems in the Agno, Bicol and Cagayan River basins in the Philippines and in the Kinabatangan River basin in Sabah and Sadong River basin in Sarawak, Malaysia. In the Philippines and the Republic of Korea, efforts had been made to improve the flood forecasting systems in the Pampanga and Han River basins respectively. It was noted that a new telemetering system was being installed in the Dae-chung Dam watershed in the Geum River basin in the Republic of Korea, and a VHF system was being installed in the Johore River basin in Malaysia. China also had plans for the installation of telemetering networks in some small watersheds.

33. A flood risk map had been prepared for the Pampanga River basin based on historical records of inundated areas during past floods. Such maps were needed for the risk analysis and economic analysis of flood mitigation works.

34. In Japan, 743 rain gauging stations, 698 stream gauging stations and 173 combined rainfall and river gauging stations had been set up by the Ministry of Construction, all linked in telemetered networks; most of them were used for flood forecasting and warning systems already operational in 17 major river basins in the country.

35. The Committee noted that there was a need for the development of hydrological forecasting systems as an aid for dam operations. As an example in the Philippines, damage had been suffered in October 1978 following typhoon "Kading", when the flooding in an already swollen stream downstream from a dam had been further exacerbated by the releases from the dam to draw down the reservoir level. It was felt that that problem should be considered by all members to ensure that existing operating procedures did not result in untimely major releases from dams during typhoons. The Government of Japan had sent a survey team to the Philippines in connexion with the development of flood forecasting and warning systems for the watersheds of all dams.

36. The attention of the Committee was invited to the improvement made in Japan in the measurement of precipitation by radar equipped with a colour display and linked with a minicomputer. One such radar system would be able simultaneously to monitor rainfall over several adjacent small watersheds. The Committee expressed interest in that system and requested TCS to disseminate relevant information about that and other similar systems to the members.

37. The Committee noted with concern that no progress had been made in 1979 in implementing the pilot flood forecasting system in the Se Bang Hien River basin in the Lao People's Democratic Republic. That country had suffered from catastrophic floods during August 1978. It was noted that the Lao People's Democratic Republic was reorganizing its hydrological and meteorological services and it was hoped that the country could now make effective use of possible assistance from the Typhoon Committee, UNDP and the Mekong Committee in the coming year.

38. The Committee was informed that Thailand had submitted a request to the Government of Japan for assistance on a number of development projects, including the implementation of the MaeKlong River basin flood forecasting system. It also learned that, subject to the assignment of priority to that project by Thailand, the Government of Japan was prepared to consider the possibility of such assistance.

Flood loss prevention and management

39. It was noted that none of the members has been able to select pilot areas or basins for which comprehensive plans for flood loss prevention and management could be prepared as called for in the programme adopted by the Committee at its eleventh session. It was agreed that there was a need to organize a mission to advise members in the selection of pilot areas or basins for comprehensive flood loss prevention and management. The Committee therefore recommended that such a mission be mounted, if possible, with the following terms of reference:

- (a) To advise and assist in the selection of a pilot basin for flood loss prevention and management;
- (b) To advise on information and data required for the formulation of comprehensive plans for flood loss prevention and management for the selected pilot basin;
- (c) To provide general guidelines and procedures for the formulation of the comprehensive plans mentioned in item (b) above.

C. DISASTER PREVENTION AND PREPAREDNESS

40. The developments under this component during 1979 are summarized below:

Philippines

41. The PAGASA-OCD broadcast station, dedicated to weather and allied information, was expanded and improved through the acquisition of studio equipment and accessories, erection of the transmitter tower and the installation of a radio link from the studio to the transmitter. The Emergency Broadcast System was extended to several regions.

42. In connexion with the proposed establishment of a training and research centre for disaster prevention and preparedness, an UNDRO consultant made a survey in the Philippines during June-July 1979. His report, which included a recommendation for establishment of a disaster research and training centre in the Philippines, was under consideration by the Government.

Republic of Korea

43. A pamphlet published by the Ministry of Construction in May 1979 shows the latest organization of the Disaster Prevention Centre. The work assigned to the centre includes implementation and supervision of flood control projects, conduct and supervision of disaster rehabilitation, and establishment, management and supervision of communication facilities.

Thailand

44. At the request of the Government of Thailand, WMO arranged the services of a consultant from the National Disasters Organization of Australia for one month during February-March 1979. He assisted the Department of Local Administration in organizing special courses in disaster prevention and preparedness in Thailand. The representative of Thailand reported that the first Civil Defence Law had been promulgated in March 1979.

Malaysia

45. With reference to the survey conducted by the LRCS consultant in 1978, the representative of Malaysia informed the Committee that some of the recommendations made by the consultant had already been implemented.

Proceedings of the Regional Seminar on Community Preparedness and Disaster Prevention

46. The proceedings of the Regional Seminar held at Tokyo in June 1976 were printed by ESCAP (Water Resources Series No. 49) and arrangements were made for distribution to all concerned.

/Guidelines

Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas

47. In pursuance of the eleventh session's recommendation, additional copies of the Guidelines were supplied to the directors of the meteorological services for distribution to the agencies concerned.

ARTIC seminar report

48. Following the cyclone and storm surge disaster in Andhra Pradesh (India) in November 1977, the Appropriate Reconstruction Training and Information Centre (ARTIC) held a seminar in August 1978 to discuss the successes and failures in the relief operation. At the suggestion of UNDRO, the proceedings of the seminar were distributed to members through TCS.

D. TRAINING

49. The Committee noted with appreciation that, in pursuance of the offer made at the eleventh session, the Government of Japan had organized group training courses in river engineering from 3 August to 4 December 1979 and another course in meteorology (radar operation and maintenance) from 4 October 1979 to 3 February 1980. It was noted with satisfaction that a TCS expert had given lectures to the training course in meteorology for one week.

50. The Committee also noted with appreciation that Japan had organized two additional group training courses, namely on (a) flood loss prevention and management from 27 September to 2 November 1979 and (b) technology for disaster prevention from 3 October to 17 December 1979.

51. The Committee noted with satisfaction that a WMO/United Nations regional training seminar on the interpretation, analysis and uses of meteorological satellite data had been held at Tokyo from 23 October to 2 November 1978 and that participants from most members had attended the seminar. The Committee was also pleased to note that a UNDP/WMO regional training seminar on flood forecasting had been organized at Nanjing (China) from 8 October to 8 November 1979. Malaysia, the Philippines and Thailand had each sent three participants to that seminar.

52. The Committee noted with satisfaction that the RA II-RA V roving seminar on "intense precipitation and floods" organized by WMO had visited six countries during November 1978 to March 1979, including two members of the Typhoon Committee (the Philippines and Malaysia).

53. The Committee was informed that the WMO Training Seminar on Tropical Cyclone Hydrology and Flood Forecasting would be held at Miami from 11 February to 4 May 1980 and that a similar seminar might be held in 1981 or 1982.

54. With reference to the proposed regional training seminars listed for 1980 and 1981 under the hydrology component of the short-term programme endorsed by the eleventh session, a proposal had been sent by ESCAP and WMO to UNDP for support for those seminars. The topics of the seminars were (a) flood loss prevention and management, (b) urban hydrology and (c) repair and maintenance of electronic equipment used in flood forecasting and warning systems. UNDP had given advance authorization for support for those seminars.

55. The Committee was informed that the proposal sent by ESCAP and WMO to UNDP for support to the regional typhoon programme during 1980-1981 included (a) support for a symposium on typhoons to be held in China in October 1980 and (b) support for study group visits to China on (i) flood control in 1980 and (ii) watershed management for flood loss prevention and management in 1981. UNDP had given advance authorization for (a), while (b) would be approved on receipt of official confirmation from the Government of China.

56. In connexion with the establishment of an automatic switching system at Bangkok RTH, the Committee noted with satisfaction that arrangements were being made for the Royal Observatory, Hong Kong, to provide training to four members of the Thai Meteorological Department on message switching programmes and techniques.

57. The Committee noted with satisfaction that the telecommunication and electronics expert of TCS had provided on-the-job training in radar calibration and maintenance to radar technicians in Malaysia and Thailand. He had also conducted an intensive one-month training course on radar theory and circuit analysis at Manila for PAGASA.

58. The representative of the United States renewed his country's offer of assistance in the field of training through the WMO Voluntary Co-operation Programme (VCP), in particular for short-term courses in meteorology.

59. The Committee was informed that USAID would sponsor a seminar on disaster preparedness at Manila in 1980, which would in particular be meant for disaster mitigation planners.

60. The representative of the Philippines drew attention to the availability of facilities for training in meteorology for a Master's degree at the University of the Philippines and informed the Committee that candidates from members would be welcome for such training. Fellowships could be sought either through WMO/VCP or from other sources.

E. RESEARCH

61. The Committee noted with satisfaction that the Royal Observatory, Hong Kong, had continued to produce objective forecasts of typhoon tracks by computer programming of selected techniques and that those forecasts had been disseminated to members for operational use. The Committee was further informed that multiple regression equations based on space mean charts at several levels were being developed by the Royal Observatory for forecasting the movement of tropical cyclones.

62. The Committee was informed that the barotropic model for typhoon track forecasting in the Philippines had been further improved and statistics were being compiled for performance verification. A technical report was expected to be available in the near future. A two-layer primitive equation baroclinic model was also being programmed for forecasting typhoon tracks.

63. As to the typhoon moderation research programme in the Philippines, the Committee was informed that a feasibility study had been completed with the help of a group of experts from the United States. The scientific basis for such a programme had been studied and a detailed experiment design formulated. The Committee was further informed that, initially, the emphasis would be on monitoring of relevant parameters before undertaking an actual experiment.

64. The Committee noted with satisfaction that a technical paper by Mr. Patipat Patvivatsiri (Thailand) on heavy rainfall over Thailand related to tropical cyclones in 1975 had been published. A study of the precipitation patterns in the Philippines associated with different types of typhoon tracks had been completed by TCS. Papers on both those studies would soon be available for distribution.

65. Mr. P. Sham (Hong Kong), co-ordinator for the joint study on tropical cyclone prediction by objective techniques, presented a progress report on the study carried out for selected tropical cyclones during 1978. The Committee was informed that after consultations between the co-ordinator, research correspondents and TCS, it had been agreed that that joint study would be

suspended from 1979 as similar studies could be resumed later with the more extensive data coverage expected during TOPEX. The co-ordinator made several recommendations in his progress report regarding the further planning of comparisons of objective techniques. The Committee recommended that the two progress reports on the joint studies on tropical cyclones during 1977 and 1978 be passed on to the co-ordinator of the Preparatory Committee for TOPEX (meteorological component).

66. Extracts were presented from a progress report prepared by Dr. M. Miyazaki (Japan), co-ordinator for the joint study on storm surges. The Committee was informed that a technical report prepared by Arafles and Alcances on storm surges in the Philippines had been printed and distributed to members. A report entitled "Progress in storm surge studies in Hong Kong" had also been circulated. The Committee was further informed that forecasting of storm surges in Victoria Harbour (Hong Kong) based on improved numerical models had been computerized for operational use.

67. The Committee was informed that in the Republic of Korea the collection and analysis of storm surge data had been carried out for the period 1960-1978 by using the data of 10 tidal stations and related weather maps. During that period, maximum peak surges had exceeded 1 metre in six cases only.

68. Reference was made to the study of storm surges undertaken in the Bay of Bengal area, which had been considered by the Panel on Tropical Cyclones, at its sixth session held in February-March 1979. The Committee supported the Panel's recommendation for a technical conference on storm surge prediction.

69. The representative of Viet Nam informed the Committee that studies on forecasting typhoon movement had been undertaken in his country. A statistical model based on multiple regression equations was being tested at present.

70. In pursuance of the eleventh session recommendation that at future sessions of the Committee members should bring with them lists of papers published since the previous session, the representative of Japan distributed a list of meteorological papers related to typhoons which had been published in Japan during 1978-1979.

/III.

III. TYPHOON OPERATION EXPERIMENT (TOPEX)
(WRD/TC.12/2 and 3)
(Agenda item 4)

71. The Committee recalled that TOPEX was the outcome of a proposal made by China and supported by Japan at the eleventh session. It had been decided that TOPEX would be carried out as part of the Typhoon Committee's programme and as a subproject of the WMO tropical cyclone programme. The Eighth World Meteorological Congress (May 1979) had commended the Committee for its initiative in planning TOPEX, urged members of WMO, especially those participating in the programmes of the Committee, to support the experiment to the maximum extent possible and requested the Secretary-General to assist in the planning and execution of TOPEX in co-operation with ESCAP.

72. As requested by the Committee, WMO had organized a Preparatory Meeting on TOPEX at Tokyo in July 1979. The Preparatory Meeting had defined the objective of TOPEX as being the reduction of the loss of life and damage from typhoon winds, floods and storm surges by improving the forecasting and warning capabilities of members of the Typhoon Committee. It had set forth the aims whereby the Experiment might achieve that objective. It had further determined the composition of TOPEX, stated the benefits that might be expected and defined the experimental area and a time schedule for its conduct. The Preparatory Meeting had begun the initial planning of the three components of TOPEX and made interim arrangements for the management of the further planning and execution of the Experiment.

73. The Committee examined the report of the Preparatory Meeting as well as information on the measures taken since that Meeting. The Committee decided to endorse the report of the Preparatory Meeting and wished to record its appreciation of the progress made in the year since its eleventh session. One of the major points discussed by the Committee was the future arrangements for the management and co-ordination of TOPEX activities and the scope of participation in the Experiment.

74. The Committee agreed to establish a Management Board for TOPEX comprised of a representative of each member of the Typhoon Committee wishing to participate in the management of the Experiment. It approved the following terms of reference for the Management Board:

/(a)

- (a) The Management Board should manage all phases of TOPEX from planning to evaluation of the results of the Experiment;
- (b) The Management Board should take all decisions necessary to achieve the objectives of TOPEX without need to refer to the Typhoon Committee;
- (c) The Management Board may set up sub-committees to plan and manage various aspects of the Experiment and invite non-Typhoon Committee members to co-operate and participate in TOPEX without need to refer to the Typhoon Committee;
- (d) The Management Board should report on progress to the Committee at its annual session.

75. The Committee further agreed that steps should be taken by members so that their designees to the Management Board might attend the First Planning Meeting on TOPEX when the Board would be formally established and its work programme finalized. WMO was requested to take urgent action through the permanent representatives with WMO to secure member's designations to the Management Board. The Committee requested ESCAP, WMO and TCS to arrange for their representatives to participate in all meetings of the TOPEX Management Board. It was decided that the Preparatory Committee for TOPEX (meteorological component) and the system of focal points should continue until such time as the Management Board had been formally established. The First Planning Meeting on TOPEX, scheduled to take place at Tokyo from 5 to 14 June 1980, would then decide on the arrangements required to ensure co-ordination of each of the three components of TOPEX.

76. In that context, the Committee also considered the desirability of inviting experts to attend the First Planning Meeting in order that advantage might be taken of the experience available in other parts of the world in conducting similar experiments. It decided to request WMO, after consultation with the Co-ordinator of the Preparatory Committee (meteorological component), to extend invitations to suitable experts. Attention was also drawn to the need to invite representatives of international organizations supporting the TOPEX programme, such as UNDP, UNDRO, UNEP and LRCS, to attend the Meeting.

77. Reference was further made to the benefits of experts participating in the planning work for TOPEX through periods of secondment by their national services. The Committee considered that that possibility should be considered by the Management Board at the time of the First Planning Meeting.

78. Advantage was taken of the presence at the session of the Co-ordinator and most of the focal points forming the Preparatory Committee (meteorological component) to hold a short informal meeting. As a result of those discussions, a draft provisional agenda for the First Planning Meeting was drawn up as a basis for the further preparations.

79. The Committee endorsed the principles stated in the report of the Preparatory Meeting on TOPEX concerning the hydrological component and was of the opinion that TOPEX was important for improving hydrological forecasting in the region. In particular, TOPEX, through its intensive observing system, should be able to provide meteorological forecasts including forecasts of quantity, intensity, time and location of precipitation associated with the selected typhoons. Those forecasts would provide the needed input to hydrological forecasts, thus ensuring the desirable link between the meteorological and the hydrological components. That would also demonstrate one of the benefits to be derived from TOPEX. It would therefore be necessary to make provision in TOPEX to meet such requirements of hydrological forecasting as quantitative precipitation forecasts.

80. It was also noted that WMO had already requested the hydrological focal points to submit specific proposals before the end of 1979 for the development of the hydrological component of TOPEX, so that it could be submitted to the First Planning Meeting in 1980.

81. The Committee recognized that, as the hydrological component was principally a national activity, the preparation of detailed specifications would depend on the information to be furnished by members. On the basis of the available information the Committee endorsed some guidelines for further planning, which are given in the annex to this report.

82. The steps taken by WMO to initiate a TOPEX newsletter in response to the request of the Preparatory Meeting were noted with satisfaction. The Committee further noted that the first issue was expected in early 1980 and requested WMO to arrange for the distribution of subsequent issues at regular intervals. It suggested that members should communicate developments in national preparations for TOPEX to the WMO secretariat to facilitate the up-to-date dissemination of information on TOPEX to a wide audience. It drew attention to the role of the newsletter as a means of securing additional support for the execution of TOPEX.

83. The representative of the United States pointed out that TOPEX was an ambitious undertaking which would require the use of expertise from other parts of the world. He considered that care should be taken not to duplicate work already carried out elsewhere in order to conserve the resources available for the Experiment. It would also be necessary to promote to the maximum extent TOPEX activities in order to secure assistance from as many sources as possible.

84. The representatives of UNDRO and LRCS expressed their pleasure at the invitation they had received to participate in TOPEX, especially in the warning dissemination and information exchange component. Both indicated their readiness to support TOPEX within the resources available to them. At the suggestion of LRCS, it was agreed that discussions should be held between WMO, UNDRO and LRCS with the object of preparing by early 1980 a draft programme of the activities to be pursued under the warning dissemination and information exchange component of TOPEX. UNDRO proposed that members participating should submit, prior to the First Planning Meeting, papers outlining the present situation and presenting proposals for the pre-experiment.

/IV.

IV. SUPPORT FOR THE COMMITTEE'S PROGRAMME
(WRD/TC.12/4)
(Agenda item 6)

85. The Committee had before it document WRD/TC.12/4, which reviewed the known requirements to implement the Committee's programme and the possible sources of support. Those were: the members themselves under national programmes and TCDC, non-member co-operating countries, WMO/VCP, UNDP, UNDRO, UNEP and LRCS, and assistance from bilateral and multilateral sources.

86. The items already identified as requiring support were: (a) TCS co-ordinator/manager; (b) TCS meteorologist; (c) TCS hydrologist; (d) TCS flood control expert; (e) disaster preparedness expert on short-term assignment; (f) revolving fund for the purchase of urgently needed equipment and spare parts; and (g) experts for an advisory mission on comprehensive flood loss prevention and management.

87. In addition, a project proposal had been submitted to UNDP for its assistance in financing during 1980-1981 the following items: (a) a two-year extension of the support provided by UNDP; (b) continuation of the WMO expert in meteorological telecommunication and electronics; (c) increased funds for travel; (d) a limited number of short-term fellowships; (e) a symposium on typhoons to be held in China; (f) participation of certain countries in TOPEX; (g) equipment; (h) regional training seminars; (i) two study group visits to China (one each for 1980 and 1981); and (j) additional consultant services in connexion with the TOPEX programme.

88. It was pointed out that in addition to the requirements enumerated in paragraphs 86 and 87 there could be additional ones which the Committee might identify arising from new developments such as the admission of Viet Nam as a new member. The representative of Viet Nam requested UNDP assistance in the procurement of equipment and the representative of the Lao People's Democratic Republic requested WMO assistance in the reactivation of the Vientiane-Bangkok point-to-point circuit and the provision of a 10-cm weather radar at Vientiane, on which agreement had previously been reached.

89. The Committee expressed the view that there was a need for an over-all co-ordinator for TOPEX, who should be provided by UNDP. It therefore suggested that the period for consultant services requested under item (j) in paragraph 87 be increased from 12 man-months to 24 man-months starting from the beginning of 1980 to enable a full-time over-all co-ordinator for TOPEX to be recruited. It requested WMO to approach UNDP and seek an early decision on the matter.

90. The representative of UNDP reaffirmed the continued interest of UNDP in the important work of the Committee. He announced that UNDP had already issued an advance authorization covering items (a) to (h) mentioned in paragraph 87 with the addition of consultant services for a total of 8 man-months in disaster preparedness, radar meteorology and storm surge prediction. That authorization covered all the components announced at the eleventh session as consisting UNDP support for the years 1980 and 1981 with the exception of two study tours in China which would be added to the project on receipt of official confirmation from the Chinese Government.

91. With reference to the 12 man-months of consultant services for work connected with TOPEX (item j) requested by WMO, the representative of UNDP said that UNDP would prefer the work to be undertaken along TCDC lines. In any case, support for TOPEX could not be considered by UNDP until the programme had been planned in more detail and the inputs by participating Governments had been decided. Furthermore, UNDP did not support basic research or experiments; the sub-experiment appeared to be sophisticated and much of the area selected fell outside the jurisdiction of Committee members. With regard to the suggestion that the Co-ordinator of TOPEX should be financed by UNDP, he pointed out that such a Co-ordinator had not been foreseen in the report of the TOPEX meeting. He appealed to the Committee members to look more to TCDC arrangements, for which UNDP support could be requested; he felt confident that members could provide qualified and able people.

92. The Committee responded to the views of the representative of UNDP by clarifying that both the core and sub-experiments were not the basic research type of experiment but they were of definite operational application. The core and sub-experiments were designed to help members to understand the structure and behaviour of typhoons and to improve forecasting of typhoons and risk of floods for the mitigation of damage. The Committee felt strongly that the services of a consultant as a co-ordinator were necessary at the earliest possible date, and preferably from the beginning of 1980, in order to undertake the co-ordination of the large amount of planning work required under the different components of TOPEX.

93. The UNDP representative assured the members that he would convey the views of the Committee to UNDP.

94. The representative of UNDP requested members to expedite endorsement of the budget revision submitted to their Governments through the regional or resident representatives of UNDP. He thanked the Government of Japan and non-Typhoon Committee members for the valuable support extended to the work programme.

95. The Committee expressed appreciation to the Philippines for its readiness to provide the TCS co-ordinator/manager and meteorologist as well as office facilities and supporting staff. It was understood that official external travel and per diem expenses of those staff would be charged to the UNDP project.

96. The Committee also welcomed the information that Japan would provide a replacement for the TCS hydrologist when his contract expired. It noted that the provision of a flood control expert for TCS was still under consideration.

97. The Committee also welcomed the offer of China to provide the services of a meteorologist to TCS on a short-term basis (six months) in 1980, whose official travel and per diem expenses would be charged against the UNDP budget.

98. The Committee welcomed the statement of the representative of Japan that if it received a request from ESCAP it would be prepared to provide three experts for an advisory mission to assist members in the selection of pilot basins for comprehensive flood loss prevention and management for a total duration of one month during the period January/February 1980.

99. Following the Eighth World Meteorological Congress, at which TOPEX had been warmly received, the support to the Typhoon Committee's programme would be strengthened for the period 1980-1983. In addition to that, the services of two sectoral advisers were available on request for short visits to members to help to initiate new technical co-operation projects.

100. The Committee noted with appreciation that LRCS and UNDR0 were prepared to support the activities of the Committee in disaster preparedness and prevention.

101. The Committee further noted with appreciation that UNEP was ready to assist the Committee in its work concerning dissemination of early warnings of natural disasters.

102. The Committee recorded its warm appreciation to UNDP for its continued support and for the valuable advice of its representative.

V. PROGRAMME FOR 1980
(WRD/TC.12/5 and WRD/TC.12/CRP.1)
(Agenda item 7)

103. In considering its programme for 1980, the Committee took into account the latest developments under each component of its activities and expected assistance from external sources. The fact that the execution of TOPEX would bring new activities in the years ahead was fully considered. Recognizing that a number of national activities of particular interest to the Committee would

be carried out by its members, the Committee directed that special attention be given, with the assistance of its secretariat, to the following items of work in 1980:

Meteorological component

- (a) Operation and maintenance of electronic equipment (RS/RW, radar, radar picture transmission, satellite receiving and telecommunication equipment);
- (b) Establishment of new radar stations in Malaysia, the Philippines and the Republic of Korea;
- (c) Provision of test equipment and spare parts and training of technicians for calibration and maintenance of weather radars;
- (d) Improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;
- (e) Establishment of suitable receiving equipment for reception of cloud imagery and other data from GMS and TIROS-N satellites;
- (f) Review of national data collection facilities and data exchanges needed for typhoon warning services, including periodical monitoring and taking of remedial measures, where necessary;
- (g) Preparations for TOPEX, including those for the First Planning Meeting, on the basis of the tentative programme recommended by the Preparatory Meeting in July 1979;
- (h) Introduction of a common system of identification of tropical cyclones in the western North Pacific and the South China Sea;
- (i) Organization of the Symposium on Typhoons to be held in China in October 1980.

Hydrological component

- (a) Establishment of a pilot flood forecasting system in Thailand, with possible assistance from the Government of Japan;
- (b) Establishment of flood forecasting systems in the Agno, Bicol and Cagayan River basins in the Philippines and in the Kinabatangan River basin in Sabah and the Sadong River

basin in Sarawak (Malaysia), with further assistance from the Government of Japan;

- (c) Further improvement in the operation of flood forecasting systems in the Pampanga River basin (Philippines) and in the Han River basin (Republic of Korea) and expansion of flood forecasting in the Nagdong and Geum River basins (Republic of Korea);
- (d) Development of flood forecasting and warning systems for dam operation;
- (e) Selection, investigation and survey of the pilot areas yet to be chosen by members for comprehensive flood loss prevention and management; organization of an advisory mission in this connexion with assistance from the Government of Japan;
- (f) Continuation of determination of magnitudes and frequency of floods in flood-prone zones subject to heavy damage, and preparation of flood-risk maps;
- (g) Preparations for activities under the hydrological component of TOPEX;
- (h) Organization of a study group visit to China.

Disaster prevention and preparedness

- (a) Promotion of studies and exchange of experience to develop more efficient methods of assessment and reporting of damage and consequent needs;
- (b) Advice and assistance with training in techniques of community preparedness, through consultancy services where appropriate;
- (c) Promotion of studies and exchange of experience on human response to warnings;
- (d) Follow-up action on the joint LRCS/WMO/ESCAP missions (1973-1976), the recommendations of the Regional Seminar held at Tokyo in 1976, the Review Mission's recommendations in 1978, and the consultants' reports on Malaysia, the Philippines and Thailand in 1978-1979;

- (e) Improvements in the dissemination of typhoon and flood warnings, exchange of information on disaster situations between concerned agencies and related measures to minimize damage (this refers to the warning dissemination and information exchange component of TOPEX).

Training

- (a) Training of personnel through group training courses in Japan and other fellowships through bilateral and VCP assistance. Short-term training courses on maintenance of radar, satellite receiving equipment and telemetering equipment might be given special consideration;
- (b) Participation in seminars on principles of flood loss prevention and management and on urban hydrology, and other seminars relevant to the Committee's programme;
- (c) On-the-job training by TCS experts, particularly in the operation and maintenance of radar (including measurement of precipitation by radar), satellite receivers and telecommunication equipment.

Research

- (a) Stimulation of research activities through advisory services, visits of study groups and exchange visits by research personnel;
- (b) Encouragement for members to undertake research on typhoons, especially on topics relating to their particular area, and promotion of joint collaboration on selected topics, such as studies directed towards the development of improved storm surge prediction methods;
- (c) Promotion of exchange of information on typhoon research activities, including developments on related matters outside the region;
- (d) Initiation of provisional studies on disaster risk evaluation in typhoon-prone areas, including flood risk mapping.

104. The Committee welcomed the statement made by the representative of Japan that his Government was considering the provision of the following assistance in the field of training during 1980:

- (a) Group training courses in meteorology (weather prediction techniques) and in river engineering to be organized in Japan with the support of JICA;
- (b) One or two experts from JMA likely to be sent to one member to hold a seminar on forecasting techniques for a period of about one month;
- (c) If requested and financially supported by WMO, JMA would be ready to send an expert on satellite data collection and reception systems for field service to some members.

Common system of identification of tropical cyclones

105. Noting that different systems were being used by members to identify tropical cyclones in the western North Pacific and the South China Sea, often leading to confusion and difficulties to users, the Committee endorsed the proposal by Hong Kong to introduce a common system. It agreed:

- (a) That a number in closed parentheses composed of 4 digits (the first two digits to indicate the year and the last two digits to indicate the sequential number of the tropical cyclone in that year: thus (8005), being the fifth tropical cyclone in 1980), should be adopted as a common system of identification;
- (b) That the common system should come into effect on 1 January 1981;
- (c) That the First Planning Meeting on TOPEX should propose to the Committee at its thirteenth session a minimum wind speed required for assigning a number to a tropical cyclone and suggest the name of a member which would be responsible for assigning and maintaining a record of such numbers.

VI. CO-ORDINATION WITH THE WMO TROPICAL CYCLONE PROJECT AND REGIONAL PROGRAMMES (WRD/TC.12/6 and WRD/TC.12/7) (Agenda item 8)

106. The Committee examined the information submitted on the progress achieved in the implementation of the WMO tropical cyclone project as given in the fifth status report on activities up to 30 June 1979. Later developments were also outlined.

107. The steps taken by the Eighth Congress to strengthen the support to those activities and to upgrade the project to the new WMO tropical cyclone

programme in the period 1980-1983 were welcomed by the Committee. The Committee noted that the Congress had unanimously decided that it was essential to strengthen and intensify the programme in the years ahead and considered that that decision largely met the requests made by Committee members following the eleventh session. It further noted that the Eighth Congress had expressed great interest in TOPEX and had commended the Committee for its initiative in planning the Experiment by adopting resolution 9 (Cg-VIII).

108. The Committee was informed that the tropical cyclone programme (TCP) for the years 1980-1983 would consist of three main components - meteorological, hydrological, and prevention and preparedness. In addition, the present division into general (formerly global) and regional components would continue, the first dealing with activities of application to all WMO members in tropical cyclone areas, while the second would be devoted to activities of more restricted application, normally those directly related to the programmes of the regional cyclone bodies.

109. Under the general component, the Committee noted that a new publication, Operational Techniques for Forecasting Tropical Cyclone Intensify and Movement, had recently been issued. It recalled that that publication was the outcome of a subproject in which Hong Kong, Japan and TCS had participated. The Committee expressed its view that that publication, as well as others already issued under TCP, would be valuable to its members in relation to their participation in TOPEX.

110. The Committee considered that the guidance material produced under the general component of TCP was of great value to developing countries affected by tropical cyclones. It recorded its gratitude to all who had taken part in the preparation of the publications, expressing its conviction that that work was an important feature of TCP which should be pursued with vigour.

111. It further noted with interest the progress being made by the other cyclone bodies under the regional component. It reiterated its previous request for regular exchange of information on those activities through TCP. The need for continued co-ordination of regional activities with all the WMO members concerned and with international organizations such as UNDP, UNDR0, UNEP and LRCS was stressed. It was also suggested that good co-ordination of the Committee's programme with those of the other regional cyclone bodies might be ensured if, to the maximum extent possible, the same WMO secretariat staff were to be responsible for support to all the bodies.

112. The Committee also considered information on the work of interest to its members being carried out under the WMO programme on research in tropical meteorology. It noted in particular that the various recommendations originating from an expert meeting held at Fort Collins, United States, in July 1979 had dealt mainly with the compilation and archiving of tropical cyclone data for research purposes. The Committee agreed on the desirability of initiating projects for that purpose and stressed the need for its members to co-operate closely with the Commission for Atmospheric Sciences (CAS) in promoting those objectives.

113. The Committee further stressed that its own long-term programme, as adopted at the eleventh session, was directed essentially at improving the operational capability of its members to combat the direct effects of tropical cyclones. The research aspects of that programme were limited and oriented to specific operational activities. The Committee was of the opinion that adequate arrangements already existed through WMO for members to participate in the work of CAS and that it would not be appropriate to expand its own programme by undertaking large-scale research projects for which it could not furnish the necessary resources.

114. On the general subject of research on tropical cyclones, the Committee drew attention to the need to keep in mind the priorities given to the various activities to ensure that the major effort was devoted to the operational aspects directly related to the safety of human life and property. It was felt that TOPEX would help by giving an indication of the minimum data requirement for tropical cyclone forecasting by numerical methods.

115. There remained major problems such as the lack of progress in techniques for forecasting tropical cyclones and in the present inability of GTS to handle large amounts of high-resolution synoptic data to cope with forecasting requirements for small-scale weather phenomena in the region.

116. The Committee welcomed the efforts being made by the Commission for Basic Systems towards an integrated observing system and the reconsideration being given to the technical structure of WMO. In that connexion, the Committee proposed that members should put forward their ideas through participation in related WMO activities.

VII. CONSIDERATION OF THE AGENDA FOR THE THIRTEENTH
SESSION OF THE COMMITTEE
(Agenda item 9)

117. The Committee requested the ESCAP and WMO secretariats, in consultation with TCS, to prepare the detailed agenda for the thirteenth session, which should include a scientific lecture on the scientific plan for TOPEX. It was agreed that members would inform ESCAP, WMO and TCS at an early date of any appropriate subjects which they might wish to propose for the next session.

VIII. DATE AND PLACE OF THE THIRTEENTH SESSION
(Agenda item 10)

118. The Committee welcomed with appreciation the tentative offer of the representative of the Philippines to provide, subject to confirmation, host facilities for the thirteenth session of the Committee. It noted his suggestion that the thirteenth session be held some time between the last half of November and the first week of December 1980.

IX. SCIENTIFIC LECTURE
(Agenda item 11)

119. The following scientific lecture was presented by Mr. T. Nitta of Japan:

"Scientific and technological background of the Typhoon Operational Experiment (TOPEX)."

120. The Committee recorded its thanks to Mr. Nitta for his presentation and to the Government of Japan for providing the services of Mr. Nitta as a consultant to it. The Committee also thanked the United States and Hong Kong for showing motion pictures on typhoons.

X. RECOGNITION OF MR. SEN'S RETIREMENT

121. The Committee noted with regret the retirement of Mr. S.N. Sen on 31 December 1979. His 12 years of dedicated service as the Chief Technical Adviser of the Typhoon Committee were recognized with appreciation by all.

XI. ADOPTION OF THE REPORT
(Agenda item 12)

122. The Committee adopted its report on 19 November 1979.

/Annex

Annex

GUIDELINES FOR FURTHER PLANNING OF THE HYDROLOGICAL
COMPONENT OF TOPEX

1. Proposed pilot river basins:

Han (Republic of Korea)

Se Bang Hieng)

Nam Ngum) (Lao People's Democratic Republic)

Kelantan (Malaysia)

Pampanga (Philippines)

Maeklong (Thailand)

Puyang)

Jian) (China)

Other members should designate the basins as soon as possible.

2. WMO, in co-operation with TCS, should circulate a questionnaire to obtain the following information on the basins:

(a) Basin area, location and other characteristics

(b) Existing hydrological and meteorological observing stations (to provide catchment maps if not already available with TCS)

(c) Data collection and transmission facilities

(d) Description of existing hydrological forecasting systems

(e) Description of the hydrological model being used

(f) Availability of computer facilities

(g) Whether affected by storm surges

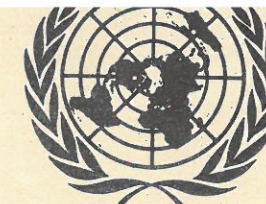
(h) Available flood risk studies and maps

In addition, information should be obtained on the availability of expertise in hydrological forecasting and the need for consultant services.

3. As far as possible the need for expert services should be satisfied from within the Typhoon Committee. TCS or WMO may be requested to provide short-term consultant services if necessary.

4. The experts designated to the TOPEX Management Board should be accompanied to planning meetings by the hydrological experts responsible for the pilot basins as far as possible.
 5. The existing or new models should be calibrated in each basin prior to the experimental phase (1 August-15 October) so that the best use can be made of the information which would be generated by the meteorological component.
 6. Proposals for the hydrological component made by Japan should be taken into account as appropriate, especially with respect to the strategy to be adopted for the step-by-step improvement of flood forecasting and warning services in the pilot basins.
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UNITED NATIONS
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GENERAL

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ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

Thirty-sixth session
18-29 March 1980
Bangkok

PROGRESS REPORTS ON SPECIAL REGIONAL PROJECTS AND
REGIONAL INSTITUTIONS

(Item 6 of the provisional agenda)

REPORT OF THE TYPHOON COMMITTEE ON ITS
TWELFTH SESSION

I. ORGANIZATION OF THE SESSION

1. The twelfth session of the Typhoon Committee was held at Bangkok from 13 to 19 November 1979.

Attendance

2. The session was attended by representatives of China, Democratic Kampuchea, Hong Kong, Japan, the Lao People's Democratic Republic, Malaysia, the Philippines, the Republic of Korea, Thailand and Viet Nam and by observers from the United States of America. Observers were also present from the Office of the United Nations Disaster Relief Co-ordinator (UNDRO), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the International Civil Aviation Organization, the International Telecommunication Union (ITU), the League of Red Cross Societies (LRCS), the Committee for Co-ordination of Investigations of the Lower Mekong Basin and the Technical Support Unit of the WMO/ESCAP Panel on Tropical Cyclones.

Opening addresses

3. Opening addresses were made by the Deputy Executive Secretary of ESCAP and the representative of the Secretary-General of WMO.

4. The Deputy Executive Secretary welcomed the participants and in particular the representatives of Viet Nam, which had just joined as the tenth member of the Committee. He stressed the urgent need for all the countries in the ESCAP region to attack one of the basic problems of the region - that of mass poverty and unemployment. The Typhoon Committee had a basic role in that drive because many of the enormous annual typhoon losses were borne mainly by the rural poor. He congratulated some of the members for their willingness to increase their commitments in replacing, in part, some of the institutional support previously provided by UNDP and commended the Committee for its initiative in embarking upon the Typhoon Operational Experiment (TOPEX). He concluded by assuring the Committee of the full support of ESCAP.

5. In his message, the Secretary-General of WMO recalled that serious tropical cyclones had affected Sri Lanka, the Caribbean, the United States and the Western Pacific since the Committee's previous session a year before. The damage and loss of life they had caused showed that there was no room for complacency. He considered that the public was often not adequately apprised of the danger or lacked the means to protect itself. The warning dissemination and information exchange component of TOPEX would provide the Committee with a new opportunity to rectify that situation, and he expressed the hope that the current session would give special attention to developing that aspect of the experiment.

6. The representative of Viet Nam thanked the Committee for accepting his country as a full member and pledged that his country would exert its best efforts to co-operate with the other members. The delegations of Viet Nam and the Lao People's Democratic Republic declared their non-recognition of the representatives of Democratic Kampuchea.

7. The delegation of Democratic Kampuchea decisively and categorically rejected the allegations of the delegations of Viet Nam and the Lao People's Democratic Republic.

8. The delegation of China protested against the introduction of that issue into the session.

9. The Committee noted the information provided by the secretariat to the effect that the issue in question had been resolved at the thirty-fourth session of the General Assembly.

/Election of

Election of officers

10. The session elected Mr. P. Sham (Hong Kong) as Chairman of the Committee for the year 1979/80, Mr. Tzee Montrivade (Thailand) as Vice-Chairman and Mr. Cheang Boon Khean (Malaysia) as Chairman of the Drafting Committee.

Agenda

11. The Committee adopted the following agenda:

1. Opening of the session
2. Election of the Chairman and Vice-Chairman
3. Adoption of the agenda
4. The Committee's activities during 1979
 - (a) Meteorological component
 - (b) Hydrological component
 - (c) Disaster prevention and preparedness
 - (d) Training
 - (e) Research
5. Typhoon Operational Experiment (TOPEX)
6. Support for the Committee's programme
7. Programme for 1980
8. Co-ordination with the WMO tropical cyclone project and regional programmes
9. Consideration of the agenda for the thirteenth session of the Committee
10. Date and place of the thirteenth session
11. Scientific lecture
12. Adoption of the report

II. THE COMMITTEE'S ACTIVITIES DURING 1979 (WRD/TC.12/1) (Agenda item 4)

12. The Committee reviewed the progress made in implementing its programme during 1979. Specific mention was made of new observing and telecommunication facilities, services of consultants on disaster prevention and preparedness, training courses and joint collaboration in research activities. The Committee was also informed of further progress made in the expansion of flood forecasting systems.

A. IMPROVEMENT OF METEOROLOGICAL FACILITIES

13. The Committee was pleased to learn that five additional 10-cm radars were being procured in early 1980 by PAGASA and were expected to be installed later in 1980. Those radars were also expected to play a significant role during TOPEX. A survey of the current performance of the existing radars and requirements for spare parts for the radar stations in the Philippines had been undertaken by PAGASA and the Typhoon Committee secretariat (TCS).

14. The Committee was informed that the 10-cm radar at Seoul (Republic of Korea), which had been in use for 10 years, would be overhauled by the end of 1979 and that Osaka and Matsue radars (Japan) were to be replaced by March 1980. The representative of the Republic of Korea informed the Committee that establishment of a 10-cm radar at Cheju was under consideration.

15. The Committee was pleased to learn that the 10-cm radar transferred from Khon Kaen to Chumphon (Thailand) had become operational in December 1979. TCS had assisted in the calibration and adjustment of the Chumphon radar and also in repairing the defective 10-cm radar at Bangkok.

16. The Committee was also informed that a new 10-cm radar had been installed in Penang (Malaysia) and had become operational in the middle of 1979. The installation of another radar at Kluang was expected to be completed in 1980. Radar test equipment worth \$14,000 provided by UNDP had been received by Malaysia. Assistance was given in the calibration of radars at Kuala Lumpur, Kuantan and Kota Baru.

17. The Committee was pleased to learn that the Tokyo-Bangkok direct satellite link was expected to be established by early 1980. The Hong Kong-Beijing link was functioning satisfactorily and the Hong Kong-Bangkok link was expected to improve with the installation of a computer switching system at Bangkok RTH.

18. In Japan, the automatic meteorological data acquisition system (AMEDAS) linking JMA with about 1,300 stations throughout Japan had been established in June 1979.

19. The representative of the Philippines informed the Committee that, with a view to improving the national data collection in the Philippines, new antennae and low frequency band crystals had been installed at some of the observing stations. In that connexion, after consultation with TCS, PAGASA had sent a request for assistance to the Government of Japan for a survey of the existing telecommunication facilities and additional requirements.

20. The Committee was informed that TCS continued to receive quarterly statistics on the monitoring of national data collection and retransmission from the Philippines, Malaysia, the Republic of Korea and Thailand. Results of analysis of those statistics had been circulated to the members concerned.

21. The Committee noted that the Hong Kong coastal radio station had been accepting weather reports from ships equipped with ship-shore telex facilities since 1 April 1979. It was reported that 15 additional ship observations per month had been received under that arrangement.

22. The representative of ITU expressed his organization's interest and concern in developing telecommunication facilities needed in connexion with natural disasters, including typhoons. The Committee noted with interest ITU's proposal, in consultation with WMO, to:

- (a) Undertake a survey and establish a telecommunication map relevant to typhoon operation - both routine as well as to meet an actual disaster situation;
- (b) Undertake or initiate with bilateral or multilateral support, appropriate case studies, projects or pilot projects to remedy deficiencies or inadequacies in telecommunication facilities relevant to typhoon operations.

23. The Committee examined the priority list established by the eleventh session and revised it as given below:

Observing facilities

(i) Upper-air stations

98223 Laoag (Philippines))	
98645 Cebu (Philippines)	)	12 GMT RS/RW national projects

(ii) Weather radar

Cheju (Republic of Korea))	
Tanay (near Manila, Philippines)	)	National projects
Kluang (Malaysia))	

(iii) Satellite receiving equipment

(GMS/TIROS-N satellite)

Manila)	
Bangkok, Kuala Lumpur, Hanoi	)	National projects

(iv) Ocean weather station

Ship at 16°N, 135°E (offered by the USSR in 1978 but no information in 1979)

Telecommunication facilities

(i) Improvement of national data collection facilities

Lao People's Democratic Republic)	
Philippines)	
Thailand (night-time reception)	)	National/bilateral projects
Viet Nam)	

(ii) Regional telecommunication links

Bangkok-Phnom Penh)	
Bangkok-Hanoi (1980)	)	National projects
Bangkok-Tokyo (1980))	

(iii) Other telecommunication facilities

Thailand - Strengthening of RTH Bangkok
- National/bilateral project

Ocean weather ships

24. The Committee was informed that the Japanese ocean weather station "Tango" (29°N, 135°E) had been in operation from May to October 1979. JMA's research vessel "Keifu-Maru" at 20°N, 130°E had made surface and upper-air observations during September-October 1979. Japan had also continued to maintain ocean buoys Nos. 3, 4, 6 and 7 at the former locations.

Exchange of radar fixes

25. Radar fix messages had continued to be exchanged between members as in previous years. The Committee urged members to ensure the regular and prompt exchange of radar messages.

Meteorological satellites

26. The Committee noted with appreciation that the Japanese Geostationary Meteorological Satellite (GMS) had continued to operate satisfactorily in 1979. Cloud imagery was being regularly transmitted in high- and low-resolution formats and other data were being transmitted via GMS.

27. The Committee was informed of members' plans for procurement of satellite ground receiving equipment. It noted that high-resolution satellite receivers were in operation at Beijing, Shanghai and Guangzhou. A high-resolution receiver had become operation in Hong Kong in November 1979. The Republic of Korea had completed the installation of a satellite receiver with dual antenna and computer system for receiving both GMS and TIROS-N high-resolution imagery. The Philippines, Thailand and Malaysia planned to install HR receivers for GMS and/or TIROS-N satellites during 1980.

28. The representative of the United States informed the Committee that his country would continue to issue bulletins containing information on the locations of tropical disturbances based on satellite imagery.

Meteorological reconnaissance flights

29. The Committee noted with appreciation that United States reconnaissance flights in the West Pacific continued to provide valuable data for typhoon warning services. The representative of the United States reiterated that such reconnaissance flights would be continued in the years ahead.

First GARP global experiment (FGGE)

30. The Committee was informed of members' participation in FGGE (1 December 1978-30 November 1979) and in the winter Monsoon Experiment (MONEX) (December 1978-February 1979). The additional contributions made by members of the Committee included two ocean weather ships (China), ships for the tropical wind observing system (Hong Kong and the Philippines), GMS system, additional ships and FGGE data management subcentre (Japan) and the winter MONEX management centre (Malaysia).

31. The Committee was pleased to learn that the data subcentre in Japan had collected and stored the level II-b data on magnetic tape after quality control. Wind vector and sea surface temperatures from GMS had been processed from April 1978 to November 1979 and stored on magnetic tape. In the preparation of the winter MONEX level II-b data set, some of the member countries had undertaken responsibility as data subcentres as stated below:

Hong Kong	:	Commercial ships' data
Malaysia	:	Special synoptic data, precipitation data and satellite imagery
Philippines	:	Radar imagery
Thailand	:	Agrometeorological data

B. HYDROLOGICAL COMPONENT

32. The Committee was informed that work was continuing on the development of flood forecasting systems in the Agno, Bicol and Cagayan River basins in the Philippines and in the Kinabatangan River basin in Sabah and Sadong River basin in Sarawak, Malaysia. In the Philippines and the Republic of Korea, efforts had been made to improve the flood forecasting systems in the Pampanga and Han River basins respectively. It was noted that a new telemetering system was being installed in the Dae-chung Dam watershed in the Geum River basin in the Republic of Korea, and a VHF system was being installed in the Johore River basin in Malaysia. China also had plans for the installation of telemetering networks in some small watersheds.

33. A flood risk map had been prepared for the Pampanga River basin based on historical records of inundated areas during past floods. Such maps were needed for the risk analysis and economic analysis of flood mitigation works.

34. In Japan, 743 rain gauging stations, 698 stream gauging stations and 173 combined rainfall and river gauging stations had been set up by the Ministry of Construction, all linked in telemetered networks; most of them were used for flood forecasting and warning systems already operational in 17 major river basins in the country.

35. The Committee noted that there was a need for the development of hydrological forecasting systems as an aid for dam operations. As an example in the Philippines, damage had been suffered in October 1978 following typhoon "Kading", when the flooding in an already swollen stream downstream from a dam had been further exacerbated by the releases from the dam to draw down the reservoir level. It was felt that that problem should be considered by all members to ensure that existing operating procedures did not result in untimely major releases from dams during typhoons. The Government of Japan had sent a survey team to the Philippines in connexion with the development of flood forecasting and warning systems for the watersheds of all dams.

36. The attention of the Committee was invited to the improvement made in Japan in the measurement of precipitation by radar equipped with a colour display and linked with a minicomputer. One such radar system would be able simultaneously to monitor rainfall over several adjacent small watersheds. The Committee expressed interest in that system and requested TCS to disseminate relevant information about that and other similar systems to the members.

37. The Committee noted with concern that no progress had been made in 1979 in implementing the pilot flood forecasting system in the Se Bang Hien River basin in the Lao People's Democratic Republic. That country had suffered from catastrophic floods during August 1978. It was noted that the Lao People's Democratic Republic was reorganizing its hydrological and meteorological services and it was hoped that the country could now make effective use of possible assistance from the Typhoon Committee, UNDP and the Mekong Committee in the coming year.

38. The Committee was informed that Thailand had submitted a request to the Government of Japan for assistance on a number of development projects, including the implementation of the Maeklong River basin flood forecasting system. It also learned that, subject to the assignment of priority to that project by Thailand, the Government of Japan was prepared to consider the possibility of such assistance.

Flood loss prevention and management

39. It was noted that none of the members has been able to select pilot areas or basins for which comprehensive plans for flood loss prevention and management could be prepared as called for in the programme adopted by the Committee at its eleventh session. It was agreed that there was a need to organize a mission to advise members in the selection of pilot areas or basins for comprehensive flood loss prevention and management. The Committee therefore recommended that such a mission be mounted, if possible, with the following terms of reference:

- (a) To advise and assist in the selection of a pilot basin for flood loss prevention and management;
- (b) To advise on information and data required for the formulation of comprehensive plans for flood loss prevention and management for the selected pilot basin;
- (c) To provide general guidelines and procedures for the formulation of the comprehensive plans mentioned in item (b) above.

C. DISASTER PREVENTION AND PREPAREDNESS

40. The developments under this component during 1979 are summarized below:

Philippines

41. The PAGASA-OCD broadcast station, dedicated to weather and allied information, was expanded and improved through the acquisition of studio equipment and accessories, erection of the transmitter tower and the installation of a radio link from the studio to the transmitter. The Emergency Broadcast System was extended to several regions.

42. In connexion with the proposed establishment of a training and research centre for disaster prevention and preparedness, an UNDRO consultant made a survey in the Philippines during June-July 1979. His report, which included a recommendation for establishment of a disaster research and training centre in the Philippines, was under consideration by the Government.

Republic of Korea

43. A pamphlet published by the Ministry of Construction in May 1979 shows the latest organization of the Disaster Prevention Centre. The work assigned to the centre includes implementation and supervision of flood control projects, conduct and supervision of disaster rehabilitation, and establishment, management and supervision of communication facilities.

Thailand

44. At the request of the Government of Thailand, WMO arranged the services of a consultant from the National Disasters Organization of Australia for one month during February-March 1979. He assisted the Department of Local Administration in organizing special courses in disaster prevention and preparedness in Thailand. The representative of Thailand reported that the first Civil Defence Law had been promulgated in March 1979.

Malaysia

45. With reference to the survey conducted by the LRCS consultant in 1978, the representative of Malaysia informed the Committee that some of the recommendations made by the consultant had already been implemented.

Proceedings of the Regional Seminar on Community Preparedness and Disaster Prevention

46. The proceedings of the Regional Seminar held at Tokyo in June 1976 were printed by ESCAP (Water Resources Series No. 49) and arrangements were made for distribution to all concerned.

/Guidelines

Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas

47. In pursuance of the eleventh session's recommendation, additional copies of the Guidelines were supplied to the directors of the meteorological services for distribution to the agencies concerned.

ARTIC seminar report

48. Following the cyclone and storm surge disaster in Andhra Pradesh (India) in November 1977, the Appropriate Reconstruction Training and Information Centre (ARTIC) held a seminar in August 1978 to discuss the successes and failures in the relief operation. At the suggestion of UNDRO, the proceedings of the seminar were distributed to members through TCS.

D. TRAINING

49. The Committee noted with appreciation that, in pursuance of the offer made at the eleventh session, the Government of Japan had organized group training courses in river engineering from 3 August to 4 December 1979 and another course in meteorology (radar operation and maintenance) from 4 October 1979 to 3 February 1980. It was noted with satisfaction that a TCS expert had given lectures to the training course in meteorology for one week.

50. The Committee also noted with appreciation that Japan had organized two additional group training courses, namely on (a) flood loss prevention and management from 27 September to 2 November 1979 and (b) technology for disaster prevention from 3 October to 17 December 1979.

51. The Committee noted with satisfaction that a WMO/United Nations regional training seminar on the interpretation, analysis and uses of meteorological satellite data had been held at Tokyo from 23 October to 2 November 1978 and that participants from most members had attended the seminar. The Committee was also pleased to note that a UNDP/WMO regional training seminar on flood forecasting had been organized at Nanjing (China) from 8 October to 8 November 1979. Malaysia, the Philippines and Thailand had each sent three participants to that seminar.

52. The Committee noted with satisfaction that the RA II-RA V roving seminar on "intense precipitation and floods" organized by WMO had visited six countries during November 1978 to March 1979, including two members of the Typhoon Committee (the Philippines and Malaysia).

53. The Committee was informed that the WMO Training Seminar on Tropical Cyclone Hydrology and Flood Forecasting would be held at Miami from 11 February to 4 May 1980 and that a similar seminar might be held in 1981 or 1982.

54. With reference to the proposed regional training seminars listed for 1980 and 1981 under the hydrology component of the short-term programme endorsed by the eleventh session, a proposal had been sent by ESCAP and WMO to UNDP for support for those seminars. The topics of the seminars were (a) flood loss prevention and management, (b) urban hydrology and (c) repair and maintenance of electronic equipment used in flood forecasting and warning systems. UNDP had given advance authorization for support for those seminars.

55. The Committee was informed that the proposal sent by ESCAP and WMO to UNDP for support to the regional typhoon programme during 1980-1981 included (a) support for a symposium on typhoons to be held in China in October 1980 and (b) support for study group visits to China on (i) flood control in 1980 and (ii) watershed management for flood loss prevention and management in 1981. UNDP had given advance authorization for (a), while (b) would be approved on receipt of official confirmation from the Government of China.

56. In connexion with the establishment of an automatic switching system at Bangkok RTH, the Committee noted with satisfaction that arrangements were being made for the Royal Observatory, Hong Kong, to provide training to four members of the Thai Meteorological Department on message switching programmes and techniques.

57. The Committee noted with satisfaction that the telecommunication and electronics expert of TCS had provided on-the-job training in radar calibration and maintenance to radar technicians in Malaysia and Thailand. He had also conducted an intensive one-month training course on radar theory and circuit analysis at Manila for PAGASA.

58. The representative of the United States renewed his country's offer of assistance in the field of training through the WMO Voluntary Co-operation Programme (VCP), in particular for short-term courses in meteorology.

59. The Committee was informed that USAID would sponsor a seminar on disaster preparedness at Manila in 1980, which would in particular be meant for disaster mitigation planners.

60. The representative of the Philippines drew attention to the availability of facilities for training in meteorology for a Master's degree at the University of the Philippines and informed the Committee that candidates from members would be welcome for such training. Fellowships could be sought either through WMO/VCP or from other sources.

E. RESEARCH

61. The Committee noted with satisfaction that the Royal Observatory, Hong Kong, had continued to produce objective forecasts of typhoon tracks by computer programming of selected techniques and that those forecasts had been disseminated to members for operational use. The Committee was further informed that multiple regression equations based on space mean charts at several levels were being developed by the Royal Observatory for forecasting the movement of tropical cyclones.

62. The Committee was informed that the barotropic model for typhoon track forecasting in the Philippines had been further improved and statistics were being compiled for performance verification. A technical report was expected to be available in the near future. A two-layer primitive equation baroclinic model was also being programmed for forecasting typhoon tracks.

63. As to the typhoon moderation research programme in the Philippines, the Committee was informed that a feasibility study had been completed with the help of a group of experts from the United States. The scientific basis for such a programme had been studied and a detailed experiment design formulated. The Committee was further informed that, initially, the emphasis would be on monitoring of relevant parameters before undertaking an actual experiment.

64. The Committee noted with satisfaction that a technical paper by Mr. Patipat Patvivatsiri (Thailand) on heavy rainfall over Thailand related to tropical cyclones in 1975 had been published. A study of the precipitation patterns in the Philippines associated with different types of typhoon tracks had been completed by TCS. Papers on both those studies would soon be available for distribution.

65. Mr. P. Sham (Hong Kong), co-ordinator for the joint study on tropical cyclone prediction by objective techniques, presented a progress report on the study carried out for selected tropical cyclones during 1978. The Committee was informed that after consultations between the co-ordinator, research correspondents and TCS, it had been agreed that that joint study would be

suspended from 1979 as similar studies could be resumed later with the more extensive data coverage expected during TOPEX. The co-ordinator made several recommendations in his progress report regarding the further planning of comparisons of objective techniques. The Committee recommended that the two progress reports on the joint studies on tropical cyclones during 1977 and 1978 be passed on to the co-ordinator of the Preparatory Committee for TOPEX (meteorological component).

66. Extracts were presented from a progress report prepared by Dr. M. Miyazaki (Japan), co-ordinator for the joint study on storm surges. The Committee was informed that a technical report prepared by Arafiles and Alcances on storm surges in the Philippines had been printed and distributed to members. A report entitled "Progress in storm surge studies in Hong Kong" had also been circulated. The Committee was further informed that forecasting of storm surges in Victoria Harbour (Hong Kong) based on improved numerical models had been computerized for operational use.

67. The Committee was informed that in the Republic of Korea the collection and analysis of storm surge data had been carried out for the period 1960-1978 by using the data of 10 tidal stations and related weather maps. During that period, maximum peak surges had exceeded 1 metre in six cases only.

68. Reference was made to the study of storm surges undertaken in the Bay of Bengal area, which had been considered by the Panel on Tropical Cyclones, at its sixth session held in February-March 1979. The Committee supported the Panel's recommendation for a technical conference on storm surge prediction.

69. The representative of Viet Nam informed the Committee that studies on forecasting typhoon movement had been undertaken in his country. A statistical model based on multiple regression equations was being tested at present.

70. In pursuance of the eleventh session recommendation that at future sessions of the Committee members should bring with them lists of papers published since the previous session, the representative of Japan distributed a list of meteorological papers related to typhoons which had been published in Japan during 1978-1979.

/III.

III. TYPHOON OPERATION EXPERIMENT (TOPEX)
(WRD/TC.12/2 and 3)
(Agenda item 4)

71. The Committee recalled that TOPEX was the outcome of a proposal made by China and supported by Japan at the eleventh session. It had been decided that TOPEX would be carried out as part of the Typhoon Committee's programme and as a subproject of the WMO tropical cyclone programme. The Eighth World Meteorological Congress (May 1979) had commended the Committee for its initiative in planning TOPEX, urged members of WMO, especially those participating in the programmes of the Committee, to support the experiment to the maximum extent possible and requested the Secretary-General to assist in the planning and execution of TOPEX in co-operation with ESCAP.

72. As requested by the Committee, WMO had organized a Preparatory Meeting on TOPEX at Tokyo in July 1979. The Preparatory Meeting had defined the objective of TOPEX as being the reduction of the loss of life and damage from typhoon winds, floods and storm surges by improving the forecasting and warning capabilities of members of the Typhoon Committee. It had set forth the aims whereby the Experiment might achieve that objective. It had further determined the composition of TOPEX, stated the benefits that might be expected and defined the experimental area and a time schedule for its conduct. The Preparatory Meeting had begun the initial planning of the three components of TOPEX and made interim arrangements for the management of the further planning and execution of the Experiment.

73. The Committee examined the report of the Preparatory Meeting as well as information on the measures taken since that Meeting. The Committee decided to endorse the report of the Preparatory Meeting and wished to record its appreciation of the progress made in the year since its eleventh session. One of the major points discussed by the Committee was the future arrangements for the management and co-ordination of TOPEX activities and the scope of participation in the Experiment.

74. The Committee agreed to establish a Management Board for TOPEX comprised of a representative of each member of the Typhoon Committee wishing to participate in the management of the Experiment. It approved the following terms of reference for the Management Board:

/(a)

- (a) The Management Board should manage all phases of TOPEX from planning to evaluation of the results of the Experiment;
- (b) The Management Board should take all decisions necessary to achieve the objectives of TOPEX without need to refer to the Typhoon Committee;
- (c) The Management Board may set up sub-committees to plan and manage various aspects of the Experiment and invite non-Typhoon Committee members to co-operate and participate in TOPEX without need to refer to the Typhoon Committee;
- (d) The Management Board should report on progress to the Committee at its annual session.

75. The Committee further agreed that steps should be taken by members so that their designees to the Management Board might attend the First Planning Meeting on TOPEX when the Board would be formally established and its work programme finalized. WMO was requested to take urgent action through the permanent representatives with WMO to secure member's designations to the Management Board. The Committee requested ESCAP, WMO and TCS to arrange for their representatives to participate in all meetings of the TOPEX Management Board. It was decided that the Preparatory Committee for TOPEX (meteorological component) and the system of focal points should continue until such time as the Management Board had been formally established. The First Planning Meeting on TOPEX, scheduled to take place at Tokyo from 5 to 14 June 1980, would then decide on the arrangements required to ensure co-ordination of each of the three components of TOPEX.

76. In that context, the Committee also considered the desirability of inviting experts to attend the First Planning Meeting in order that advantage might be taken of the experience available in other parts of the world in conducting similar experiments. It decided to request WMO, after consultation with the Co-ordinator of the Preparatory Committee (meteorological component), to extend invitations to suitable experts. Attention was also drawn to the need to invite representatives of international organizations supporting the TOPEX programme, such as UNDP, UNDRO, UNEP and LRCS, to attend the Meeting.

77. Reference was further made to the benefits of experts participating in the planning work for TOPEX through periods of secondment by their national services. The Committee considered that that possibility should be considered by the Management Board at the time of the First Planning Meeting.

78. Advantage was taken of the presence at the session of the Co-ordinator and most of the focal points forming the Preparatory Committee (meteorological component) to hold a short informal meeting. As a result of those discussions, a draft provisional agenda for the First Planning Meeting was drawn up as a basis for the further preparations.

79. The Committee endorsed the principles stated in the report of the Preparatory Meeting on TOPEX concerning the hydrological component and was of the opinion that TOPEX was important for improving hydrological forecasting in the region. In particular, TOPEX, through its intensive observing system, should be able to provide meteorological forecasts including forecasts of quantity, intensity, time and location of precipitation associated with the selected typhoons. Those forecasts would provide the needed input to hydrological forecasts, thus ensuring the desirable link between the meteorological and the hydrological components. That would also demonstrate one of the benefits to be derived from TOPEX. It would therefore be necessary to make provision in TOPEX to meet such requirements of hydrological forecasting as quantitative precipitation forecasts.

80. It was also noted that WMO had already requested the hydrological focal points to submit specific proposals before the end of 1979 for the development of the hydrological component of TOPEX, so that it could be submitted to the First Planning Meeting in 1980.

81. The Committee recognized that, as the hydrological component was principally a national activity, the preparation of detailed specifications would depend on the information to be furnished by members. On the basis of the available information the Committee endorsed some guidelines for further planning, which are given in the annex to this report.

82. The steps taken by WMO to initiate a TOPEX newsletter in response to the request of the Preparatory Meeting were noted with satisfaction. The Committee further noted that the first issue was expected in early 1980 and requested WMO to arrange for the distribution of subsequent issues at regular intervals. It suggested that members should communicate developments in national preparations for TOPEX to the WMO secretariat to facilitate the up-to-date dissemination of information on TOPEX to a wide audience. It drew attention to the role of the newsletter as a means of securing additional support for the execution of TOPEX.

83. The representative of the United States pointed out that TOPEX was an ambitious undertaking which would require the use of expertise from other parts of the world. He considered that care should be taken not to duplicate work already carried out elsewhere in order to conserve the resources available for the Experiment. It would also be necessary to promote to the maximum extent TOPEX activities in order to secure assistance from as many sources as possible.

84. The representatives of UNDRO and LRCS expressed their pleasure at the invitation they had received to participate in TOPEX, especially in the warning dissemination and information exchange component. Both indicated their readiness to support TOPEX within the resources available to them. At the suggestion of LRCS, it was agreed that discussions should be held between WMO, UNDRO and LRCS with the object of preparing by early 1980 a draft programme of the activities to be pursued under the warning dissemination and information exchange component of TOPEX. UNDRO proposed that members participating should submit, prior to the First Planning Meeting, papers outlining the present situation and presenting proposals for the pre-experiment.

/IV.

IV. SUPPORT FOR THE COMMITTEE'S PROGRAMME
(WRD/TC.12/4)
(Agenda item 6)

85. The Committee had before it document WRD/TC.12/4, which reviewed the known requirements to implement the Committee's programme and the possible sources of support. Those were: the members themselves under national programmes and TCDC, non-member co-operating countries, WMO/VCP, UNDP, UNDRO, UNEP and LRCS, and assistance from bilateral and multilateral sources.

86. The items already identified as requiring support were: (a) TCS co-ordinator/manager; (b) TCS meteorologist; (c) TCS hydrologist; (d) TCS flood control expert; (e) disaster preparedness expert on short-term assignment; (f) revolving fund for the purchase of urgently needed equipment and spare parts; and (g) experts for an advisory mission on comprehensive flood loss prevention and management.

87. In addition, a project proposal had been submitted to UNDP for its assistance in financing during 1980-1981 the following items: (a) a two-year extension of the support provided by UNDP; (b) continuation of the WMO expert in meteorological telecommunication and electronics; (c) increased funds for travel; (d) a limited number of short-term fellowships; (e) a symposium on typhoons to be held in China; (f) participation of certain countries in TOPEX; (g) equipment; (h) regional training seminars; (i) two study group visits to China (one each for 1980 and 1981); and (j) additional consultant services in connexion with the TOPEX programme.

88. It was pointed out that in addition to the requirements enumerated in paragraphs 86 and 87 there could be additional ones which the Committee might identify arising from new developments such as the admission of Viet Nam as a new member. The representative of Viet Nam requested UNDP assistance in the procurement of equipment and the representative of the Lao People's Democratic Republic requested WMO assistance in the reactivation of the Vientiane-Bangkok point-to-point circuit and the provision of a 10-cm weather radar at Vientiane, on which agreement had previously been reached.

89. The Committee expressed the view that there was a need for an over-all co-ordinator for TOPEX, who should be provided by UNDP. It therefore suggested that the period for consultant services requested under item (j) in paragraph 87 be increased from 12 man-months to 24 man-months starting from the beginning of 1980 to enable a full-time over-all co-ordinator for TOPEX to be recruited. It requested WMO to approach UNDP and seek an early decision on the matter.

90. The representative of UNDP reaffirmed the continued interest of UNDP in the important work of the Committee. He announced that UNDP had already issued an advance authorization covering items (a) to (h) mentioned in paragraph 87 with the addition of consultant services for a total of 8 man-months in disaster preparedness, radar meteorology and storm surge prediction. That authorization covered all the components announced at the eleventh session as consisting UNDP support for the years 1980 and 1981 with the exception of two study tours in China which would be added to the project on receipt of official confirmation from the Chinese Government.

91. With reference to the 12 man-months of consultant services for work connected with TOPEX (item j) requested by WMO, the representative of UNDP said that UNDP would prefer the work to be undertaken along TCDC lines. In any case, support for TOPEX could not be considered by UNDP until the programme had been planned in more detail and the inputs by participating Governments had been decided. Furthermore, UNDP did not support basic research or experiments; the sub-experiment appeared to be sophisticated and much of the area selected fell outside the jurisdiction of Committee members. With regard to the suggestion that the Co-ordinator of TOPEX should be financed by UNDP, he pointed out that such a Co-ordinator had not been foreseen in the report of the TOPEX meeting. He appealed to the Committee members to look more to TCDC arrangements, for which UNDP support could be requested; he felt confident that members could provide qualified and able people.

92. The Committee responded to the views of the representative of UNDP by clarifying that both the core and sub-experiments were not the basic research type of experiment but they were of definite operational application. The core and sub-experiments were designed to help members to understand the structure and behaviour of typhoons and to improve forecasting of typhoons and risk of floods for the mitigation of damage. The Committee felt strongly that the services of a consultant as a co-ordinator were necessary at the earliest possible date, and preferably from the beginning of 1980, in order to undertake the co-ordination of the large amount of planning work required under the different components of TOPEX.

93. The UNDP representative assured the members that he would convey the views of the Committee to UNDP.

94. The representative of UNDP requested members to expedite endorsement of the budget revision submitted to their Governments through the regional or resident representatives of UNDP. He thanked the Government of Japan and non-Typhoon Committee members for the valuable support extended to the work programme.

95. The Committee expressed appreciation to the Philippines for its readiness to provide the TCS co-ordinator/manager and meteorologist as well as office facilities and supporting staff. It was understood that official external travel and per diem expenses of those staff would be charged to the UNDP project.

96. The Committee also welcomed the information that Japan would provide a replacement for the TCS hydrologist when his contract expired. It noted that the provision of a flood control expert for TCS was still under consideration.

97. The Committee also welcomed the offer of China to provide the services of a meteorologist to TCS on a short-term basis (six months) in 1980, whose official travel and per diem expenses would be charged against the UNDP budget.

98. The Committee welcomed the statement of the representative of Japan that if it received a request from ESCAP it would be prepared to provide three experts for an advisory mission to assist members in the selection of pilot basins for comprehensive flood loss prevention and management for a total duration of one month during the period January/February 1980.

99. Following the Eighth World Meteorological Congress, at which TOPEX had been warmly received, the support to the Typhoon Committee's programme would be strengthened for the period 1980-1983. In addition to that, the services of two sectoral advisers were available on request for short visits to members to help to initiate new technical co-operation projects.

100. The Committee noted with appreciation that LRCS and UNDRO were prepared to support the activities of the Committee in disaster preparedness and prevention.

101. The Committee further noted with appreciation that UNEP was ready to assist the Committee in its work concerning dissemination of early warnings of natural disasters.

102. The Committee recorded its warm appreciation to UNDP for its continued support and for the valuable advice of its representative.

V. PROGRAMME FOR 1980
(WRD/TC.12/5 and WRD/TC.12/CRP.1)
(Agenda item 7)

103. In considering its programme for 1980, the Committee took into account the latest developments under each component of its activities and expected assistance from external sources. The fact that the execution of TOPEX would bring new activities in the years ahead was fully considered. Recognizing that a number of national activities of particular interest to the Committee would

be carried out by its members, the Committee directed that special attention be given, with the assistance of its secretariat, to the following items of work in 1980:

Meteorological component

- (a) Operation and maintenance of electronic equipment (RS/RW, radar, radar picture transmission, satellite receiving and telecommunication equipment);
- (b) Establishment of new radar stations in Malaysia, the Philippines and the Republic of Korea;
- (c) Provision of test equipment and spare parts and training of technicians for calibration and maintenance of weather radars;
- (d) Improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;
- (e) Establishment of suitable receiving equipment for reception of cloud imagery and other data from GMS and TIROS-N satellites;
- (f) Review of national data collection facilities and data exchanges needed for typhoon warning services, including periodical monitoring and taking of remedial measures, where necessary;
- (g) Preparations for TOPEX, including those for the First Planning Meeting, on the basis of the tentative programme recommended by the Preparatory Meeting in July 1979;
- (h) Introduction of a common system of identification of tropical cyclones in the western North Pacific and the South China Sea;
- (i) Organization of the Symposium on Typhoons to be held in China in October 1980.

Hydrological component

- (a) Establishment of a pilot flood forecasting system in Thailand, with possible assistance from the Government of Japan;
- (b) Establishment of flood forecasting systems in the Agno, Bicol and Cagayan River basins in the Philippines and in the Kinabatangan River basin in Sabah and the Sedong River

basin in Sarawak (Malaysia), with further assistance from the Government of Japan;

- (c) Further improvement in the operation of flood forecasting systems in the Pampanga River basin (Philippines) and in the Han River basin (Republic of Korea) and expansion of flood forecasting in the Nagdong and Geum River basins (Republic of Korea);
- (d) Development of flood forecasting and warning systems for dam operation;
- (e) Selection, investigation and survey of the pilot areas yet to be chosen by members for comprehensive flood loss prevention and management; organization of an advisory mission in this connexion with assistance from the Government of Japan;
- (f) Continuation of determination of magnitudes and frequency of floods in flood-prone zones subject to heavy damage, and preparation of flood-risk maps;
- (g) Preparations for activities under the hydrological component of TOPEX;
- (h) Organization of a study group visit to China.

Disaster prevention and preparedness

- (a) Promotion of studies and exchange of experience to develop more efficient methods of assessment and reporting of damage and consequent needs;
- (b) Advice and assistance with training in techniques of community preparedness, through consultancy services where appropriate;
- (c) Promotion of studies and exchange of experience on human response to warnings;
- (d) Follow-up action on the joint LRCS/WMO/ESCAP missions (1973-1976), the recommendations of the Regional Seminar held at Tokyo in 1976, the Review Mission's recommendations in 1978, and the consultants' reports on Malaysia, the Philippines and Thailand in 1978-1979;

- (e) Improvements in the dissemination of typhoon and flood warnings, exchange of information on disaster situations between concerned agencies and related measures to minimize damage (this refers to the warning dissemination and information exchange component of TOPEX).

Training

- (a) Training of personnel through group training courses in Japan and other fellowships through bilateral and VCP assistance. Short-term training courses on maintenance of radar, satellite receiving equipment and telemetering equipment might be given special consideration;
- (b) Participation in seminars on principles of flood loss prevention and management and on urban hydrology, and other seminars relevant to the Committee's programme;
- (c) On-the-job training by TCS experts, particularly in the operation and maintenance of radar (including measurement of precipitation by radar), satellite receivers and telecommunication equipment.

Research

- (a) Stimulation of research activities through advisory services, visits of study groups and exchange visits by research personnel;
- (b) Encouragement for members to undertake research on typhoons, especially on topics relating to their particular area, and promotion of joint collaboration on selected topics, such as studies directed towards the development of improved storm surge prediction methods;
- (c) Promotion of exchange of information on typhoon research activities, including developments on related matters outside the region;
- (d) Initiation of provisional studies on disaster risk evaluation in typhoon-prone areas, including flood risk mapping.

104. The Committee welcomed the statement made by the representative of Japan that his Government was considering the provision of the following assistance in the field of training during 1980:

- (a) Group training courses in meteorology (weather prediction techniques) and in river engineering to be organized in Japan with the support of JICA;
- (b) One or two experts from JMA likely to be sent to one member to hold a seminar on forecasting techniques for a period of about one month;
- (c) If requested and financially supported by WMO, JMA would be ready to send an expert on satellite data collection and reception systems for field service to some members.

Common system of identification of tropical cyclones

105. Noting that different systems were being used by members to identify tropical cyclones in the western North Pacific and the South China Sea, often leading to confusion and difficulties to users, the Committee endorsed the proposal by Hong Kong to introduce a common system. It agreed:

- (a) That a number in closed parentheses composed of 4 digits (the first two digits to indicate the year and the last two digits to indicate the sequential number of the tropical cyclone in that year: thus (8005), being the fifth tropical cyclone in 1980), should be adopted as a common system of identification;
- (b) That the common system should come into effect on 1 January 1981;
- (c) That the First Planning Meeting on TOPEX should propose to the Committee at its thirteenth session a minimum wind speed required for assigning a number to a tropical cyclone and suggest the name of a member which would be responsible for assigning and maintaining a record of such numbers.

VI. CO-ORDINATION WITH THE WMO TROPICAL CYCLONE PROJECT AND REGIONAL PROGRAMMES (WRD/TC.12/6 and WRD/TC.12/7) (Agenda item 8)

106. The Committee examined the information submitted on the progress achieved in the implementation of the WMO tropical cyclone project as given in the fifth status report on activities up to 30 June 1979. Later developments were also outlined.

107. The steps taken by the Eighth Congress to strengthen the support to those activities and to upgrade the project to the new WMO tropical cyclone

programme in the period 1980-1983 were welcomed by the Committee. The Committee noted that the Congress had unanimously decided that it was essential to strengthen and intensify the programme in the years ahead and considered that that decision largely met the requests made by Committee members following the eleventh session. It further noted that the Eighth Congress had expressed great interest in TOPEX and had commended the Committee for its initiative in planning the Experiment by adopting resolution 9 (Cg-VIII).

108. The Committee was informed that the tropical cyclone programme (TCP) for the years 1980-1983 would consist of three main components - meteorological, hydrological, and prevention and preparedness. In addition, the present division into general (formerly global) and regional components would continue, the first dealing with activities of application to all WMO members in tropical cyclone areas, while the second would be devoted to activities of more restricted application, normally those directly related to the programmes of the regional cyclone bodies.

109. Under the general component, the Committee noted that a new publication, Operational Techniques for Forecasting Tropical Cyclone Intensify and Movement, had recently been issued. It recalled that that publication was the outcome of a subproject in which Hong Kong, Japan and TCS had participated. The Committee expressed its view that that publication, as well as others already issued under TCP, would be valuable to its members in relation to their participation in TOPEX.

110. The Committee considered that the guidance material produced under the general component of TCP was of great value to developing countries affected by tropical cyclones. It recorded its gratitude to all who had taken part in the preparation of the publications, expressing its conviction that that work was an important feature of TCP which should be pursued with vigour.

111. It further noted with interest the progress being made by the other cyclone bodies under the regional component. It reiterated its previous request for regular exchange of information on those activities through TCP. The need for continued co-ordination of regional activities with all the WMO members concerned and with international organizations such as UNDP, UNDRO, UNEP and LRCS was stressed. It was also suggested that good co-ordination of the Committee's programme with those of the other regional cyclone bodies might be ensured if, to the maximum extent possible, the same WMO secretariat staff were to be responsible for support to all the bodies.

112. The Committee also considered information on the work of interest to its members being carried out under the WMO programme on research in tropical meteorology. It noted in particular that the various recommendations originating from an expert meeting held at Fort Collins, United States, in July 1979 had dealt mainly with the compilation and archiving of tropical cyclone data for research purposes. The Committee agreed on the desirability of initiating projects for that purpose and stressed the need for its members to co-operate closely with the Commission for Atmospheric Sciences (CAS) in promoting those objectives.

113. The Committee further stressed that its own long-term programme, as adopted at the eleventh session, was directed essentially at improving the operational capability of its members to combat the direct effects of tropical cyclones. The research aspects of that programme were limited and oriented to specific operational activities. The Committee was of the opinion that adequate arrangements already existed through WMO for members to participate in the work of CAS and that it would not be appropriate to expand its own programme by undertaking large-scale research projects for which it could not furnish the necessary resources.

114. On the general subject of research on tropical cyclones, the Committee drew attention to the need to keep in mind the priorities given to the various activities to ensure that the major effort was devoted to the operational aspects directly related to the safety of human life and property. It was felt that TOPEX would help by giving an indication of the minimum data requirement for tropical cyclone forecasting by numerical methods.

115. There remained major problems such as the lack of progress in techniques for forecasting tropical cyclones and in the present inability of GTS to handle large amounts of high-resolution synoptic data to cope with forecasting requirements for small-scale weather phenomena in the region.

116. The Committee welcomed the efforts being made by the Commission for Basic Systems towards an integrated observing system and the reconsideration being given to the technical structure of WMO. In that connexion, the Committee proposed that members should put forward their ideas through participation in related WMO activities.

VII. CONSIDERATION OF THE AGENDA FOR THE THIRTEENTH
SESSION OF THE COMMITTEE
(Agenda item 9)

117. The Committee requested the ESCAP and WMO secretariats, in consultation with TCS, to prepare the detailed agenda for the thirteenth session, which should include a scientific lecture on the scientific plan for TOPEX. It was agreed that members would inform ESCAP, WMO and TCS at an early date of any appropriate subjects which they might wish to propose for the next session.

VIII. DATE AND PLACE OF THE THIRTEENTH SESSION
(Agenda item 10)

118. The Committee welcomed with appreciation the tentative offer of the representative of the Philippines to provide, subject to confirmation, host facilities for the thirteenth session of the Committee. It noted his suggestion that the thirteenth session be held some time between the last half of November and the first week of December 1980.

IX. SCIENTIFIC LECTURE
(Agenda item 11)

119. The following scientific lecture was presented by Mr. T. Nitta of Japan:

"Scientific and technological background of the Typhoon Operational Experiment (TOPEX)."

120. The Committee recorded its thanks to Mr. Nitta for his presentation and to the Government of Japan for providing the services of Mr. Nitta as a consultant to it. The Committee also thanked the United States and Hong Kong for showing motion pictures on typhoons.

X. RECOGNITION OF MR. SEN'S RETIREMENT

121. The Committee noted with regret the retirement of Mr. S.N. Sen on 31 December 1979. His 12 years of dedicated service as the Chief Technical Adviser of the Typhoon Committee were recognized with appreciation by all.

XI. ADOPTION OF THE REPORT
(Agenda item 12)

122. The Committee adopted its report on 19 November 1979.

/Annex

Annex

GUIDELINES FOR FURTHER PLANNING OF THE HYDROLOGICAL
COMPONENT OF TOPEX

1. Proposed pilot river basins:

Han (Republic of Korea)
Se Bang Hieng)
Nam Ngum) (Lao People's Democratic Republic)
Kelantan (Malaysia)
Pampanga (Philippines)
Maeklong (Thailand)
Puyang)
Jian) (China)

Other members should designate the basins as soon as possible.

2. WMO, in co-operation with TCS, should circulate a questionnaire to obtain the following information on the basins:

- (a) Basin area, location and other characteristics
- (b) Existing hydrological and meteorological observing stations (to provide catchment maps if not already available with TCS)
- (c) Data collection and transmission facilities
- (d) Description of existing hydrological forecasting systems
- (e) Description of the hydrological model being used
- (f) Availability of computer facilities
- (g) Whether affected by storm surges
- (h) Available flood risk studies and maps

In addition, information should be obtained on the availability of expertise in hydrological forecasting and the need for consultant services.

3. As far as possible the need for expert services should be satisfied from within the Typhoon Committee. TCS or WMO may be requested to provide short-term consultant services if necessary.

4. The experts designated to the TOPEX Management Board should be accompanied to planning meetings by the hydrological experts responsible for the pilot basins as far as possible.

5. The existing or new models should be calibrated in each basin prior to the experimental phase (1 August-15 October) so that the best use can be made of the information which would be generated by the meteorological component.

6. Proposals for the hydrological component made by Japan should be taken into account as appropriate, especially with respect to the strategy to be adopted for the step-by-step improvement of flood forecasting and warning services in the pilot basins.

.....

7. In providing for the hydrological component, the Preparatory Meeting requested the WMO Secretariat to liaise with the focal points in the further planning. It was suggested that proposals for the more detailed specification of the activities foreseen under the component should be sought, together with indications of the manner and extent of the future participation of members, so that more detailed plans for the component could be drawn up. This information has been requested from the focal points designated to date, again with the proposal that there should be further discussion of the component at the Typhoon Committee session.

8. As requested at the Preparatory Meeting, members have been invited to designate focal points for the warning dissemination and information exchange component. So far, five members have done so. Preliminary contacts have also been made with other interested international organizations as agreed at the Meeting. No definite proposals have yet emerged for the conduct of this component and it will be necessary for TC.12 to consider it in greater detail.

TOPEX Newsletter

9. In view of the considerable interest in TOPEX shown by many WMO Members, and their request for regular information on the progress achieved, the Tokyo Meeting decided that a periodic newsletter should be issued. WMO was asked to make the necessary arrangements.

10. One of the steps taken for this purpose was to invite Typhoon Committee members to provide short contributions on national activities undertaken with a view to participation in TOPEX. At the time of preparing this document, notes had been received from several members. In parallel, the WMO Secretariat initiated action for the production of the first newsletter which it was hoped could be available in time for the Typhoon Committee session. Although it may now be difficult to respect this target date, arrangements for the newsletter are sufficiently well advanced to ensure the appearance of the first issue within a relatively short period.

Action proposed

11. The Committee is invited to note the information given in this document on the action taken subsequent to the Preparatory Meeting and to consider the measures necessary to support the further planning and execution of TOPEX. In particular, it may wish to:

- (a) examine closely the information provided by members on national aspects of their participation in TOPEX, covering each of the three components concerned;
- (b) draw up a programme for the activities of the Preparatory Committee for TOPEX (Meteorological Component) in the period prior to the First Planning Meeting;
- (c) consider the measures necessary to develop in more detail the work to be pursued under the hydrological and warning dissemination and information exchange components;
- (d) propose appropriate dates for the First Planning Meeting on TOPEX;
- (e) indicate any other ways in which it feels the planning process for TOPEX could be strengthened, including possible direct or indirect assistance from sources outside the Typhoon Committee membership.

/Typhoon

Typhoon Operational Experiment (TOPEX) -
Designation of focal points

<u>Typhoon Committee member</u>	<u>Preparatory Committee (Meteorological component)</u>	<u>Hydrological component</u>	<u>Warning Dissemination and Info. Exchange component</u>
CHINA	WANG SHIHPING	ZHAO KEJING	ZHANG XUNLIANG
DEM. KAMPUCHEA			
HONG KONG	P. SHAM	P. SHAM	P. SHAM
	<u>Co-ordinator</u>		
JAPAN	T. NITTA	T. NAKAO	-
LAO P.D.R.			
MALAYSIA	CHEANG BOON KHEAN		
PHILIPPINES	C.P. ARAFILES	C.P. ARAFILES	C.P. ARAFILES
REP. OF KOREA	HAK JOONG SEANG	CHAN SIK CHOI	DAL YOUNG OH
THAILAND	P. PATVIVATSIRI	A. CHANTANAVIVATE	P. PATVIVATSIRI

WRD/TC.12/4
8 October 1979

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
Bangkok

SUPPORT FOR THE COMMITTEE'S PROGRAMME

(Item 6 of the provisional agenda)

Note by the ESCAP secretariat

Introduction

In discussing support for the Committee's programme at the eleventh session, certain views were expressed which could be taken as guidelines for the provision of future support for the Committee's programme. These guidelines include elements of technical co-operation among developing countries (TCDC), continuing endeavours of members to meet requirements from their own resources, the utilization of support from the WMO Voluntary Contribution Programme (VCP), the utilization of expert services from other United Nations bodies like UNDRP and UNEP, the solicitation of aid from bilateral sources, and provision of programme support for selected activities by UNDP. The support to the Typhoon Committee secretariat (TCS) will have to be increased in view of the expanded activities associated with the typhoon operational experiment (TOPEX).

Sources of support

(i) Committee members

At its eleventh session, the Committee was informed that for 1980-1981 the Philippine Government would consider providing the services of a co-ordinator/manager who might also act as the technical adviser in

/his field

his field of specialization and who would also take over the duties of the Chief Technical Adviser of TCS and, if necessary, the services of a meteorologist, on the understanding that costs associated with travel would in both cases would be met from other sources.

Japan also stated that it would consider providing for the same period the services of a hydrologist including travel costs. Representations were also made by ESCAP with the Japanese Government for the provision of the services of a flood control expert. No advice had been received from the Government of Japan concerning these matters at the time this document was under preparation.

The new programme adopted at the eleventh session and TOPEX will call for additional national contributions.

(ii) UNDP

UNDP has played an important role in the history of the Committee. It has been a major source of financial support in the past and, it is hoped, will continue to provide such support in the future. At the eleventh session of the Committee, the representative of UNDP stated that because of the TCDC elements of the Committee and of its grave concern for the loss of human lives and the damage to the economies of its members, UNDP would be prepared to consider support for selected activities for the biennium 1980-1981.

In response to the Committee's request, a project proposal based on guidelines laid down by the Committee was submitted by ESCAP and WMO in June 1979 to UNDP which would provide for:

- (a) An extension of the project for a further two years;
- (b) The continuation of the WMO expert in meteorological telecommunication and electronic equipment;
- (c) Increased travel costs;
- (d) A limited number of short-term fellowships for each participating country;
- (e) Support for a symposium on typhoon forecasting and warning to be held in China;
- (f) Support for the participation of certain countries in TOPEX;

/(g)

- (g) Priority equipment requirements;
- (h) Support for regional training seminars;
- (i) Study group visits to China on (i) flood control in 1980 and (ii) watershed management for flood loss prevention and management in 1981;
- (j) Additional consultant services in connexion with the TOPEX programme.

In August, UNDP gave advance authorization for part of the programme. The items under (i) and (j), however, have not been approved yet.

(iii) WMO/ESCAP

At its eleventh session, the Committee called upon WMO to provide increased support to its expanded activities through the WMO tropical cyclone programme (TCP) during the period 1980-1983. This request was submitted to the Eighth World Meteorological Congress (May 1979) in documents prepared by Typhoon Committee members and by the Secretary-General. The Congress decided that an intensified TCP should be conducted during 1980-1983 and further commended the Committee for its initiative in planning TOPEX. It urged WMO members to support TCP and TOPEX to the maximum extent possible. Because of severe budgetary limitations it was possible for the Congress to provide only minor financial support to the Committee through the WMO regular budget.

However, the Congress recognized the need to strengthen the secretariat support to TCP as a whole. The provision of additional staff in 1980 will undoubtedly make it possible to give improved assistance to the Committee, particularly in the planning and execution of TOPEX.

The WMO VCP, formerly VAP, will continue to be available in the years 1980-1983 as another source of support for Committee members.

Establishment of a revolving fund

At its eleventh session, the Committee requested the ESCAP secretariat to use its best endeavours to obtain additional support in order to meet the Committee's objectives of enlarging its activities as set out in its short- and long-term programmes. Reference was made to the possible value of a revolving fund through which countries could obtain urgently needed items of equipment.

/This view

This view was brought to the attention of the Commission at its thirty-fifth session, which was held in March 1979. In listing the extra-budgetary resource requirements for the work programme of ESCAP, the secretariat included an amount of \$100,000 to start a revolving fund for urgently needed items of equipment for the Typhoon Committee. Unfortunately there was no response to this proposal and no prospective donor offered to provide the necessary funds.

(iv) Other UNDRO, UNEP, LRCS

UNEP was prepared to give consideration to providing support by making available short-term consultants in disaster prevention and mitigation, preparedness planning, training and research, information and environmental effects of typhoons. It was expected that UNDRO and LRCS would be able to provide a specialist in disaster preparedness whose services could be shared with the members of the WMO/ESCAP Panel on Tropical Cyclones.

Future needs

The new programmes, and TOPEX, will undoubtedly give rise to a need for additional support for some activities. At present it is not clear to what extent members can meet these needs nationally and how much support will be needed from outside. A very careful appraisal is necessary and it is suggested that discussions should be channelled in this direction. Where details cannot be provided, a mechanism permitting their early definition will be essential.

Action proposed

- (a) Review of present sources of support and determination of the extent to which they meet present requirements;
 - (b) Definition of additional requirements, including time-table for their introduction;
 - (c) Proposals for likely sources of new support;
 - (d) Arrangements for continued review of programme requirements.
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FOR PARTICIPANTS ONLY

WPD/TC.12/5
27 September 1979

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
Bangkok

PROGRAMME FOR 1980

(Item 7 of the provisional agenda)

Note by the Typhoon Committee secretariat

Introduction

It is recognized that many activities of interest to the Typhoon Committee will be carried out by the individual members. However, under this agenda item, the Committee may wish to consider only those items of work on which it will concentrate during 1980, with the assistance of the Typhoon Committee secretariat (TCS). For this purpose, the short-term programme of the Committee (1979-1982) approved at the eleventh session should provide the necessary guidelines.

Under item 6 of the provisional agenda, the requirements for further assistance from UNDP during 1980-1981, for which a request has already been submitted to UNDP, will be considered. The planned work programme as included in the request to UNDP for further assistance should therefore be considered in formulating the programme for 1980. The latest developments in the execution of the Committee's programme and expected assistance from other sources of support, such as WMO VCP, bilateral aid, UNDRO, UNEP and LRCS, must also be taken into account.

Further, the decision of the Committee to undertake the typhoon operational experiment (TOPEX) will introduce special activities in the Committee's programme in the year ahead. Preparations for TOPEX, including

the organization of a planning meeting, should therefore constitute a major item in the programme for 1980.

On the basis of the above considerations, the following tentative programme of work for special attention during 1980 has been drawn up:

Meteorological component

- (a) Operation and maintenance of electronic equipment (RS/RW, radar, radar picture transmission, satellite receiving and telecommunication equipment);
- (b) Establishment of new radar stations in Malaysia, the Philippines and the Republic of Korea;
- (c) Provision of test equipment and spare parts and training of technicians for calibration and maintenance of weather radars;
- (d) Improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;
- (e) Establishment of suitable receiving equipment for reception of cloud imagery and other data from GMS and TIROS-N satellites;
- (f) Review of national data collection facilities and data exchanges needed for typhoon warning services, including periodical monitoring, and taking of remedial measures, where necessary;
- (g) Review of the present arrangements for dissemination of typhoon and flood warnings with a view to introducing improvements, where necessary;
- (h) Preparations for TOPEX, including those for the First Planning Meeting, on the basis of the tentative programme recommended by the Preparatory Meeting in July 1979.

Hydrological component

- (a) Establishment of a pilot flood forecasting system in Thailand, with possible assistance from the Government of Japan;
- (b) Establishment of flood forecasting systems in the Agno, Bicol and Cagayan River basins in the Philippines and in selected river basins in Sabah and Sarawak (Malaysia), with further assistance from the Government of Japan;

/(c)

(c) Further improvement in the operation of flood forecasting systems in the Pampanga River basin (Philippines) and in the Han River basin (Republic of Korea) and expansion of flood forecasting in the Nagdong and Geum River basins (Republic of Korea);

(d) Selection, investigation and survey of the pilot areas yet to be chosen by member countries for comprehensive flood loss prevention and management;

(e) Continuation of determination of magnitudes and frequency of floods in flood-prone zones subject to heavy damage, and preparation of flood-risk maps;

(f) Preparations for activities under hydrological component of TOPEX.

Disaster prevention and preparedness

- (a) Promotion of studies and exchange of experience to develop more efficient methods of assessment and reporting of damage and consequent needs;
- (b) Advice and assistance with training in techniques of community preparedness, through consultancy services where appropriate;
- (c) Promotion of studies and exchange of experiences on human response to warnings;
- (d) Follow-up action on the joint LRCS/WMO/ESCAP missions (1973-1976), the recommendations of the Regional Seminar held at Tokyo in 1976 and the consultant's survey report on Malaysia and the Philippines in 1978.

Training

- (a) Training of personnel through group training courses in Japan and other fellowships through bilateral and VCP assistance. Short-term training courses on maintenance of radar, satellite receiving equipment and telemetering equipment might be given special considerations;
- (b) Participation in seminars relevant to the Committee's programme;
- (c) On-the-job training by TCS experts, particularly in the operation and maintenance of radar and telecommunication equipment.

Research

- (a) Stimulation of research activities through advisory services, visits of study groups and exchange visits by research personnel;

/(b)

(b) Encouragement to members to undertake research on typhoons, especially on topics relating to their particular area, and promotion of joint collaboration on selected topics, such as studies directed towards the development of improved storm surge prediction methods;

(c) Promotion of exchange of information on typhoon research activities, including developments on related matters outside the region;

(d) Initiation of provisional studies on disaster risk evaluation in typhoon-prone areas, including flood risk mapping.

Action proposed

The Committee may wish:

(a) To approve in principle or suggest amendments to the items of work outlined above on which the Committee should concentrate during 1980;

(b) To urge member countries to take all possible measures, with the assistance of TCS, to accelerate implementation of the Committee's programmes.

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FOR PARTICIPANTS ONLY

WRD/TC.12/6
13 September 1979

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
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CO-ORDINATION WITH THE WMO TROPICAL CYCLONE PROJECT
AND REGIONAL PROGRAMMES

(Item 8 of the provisional agenda)

Note by the WMO secretariat

Purpose of document

1. The annex to this document (fifth status report on the implementation of the WMO tropical cyclone project) provides the twelfth session of the Typhoon Committee with information on the activities under the project up to 30 June 1979. It thus contains the principal decisions taken by Eighth Congress on the future activities to be carried out from 1980 on, under what will then be known as the WMO tropical cyclone programme (TCP). Any later information available by the time of the session will be presented to the Committee by the representative of the WMO secretariat.

Action proposed

2. The Committee is invited:

(a) To note and comment upon the information provided in the annex to this document;

(b) To consider what further measures, if any, are required to ensure effective co-ordination between its own activities and those conducted under other parts of TCP.

/Annex

Annex

FIFTH STATUS REPORT ON THE IMPLEMENTATION OF THE
WMO TROPICAL CYCLONE PROJECT

(30 June 1979)

Introduction

1. The WMO Tropical Cyclone Project was initiated by Sixth Congress in 1971 in response to Resolution 2733 (XXV) of the United Nations General Assembly. A Plan of Action proposed by the former Executive Committee Panel of Experts on Tropical Cyclones forms the basis of the activities.
2. In May 1979 Eighth Congress reviewed the progress made and decided that the activities should be intensified in the years 1980-1983. In calling for an intensification of these activities, Eighth Congress stated that the ultimate objective of the WMO Tropical Cyclone Programme, as it will be named from 1980 onwards, is to establish national and regionally co-ordinated systems to ensure that the loss of life and damage caused by tropical cyclones are reduced to a minimum. This goal can only be attained if each Member affected by tropical cyclones is able to:
 - (a) Detect, track and forecast the approach of tropical cyclones;
 - (b) Apply the most appropriate techniques of quantitative storm surge prediction;
 - (c) Forecast the flooding arising from a tropical cyclone strike;
 - (d) Issue timely and accurate early warnings;
 - (e) Organize and execute the essential disaster prevention and preparedness measures;
 - (f) Provide the basic data on risk of loss by winds, storm surges and floods to meet the needs of development planners and others.
3. To attain its purposes the TCP will have three main elements:
 - (a) Meteorological, based on the World Weather Watch (WWW), which will be concerned with the provision of the basic meteorological data required for tropical cyclone forecasting and the application of the appropriate techniques to ensure timely and accurate forecasts;

- (b) Hydrological, based on the Operational Hydrology Programme (OHP), which will be concerned with the basic hydrological data required for flood forecasting and the application of the appropriate techniques to ensure timely and accurate forecasts;
- (c) *Prevention and preparedness, which will be concerned with all other structural and non-structural measures required to ensure the maximum safety of human life and the reduction of damage to a minimum.

4. The further implementation and development of the TCP will enable Members to provide improved services to offset the present dramatic impact of tropical cyclones upon their populations and national economies. In particular, it may be expected that the following advantages will accrue:

- (a) Improved capability to issue accurate and timely warnings of tropical cyclones and their expected effects in terms of strong winds, storm surges and floods;
- (b) Co-ordinated planning and execution of disaster prevention and preparedness measures;
- (c) Reduction of the loss of human lives;
- (d) Minimization of tropical cyclone damage and its present impact upon national economies, thereby permitting increased economic growth in developing countries.

5. The Implementation Programme (IP) for 1980-1983 continues the division of the activities in two separate parts, under a general component and a regional component.

6. The general component will cover those aspects of the TCP of general interest to Members affected by tropical cyclones. It will seek to convey information on developing sources of data from, for example, satellites and drifting buoys. It will provide guidance to Members to permit the introduction of new prediction and warning techniques through the spreading of scientific knowledge and will ensure the wide availability of this information through the publication of manuals and reports. It will encompass the broader training requirements for the TCP.

7. Under the regional component the TCP/IP will concern itself mainly with the development of co-ordinated regional systems to combat loss of life and damage

* WMO's role in assisting Members in co-ordination measures to protect life and property will be performed in close co-operation with UNDRO, LRCS and other bodies with special expertise in these fields.

resulting from tropical cyclones. This task will be carried out through inter-governmental groups such as the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones, or similar regional mechanisms set up by the WMO regional associations such as the RA I Tropical Cyclone Committee for the South-West Indian Ocean and the RA IV Hurricane Committee. Close liaison has been and should be maintained between these various regional cyclone bodies. In relation to the regional component of the TCP, reference is made to the responsibilities of Regional Meteorological Centres (RMCs) for the preparation of analyses and prognoses and for the issue of advisories on tropical cyclones. Where these products are not already available to the NMCs from the RMCs concerned, the TCP should assist in measures to ensure their early availability, as well as in arrangements for their timely distribution to all Members affected by tropical cyclones in the area of the RMC. The main decisions taken by Eighth Congress are contained in Resolution 8 (Cg-VIII) and its annex.

Current activities

8. Details of the work being carried out have been given in annual status reports issued by the WMO Secretariat since 1975; the present (fifth) report aims to give information on the latest developments rather than to attempt to summarize all the activities carried out so far. As in the past years the information is presented under two main headings, the general component and the regional component. Information on the action taken jointly with other international organizations and on the programme envisaged for 1979-1980 is also given. An appendix contains a summary of the progress in executing a number of sub-projects under the global component.

General* component

9. Under the existing plan of action the principal steps taken on the global level have been the continuation of 12 sub-projects. A summary of the status of implementation of these sub-projects is given in the appendix. It shows that reports on the following sub-projects have been completed and distributed:

- No. 2 - Observations from mobile ships;
- No. 5 - Geostationary satellites;
- No. 6 - Forecasting tropical cyclone intensity and movement;
- No. 7 - Storm surge prediction;
- No. 8 - Risk evaluation techniques;
- No. 10 - Community preparedness and disaster prevention.

* Previously termed 'global' component but renamed by Eighth Congress

In addition, reports on three other sub-projects have been completed and are in the stage of final review prior to publication. They are:

- No. 1 - Special wind and pressure observation network;
- No. 3 - Automatic weather stations;
- No. 9 - Tropical cyclone warning systems.

Two new sub-projects on the regional aspects of storm surges in the hurricane area and on public information and education have been requested by the Hurricane Committee and will be initiated in the near future.

Regional component

10. The regional programmes are aimed primarily at the efficient operation of tropical cyclone early warning systems, including warnings of associated phenomena such as storm surge and floods, and of the relevant disaster prevention and preparedness organization. In all these aspects, progress is heavily dependent upon the World Weather Watch and the Operational Hydrology Programmes of WMO and upon the support of the regional associations concerned. The disaster prevention and preparedness activities are carried out in collaboration with other international organizations such as ESCAP, the Office of the United Nations Disaster Relief Co-ordinator (UNDRO) and LRCS.

Africa (RA I)

11. At its seventh session (Nairobi, February 1978) the Regional Association for Africa decided to re-establish the RA I Tropical Cyclone Committee for the South-West Indian Ocean. The member countries participating in the Committee's work are: Comoros, France, Madagascar, Malawi, Mauritius, Mozambique, Seychelles and the United Republic of Tanzania. The fourth session of the Committee is to be held at Maputo, Mozambique, from 15 to 22 October 1979.

Asia (RA II)

12. The eleventh session of the Typhoon Committee took place in October 1978. One of the principal topics of discussion was the report of the review mission which had visited, in order, Thailand, Malaysia, Philippines, Japan, the Republic of Korea, Hong Kong and China earlier in the year. In general, the report was warmly received by the Committee and the proposed long-term programme was endorsed as a suitable framework for future activities. Careful consideration was given to the question of

the Committee's involvement in flood control and it was agreed that comprehensive plans for flood loss prevention and management in pilot areas vulnerable to heavy damage should be prepared on the understanding that implementation of only selected aspects of the plan by stages would be considered. Increased attention will be given to non-structural techniques for damage mitigation.

13. The other main topic at the session was the question of future support for the Committee's programme. UNDP announced its readiness to consider continued support for selected activities in 1980-1981, provided the participating Governments progressively increased their inputs to the project. The members responded positively to this offer, agreeing to provide four of the six professional staff foreseen for the Typhoon Committee Secretariat after 1979.

14. A major development was a proposal for the conduct of a Typhoon Operational Experiment (TOPEX) in the Western Pacific. The objective of the Experiment would be to carry out, through international co-operation in the prompt and reliable collection and exchange of observational data, an operational test of the functioning of the various systems used for typhoon analysis, forecasting and warning. The Experiment would be carried out on actual typhoons through all stages of detection and tracking and would be effected on three levels:

- (i) The Core Experiment, based on an intensified network of observations around the typhoon with real-time integrated analysis, forecasting and warning;
- (ii) The Sub-Experiment, aimed at obtaining details of the three-dimensional structure of the typhoon, the mechanism of generation and its development and decay; and
- (iii) National activities, carried out by participating Members, such as those relating in particular to the hydrological aspects of the Experiment.

15. A Preparatory Meeting is to be held at Tokyo from 3 to 6 July 1979 to plan the further organization and conduct of the Experiment. TOPEX is to be carried out as part of the Typhoon Committee's programme and as a sub-project of the Tropical Cyclone Programme.

16. The sixth session of the WMO/ESCAP Panel on Tropical Cyclones was held in Rangoon, Burma, from 27 February to 5 March 1979. The Panel made a thorough review of its Technical Plan in the light of developments since the fifth session and drew attention to a number of shortcomings in the meteorological observing and telecommunication systems.

17. The major issue at the sixth session was again the problem of securing adequate support for the execution of the Panel's programme and particularly for the staffing of the Technical Support Unit (TSU). The Panel recognized that UNDP could not provide institutional support on a long-term basis but felt that the TSU had only recently begun to operate effectively. A limited period with staffing at the desired level was essential. It therefore called for UNDP support for 4-5 years, at the end of which the Panel members would assume the management and co-ordination functions at present performed by the TSU. A project document for this support, and for the provision of equipment and fellowships, has been prepared and submitted to UNDP. The project seeks support totalling US \$2 million over a 3-year period beginning in 1980.

18. In the meanwhile the TSU will have the services of its Chief Technical Adviser and the Telecommunications/Electronics Expert until the end of 1979. Consultant services in hydrology are also available. The appointment of the Telecommunications/Electronics Expert late in 1978 has resulted in a marked improvement in the telecommunication links in the Panel area. The implementation of the links Dacca - New Delhi and Karachi - New Delhi in the first half of 1979 was the most important feature of this improvement and represents a major step forward in completing the telecommunication system in that area.

North and Central America (RA IV)

19. The establishment of the RA IV Hurricane Committee by the seventh session of RA IV to cover areas of the Caribbean, Central America and the Eastern Pacific was reported in the third status report. The first session of the Committee (San Juan, May 1978) formulated a Hurricane Operational Plan for its region and also its Technical Plan and Implementation Programme. As requested, the Secretary-General arranged for the early publication in loose-leaf form of the RA IV Hurricane Operational Plan which is now available as WMO Publication No. 524. It defines the responsibilities of all the Members concerned to ensure the most effective co-operation between their countries in the provision of meteorological information, forecasts and warnings of all tropical cyclones affecting the area.

20. The Committee's second session took place in San José, Costa Rica, from 2 to 10 April 1979. Amongst the changes made to the Hurricane Operational Plan was one to provide for rotating lists of names for hurricanes in the Caribbean Sea, the Gulf of Mexico and the North Atlantic Ocean, and in the eastern North Pacific respectively. A thorough review was made of Committee's Technical Plan and Implementation Programme and appropriate adjustments were made. It was recommended that the new hydrological component prepared by the RA IV Working Group on Hydrology should be adopted as a

matter of urgency for inclusion in the Technical Plan.

21. It was also proposed that a seminar/workshop on the use of satellite data for hurricane detection and prediction should, if possible, be held immediately prior to the third session of the Committee. Confirmation has been received that Mexico is prepared to act as host country to both the seminar/workshop and the third session in April 1980.

22. During the second session reference was made to a recent study that shows there has been a deterioration in hurricane forecast accuracy over the past five years. A similar trend has been observed in the Pacific. It is thought that this fact is related to a gradual reduction in the number of conventional observing platforms and means that any improvement in the effectiveness of warnings will depend upon better awareness and public response.

23. Action on the Technical Plan and Implementation Programme of the RA IV Hurricane Committee will be promoted by a one-year preparatory assistance project, addressed to six Central American countries to be initiated in October 1979. The purpose of the preparatory assistance is to prepare a detailed project document and to identify possible donors for a project which would cater for installation of one operational flood forecasting system in each one of the six countries, for improvement in flood warning and water management.

South-West Pacific (RA V)

24. The main activities of WMO Members in RA V in the Tropical Cyclone Projects have been through membership of the Typhoon Committee or through participation in various sub-projects under the general component. The seventh session of the Association was held in Jakarta in July 1978 and considered whether measures at the regional level were needed to improve the protective system. It recalled that its area of concern had been very seriously affected by tropical cyclones on a number of occasions since its sixth session and expressed the opinion that there was a need for concerted action in raising the level of the protective system as a whole in the area. The Association decided to appoint a rapporteur with the task of assessing the tropical cyclone protective system in the region in order to determine needs and define what must be done to improve it.

Co-operation with other organizations

25. In accordance with the wishes of the Seventh Congress, close co-operation with other international organizations active in disaster mitigation has continued. Thus there has been close consultation with ESCAP, UNDP, UNEP and UNDRO on a variety of matters of common concern. As in the past, WMO has maintained close relations with LRCS; recently, the League has assisted in the provision of a consultant for a one-month mission to advise Bangladesh in drawing up its national disaster preparedness plan. A WMO/UNEP project entitled "Tropical Cyclone monitoring and early warning systems in countries in the areas of the Bay of Bengal and the Arabian Sea" ended on 31 December 1978. UNEP approved the use of some remaining funds for the purchase of tide gauges to improve storm surge prediction in the Bay of Bengal and the equipment has been delivered. Another WMO/UNEP project entitled 'Selection of hurricane and early warning, including flood forecasting, systems in Central America' was also completed in 1978 and the relevant report will be published shortly.

Programme for 1979-1980

26. The activities of the WMO Tropical Cyclone Project are of a continuing and long-term nature. The project covers a very wide range of activities which, on the technical and operational side are of close concern to the World Weather Watch and Operational Hydrology Programme. There are also research aspects of the project to which CAS is giving attention in response to the directives of the Congress and the Executive Committee. In the 1979-1980 programme, therefore, sections A, B and C relate to activities which are taken care of within the WWV programme but the total context is much wider and includes many aspects of operational hydrology, a number of matters involving training and, to a lesser extent, research as well as the work on disaster prevention and preparedness carried out in collaboration with other international organizations. Section D relates to specific activities in hydrology.

A. General component

- (a) Revision of the Plan of Action for the Tropical Cyclone Programme;
- (b) Examination of the feasibility of setting up an aerial reconnaissance facility with international participation;
- (c) Implementation of TCP sub-projects (see appendix); preparation, editing and publication of reports;

- (d) Meetings of experts required for the implementation of the TCP sub-projects listed in the appendix.

B. Regional component

Under the regional component the programme will be chiefly concerned with the activities undertaken by the regional cyclone bodies and the implementation of the decisions they make. The planning of the Typhoon Operational Experiment (TOPEX) will be an important new activity. Meetings of regional cyclone bodies and those related to TOPEX in the period 1 July 1979 - 31 December 1980 are listed below:

- (a) Preparatory Meeting on the Typhoon Operational Experiment (TOPEX), (Tokyo, Japan, 3 - 6 July 1979);
- (b) RA I Tropical Cyclone Committee for the South-West Indian Ocean - fourth session (Maputo, Mozambique, 15 - 22 October 1979);
- (c) ESCAP/WMO Typhoon Committee - twelfth session (Bangkok, Thailand, 13 - 19 November 1979);
- (d) WMO/ESCAP Panel on Tropical Cyclones - seventh session (tentatively Bangkok, Thailand, March 1980);
- (e) RA IV Hurricane Committee - third session (Mexico City, Mexico, April 1980) - The session will follow immediately after the seminar/workshop on the use of satellite data for hurricane detection and prediction;
- (f) First Planning Meeting of Experts for TOPEX (place and date to be decided);
- (g) ESCAP/WMO Typhoon Committee - thirteenth session (place and dates to be decided).

C. Disaster prevention and preparedness

- (a) Follow-up action on recommendations from co-operating organizations;
- (b) Follow-up of LRCS/WMO/ESCAP missions to developing countries in tropical cyclone areas;
- (c) Case studies of severe tropical cyclone events with a view to improving protective measures.

D. Specific hydrological aspects

- (a) Catchment models; trials of various models leading to adoption of standard model(s) for tropical cyclone areas;
- (b) Flood frequencies; disaster risk studies in selected countries using, when appropriate, techniques described in WMO/UNEP report on risk evaluation; applications to data-sparse areas;
- (c) Expansion, improvement and automation of hydrological networks; establishment of flood forecasting systems.

WMO TROPICAL CYCLONE PROJECT - PLAN OF ACTION

Implementation programme and its status on 30 June 1979

<u>Sub-project number, title and objectives</u>	<u>Mode of implementation</u>	<u>Status</u>
<p>1. <u>Special tropical cyclone observing network</u> (anemometer and barometer networks)</p> <p>Objectives: To produce a report on the desirability and feasibility of establishing a relatively dense network of wind and pressure observing stations</p>	<p>Australia, with the collaboration of Japan, India and the Typhoon Committee Secretariat (TCS)</p> <p>Leader: Australia Experts nominated: Dr. M. Komabayashi (Japan) Shri V. Balasubramaniam (India) Dr. S.N. Sen (TCS)</p>	<p>Draft report completed and received for publication in the WMO Secretariat.</p>
<p>2. <u>Observations from mobile ships</u></p> <p>Objectives: To assess the present status of the availability, collection, dissemination and density of ships' reports for tropical cyclone detection and warning, and to make recommendations for improvements</p>	<p>Hong Kong, with the collaboration of India, Japan, Kenya, Mauritius, Pakistan and Thailand</p> <p>Leader: Mr. P.P. Sham (Hong Kong) Experts nominated: Shri V. Balasubramaniam (India) Mr. Hajime Mitsuno (Japan) Mr. E.G. Njoroge (Kenya) Mr. I. Dhanupathi (Mauritius) Mr. S. Akhlague Husain (Pakistan)</p>	<p>A report entitled "Observations from mobile ships" distributed on 16 March 1977.</p>
<p>3. <u>Automatic weather stations</u></p> <p>Objectives: Production of a report, sufficiently comprehensive, complete and detailed to enable developing countries with suitable sites to obtain and install automatic weather stations at strategic points to obtain additional data for tropical cyclone detection and warning</p>	<p>Japan, with the collaboration of Australia, France, India, Thailand, USA and CIMO</p> <p>Leader: Dr. J. Kobayashi (Japan) Mr. P.J.R. Shaw (Australia) Mr. M.C. Pichaux (France/CIMO) Shri S.V. Datar (India) Mr. P. Patvivatsiri (Thailand) Dr. J. Giraytys (U.S.A.)</p>	<p>Draft report entitled "The role of automatic weather stations in tropical cyclone monitoring" has been completed and received for publication in the WMO Secretariat.</p>

<u>Sub-project number, title and objectives</u>	<u>Mode of implementation</u>	<u>Status</u>
4. <u>Radar</u>		
Development of guides which will assist Members in selecting storm warning radar equipment, installing it in the best practical location and making the best use of it in tropical cyclone tracking, forecasting and warning	U.S.A., with the collaboration of Australia, France, Japan and CIMO Leader: Mr. D. Holmes (U.S.A.) Dr. P. Barclay (Australia) Mr. M. Malick (France) Mr. J. Aoyagi (Japan) Dr. H. Kodaira (CIMO)	All collaborating countries have designated experts for this sub-project. A first draft is expected to be circulated to the experts shortly.
5. <u>Geostationary satellites</u>		
(i) Objectives: To develop a technique for the analysis and forecasting of tropical cyclone intensities, using satellite data;	Experts from the U.S.A., in collaboration with experts designated by Japan, U.S.S.R. and ESA, have prepared a manuscript on the "Use of Satellite Imagery in Tropical Cyclone Analysis"	Information on satellite data for cyclone forecasting is now available in WMO Publication No. 411 - "Information on Meteorological Satellite Programmes operated by Members and Organizations".
(ii) To develop a technique for the analysis and forecasting of tropical cyclone intensities, using satellite data;		WMO Technical Note No. 153 - "The Use of Satellite Imagery in Tropical Cyclone Analysis" was published in November 1977(WMO-473)
(iii) To advise the cyclone warning centres on the installation and operation of ground equipment		Advice being provided to Members concerned through the regional cyclone bodies.
6. <u>Forecasting tropical cyclone intensity and movement</u>		
Objectives: To prepare a manual on available techniques at cyclone warning centres for the prediction of intensity and direction of motion of the tropical disturbances. Evaluation of the above methods and on the applicability of the semi-objective techniques used in some regions for other regions affected by tropical cyclones	U.S.A., in collaboration with Hong Kong, India, Japan, U.S.S.R. and TCS Experts nominated: Dr. J.M. Pelissier, leader (U.S.A.) Dr. P.C.Chin (Hong Kong) Shri V. Balasubramaniam (India) Mr. Y.Okamura (Japan) Dr. S.N.Sen (TCS)	Publication sent for printing and copies expected to be available in July 1979.

<u>Sub-project number, title and objectives</u>	<u>Mode of implementation</u>	<u>Status</u>
7. <u>Storm surge prediction</u>		
Objectives: Preparation and publication of a Guide on Storm Surge Prediction	Japan, in collaboration with India and U.S.A. A text for the "Guidelines on Storm Surge Prediction" has been prepared by Drs. M. Miyazaki, P.K. Das and C.P. Jelesnianski	The publication "Present techniques of tropical storm surge prediction" was issued in March 1978(WMO-500)
8. <u>Risk evaluation techniques</u>		
Objectives: Providing basic data on risk of loss by cyclone wind, storm surge, flood and river flood to those countries affected by tropical cyclones who need them for development planning and other purposes	WMO Secretariat, with assistance of consultants. Implemented in conjunction with UNEP/WMO project on "Quantitative evaluation of disaster risks (tropical cyclones)"	"The quantitative evaluation of the risk of disaster from tropical cyclones, report of a WMO/UNEP project on the meteorological and hydrological aspects" was published at the end of 1976 (WMO-455). Pilot studies are being undertaken in a number of countries to test the techniques described in the hydrological component of the above report.
9. <u>Tropical cyclone warning systems</u>		
Objectives: The production of guidelines describing the main principles and practical considerations to be followed in setting up a tropical cyclone warning system	India, in collaboration with Australia, France (La Réunion), Japan and U.S.A. Experts nominated: Shri V.Balasubramaniam leader (India) Dr. R. Tatehira (Japan) Mr. F. Herry (Australia)	A first draft has been prepared for circulation to collaborators. A revised text is expected shortly.

<u>Sub-project number, title and objectives</u>	<u>Mode of implementation</u>	<u>Status</u>
<p>10. <u>Community preparedness and disaster prevention</u></p> <p>Objectives: Preparation and publication of a guide on community preparedness and disaster prevention to assist developing countries in the protection of human lives and property against the harmful effect of tropical cyclones</p>	<p>Joint project ESCAP/LRCS/WMO with the collaboration of UNDR0 and TCS</p> <p>Publication by WMO</p>	<p>The "Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas" was published in English in June 1977 and French and Spanish versions in the first half of 1978. Copies may be obtained from the WMO, LRCS and ESCAP Secretariats.</p>
<p>11. <u>Flood forecasting and warning</u></p> <p>Objectives: To establish and/or strengthen river and flood forecasting capability in countries affected by tropical cyclones</p>	<p>WMO and ESCAP Secretariats, with assistance of consultants</p>	<p>A joint ESCAP/WMO mission visited the Tropical Cyclone Panel member countries to assess facilities available and evaluate the improvements required. Significant progress has been made in improving hydrological facilities in the Typhoon Committee area. A roving seminar was organized to train local personnel in the analysis and prediction of intense precipitation and floods in Asia and S.W. Pacific.</p>

<u>Sub-project number, title and objectives</u>	<u>Mode of implementation</u>	<u>Status</u>
<p>12. <u>Human response to tropical cyclone warnings and their content</u></p> <p>Objectives: To prepare a publication for use in countries exposed to tropical cyclones providing information and guidance on the most effective wording for use in tropical cyclone warnings.</p>	<p>U.S.A. with the collaboration of Australia, Madagascar, India, Philippines and UNDR0</p> <p>Leader: Mr. Richard I. Coleman (U.S.A.)</p> <p>Mr. R.L. Southern (Australia)</p> <p>..... (Madagascar)</p> <p>Mr. B. Rajagopal (India)</p> <p>Mr. A.K. Sen Sarma (India)</p> <p>Mr. L.A. Amadore (Philippines)</p> <p>..... (UNDR0)</p>	<p>U.S.A. has accepted the invitation to execute the Sub-project and appointed the leader. Collaboration of other Members and UNDR0 has been sought.</p>

FOR PARTICIPANTS ONLY

WRD/TC.12/7
27 September 1979

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Twelfth session
13-19 November 1979
Bangkok

CO-ORDINATION WITH THE WMO TROPICAL CYCLONE PROJECT
AND REGIONAL PROGRAMMES

(Item 8 of the provisional agenda)

WMO PROGRAMME ON RESEARCH IN TROPICAL METEOROLOGY

Note by the WMO secretariat

Introduction

1. The Eighth Congress (April/May 1979) approved in resolution 23 (Cg-VIII) the WMO programme on research in tropical meteorology (PRTM). One of the programme components relates to tropical cyclones, for which a number of possible high-priority specific research projects have been developed by the WMO Commission for Atmospheric Sciences (CAS). (For details see the report of the informal meeting of experts on PRTM (Geneva, August 1978) which was distributed under the cover of letter R/TPM/1 of 20 November 1978.) Cg-VIII stressed that in the implementation of these projects, which are closely related to the WMO tropical cyclone project (TCP), a closer interaction needs to be maintained between the regional bodies of TCP and the CAS Working Group on Tropical Meteorology. EC-XXXI, while noting new developments in activities of the WMO/TCP, such as the typhoon operational experiment (TOPEX), specifically emphasized such a requirement.

Discussion

2. In response to the request of EC-XXXI, arrangements were made to hold an expert meeting at Fort Collins, Colorado, United States of America, from 16 to 19 July 1979 to further elaborate and develop the long-term implementation

plan for relevant specific Priority I research projects of the PRTM. Under the tropical cyclone component, the meeting came up with proposals for the practical implementation of the following research projects:

Project TC1 - Global tropical cyclone data for research, which envisages the setting-up of a uniform collection system of global conventional data relevant to tropical cyclones for research purposes. The project consists of two components, namely (1) the preparation and archiving of historical data sets and (2) the selection and archiving of relevant current data on a routine basis: this will include (a) tropical cyclone tracks and intensity, (b) routine surface and upper-air observational data transmitted over the CTS, (c) analysed weather maps on microfilm, (d) satellite imagery on microfilm and (e) forecasts and warnings.

Project TC3 - Small-scale cycloidal motion of tropical cyclones, which proposes to prepare a survey report on the current state of knowledge concerning the use of radar in tracking tropical cyclones. (It has been proposed to approach the United States to volunteer the services of an expert to undertake this work).

Project TC4 - Association of tropical cyclogenesis with large-scale circulation changes, which is aimed at better understanding the relationships between seasonal and interannual variations of tropical cyclogenesis and large-scale circulation features. The project will help to encourage members concerned to intensify their research efforts in the climatology of tropical cyclones.

3. As stated in resolution 23 (Cg-VIII), the implementation of the above-mentioned tropical cyclone research projects requires collaboration and the contribution of members in every way possible to the over-all effort. To help the Committee's discussion on possible collaboration and/or participation by members in its implementation, a summary of the main recommendations on the initiatives to be taken on these projects as well as related topics is given in the annex to this document. (The report of the Fort Collins expert meeting will be made available by the time of the twelfth session.)

4. It should be mentioned that the expert meeting, in developing the long-term implementation plan of these tropical cyclone research projects, took due account of the findings and recommendations contained in Prof. W.M. Gray's survey report on the state of research activities at existing

/tropical cyclone

tropical cyclone centres and research institutions. A copy of his survey report has been distributed to all members concerned under the cover of letter R/TPM/1 of 10 July 1979. Prof. Gray is also currently engaged in the preparation of a WMO Technical Note on "Advances in tropical cyclone research", which is expected to be available in the near future (probably in early 1980).

ACTION PROPOSED

5. The Committee is invited to take note of the information contained in this document and to discuss and decide on any measures that it should take to maintain close collaboration with the CAS Working Group on Tropical Meteorology in the implementation of those high priority tropical cyclone research projects as referred to in paragraph 2 and the annex to this document.

/Annex

Annex

SUMMARY OF THE MAIN RECOMMENDATIONS CONTAINED IN
THE REPORT OF AN EXPERT MEETING ON WMO/PRTM

(Ft. Collins, 16-19 July 1979)

I. TROPICAL CYCLONE (TC) COMPONENT

Ref. para.

5.3 Project TC1 - Global tropical cyclone data for research

(1) Preparation and archiving of historical data sets

- SG to ask P.R. of the United States to arrange for archiving facilities at NCAR and/or National Climate Center (NCC)/NOAA at Ashville.
- SG to consult President of CBS about appropriate arrangements for making historical data available on request through WDCs.

(2) Selection and archiving of relevant current data on a routine basis

- (a) Tropical cyclone tracks and intensity - Collection of six-hour information for all stages of tropical cyclones concerning (i) storm name and number, (ii) latitude and longitude, (iii) maximum wind and (iv) minimum sea-level pressure. Data need to be compiled by ocean basin and be ready for research purposes not longer than one year after the cyclone season.
- SG to approach P.R. of the United States to request NOAA Environmental Data Service to compile a yearly global summary of all such cyclones.
- (b) Routine surface and upper-air observational data transmitted over the GTS
- Ask President of CBS to make arrangements for the routine extraction and archiving at WDCs of the following categories of data within a radius of 20° of each designated tropical storm: (i) upper-air observations of wind, temperature and dew-point at the mandatory levels, (ii) ship reports, (iii) surface land station reports, (iv) satellite winds and (v) aircraft reports. Period covered from three days before

/the tropical

the tropical storm designation (max. wind 234 kts) to the day on which it declines in strength below this value. The establishment of uniform storm designation procedure is also needed.

(c) Analyzed weather maps on microfilm - Once a day at the time of best coverage at either 0000 or 1200 GMT during tropical cyclone season at three levels (surface, 500 and 200 mb).

- SG to ask PRs of countries concerned with tropical centres (e.g., Nadi, French Polynesia, La Réunion or Mauritius, New Delhi, Miami, Guam, Hong Kong and Darwin) to arrange for the microfilms to be prepared annually, after investigating the possibility of providing microfilm equipment (on loan). (As an alternative, contact the United States and the USSR about provision of sets of microfilmed global weather charts).
- Ask President of CBS to arrange for one copy of the microfilmed maps from these centres to be archived at NCC/NOAA (Ashville) and WDC-B (Moscow).

(d) Satellite imagery on microfilm

- SG to ask P.R. of the United States to make available a microfilmed Mercator composite of Polar orbiting satellites to research workers on request.

(e) Forecasts and warnings - to be compiled at regional centres and to make the information available through WDCs.

- SG to consult President of CBS on this matter.

Ref. para.

5.4 Project TC3 - Small-scale cycloidal motion of tropical cyclones

- SG through P.R. of the United States to invite experts from either NHEML or NMC to prepare a technical note on the current state of knowledge on the subject matter.
- Advise individual countries or areas (e.g., the United States, Japan, Hong Kong, India, Australia and others) of the need for compiling information on radar-tracked eye positions available

in map form and sending it to tropical research centres at Miami or Tokyo. (Also request members concerned to document tropical cyclone locations at intervals of one hour or less.)

- SG to ensure wider dissemination of information on the availability of these data and to consider the possibility of preparing a second T.N. when more detailed information becomes available.

Ref. para.

5.5 Project TC4 - Association of tropical cyclogenesis with large-scale circulation changes

- SG to invite an expert (Professor W.M. Gray from Colorado State University is proposed as a possible expert) to prepare a global climatological survey of tropical cyclones for one recent year. The survey should summarize the main features of (i) global circulation with indication of anomalous features in low latitudes, (ii) tropical cyclone occurrence, structure and tracks with any departures from the average pattern and (iii) relationships between (i) and (ii).
- The secretariat to consider a long-term programme of publication of annual summaries of global tropical cyclogenesis and climatology.

Ref. para.

5.6 Organization of a WMO symposium on tropical cyclones

- The secretariat, in consultation with the President of CAS, to take the necessary action to have the proposed WMO symposium organized in 1981 or 1982, subject to approval of EC-XXXII. (Venue: China, Hong Kong or Japan.)
- Participation of one to three representatives from each of the regional bodies involved in WMO/TCP to be ensured.

Ref. para

5.7 Typhoon operational experiment (TOPEX)

- The secretariat to arrange for a summary of any research needs arising from this experiment to be made known to the CAS Working Group on Tropical Meteorology.

Ref. para

5.8 Collaboration between regional bodies of WMO/TCP and CAS Working Group on Tropical Meteorology

- Bring to the attention of each of the regional bodies a requirement for designating an expert (a young scientist) to serve as the communication channel through the CAS Working Group in the