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AND

WORLD METEOROLOGICAL ORGANIZATION

REPORT OF THE TYPHOON COMMITTEE

ON ITS SIXTEENTH SESSION

**Tokyo, Japan
6 - 12 December 1983**

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

TYPHOON COMMITTEE

Sixteenth session
6-12 December 1983
Tokyo

DRAFT REPORT OF THE TYPHOON COMMITTEE
ON ITS SIXTEENTH SESSION

I. ORGANIZATION OF THE SESSION

1. The sixteenth session of the Typhoon Committee was held in Tokyo from 6 to 12 December 1983.

Attendance

2. The session was attended by representatives of China, Hong Kong, Japan, Malaysia, the Philippines, the Republic of Korea and Thailand. Observers from France, the Republic of Indonesia, the Union of Soviet Socialist Republics, and the United States of America attended the session. Observers were also present from the United Nations Development Programme (UNDP), the Office of the United Nations Disaster Relief Co-ordinator (UNDRO), 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. At the opening session welcome addresses were given by Dr. Shigeji Suyehiro, Director-General, Japan Meteorological Agency and Mr. Shouhei Inoue, Director-General, River Bureau, Ministry of Construction. A message from Mr. S.A.M.S. Kibria, Executive Secretary of ESCAP and a statement by Dr. A.C. Wiin-Neilsen, Secretary-General of WMO were read by respective representatives of those organizations.

4. In his welcome address Dr. Suyehiro extended a hearty welcome to all the participants. He invited the attention of the Committee to the friendly co-operation of scientists seconded to IEC in Tokyo under the Meteorological Component of TOPEX. He hailed the co-operation of national meteorological services on a real-time basis as an epoch-making event in the history of the Typhoon Committee. Dr. Suyehiro urged the Committee not to lose the momentum gained by TOPEX, and expressed his hope of keeping high the spirit of co-operation despite strong head winds hindering progress in promoting of typhoon damage mitigation.

5. Mr. Inoue also welcomed the participants of the sixteenth session of the Committee. He noted in his address that mitigation of typhoon and flood damage is a frequent subject in the region. In this connection he stressed the importance of developments in the application of wide ranging measures, including typhoon tracking and forecasting, flood forecasting, comprehensive flood damage mitigation and

improvement of disaster prevention and preparedness systems. Keeping in mind the fruitful results achieved in all components of the Committee's programme, he expressed his appreciation for the efforts made by members and for assistance provided by ESCAP, WMO, UNDP and other international organizations. He concluded his address by noting the need for the Committee to continue its efforts and hoped that the Committee would adopt an appropriate plan for its future activities.

6. The Executive Secretary of ESCAP extended his sincere thanks to the Government of Japan for its support and for the assistance provided to the various activities of the Committee.

7. Reviewing typhoon and flood disasters in the ESCAP region during 1983, particularly a flood in western Japan in July and a prolonged flood in Bangkok, the Executive Secretary noted in his message that, despite large investments in flood mitigation schemes, flood damage in the region had continued to increase. Japan, for example, had allotted considerable resources in this field in the past and indeed the loss of lives had been reduced; however, the economic cost of damage continued to increase as a result of the economic development of the country. Although flood damage could not be eliminated completely, he noted that available measures which could be encompassed properly in a comprehensive flood plain management plan should be implemented by members to minimize their adverse effects. In this

respect, he noted the programme on implementation of a comprehensive approach in the proposed medium- to long-term plan of the Committee to be considered at the sixteenth session. He concluded his message with the hope that the Committee will execute these activities with great vigour.

8. The representative of WMO in his address pointed out that the session marked an important milestone in the activities of the Typhoon Committee for it was the first to be held after the operational phase of TOPEX. Although, the technical and scientific evaluation of TOPEX had not yet taken place, the preliminary indications were that it had been a successful exercise in regional co-operation. He acknowledged the contributions of the Government of Japan and the UNDP for the completion of the operational phase of TOPEX. The Committee was also reminded that in view of the reduction of the UNDP support for the Committee's programme, other sources of assistance such as TCDC would need to be explored. He finally expressed the hope that it would be possible for the Committee to give its frank views on the achievements and shortcomings of the Tropical Cyclone Programme to enable the next session of the Executive Council of WMO to decide on future additional support for the Programme.

Election of officers

9. The Committee elected Dr. Ryuichi Iida (Japan) as Chairman of the Committee for the year 1983/1984 and Mr. Ho Tong Yuen (Malaysia) as Vice-Chairman; Mr. Lam Chiu Ying (Hong Kong) was elected Chairman of the Drafting Committee.

Agenda

10. The Committee adopted the following agenda:
1. Opening of the session
 2. Election of officers
 3. Adoption of the agenda
 4. The Committee's activities during 1983
 - (a) Meteorological component
 - (b) Hydrological component
 - (c) Disaster prevention and preparedness component
 - (d) Training
 - (e) Research
 5. Typhoon Operational Experiment
 - (a) Report on the Third Planning Meeting
 - (b) Report on the sixth and seventh sessions of the Management Board
 - (c) Report on the Second Operational Experiment
 - (d) Report on the Sub-Experiment
 6. Review of the 1982 and 1983 typhoon seasons
 7. Co-ordination with other activities of the WMO tropical cyclone programme
 8. Medium- to long-term plan of the Committee
 9. Support required for the Committee's programme
 10. Programme for 1984
 11. Consideration of the agenda for the seventeenth session
 12. Date and place of the seventeenth session
 13. Scientific lecture
 14. Adoption of the report

II. THE COMMITTEE'S ACTIVITIES DURING 1983

11. The Committee reviewed and assessed the progress made in implementing its programme during 1983, as set out in document WRD/TC.16/1. It considered in turn the five components, namely (a) meteorological, (b) hydrological, (c) disaster prevention and preparedness, (d) training and (e) research. The main features of the discussions and decisions taken for each component are reported below.

A. METEOROLOGICAL COMPONENT (Agenda item 4 (a))

12. The Committee noted with satisfaction the progress made by members in improving their observing facilities and capabilities for typhoon forecasting and warning services, and in particular their contributions in support of the Second Operational Experiment (SOE) of TOPEX.

13. The SOE had been successfully completed with the collaboration of the members of the Committee. The financial support provided by UNDP, the contributions of Japan, WMO, ESCAP and TCS in the planning and organization, as well as the provision of technical services were invaluable factors in the smooth operation of the SOE. The experiment also demonstrated that success in typhoon forecasting, warning dissemination, data collection and analysis for flood prediction was in a large measure due to the collaborative efforts of members and the spirit of regional co-operation that prevailed between them. (See also agenda item 5).

14. Japan continued successfully to operate the Geostationary Meteorological Satellite (GMS-2) which provided cloud imagery, as well as vital information on cloud wind vectors, and sea surface temperature. Special arrangements were made to transmit cloud pictures hourly during the TTE periods of the SOE. This contributed significantly to accurate typhoon positioning and improved forecasting and warning capabilities. The Committee expressed its appreciation to JMA for its effort in providing special observations from GMS-2 and expressed the hope that GMS could be further upgraded with capabilities for transmitting hourly pictures, and retransmission of platform data in the near future.

15. With a view to improving the reception of the GMS satellite pictures, Japan had installed small scale data utilization stations in Fukuoka and Okinawa in March 1983. Similar stations were planned at Sapporo, Sendai, and Osaka in March 1984. An image monitoring system for animated presentation of colour GMS images was also planned to be installed at the JMA headquarters in March 1984.

16. In the Republic of Korea, four sets of LASER-FAX receivers were installed at Pusan, Kwanju, Kangnung and Kimpo to receive GMS pictures retransmitted by the Central Meteorological Office at Seoul.

17. The satellite receivers of some members were repaired by the TCS expert with spare parts provided under the UNDP regional typhoon project fund.

18. The Committee stressed a need for obtaining additional funds to assist members to obtain in time urgently needed spare parts for essential electronic equipment such as satellite receivers and weather radars. The Committee was informed that most members were experiencing difficulties in obtaining the necessary spare parts from abroad either because of a shortage of foreign exchange or the lengthy procedures involved for their procurement. Often, therefore, the operation of such equipment was interrupted for considerable periods of time.

19. In compliance with a requirement for the SOE, four upper-air observations daily through one full TTE-period of five days were made by a special network of 27 upper-air stations, in China (10), Hong Kong (1), Japan (5), Korea (1), Malaysia (3), Philippines (3), Thailand (2) and Viet Nam (2).

20. In support of the SOE, TCS experts assisted members in calibrating weather radars and DVIP systems. Radars at Nanhui, Dongtou, Shantou, and Xisah Dao in the coastal area of China were also calibrated before the SOE. A test and comparison of the performance of a newly made prototype radar with the one in use at Shantou was also made during the typhoon season and the results found to be satisfactory.

21. With a view to improving typhoon tracking and warning services, a number of weather radars were replaced and additional ones installed in 1983 in Hong Kong (1), Japan (2), Philippines (1). The Committee noted that there were plans for installing new radars in Japan (Naze) and the Philippines (Busuanga, Palawan Province) before the next typhoon season.

22. A new OMEGA type upper-air sounding ground receiver system was installed and put into operation at Bangkok, ^{Channay, Zoukri} and the installation of similar equipment at Chiang Mai and Songkhla in Thailand is in progress. A Micro-Cora system was installed at Laoag, Philippines.

23. With a view to ensuring prompt and efficient data exchanges for the Second Operational Experiment of TOPEX, a test exercise on data exchange between the IEC, Tokyo and the ESCs was conducted in May with successful results.

24. In order to cope with the vast volume of data exchanged through the telecommunication system, the computers of the following members were further upgraded:

China: through national resources with some assistance provided by UNDP under the regional typhoon project,

Hong Kong: through national resources;

Malaysia: through national resources;

Thailand: with the assistance of USA under VCP.

25. In the Republic of Korea, four sets of teletype equipment with an 8-K computer memory acquired under the UNDP regional typhoon project were installed. This improved very much the collection of data throughout the country.

26. In Thailand various steps for the improvement of national data collection, particularly during the night, were planned in consultation with the TCS Telecommunication expert. For the present, 15 new SSB transceivers will be installed by April 1984.

27. With a view to improving telecommunication systems and ensuring efficient data collection in the Philippines, a feasibility study for a new telecommunication system including a radio wave propagation test, was carried out with the assistance of the Government of Japan.

28. In compliance with the request of the members to improve data exchange between the RTH Tokyo and certain NMCs, the Japan Meteorological Agency had plans to upgrade the following telecommunication circuits:

Tokyo-Hong Kong, 200 bps, January 1984.

Tokyo-Seoul, 200 bps, March 1984.

Tokyo-Beijing, in the range of 4800 to 9600 bps, October 1984. } Subject to the Government approval

Tokyo-Bangkok, Tokyo-Manila, 200 bps, October 1984.

29. The Committee welcomed the information that the United States planned to continue to carry out meteorological reconnaissance flights in the typhoon affected areas in the years ahead, and that the observations would be provided to members.

30. The Committee revised the priority list established at its fifteenth session as shown below:

Priority list as revised by the
Typhoon Committee at its sixteenth session

Observing facilities

(a) Upper-air stations

98223 Laoag (Philippines)	} 12 GMT RS/RW national projects External assistance needed
98645 Cebu (Philippines)	
47187 Cheju (Rep. of Korea)	

(b) Weather radar

Xisha (China)	National/external assistance needed
Cheju (Republic of Korea)	External assistance needed
Tanay (near Manila, Philippines)	National project
Haiphong (Viet Nam)	External assistance needed
Vientiane (Lao PDR)	External assistance needed

(c) Satellite receiving equipment (GMS/TIROS-N satellite)

Hanoi (Viet Nam)	External assistance needed
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Telecommunication

(a) Improvement of national data collection facilities

Lao People's Democratic Republic	} National/bilateral projects/external assistance needed
Philippines	
Viet Nam	

(b) Regional telecommunication links

Bangkok-Hanoi (new circuit)	National project
Beijing-Guagnzhou-Hong Kong	National/bilateral project

(c) Other telecommunication facilities

Thailand - Strengthening of RTH, Bangkok	National/external assistance needed
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B. HYDROLOGICAL COMPONENT
(Agenda item 4(b))

31. The Committee reviewed the accomplishments under the hydrological component during 1983 as reported in document WRD/TC.16/1 and noted with satisfaction the progress made by members in the establishment, improvement and operation of flood forecasting and warning systems. The review also covered measures for the establishment of flood loss prevention and management in pilot areas.

32. The Committee noted the following additional developments reported by the members.

33. The semi-automatic telecommunication system in the Puyang River basin, China had been operational since 1982. The system was connected with the computer at the telemetering center in Hangzhou. Most of the telecommunication facilities of the flood forecasting system were installed for the Xishi River basin in Guangdong Province and operated quite well. It was also planned to summarize the results of the experiment conducted over the past three years with a view to improving the flood forecasting and warning systems of these two river basins.

34. Japan continued the improvement of existing flood forecasting and warning systems. In 1983 17 flood forecasting systems were operational. The Committee noted the usefulness of radar rain-gauges in observation of areal distribution of rainfall and forecasting of its movement.

35. Japan was carrying out comprehensive flood loss prevention and management plans since 1978 in order to improve flood control facilities, to provide storage capacity and to control the increase in flood discharge due to development in the river basin. In 1983, a "Basin Council", consisting of heads of departments concerned in prefectural and municipal governments was established in the Yamato river basin. Comprehensive flood loss prevention plans were established in the Mama river, the Nakagawa/Ayase river and the Sakai river basins. Maps of flooded areas were prepared for the use of the public in the Mama, Yamato and Sakai river basins in 1983. The Nagasaki prefecture, which had suffered from serious damage in July 1982, was also undertaking flood loss prevention and management measures for making the city safe against disaster.

36. Malaysia had completed the structural work necessary for the flood forecasting systems in Sabah and Sarawak. Aquisition and installation of the telemetering equipment was rescheduled from 1983 to 1984 because of budgetary constraints. A new computer (PERKIN ELMA 3210) had been installed to facilitate more efficient flood forecasting.

37. Malaysia informed the Committee that it intended to carry out flood risk mapping to facilitate proper land-use planning and development in the upper Klang river basin.

C. DISASTER PREVENTION AND PREPAREDNESS COMPONENT
(Agenda item 4(c))

38. The Committee reviewed the activities under this component of its programme, noting the following information:

39. Members improved their gathering of disaster statistics for damage assessment through the use of the standard format adopted at the Third Planning Meeting for TOPEX.

40. Case studies which formed an important activity under the Warning Dissemination and Information Exchange Component of TOPEX (WD/IE) were undertaken by several members. Public education and training also received increased attention. Pamphlets containing information on typhoons, flooding and measures for community preparedness were published by some members.

41. In China work was concentrated on the improvement of the communication network by setting up radio links, providing audio-visual facilities for public education and information, and developing training for trainers. In addition, weather forecasting offices in coastal areas were requested to implement the system for providing typhoon forecasting services and reporting timely disaster information.

42. The Royal Observatory made a thorough review of the Natural Disaster Emergency Organization in Hong Kong. Warning systems covering tropical cyclones, storm surges, flooding and landslips due to heavy or prolonged rainfall, etc., had been streamlined. Dissemination lists were updated for all warnings, advice and precautionary announcements originated at the Royal Observatory. In addition, the Information Service Department ensured that all public notifications regarding the operation and decisions of government departments and other organizations in respect to closure of schools, suspension of public transport services, etc., were promptly disseminated for broadcast. The public is informed by broadcast of the extent of disasters and of the arrangements made to ensure safety, and provisions for relief. Improvements were also introduced in the collection of operational data, e.g., real-time wind, rainfall and tides. The Royal Observatory also carried out a programme of press, radio and TV interviews to publicize the various warning services.

43. The Committee was informed of a roving mission consisting of two experts provided by the Government of Japan and a technical secretary to study present systems used to assess damage and to recommend methods for their improvement. The mission had visited Hong Kong, Malaysia, Thailand, the Philippines and Viet Nam, and planned to visit China and the Republic of Korea in January 1984. The report of the mission was expected to be available in early 1984. The Committee conveyed its appreciation to the Government of Japan for the financial support provided to the mission.

44. In support of TOPEX Japan conducted a seminar on hydrology and warning dissemination and information exchange at Tokyo with the assistance of the Japan International Cooperation Agency (JICA). This seminar concentrated on ways and means of improving member's systems for typhoon disaster mitigation.

45. In Malaysia, a case study was carried out on the heavy monsoon rainfall from 13 to 16 December 1982 which caused flooding over the Kelantan River basin; approximately 4,900 people were evacuated to higher ground following advance warnings although five lives were ~~still~~ lost.

46. The Ministry of Welfare Services in Malaysia was given responsibility for identifying and establishing evacuation centres, managing such centres during disaster periods and providing the rehabilitation facilities needed for the victims. A total of 2,234 evacuation centres, capable of giving care and protection to 604,000 people, were identified for the whole country. Welfare and other officials, as well as volunteers, were also chosen to manage the evacuation centres in times of disaster. One hundred two "forward supply bases", whose tasks were to stock food and other necessities, were also identified in isolated areas where breakdowns in transportation and communication systems were likely to occur. The services of the Malaysian Air Force were also recruited for short-notice airlifting of supplies to disaster affected areas.

47. In the Philippines illustrated pamphlets on the precautionary measures to be taken in the event of typhoons, floods and landslips were published and distributed in typhoon-prone areas, river basins, coastal areas and areas on mountain slopes.

48. Exercises were also carried out to test the dependability and reliability of the warning systems. Evacuation drills were also conducted, and the damage assessment scheme based on the manual published by the Office of Civil Defense in 1982, "How to Assess Damage Impact," was tested. A Committee was also formed to handle matters relative to conducting the survey on the efficiency and effectiveness of warning dissemination, especially to disaster-prone areas.

49. The Committee was informed that the government of the Philippines plans to establish a Natural Disaster Research and Training Centre in Manila with the assistance of USAID and UNDR0. The plan was supported at the ASEAN expert meeting on natural disasters held in Singapore in October 1983. ✓

50. In Thailand, the Meteorological Department and the Local Administration Department implemented a plan for better interaction between local governments and the general public which the focal points of the three components of TOPEX worked out during the experiment period. The Local Administration Department planned to establish a civil defence school to train volunteers and to undertake case studies. ✓

51. Thailand also conducted a case study on historical floods and losses. In support for an information campaign, pamphlets for community education and awareness of natural hazards were published and circulated. Also the assessment of damage caused by tropical cyclones was standardized using the recommended format adopted at the Third Planning Meeting.

In support of the Second Operational Experiment, all emergency communication networks, disaster prevention wireless systems and warning dissemination systems in Thailand were activated.

52. The Committee was informed of a new publication in the WMO Tropical Cyclone Programme series entitled "Human Response to Tropical Cyclone Warnings and their Content".

It had been prepared by a group of experts from Australia, India, the Philippines and USA. The publication could be obtained free of charge from WMO.

53. The Committee considered there is a need for the preparation of appropriate textbooks on response to natural disasters and especially to the threat of typhoons and floods for the education of the population and, more particularly, for the younger generation. A report analysing the human reaction to disaster in Japan was brought to the attention of the Committee.

54. The Committee was also informed that WMO, UNDRO and LRCS were co-operating in a project which aimed to prepare guidance material to assist members in the improvement of their public information and education programmes. Work was proceeding on a report which, it was expected, would be published in 1984.

D. TRAINING
(Agenda item 4(d))

55. The Committee under this item noted that the following training events had been organized during the year in which a number of members had participated.

- (a) Training seminar in flood forecasting at the Asian Institute of Technology in Bangkok from 21 - 25 February, 1983.
- (b) Seminar on the principles of Flood Plain Management for Flood Loss Prevention in Bangkok from 18 - 22 October, 1983.
- (c) Seminar on the application of radar data to tropical cyclone forecasting in Bangkok from 21 November - 2 December, 1983.
- (d) Seminar on automated message switching system organized jointly by the Royal Observatory Hong Kong and WMO in Hong Kong from 23 - 29 November, 1983.

56. The Committee noted that in support of TOPEX, Japan had conducted a seminar in the hydrology and warning dissemination and information exchange at Tokyo from 1 July - 6 August, 1983. Group training courses on river engineering, flood loss prevention and management, technology for disaster prevention and meteorology had also been arranged by Japan for the benefit of members. The Committee expressed its gratitude to the Government of Japan for providing these courses and seminars.

57. The Committee, while of the firm view that training seminars and workshops continued to be an effective means for broadening knowledge and dissemination of new techniques among members, felt that in the selection of topics for future training events, particular attention should be given to the changing requirements and priorities of members.

58. The Committee considered that besides group training activities, such as seminars and workshops, attachments of personnel to advanced centres, to observe and study new systems and techniques was another method of acquiring skills. It accordingly encouraged such attachments to be arranged under bilateral schemes, the VCP, or UNDP.

59. The Committee noted the offer of the USSR to provide training to members in meteorology and meteorological equipment through the award of fellowships under the VCP.

60. The USA informed the Committee that it was hosting a training course on tropical meteorology and tropical storm forecasting at the University of Miami, Florida, 27 February to 4 May 1984. Additionally the USA expected to organise a hydrological forecasting course at University of California at Davis in co-operation with WMO in 1984. Some fellowships to both courses would be available through the VCP.

E. RESEARCH
(Agenda item 4(e))

61. The Committee was informed that research correspondents had been redesignated by members to collect and exchange information in research activities, and to carry out joint research on selected topics. It noted that following a decision of TC 15, research activities had been expanded to include a greater emphasis on the hydrological and DPP components.

62. The Committee felt that research under the DPP component had generally lagged behind that of the meteorological and hydrological components. DPP research was considered important in relation to such questions as the lack of adequate response by the public to heed weather warnings, and the proper approaches to Governments to convince them of the economic benefits of a good typhoon warning system.

63. The Committee therefore recognized the importance of raising the level of DPP research to that of the two other components. It further decided that DPP research should best be undertaken by sociologists or social scientists with the advice and support of such agencies as UNDRO, LRCS and ESCAP.

64. The Committee requested research correspondents to prepare consolidated reports on ongoing research in their respective countries, and a plan of action for research on specific topics. To accomplish this task it felt it would be desirable for a meeting of the correspondents to be convened in 1984 with possible assistance from WMO or ESCAP.

65. The Philippines announced its plans for the establishment of a National Disaster Research and Training Centre in Manila whose facilities would be made available to members. This was welcomed by the Committee.

66. The Committee acknowledged the donation of research publications on meteorology and atmospheric physics by the USSR to the TCS.

67. Japan presented a booklet entitled "Collected Scientific Papers related to Typhoon Damage Mitigation" giving summaries of research carried out in Japan. The Committee felt that the exchange of such research publications constituted an effective method of circulating information among members.

III. TYPHOON OPERATIONAL EXPERIMENT (TOPEX)
(Agenda item 5)

A. REPORT ON THE THIRD PLANNING MEETING (WRD/TC.16/2)

68. The report on the Third Planning Meeting for TOPEX (PM-III) was submitted to the Committee by the Chairman of PM-III, Mr. C.P. Arafles (Philippines). He called attention to the purpose of that meeting, held at Tokyo from 17-21 February 1983, namely to take up the detailed planning of the Second Operational Experiment (SOE) which had been scheduled to take place from 1 August to 15 October 1983. The Committee was given a summary of the main decisions made by PM-III.

69. The Committee was of the opinion that the careful preparations made by PM-III had made a decisive contribution to the smooth execution of the programme established for the SOE. It wished to record its appreciation to the Chairman of PM-III for his skilful conduct of the meeting.

70. It was further noted that PM-III had set a broad outline for the Evaluation Meeting for TOPEX to be held in March 1984 and that the further planning of that meeting would be taken up by the eighth session of the Management Board for TOPEX immediately after the sixteenth session of the Committee.

B. REPORT ON THE SIXTH AND SEVENTH SESSIONS OF
THE MANAGEMENT BOARD FOR TOPEX (WRD/TC.16/3)

71. The Committee considered the reports of the Management Board on its sixth and seventh sessions, and the summary of its work contained in document WRD/TC.16/3. It endorsed the reports of both sessions and noted that amongst the questions to be considered by MB-VIII was that of the date and place of its ninth and final session. The Committee expressed its view that the final session might conveniently be held in March 1984 in conjunction with the Evaluation Meeting but felt that the decision should be left to the Board at its eighth session.

C. REPORT ON THE SECOND OPERATIONAL EXPERIMENT

72. The Committee was informed that the detailed examination of the report of the Director of the International Experiment Centre (IEC) would be taken up by the eighth session of the Management Board for TOPEX immediately after the sixteenth session. As provided for in the agenda for TC.16, the Committee was however given a general description of the Second Operational Experiment (SOE) by the Director, Mr. I. Shimizu.

73. The Committee considered that the SOE had been an unqualified success and that the IEC had operated very efficiently. It considered that this was in large measure a consequence of the distinguished leadership provided by the Director and the devotion and scientific skill of the scientists seconded to the IEC during the two and a half months of the SOE. The excellent facilities provided by the Japan Meteorological Agency (JMA) and the funding provided by the Japan International Co-operation Agency (JICA) and WMO to assemble the team of scientists in Tokyo had also made significant contributions. In recognition of these facts the Typhoon Committee wished to place on record its sincere appreciation to the Government of Japan, including JMA and JICA, to the director of the IEC, and to the seconded scientists, as well as to WMO.

74. It was further pointed out that scientists and technicians at many different levels and in different places had made important contributions to the success of the SOE and were also deserving of the gratitude of the meteorological community as a whole.

75. Although the operational phase of TOPEX had ended, the Committee wished to draw attention to the need for the data sets to be made widely available and for a great deal of research and studies to be carried out. In that context the Committee felt that developed countries with good facilities for research (such as fast computers) should be prepared to share these facilities with those less well-equipped countries in carrying out research on the TOPEX data sets. It was further the view of the Committee that the close co-operation which TOPEX has promoted should be continued in the future.

76. Short accounts of the parallel SOE activities carried out at the Experiment Sub-Centres were also presented to the Committee for information. The Committee welcomed this information which would receive more detailed consideration at the eighth session of the Management Board.

D. REPORT ON THE SUB-EXPERIMENT

77. The Chairman of the Sub-Committee on the Sub-Experiment (Dr. M. Kanamitsu) presented a report on the further work undertaken in pursuit of the studies being carried out under the TOPEX Sub-Experiment, Meteorological Component.

78. The report was based mainly on progress reports submitted by the participating members of the Typhoon Committee at the request of the Chairman. They showed that 19 studies were being carried out by six members, many of them being statistical or synoptic studies as a result of the research priorities assigned for the 1982-1983 period. About 10 of the studies made direct or indirect use of TOPEX observations.

79. The degree of progress achieved with these studies to date varied considerably. Many of them were still in a very early stage, the time-scale for the research phase of TOPEX being much longer than that for the operational phase. Another factor of importance was that complete TOPEX data sets were not yet available, although they would soon be. The Committee noted with satisfaction that the Chairman of the Sub-Committee had requested members to submit more complete reports on the studies in hand by February 1984 in order that he might report thereon to the Evaluation Meeting for TOPEX (March 1984).

IV. REVIEW OF THE 1982 AND 1983 TYPHOON SEASONS
(Agenda item 6)

80. The Committee reviewed the 1982 and 1983 typhoon seasons on the basis of information provided by members.

81. Among 18 typhoons which had occurred in the region during the period from September 1982 to August 1983, the Committee was informed that 12 typhoons, namely, Nos. 8216, 8217, 8218, 8219, 8221, 8222, 8224, 8225, 8301, 8302, 8303 and 8306 had seriously affected members. The numbers of dead and missing persons due to typhoons and floods were 406 in the Philippines, 29 in Thailand and 99 in Korea. The cost of damage caused by typhoons and floods was estimated to be approximately 109 million dollars in the Philippines, 9 million dollars in Thailand and 30 million dollars in Korea during the period. In Japan, 494 persons were killed or missing in 1982 and 164 in 1983. In Malaysia 14 persons were dead or missing and M\$ 5 million worth ^{of properties} was reported lost in 1982.

82. Papers on damage caused by typhoons and floods in Hong Kong in 1982 and 1983, and in Japan in 1981 through 1983 were distributed during the session.

83. Japan reported on the Shimane disaster in July 1983 which was caused by torrential rain. An illustrated pamphlet on the disaster was distributed.

84. The Committee requested members to submit to the TCS country papers and reports not only on damage statistics but also other relevant information such as on the tracks and intensities of typhoons and on associated floods. Information should include statistics for comparison with those of previous years. TCS was requested to compile the information for presentation to the annual session of the Committee.

85. Consideration was also given by the Committee to a proposal for the production of an annual publication which would provide information on the typhoon seasons and its effects on members. One of its purposes would be to give ^{wide} publicity to the Typhoon Committee, and boost its image. Hong Kong offered to make a draft proposal on its content and format for consideration by TC.17.

The Committee suggested that a draft proposal on its content format be submitted to TC.17th.

Hong Kong agreed undertake this task.

V. CO-ORDINATION WITH OTHER ACTIVITIES OF THE WMO
TROPICAL CYCLONE PROGRAMME

(Agenda item 7)

(WRD/TC.16/7)

86. The Committee's discussion was based mainly upon the information given in the "Ninth Status Report on the Implementation of the WMO Tropical Cyclone Programme" (WRD/TC.16/7). This information was supplemented by an oral presentation of later developments and, in particular, of the need for the views of the Committee on the TCP as an input to the appraisal of its successes and shortcomings as requested by the WMO Executive Council.

87. The Committee decided to note the information provided by the WMO Secretariat in the Ninth Status Report as well as that on later developments. It felt that the most important question under this item was that of the appraisal of the TCP requested by the Executive Council and decided to concentrate thereon.

88. As a first comment the Committee wished to state that the WMO Tropical Cyclone Programme was one of the most important programmes being carried out by WMO. It was a programme that affected the safety of human lives and the economies of members. As such, there were strong reasons for giving it the maximum possible support. It was, however, a fact that it had never been adequately funded despite the increasing recognition it had received. At the same

time, the Committee considered that UNDP had played a vital role over a period of some 15 years. It accordingly understood that UNDP institutional support could not continue after 1984 although it hoped that programme and TCDC activities would continue to receive careful consideration by UNDP for the allocation of further funding. It wished to convey to UNDP its great appreciation of the long period of support it had received and to express its opinion that continued support of programme activities by UNDP would constitute a sound investment in terms of development and the transfer of technology.

89. In its assessment of the importance of the TCP, the Committee drew attention to the fact that it is a programme directly affecting many hundreds of millions of persons in tropical cyclone threatened areas. It also covered very large areas of the earth's surface, over land and sea. It would be advantageous for WMO to make these facts more widely known in order to secure greater support for action under the TCP.

90. These considerations apart, the Committee considered that the TCP had yet to realise its full potential. Its operations to date showed many shortcomings and deficiencies, principally because it operated with resources which were conspicuously inadequate to the task it faced. This was apparent not only in the very limited ability of the TCP to assist members affected by tropical cyclones, but also

in the relatively weak support provided by the WMO Secretariat. There was a pressing, urgent need to increase the capability of the Secretariat to furnish assistance and that would imply not only greater resources for the execution of the programme, but also a more realistic approach to the role of the Secretariat in the broad management of the TCP.

✓ 91. The Committee accordingly listed the following areas for which it felt greater support was urgently required:

- (i) Secretariat support to the regional cyclone bodies in the implementation of national and international activities;
- (ii) Telecommunications;
- (iii) Maintenance of electronic equipment;
- (iv) Training;
- (v) Transfer of technology;
- (vi) Research phase of TOPEX
- (vii) TCP publications providing guidance material.

✓ 92. The Committee further considered that the Disaster Prevention and Preparedness Component of its programme was not adequately covered at present. Advantage should be taken of the annual ESCAP Commission session to highlight this shortcoming and to request the resources that would

permit remedial measures to be taken. Greater use should also be made of other meetings to promote information on the work being done under the TCP, so that it would receive further support.

✓ 93. Having made the above statement of views for the benefit of the TCP appraisal for the WMO Executive Council, the Committee, noting that four of its members had seats on the Council, requested them to act as a spokesman for the Committee at the Council's next session in June 1984. That occasion should be used to advance solid arguments for the transfer of savings from other WMO programmes in 1984 to the TCP.

VI. MEDIUM TO LONG-TERM PLAN OF THE COMMITTEE
(Agenda item 6)

94. At its fifteenth session, the Typhoon Committee had established a small working group on Programme Planning composed of representatives of China, Hong Kong, Japan and Philippines, together with representatives of the WMO, ESCAP and Typhoon Committee Secretariats. Its task was to review past and current programmes including TOPEX and prepare a medium - to long-term plan (1984 - 1992) covering the Committee's activities in all five components of its programme.

95. The Working Group met in the Philippines from 20 to 27 June 1983 under the Chairmanship of Dr. R.L. Kintanar, and its report, including the resulting draft of the Plan, was submitted to the Committee in document WRD/TC.16/4.

96. The Committee made a very thorough examination of the Plan, discussing it in considerable detail. It was generally agreed that the plan prepared by the Group was acceptable in principle, and the Committee wished to express its appreciation to the Group and its Chairman for the excellent way in which they had dealt with a difficult task. It was, however, felt that some changes and amendments to the Plan were desirable, and it was suggested that the view of the Committee on the modifi-

cations required should be conveyed to the Working Group with the request that the Plan be amended accordingly. This work could be accomplished by correspondence under the guidance of the Chairman. A list of the points raised during the discussion and calling for changes is given in Annex A to this report.

97. The question of a mechanism for the periodic updating or revision of the Plan was also considered by the Committee. It was decided that the Working Group should seek views and ideas from members between sessions of the Typhoon Committee and submit proposals to the Committee's annual session. The TCS was requested to assist the Chairman of the Working Group in carrying out this work.

VII. SUPPORT REQUIRED FOR THE COMMITTEE'S

PROGRAMME (WRD/TC.16/5)

(Agenda item 7)

98. The Committee considered document WRD/TC.16/5, which reviewed the position with regard to institutional support, and the Committee's programme activities.

Institutional support

99. With regard to the post of Co-ordinator of TCS, the Committee expressed the strong desire that the Philippines should continue to provide the services of the Co-ordinator. The Philippines agreed to do so for a further period in view of the desire of the Committee and the location of TCS at Manila.

100. The Philippines also agreed to continue to provide the meteorologist for a further period as well as the facilities for the TCS at Manila. The Committee was informed that Japan would continue to provide a hydrologist in TCS.

101. The Committee expressed its gratitude to the Philippines for providing the co-ordinator, the meteorologist and facilities for the TCS, and to Japan for providing a hydrologist.

102. The post of telecommunication and electronics expert, which was being funded by UNDP to the end of 1984 under the current project, was one of much concern to the Committee. It noted the valuable contribution of the expert and expressed its view that it was essential to continue this post after 1984. ✓

103. The Committee, therefore, discussed possible ways of funding the post after 1984. It considered there were several potential sources of funding:

(i) Through a TCDC arrangement;

(ii) By a seconded expert or consultant appointed by WMO;

(iii) From savings in the WMO regular budget; ✓

(iv) From private sector funding.

It was the consensus that the Secretary-General of WMO be requested to investigate these different possibilities in the light of developments in order to ensure that the expert would remain in the post is filled after the end of 1984. The Committee was informed by the representative of UNDP that the travelling expenses of this expert could be met from UNDP funds as part of the programme support to the Typhoon Committee. ✓

Programme support

✓ 104. The Committee was informed that a project to improve systems of compiling typhoon and flood damage data had been proposed by the ESCAP secretariat and approved by the Government of Japan. This project, was being carried out in 1983/1984, at a cost of approximately US\$50,000.

✓ 105. In addition, TCS, in consultation with ESCAP had prepared a project proposal for the improvement of disaster prevention systems based on risk analysis of disasters from typhoons and heavy rainfall, with a total project cost of approximately US\$70,000. This project had been approved by the ESCAP Projects Review Committee, and was ready for submission to a donor country.

106. The representative of UNDP confirmed the intention of his organization to provide US\$ 312,000 for the programme activities of the Typhoon Committee for the year 1985 and 1986. He further suggested that TCDC ^{facility} be introduced into the project budget in order to promote the provision of expert services ~~between the members.~~

and other form of cooperation

107. The Committee welcomed the confirmation from UNDP that funds would be allocated for 1985 and 1986. It considered that its new medium- to long-term plan would call for a considerable expansion of its activities and that further external support for its programme was essential in 1987 and beyond. It therefore expressed the hope that UNDP would continue and if possible augment its support during the next programming cycle. *\$ 300,000 \$ 150,000*

✓ 108. The Committee was also informed of the latest position with regard to other sources of support for programme activities. Thus, the WMO Voluntary Co-operation Programme (VCP) would continue to present opportunities for Typhoon Committee members. A recent change in procedures made it possible for the travel and per diem costs for TCDC experts to be met from the fund. For the WMO Special Temporary Voluntary Fund for TOPEX, only four members of the Committee had so far contributed the token US\$1,000 requested at earlier sessions. The Committee urged those members which had not done so to reconsider making their contributions at an early date. The representative of China informed the Committee that its contribution would be paid shortly.

109. Information was also given that the efforts to raise support from the private sector were continuing. No definite information could yet be given, but there was room for cautious optimism in the longer term.

110. The Committee was pleased to learn that, as stated at TC.15, China was ready to provide experts to other members during the typhoon season under TCDC arrangements. It was ready on request to send 2 - 3 meteorological experts for periods of 1 - 3 months. The Committee welcomed this offer and expressed the hope that members would take full advantage of it.

111. A discussion also took place under this item on the desirability of attempting to assess the budgetary implications of the Committee's programme for the next 1 - 2 years. It was realised that it would be a difficult exercise and could only be carried out when the detailed programme for the period had been worked out. Nevertheless, it was felt that such information would be very useful in seeing which activities would be funded nationally and, hence, the magnitude of external support required. The Committee requested the TCS to investigate ways in which it could provide the required information.

112. The Committee noted with satisfaction the U.S.S.R. offer to provide specialists, scientific research vessels and meteorological equipment to carry out joint international experiments on tropical cyclones. It invited those interested to have preliminary consultations on the matter.

VIII. PROGRAMME FOR 1984 AND BEYOND
(Agenda item 8)
(WRD/TC.16/6)

113. In considering its programme for 1984 ^{and beyond} as set out in document WRD/TC.16/6, the Committee took into account the on-going programme of work and the medium-to long-term programme it had adopted. The execution of the TOPEX sub-experiment was fully taken into account.

114. The programme for 1984 ^{and beyond} adopted by the Committee is given in Annex B. The Committee noted that some of the programmes were ongoing projects on urged members to make every effort to implement them to the extent that resources were available, with the assistance of the TCS.

IX. CONSIDERATION OF THE AGENDA FOR
THE SEVENTEETH SESSION
(Agenda item 11)

✓ 115. The Committee requested the ESCAP and WMO secretariats, in close consultation with the TCS, to prepare the detailed agenda for the seventeenth session, which should include an overall review of the Typhoon Operational Experiment and a comprehensive review of the 1983 and 1984 typhoon seasons. 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.

X. DATE AND PLACE OF THE SEVENTEENTH SESSION
(Agenda item 12)

[116. The Committee decided that the seventeenth session would be held in Bangkok, from 30 October to 5 November 1984.]

to determine later.

XI. SCIENTIFIC LECTURES
(Agenda item 13)

117. The following scientific lectures were presented:

- (a) From meteorology, through hydrology, to disaster prevention and preparedness by Dr. Takeo Kinoshita, Director, First Research

Division, National Research Center for Disaster Prevention, Science and Technology Agency.

(b) Present status of damage data compilation in the region by Mr. Yoichiro Yano, Team Leader of the Roving Mission for Improvement of Systems of Compilation of Damage Caused by Typhoons and Floods, Policy Planning Officer, Minister's Secretariat, Ministry of Construction.

(c) Typhoon Ellen in 1983, together with a technical film on the typhoon, by Mr. Lam Chiu Ying, Senior Scientific Officer, Royal Observatory, Hong Kong.

118. The Committee expressed its thanks to the lecturers for their interesting presentations.

119. It was decided that one of the scientific lectures at future sessions should be devoted to a review of the previous typhoon season.

XII. ADOPTION OF THE REPORT
(Agenda item 14)

120. The Committee adopted its report on December 1983.

VIEWS EXPRESSED BY THE SIXTEENTH SESSION OF THE TYPHOON
COMMITTEE ON THE CHANGES NECESSARY TO THE MEDIUM -
TO LONG-TERM PLAN (1984 - 1992)

I. METEOROLOGICAL COMPONENT

- (i) For the years 1985 - 1987, the programme requires further development for discussion and approval at TC.17;
- (ii) The programme for 1988 - 1992 should be updated by 1987 in the light of circumstances;
- (iii) Under sections I, II and V, there is a need to introduce a reference to new technology, particularly observing platforms, with the purpose of improving real-time processing for Nowcasting;
- (iv) Section II (ii) should cover requirements both for additional new radar stations and for the replacement of older equipment by more up-to-date equipment;
- (v) Account should be taken of the observations increasingly available from platforms such as oil-rigs and measures taken to ensure availability on GTS circuits;

II. HYDROLOGICAL COMPONENT

- (i) Inclusion of a programme on application of the results of TOPEX in flood forecasting and warning;
- (ii) For section I - Flood forecasting and warning; external assistance in provision of equipment was required;
- (iii) For section II 1) - Establishment of pilot area for comprehensive flood loss prevention and management by each member; long-term experts were required for its implementation. Malaysia informed the pilot area for this item would be Kelang River basin;
- (iv) Implementation in early stage of section I (v) - Missions of expert to provide technical guidance on items (i) to (iv).

III. DISASTER PREVENTION AND PREPAREDNESS COMPONENT

- (i) There is a need to designate Focal Points for each member;
- (ii) An interface between the DPP component and the other components is needed.

IV. TRAINING COMPONENT

- (i) For sections I(vi) - Tropical Cyclone Forecasting and II(v) - Flood Loss Prevention, no JICA funding would be available. For section I(vii) - Meteorology and II(vi) - River Engineering, efforts would be made by JICA to support the group training courses.
- (ii) In section III(i) - "Volunteer Leaders" to be added;
- (iii) For section III (vi), efforts would be made by JICA to support the group training courses.

V. RESEARCH COMPONENT

- (i) There is a need for research into special types of typhoon warning services for users, such as oil rigs and other small platforms;
- (ii) Post-TOPEX research under II. Hydrology should include a comparison of the performance of different models using the same data set.

VI. GENERAL

- (i) Special studies should be conducted to discuss innovations in methods and facilities;
- (ii) Attention should be given to the administrative/institutional arrangements for assistance to members of the Typhoon Committee;
- (iii) Publications and information on Typhoon Committee activities should be given priority.

A. Meteorological component

- (i) Operation and maintenance of electronic equipment (R/W, radar, radar picture transmission, satellite receiving and telecommunication equipment);
- (ii) Establishment of new radar stations at key locations in the Philippines, the Republic of Korea and Viet Nam;
- (iii) Replacement and/or upgrading of old radar sets in Malaysia, the Philippines, the Republic of Korea and Thailand;
- (iv) Provision of equipment and spare parts for weather radar and satellite data receiving stations;
- (v) Provision or improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;
- (vi) Establishment of satellite data receiving stations for reception of cloud imagery and other data from GMS and TIROS-N satellites;
- (vii) Installation of a computer processing system at selected locations with a view to integrating satellite, radar and rainfall data so as to provide a spatial distribution of rainfall amount over a large region;
- (viii) Monitoring of data exchange on existing point-to-point telecommunication circuits with a view to their improvement, where necessary;
- (ix) Enhancement of TC members facilities for reception/dissemination of meteorological information with automation and upgrading of GTS centres to accommodate higher speed data transmissions;
- (x) Improvement of data completeness and quality, including real-time and non-real-time monitoring;
- (xi) Review of national data collection facilities and data exchanges needed for typhoon warning services, taking remedial measures when necessary;
- (xii) Review of the existing arrangements for dissemination of typhoon warnings with a view to introducing improvements, where necessary;
- (xiii) Procurement and installation of equipment and spare parts for telecommunication, radar, satellite data receivers, etc., under the UNDP fund for 1984;

(xiv) Development of instruments to meet specific needs in tropical cyclone areas;

(xv) Improvement of operation of those centres with responsibilities for the provision of processed information needed by TC members for their forecasting and warning systems;

(xvi) Enhancement of co-operation in typhoon monitoring, forecasting and warning;

(xvii) Exchange of forecasts, including products of different objective methods;

(xviii) Commissioning of a comprehensive study on ways to provide adequate data over tropical cyclone-prone ocean areas;

(xix) Preparation for and execution of the evaluation for TOPEX and its Sub-Experiment on the basis of the programme recommended by the planning meetings and the decisions made by the Management Board for TOPEX;

(xx) Initiation of planning of further measures to be taken within the Committee's programme to identify and conduct studies and/or evaluations, in association with the ISS, Integrated WWW System Study, which would assist in defining a cost-effective best mix of observing systems in support of typhoon forecasting and warning;

(xxi) Collection and dissemination of the tide gauge and water level data for use in storm surge prediction.

(xxii) Promotion of inter-disciplinary co-operation and research in the area at the interface between the meteorological and disaster prevention and preparedness components;

(xxiii) Conducting studies on human response to warnings;

B. Hydrological component

(i) Establishment of flood forecasting and warning systems in the Nam Ngun and Se Bang Hieng River basins in the Lao People's Democratic Republic, the Kinabatangan basin in Sabah and the Sadong basin in Sarawak, Malaysia, the Pasak River basin in Thailand and one river basin to be selected in Viet Nam;

(ii) Improvement of existing flood forecasting and warning systems making use, where appropriate, of the results of TOPEX and the technology available through HOMS;

(iii) Establishment and operation of new flood forecasting and warning systems;

(xiv) Development of instruments to meet specific needs in tropical cyclone areas;

(xv) Improvement of operation of those centres with responsibilities for the provision of processed information needed by TC members for their forecasting and warning systems;

(xvi) Enhancement of co-operation in typhoon monitoring, forecasting and warning;

(xvii) Exchange of forecasts, including products of different objective methods;

(xviii) Commissioning of a comprehensive study on ways to provide adequate data over tropical cyclone-prone ocean areas;

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(i) Establishment of flood forecasting and warning systems in the Nam Ngun and Se Bang Hieng River basins in the Lao People's Democratic Republic, the Kinabatangan basin in Sabah and the Sadong basin in Sarawak, Malaysia, the Pasak River basin in Thailand and one river basin to be selected in Viet Nam;

(ii) Improvement of existing flood forecasting and warning systems making use, where appropriate, of the results of TOPEX and the technology available through HOMS;

(iii) Establishment and operation of new flood forecasting and warning systems;

(vi) Promotion of interdisciplinary co-operation and research programmes among the meteorological, hydrological and disaster prevention and preparedness components;

(vii) Improvement of public awareness on storm warnings coupled with studies of human response to warnings;

(viii) Production of materials related to public information and education on the activities of the Typhoon Committee, particularly on storm warning, disaster prevention and preparedness;

(ix) Establishment/updating of disaster prevention and preparedness plans at different levels;

(x) Strengthening national co-ordination and co-operation between departments/agencies involved in disaster prevention and preparedness activities;

(xi) Improvement of communication systems for warning dissemination and relief operations;

(xii) Improvement of damage assessment and reporting;

(xiii) Development and exchange of information and guidance materials on structural and non-structural measures for mitigating disasters;

(xiv) Conducting case studies on major disasters;

(xv) Organizing joint missions to evaluate DPP procedures and to provide advice on local problems;

(xvi) Establishment of disaster research and training institutes, and

(xvii) Promoting enhanced co-operation among members on DPP matters.

D. Training

(i) Training of personnel through group training courses in Japan through fellowships under UNDP, TCDC, VCP or other bilateral schemes on :
(a) Tropical cyclone forecasting; (b) meteorology; (c) flood loss prevention; (d) river engineering; (e) technology for disaster prevention; (f) maintenance of electronic equipment.

(ii) Training by TCS staff assisted by counterpart staff in meteorology, hydrology and electronics in particular the calibration maintenance and repairs of electronic equipment, including on-the-job training.

(iii) Exchange of information and identification of training facilities available among WMO members in areas of concern and a survey of available fellowships and scholarships assistance.

(iv) Participation in study tours and seminars relevant to the Committee's programme organized by members or international bodies;

(v) Organization of training courses/seminars with bilateral/multilateral assistance on (a) flood forecasting; (b) disaster prevention and preparedness; (c) socio-economic impact of disasters; (d) disaster vulnerability and risk assessment; (e) meteorology; (f) hydrology; (g) electronics.

(vi) Provision of short-term fellowships with external support on (a) utilisation of soft-ware for integrating satellite/radar/rainfall data; (b) quantitative precipitation assessment and forecast models; (c) storm surge and wave prediction; (d) flood forecasting.

(vii) Exploration of the possibility of (a) providing facilities for training of personnel in disaster prevention and preparedness; (b) flood loss prevention; (c) establishment of a TC Training Centre for the maintenance of electronic equipment.

(viii) Organisation of seminars on socio-economic impact of disasters, vulnerability and risk assessment and technology for disaster prevention.

E. Research

(i) Stimulation of research activities through consultancy services, visits of study groups, exchange visits by research personnel.

(ii) Promotion of the exchange of information on typhoon related research activities and its results, including developments outside the region.

(iii) Encouragement of co-operation in the study of typhoon-related topics, among researchers in the fields of meteorology, hydrology and social sciences.

(iv) Initiation and/or continuation of research on the following topics:

Post-TOPEX

(a) Utilization of TOPEX data set (radar, satellite, upper-air soundings, etc.) in tropical cyclone numerical and physical modelling with the aim of improving existing methods of predicting formation, development and steering;

(b) Establishment and operation of a typhoon data bank for the Western Pacific and East Asia with compatible software exchange between members, and

(c) Development of an operational NWP model for typhoon movement and development.

Meteorology

- (a) Methods of typhoon location and accuracy;
- (b) Development mechanism and forecasting;
- (c) Disastrous weather associated with typhoons;
- (d) Objective forecasting of precipitation;
- (e) Meso- and micro-scale weather systems related to typhoons;
- (f) Interaction between typhoons and the tropical circulation;
- (g) The possibility of extended track forecasting methods;
- (h) Sensitivity of objective methods to initial data distribution and quality, and
- (i) Compilation of a forecasters' guide for Western North Pacific typhoon prediction.

Hydrology

- (a) Research and study on comprehensive flood loss prevention and management;
- (b) Research and study on flood risk analysis including flood risk mapping;
- (c) Review of the existing flood run-off models and development of appropriate models for the region, and
- (d) Further study on application of meteorological inputs to flood forecasting.

Disaster Prevention and Preparedness

- (a) Studies on socio-economic impact of disasters;
- (b) Vulnerability and risk assessment of disaster-prone areas, and
- (c) Socio-economic implications of inaccurate typhoon and flood forecasts and warnings.

WED/TC.16/8
22 February 1984

ORIGINAL: ENGLISH

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

TYPHOON COMMITTEE

Sixteenth session
6-12 December 1983
Tokyo

REPORT OF THE TYPHOON COMMITTEE
ON ITS SIXTEENTH SESSION

I. ORGANIZATION OF THE SESSION

1. The sixteenth session of the Typhoon Committee was held at Tokyo from 6 to 12 December 1983.

Attendance

2. The session was attended by representatives of China, Hong Kong, Japan, Malaysia, the Philippines, the Republic of Korea and Thailand. Observers from France, Indonesia, the Union of Soviet Socialist Republics and the United States of America attended the session. Observers were also present from the United Nations Development Programme (UNDP), the Office of the United Nations Disaster Relief Co-ordinator (UNDRO), the League of Red Cross Societies (LRCS), the Interim 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. At the opening session, welcoming addresses were given by Dr. Shigeji Suyehiro, Director-General, Japan Meteorological Agency, and Mr. Shouhei Inoue, Director-General, River Bureau, Ministry of Construction. Messages from the Executive Secretary of ESCAP and the Secretary-General of WMO were read by the representatives of those organizations.

4. In his welcoming address, Dr. Suyehiro extended a hearty welcome to all the participants. He invited the attention of the Committee to the friendly co-operation of scientists seconded to the International Experiment Centre (IEC) at Tokyo under the meteorological component of the Typhoon Operational Experiment

(TOPEX). He hailed the co-operation of national meteorological services on a real-time basis as an epoch-making event in the history of the Typhoon Committee. He urged the Committee not to lose the momentum gained by TOPEX and expressed his hope that a spirit of co-operation would be maintained despite strong headwinds hindering progress in promoting typhoon damage mitigation.

5. Mr. Inoue also welcomed the participants. He noted in his address that mitigation of typhoon and flood damage was an important matter in the region. In that connection, he stressed the importance of developments in the application of wide-ranging measures, including typhoon tracking and forecasting, flood forecasting, comprehensive flood damage mitigation and improvement of disaster prevention and preparedness systems. Keeping in mind the fruitful results achieved in all components of the Committee's programme, he expressed his appreciation of the efforts made by members and the assistance provided by ESCAP, WMO, UNDP and other international organizations. He concluded his address by noting the need for the Committee to continue its effort and hoped that the Committee would adopt an appropriate plan for its future activities.

6. In his message, the Executive Secretary of ESCAP extended his sincere thanks to the Government of Japan for its support and for the assistance provided to the various activities of the Committee.

7. Reviewing typhoon and flood disasters in the ESCAP region during 1983, particularly a flood in western Japan in July and a prolonged flood in Bangkok, the Executive Secretary noted that, despite large investments in flood mitigation schemes, flood damage in the region had continued to increase. Japan, for example, had allotted considerable resources to that field in the past and indeed the loss of lives had been reduced; however, the economic cost of damage continued to increase as a result of the economic development of the country. Although flood damage could not be eliminated completely, available measures which could be encompassed properly in a comprehensive flood plain management plan should be implemented by members to minimize the adverse effects. In that respect, he noted the programme on implementation of a comprehensive approach in the proposed medium- to long-term plan of the Committee to be considered at the sixteenth session. He concluded his message with the hope that the Committee would execute those activities with great vigour.

8. In his message, the Secretary-General of WMO pointed out that the current session marked an important milestone in the activities of the Typhoon Committee for it was the first to be held after the operational phase of TOPEX. Although the technical and scientific evaluation of TOPEX had not yet taken place, the preliminary indications were that it had been a successful exercise in regional co-operation. He acknowledged the contributions of the Government of Japan and UNDP to the completion of the operational phase of TOPEX. The Committee was also reminded that, in view of the reduction in UNDP support for the Committee's programme, other sources of assistance such as TCDC would need to be explored. He finally expressed the hope that it would be possible for the Committee to give its frank views on the achievements and shortcomings of the tropical cyclone programme to enable the Executive Council of WMO to decide on future additional support for the programme at its next session.

Election of officers

9. The Committee elected Dr. Ryuichi Iida (Japan) as Chairman for the year 1983/84 and Mr. Ho Tong Yuen (Malaysia) as Vice-Chairman; Mr. Lam Chiu Ying (Hong Kong) was elected Chairman of the Drafting Committee.

Agenda

10. The Committee adopted the following agenda:

1. Opening of the session
2. Election of officers
3. Adoption of the agenda
4. The Committee's activities during 1983
 - (a) Meteorological component
 - (b) Hydrological component
 - (c) Disaster prevention and preparedness component
 - (d) Training
 - (e) Research
5. Typhoon Operational Experiment
 - (a) Report on the Third Planning Meeting
 - (b) Report on the sixth and seventh sessions of the Management Board
 - (c) Report on the Second Operational Experiment
 - (d) Report on the Sub-Experiment

6. Review of the 1982 and 1983 typhoon seasons
7. Co-ordination with other activities of the WMO tropical cyclone programme
8. Medium- to long-term plan of the Committee
9. Support required for the Committee's programme
10. Programme for 1984 and beyond
11. Consideration of the agenda for the seventeenth session
12. Date and place of the seventeenth session
13. Scientific lectures
14. Adoption of the report

II. THE COMMITTEE'S ACTIVITIES DURING 1983

11. The Committee reviewed and assessed the progress made in implementing its programme during 1983, as set out in document WRD/TC.16/1. It considered in turn the five components, namely, (a) meteorological, (b) hydrological, (c) disaster prevention and preparedness, (d) training and (e) research. The main features of the discussions and the decisions taken for each component are reported below.

A. Meteorological component (Agenda item 4 (a))

12. The Committee noted with satisfaction the progress made by members in improving their observing facilities and capabilities for typhoon forecasting and warning services, and in particular their contributions in support of the Second Operational Experiment (SOE) of TOPEX.

13. The SOE had been successfully completed with the collaboration of the members of the Committee. The financial support provided by UNDP, the contributions from Japan, WMO, ESCAP and the Typhoon Committee Secretariat (TCS) in planning and organization and the provisions of technical services had been invaluable factors in the smooth operation of the SOE. The experiment had demonstrated that the success in typhoon forecasting, warning dissemination, data collection and analysis for flood prediction was in a large measure due to the collaborative efforts of members and the spirit of regional co-operation that had prevailed between them. (See also agenda item 5.)

14. Japan had continued successfully to operate the Geostationary Meteorological Satellite (GMS-2), which provided cloud imagery, as well as vital information on cloud wind vectors and sea surface temperature. Special arrangements had been made to transmit cloud pictures hourly during the Typhoon Tracking Experiment periods of the SOE. That had contributed significantly to accurate typhoon positioning and improved forecasting and warning capabilities. The Committee expressed its gratitude to the Japan Meteorological Agency (JMA) for its effort in providing special observations from GMS-2 and expressed the hope that GMS could be further upgraded with capabilities for transmitting hourly pictures and retransmitting platform data in the near future.

15. With a view to improving the reception of the GMS pictures, Japan had installed small-scale data utilization stations in Fukuoka and Okinawa in March 1983. Similar stations were planned at Sapporo, Sendai and Osaka in March 1984. It was also planned to install an image monitoring system for animated presentation of colour GMS images at JMA headquarters in March 1984.

16. In the Republic of Korea, four sets of LASER-FAX receivers had been installed at Pusan, Kwanju, Kangnung and Kimpo to receive GMS pictures retransmitted by the Central Meteorological Office at Seoul.

17. The satellite receivers of some members had been repaired by the TCS expert with spare parts provided under the UNDP regional typhoon project fund.

18. The Committee stressed the need to obtain additional funds to assist members in obtaining in time urgently needed spare parts for essential electronic equipment such as satellite receivers and weather radars. The Committee was informed that most members were experiencing difficulties in obtaining the necessary spare parts from abroad because of either a shortage of foreign exchange or the lengthy procedures involved for their procurement. Often, therefore, the operation of such equipment was interrupted for considerable periods of time.

19. In compliance with a requirement for the SOE, four upper-air observations daily through one full TTE-period of five days had been made by a special network of 27 upper-air stations in China (10), Hong Kong (1), Japan (5), Malaysia (3), the Philippines (3), the Republic of Korea (1), Thailand (2) and Viet Nam (2).

20. In support of the SOE, TCS experts had assisted members in calibrating weather radars and DVIP systems. Radars at Nanhui, Dongtou, Shantou and Xisah Dao in the coastal area of China had also been calibrated before the SOE. A test and comparison of the performance of a newly made prototype radar with the one in use at Shantou had also been made during the typhoon season and the results found to be satisfactory.

21. With a view to improving typhoon tracking and warning services, a number of weather radars had been replaced and additional ones installed in 1983 in Hong Kong (1), Japan (2) and the Philippines (1). The Committee noted that there were plans to install new radars in Japan (Naze) and the Philippines (Busuanga, Palawan Province) before the next typhoon season.

22. New OMEGA-type upper-air sounding ground receiver systems had been installed and put into operation at Bangkok, Chiang Mai and Songkhla in Thailand. A Micro-Cora system had been installed at Laoag, Philippines.

23. With a view to ensuring prompt and efficient data exchanges for the SOE, a test exercise on data exchange between the IEC, Tokyo, and the experiment sub-centres had been conducted in May with successful results.

24. In order to cope with the vast volume of data exchanged through the telecommunication system, the computers of the following members had been further upgraded:

China: through national resources with some assistance provided by UNDP under the regional typhoon project;

Hong Kong: through national resources;

Malaysia: through national resources;

Thailand: with the assistance of the United States under the Voluntary Co-operation Programme (VCP).

25. In the Republic of Korea, four sets of teletype equipment with an 8-K computer memory acquired under the UNDP regional typhoon project had been installed. That had improved very much the collection of data throughout the country.

26. In Thailand, various steps for the improvement of national data collection particularly during the night, had been planned in consultation with the TCS telecommunication expert. For the present, 15 new SSB transceivers would be installed by April 1984.

27. With a view to improving telecommunication systems and ensuring efficient data collection in the Philippines, a feasibility study for a new telecommunications system, including a radio wave propagation test, had been carried out with the assistance of the Government of Japan.

28. In compliance with the request of the members to improve data exchange between the radio telecommunication hub (RTH), Tokyo, and certain national meteorological centres, JMA had plans to upgrade the following telecommunication circuits:

Tokyo-Hong Kong, 200 bps, January 1984;

Tokyo-Seoul, 200 bps, March 1984;

Tokyo-Beijing, in the range of 4,800 to 9,600 bps,
October 1984;

Subject to
government
approval

Tokyo-Bangkok, Tokyo-Manila, 200 bps, October 1984.

29. The Committee welcomed the information that the United States planned to continue to carry out meteorological reconnaissance flights in the typhoon-affected areas in the year ahead and that the observations would be provided to members.

30. The Committee revised the priority list established at its fifteenth session as shown below:

Priority list as revised by the
Typhoon Committee at its sixteenth session

Observing facilities

(a) Upper-air stations

98223 Laoag (Philippines)	}	12 GMT RS/RW national projects
98645 Cebu (Philippines)		External assistance needed
47187 Cheju (Rep. of Korea)		

(b) Weather radar

Xisha (China)	National/external assistance needed
Cheju (Republic of Korea)	External assistance needed
Tanay (near Manila, Philippines)	National project
Haiphong (Viet Nam)	External assistance needed
Vientiane (Lao PDR)	External assistance needed

(c) Satellite receiving equipment (GMS/TIROS-N satellite)

Hanoi (Viet Nam)

External assistance needed

Telecommunication(a) Improvement of national data collection facilities

Lao People's Democratic Republic) National/bilateral projects/external assistance needed
Philippines	
Viet Nam	

(b) Regional telecommunication links

Bangkok-Hanoi (new circuit)	National project
Beijing-Guangzhou-Hong Kong	National/bilateral project

(c) Other telecommunication facilities

Thailand - Strengthening of RTH, Bangkok	National/external assistance needed
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B. Hydrological component
(Agenda item 4 (b))

31. The Committee reviewed the accomplishments under the hydrological component during 1983 as reported in document WRD/TC.16/1 and noted with satisfaction the progress made by members in the establishment, improvement and operation of flood forecasting and warning systems. The review also covered measures for flood loss prevention and management in pilot areas.

32. The Committee noted the following additional developments reported by the members.

33. The semi-automatic telecommunication system in the Puyang River basin, China, had been operational since 1982. The system was connected with the computer at the telemetering centre at Hangzhou. Most of the telecommunication facilities of the flood forecasting system had been installed for the Xishi River basin in Guangdong Province and operated quite well. It was also planned to summarize the results of the experiment conducted over the previous three years with a view to improving the flood forecasting and warning systems of those two river basins.

34. Japan had continued to improve the existing flood forecasting and warning systems. In 1983, 17 flood forecasting systems had been operational. The Committee noted the usefulness of radar rain-gauges in observing areal distribution of rainfall and forecasting its movement.

35. Japan had been carrying out comprehensive flood loss prevention and management plans since 1978 in order to improve flood control facilities, provide storage capacity and control the increase in flood discharge owing to river basin development. In 1983, a "Basin Council", consisting of heads of departments concerned in prefectural and municipal governments, had been established in the Yamato River basin. Comprehensive flood loss prevention plans had been drawn up for the Mama River, the Nakagawa/Ayase River and the Sakai River basins. Maps of flooded areas had been prepared for the use of the public in the Mama, Yamato and Sakai River basins in 1983. Nagasaki prefecture, which had suffered from serious damage in July 1982, was also undertaking flood loss prevention and management measures to make the city safe from disaster.

36. Malaysia had completed the structural work necessary for the flood forecasting systems in Sabah and Sarawak. The acquisition and installation of the telemetering equipment had been rescheduled from 1983 to 1984 because of budgetary constraints. A new computer (PERKIN ELMA 3210) had been installed to facilitate more efficient flood forecasting.

37. Malaysia informed the Committee that it intended to carry out flood risk mapping to facilitate proper land-use planning and development in the upper Klang River basin.

C. Disaster prevention and preparedness component
(Agenda item 4 (c))

38. The Committee reviewed the activities under this component of its programme, noting the information below.

39. Members had improved their gathering of disaster statistics for damage assessment through the use of the standard format adopted at the Third Planning Meeting for TOPEX.

40. Case studies, which formed an important activity under the warning dissemination and information exchange component of TOPEX, had been undertaken by several members. Public education and training had also received increased attention. Pamphlets containing information on typhoons, flooding and measures for community preparedness had been published by some members.

41. In China, work had been concentrated on the improvement of the communication network by setting up radio links, providing audio-visual facilities for public education and information and developing training for

trainers. In addition, weather forecasting offices in coastal areas had been requested to implement the system for providing typhoon forecasting services and reporting timely disaster information.

42. The Royal Observatory had made a thorough review of the Natural Disaster Emergency Organization in Hong Kong. Warning systems covering tropical cyclones, storm surges, flooding and landslips due to heavy or prolonged rainfall etc. had been streamlined. Dissemination lists had been updated for all warnings, advice and precautionary announcements originating at the Royal Observatory. In addition, the Information Service Department ensured that all public notifications regarding the operation and decisions of government departments and other organizations in respect of closure of schools, suspension of public transport services etc. were promptly disseminated for broadcast. The public was informed by broadcast of the extent of disasters, the arrangements made to ensure safety and provisions for relief. Improvements had also been introduced in the collection of operational data, e.g., real-time wind, rainfall and tides. The Royal Observatory and also carried out a programme of press, radio and TV interviews to publicize the various warning services.

43. The Committee was informed of a roving mission consisting of two experts provided by the Government of Japan and a technical secretary to study present systems used to assess damage and to recommend methods for their improvement. The mission had already visited Hong Kong, Malaysia, the Philippines, Thailand and Viet Nam and planned to visit China and the Republic of Korea in January 1984. The report of the mission was expected to be available in early 1984. The Committee conveyed to the Government of Japan its appreciation of the financial support provided to the mission.

44. In support of TOPEX, Japan had conducted a seminar on hydrology and warning dissemination and information exchange at Tokyo with the assistance of the Japan International Co-operation Agency (JICA). The seminar had concentrated on ways and means of improving members' systems for typhoon disaster mitigation.

45. In Malaysia, a case study had been carried out on the heavy monsoon rainfall from 13 to 16 December 1982 which had caused flooding over the Kelantan River basin; approximately 4,900 people had been evacuated to higher ground following advance warnings although five lives had been lost.

46. The Ministry of Welfare Services in Malaysia had been given the responsibility for identifying and establishing evacuation centres, managing such centres during disaster periods and providing the rehabilitation facilities needed for the victims. A total of 2,234 evacuation centres, capable of giving care and protection to 604,000 people, had been identified for the whole country. Welfare and other officials, as well as volunteers, had also been chosen to manage the evacuation centres in times of disaster. One hundred and two "forward supply bases", whose tasks were to stock food and other necessities, had also been identified in isolated areas where breakdowns in transportation and communication systems were likely to occur. The services of the Malaysian Air Force had been recruited for short-notice airlifting of supplies to disaster-affected areas.

47. In the Philippines, illustrated pamphlets on the precautionary measures to be taken in the event of typhoons, floods and landslips had been published and distributed in typhoon-prone areas, river basins, coastal areas and areas on mountain slopes.

48. Exercises had also been carried out to test the dependability and reliability of the warning systems. Evacuation drills had been conducted, and the damages assessment scheme based on the manual published by the Office of Civil Defense in 1982, How to Assess Damage Impact, had been tested. A Committee had also been formed to handle matters related to conducting a survey on the efficiency and effectiveness of warning dissemination, especially to disaster-prone areas.

49. The Committee was informed that the Government of the Philippines planned to establish a natural disaster research and training centre at Manila with the assistance of the United States Agency for International Development and UNDR0. That plan had been supported at the ASEAN expert meeting on natural disasters held at Singapore in October 1983.

50. In Thailand, the Meteorological Department and the Local Administration Department had implemented a plan for better interaction between local government and the general public which the focal points of the three components of TOPEX had worked out during the experiment period. The Local Administration Department planned to establish a civil defence school to train volunteers and undertake case studies.

51. Thailand had also conducted a case study on historical floods and losses. In support of an information campaign, pamphlets for community education and awareness of natural hazards had been published and circulated. In addition, the assessment of damage caused by tropical cyclones had been standardized using the recommended format adopted at the Third Planning Meeting. In support of the SOE, all emergency communication networks, disaster prevention wireless systems and warning dissemination systems in Thailand had been activated.

52. The Committee was informed of a new publication in the WMO tropical cyclone programme series entitled Human Response to Tropical Cyclone Warnings and Their Content. It had been prepared by a group of experts from Australia, India, the Philippines and the United States. The publication could be obtained free of charge from WMO.

53. The Committee considered that there was a need to prepare appropriate textbooks on response to natural disasters and especially the threat of typhoons and floods to educate the population, particularly the younger generation. A report analysing the human reaction to disaster in Japan was brought to the attention of the Committee.

54. The Committee was also informed that WMO, UNDRO and LRCS were co-operating in a project aimed at preparing guidance material to assist members in improving their public information and education programmes. Work was proceeding on a report which was expected to be published in 1984.

D. Training
(Agenda item 4 (d))

55. Under this item, the Committee noted that the following training events, in which a number of members had participated, had been organized during the year:

(a) A training seminar in flood forecasting at the Asian Institute of Technology, Bangkok, from 21 to 25 February 1983;

(b) A seminar on the principles of flood plain management for flood loss prevention at Bangkok from 18 to 22 October 1983;

(c) A seminar on the application of radar data to tropical cyclone forecasting at Bangkok from 21 November to 2 December 1983;

(d) A seminar on automated message switching systems organized jointly by the Royal Observatory of Hong Kong and WMO in Hong Kong from 23 to 29 November 1983.

56. The Committee noted that, in support of TOPEX, Japan had conducted a seminar on hydrology and warning dissemination and information exchange at Tokyo from 1 July to 6 August 1983. Group training courses on river engineering, flood loss prevention and management, technology for disaster prevention and meteorology had also been arranged by Japan for the benefit of members. The Committee expressed its gratitude to the Government of Japan for organizing those courses and seminars.

57. The Committee, while of the firm view that training seminars and workshops continued to be an effective means for broadening knowledge and disseminating new techniques among members, felt that, in the selection of topics for future training events, particular attention should be given to the changing requirements and priorities of members.

58. The Committee considered that, in addition to group training activities, such as seminars and workshops, the attachment of personnel to advanced centres to observe and study new systems and techniques was another method of acquiring skills. It accordingly encouraged that such attachments be arranged under bilateral schemes, VCP or UNDP.

59. The Committee noted the offer of the USSR to provide training to members in meteorology and meteorological equipment through the award of fellowships under VCP.

60. The United States informed the Committee that it was hosting a training course on tropical meteorology and tropical storm forecasting at the University of Miami, Florida, from 27 February to 4 May 1984. Additionally, the United States expected to organize a hydrological forecasting course at the University of California at Davis in co-operation with WMO in 1984. Some fellowships for both courses would be available through VCP.

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E. Research
(Agenda item 4 (e))

61. The Committee was informed that research correspondents had been redesignated by members to collect and exchange information in research activities and to carry out joint research on selected topics. It noted that, in accordance with a decision it had taken at its fifteenth session, research activities had been expanded to put greater emphasis on the hydrological and disaster prevention and preparedness components.

62. The Committee felt that research under the disaster prevention and preparedness component had generally lagged behind that under the meteorological and hydrological components. Such research was considered important in relation to such questions as the lack of adequate response by the public to heed weather warnings and the proper approaches to Governments to convince them of the economic benefits of a good typhoon warning system.

63. The Committee therefore recognized the importance of raising the level of disaster prevention and preparedness research to that of the two other components. It further decided that such research should best be undertaken by sociologists or social scientists with the advice and support of such agencies as UNDRO, LRCS and ESCAP.

64. The Committee requested research correspondents to prepare consolidated reports on ongoing research in their respective countries and a plan of action for research on specific topics. To accomplish that task, it felt it would be desirable for a meeting of the correspondents to be convened in 1984, with possible assistance from WMO or ESCAP.

65. The Philippines announced its plans for the establishment of a national disaster research and training centre at Manila whose facilities would be made available to members. That was welcomed by the Committee.

66. The Committee acknowledged the donation of research publications on meteorology and atmospheric physics by the USSR to TCS.

67. Japan presented a booklet entitled Collected Scientific Papers related to Typhoon Damage Mitigation giving summaries of research carried out in Japan. The Committee felt that the exchange of such research publications constituted an effective method of circulating information among members.

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III. TYPHOON OPERATIONAL EXPERIMENT
(Agenda item 5)

A. Report on the Third Planning Meeting (WRD/TC.16/2)

68. The report on the Third Planning Meeting for TOPEX was submitted to the Committee by the Chairman of the Meeting, Mr. C.P. Arafles (Philippines). He called attention to the purpose of that Meeting, held at Tokyo from 17 to 21 February 1983, namely, to take up the detailed planning of the SOE, which had been scheduled to take place from 1 August to 15 October 1983. The Committee was given a summary of the main decisions taken by the Meeting.

69. The Committee was of the opinion that the careful preparations made by the Meeting had contributed decisively to the smooth execution of the programme established for the SOE. It wished to record its appreciation to the Chairman for his skilful conduct of the Meeting.

70. It was further noted that the Third Planning Meeting had set a broad outline for the Evaluation Meeting for TOPEX to be held in March 1984 and that the further planning of that Meeting would be taken up by the Management Board for TOPEX at its eighth session, immediately after the sixteenth session of the Committee.

B. Report on the sixth and seventh sessions of the Management Board (WRD/TC.16/3)

71. The Committee considered the reports of the Management Board on its sixth and seventh sessions and the summary of its work contained in document WRD/TC.16/3. It endorsed the reports on both sessions and noted that one of the questions to be considered at the eighth session was the date and place of the ninth and final session. The Committee expressed the view that the final session might conveniently be held in March 1984 in conjunction with the Evaluation Meeting but felt that the decision should be left to the Board at its eighth session.

C. Report on the Second Operational Experiment

72. The Committee was informed that the report of the Director of IEC would be examined in detail at the eighth session of the Management Board for TOPEX immediately after the sixteenth session. As provided for in its agenda, the Committee was, however, given a general description of the SOE by the Director, Mr. I. Shimizu.

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73. The Committee considered that the SOE had been an unqualified success and that IEC had operated very efficiently. It considered that that was in large measure a consequence of the distinguished leadership provided by the Director and the devotion and scientific skill of the scientists seconded to IEC during the two and a half months of the SOE. The excellent facilities provided by JMA and the funding provided by JICA and WMO to assemble the team of scientists in Tokyo had also made significant contributions. In recognition of those facts, the Typhoon Committee wished to place on record its sincere gratitude to the Government of Japan, including JMA and JICA, to the director of IEC and to the seconded scientists, as well as to WMO.

74. It was further pointed out that scientists and technicians at many different levels and in different places had made important contributions to the success of the SOE and were also deserving of the gratitude of the meteorological community as a whole.

75. Although the operational phase of TOPEX had ended, the Committee wished to draw attention to the need for the data sets to be made widely available and for a great deal of research and studies to be carried out. In that context, the Committee felt that developed countries with good facilities for research (such as fast computers) should be prepared to share those facilities with less well-equipped countries to carry out research on the TOPEX data sets. It was also the view of the Committee that the close co-operation which TOPEX had promoted should be continued in the future.

76. Short accounts of the parallel SOE activities carried out at the experiment sub-centres were also presented to the Committee for information. The Committee welcomed that information, which would receive more detailed consideration at the eighth session of the Management Board.

D. Report on the Sub-Experiment

77. The Chairman of the Sub-Committee on the Sub-Experiment (Dr. M. Kanamitsu) presented a report on the further work undertaken in pursuit of the studies being carried out under the TOPEX Sub-Experiment, meteorological component.

78. The report was based mainly on progress reports submitted by the participating members of the Typhoon Committee at the request of the Chairman. They showed that 19 studies were being carried out by six members, many of

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them being statistical or synoptic studies as a result of the research priorities assigned for 1982-1983. About 10 of the studies made direct or indirect use of TOPEX observations.

79. The degree of progress achieved with those studies to date varied considerably. Many of them were still in a very early stage, the time-scale for the research phase of TOPEX being much longer than that for the operational phase. Another factor of importance was that complete TOPEX data sets were not yet available, although they soon would be. The Committee noted with satisfaction that the Chairman of the Sub-Committee had requested members to submit more complete reports on the studies in hand by February 1984 in order that he might report thereon to the Evaluation Meeting for TOPEX (March 1984).

IV. REVIEW OF THE 1982 AND 1983 TYPHOON SEASONS (Agenda item 6)

80. The Committee reviewed the 1982 and 1983 typhoon seasons on the basis of information provided by members.

81. Among 18 typhoons which had occurred in the region during the period from September 1982 to August 1983, the Committee was informed that 12 typhoons, namely, Nos. 8216, 8217, 8218, 8219, 8221, 8222, 8224, 8225, 8301, 8302, 8303 and 8306, had seriously affected members. The numbers of dead and missing persons as a result of typhoons and floods were 406 in the Philippines, 29 in Thailand and 99 in the Republic of Korea. The cost of damage caused by typhoons and floods was estimated to be approximately \$ 109 million in the Philippines, \$ 9 million in Thailand and \$ 30 million in the Republic of Korea during the period. In Japan, 494 persons had been killed or gone missing in 1982 and 164 in 1983. In Malaysia 14 persons had been dead or missing and \$M 5 million worth of property had been reported lost in 1982.

82. Papers on damage caused by typhoons and floods in Hong Kong in 1982 and 1983 and in Japan in 1981-1983 were distributed during the session.

83. Japan reported on the Shimane disaster in July 1983, which had been caused by torrential rain. An illustrated pamphlet on the disaster was distributed.

84. The Committee requested members to submit to TCS country papers and reports not only on damage statistics but also on other relevant matters such as the tracks and intensities of typhoons and associated floods. Information should include statistics for comparison with those of previous years. TCS was requested to compile the information for presentation to the Committee at its annual session.

85. The Committee also considered a proposal for the production of an annual publication which would provide information on the typhoon seasons and the effects on members. One of its purposes would be to give wider publicity to the Committee and boost its image. The Committee suggested that a draft proposal on the publication's content and format be submitted for consideration at the seventeenth session. Hong Kong agreed to undertake that task.

V. CO-ORDINATION WITH OTHER ACTIVITIES OF THE WMO
TROPICAL CYCLONE PROGRAMME
(Agenda item 7)
(WRD/TC.16/7)

86. The Committee's discussion was based mainly upon the information given in the "Ninth status report on the implementation of the WMO tropical cyclone programme" (WRD/TC.16/7). That information was supplemented by an oral presentation of later developments and, in particular, of the need for the views of the Committee on the programme as an input into the appraisal of its successes and short-comings as requested by the WMO Executive Council.

87. The Committee decided to note the information provided by the WMO secretariat in the ninth status report as well as that on later developments. It felt that the most important question under the item was the appraisal of the programme requested by the Executive Council and decided to concentrate thereon.

88. As a first comment, the Committee wished to state that the tropical cyclone programme was one of the most important programmes being carried out by WMO. It was a programme that affected the safety of human lives and the economies of members. As such, there were strong reasons for giving it the maximum possible support. It was, however, a fact that it had never been adequately funded despite the increasing recognition it had received. At the same time, the Committee considered that UNDP had played a vital role over a

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period of some 15 years. It accordingly understood that UNDP institutional support could not continue after 1984 although it hoped that programme and TCDC activities would continue to receive careful consideration by UNDP for the allocation of further funding. It wished to convey to UNDP its great appreciation of the long period of support it had received and to express its opinion that continued support of programme activities by UNDP would constitute a sound investment in terms of development and the transfer of technology.

89. In its assessment of the importance of the programme, the Committee drew attention to the fact that it directly affected many hundreds of millions of persons in tropical-cyclone-threatened areas. It also covered very large areas of the earth's surface, over land and sea. It would be advantageous for WMO to make those facts more widely known in order to secure greater support for action under the programme.

90. Those considerations apart, the Committee considered that the programme had yet to realize its full potential. Its operations to date showed many shortcomings and deficiencies, principally because it operated with resources which were conspicuously inadequate to the task it faced. That was apparent not only in the programme's very limited ability to assist members affected by tropical cyclones, but also in the relatively weak support provided by the WMO secretariat. There was a pressing need to increase the capability of the secretariat to furnish assistance and that would imply not only greater resources for the execution of the programme, but also a more realistic approach to the role of the secretariat in the broad management of the programme.

91. The Committee accordingly listed the following areas for which it felt greater support was urgently required:

- (a) Secretariat support to the regional cyclone bodies in the implementation of national and international activities;
- (b) Telecommunications;
- (c) Maintenance of electronic equipment;
- (d) Training;
- (e) Transfer of technology;

/(f)

(f) Research phase of TOPEX;

(g) Tropical cyclone programme publications providing guidance material.

92. The Committee further considered that the disaster prevention and preparedness component of its programme was not adequately covered at present. Advantage should be taken of the annual ESCAP session to highlight that shortcoming and request the resources that would permit remedial measures to be taken. Greater use should also be made of other meetings to promote information on the work being done under the programme, so that it would receive further support.

93. Having made the above statement of views for the benefit of the tropical cyclone programme appraisal by the WMO Executive Council, the Committee, noting that four of its members had seats on the Council, requested them to act as spokesmen for the Committee at the Council's next session in June 1984. That occasion should be used to advance solid arguments for the transfer of savings from other WMO programmes in 1984 to the tropical cyclone programme.

VI. MEDIUM- TO LONG-TERM PLAN OF THE COMMITTEE
(Agenda item 8)

94. At its fifteenth session, the Typhoon Committee had established a small working group on programme planning composed of representatives of China, Hong Kong, Japan and the Philippines, together with representatives of the WMO, ESCAP and Typhoon Committee secretariats. Its task had been to review previous and current programmes including TOPEX and prepare a medium-to long-term plan (1984-1992) covering the Committee's activities in all five components of its programme.

95. The working group had met in the Philippines from 20 to 27 June 1983 under the Chairmanship of Dr. R.L. Kintanar, and its report, including the resulting draft of the plan, was submitted to the Committee in document WRD/TC.16/4.

96. The Committee made a very thorough examination of the plan, discussing it in considerable detail. It was generally agreed that the plan prepared by the group was acceptable in principle, and the Committee wished to express its gratitude to the group and its chairman for the excellent way in which

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they had dealt with a difficult task. It was felt, however, that some changes and amendments to the plan were desirable, and it was suggested that the view of the Committee on the modifications required should be conveyed to the working group with the request that the plan be amended accordingly. That work could be accomplished by correspondence under the guidance of the Chairman. A list of the points raised during the discussion and calling for changes is given in annex I to this report.

97. The question of a mechanism for the periodic updating or revision of the plan was also considered by the Committee. It was decided that the working group should seek views and ideas from members between sessions of the Typhoon Committee and submit proposals to the Committee at its annual sessions. TCS was requested to assist the chairman of the working group in carrying out that task.

VII. SUPPORT REQUIRED FOR THE COMMITTEE'S PROGRAMME
(Agenda item 9)
(WRD/TC.16/5)

98. The Committee considered document WRD/TC.16/5, which reviewed the position with regard to institutional support and the Committee's programme activities.

Institutional support

99. With regard to the post of Co-ordinator of TCS, the Committee expressed the strong desire that the Philippines should continue to provide the services of the Co-ordinator. The Philippines agreed to do so for a further period in view of the desire of the Committee and the location of TCS at Manila.

100. The Philippines also agreed to continue to provide the meteorologist for a further period as well as the facilities for TCS at Manila. The Committee was informed that Japan would continue to provide a hydrologist to TCS.

101. The Committee expressed its gratitude to the Philippines for providing the Co-ordinator, the meteorologist and facilities for TCS and to Japan for providing a hydrologist.

102. The post of telecommunication and electronics expert, which was being funded by UNDP to the end of 1984 under the current project, was one of much

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concern to the Committee. It noted the valuable contribution of the expert and expressed its view that it was essential to continue that post after 1984.

103. The Committee therefore discussed possible ways of funding the post after 1984. It considered that there were several potential sources of funding:

- (a) Through a TCDC arrangement;
- (b) By a seconded expert or consultant appointed by WMO;
- (c) From savings in the WMO regular budget;
- (d) From private sector funding.

It was the consensus that the Secretary-General of WMO should be requested to investigate those different possibilities in the light of developments in order to ensure that the post was filled after the end of 1984. The Committee was informed by the representative of UNDP that the travelling expenses of that expert could be met from UNDP funds as part of the programme support to the Typhoon Committee.

Programme support

104. The Committee was informed that a project to improve systems of compiling typhoon and flood damage data had been proposed by the ESCAP secretariat and approved by the Government of Japan. That project was being carried out in 1983-1984, at a cost of approximately \$US50,000.

105. In addition, TCS, in consultation with ESCAP, had prepared a project proposal for the improvement of disaster prevention systems based on risk analysis of disasters from typhoons and heavy rainfall, with a total project cost of approximately \$US70,000. That project had been approved by the ESCAP Projects Review Committee and was ready for submission to a donor country.

106. The representative of UNDP confirmed the intention of his organization to provide \$US 312,000 for the programme activities of the Typhoon Committee for the years 1985 and 1986. He further suggested that a TCDC facility be introduced into the project budget in order to promote the provision of expert services and other forms of co-operation between the members.

107. While welcoming the confirmation from UNDP that funds would be allocated for 1985 and 1986, the Committee noted with concern the 50 per cent reduction in support compared with previous years and expressed the hope that

UNDP would augment its support for those years. It considered that its new medium- to long-term plan would call for a considerable expansion of its activities and that further external support for its programme was essential in 1987 and beyond. It therefore expressed the hope that UNDP would continue and if possible augment its support during the next programming cycle.

108. The Committee was also informed of the latest position with regard to other sources of support for programme activities. Thus, VCP would continue to present opportunities for Typhoon Committee members. A recent change in procedures made it possible for the travel and per diem costs for TCDC experts to be met from the fund. For the WMO Special Temporary Voluntary Fund for TOPIEX, only four members of the Committee had so far contributed the token \$US1,000 requested at earlier sessions. The Committee urged those members which had not done so to reconsider making their contributions at an early date. The representative of China informed the Committee that his country's contribution would be paid shortly.

109. It was also indicated that the efforts to raise support from the private sector were continuing. No definite information could yet be given, but there was room for cautious optimism in the longer term.

110. The Committee was pleased to learn that, as stated at its fifteenth session, China was ready to provide experts to other members during the typhoon season under TCDC arrangements. It was ready on request to send two to three meteorological experts for periods of one to three months. The Committee welcomed that offer and expressed the hope that members would take full advantage of it.

111. A discussion also took place under this item on the desirability of attempting to assess the budgetary implications of the Committee's programme for the next one to two years. It was realized that that would be a difficult exercise and could be carried out only when the detailed programme for the period had been worked out. Nevertheless, it was felt that such information would be very useful in seeing which activities would be funded nationally and, hence, the magnitude of external support required. The Committee requested TCS to investigate ways in which it could provide the required information.

112. The Committee noted with satisfaction the USSR's offer to provide specialists, scientific research vessels and meteorological equipment to

carry out joint international experiments on tropical cyclones. It invited those interested to have preliminary consultations on the matter.

VIII. PROGRAMME FOR 1984 AND BEYOND
(Agenda item 10)
(WRD/TC.16/6)

113. In considering its programme for 1984 and beyond, as set out in document WRD/TC.16/6, the Committee took into account the ongoing programme of work and the medium- to long-term programme it had adopted. The execution of the TOPEX Sub-Experiment was fully taken into account.

114. The programme for 1984 and beyond adopted by the Committee is given in annex II. The Committee noted that some of the programmes were ongoing projects and urged members to make every effort to implement them to the extent that resources were available, with the assistance of TCS.

IX. CONSIDERATION OF THE AGENDA FOR
THE SEVENTEENTH SESSION
(Agenda item 11)

115. The Committee requested the ESCAP and WMO secretariats, in close consultation with TCS, to prepare the detailed agenda for the seventeenth session, which should include an overall review of TOPEX and a comprehensive review of the 1983 and 1984 typhoon seasons. 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.

X. DATE AND PLACE OF THE SEVENTEENTH SESSION
(Agenda item 12)

116. The Committee decided that its seventeenth session would be held from 30 October to 5 November 1984 at a place to be determined later.

XI. SCIENTIFIC LECTURES
(Agenda item 13)

117. The following scientific lectures were presented:

(a) "From meteorology, through hydrology, to disaster prevention and preparedness", by Dr. Takeo Kinoshita, Director, First Research Division, National Research Center for Disaster Prevention, Science and Technology Agency, Japan;

/(b)

(b) "Present status of damage data compilation in the region", by Mr. Yoichiro Yano, Team Leader of the Roving Mission for Improvement of Systems of Compilation of Damage Caused by Typhoons and Floods, Policy Planning Officer, Minister's Secretariat, Ministry of Construction, Japan;

(c) "Typhoon Ellen in 1983", together with a technical film on the typhoon, by Mr. Lam Chiu Ying, Senior Scientific Officer, Royal Observatory, Hong Kong.

118. The Committee expressed its thanks to the lecturers for their interesting presentations.

119. It was decided that one of the scientific lectures at future sessions should be devoted to a review of the previous typhoon season.

XII. ADOPTION OF THE REPORT
(Agenda item 14)

120. The Committee adopted its report on 12 December 1983.

/Annex I

Annex I

VIEWS EXPRESSED BY THE TYPHOON COMMITTEE AT ITS SIXTEENTH SESSION
ON THE CHANGES NECESSARY TO THE MEDIUM-
TO LONG-TERM PLAN (1984-1992)

I. METEOROLOGICAL COMPONENT

(a) For the years 1985-1987, the programme requires further development for discussion and approval at the Committee's seventeenth session;

(b) The programme for 1988-1992 should be updated by 1987 in the light of circumstances;

(c) Under sections I, II and V, there is a need to introduce a reference to new technology, particularly observing platforms, with the purpose of improving real-time processing for forecasting;

(d) Section II (ii) should cover requirements both for additional new radar stations and for the replacement of older equipment by more up-to-date equipment;

(e) Account should be taken of the observations increasingly available from platforms such as oil-rigs and measures taken to ensure availability on GTS circuits.

II. HYDROLOGICAL COMPONENT

(a) Inclusion of a programme on application of the results of TOPEX in flood forecasting and warning;

(b) For section I, "Flood forecasting and warning", external assistance in provision of equipment is required;

(c) For section II (1), "Establishment of pilot area for comprehensive flood loss prevention and management by each member", long-term experts are required for its implementation. Malaysia stated that the pilot area for this item would be the Kelang River basin;

(d) Early implementation of section I (v), "Missions of expert to provide technical guidance on items (i) to (iv)".

III. DISASTER PREVENTION AND PREPAREDNESS COMPONENT

(a) There is a need to designate focal points for each member;

(b) An interface between this component and the other components is needed.

/IV.

IV. TRAINING COMPONENT

(a) For sections I (vi), "Tropical cyclone forecasting", and II (v), "Flood loss prevention", no JICA funding will be available. For section I (vii), "Meteorology", and II (vi), "River engineering", efforts will be made by JICA to support the group training courses;

(b) In section III (i), "Volunteer leaders" to be added;

(c) For section III (vi), efforts will be made by JICA to support the group training courses.

V. RESEARCH COMPONENT

(a) There is a need for research into special types of typhoon warning services for users, such as oil-rigs and other small platforms;

(b) Post-TOPEX research under II, "Hydrology", should include a comparison of the performance of different models using the same data set.

VI. GENERAL

(a) Special studies should be conducted to discuss innovations in methods and facilities;

(b) Attention should be given to the administrative/institutional arrangements for assistance to members of the Typhoon Committee;

(c) Publications and information on Typhoon Committee activities should be given priority.

/Annex II

Annex II

PROGRAMME FOR 1984 AND BEYOND

I. METEOROLOGICAL COMPONENT

- (a) Operation and maintenance of electronic equipment (R/W, radar, radar picture transmission, satellite receiving and telecommunication equipment);
- (b) Establishment of new radar stations at key locations in the Philippines, the Republic of Korea and Viet Nam;
- (c) Replacement and/or upgrading of old radar sets in Malaysia, the Philippines, the Republic of Korea and Thailand;
- (d) Provision of equipment and spare parts for weather radar and satellite data receiving stations;
- (e) Provision or improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;
- (f) Establishment of satellite data receiving stations for reception of cloud imagery and other data from GMS and TIROS-N satellites;
- (g) Installation of a computer processing system at selected locations with a view to integrating satellite, radar and rainfall data so as to provide a spatial distribution of rainfall amount over a large region;
- (h) Monitoring of data exchange on existing point-to-point telecommunication circuits with a view to their improvement, where necessary;
- (i) Enhancement of Typhoon Committee members' facilities for reception/dissemination of meteorological information with automation and upgrading of GTS centres to accommodate higher-speed data transmissions;
- (j) Improvement of data completeness and quality, including real-time and non-real-time monitoring;
- (k) Review of national data collection facilities and data exchanges needed for typhoon warning services, taking remedial measures when necessary;
- (l) Review of the existing arrangements for dissemination of typhoon warnings with a view to introducing improvements, where necessary;
- (m) Procurement and installation of equipment and spare parts for telecommunication, radar, satellite data receivers etc. under the UNDP fund for 1984;

/(n)

- (n) Development of instruments to meet specific needs in tropical cyclone areas;
- (o) Improvement of the operation of those centres with responsibilities for the provision of processed information needed by Committee members for their forecasting and warning systems;
- (p) Enhancement of co-operation in typhoon monitoring, forecasting and warning;
- (q) Exchange of forecasts, including products of different objective methods;
- (r) Commissioning of a comprehensive study on ways to provide adequate data over tropical-cyclone-prone ocean areas;
- (s) Preparation for and execution of the evaluation of TOPEX and its Sub-Experiment on the basis of the programme recommended by the planning meetings and the decisions made by the Management Board for TOPEX;
- (t) Initiation of planning of further measures to be taken within the Committee's programme to identify and conduct studies and/or evaluations, in association with the Integrated WWW System Study, which would assist in defining a cost-effective best mix of observing systems in support of typhoon forecasting and warning;
- (u) Collection and dissemination of tide gauge and water level data for use in storm surge prediction;
- (v) Promotion of interdisciplinary co-operation and research in the area at the interface between the meteorological and disaster prevention and preparedness components;
- (w) Conducting studies on human response to warnings.

II. HYDROLOGICAL COMPONENT

- (a) Establishment of flood forecasting and warning systems in the Nam Ngun and Se Bang Hieng River basins in the Lao People's Democratic Republic, the Kinabatangan basin in Sabah and the Sadong basin in Sarawak, Malaysia, the Pasak River basin in Thailand and one river basin to be selected in Viet Nam;

/(b)

(b) Improvement of existing flood forecasting and warning systems making use, where appropriate, of the results of TOPEX and the technology available through the hydrological operational multi-purpose subprogramme (HOMS);

(c) Establishment and operation of new flood forecasting and warning systems;

(d) Establishment and operation of flood forecasting and warning systems for dam operations;

(e) Organizing missions by experts to provide technical guidance on items (a) to (d) at the request of members, with bilateral or multilateral support if available, making use, where appropriate, of technology available through HOMS;

(f) Organization of a symposium on the results of the hydrological component of TOPEX by WMO in late 1984;

(g) Selection of a pilot area for establishment of comprehensive flood loss prevention and management studies;

(h) Investigation, survey and study of the pilot area selected for comprehensive flood loss prevention and management;

(i) Organizing missions by experts to provide technical guidance to members on items (g) and (h) at the request of members, with bilateral or multilateral support if available;

(j) Conducting a preliminary survey and formulation of a detailed implementation programme for flood risk analysis and mapping in a demonstration area(s) including an expert group meeting at the request of the Typhoon Committee, with multilateral support (ESCAP/XB);

(k) Review of the existing arrangements for dissemination of flood warnings with a view to introducing improvements, where necessary.

III. DISASTER PREVENTION AND PREPAREDNESS COMPONENT

(a) Taking follow-up action on the joint LRCS/WMO/ESCAP missions in 1973-1976, the recommendations of the regional seminar at Tokyo in 1976, the review mission in 1976, the consultant's report on Malaysia, the Philippines and Thailand in 1978-1979, the recommendations made by the consultant in 1981 and the recommendations of the roving mission in 1982,

/(b)

(b) Taking follow-up action on the Philippine project to establish a Philippine training and research centre for disaster prevention and preparedness, through consultancy services where appropriate.

(c) Provision of advice and assistance in the field of training in disaster prevention and community preparedness, through consultancy services where appropriate,

(d) Improvement in the dissemination of timely warnings on typhoons, floods and storm surges, with particular attention to remote areas,

(e) Compilation of information on loss of human life and damage caused by typhoons, including damage to houses, public facilities, agricultural products etc.,

(f) Promotion of interdisciplinary co-operation and research programmes among the meteorological, hydrological and disaster prevention and preparedness components,

(g) Improvement of public awareness on storm warnings coupled with studies of human response to warnings,

(h) Production of materials related to public information and education on the activities of the Typhoon Committee, particularly storm warning and disaster prevention and preparedness,

(i) Establishment/updating of disaster prevention and preparedness plans at different levels,

(j) Strengthening national co-ordination and co-operation between departments/agencies involved in disaster prevention and preparedness activities,

(k) Improvement of communication systems for warning dissemination and relief operations,

(l) Improvement of damage assessment and reporting,

(m) Development and exchange of information and guidance materials on structural and non-structural measures for mitigating disasters,

(n) Conducting case studies on major disasters,

(o) Organizing joint missions to evaluate disaster prevention and preparedness procedures and to provide advice on local problems,

/(p)

(p) Establishment of disaster research and training institutes,

(q) Promoting enhanced co-operation among members on disaster prevention and preparedness matters.

IV. TRAINING

(a) Training of personnel through group training courses in Japan, through fellowships under UNDP, TCDC, VCP or other bilateral schemes on:

(i) tropical cyclone forecasting, (ii) meteorology, (iii) flood loss prevention, (iv) river engineering, (v) technology for disaster prevention, and (vi) maintenance of electronic equipment;

(b) Training by TCS staff assisted by counterpart staff in meteorology, hydrology and electronics, in particular the calibration, maintenance and repair of electronic equipment, including on-the-job training;

(c) Exchange of information and identification of training facilities available among WMO members in areas of concern and survey of available fellowship and scholarship assistance;

(d) Participation in study tours and seminars relevant to the Committee's programme organized by members or international bodies;

(e) Organization of training courses/seminars with bilateral/multilateral assistance on (i) flood forecasting, (ii) disaster prevention and preparedness, (iii) socio-economic impact of disasters, (iv) disaster vulnerability and risk assessment, (v) meteorology, (vi) hydrology, and (vii) electronics;

(f) Provision of short-term fellowships with external support on:
(i) utilization of software for integrating satellite/radar/rainfall data,
(ii) quantitative precipitation assessment and forecast models, (iii) storm surge and wave prediction, (iv) flood forecasting.

(g) Exploration of the possibility of: (i) providing facilities for training of personnel in disaster prevention and preparedness, (ii) flood loss prevention, and (iii) establishment of a Typhoon Committee training centre for the maintenance of electronic equipment;

(h) Organization of seminars on the socio-economic impact of disasters, vulnerability and risk assessment and technology for disaster prevention.

/V.

V. RESEARCH

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

(b) Promotion of the exchange of information on typhoon-related research activities and their results, including developments outside the region;

(c) Encouragement of co-operation in the study of typhoon-related topics, among researchers in the fields of meteorology, hydrology and social sciences;

(d) Initiation and/or continuation of research on the following topics:

Post-TOPEX

(i) Utilization of TOPEX data sets (radar, satellite, upper-air soundings etc.) in tropical cyclone numerical and physical modelling with the aim of improving existing methods of predicting formation, development and steering;

(ii) Establishment and operation of a typhoon data bank for the western Pacific and East Asia with compatible software exchange between members;

(iii) Development of an operational numerical weather prediction model for typhoon movement and development.

Meteorology

(i) Methods of typhoon location and accuracy;

(ii) Development mechanism and forecasting;

(iii) Disastrous weather associated with typhoons;

(iv) Objective forecasting of precipitation;

(v) Meso- and micro-scale weather systems related to typhoons;

(vi) Interaction between typhoons and the tropical circulation;

(vii) The possibility of extended track forecasting methods;

(viii) Sensitivity of objective methods to initial data distribution and quality;

(ix) Compilation of a forecasters' guide for western north Pacific typhoon prediction.

/Hydrology

Hydrology

- (i) Research and study on comprehensive flood loss prevention and management;
- (ii) Research and study on flood risk analysis, including flood risk mapping;
- (iii) Review of the existing flood run-off models and development of appropriate models for the region;
- (iv) Further study on application of meteorological inputs to flood forecasting.

Disaster prevention and preparedness

- (i) Studies on the socio-economic impact of disasters;
- (ii) Vulnerability and risk assessment of disaster-prone areas;
- (iii) Socio-economic implications of inaccurate typhoon and flood forecasts and warnings.

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Ministri ng Hagnayang Panlabas

Ministry of Foreign Affairs

MANILA

21518

20 September 1983

S i r :

Enclosed, for your information and reference, are the following ESCAP documents on the 16th Session of the Typhoon Committee to be held in Tokyo on 6-12 December 1983:

1. WRD/TC.16/L.1 dated 17 August 1983 - Provisional Agenda;
2. WRD/TC.16/L.2 dated 18 August 1983 - Annotated Provisional Agenda; and
3. WRD/TC.16/3 dated 31 August 1983 - Report on the 6th and 7th Session of the Management Board.

Very truly yours,

For the Acting Minister for Foreign Affairs:

Rosalinda V. Tirona

ROSALINDA V. TIRONA
Executive Director, United Nations and
International Organizations

Encl: a/s

The Director
Philippine Atmospheric, Geophysical and
Astronomical Services Administration
Quezon Ave., Quezon City

WRD/TC.16/L.1
17 August 1983

ORIGINAL: ENGLISH

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

Typhoon Committee
Sixteenth session
6-12 December 1983

September 1983

Tokyo Sir :

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4. 4. The Committee
(a) Meteorological component
(b) Hydrological component
(c) Disaster prevention and preparedness component
(d) Training
(e) Research
5. 5. Research Operational Experiment
(a) Report on the Third Planning
(b) Report on the sixth and seventh sessions of the Management Board
(c) Report on the Second Operational Experiment
Encl: a/s
6. 6. Medium- to long-term plan of the Committee
7. 7. The Director
Philippine Atmospheric, Geophysical and Astronomical Services Administration
Quezon Ave., Quezon City
8. 8. Programme
9. 9. Review of the 1982 and 1983 typhoon seasons
10. 10. Co-ordination with other activities of the WMO tropical cyclone programme
11. 11. Consideration of the agenda for the seventeenth session
12. 12. Date and place of the seventeenth session
13. 13. Scientific lectures

Very truly yours,

For the Acting Minister for Foreign Affairs:

ROSALINDA V. TIRONA
Executive Director, United Nations and
International Organizations

UNIO:RVT:LFL:EDR:CTT

WRD/TC.16/L.1
17 August 1983

ORIGINAL: ENGLISH

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

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

PROVISIONAL AGENDA

1. Opening of the session
2. Election of officers
3. Adoption of the agenda
4. The Committee's activities during 1983
 - ✓ (a) Meteorological component
 - (b) Hydrological component
 - (c) Disaster prevention and preparedness component
 - (d) Training
 - (e) Research
5. Research Operational Experiment
 - (a) Report on the Third Planning Meeting
 - (b) Report on the sixth and seventh sessions of the Management Board
 - (c) Report on the Second Operational Experiment
- ✓ 6. Medium- to long-term plan of the Committee
7. Support required for the Committee's programme
- ✓ 8. Programme for 1984
9. Review of the 1982 and 1983 typhoon seasons
10. Co-ordination with other activities of the WMO tropical cyclone programme
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20 September 1983

211

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Very truly yours,

For the Acting Minister for Foreign Affairs:

ROSALENE V. TIRONA
Executive Director, United Nations and
International Organizations

Encl: 3/c

The Director
Philippine Atmospheric, Geophysical and
Astronomical Services Administration
Quezon Ave., Quezon City

UNIO:RVT:LEA:INDR:CTT

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

Typhoon Committee
Sixteenth session
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ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

ANNOTATED PROVISIONAL AGENDA

1. Opening of the session

The sixteenth session of the Typhoon Committee will begin at Tokyo on 6 December 1983.

2. Election of officers

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 1983

A review of the activities of the Committee since the fifteenth session will be made under this item (WRD/TC.16/1). The review will cover each of the five components of the programme, namely: (a) meteorological, (b) hydrological, (c) disaster prevention and preparedness, (d) training and (e) research. The Committee is invited to assess the progress made since its fifteenth session, comment on the activities undertaken in 1983 and offer suggestions for accelerating those not completed. The members may also wish to report on the establishment in their countries in 1983 of any relevant facilities not covered by the report.

5. Typhoon Operational Experiment

(a) Report on the Third Planning Meeting

In accordance with the timetable established for the Typhoon Operational Experiment (TOPEX), the Third Planning Meeting was held at Tokyo in February 1983. Its main purpose was to review the results of the First Operational Experiment (FOE) with a view to ensuring that the planning of the Second Operational Experiment (SOE) would be as efficient as possible. A summary of the main decisions made for the SOE will be submitted to the Committee as document WRD/TC.16/2. Participants are advised to bring with them to the session the full report for reference during the discussion of this item.

(b) Report on the sixth and seventh sessions of the Management Board

In accordance with its terms of reference, the Board is required to report on progress to the Committee at its annual sessions. Since the fifteenth session, the Board has met twice, making a number of important decisions relating to TOPEX, and especially to the Second Operational Experiment. A report on the Board's sixth and seventh sessions will be submitted to the Committee at its sixteenth session as document WRD/TC.16/3.

(c) Report on the Second Operational Experiment

The Second Operational Experiment will take place from 1 August to 15 October 1983. Following the procedures used for the Pre-Experiment and the FOE, reports on the results will be prepared by the Directors of the International Experiment Centre and the experiment subcentres for submission to the Chairman of the Management Board. These reports will therefore be taken up by the Board at its eighth session, immediately after the sixteenth session of the Committee. It may be expected that they will also be available in time for the Committee session and each Director is requested to arrange for 25 copies of his report to be brought to the session.

6. Medium- to long-term plan of the Committee

At its fifteenth session, the Committee established a Working Group on Programme Planning to develop a draft medium- to long-term plan covering its programme over the years 1984 to 1992. After initiating its work by correspondence the Working Group held a short session in June 1983 to prepare the draft plan which will be submitted to the Committee in document WRD/TC.16/4. The Committee is invited to review the draft and to decide upon an agreed content, instructing the Working Group to make any changes desired.

7. Support required for the Committee's programme

At each session it is customary for the Committee to review the sources of support for its programme, with regard to both the contributions made by members themselves and the external support available from a variety of sources such as UNDP, the WMO/VCP and ESCAP/XB. The main discussion may conveniently be divided into two parts, one dealing with institutional support and the other with programme activities. An important development on the first of these parts will be the response of members to the proposal made at the fifteenth session that consideration be given to cash contributions. This response will have an important impact upon the future arrangements for the staffing of TCS and other aspects of an institutional nature.

In considering programme activities, the Committee may wish to discuss the extension of the present 1982-1984 UNDP project to cover the years 1985 and 1986 in the light of the latest information available from UNDP itself on the funding of regional projects during those years. The increasingly valuable support through the WMO/VCP, especially for the Committee's need directly related to World Weather Watch and tropical cyclone programme facilities, should also be given close attention. The latest developments in efforts to secure additional resources from the private sector will also be reported in the document submitted to the Committee on this item (WRD/TC.16/5).

8. Programme for 1984

It is proposed that the Committee continue its practice of selecting specific items of work on which it wishes to concentrate, with the assistance of TCS, during the coming year. In the light of the development of a medium- to long-term plan, it may be desirable for the Committee to review the future need for this item or to decide how it would wish to translate the appropriate activities in the plan into a more detailed work programme for a single year. A document (WRD/TC.16/6) will be submitted to the Committee.

9. Review of the 1982 and 1983 typhoon seasons

At its fifteenth session, the Committee decided to retain this item in its agenda for the annual sessions. Members were requested to prepare country papers containing information on typhoon and flood damage during 1982 and 1983. The Committee may wish to express its views on the reports to be submitted by members to the sixteenth session.

10. Co-ordination with other activities of the WMO tropical cyclone programme

Developments under the WMO tropical cyclone programme will be reported to the Committee under this item. A status report on the implementation of the programme is issued each year and the

30 June 1983 will form the basis of the document submitted to the Committee at its sixteenth session (WRD/TC.16/7) giving information on the general and regional activities under the programme. The Committee may wish to review the effectiveness of the present arrangements for co-ordination of such activities and the exchange of information thereon.

11. Consideration of the agenda for the seventeenth session

In accordance with normal practice the Committee is requested to draw up a provisional version of the agenda it would wish to consider at its seventeenth session, it being understood that additions or changes can be made to that agenda at any time.

12. Date and place of the seventeenth 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." Members may wish to make offers to host the seventeenth session.

13. Scientific lectures

In accordance with the wishes expressed by the Committee, a programme of scientific lectures will be arranged during the sixteenth session. Details will be announced later.

14. Adoption of the report

The Committee's report on its sixteenth 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
Sixteenth session
6-12 December 1983
Tokyo

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5. Typhoon Operational Experiment

(a) Report on the Third Planning Meeting

In accordance with the timetable established for the Typhoon Operational Experiment (TOPEX), the Third Planning Meeting was held at Tokyo in February 1983. Its main purpose was to review the results of the First Operational Experiment (FOE) with a view to ensuring that the planning of the Second Operational Experiment (SOE) would be as efficient as possible. A summary of the main decisions made for the SOE will be submitted to the Committee as document WRD/TC.16/2. Participants are advised to bring with them to the session the full report for reference during the discussion of this item.

(b) Report on the sixth and seventh sessions of the Management Board

In accordance with its terms of reference, the Board is required to report on progress to the Committee at its annual sessions. Since the fifteenth session, the Board has met twice, making a number of important decisions relating to TOPEX, and especially to the Second Operational Experiment. A report on the Board's sixth and seventh sessions will be submitted to the Committee at its sixteenth session as document WRD/TC.16/3.

(c) Report on the Second Operational Experiment

The Second Operational Experiment will take place from 1 August to 15 October 1983. Following the procedures used for the Pre-Experiment and the FOE, reports on the results will be prepared by the Directors of the International Experiment Centre and the experiment subcentres for submission to the Chairman of the Management Board. These reports will therefore be taken up by the Board at its eighth session, immediately after the sixteenth session of the Committee. It may be expected that they will also be available in time for the Committee session and each Director is requested to arrange for 25 copies of his report to be brought to the session.

6. Medium- to long-term plan of the Committee

At its fifteenth session, the Committee established a Working Group on Programme Planning to develop a draft medium- to long-term plan covering its programme over the years 1984 to 1992. After initiating its work by correspondence the Working Group held a short session in June 1983 to prepare the draft plan which will be submitted to the Committee in document WRD/TC.16/4. The Committee is invited to review the draft and to decide upon an agreed content, instructing the Working Group to make any changes desired.

7. Support required for the Committee's programme

At each session it is customary for the Committee to review the sources of support for its programme, with regard to both the contributions made by members themselves and the external support available from a variety of sources such as UNDP, the WMO/VCP and ESCAP/XB. The main discussion may conveniently be divided into two parts, one dealing with institutional support and the other with programme activities. An important development on the first of these parts will be the response of members to the proposal made at the fifteenth session that consideration be given to cash contributions. This response will have an important impact upon the future arrangements for the staffing of TCS and other aspects of an institutional nature.

In considering programme activities, the Committee may wish to discuss the extension of the present 1982-1984 UNDP project to cover the years 1985 and 1986 in the light of the latest information available from UNDP itself on the funding of regional projects during those years. The increasingly valuable support through the WMO/VCP, especially for the Committee's need directly related to World Weather Watch and tropical cyclone programme facilities, should also be given close attention. The latest developments in efforts to secure additional resources from the private sector will also be reported in the document submitted to the Committee on this item (WRD/TC.16/5).

8. Programme for 1984

It is proposed that the Committee continue its practice of selecting specific items of work on which it wishes to concentrate, with the assistance of TCS, during the coming year. In the light of the development of a medium- to long-term plan, it may be desirable for the Committee to review the future need for this item or to decide how it would wish to translate the appropriate activities in the plan into a more detailed work programme for a single year. A document (WRD/TC.16/6) will be submitted to the Committee.

9. Review of the 1982 and 1983 typhoon seasons

At its fifteenth session, the Committee decided to retain this item in its agenda for the annual sessions. Members were requested to prepare country papers containing information on typhoon and flood damage during 1982 and 1983. The Committee may wish to express its views on the reports to be submitted by members to the sixteenth session.

10. Co-ordination with other activities of the WMO tropical cyclone programme

Developments under the WMO tropical cyclone programme will be reported to the Committee under this item. A status report on the implementation of the programme is issued each year and the report up to

30 June 1983 will form the basis of the document submitted to the Committee at its sixteenth session (WRD/TC.16/7) giving information on the general and regional activities under the programme. The Committee may wish to review the effectiveness of the present arrangements for co-ordination of such activities and the exchange of information thereon.

11. Consideration of the agenda for the seventeenth session

In accordance with normal practice the Committee is requested to draw up a provisional version of the agenda it would wish to consider at its seventeenth session, it being understood that additions or changes can be made to that agenda at any time.

12. Date and place of the seventeenth 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." Members may wish to make offers to host the seventeenth session.

13. Scientific lectures

In accordance with the wishes expressed by the Committee, a programme of scientific lectures will be arranged during the sixteenth session. Details will be announced later.

14. Adoption of the report

The Committee's report on its sixteenth 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
Sixteenth session
6-12 December 1983
Tokyo

TYPHOON OPERATIONAL EXPERIMENT

REPORT ON THE SIXTH AND SEVENTH SESSIONS
OF THE MANAGEMENT BOARD

(Item 5 (b) of the provisional agenda)

Note by the WMO secretariat

Introduction

1. The terms of reference assigned by the Typhoon Committee to the Management Board for TOPEX require it to report on progress to the Committee's annual session. Since the fifteenth session the Board has met twice, holding its sixth session in Bangkok from 16 to 18 November 1982 and its seventh session in Tokyo on 22-23 February 1983. At the time of the sixth session the First Operational Experiment (FOE) had recently been concluded. As might be expected, the Board was able to review the FOE and to consider the arrangements for the Second Operational Experiment (SOE). This process was continued at the seventh session of the Board, giving particular attention to the findings of the Third Planning Meeting (see document WRD/TC.16/2). This document contains a brief review of the main decisions taken by the Board at the above two sessions.

Decisions of the Board at its sixth session

2. MB-VI was held immediately following the fifteenth session of the Typhoon Committee. It was able to give detailed attention to the outcome of the FOE on the basis of the report of the Director of the International Experiment Center (IEC) and the individual reports submitted by the Directors of the

/Experiment

Experiment Sub Centers (ESCs). There was general satisfaction with the way in which the FOE had taken place without any serious problems. The programmes of intensified observations, telecommunication arrangements and procedures laid down in the TOPEX Operational Manual (TOM) had all contributed to a highly successful phase of TOPEX.

3. The Board felt, however, that further improvements were necessary before the SOE to ensure that it would constitute a genuine advance over the FOE both in organization and results. The IEC/ESC recommendations were therefore discussed with this aim in mind.

4. Amongst the main decisions were those fixing the dates of the SOE (1 August - 15 October), the selection of four typhoons and that the Typhoon Tracking Experiment (TTE) periods should again be of five days duration. One major change was the decision to make upper-air observations four times daily during one full TTE period at a network of strategic stations regardless of their distance from the centre of the typhoon. Other questions dealt with by the Board under the Meteorological Component concerned data archiving, revision of the TOM, weekend duty at the IEC and the need for the development of an operational model for predicting typhoon movement and development.

5. Discussion under the Hydrological and Warning Dissemination/Information Exchange Components centred on flood events and flood forecasting operations during the 1982 typhoon season and on proposed guidelines to be used for evaluation of these two components. ESCAP and WMO were requested to give further consideration to making the guidelines for the Hydrological Component more specific whilst those for the WD/IE component were adopted without change.

6. The need for support for further TOPEX activities received careful attention by the Board. It considered that new efforts were required to tap all available sources of support and a list of priority items for TOPEX was drawn up.

Decisions of the Board at its seventh session

7. MB-VII took place immediately after the Third Planning Meeting (PM-III). Mr. I. Shimizu (Japan) and Mr. Fang Qi (China) were re-elected as chairman and vice-chairman respectively until the first meeting in 1984, in accordance with the Board's Rules of Procedure.

8. The first task of the Board was to consider the results of PM-III. It noted that no specific questions had been referred to it. Attention was however drawn to the decision of PM-III that special measures were necessary to ensure that the scientists attending the IEC for the first time in 1983 were adequately trained in TOPEX questions. The Board proposed the convening of discussion groups in which Directors of ESCs, focal points and scientists previously at the IEC would take part. A list of introductory reading material would be drawn up by the WMO Secretariat and circulated to all concerned.

9. The Board considered and approved for publication in the TOPEX series a text prepared by the Co-ordinator of the Meteorological Component (Dr. T. Nitta) giving a preliminary evaluation of the First Operational Experiment.

10. Finally the Board took up the question of its own future activities. To conform to its Terms of Reference it would need to remain in being at least until the end of the March 1984 Evaluation Meeting. It was, however, emphatic that it should not continue indefinitely and decided that its ninth session should be its last. The timing of that session in relation to the Evaluation Meeting and to the seventeenth session of the Typhoon Committee later in 1984 should be determined by the Board itself.

Action proposed

11. The Committee is invited to:

- (a) Endorse the reports of the Management Board for TOPEX on its sixth and seventh sessions;
- (b) Make proposals for any questions to which the Evaluation Meeting should give special attention;
- (c) Advise the Board on any views it may have upon the dates of the Board's ninth and final session.

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WRD/TC.16/L.1
17 August 1983

ORIGINAL: ENGLISH

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

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

PROVISIONAL AGENDA

1. Opening of the session
2. Election of officers
3. Adoption of the agenda
4. The Committee's activities during 1983
 - (a) Meteorological component
 - (b) Hydrological component
 - (c) Disaster prevention and preparedness component
 - (d) Training
 - (e) Research
5. Research Operational Experiment
 - (a) Report on the Third Planning Meeting
 - (b) Report on the sixth and seventh sessions of the Management Board
 - (c) Report on the Second Operational Experiment
6. Medium- to long-term plan of the Committee
7. Support required for the Committee's programme
8. Programme for 1984
9. Review of the 1982 and 1983 typhoon seasons
10. Co-ordination with other activities of the WMO tropical cyclone programme
11. Consideration of the agenda for the seventeenth session
12. Date and place of the seventeenth session
13. Scientific lectures

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

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

ANNOTATED PROVISIONAL AGENDA

1. Opening of the session

The sixteenth session of the Typhoon Committee will begin at Tokyo on 6 December 1983.

2. Election of officers

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 1983

A review of the activities of the Committee since the fifteenth session will be made under this item (WRD/TC.16/1). The review will cover each of the five components of the programme, namely: (a) meteorological, (b) hydrological, (c) disaster prevention and preparedness, (d) training and (e) research. The Committee is invited to assess the progress made since its fifteenth session, comment on the activities undertaken in 1983 and offer suggestions for accelerating those not completed. The members may also wish to report on the establishment in their countries in 1983 of any relevant facilities not covered by the report.

5. Typhoon Operational Experiment

(a) Report on the Third Planning Meeting

In accordance with the timetable established for the Typhoon Operational Experiment (TOPEX), the Third Planning Meeting was held at Tokyo in February 1983. Its main purpose was to review the results of the First Operational Experiment (FOE) with a view to ensuring that the planning of the Second Operational Experiment (SOE) would be as efficient as possible. A summary of the main decisions made for the SOE will be submitted to the Committee as document WRD/TC.16/2. Participants are advised to bring with them to the session the full report for reference during the discussion of this item.

(b) Report on the sixth and seventh sessions of the Management Board

In accordance with its terms of reference, the Board is required to report on progress to the Committee at its annual sessions. Since the fifteenth session, the Board has met twice, making a number of important decisions relating to TOPEX, and especially to the Second Operational Experiment. A report on the Board's sixth and seventh sessions will be submitted to the Committee at its sixteenth session as document WRD/TC.16/3.

(c) Report on the Second Operational Experiment

The Second Operational Experiment will take place from 1 August to 15 October 1983. Following the procedures used for the Pre-Experiment and the FOE, reports on the results will be prepared by the Directors of the International Experiment Centre and the experiment subcentres for submission to the Chairman of the Management Board. These reports will therefore be taken up by the Board at its eighth session, immediately after the sixteenth session of the Committee. It may be expected that they will also be available in time for the Committee session and each Director is requested to arrange for 25 copies of his report to be brought to the session.

6. Medium- to long-term plan of the Committee

At its fifteenth session, the Committee established a Working Group on Programme Planning to develop a draft medium- to long-term plan covering its programme over the years 1984 to 1992. After initiating its work by correspondence the Working Group held a short session in June 1983 to prepare the draft plan which will be submitted to the Committee in document WRD/TC.16/4. The Committee is invited to review the draft and to decide upon an agreed content, instructing the Working Group to make any changes desired.

7. Support required for the Committee's programme

At each session it is customary for the Committee to review the sources of support for its programme, with regard to both the contributions made by members themselves and the external support available from a variety of sources such as UNDP, the WMO/VCP and ESCAP/XB. The main discussion may conveniently be divided into two parts, one dealing with institutional support and the other with programme activities. An important development on the first of these parts will be the response of members to the proposal made at the fifteenth session that consideration be given to cash contributions. This response will have an important impact upon the future arrangements for the staffing of TCS and other aspects of an institutional nature.

In considering programme activities, the Committee may wish to discuss the extension of the present 1982-1984 UNDP project to cover the years 1985 and 1986 in the light of the latest information available from UNDP itself on the funding of regional projects during those years. The increasingly valuable support through the WMO/VCP, especially for the Committee's need directly related to World Weather Watch and tropical cyclone programme facilities, should also be given close attention. The latest developments in efforts to secure additional resources from the private sector will also be reported in the document submitted to the Committee on this item (WRD/TC.16/5).

8. Programme for 1984

It is proposed that the Committee continue its practice of selecting specific items of work on which it wishes to concentrate, with the assistance of TCS, during the coming year. In the light of the development of a medium- to long-term plan, it may be desirable for the Committee to review the future need for this item or to decide how it would wish to translate the appropriate activities in the plan into a more detailed work programme for a single year. A document (WRD/TC.16/6) will be submitted to the Committee.

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At its fifteenth session, the Committee decided to retain this item in its agenda for the annual sessions. Members were requested to prepare country papers containing information on typhoon and flood damage during 1982 and 1983. The Committee may wish to express its views on the reports to be submitted by members to the sixteenth session.

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30 June 1983 will form the basis of the document submitted to the Committee at its sixteenth session (WRD/TC.16/7) giving information on the general and regional activities under the programme. The Committee may wish to review the effectiveness of the present arrangements for co-ordination of such activities and the exchange of information thereon.

11. Consideration of the agenda for the seventeenth session

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13. Scientific lectures

In accordance with the wishes expressed by the Committee, a programme of scientific lectures will be arranged during the sixteenth session. Details will be announced later.

14. Adoption of the report

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

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LIMITED

WRD/TC.16/L.1/Corr.1
12 September 1983

ORIGINAL: ENGLISH

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

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

PROVISIONAL AGENDA

Corrigendum

Item 5 should read

Typhoon Operational Experiment

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WRD/TC.16/2
12 September 1983

ORIGINAL: ENGLISH

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

Typhoon Committee

Sixteenth session
6-12 December 1983
Tokyo

TYPHOON OPERATIONAL EXPERIMENT
REPORT ON THE THIRD PLANNING MEETING
(Item 5 (a) of the provisional agenda)

Note by the WMO secretariat

Introduction

1. In accordance with the decision of the Second Planning Meeting for TOPEX, the Third Planning Meeting (PM-III) was held at the Japan Meteorological Agency in Tokyo from 17 to 21 February 1983. It was attended by representatives of eight of the ten members of the Typhoon Committee and by observers from UNDRO and LRCS.

2. The primary purpose of PM-III was to take up the detailed planning of the Second Operational Experiment (SOE) scheduled for 1 August to 15 October 1983. The full report of the meeting has been published by WMO as TOPEX Report No. 8 under the Tropical Cyclone Programme series. The complete report, which participants at TC.16 may wish to bring with them, is not therefore being reproduced as a document for the session. A summary of the principal decisions of PM-III is, however, given in the present document. In this summary, which follows the order in which the items were considered by PM-III, cross-references are given to the appropriate paragraphs of the full report.

Review of the First Operational Experiment (Paras. 9-31)

3. Activities during the FOE were reviewed to determine the extent to which the planning had been adequate and the lessons to apply during the SOE. Decisions made by the Typhoon Committee and the Management Board were also taken into account.

4. Under the Meteorological Component the meeting noted that a number of points relative to the Core Experiment had been referred to it by MB-VI and that several other questions had been directed to the Sub-Committee for the Sub-Experiment. It decided to take them up when discussing the further planning of the SOE.

5. For the Hydrological Component PM-III considered that the performance of the flood forecasting systems monitored in the year up to 28 February 1982 had been good. Members were urged to complete monitoring and forecast accuracy reports for the water year 1982/1983 for all the designated basins. The meeting noted with appreciation the technical report on flood risk analysis and mapping prepared by Japan and considered that the importance of this matter called for more efforts by all concerned to carry it out effectively.

6. Consideration of the Warning Dissemination and Information Exchange Component under this item was based mainly on national activities such as case studies. Reference was also made to the seminar on the Hydrological and WD/IE Components organized by Japan in 1982.

Planning for the Second Operational Experiment (SOE)
Meteorological Component (Paras. 33-53)

7. The current performance of telecommunication circuits important for the SOE was reviewed and it was decided that no particular measures were called for. It was agreed to repeat the test exercise carried out prior to the FOE between RTH Tokyo and GTS centres associated with TOPEX ESCs.

8. PM-III endorsed the MB-VI decision that when two typhoons co-existed they would be counted as one and all the analysis/forecast procedures carried out for both. PM-III decided that they should be within 1200 km of each other for this purpose. Having already decided that the four TTE-periods for the selected typhoons should each be of five days duration, MB-VI had requested the Planning Meeting to work out procedures for the possible selection of a fifth typhoon. Recognizing that the selection of an additional typhoon would have logistic and other implications, PM-III decided to leave this question to the discretion of the Director of the IEC. The meeting went on to select a network of 27 strategic upper-air stations which would make 6-hourly observations throughout one full TTE-period regardless of distance from the centre of the selected typhoon.

9. A newly-revised version of the TOPEX Operational Manual (TOM) was considered by PM-III. It proposed some further amendments and requested WMO to reproduce and distribute the final version to all concerned. Considerable attention was given to the need for careful and adequate preparation of scientists seconded to the IEC in order to facilitate its efficient operation during the SOE. Various proposals were made to this end, including briefing by scientists previously at the IEC and the preparation of a list of reading material.

10. Sub-Experiment activities were examined by PM-III on the basis of a report prepared by the Chairman of the Sub-Committee. A number of research activities were proposed as a result of needs revealed by the FOE and priorities set for the studies to be undertaken in 1983. It was considered that the Sub-Committee could appropriately meet in conjunction with the Evaluation Meeting in March 1984 and WMO was requested to consider providing the necessary financial assistance.

Hydrological Component (Paras. 54-69)

11. It was first agreed that the activities under this component should continue under the four headings - (i) evaluation of flood forecasting systems; (ii) identification and comparison of forecasting models; (iii) flood risk analysis; and (iv) storm-surge flooding analysis and forecasting. As a result of the PM-III discussions these activities will be strengthened, particularly in view of the decision that the final water year should terminate on 31 December 1983. Members would therefore need to make arrangements nationally to submit the standard monitoring and forecast accuracy reports for all designated basins by 31 January 1984. Noting that during the FOE neither QPF nor other meteorological information was used as direct inputs to the streamflow forecasting models, PM-III considered that it did not necessarily mean that such information was not available. It therefore agreed that a study be made during the SOE to determine what meteorological information was actually available to those preparing the streamflow forecasts.

12. On the analysis and forecasting of storm-surge flooding it was agreed that further information be provided by members and that, in the light of the response, a decision would be made on the revision or updating of the earlier report prepared by the Philippines.

13. Specific guidelines for the evaluation of the Hydrological Component were considered and adopted by PM-III. A corresponding format prepared by Japan based on those guidelines was also adopted.

Warning Dissemination/Information Exchange Component
(WD/IE) (paras. 70-87)

14. PM-III revealed that most members have well-advanced plans for the activities they would carry out during the SOE under this component. Case studies would again form an important part and public education and training would receive increased attention. A standard format for damage assessment was examined by the meeting and accepted as a means of improving the gathering of disaster statistics. PM-III proposed that members consider the publication of pamphlets containing information on typhoons, flooding and measures for community preparedness for distribution to the public.

They should preferably be written in the local dialect.

15. During five weeks of the SOE, Japan will again conduct a seminar on the Hydrology and WD/IE components in Tokyo.

Support for TOPEX (Paras. 88-95)

16. The Planning Meeting discussed the various sources of support for TOPEX with emphasis on the expected requirements for the SOE. Japan announced that it would again provide support to second six scientists to the IEC for the full SOE period. It would also fund the attendance of five experts at the Hydrology-WD/IE seminar.

17. Major attention was given by PM-III to the requirements for additional funds for the secondment of scientists to the IEC. WMO was requested to examine all possible sources of funding so that the IEC would be able to operate in the most effective way during the SOE.

Planning for the TOPEX Evaluation Meeting (Paras. 96-101)

18. The meeting confirmed that the guidelines already adopted for the evaluation of the three components should be used in preparation for the TOPEX Evaluation Meeting which would be held in Tokyo from 12-16 March 1984. Deadlines were set for each member to send preliminary evaluation reports to the Co-ordinators of each of the three components. It was further decided that both administrative and technical matters should be covered and that two days should be allotted to scientific presentations on the results of the Core Experiment and the Sub-Experiment.

Action proposed

19. The Typhoon Committee is invited to:

- (a) Note this summary of the main decisions of PM-III, in conjunction, as may be required with the full report of the meeting;
- (b) Consider, in the light of the results of the SOE, any further steps which may be necessary in the conduct of the Sub-Experiment to obtain the maximum benefit from the total TOPEX operation;
- (c) Express its views on any particular question it feels should be considered at the TOPEX Evaluation Meeting;
- (d) Refer to the Management Board at its eighth session those questions on which further early action is required.

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

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

NOTES FOR THE INFORMATION OF PARTICIPANTS

1. The sixteenth session of the Typhoon Committee will be held at Tokyo from 6 to 12 December 1983.

Immigration requirements

2. Participants are requested to obtain, before their departure, entry visas for Japan from the Japanese diplomatic or consular missions in their countries. Where there are no such missions, they are requested to make a brief stop-over en route at a convenient place where the Japanese diplomatic or consular missions are located to obtain the required visas. It is not possible to obtain a landing permit from the immigration authorities at the port of entry if participants fail to secure entry visa prior to arriving in Japan.

Health requirements

3. Participants are not required to obtain any certificate of vaccination. They are, however, advised to consult travel agents in their own countries at least two weeks in advance of their departure, in order to obtain up-to-date information on health requirements.

Foreign exchange

4. Participants may bring with them pounds sterling or United States dollar travellers' cheques or bank drafts, which can be exchanged for Japanese currency at the prevailing bank rates. The exchange rates, which fluctuate from day to day, are approximately as follows (as of September 20, 1983):

\$US 1.00 = 242.50 yen

£ 1.00 = 364.84 yen

Weather

5. The climate of Tokyo during December is cold. The temperature varies between 13.0 degree Celsius to 5.7 degree Celsius. Winter clothing is needed.

Communications

6. Mail intended for participants during the period of the session may be addressed to:

c/o Mr. H. Mitsuya
(Typhoon Committee 16th session)
Specialized Agencies Division
U.N. Bureau, Ministry of Foreign Affairs
2-2-1, Kasumigaseki, Chiyoda-ku, Tokyo, Japan

Cable: ESCAP c/o CAIMUDALJIN TOKYO

Telephone: Tokyo, 580-3311 ext. 2868

Hotel accommodation

7. To facilitate reservation of hotel accommodation, participants are requested to complete and submit the attached attendance information form at an early date. The form should be sent to Mr. H. MITSUYA, Specialized Agencies Division, United Nations Bureau, Ministry of Foreign Affairs, 2-2-1 Kasumigaseki, Chiyoda-ku, Tokyo, Japan, and a copy to the Chief, Natural Resources Division, ESCAP Bangkok.

If no information is received by 25 November 1983, it will be assumed that participants will make their own arrangements.

Accommodation will be reserved at the request of participants subject to availability of rooms at the following hotels, the rates of which are especially discounted for the participants;

<u>Hotel</u>	<u>Room</u>		
Shimbashi Dai-ichi Hotel Tel.: (03) 501-4411 (15 min. walk to Ministry)	Single	Yen	10,000
	Twin	Yen	15,800
Akasaka Tokyu Hotel Tel.: (03) 580-2311 (15 min. to the Ministry by subway)	Single	Yen	11,200
	Twin	Yen	15,800

(The above rates are inclusive of tax and service charge. No meal is included.)

8. Subsequent changes in arrival plans should be communicated immediately to both ESCAP and the Japanese Government. Rooms not occupied will be held 24 hours at the individual's expense and then released. All rooms will be assigned according to information furnished on the enclosed forms and on a first-come first-served basis.

Transport

9. Participants are requested to arrive at Tokyo by the evening of Monday, 5 December 1983. On arrival at the Tokyo International Airport (Narita), participants are requested to proceed on their own to their hotel. It is advisable to take a limousine bus from Tokyo International Airport (Narita) to the Tokyo City Air Terminal (TCAT) at Hakozaeki (bus fare ¥2,500) and then to take a taxi from Hakozaeki to their hotel (taxi fare about ¥2,500).

Place of meeting

10. The opening meeting will be held at 1000 hours on Tuesday, 6 December 1983 (0900-0945: Registration) at:

Conference Room 751, 7th floor of
Ministry of Foreign Affairs
2-2-1, Kasumigaseki, Chiyoda-ku, Tokyo
Tel.: (03) 580-3311 ext. 2868 (Mr. Mitsuya)

11. All subsequent sessions will also be held at the same Conference Room.

Schedule of meetings

12. Subject to confirmation by the participants, the daily schedule, except for the opening meeting, will be as follows:

Monday to Friday	0930 to 1230 hours 1430 to 1700 hours
Saturday	0930 to 1300 hours

Registration

13. A registration desk will be located outside the conference room. Participants are requested to be in the lobby outside the conference room between 0900 and 0945 hours on the opening day, in order to allow time

for registration. Participants who have failed to register on the opening day of the session should please request for a registration form to ensure that their names will appear in the list of participants.

Badges

14. Participants are requested to wear the identification badges they receive upon registration at all meetings and official functions.

Working hours of the secretariat

15. The working hours of the secretariat are from 0900 to 1730 hours with a break of 60 minutes for lunch, Monday through Friday and from 0900 to 1330 hours on Saturday.

Documents

16. Documents for the session are normally sent to the seats of Government at least six weeks before the session. In addition, documents are sent directly to participants if their names are submitted to the ESCAP secretariat at least three weeks before the start of the session. In view of the limited number of copies available, it will be appreciated if participants bring with them the sets supplied in advance.

Working language

17. The working languages of the session will be English and French but will be limited to English should there be no representatives of French-speaking members of the Committee.

Microphones

18. Sound equipment is provided in the conference room. Before speaking, participants are requested to push the button on their microphone stand; a red signal will then show.

First-aid facilities

19. The first-aid room is located on the 8th floor of the Old Building, however, participants are requested to contact one of the staff member of the secretariat beforehand.

Postal facilities

20. A post office is located on the ground floor of the Ministry of Agriculture, Forestry and Fisheries (across the street from the Ministry of Foreign Affairs). Its working hours are from 9000 to 1700 hours from Monday to Friday and from 9000 to 1230 hours on Saturday.

Return bookings

21. Participants are advised to ensure that their return booking is confirmed soon after their arrival in Tokyo.

/ATTENDANCE INFORMATION

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

TYPHOON COMMITTEE
Sixteenth session
6-12 December 1983
Tokyo

ATTENDANCE INFORMATION
(Please type or print)

1. NAME Mr./Mrs./Miss _____
Family name First name Other names
(As it should appear in the official listing)
2. TITLE OF PRESENT OFFICIAL POSITION: _____
(In home country or at official duty station)
3. PERMANENT MAILING ADDRESS: _____

4. COUNTRY/ORGANIZATION REPRESENTED: _____

5. WILL ATTEND THE SESSION AS
☐ REPRESENTATIVE ☐ ADVISER
☐ ALTERNATE _____ OTHER

6. ACCOMPANIED BY FOLLOWING MEMBERS OF FAMILY:

Name	Relationship	Age if under 18
_____	_____	_____
_____	_____	_____

7. ARRIVAL IN TOKYO

Date: _____ Flight No.: _____ Time: _____

8. PLEASE RESERVE LIVING ACCOMMODATION IN TOKYO AS INDICATED BELOW

Name of hotel: _____ Rooms: Single _____
Check-in date: _____ Double _____
Check-out date: _____

9. IF MAKING OWN LIVING ARRANGEMENTS IN TOKYO, PLEASE INDICATE ADDRESS IN TOKYO AND DATES OF ARRIVAL AND DEPARTURE

Please address this ATTENDANCE INFORMATION to:

Mr. H. MITSUYA
Specialized Agencies Division
United Nations Bureau
Ministry of Foreign Affairs
2-2-1 Kasumigaseki, Chiyoda-ku, Tokyo

Cable Address: GAIMUDALJIN TOKYO

With a copy to: Mr. L.N. Fan
Chief

Natural Resources Division
Economic and Social Commission for Asia
and the Pacific (ESCAP)
United Nations Building
Rajadamnern Avenue
Bangkok 10200, Thailand

CABLE ADDRESS: ESCAP BANGKOK

FOR PARTICIPANTS ONLY

WRD/TC.16/1
26 September 1983

ORIGINAL: ENGLISH

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

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

THE COMMITTEE'S ACTIVITIES DURING 1983

(Item 4 of the provisional agenda)

Note by the Typhoon Committee secretariat

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Mention of any firm or licensed process does not imply endorsement by the United Nations.

I. BACKGROUND

1. At its thirty-ninth session, the Economic and Social Commission for Asia and the Pacific (ESCAP) expressed its satisfaction with the work of the Committee during the year, including the successful conclusion of the first Typhoon Operational Experiment (TOPEX) held during the period from 1 August to 15 October 1982. It also expressed the hope that the second operational experiment in 1983 would be successful. The Commission expressed its appreciation for the considerable support of UNDP.
2. The Commission noted with appreciation the announcement by the representative of Japan that his Government would host the sixteenth session of the Typhoon Committee in December 1983.
3. The Third Planning Meeting for TOPEX was held at Tokyo from 17 to 21 February 1983. The report of the Meeting (document WRD/TC.16/2) will be discussed under item 5(a) of the provisional agenda.
4. The sixth and seventh sessions of the Management Board for TOPEX were held at Bangkok from 16 to 18 November 1982, after the fifteenth session of the Committee, and at Tokyo on 22 and 23 February 1983 after the Third Planning Meeting. Reports on these meetings (document WRD/TC.16/3) will be discussed under item 5(b) of the provisional agenda.
5. In accordance with the view of members at the fifteenth session that it was considered necessary to draft a new medium- to long-term plan for the Committee, the working group, composed of representatives of China, Hong Kong, Japan, the Philippines, ESCAP, WMO, the League of Red Cross Societies (LRCS), UNDRO and the Typhoon Committee secretariat, met at Manila/Baguio City and prepared a draft plan in accordance with its terms of reference. The report of the working group (document WRD/TC.16/4) will be discussed under item 6 of the provisional agenda.
6. Members of the Typhoon Committee have made considerable efforts to mobilize the resources and manpower required for the second operational experiment, held from 1 August to 15 October 1983. China, Hong Kong, Japan, Malaysia, the Philippines, the Republic of Korea, Thailand and Viet Nam have nominated scientists to be seconded to the International Experiment Centre, Tokyo. National experiment sub-centres have also been established by members participating in TOPEX.

7. ESCAP has planned a roving mission for the latter part of 1983 with the financial and technical support of the Government of Japan. The mission will stay one week in each member country or area and conduct studies of the present systems of damage survey with a view to identifying deficiencies and recommending improvements. It is also planned that the mission will conduct training seminars on that subject in each of the members visited.

8. In accordance with the decision of the Typhoon Committee at its fourteenth session to strengthen co-ordination with other regional cyclone bodies, the Typhoon Committee secretariat was represented at the tenth session of the WMO/ESCAP Panel on Tropical Cyclones held from 22 to 29 March 1983 at Dhaka.

9. The fifth session of the Regional Association II (RA-II) Working Group on Meteorological Telecommunications will be held in Tokyo from 19 to 28 October 1983.

10. A seminar on automated message switching systems for regional and national meteorological centres in southern Asia will be held at Hong Kong from 23 to 29 November 1983.

11. Other missions made by Typhoon Committee secretariat staff during 1983 included:

Telecommunications and Electronics Expert	: Japan (February, July to August, October); Bangladesh (March); Thailand (July); Republic of Korea (July); Malaysia (August); China (September).
Hydrologist	: Republic of Korea (July); Japan (July-August); Malaysia (August).
Meteorologist	: Japan (February, August, October), Republic of Korea (July); Malaysia (August); China (September).
Assistant to the Co-ordinator	: Thailand (July).

/II.

II. METEOROLOGICAL COMPONENT

A. Meteorological satellites

12. The Geostationary Meteorological Satellite (GMS-2) has been in operation at 140°E over the equator since 1 April 1982. Three-hourly observations are being made regularly, and hourly special observations were made during the TOPEX typhoon tracking experiment (TTE) period. These GMS data were disseminated by HR and LR facsimile. Cloud wind vectors and sea surface temperatures derived from the satellite data were also disseminated over GTS. Members of the Committee have been made aware of the importance of GMS information for use in improving weather forecasting, particularly for typhoon and flood warning services in the region.

13. In Japan, a small-scale data utilization station was installed at Fukuoka and Okinawa in March 1983. Similar equipment will be provided to Sapporo, Sendai and Osaka in March 1984. An image monitor operating system for animated presentation of false colour GMS images will be installed at the Japan Meteorological Agency headquarters in March 1984.

14. In the Republic of Korea, four sets of LASER-FAX, which has the capability of receiving good quality satellite imagery from the Seoul head office via land lines, were installed at the three regional forecast centers at Pusan, Kwangju and Kangreung and at the Kimpo International Airport Meteorological Office. The computer component of the satellite receiver at Seoul was repaired with spare parts provided through WMO under the UNDP regional typhoon project.

15. Most members are now able to intercept satisfactory either GMS or TIROS-N satellite picture imagery. However, as in the past, members have experienced difficulties in obtaining replacement parts for repair and maintenance from abroad. For this reason some members have requested WMO through the Committee secretariat to provide necessary replacement spare parts for emergency repair. However, provision of spare parts has not been very satisfactory due to the high cost and insufficient project funds. Members were advised to stock sufficient spare parts to maintain their equipment without long interruption in case of breakdowns.

/B.

B. Radar and upper-air observations

16. A special network of 27 strategic upper-air stations was designated to make four observations daily throughout one full TTE-period of five days during the second operational experiment, as follows: China (10), Hong Kong (1), Japan (5), Korea (1), Malaysia (3), Philippines (3), Thailand (2) and Viet Nam (2).

17. In support of the second operational experiment, China inspected and calibrated the radar systems at Nanhui, Dongtou, Shantou, and Xisha Dao. It also made available the equipment and expendables used at the committed upper-air stations for intensified observations. A comparison between the newly developed radar prototype and the radar in use at Shantou was made during the typhoon season.

18. In Hong Kong, a new radar system with CAPPI and DVIP display units was installed in July to replace the existing Plessey 10-cm radar system. It is expected that routine operation should begin by the latter part of 1983.

19. In Japan, the weather radar systems at Kushiro and Akita were renewed in March 1983. The one at Naze will be renewed by March 1984. Radar echo processing/transmitting equipment with automatic elimination of ground clutter was added to the radar system at Niigata in March 1983 and will be added to the Mt. Fuji radar system by the autumn of 1983. Similar equipment was provided to the radar systems at Nagoya and Fukui in 1982. The composite echo charts for the areas covered by these radar systems are being produced for dissemination over the national facsimile network. The composite charts of radar rain data were calibrated by AMEDAS data.

20. The Philippines has installed a new 10-cm, WSR-77 model radar system at Baler, Quezon Province, on the island of Luzon. This set is provided with DVIP and colour display units. A similar radar system is expected to be operational by the end of 1983 in Busuanga, Palawan Province. Hydrogen generators acquired under USAID assistance were installed at Laoag (98223), Mactan (98646) and Zamboanga (98836).

21. In Thailand, following the installation of new upper-air sounding ground receiving equipment (403 MHz, OMEGA systems, Buekers, United States) in 1983 at Bangna station, Bangkok, the installation of similar sets at Chiang Mai and Songkhla is in progress. These were expected to be operational by the end of 1983.

22. With a view to effective participation in the TOPEX special observations the radar systems in the Republic of Korea and Thailand were inspected and calibrated by the Telecommunications and Electronics Expert of the Committee secretariat.

C. Meteorological telecommunications

23. A test exercise on data exchange between the International Experiment Center (IEC) (Tokyo) and the national experiment sub-centres conducted on 13 May 1983 was successful. As in the First Operational Experiment, the object of the test was to check the efficiency of transmissions on existing GTS links between IEC and the national experiment sub-centres and to ensure prompt and reliable data exchange.

24. In Hong Kong, the computer system was enhanced in February 1983. A twin Eclipse S130/S140 computer with 1.5 megabyte CPU, 400 megabyte DISC, 16 terminals graphic VMS and plotters was installed.

25. In compliance with the request of the members of the Typhoon Committee for the improvement of data exchange between the radio telecommunication hub (RTH), Tokyo, and national meteorological centres of members, the Japan Meteorological Agency has planned to upgrade the following circuits:

Tokyo-Hong Kong, Tokyo-Seoul with 200 bps by January 1984;

Tokyo-Beijing with 9600 bps by January 1985;

Tokyo-Bangkok, Tokyo-Manila with 200 bps by April 1985.

26. In Malaysia, a new computer system (Perkin Elmer 3230) was installed in May 1983 at the Malaysian Meteorological Service. It includes two processors each of capacity 1 megabyte, and 6 disk drives of 80 megabytes each, to implement message-switching of GTS data.

27. In Thailand, 15 sets of SSB transceivers were purchased in 1983 with a view to improving night-time data collection. A request was made by the concerned authority for allocation of proper frequency bands to be used in night-time communications. The Meteorological Department expressed the view that external assistance to Thailand would be welcomed in carrying out the survey of telecommunication facilities and in drawing up improvement plans.

28. In the Republic of Korea, four sets of automatic send/receive teletype with 8K memory, acquired through WMO under the UNDP regional typhoon project, were installed in April 1983. These teletypes have been used effectively to improve national data collection and transmission in the country.

29. Following the first and second mission for the survey of the meteorological telecommunication systems in the Philippines, a preliminary study was completed with the assistance of the Japanese Government. A feasibility study, including radio wave propagation tests, is to be conducted during the latter part of 1983.

30. The Committee secretariat continued to receive quarterly statistics of national data collection and transmission from Committee members in order to review the efficiency of operation. The statistics were analysed and the summarized results were circulated to members.

D. Ocean weather ships and buoys

31. The Japanese ocean weather ship Keifu-Maru (20°N, 130°E during August and September 1983 and in the vicinity of Torishima Island in October 1983) made three-hourly surface observations at 00 and 12 GMT, echorawin or rawin observations at 06 and 18 GMT, radar observations at 00 and 06 GMT, and BT observations once daily. Keifu-Maru also participated in the intensified upper-air observations during the TOPEX TTE periods. Japan continued to operate ocean buoys Nos. 3, 4, 6, 7, and 8 at their usual locations.

E. Exchange of radar fixes

32. Regular and prompt exchange of radar fix messages through GTS were undertaken by members. In response to the decision of the Committee at its fifteenth session, these radar fix messages were included in RTH radio broadcasts for the benefit of those members which had not yet established point-to-point GTS circuits.

F. Meteorological reconnaissance flights

33. Reconnaissance flights by United States aircraft continued to provide valuable information for typhoon warning and tracking purposes. At its fifteenth session, the Committee welcomed the information that the United States was likely to continue its programme of typhoon reconnaissance in the years ahead.

G. Action proposed

34. The Committee is invited to:

- (a) Revise its list of priorities;
- (b) Recommend further measures to expedite implementation of the required meteorological observing and telecommunication facilities;
- (c) Record its appreciation to Japan for maintaining GMS operations;
- (d) Record its gratitude to the United States for providing aircraft reconnaissance information.

/III.

III. HYDROLOGICAL COMPONENT

A. General activities

35. Continued efforts were made to improve the flood forecasting and warning systems in the major river basins in the Philippines, China, Malaysia, Thailand and the Republic of Korea. Based on the programme for 1983 agreed upon at the fifteenth session of the Typhoon Committee, the following activities were undertaken by members.

B. National activities

China

36. Further improvement of the semi-automatic telecommunication system, which was completed in the Puyang Jiang River basin in 1982, has been planned. In the Xishi Jiang River basin, improvement of the telecommunication facilities of the flood forecasting system is underway. It includes the installation of additional telemetering stations and a telecommunication line connected to the hydrological centre as well as a computer system in Guangzhou. Establishment of an experimental flood forecasting system is under preparation in the Yihe River basin.

Hong Kong

37. A flood warning system covering both urban and rural areas was introduced in 1983. A rainfall data collection system consisting of about 40 automatic telemetering raingauges provides input data for the operation of the warning system. The network will be extended to a total of 60 raingauges by the end of 1983.

Japan

38. Five radar raingauges established before and during 1982 were operated satisfactorily during 1983. Two additional systems in the southern part of Japan are expected to be established in 1983.

Malaysia

39. Pre-construction steps were undertaken to establish flood forecasting systems in Sabah and Sarawak, in accordance with the technical feasibility studies carried out with the assistance of the Japanese Government in 1979 and 1980. The systems are expected to be completed in 1984.

40. The Drainage and Irrigation Department has started the study of flood risk mapping in the Klang River basin to promote comprehensive flood loss prevention and management.

Philippines

41. The flood forecasting systems in the Agno, Bicol and Cagayan River basins, which were established before the 1982 rainy season, were fully operational during

- 8 -

the 1983 rainy season. The flood forecasting system in the Pampanga River basin was also put into operation. The system was established in 1973 as a pilot project of the Typhoon Committee and rehabilitated in 1982 with the assistance of the Japanese Government. To further improve the system, PAGASA has begun a detailed survey for establishing two additional raingauge stations and a water-level gauge station. Government agencies have been conducting detailed design surveys for establishing flood forecasting and warning systems for a five-dam operations project in Luzon Island to reduce the damage caused by water released from dams. These systems are expected to be completed in 1985.

Republic of Korea

42. The flood forecasting system in the Han River basin operated well during the 1983 typhoon season. The Chungju multipurpose dam is under construction and is expected to be completed in 1985. With a view to more accurate flood forecasting in the Han River basin, additional rainfall and water-level gauging stations are being installed. Furthermore, the existing flood forecasting method has been reviewed and more suitable flood forecasting systems for the Han River basin are expected to be set up, awaiting the completion of the multipurpose dam. A Japanese hydrologist was sent to the Han River Flood Control Office for the improvement of the system in August 1983 for one year.

43. In the Anyang River basin, a survey for comprehensive flood loss prevention and management, including existing data and data observed in the past two years, is in the final stage.

C. Flood loss prevention and management

44. As a part of a system of comprehensive flood loss prevention and management, Japan has been promoting a comprehensive mudflow countermeasure which consists of the promotion of sabo-works, identification of mudflow risk areas and publication of the results for public use, establishment of a warning and evacuation system, promotion of the removal of residences in mudflow risk areas, and collection and dissemination of information on mudflow.

D. Action proposed

45. The Typhoon Committee is invited to:

- (a) Take note of the above information;
- (b) Express its views on the activities carried out by members under this component;
- (c) Recommend any action required to accelerate and/or improve implementation of activities under this component.

IV. DISASTER PREVENTION AND PREPAREDNESS COMPONENT

A. General activities

46. To further improve gathering of disaster statistics, members, in co-operation with ESCAP, UNDRO and LRCS, adopted a standard format for damage assessment.
47. Case studies formed an important activity under the warning dissemination and information exchange component of TOPEX. Public education and training also received increased attention by members. Pamphlets containing information on typhoons, flooding and measures for community preparedness were published.

B. National activities

China

48. Activities were carried out mainly on the improvement of the capability of the communication network by setting up radio links, providing audio-visual facilities for public education and information and developing training for trainers.
49. Weather forecasting offices along the coastal areas were requested to implement the system for rendering typhoon forecasting services and reporting timely disaster information.

Hong Kong

50. A thorough review of the Natural Disaster Emergency Organization has been made. Warning systems covering tropical cyclones, storm surges, flooding and landslips due to heavy or prolonged rainfall etc. have been streamlined. Dissemination lists were updated for all warnings, advice and precautionary announcements originated at the Royal Observatory. In addition, the Information Service Department ensured that all public notifications regarding the operations and decisions of government departments and other organizations in respect to closure of schools, suspension of public transport services etc. were promptly disseminated for broadcast. The public has been kept informed by broadcast of the extent of disasters and of the arrangements made to ensure safety and provisions for relief. Improvements were also introduced in the collection of operational data, e.g., real-time wind, rainfall and tides. The Royal Observatory also carried out a programme of press, radio and TV interviews to publicize the various warning services.

Japan

51. In support of TOPEX the seminar on hydrology and warning dissemination and information exchange was held at Tokyo with the assistance of the Japan International Co-operation Agency. This seminar was concentrated on ways and means of improving member's systems for typhoon disaster mitigation.

Malaysia

52. A case study was carried out on the heavy monsoon rainfall of 13 to 16 December 1982 which caused flooding over the Kelantan River basin. Approximately 4,900 people were evacuated to higher grounds following provision of advance warnings, but several lives were still lost.

53. The Ministry of Welfare Services was given the responsibility for identifying and establishing evacuation centers, managing such centers during disaster periods and providing rehabilitation facilities needed for the victims. A total of 2,234 evacuation centres, capable of giving care and protection to 604,000 people, were identified for the whole country. Welfare and other officials, as well as volunteers, were also chosen to manage the evacuation centres in times of disasters. Members of 102 "forward supply bases", whose tasks were to stock food and other necessities, were also identified in isolated areas where breakdowns in transportation and communication systems were likely to occur. The services of the Malaysian Air Force were also recruited for short-notice airlifting of supplies to disaster affected areas.

Philippines

54. Illustration pamphlets on the precautionary measures to be taken in the event of typhoons, floods and landslips were published and distributed in typhoon-prone areas, river basins, coastal areas and areas on mountain slopes.

55. Exercises were carried out to test the dependability and reliability of the warning systems, e.g., the siren system used in the downstream area of the Angat Dam in Bulacan (Central Luzon). Evacuation drills were also conducted, and the damage assessment scheme based on the manual published by the Office of Civil Defense in 1982, "How to Assess Damage Impact," was tested. A committee was formed to handle matters relative to conducting the survey on the efficiency and effectivity of warning dissemination, especially to disaster-prone areas.

Thailand

56. The Meteorological Department and the Local Administration Department implemented a plan for better interaction between local governments and the general public which the focal points of the three components of TOPEX had

worked out during the experiment period. The Department planned to establish a civil defense school to train volunteers and to undertake case studies.

57. A case study on historic floods and losses was conducted. Pamphlets for community education and awareness of natural hazards were published and circulated. Standardization on the assessment of damage caused by tropical cyclones since 1981 was undertaken using the recommended format adopted at the Third Planning Meeting.

58. All emergency communication networks, disaster prevention wireless systems and warning dissemination systems were activated in support of the second operational experiment.

C. Action proposed

59. The Committee is invited to:

(a) Take note of the above information;

(b) Consider further the action necessary to ensure effective work in the field of disaster prevention and preparedness with reference to recommendations made by consultants and roving missions in the past and the medium- to long-term plan of the Committee (1984-1992).

V. TRAINING COMPONENT

A. General activities

60. Members participated in the regional training seminar on flood forecasting organized within the framework of the Typhoon Committee and held at the Asian Institute of Technology (AIT), Bangkok, from 21 to 25 February 1983. A seminar on the principles of flood plain management for flood loss prevention has been organized by ESCAP and will be held at Bangkok from 18 to 22 October 1983. Some members are also taking part in a two-year course in basic electronic instrument maintenance which began in September 1983 at the British Meteorological Office College, Shinfield Park, Reading, United Kingdom.

61. In support of TOPEX, Japan conducted a seminar on the hydrology and warning dissemination and information exchange components at Tokyo from 1 July to 6 August 1983. This seminar was attended by representatives of the focal points of TOPEX.

62. Group training courses on the following subjects were also held in Japan for the benefit of members of the Committee:

- (a) River engineering (July to November);
- (b) Flood loss prevention and management (July to September);
- (c) Technology for disaster prevention (September to December);
- (d) Meteorology (October to January 1984).

63. On-the-job training on radar maintenance and calibration was provided to Malaysia, Thailand and the Republic of Korea by a Committee secretariat expert.

64. Short-term training on the application of satellite pictures for typhoon and heavy precipitation forecasting was also provided to Malaysia and the Republic of Korea by Committee secretariat experts.

B. National activities

China

65. A national-level meeting which included training for TOPEX was held at Shanghai in May 1983. Topics of discussion included the results of the First Operational Experiment and arrangements for the second operational experiment.

Hong Kong

66. The Royal Observatory conducted for the first time an in-house course on meteorology of South-East Asia for a number of forecasters from April to June 1983. Particular emphasis was placed on regional forecasting and tropical cyclone forecasting.

Malaysia

67. An engineer from the Drainage and Irrigation Department attended a training course in hydrological forecasting held at the University of California, Davis, United States, from 5 July to 23 September 1983.

Philippines

68. Ten-day regional training seminar-workshops on disaster preparedness were held for field meteorological personnel in Mindanao, Northern Luzon, Southern Luzon and the Visayas in December 1982, May, June and July 1983, respectively.

Thailand

69. Seven personnel members underwent training at AIT in remote sensing from January to April, May to August and September to December 1983.

/70.

70. Participants also attended the hydrological operational multipurpose subprogramme (HOMS) workshop on application of micro-computers to primary forecasting of hydrological data held at AIT from 4 to 16 July 1983.

71. A participant was sent to the sixth FAO/UNDRO/WMO/SEA training course on satellite applications to flood control and forecasting held in Italy from 7 to 18 November 1983.

72. Participants took part in a seminar on automated message switching systems held at Hong Kong from 23 to 29 November 1983 for regional and national meteorological centres in South-East Asia.

C. Action proposed

73. The Committee is invited to:

- (a) Take note of the above information;
- (b) Record its gratitude for the assistance provided by the Government of Japan in organizing seminars and training courses for members of the Committee;
- (c) Advise members to take full advantage of the various training facilities offered by members, UNDP and through the WMO Voluntary Contribution Programme (VCP).

VI. RESEARCH COMPONENT

A. General activities

74. At its fifteenth session the Committee agreed to expand research activities to include not only the meteorological component but also the hydrological and the disaster prevention and preparedness components. Attention was drawn to the system whereby members had in the past designated research correspondents whose responsibility was to collect and exchange information on research activities and to participate jointly in selected projects. The members stressed that it would be beneficial to reintroduce that system and requested the Committee secretariat to initiate action. Accordingly, some members have re-designated their research correspondent(s) to undertake action.

B. National activities

China

75. Three proposed studies entitled, "Diagnostic analysis of abnormal typhoon tracks", "Generation and development of off-shore typhoon and its intensity"

and "Development of a NWP model for typhoon tracks", were submitted to the sub-committee for the TOPEX sub-experiment. These studies are now underway. A national-level workshop for TOPEX was planned after the second operational experiment ends in 1983, at which time the results of these research work will be presented. Eleven typhoon objective forecasting methods were put into operation and evaluation was undertaken to select the best to be used in typhoon forecasting operations.

Hong Kong

76. An objective method to forecast tropical cyclone movement based on a combination of statistics and synoptic patterns was developed using upper-air and tropical cyclone data of 1973-1980. It was to be tested using data of 1981-1983. Work was also in progress to find an alternative way of combining persistence and climatology in tropical cyclone movement forecasts.

77. Simulated tropical cyclone movement forecasts using several common objective methods were carried out in which random errors with known statistics properties were added to initial best-track positions. The results were used to evaluate the extent to which initial position errors contributed to forecast position errors.

78. A critical review of climatological data on tropical cyclones before the 1940s was carried out. A summary of tropical cyclones making landfall was also prepared. The life spans of various categories of tropical cyclones were examined.

Japan

79. Research activities were centred mainly on the sub-experiment of the meteorological component of TOPEX, especially those activities endorsed at the Third Planning Meeting.

80. The HITAC 8800 computer at the Japan Meteorological Agency for NWP was replaced by a HITAC M-200H which became operational in March 1982. Performances of the old and the new computers were compared. Details in the changes in the NWP models associated with this renewal of computer will be given in the publications entitled "Outline of operational NWP at Japan Meteorological Agency, August 1983" for distribution from WMO soon.

Malaysia

81. National efforts for the sub-experiment of TOPEX have been initiated using data from the First Operational Experiment. Research activity is focussed

on the development of convective systems and the large-scale influence of typhoons over equatorial South-East Asia. A preliminary study on this subject has already been completed and the paper will be distributed to members in due time.

Philippines

82. Continued efforts have been made in relation to disaster prevention and preparedness research on the social behaviour of communities during disasters and also on the translation of technical terms of tropical cyclone warning terminologies into terms understandable by laymen.

83. Under the meteorological component continued efforts were made on the sub-experiment of TOPEX, especially those activities involving typhoon forecasting methods.

Republic of Korea

84. Research has been planned on typhoon climatology and forecasting typhoon movement and intensity change using objective methods with dynamic techniques and using non-divergent barotropic models with empirical techniques from the results of J.E. George and W.M. Gray.

Thailand

85. Studies have been executed under the hydrological component on short-term forecasting using the stage-correlation model and SARP Model from the existing hydrological network of the Pasak River basin, and on long-term forecasting using seasonal stream flow forecasting.

86. Continued efforts were made on disaster prevention and preparedness research involving case studies on warning dissemination and information exchange.

C. Action proposed

87. The Committee is invited to:

(a) Take note of the above information;

(b) Consider further action necessary to ensure effective collaboration in typhoon and associated flood research and to exchange the results among members.

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ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND

WORLD METEOROLOGICAL ORGANIZATION

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

TYPHOON OPERATIONAL EXPERIMENT

REPORT ON THE SIXTH AND SEVENTH SESSIONS
OF THE MANAGEMENT BOARD

(Item 5 (b) of the provisional agenda)

Note by the WMO secretariat

Introduction

1. The terms of reference assigned by the Typhoon Committee to the Management Board for TOPEX require it to report on progress to the Committee's annual session. Since the fifteenth session the Board has met twice, holding its sixth session in Bangkok from 16 to 18 November 1982 and its seventh session in Tokyo on 22-23 February 1983. At the time of the sixth session the First Operational Experiment (FOE) had recently been concluded. As might be expected, the Board was able to review the FOE and to consider the arrangements for the Second Operational Experiment (SOE). This process was continued at the seventh session of the Board, giving particular attention to the findings of the Third Planning Meeting (see document WRD/TC.16/2). This document contains a brief review of the main decisions taken by the Board at the above two sessions.

Decisions of the Board at its sixth session

2. MB-VI was held immediately following the fifteenth session of the Typhoon Committee. It was able to give detailed attention to the outcome of the FOE on the basis of the report of the Director of the International Experiment Center (IEC) and the individual reports submitted by the Directors of the

/Experiment

Experiment Sub Centers (ESCs). There was general satisfaction with the way in which the FOE had taken place without any serious problems. The programmes of intensified observations, telecommunication arrangements and procedures laid down in the TOPEX Operational Manual (TOM) had all contributed to a highly successful phase of TOPEX.

3. The Board felt, however, that further improvements were necessary before the SOE to ensure that it would constitute a genuine advance over the FOE both in organization and results. The IEC/ESC recommendations were therefore discussed with this aim in mind.

4. Amongst the main decisions were those fixing the dates of the SOE (1 August - 15 October), the selection of four typhoons and that the Typhoon Tracking Experiment (TTE) periods should again be of five days duration. One major change was the decision to make upper-air observations four times daily during one full TTE period at a network of strategic stations regardless of their distance from the centre of the typhoon. Other questions dealt with by the Board under the Meteorological Component concerned data archiving, revision of the TOM, weekend duty at the IEC and the need for the development of an operational model for predicting typhoon movement and development.

5. Discussion under the Hydrological and Warning Dissemination/Information Exchange Components centred on flood events and flood forecasting operations during the 1982 typhoon season and on proposed guidelines to be used for evaluation of these two components. ESCAP and WMO were requested to give further consideration to making the guidelines for the Hydrological Component more specific whilst those for the WD/IE component were adopted without change.

6. The need for support for further TOPEX activities received careful attention by the Board. It considered that new efforts were required to tap all available sources of support and a list of priority items for TOPEX was drawn up.

Decisions of the Board at its seventh session

7. MB-VII took place immediately after the Third Planning Meeting (PM-III). Mr. I. Shimizu (Japan) and Mr. Fang Qi (China) were re-elected as chairman and vice-chairman respectively until the first meeting in 1984, in accordance with the Board's Rules of Procedure.

8. The first task of the Board was to consider the results of PM-III. It noted that no specific questions had been referred to it. Attention was however drawn to the decision of PM-III that special measures were necessary to ensure that the scientists attending the IEC for the first time in 1983 were adequately trained in TOPEX questions. The Board proposed the convening of discussion groups in which Directors of ESCs, focal points and scientists previously at the IEC would take part. A list of introductory reading material would be drawn up by the WMO Secretariat and circulated to all concerned.

9. The Board considered and approved for publication in the TOPEX series a text prepared by the Co-ordinator of the Meteorological Component (Dr. T. Nitta) giving a preliminary evaluation of the First Operational Experiment.

10. Finally the Board took up the question of its own future activities. To conform to its Terms of Reference it would need to remain in being at least until the end of the March 1984 Evaluation Meeting. It was, however, emphatic that it should not continue indefinitely and decided that its ninth session should be its last. The timing of that session in relation to the Evaluation Meeting and to the seventeenth session of the Typhoon Committee later in 1984 should be determined by the Board itself.

Action proposed

11. The Committee is invited to:

- (a) Endorse the reports of the Management Board for TOPEX on its sixth and seventh sessions;
- (b) Make proposals for any questions to which the Evaluation Meeting should give special attention;
- (c) Advise the Board on any views it may have upon the dates of the Board's ninth and final session.

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

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo

MEDIUM- TO LONG-TERM PLAN OF THE COMMITTEE

(Item 6 of the provisional agenda)

Note by the WMO secretariat

Introduction

1. At its fifteenth session the Committee established a Working Group on Programme Planning to prepare a draft medium- to long-term plan for the Committee's activities over the period 1984-1992. After initiating its work by correspondence the Group held a meeting in the Philippines from 20 to 27 June 1983. The report of the meeting, including the resulting draft of the plan, forms the annex to this document.

Action proposed

2. The Committee is invited to:
- (a) examine the draft medium- to long-term plan contained in the annex to this document and decide on the modifications, if any, required;
 - (b) instruct the Working Group on Programme Planning on the further work it should carry out in redrawing the plan;
 - (c) decide upon a suitable mechanism for the periodic updating or revision of the plan.

REPORT OF THE TYPHOON COMMITTEE
WORKING GROUP ON PROGRAMME PLANNING

I. OPENING OF THE SESSION

1. The Session of the Typhoon Committee Working Group on Programme Planning opened at PAGASA Headquarters, Quezon City, Metro Manila, Philippines on 20 June 1983. Dr. Roman L. Kintanar, Director-General of PAGASA welcomed the participants and the representatives of WMO and ESCAP made brief statements. The attendance at the session is shown in Appendix A.

II. ELECTION OF THE CHAIRMAN

2. Dr. Roman L. Kintanar was unanimously elected chairman of the session and Mr. I. Shimizu (Japan) vice chairman.

III. ADOPTION OF THE AGENDA

3. The meeting adopted the agenda as given in Appendix B and fixed its working hours.

IV. GUIDING PRINCIPLES FOR PREPARATION OF A MEDIUM-TO-LONG-TERM PLAN

4. To facilitate the preparation of its plan the Working Group first discussed the guiding principles to be used in its formulation. It decided that :
 - a) The plan should include broad programme activities contributing to the further implementation of the Typhoon Committee's objectives;
 - b) The activities in (a) could be developed in greater detail on a national basis by those members wishing to do so;
 - c) An indication of the probable duration of the individual work items should be given;
 - d) Whenever possible, at least for the medium-term plan (1984-1987), the probable resources for implementation should be stated; and
 - e) A mechanism for revising and updating the plan would be necessary, or at least a decision on how often revision should take place.

5. The group further decided to adopt the format proposed by WMO in drawing up its plan, noting that it would then be consistent with that used for the 10-year WMO Long-Term Plan.

V. PREPARATION OF THE DRAFT PLAN

6. The terms of reference given to the Working Group (see Appendix C) required it to review past and current programmes, including TOPEX, and also to consult all members of the Typhoon Committee to obtain their views for inclusion in the future programme. The material available to the Group consisted of proposals received from seven members of the Committee, together with material contributed by ESCAP, WMO, UNDRO and LRCS.
7. In view of the varied expertise available to the Working Group in the three main programme areas - meteorology, hydrology and disaster prevention and preparedness - the Group decided to split into sub-groups one dealing with meteorology and the other with hydrology and disaster prevention and preparedness. Each of the Sub-groups also compiled appropriate material on training and research for inclusion in those components of the Committee's programme. The plan constructed in this way was then examined and amended by the full Working Group. The agreed form of the draft plan is given as Appendix D to this report.

VI. SUPPORT FOR FUTURE ACTIVITIES

8. The Working Group was of the view that the preparation of a medium-to long-term plan must essentially be combined with a search for adequate funding and other resources if such an exercise was to be meaningful. Whilst it could not go into details at its session it wished to draw the attention of the Typhoon Committee to some of the further action that would be necessary.
9. Firstly, it felt that the present arrangements for the hosting of the TCS in Manila were very satisfactory and should continue and be strengthened. With the ending of UNDP institutional support the

question of the cash contributions from members proposed by TC.15 would become increasingly urgent. The Group hoped that members would give favourable consideration to the letter recently distributed by the Secretary-General of WMO on that question.

10. The Working Group further noted the efforts being made to obtain funds from the private sector and that the Ninth World Meteorological Congress and the WMO Executive Council had endorsed those efforts. It wished to recommend that Typhoon Committee members should also endeavour to tap those sources and that they should consider giving additional support to the Committee's activities. In recognition of the wide range of experience and expertise available within the members of the Committee, the Working Group felt that there would have to be a considerable expansion of TCDC arrangements in the future to meet the needs of the new plan and urged members to find ways of providing that type of assistance.
11. It was also the view of the group that there should be a much greater awareness of the importance of the Committee's work as an effective means of promoting economic development. Advantage should therefore be taken of occasions such as the annual ESCAP Commission Session by briefing delegates beforehand so that they could request the assignment of ESCAP funding for some parts of the Committee's programme.
12. Under this item the functions and duties of the TCS were reviewed. It was considered that they still reflected very well the support required from TCS and that no substantial changes were called for. It was, however, proposed to add to item (e) the words ".... and associated instrumentation" and to add a new item (j) to read "to carry out such other tasks as the Typhoon Committee may direct from time to time". It was also noted that some minor editorial changes were necessary.

VII. FURTHER ACTIVITIES OF THE WORKING GROUP

13. The terms of reference of the Working Group on Programme Planning require it to revise the draft plan as necessary following its consideration by TC.16 and to prepare a final version. The Group did not see any need for it to carry out any other functions in the interim period. The method by which the revision of the draft should be carried out could best be considered when the magnitude of the task became clear.
14. Attention was drawn under agenda item 4 to the need for a mechanism for the periodic updating or revision of the plan. It was suggested that TC.16 should consider this question. One possibility would be to reconvene the Working Group during sessions of the Typhoon Committee at intervals of three or four years.

VIII. CLOSING OF THE SESSION

15. The session of the Typhoon Committee Working Group on Programme Planning was closed in Manila on 27 June 1983.

PARTICIPANTS IN THE WORKING GROUP MEETING
ON THE
MEDIUM- TO LONG-TERM PLAN
OF THE
TYPHOON COMMITTEE
20-27 June 1983

N A M E	A D D R E S S	MEMBER/ ORGANIZATION
JIANMIN <u>XU</u>	State Meteorological Administration No. 46 Bai Shi Chiao Road Beijing, China	C H I N A
<u>TSUI</u>	Royal Observatory Nathan Road, Kowloon Hong Kong	HONG KONG
LESURO <u>SHIMIZU</u>	Japan Meteorological Agency Chiyoda-Ku, Otemachi 1-3-4 100 Tokyo, Japan	J A P A N
TOMINOBU <u>KIRIKU</u>	Ministry of Construction Chiyoda-ku, Otemachi 1-3-1 100 Tokyo, Japan	J A P A N
CATALINO P. <u>ARAFILES</u>	Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) 1424 Quezon Avenue, Quezon City Philippines	PHILIPPINES
MANUEL C. <u>BONJOC</u>	- do -	- do -
VICTOR R. <u>PAGULAYAN, Jr.</u>	Office of Civil Defense Camp. Gen. E. Aguinaldo Quezon City, Philippines	- do -
EDUARDO X. <u>QUISIDO, Jr.</u>	Office of Civil Defense San Fernando, La Union Philippines	- do -
<u>ARCE</u>	Office of Civil Defense Camp Gen. E. Aguinaldo Quezon City, Philippines	- do -

N A M E	A D D R E S S	MEMBER/ ORGANIZATION
T. <u>OMACHI</u>	ESCAP United Nations Building Rajadamnern Avenue, Bangkok Thailand	E S C A P
TADATERU <u>KONOE</u>	League of Red Cross Societies (LRCS) P. O. Box 276 CH-1211, Geneva 19 S w i t z e r l a n d	L R C S
J. B. <u>MILLER</u>	World Meteorological Organization P. O. Box 5 CH-1211, Geneva 20 S w i t z e r l a n d	W M O
P. <u>ROGERS</u>	- do -	- do -
HIDETOMI <u>OI</u>	UNDRO Palais des Nations, Geneva S w i t z e r l a n d	U N D R O
ROMAN L. <u>KINTANAR</u>	ESCAP/WMO Typhoon Committee Secretariat P. A. G. A. S. A. 1424 Quezon Avenue, Quezon City Philippines	T C S
CRISOSTOMO C. <u>REYES</u>	- do -	- do -
C. H. <u>TANG</u>	- do -	- do -
CLARO S. <u>DOCTOR</u>	- do -	- do -
HIDEAKI <u>YOKOUCHI</u>	- do -	- do -
ESPERIDION G. <u>ARAGON</u>	Office of the Director-General P. A. G. A. S. A. 1424 Quezon Avenue, Quezon City Philippines	Conference Officer

- 8 -

APPENDIX B

A G E N D A

1. OPENING OF THE SESSION
2. ELECTION OF THE CHAIRMAN
3. ADOPTION OF THE AGENDA
4. GUIDING PRINCIPLES FOR PREPARATION OF A MEDIUM-
TO LONG-TERM PLAN
5. PREPARATION OF THE DRAFT PLAN
 - 5.1 Meteorology
 - 5.2 Hydrology
 - 5.3 Disaster Prevention and Preparedness
 - 5.4 Training
 - 5.5 Research
6. SUPPORT FOR FUTURE ACTIVITIES
7. FURTHER ACTIVITIES OF THE WORKING GROUP
8. CLOSING OF THE SESSION

- 9 -

APPENDIX C

WORKING GROUP ON PROGRAMME PLANNING

Terms of reference:

- 1) To review past and current programmes including TOPEX and prepare a medium- to long-term plan (1984 - 1992) covering the Committee's activities in all five components of its programme;
- 2) In carrying out 1) above the WG should:
 - a) consult all members of the Committee and obtain their views on items for inclusion in the future programme;
 - b) prepare a draft programme for consideration by TC.16;
 - c) following consideration by TC.16, revise the draft programme as necessary and prepare a final version for execution by the Committee.

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

METEOROLOGICAL COMPONENT	Medium-Term						Long-Term				I M P L E M E N T A T I O N	REMARKS	
	84	85	86	87	88	89	Long-Term						
							90	91	92				
III. <u>FULL IMPLEMENTATION OF THE WWW GLOBAL TELECOMMUNICATIONS SYSTEM</u>													
(i) Improvement of the operation of the facilities necessary for the rapid and reliable collection and distribution of the required observational and processed information;	-	-	-	-	-	-	-	-	-	-	-	-	Mainly national resources but for certain portions with external support to the extent available and necessary.
(ii) Enhancement of TC members facilities for reception/dissemination of meteorological information;	-	-	-	-	-	-	-	-	-	-	-	-	Automation and upgrading of GTS centres to accomodate higher speed data transmission through transfer of technology by TC members and with external support to the extent available and necessary.
(iii) Improvement of national data collection and retransmission to associated RTH													Mainly national resources but with external support to the extent available and necessary
(iv) Improvement of data completeness and quality, including real-time and non-real time monitoring	-	-	-	-	-	-	-	-	-	-	-	-	National
IV. <u>ADDITIONAL TELECOMMUNICATION REQUIREMENTS SPECIFICALLY FOR TROPICAL CYCLONE FORECASTING AND WARNING</u>													
(i) Special national data collection and dissemination system	-	-	-	-	-	-	-	-	-	-	-	-	Mainly national but with external support to the extent available and necessary.

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

METEOROLOGICAL COMPONENT	Medium-Term						Long-Term					I M P L E M E N T A T I O N	REMARKS
	84	85	86	87	88	89	90	91	92				
V. <u>FULL IMPLEMENTATION OF THE WWW GLOBAL DATA-PROCESSING SYSTEM</u>													
(i) Improved operation of those centres with responsibilities for the provision of processed information needed by TC members for their forecasting and warning systems.													Mainly national resources but for certain portions with external support to the extent available and necessary.
VI. <u>ADDITIONAL REQUIREMENTS SPECIFICALLY FOR TROPICAL CYCLONE FORECASTING AND WARNING</u>													
(i) Installation of a computer processing system with a view to integrating satellite, radar and rainfall data so as to provide a spatial distribution of rainfall amount over a large region;													Mainly through national or TCDC efforts. Technical consultancy and assistance from external sources would be required.
(ii) Co-operation in typhoon monitoring, forecasting and warning;													Guidelines to be formulated by the Typhoon Committee through the TOPEX Evaluation Meeting.
(iii) Exchange of forecasts, including products of different objective methods;													

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

METEOROLOGICAL COMPONENT	Medium-Term						Long-Term				I M P L E M E N T A T I O N	REMARKS
	84	85	86	87	88	89	90	91	92			
(iv) Planning of TOPEX - II											Typhoon Committee members.	
(v) Execution of TOPEX - II												

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

HYDROLOGICAL COMPONENT	Medium-Term						Long-Term				I M P L E M E N T A T I O N	REMARKS	
	84	85	86	87	88	89	90	91	92				
I. FLOOD FORECASTING AND WARNING													
(i) Establishment and operation of new flood forecasting and warning system.	-	-	-	-	-	-	-	-	-	-	→	By members at national level with bilateral or multi-lateral support if available (e.g. UNDP). Technical cooperation between Committee members will also be used (TCDC).	Includes real-time data collection and hydro-logical modelling.
(ii) Improvement of existing flood forecasting and warning systems, making use, where appropriate, of the results of TOPEX.	-	-	-	-	-	-	-	-	-	-	→	- ditto -	Faulty dam operation can aggravate flooding downstream.
(iii) Establishment and operation of flood forecasting and warning systems for dam operations.	-	-	-	-	-	-	-	-	-	-	→	- ditto -	T h i s includes interaction of river floods and storm surges.
(iv) Establishment and operation of flood forecasting and warning systems for inundation from storm surges.											→	- ditto -	
(v) Missions of experts to provide technical guidance on items (i) to (iv) above.											→	At the request of members, with bilateral and multi-lateral support (e.g. UNDP).	
(vi) Exchange of technical visits among flood forecasters.											→	At the request of members, coordinated by WMO.	

TYPHOON COMMITTEE: MEDIUM- TO LONG-TERM PLAN (1984-1992)

HYDROLOGICAL COMPONENT	Medium-Term						Long-Term				I M P L E M E N T A T I O N	REMARKS
	84	85	86	87	88	89	90	91	92			
(vii) Symposium on results of the hydrological component of TOPEX.	→										To be convened by WMO in late 1984.	
(viii) Development of guidance on hydrological technology, including hydrological models, for tropical cyclone regions.			→								By WMO, in consultation with members, on basis of OHP (HOMS). With UNDP support if available.	

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

HYDROLOGICAL COMPONENT	Medium-Term						Long-Term						I M P L E M E N T A T I O N	REMARKS	
	84	85	86	87	88	89	90	91	92						
II. COMPREHENSIVE FLOOD LOSS PREVENTION AND MANAGEMENT														By members at national level with bi-lateral or multi-lateral support if available.	Detailed programme will be established by respective members.
1) Establishment of pilot area for comprehensive flood loss prevention and management by each member ;															
(i) Selection of pilot area															
(ii) Investigation and survey including:															
a) Determination of flood prone areas subject to heavy damage;															
b) Determination of magnitudes and corresponding frequency of floods in each flood-prone area;															
c) Assessment of potential flood damage in each area for various flood magnitudes;															
d) Preparation of flood risk maps.															
(iii) Preparation of comprehensive plans.															
(iv) Implementation of selected aspects of comprehensive plans,															

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

HYDROLOGICAL COMPONENT	Medium-Term		Long-Term				I M P L E M E N T A T I O N	REMARKS
	84	85 86 87	88	89	90	91 92		
2) Missions of experts to provide technical guidance to members on item (1).								At request of members, with bi-lateral or multi-lateral support, if available.
3) Flood risk analysis and mapping in demonstration area(s).								As a joint project of TC, select one or two demonstration areas for implementation.
(i) Preliminary survey and formulation of detailed implementation programme (including an expert group meeting).								At request of TC, with multi-lateral support (ESCAP/XB).
(ii) Collection of data and information and land survey.								Through national effort of hosting member (s) of project and on request, with multi-lateral and bi-lateral support, including ESCAP/XB.
(iii) Flood risk analysis and mapping								- ditto -
(iv) Preparation of guidelines and manuals.								- ditto -
(v) Workshop on flood risk analysis and mapping.								- ditto -
(vi) Extension to other areas.								By members, at national level, with bi-lateral or multi-lateral support, if available.

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

DISASTER PREVENTION AND PREPAREDNESS COMPONENT	Medium-Term		Long-Term					I M P L E M E N T A T I O N	REMARKS	
	84	85	86	87	88	Long-Term				
						89	90			91
I. PUBLIC AWARENESS										Work under the WMO TC Projects 12 and 14 is also relevant
(i) Improvement of public awareness, coupled with studies of human response of warnings.	-	-	-	-	-	-	-	-	-	
(ii) Production of materials related to public information and education.	-	-	-	-	-	-	-	-	-	
II. DISASTER MANAGEMENT										
(i) Establishment/updates of prevention and preparedness plans at different levels.	-	-	-	-	-	-	-	-	-	
(ii) Strengthening coordination and cooperation between departments/agencies.	-	-	-	-	-	-	-	-	-	National
(iii) Improvement of communication systems for warning dissemination and relief operations.	-	-	-	-	-	-	-	-	-	National with bi-lateral or multi-lateral support if available.
(iv) Improved damage assessment and reporting.	-	-	-	-	-	-	-	-	-	National with multilateral support if available and advice from ESCAP roving mission.
(v) Development and exchange of information and guidance materials on structural and non-structural measures for mitigating disasters.	-	-	-	-	-	-	-	-	-	With guidance from international agencies such as UNDRO, LRCS, ESCAP and WMO.

Work under the WMO TC Projects 12 and 14 is also relevant

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

DISASTER PREVENTION AND PREPAREDNESS COMPONENT	Medium-Term					Long-Term					I M P L E M E N T A T I O N	REMARKS
	84	85	86	87	88	89	90	91	92			
(vi) Case studies of response to major disasters.	-	-	-	-	-	-	-	-	-	-	By members, with advice from UNDRG/LRCS/ESCAP/WMO.	
(vii) Joint missions to evaluate DPP procedures and to provide advice on local problems.	-	-	-	-	-	-	-	-	-	-	At request of members with bilateral or multilateral support if available.	
(viii) Establishment of disaster research and training institutes.	-	-	-	-	-	-	-	-	-	-	National with bilateral or multilateral support if available.	
III. REGIONAL CO-OPERATION												
(i) Study of enhanced co-operation among members.											Study to be carried out by TCS in consultation with TC members and UNDRG/LRCS.	

TYPHOON COMMITTEE: MEDIUM- TO LONG-TERM PLAN (1984-1992)

TRAINING COMPONENT	Medium-Term						Long-Term					I M P L E M E N T A T I O N	REMARKS
	84	85	86	87	88	89	90	91	92				
I. <u>METEOROLOGY</u>													
(i) Engineering applications of tropical cyclone climatological data;				↑									Conferences, seminars and overseas training programmes through external support, including roving missions and TCDC arrangements.
(ii) Applications of radar and satellite data in tropical cyclone tracking, forecasting and very short-range precipitation forecasts;			↑										
(iii) Calibration, maintenance and repair of electronic meteorological instrumentation;													
(iv) Software for integrating satellite/radar/rainfall data;				↑									TCS to provide on-the-job training by its electronic experts.
(v) Quantitative Precipitation Forecast (QPF) models;				↑									Short-term fellowships with external support
(vi) Tropical cyclone forecasting;													
(vii) Meteorology													At the request of the TC annual seminars of about one month and roving missions (1985 and 1987) could be provided by the Japan International Cooperation Agency. Continuation of group training courses of about 4 months provided by the Japan International Co-operation Agency.

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

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- 27 -

TYPHOON COMMITTEE : MEDIUM- TO LONG-TERM PLAN (1984-1992)

[illegible]

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

Typhoon Committee
Sixteenth session
6-12 December 1983
Tokyo, Japan

SUPPORT REQUIRED FOR THE COMMITTEE'S PROGRAMME

(Item 7 of the provisional agenda)

Note by the ESCAP and WMO secretariats

Introduction

1. At its annual sessions the main tasks of the Typhoon Committee are to decide upon the activities it wishes to pursue in the short or longer term and to determine how the resources needed for these activities should be found.
2. The major source of support for its programme has always been and will continue to be the contributions made by Committee members. These contributions are made principally through the facilities and services provided by the national meteorological, hydrological or other agencies with responsibilities within the tropical cyclone warning system. Despite the magnitude of these contributions the Committee has, since its inception, sought external aid to enable it to carry out common programmes to improve the warning system. UNDP has been a major contributor and very substantial assistance has been obtained from developed countries, either bilaterally or through ESCAP and the WMO Voluntary Co-operation Programme (VCP). TCDC arrangements between members of the Committee are beginning to play an important role.
3. At its sixteenth session the Committee will need to take into account a number of new factors influencing the future availability of resources. These include the further reduction in UNDP funding likely from 1985 onwards, the outcome of current efforts to secure support from the private sector, and

the response of members to the Committee's proposal that they should make cash contributions. The additional requirements arising from the new medium- to long-term plan for the years 1984 to 1992 must also be considered.

4. As in the past the information in this document is presented in two parts, first for the manning of the Typhoon Committee secretariat (TCS), and then for programme activities.

1. Typhoon Committee secretariat

5. The present staffing of TCS consists of:

- (a) A co-ordinator, provided by the Philippines,
- (b) A meteorologist, provided by the Philippines,
- (c) A hydrologist, provided by Japan,
- (d) A telecommunication/electronics expert, provided by UNDP.

6. In line with the phased withdrawal of UNDP institutional support, the Philippines has provided a co-ordinator since 1980. At the fifteenth session, it agreed to continue such support for a further period on the understanding that other arrangements would be considered in the future.

7. The posts of meteorologist and hydrologist are at present filled by staff assigned by the Philippines and Japan respectively. Although the Committee was informed at its fifteenth session that they will continue to provide these services the Committee may wish to consider the long-term arrangements.

8. The post giving rise to the greatest concern is that of the telecommunication and electronics expert (TEE) which is funded by UNDP. As a result of strong representations by the Committee, UNDP agreed to extend this post to the end of 1983. The Committee is well aware of the importance of this post and the invaluable services provided by the incumbent. Noting these facts, the Committee again, at its fifteenth session, strongly requested UNDP to continue funding the post to the end of 1984. Although no definite reply had been received at the time of writing this document discussions with UNDP resulted in a tentative agreement to meet the Committee's request.

9. In any case, 1984 will be the last year of UNDP funding for this post and it is by no means too soon for the Committee to consider alternative arrangements from 1985 on. There are several ways in which the services of the TEE could be provided:

/(a)

- (a) Under a TCDC arrangement;
- (b) With funds secured from the private sector;
- (c) From cash contributions made by members.

The outcome of the steps being taken under (b) and (c) above cannot be given at this stage although there will definitely be further information to report at the sixteenth session. A TCDC arrangement would be a very satisfactory and economic means of ensuring the continued presence of the TEE in TCS and merits careful consideration by the Committee. Assuming that the Committee will adopt the proposed medium- to long-term plan, the introduction of new technology and equipment will serve further to reinforce the need for this post over a prolonged period.

10. In connection with the new medium- to long-term plan, the Committee may also wish to consider what other institutional arrangements may be required. Although the Committee generally considers that a full-time expert in disaster prevention and preparedness (DPP) is not required, this need may be reviewed in the context of the new plan.

11. In relation to TCS the Committee decided at its fifteenth session that the views of members should be sought on making annual cash contributions for institutional support. A deadline of 1 September 1983 was set for this purpose and further developments will be reported at the sixteenth session.

2. Programme activities

12. In its consideration of the funding of its future programme the Committee should, it is suggested, discuss the outlook in terms of its demonstrated intention of maintaining and further expanding the tempo of its work. The new medium- to long-term plan (1984-1992) is, indeed, a direct consequence of the Committee's desire that the impetus given to its activities by TOPEX should not be allowed to diminish. This section of the document accordingly looks at the known sources of support, summarizing the apparent prospects for assistance to the extent that it is possible to do so at the time of writing the document.

(a) UNDP

13. The project RAS/81/054 "Programme support to the Typhoon Committee" covering the period 1982-1984, provides a total amount of \$US 1,001,400. Discussions with UNDP on the prospects for the remaining two years of the

/programming

programming period indicate that support of the order of \$US 175,000 for 1985 and \$US 135,000 for 1986 is likely for programme activities. Further information will be available to the session in the light of the decisions of the UNDP meeting of aid co-ordinators to be held in October 1983.

(b) WMO Voluntary Co-operation Programme

14. Information on recent projects carried out in four Typhoon Committee member countries under WMO VCP is given in the annex to this document. VCP remains, potentially, a major source of support for Committee activities and full advantage should be taken of the opportunities it presents for the future. It would be helpful if the Committee could identify specific parts of its programme that would qualify for VCP assistance and give its support as an intergovernmental body to individual requirements for items needed as a priority.

(c) WMO Special Temporary Voluntary Fund for TOPEX

15. At its last session the Committee urged members to act upon its earlier proposal that each should make a token contribution of \$US 1,000. It is disappointing to report that only 4 of the 10 members have responded to this request. Although the operational phase of TOPEX ends in 1983 there are still requirements in relation to its evaluation as well as for data sets and sub-experiment activities. The Committee may therefore wish once more to urge members which have not yet done so to contribute to the fund.

(d) ESCAP extrabudgetary resources

16. In response to a request made by the Commission at its thirty-eighth session, the ESCAP secretariat prepared a proposal for a project to improve systems of compiling information on typhoon and flood damage. This proposal was endorsed by the ESCAP Projects Review Committee and approved by one of the donor countries - Japan. The funds allotted to the project total approximately \$US 50,000.

17. In addition, TCS, in consultation with ESCAP prepared a project proposal for the improvement of disaster prevention systems based on risk analysis of disasters from typhoons and heavy rainfall. The total cost of the project is approximately \$US 70,000. This proposal has been submitted to the ESCAP Projects Review Committee. Further developments will be reported at the sixteenth session.

/(e) TCDC

(e) TCDC

18. The use of TCDC as a means of support for the Committee's activities is at a very early stage. Given the high degree of expertise available within the Committee's membership, it seems clear that TCDC arrangements must play a much greater role in the future programme. Little has so far been done to explore this possibility and the Committee should discuss in some detail how TCDC could be used for the exchange of experts, provision of equipment, training and research. In particular, the Committee should look at the medium-term plan and select those activities in which TCDC arrangements could provide part or all of the resources needed.

(f) Bilateral assistance

19. Bilateral arrangements, either directly or through WMO or ESCAP programmes, have made many valuable contributions to the programmes in the past. Whilst it will certainly continue in the future, bilateral aid is of unknown magnitude and therefore difficult to fit into the future plan for funding activities. The Committee is invited to consider how this source of aid can be tapped for support of its future programme.

(g) Mobilization of national resources

20. Many funding agencies, such as UNDP and UNEP are facing financial difficulties. The mobilization of national resources will become an increasingly important factor in the implementation of the Committee's programme, and it may be expected that most of the items included in the new medium- to long-term plan will have to be implemented by augmenting national resources. Future assistance from external sources may well be concentrated on specific areas where national resources cannot be made available. The Committee may wish to express its views on the trends in this direction.

(h) Support from the private sector

21. The Committee has previously been informed of the initiatives taken in the hope of securing assistance from the private sector. At the time of writing negotiations were continuing with a firm hope that some more definite news would be available to report to the sixteenth session. The potential of the private sector as a means of support to the Typhoon Committee is considerable and merits the close consideration of the session. The Secretary-General had been requested to pursue actively these negotiations. The Committee should discuss how the maximum advantage could be taken of such possibilities.

3. Conclusion

22. In this document the likely sources of support have each been reviewed. When the Committee considers the information presented it will still be without some of the elements necessary if it is to plan its work programme in a realistic way and with full knowledge of the magnitude of the resources needed. In the past little effort has been made to calculate the budgetary implications of the programme, even for comparatively short periods. The new medium- to long-term plan effectively establishes the Committee's programme for the years 1984 to 1992, although many of the individual items will require development in more detail. It is not suggested that that programme can be costed for the full period covered by the plan, it clearly being impossible to make valid assumptions on the economic climate likely to obtain eight or nine years hence.

23. Yet it is felt that it would help considerably if the financial consequences of an agreed programme could be assessed for a reasonable period ahead - perhaps one to two years. It would then be possible to determine as a next step how much would be borne by Typhoon Committee members and, consequently, the extent to which external resources would be necessary. This exercise would not be a simple one but it would enable the Committee to plan its activities in a more realistic way and would also, possibly, assist in seeking outside support for well-determined purposes.

24. It is proposed that the Committee discuss the means of carrying out an assessment of requirements of this sort. If considered desirable, attention will need to be given to a suitable mechanism for this purpose which could operate effectively at intervals of one to two years.

4. Action proposed

25. The Typhoon Committee is invited to:

(a) Review the staffing of the TCS and to:

(i) Consider future arrangements for filling the post of the co-ordinator (paragraph 6);

(ii) Seek confirmation that the posts of meteorologist and hydrologist will continue to be filled by national staff (paragraph 7);

/(iii)

(iii) Consider arrangements required for continuation of the services of the telecommunication and electronics expert from 1985 and beyond (paragraphs 8-9);

(iv) Examine the need for additional staff and/or consultant services in connexion with the implementation of the new medium- to long-term plan of the Committee (paragraph 10);

(b) Decide whether members should make annual cash contributions to augment the institutional support available to the Committee (paragraph 11);

(c) Review the different potential sources of support for programme activities and decide on the further action necessary to obtain the maximum input from them (paragraphs 13-21);

(d) Consider the desirability of assessing the budgetary implications of its agreed programme and, if necessary, recommend a suitable mechanism for this task (paragraphs 22-24).

/Annex

Annex

VCP ACTIVITIES IN COUNTRIES PARTICIPATING IN THE TYPHOON COMMITTEE

China

Under VCP project HY/3/1/1 equipment for the real-time telemetering and flood forecasting system for the Yangtse River is being provided with the support of the United States of America.

The Philippines

In support of TOPEX one automatic upper-air system has been installed at Laoag with the assistance of Finland and 200 hydrogen cylinders were provided by China. Replacement parts for use in four upper-air stations and expert services to repair, overhaul and put each system in good operational status were financed from WMO VCP funds. In addition, SSB transceivers were installed in eight stations to improve national collection of observational data and electrolytic hydrogen generators were installed in three upper-air stations with the support of the United States.

Thailand

In support of TOPEX, 120 hydrogen cylinders, six hydrogen generators and six gauges were provided by China.

A computer message switching system and an uninterruptible power system have been provided with the joint support of the United States and VCP funds, for the RTH at Bangkok. The installation will be completed shortly.

Viet Nam

To strengthen surface and upper-air networks in Viet Nam as well as meteorological telecommunication facilities, an important quantity of equipment has been provided with the assistance of France, USSR and VCP funds. With the support of the USSR, a weather radar 3 cm MRL-2 will be installed at Phu-lien, the site preparation is underway.

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FOR PARTICIPANTS ONLY

WRD/TC.16/7
15 September 1983

ORIGINAL: ENGLISH

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

Typhoon Committee
Sixteen session
6-12 December 1983
Tokyo

CO-ORDINATION WITH OTHER ACTIVITIES OF THE
WMO TROPICAL CYCLONE PROGRAMME

(Item 10 of the provisional agenda)

Note by the WMO secretariat

Introduction

1. The purpose of this document is to inform the Committee of the various activities related to its own work which are being carried out under the WMO Tropical Cyclone Programme (TCP), of which this work forms part. The annex to the document consists of the ninth status report on the implementation of the TCP which provides a summary of the developments that have taken place in the year up to 30 June 1983. Later information covering the period between the issue of the status report and the sixteenth session of the Committee will be presented by the representative of the WMO secretariat at the session.

Action proposed

2. The Committee is invited to:
- (a) Note and comment on the information provided in the annex to this document and on any later developments reported to the session;
 - (b) Review the measures taken to ensure effective co-ordination of the Committee's activities with those performed under the TCP as a whole;
 - (c) Make proposals for any new measures which it feels would enhance this co-ordination.

WORLD METEOROLOGICAL ORGANIZATION

Ninth Status Report on the Implementation of the

WMO Tropical Cyclone Programme

(30 June 1983)

Introduction

1. Resolution 2733 (XXV) of the United Nations General Assembly expressed concern at the loss of human life and material damage caused by tropical cyclones and other natural disasters and requested international action for the mitigation of the harmful effects of such disasters. In response to this resolution, the Sixth World Meteorological Congress, in 1971, initiated the WMO Tropical Cyclone Project.

2. The United Nations General Assembly has maintained a close interest in the project and in 1977 adopted a further resolution (A/RES/32/196) calling on WMO to intensify its efforts in this field. Eighth Congress reviewed the achievements up to 1979 and decided that the project should be upgraded to be the WMO Tropical Cyclone Programme (TCP) from 1980 onwards. It unanimously agreed that it was essential to strengthen and intensify the programme in the years ahead and that WMO should co-ordinate these activities. In May 1983, Ninth Congress expressed great satisfaction with the progress being made in the implementation of the programme which is of concern not only to countries directly affected by tropical cyclones but to many others. It attached high priority to the TCP.

3. A plan of action for the TCP was first adopted by the Executive Committee in 1972. A revised plan of action, prepared at the request of Eighth Congress (1979) was published in 1981 within the TCP series. This revised plan of action was endorsed by Ninth Congress which felt that it provides a sound basis for guiding the development and implementation of the programme in the years ahead.

4. The ultimate objective of the TCP 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. To attain this objective, the programme aims at strengthening the capabilities of Members affected by tropical cyclones to:

- (a) detect, track and forecast the approach and landfall of tropical cyclones;
- (b) provide forecasts or timely assessments of heavy rainfall and forecasts of strong winds resulting from tropical cyclones;
- (c) apply the most appropriate techniques of quantitative storm-surge prediction;

- (d) forecast the flooding arising from a tropical cyclone strike;
- (e) provide the basic data on risk of loss by winds, storm-surges and floods to meet the needs for development planning and other purposes;
- (f) organize and execute the essential disaster prevention and preparedness measures.

5. It is expected that the following benefits will increasingly be derived from the further implementation and development of the TCP:

- (a) improved capability to issue accurate and timely warnings of tropical cyclones and their effects, particularly those caused by 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) mitigation of the dramatic impact of tropical cyclones upon the populations and economies of the countries affected.

6. The TCP is organized around three main elements:

- (a) Meteorological, based on the World Weather Watch, which is 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, which is 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 is 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. In this connexion, WMO's role of assisting Members to ensure the co-ordination measures to protect life and property will be performed in close co-operation with UNDRO, LRCS and other appropriate bodies with special expertise in these fields.

To achieve the objectives of the programme, attention is given not only to operational aspects but also to research and to education and training.

7. It is found convenient to regard the TCP as being composed of two components, a general component concerned with methodology and transfer of technology and a regional component devoted to the programmes of regional tropical cyclone bodies. The information on activities and developments during the period of the report is presented below under two main headings,

the general component and regional component. Additionally information of a more general nature, information on the action taken jointly with other international organizations and on the programme envisaged for 1983-1984 is also given. The status of implementation of the various projects under the general component, in summary form, is shown in an appendix to this report.

General component

8. The aim of the general component is to convey information and provide guidance to Members, mainly through the publication of manuals and reports, to enable increased application of scientific knowledge and technological developments to the introduction or improvement of the components of the warning and disaster preparedness and prevention systems. It encompasses the broader aspects of training for the TCP.

9. The principal steps taken within the general component during the period of the report have been the continuation of activities under a number of projects. A summary of the status of implementation of each of the 15 projects is given in the appendix. It shows that prior to July 1982, reports had been prepared and distributed under projects Nos. 2, 5, 6, 7, 8 and 10 and that project No. 11 had been successfully accomplished. Further action on these projects, such as the updating of publications when significant new information becomes available, will be taken when appropriate. Information on projects No. 1, 4, 9, 12, 13, 14 and 15 is given in the following paragraphs as well as in the appendix.

10. The reports entitled "Special wind and pressure observing network" and "Human response to tropical cyclone warnings and their content", which had been prepared under projects No. 1 and No. 12 respectively, were distributed to all tropical cyclone-prone Members during the current reporting period. The latter report, which was prepared by a team of experts comprising a team leader from the USA and other experts from Australia, India and the Philippines was completed in late 1982 and published in January 1983.

11. Project No. 4 - 'Radar' aims at providing guidance information to assist Members in selecting and installing storm warning radar equipment and in making the best use of it in tropical cyclone tracking, forecasting and warning. An expert from USA, in consultation with experts designated by Australia, France, Japan and the WMO Commission for Instruments and Methods of Observation (CIMO), completed preparation of and submitted for publication a report entitled "Weather radars for monitoring tropical cyclones".

12. Following the review made under project No. 9 of the draft text of a publication on 'Tropical Cyclone Warning Systems' it was felt that there is a need to complete and update the available information. Arrangements are in hand to consign this work to a small group of experts.

13. Continued progress was made towards the implementation of project No. 13 - 'Regional aspects of storm surge prediction (Caribbean, Central America and Eastern Pacific)'. An expert meeting in its report which was endorsed by the RA IV Hurricane Committee re-defined the objectives, identified the resources needed and set out an action programme for implementation of the project. Members have been giving consideration to the identification of suitable nominees to be trained and to adapt the models to

specific localities as the basis for development of the atlases. The USA has kindly offered to provide training for one or two qualified persons, commencing in 1984 and it is anticipated that training of additional persons might take place in the region.

14. During the year a joint board, established by WMO, UNDR0 and LRCS, drew up plans for the implementation of project No. 14 - 'Public information and education'. Taking into account the advice of experts the board formulated the outlines of a report to be issued under this project. Arrangements for preparation of substantial segments of the report have been finalized.

15. Project No. 15 - Typhoon Operational Experiment (TOPEX) forms part of the programme of activities of the ESCAP/WMO Typhoon Committee. As shown in the appendix, the first five in the series of TOPEX reports had been issued prior to July 1982. During the past year TOPEX Reports Nos. 6, 7 and 8 and also a new edition of Report No. 2 were prepared and issued. Additionally, preparation of TOPEX Report No. 9 - 'A Preliminary Evaluation of the TOPEX First Operational Experiment - Meteorological Component' was nearing completion.

16. A report on the WMO workshop on the use of satellite data for hurricane detection and prediction held in 1980 within the programme of the RA IV Hurricane Committee, was published in the TCP series and distributed in 1981 to all Members participating in the TCP regional bodies. The report included a selection of training material used during the workshop. Following this pattern a report on the WMO seminar on the application of satellite data to tropical cyclone forecasting, held in May to June 1982 as part of the programme of the WMO/ESCAP Panel on Tropical Cyclones was published and distributed in the second half of 1982. Additionally, following the WMO assistance to the WMO Regional Meteorological Training Centres sets of the training material used at the seminar were supplied to those centres.

Regional Component

17. The regional component of the TCP is concerned mainly with the development of co-ordinated regional systems to combat loss of life and damage resulting from tropical cyclones. Its main thrust therefore is for the efficient operation of tropical cyclone early warning systems, including warnings of associated phenomena such as storm surges and floods and of the relevant disaster prevention and preparedness organization.

18. Under the regional component, work is carried out through two intergovernmental groups: the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones and two groups established by regional associations: the RA I Tropical Cyclone Committee for the South-West Indian Ocean and the RA IV Hurricane Committee. Close liaison has been maintained between the four regional cyclone bodies.

19. Regional Association V, at its eighth session (September 1982), proposed the establishment of a fifth regional tropical cyclone body for the South-West Pacific which might be called the South-West Pacific Tropical Cyclone Committee. It requested that WMO, in collaboration with ESCAP, should organize a survey mission as soon as possible to explore with the governments concerned their requirements, both as regards the need for and structure of the proposed regional committee, the scope of its work, as well as the improvement of the different components of the warning system.

20. For the Typhoon Committee the period covered by this status report has again, inevitably, been dominated by its involvement in the Typhoon Operational Experiment (TOPEX). The preparations made at the Second Planning Meeting for TOPEX in early 1982 led on smoothly to the First Operational Experiment (FOE) which was held from 1 August to 15 October 1982. During that period the International Experiment Centre (IEC) was set up at the Headquarters of the Japan Meteorological Agency in Tokyo, staffed by scientists from China, Hong Kong, Japan, Malaysia, Philippines, Republic of Korea, Thailand and Viet Nam. Throughout its operation the IEC was in close contact with the Experiment Sub-Centres (ESCs) established by each of these members of the Typhoon Committee.

21. Four typhoons were selected for the tracking in conformity with the criteria agreed by participating members at the First Planning Meeting. During the four Typhoon Tracking Experiment (TTE) periods, operations were carried out satisfactorily at the IEC using data and materials furnished by the ESC, Tokyo. Despite the difficulty of selection of the target typhoon, adequate storms for the Experiment showing interesting characteristics were chosen. As planned, the typhoon operations at IEC were practiced following the procedures described in the TOPEX Operational Manual (TOM). The execution of TOM procedures played an important and key role in the whole Core Experiment.

22. Later consideration of the results of the FOE led to the unanimous view that it had been highly successful. However, despite the general satisfaction expressed, the sixth session of the Management Board for TOPEX was of the opinion that further improvements would be necessary before the Second Operational Experiment (SOE) in 1983 in order to ensure that it would not be simply a repetition of the FOE but would constitute a genuine advance in terms both of its organization and its results.

23. With those thoughts in mind the Management Board and the later Third Planning Meeting made a number of important decisions for the SOE, again to be held from 1 August to 15 October. Thus some important changes have been made, including the selection of a network of 27 strategic upper-air stations which will make four observations daily throughout one full TTE-period of five days. The Board felt it to be essential to determine more precisely the usefulness of additional observations to justify the extra resources called for. These observations will therefore be made regardless of the distance from the centre of the selected typhoon.

24. Four typhoons will again be selected during the SOE but if two co-exist during a TTE-period they will be treated as one and all the analysis/forecasting procedures will be carried out for both. Consideration would also be given to the selection of a fifth typhoon if it seemed to be necessary for the full success of the Experiment.

25. As the host to the IEC, Japan has announced that more space and additional facilities will be available to the scientists seconded there in 1983. This news is all the more to be welcomed in the knowledge that a larger number of scientists are expected to participate in the IEC operations this year. Japan, through the Japan International Co-operation Agency (JICA) will

again fund the attendance of six scientists. WMO will support the other six seconded scientists who may be expected to participate for all or part of the SOE period. Further support will also be provided to the IEC by the ESC, Tokyo, including the supply of enhanced IR satellite imagery so that the Dvorak method can be used to estimate and predict typhoon intensity.

26. At the national level preparations are also well in hand. There will be improvements at a number of ESCs in the light of lessons learned during the FOE. A new, revised version of the TOPEX Operational Manual has been distributed and training of the IEC scientists is already in hand.

27. All these activities refer to the Core Experiment portion of the TOPEX Meteorological Component. But the Sub-Experiment, though of less immediacy, has not been overlooked. Plans for individual and co-operative studies are progressing, though it is recognized that most members await the availability of complete TOPEX data sets.

28. During the SOE, activities under the Hydrological Component will continue to be strengthened, particularly in view of the fact that the final water year will now terminate on 31 December 1983 instead of 29 February 1984.

29. It is clear that most members have well-advanced plans for the activities they will carry out under the Warning Dissemination and Information Exchange (WD/IE) Component. Case studies will again form an important part of these activities and public education and training are receiving increased attention. A standard format for damage assessment has been accepted by members in an attempt to improve the gathering of disaster statistics. At the Planning Meeting it was proposed that members consider the publication of pamphlets containing information on typhoons, flooding and measures for community preparedness. The pamphlets should preferably be written in the local dialect. Some members are already undertaking this work.

30. As part of the SOE activities Japan will again in 1983 conduct a seminar on the Hydrology and WD/IE Components. It will cover the period from 30 June to 6 August and five participants will be supported financially by JICA.

31. At the fifteenth session of the Typhoon Committee (Bangkok, November 1982) a major decision was made to begin planning of the post-TOPEX activities. The Committee set up a small Working Group on Programme Planning charged with the preparation of a plan covering the years 1984 to 1992. The group met in late June 1983 and completed a draft plan for submission to the Committee's sixteenth session in December 1983.

WMO/ESCAP Panel on Tropical Cyclones

32. Shortly after the ninth session, and with the full support of all its members, the Republic of the Maldives became the seventh member of the Panel. The Maldives has already demonstrated its intention of participating in the work of the Panel to the greatest extent possible.

33. Institutional arrangements for the management of the Panel's programme during the past year have progressed smoothly. Although scheduled to end in

December 1982, UNDP funding for the post of Chief Technical Adviser was extended for a further six months to ensure the smooth transition of his functions to the Permanent Representative of Sri Lanka with WMO as the new Co-ordinator. In this role he is assisted full-time by a senior staff member of the Department of Meteorology. The other post of Telecommunications/Electronics Expert will continue to be filled by expatriate staff until the end of 1984. Thus a progressive transition towards self-sufficiency on the part of Panel members in assuming responsibility for the management of its own programme is taking place. This development is of particular importance in meeting the requirements of UNDP for consideration of continued programme support.

34. In programme activities, the past year has been in many respects the most active in the history of the Panel. Thus there were a number of valuable improvements to observing and telecommunication facilities, notably the new radars installed at Visakhapatnam (India) and Trincomalee (Sri Lanka). A special ship weather-reporting programme was mounted from October to December 1982. Although the results varied from country to country it was generally felt that the special effort had been worthwhile and it will be repeated during the 1983 cyclone season. Wide-ranging recommendations for improving disaster preparedness measures in Panel countries were made by a joint UNDRO/WMO/LRCS Mission that visited members from late September to early November. Training events included seminars on the application of satellite data to tropical cyclone forecasting, on flood vulnerability analysis, and on flood forecasting.

35. The tenth session of the Panel was inaugurated at Dhaka, Bangladesh, in March by Lt. Gen. H.M. Ershad, Chief Martial Law Administrator and Commander-in-Chief, at a ceremony attended by more than 400 persons. During the ensuing week the Panel members gave close attention to future activities, making several new initiatives. Foremost among these was an ambitious plan to develop a storm surge measurement and prediction system for the Bay of Bengal. On the operational side the plan calls for the compilation of complete dossiers of data on individual surges to permit simulation of the surge at any later date for the purpose of tuning and verifying surge prediction systems. Experts would spend an initial two-year period training teams of scientists in each country for this purpose. Coastal tide gauges would be increased and a deep-water tidal measurement programme of the tidal elevations across the Southern Bay of Bengal undertaken. A vessel would set acoustic buoys on the sea bed at about 10 sites to record sea level changes accurately for a period of one year.

36. The project would also provide for meteorological and storm surge research and for the long-term development of oceanography in the area. A regional physical oceanography centre would be established at the University of Chittagong to pursue storm surge and tidal research and to offer one-year post-graduate courses in physical oceanography.

37. The programme activities call for a higher level of funding than is at present available to the Panel. Efforts are being made to find the additional funds required through UNDP and other sources.

RA I Tropical Cyclone Committee for the South-West Indian Ocean

38. Regional Association I at its eighth session (Cairo, November 1982) expressed its satisfaction with the work accomplished by the RA I Tropical Cyclone Committee, through the TCP, to mitigate the harmful effects of tropical cyclones in its Region. It was of the view that the Tropical Cyclone Operational Plan for the South-West Indian Ocean, which was adopted at the session, was a significant step forward in this connexion.

39. The operational plan had been developed by the RA I Tropical Cyclone Committee to ensure the most effective co-operation between all the Members of the Committee in the provision of meteorological information, forecasts and warnings of all tropical cyclones affecting the area. In addition to defining the forecasting and warning responsibilities of Members, it sets out the arrangements in the region for provision of observational data and exchange of information and contains information on practices and procedures of regional significance. The Association commended Members on the co-operative efforts made. It agreed that the operational plan will serve as a valuable source of information for the operational services and requested that it be issued as a WMO publication in loose-leaf form.

40. The Association suggested that Members concerned should conduct a detailed study of the likely advantages and disadvantages of a proposed change of the Committee's status before proceeding with the necessary negotiations among themselves. The proposal arose from the Committee's conclusion that a change of its status from that of a Working Group of Regional Association I to that of an inter-governmental body is desirable. In the meantime the Association re-established the Committee. Eight Members will continue to participate in its work. Furthermore, as requested by the Committee, provision was made by the Association for a representative of RTH Nairobi to serve as an ex-officio member.

41. A study group established by the fifth session of the Committee (Seychelles, September 1981) carried out a review of the structure of the Technical Plan and its Implementation Programme. The study group has prepared a report on its work, with recommendations, for submission to the Committee's sixth session which will be held in St. Denis, Réunion in September 1983.

RA IV Hurricane Committee

42. The number of Members of RA IV participating in the work of the RA IV Hurricane Committee continues to increase. Venezuela and St. Lucia joined the list of Members in 1982 and 1983 respectively, bringing the number up to twenty-two.

43. The 1983 session of the Committee was cancelled for administrative reasons. Instead an informal meeting of the Committee was held in Geneva on 7 May 1983, taking advantage of the presence there of participants who were attending Ninth Congress.

44. Due to the limited time available, the discussions at the meeting were confined to preparation for the 1983 hurricane season. The meeting carried out a review of the past hurricane season with its contrasting very low level of activity in the Atlantic and extremely active eastern Pacific season. It was suggested that the frequency of occurrence of tropical cyclones may be related to the Southern Oscillation and proposed that this relationship be studied on a regional basis.

45. As recommended by the meeting, modifications have been made to the RA IV Hurricane Operational Plan (WMO-No. 524), primarily on the arrangements for the distribution of warnings, threshold values for high seas in marine advisories and terminology for use in the region.

46. During the 1982 season, the USA initiated arrangements for using Hurricane Research Aircraft stationed in Miami to provide quick response reconnaissance flight missions to the east of the Antilles. The Committee recorded its satisfaction with and appreciation for these arrangements which met the need it had previously expressed for timely information from that area as required for the issue of hurricane watch and warnings.

47. A programme to be initiated in the USA during the summer of 1983 will provide the probability of tropical storm/hurricane conditions to disaster officials and the public. The main aim will be to facilitate the development of objective preparedness plans, primarily for coastal locations with large population concentrations, which require lead times of 24 to 48 hours. A report to be prepared on the experience gained in 1983 with the use of this system will form the basis for consideration by the Committee of possible problems with its application in some other areas. The main concern in such cases is with the possibility of misinterpretation of and inappropriate response to the rather low probability values that occur once the hurricane is more than 24 hours away.

48. Steps are being taken to strengthen the co-ordination between the work of the Committee and that of the Pan-Caribbean Disaster Preparedness and Prevention Project (PCDPPP), especially in regard to disaster prevention and preparedness for hurricanes. Arrangements were made for the provision to PCDPPP of operational meteorological information and advice.

49. At a meeting held in Miami, USA in November 1982, a study group established by the Committee carried out a review of satellite, radar and other techniques for tropical cyclone rainfall estimation. The meeting discussed the testing and operational application of available techniques and made recommendations for the establishment of a TCP project and of pilot projects and operational systems in Region IV. The study group was assisted in its tasks by the CHY Rapporteur on Multisensor Data Analysis and by scientists from the USA. Its report will be submitted to the next session of the Committee which will be held in Barbados during 1984.

Co-operation with other organizations

50. In accordance with the wishes of the WMO Congress, close co-operation with other international organizations active in disaster mitigation has continued. Thus there has been close consultation with ESCAP, UNDP, UNDRO and LRCS on a variety of matters of common concern. The main items include ESCAP's co-sponsorship of the Typhoon Committee and the Panel on Tropical Cyclones, UNDP's invaluable support, through regional projects, for the programmes of those two bodies as well as UNDRO and LRCS involvement in the WD/IE Component of TOPEX, in the joint mission on disaster preparedness for the Panel on Tropical Cyclones and in TCP project No. 14. Additional UNDRO and LRCS activities of specific interest to the TCP include the work being done in RA IV under the Pan-Caribbean Disaster Preparedness and Prevention Project and their involvement in planning a seminar on disaster prevention and preparedness for RA I TCC countries and for consultancy services on disaster preparedness to meet the request of the Panel.

Programme for 1982-1983

51. The TCP covers a wide range of activities which are of a continuing and long-term nature. Preceding sections of this report contain an overview of several of the ongoing activities and, in some instances, indications have been given of the plans for the period ahead. The main parts of the 1983-1984 programme are set out below in summary form:

General component

- (a) continued activities for the implementation of the plan of action for the Tropical Cyclone Programme, including the formulation of new projects;
- (b) as appropriate, preparation, editing, publication and distribution of reports under TCP projects Nos. 4, 9, 14 and 15 (see Appendix, section B);
- (c) implementation of items, particularly towards attainment of the short-term objectives, of the action programme for TCP project No. 13 on storm-surge prediction;
- (d) execution of TOPEX and, in particular, of its Second Operational Experiment, through operations at the IEC and ESCs and other national activities;
- (e) evaluation of TOPEX and planning of further follow-up activities, with co-ordination mainly through an Evaluation Meeting and meetings of the TOPEX Management Board and of the Typhoon Committee itself.
- (f) initiating action on further proposals made by the regional tropical cyclone bodies including developments aimed at tropical cyclone rainfall estimation on an operational basis.

Regional component

52. A survey mission to cyclone-prone countries of the South-West Pacific is planned for the second half of 1983. Otherwise, under the regional component, the programme will be chiefly concerned with the activities undertaken by the regional tropical cyclone bodies and the implementation of the decisions they make. A provisional schedule, for the period 1 July 1983 to 30 June 1984, of meetings of regional bodies, related WMO regional training activities and TOPEX meetings is given below:

- RA I Tropical Cyclone Committee for the South-West Indian Ocean, sixth session (St. Denis, Réunion, 20-26 September 1983);
- WMO/ESCAP Panel on Tropical Cyclones. Seminar on the Application of Radar Data to Tropical Cyclone Forecasting (Bangkok, Thailand, 21 November to 2 December 1983);
- Seminar on Automated Message Switching Systems for Regional and National Meteorological Centres in South-East Asia (Hong Kong, 23-29 November 1983);
- RA IV Workshop on Recent Advances in Tropical Meteorology with Particular Emphasis on Tropical Cyclone Forecasting (San Juan, Puerto Rico, 28 November to 2 December 1983);
- ESCAP/WMO Typhoon Committee, sixteenth session (Tokyo, Japan, 6 to 12 December 1983);
- Management Board for TOPEX, eighth session (Tokyo, Japan, 13-14 December 1983);
- WMO/ESCAP Panel on Tropical Cyclones, eleventh session (tentatively Malé, Maldives, February 1984);
- Training Course on Tropical Meteorology and Hurricane Forecasting (Miami, USA, March to mid-May 1984);
- Evaluation Meeting for TOPEX (Tokyo, Japan, 12-16 March 1984);
- Management Board for TOPEX, ninth session (to be held in 1984);
- RA IV Hurricane Committee, sixth session (Barbados, tentatively 8-14 May 1984).

/APPENDIX

APPENDIX

WMO TROPICAL CYCLONE PROGRAMME - GENERAL COMPONENT

Status of Implementation on 30 June 1983

A. Projects (formerly called sub-projects) completed or under which reports have been issued

<u>Project number and title</u>	<u>Title of report and date of issue</u>	<u>Remarks</u>
No. 1 - Special tropical cyclone observing network	"Special wind and pressure observing network" issued in September 1982.	
No. 2 - Observations from mobile ships	"Observations from mobile ships" distributed on 16 March 1977.	
No. 3 - Automatic weather stations	"Automatic weather stations for tropical cyclone areas" issued in July 1981	WMO Publication, in the TCP series (WMO-No. 570)
No. 5 - Geostationary satellites	"The use of Satellite Imagery in Tropical Cyclone Analysis" issued in November 1977.	WMO Technical Note No. 153
No. 6 - Forecasting tropical cyclone intensity and movement	"Operational Techniques for Forecasting Tropical Cyclone Intensity and Movement" issued in August 1979	WMO Publication (WMO-No. 528)
No. 7 - Storm surge prediction	"Present techniques of tropical storm surge prediction" issued in March 1978	WMO Publication (WMO-No. 500)
No. 8 - Risk evaluation techniques	"The quantitative evaluation of the risk of disaster from tropical cyclones - report of a WMO/UNEP project on the meteorological and hydrological aspects" issued at the end of 1976	WMO Publication (WMO-No. 455)

<u>Project number and title</u>	<u>Title of report and date of issue</u>	<u>Remarks</u>
No.10 - Community preparedness and disaster prevention	"Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas" prepared jointly by WMO, ESCAP and LRCS and issued in English in June 1977 and in French and Spanish during the first half of 1978.	Published by WMO. Requests for copies may be addressed to WMO, ESCAP or LRCS Secretariats.
No.11 - Flood forecasting and warning	-----	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.
No.12 - Human response to tropical cyclone warnings and their content	"Human response to tropical cyclone warnings and their content" issued in February 1983	Published in the TCP series.
No.15 - Typhoon Operational Experiment (TOPEX)	(See list below*)	(See section B of this Appendix).
	*TOPEX Report No. 1 - "First Planning Meeting" issued in 1980	WMO Publication in the TCP series (WMO-No. 565).

APPENDIX

WMO TROPICAL CYCLONE PROGRAMME - GENERAL COMPONENT

Status of Implementation on 30 June 1983

A. Projects (formerly called sub-projects) completed or under which reports have been issued

<u>Project number and title</u>	<u>Title of report and date of issue</u>	<u>Remarks</u>
No. 1 - Special tropical cyclone observing network	"Special wind and pressure observing network" issued in September 1982.	
No. 2 - Observations from mobile ships	"Observations from mobile ships" distributed on 16 March 1977.	
No. 3 - Automatic weather stations	"Automatic weather stations for tropical cyclone areas" issued in July 1981	WMO Publication, in the TCP series (WMO-No. 570)
No. 5 - Geostationary satellites	"The use of Satellite Imagery in Tropical Cyclone Analysis" issued in November 1977.	WMO Technical Note No. 153
No. 6 - Forecasting tropical cyclone intensity and movement	"Operational Techniques for Forecasting Tropical Cyclone Intensity and Movement" issued in August 1979	WMO Publication (WMO-No. 528)
No. 7 - Storm surge prediction	"Present techniques of tropical storm surge prediction" issued in March 1978	WMO Publication (WMO-No. 500)
No. 8 - Risk evaluation techniques	"The quantitative evaluation of the risk of disaster from tropical cyclones - report of a WMO/UNEP project on the meteorological and hydrological aspects" issued at the end of 1976	WMO Publication (WMO-No. 455)

<u>Project number and title</u>	<u>Title of report and date of issue</u>	<u>Remarks</u>
No.10 - Community preparedness and disaster prevention	"Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas" prepared jointly by WMO, ESCAP and LRCS and issued in English in June 1977 and in French and Spanish during the first half of 1978.	Published by WMO. Requests for copies may be addressed to WMO, ESCAP or LRCS Secretariats.
No.11 - Flood forecasting and warning	-----	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.
No.12 - Human response to tropical cyclone warnings and their content	"Human response to tropical cyclone warnings and their content" issued in February 1983	Published in the TCP series.
No.15 - Typhoon Operational Experiment (TOPEX)	(See list below*)	(See section B of this Appendix).
	*TOPEX Report No. 1 - "First Planning Meeting" issued in 1980	WMO Publication in the TCP series (WMO-No. 565).

<u>Project number and title</u>	<u>Title of report and date of issue</u>	<u>Remarks</u>
	TOPEX Report No. 2 - "TOPEX Operational Manual", issued in 1980, new editions issued in 1981 and March 1983.	Published in the TCP series.
	TOPEX Report No. 3 - "TOPEX - a general description" issued in 1981.	WMO Publication in the TCP series (WMO-No. 573).
	TOPEX Report No. 4 - "Information on objective methods of typhoon track prediction being used operationally at experiment sub-centres, TOPEX Core Experiment", issued in May 1982.	Published in the TCP series.
	TOPEX Report No. 5 - "Second Planning Meeting", issued in June 1982.	Published in the TCP series.
	TOPEX Report No. 6 - "Evaluation report on the Pre-experiment for the Meteorological Component of TOPEX" issued in September 1982	Published in the TCP series.
	TOPEX Report No. 7 - "First Operational Experiment - Report of the International Experiment Centre" issued in March 1983.	Published in the TCP series.
	TOPEX Report No. 8 - "Third Planning Meeting" published in June 1983.	Published in the TCP series.

B. Other projects

<u>Project number, title and objectives</u>	<u>Mode of implementation</u>	<u>Status</u>
No. 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.	USA with the collaboration of Australia, France, Japan and CIMO Mr. D. Holmes (USA) Leader, Dr. P. Barclay (Australia) Mr. M. Malick (France) Mr. J. Aoyagi (Japan) Dr. N. Kodaira (CIMO)	Report entitled: "Weather radars for monitoring tropical cyclones" has been submitted for publication.
No. 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.	Revision and updating to be carried out by small group of experts	Final text for publication not expected before late 1984.

<u>Project number, title and objectives</u>	<u>Mode of implementation</u>	<u>Status</u>
No.13 - <u>Regional aspects of storm surge prediction (Caribbean, Central America and Eastern Pacific)</u>		
Main objectives:		
a) to develop storm surge atlases for all the larger countries of the region that are substantially threatened by storm surges.	Members represented on the RA IV Hurricane Committee with assistance from the WMO Secretariat and consultant services.	A draft action programme prepared by an experts' meeting has been endorsed by the RA IV Hurricane Committee. Training of personnel to develop the atlases is expected to commence in 1984.
b) to study the impact of the surge on small islands.		
c) to develop the capability of updating the models used to generate the atlases with a view to facilitating simulation exercises as well as revision of the atlases.		
d) to provide for training of personnel involved in the application of the atlases.		

WRD/TC.16/6
18 October 1983

ORIGINAL: ENGLISH

<u>Project number, title and objectives</u>	<u>Mode of implementation</u>	<u>Status</u>
No.14 - <u>Public information and education</u>		
Objectives:		
To prepare guidance and sample material to assist Members in the improvement of their public information and education programmes.	Joint WMO/UNDRO/LRCS project.	Plans for implementation of the project have been drawn up by the joint board and outlines of a report prepared.
No.15 - <u>Typhoon Operational Experiment (TOPEX)</u>		
Objectives:		
To reduce the risk of 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 through the conduct of an operational test of the various systems used for typhoon analysis, forecasting and warning, as well as for flood forecasting during all stages of typhoons in the area.	Project of the ESCAP/WMO Typhoon Committee.	Planning and execution proceeding. (Reports which have been issued are listed in section A of this Appendix).

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
AND
WORLD METEOROLOGICAL ORGANIZATIONTyphoon Committee
Sixteenth session
6-12 December 1983
Tokyo, Japan

PROGRAMME FOR 1984

(Item 8 of the provisional agenda)

Note by the Typhoon Committee Secretariat

1. At its fifteenth session, the Typhoon Committee decided that a medium- to long-term plan covering all its activities in the post-TOPEX period should be drawn up for the years 1984-1992.
2. To carry out this task, a meeting of the Working Group on Programme Planning consisting of representatives of China, Hong Kong, Japan, the Philippines, ESCAP, WMO, UNDRO, LRCS and the Co-ordinator of the Typhoon Committee Secretariat and its staff was held at Manila/Baguio City in June 1983. The report of the Working Group will be submitted to the Committee for consideration under item 6 of the provisional agenda.
3. In formulating the programme for 1984, the Committee will no doubt wish to take into account the medium- to long-term plan adopted at the session or the report of the above-mentioned Working Group and also the relevant parts of the short- and long-term programme of activities approved at its eleventh session.
4. The execution of the TOPEX Sub-Experiment, which may bring new activities in 1984, should also be considered.
5. With a view to facilitating the work of the Committee in elaborating the programme for 1984, a list of projected activities is given below:

A. Meteorological component

- (i) Operation and maintenance of electronic equipment (R/W, radar, radar picture transmission, satellite receiving and telecommunication equipment);
- (ii) Establishment of new radar stations at key locations in the Philippines, the Republic of Korea and Viet Nam;
- (iii) Replacement and/or upgrading of old radar sets in Malaysia, the Philippines, the Republic of Korea and Thailand;
- (iv) Provision of equipment and spare parts for weather radar and satellite data receiving stations;
- (v) Provision or improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;
- (vi) Establishment of satellite data receiving stations for reception of cloud imagery and other data from GMS and TIROS-N satellites;
- (vii) Installation of a computer processing system at selected locations with a view to integrating satellite, radar and rainfall data so as to provide a spatial distribution of rainfall amount over a large region;
- (viii) Monitoring of data exchange on existing point-to-point telecommunication circuits with a view to their improvement, where necessary;
- (ix) Enhancement of TC members facilities for reception/dissemination of meteorological information with automation and upgrading of GTS centres to accommodate higher speed data transmissions;
- (x) Improvement of data completeness and quality, including real-time and non-real-time monitoring;
- (xi) Review of national data collection facilities and data exchanges needed for typhoon warning services, taking remedial measures when necessary;
- (xii) Review of the existing arrangements for dissemination of typhoon warnings with a view to introducing improvements, where necessary;
- (xiii) Procurement and installation of equipment and spare parts for telecommunication, radar, satellite data receivers, etc., under the UNDP fund for 1984;

- (xiv) Development of instruments to meet specific needs in tropical cyclone areas;
- (xv) Improvement of operation of those centres with responsibilities for the provision of processed information needed by TC members for their forecasting and warning systems;
- (xvi) Enhancement of co-operation in typhoon monitoring, forecasting and warning;
- (xvii) Exchange of forecasts, including products of different objective methods;
- (xviii) Commissioning of a comprehensive study on ways to provide adequate data over tropical cyclone-prone ocean areas;
- (xix) Preparation for and execution of the evaluation for TOPEX and its Sub-Experiment on the basis of the programme recommended by the planning meetings and the decisions made by the Management Board for TOPEX;
- (xx) Initiation of planning of further measures to be taken within the Committee's programme to identify and conduct studies and/or evaluations, in association with the ISS, Integrated WWW System Study, which would assist in defining a cost-effective best mix of observing systems in support of typhoon forecasting and warning;
- (xxi) Collection and dissemination of the tide gauge and water level data for use in storm surge prediction.
- (xxii) Promotion of inter-disciplinary co-operation and research in the area at the interface between the meteorological and disaster prevention and preparedness components;
- (xxiii) Conducting studies on human response to warnings;

B. Hydrological component

- (i) Establishment of flood forecasting and warning systems in the Nam Ngun and Se Bang Hieng River basins in the Lao People's Democratic Republic, the Kinabatangan basin in Sabah and the Sadong basin in Sarawak, Malaysia, the Pasak River basin in Thailand and one river basin to be selected in Viet Nam;
- (ii) Improvement of existing flood forecasting and warning systems making use, where appropriate, of the results of TOPEX and the technology available through HOMS;
- (iii) Establishment and operation of new flood forecasting and warning systems;

(iv) Establishment and operation of flood forecasting and warning systems for dam operations;

(v) Organizing missions by experts to provide technical guidance on items (i) to (iv) at the request of members, with bilateral or multi-lateral support if available, making use, where appropriate, of technology available through HOMs;

(vi) Organization of a symposium on the results of the hydrological component of TOPEX by WMO in late 1984;

(vii) Selection of pilot area for establishment of comprehensive flood loss prevention and management studies;

(viii) Investigation, survey and study of the pilot area selected for comprehensive flood loss prevention and management;

(ix) Organizing missions by experts to provide technical guidance to members on items (vii) to (viii) at the request of members, with bilateral or multi-lateral support if available, and

(x) Conducting a preliminary survey and formulation of detailed implementation programme for flood risk analysis and mapping in demonstration area(s) including the expert group meeting at the request of the Typhoon Committee, with multi-lateral support (ESCAP/XB).

(xi) Review of the existing arrangements for dissemination of flood warnings with a view to introducing improvements, where necessary;

C. Disaster Prevention and Preparedness Component

(i) Taking follow-up action on the joint LRCS/WMO/ESCAP missions in 1973-1976, the recommendations of the regional seminar at Tokyo in 1976, the review mission in 1976, the consultant's report on Malaysia, the Philippines and Thailand in 1978-1979, the recommendations made by the consultant in 1981 and the recommendations of the roving mission in 1982;

(ii) Taking follow-up action on the Philippine project to establish a Philippine training and research centre for disaster prevention and preparedness, through consultancy services where appropriate;

(iii) Provision of advice and assistance in the field of training in disaster prevention and community preparedness, through consultancy services where appropriate;

(iv) Improvement in the dissemination of timely warnings on typhoons, floods and storm surges, with particular attention to remote areas;

(v) Compilation of information on loss of human life and damage caused by typhoons, including damage to houses, public facilities, agricultural products, etc.;

(vi) Promotion of interdisciplinary co-operation and research programmes among the meteorological, hydrological and disaster prevention and preparedness components;

(vii) Improvement of public awareness on storm warnings coupled with studies of human response to warnings;

(viii) Production of materials related to public information and education on the activities of the Typhoon Committee, particularly on storm warning, disaster prevention and preparedness;

(ix) Establishment/updating of disaster prevention and preparedness plans at different levels;

(x) Strengthening national co-ordination and co-operation between departments/agencies involved in disaster prevention and preparedness activities;

(xi) Improvement of communication systems for warning dissemination and relief operations;

(xii) Improvement of damage assessment and reporting;

(xiii) Development and exchange of information and guidance materials on structural and non-structural measures for mitigating disasters;

(xiv) Conducting case studies on major disasters;

(xv) Organizing joint missions to evaluate DPP procedures and to provide advice on local problems;

(xvi) Establishment of disaster research and training institutes, and

(xvii) Promoting enhanced co-operation among members on DPP matters.

D. Training

(i) Training of personnel through group training courses in Japan, through fellowships under UNDP, TCDC, VCP or other bilateral schemes on:
(a) Tropical cyclone forecasting; (b) meteorology; (c) flood loss prevention; (d) river engineering; (e) technology for disaster prevention; (f) maintenance of electronic equipment.

(ii) Training by TCS staff assisted by counterpart staff in meteorology, hydrology and electronics in particular the calibration, maintenance and repairs of electronic equipment, including on-the-job training.

(iii) Exchange of information and identification of training facilities available among WMO members in areas of concern and a survey of available fellowships and scholarships assistance.

(iv) Participation in study tours and seminars relevant to the Committee's programme organized by members or international bodies;

(v) Organization of training courses/seminars with bilateral/multilateral assistance on (a) flood forecasting; (b) disaster prevention and preparedness; (c) socio-economic impact of disasters; (d) disaster vulnerability and risk assessment; (e) meteorology; (f) hydrology; (g) electronics.

(vi) Provision of short-term fellowships with external support on (a) utilisation of soft-ware for integrating satellite/radar/rainfall data; (b) quantitative precipitation assessment and forecast models; (c) storm surge and wave prediction; (d) flood forecasting.

(vii) Exploration of the possibility of (a) providing facilities for training of personnel in disaster prevention and preparedness; (b) flood loss prevention; (c) establishment of a TC Training Centre for the maintenance of electronic equipment.

(viii) Organisation of seminars on socio-economic impact of disasters, vulnerability and risk assessment and technology for disaster prevention.

E. Research

(i) Stimulation of research activities through consultancy services, visits of study groups, exchange visits by research personnel.

(ii) Promotion of the exchange of information on typhoon related research activities and its results, including developments outside the region.

(iii) Encouragement of co-operation in the study of typhoon-related topics, among researchers in the fields of meteorology, hydrology and social sciences.

(iv) Initiation and/or continuation of research on the following topics:

Post-TOPEX

(a) Utilization of TOPEX data set (radar, satellite, upper-air soundings, etc.) in tropical cyclone numerical and physical modelling with the aim of improving existing methods of predicting formation, development and steering;

(b) Establishment and operation of a typhoon data bank for the Western Pacific and East Asia with compatible software exchange between members, and

(c) Development of an operational NWP model for typhoon movement and development.

Meteorology

(a) Methods of typhoon location and accuracy;

(b) Development mechanism and forecasting;

(c) Disastrous weather associated with typhoons;

(d) Objective forecasting of precipitation;

(e) Meso- and micro-scale weather systems related to typhoons;

(f) Interaction between typhoons and the tropical circulation;

(g) The possibility of extended track forecasting methods;

(h) Sensitivity of objective methods to initial data distribution and quality, and

(i) Compilation of a forecasters' guide for Western North Pacific typhoon prediction.

Hydrology

(a) Research and study on comprehensive flood loss prevention and management;

(b) Research and study on flood risk analysis including flood risk mapping;

(c) Review of the existing flood run-off models and development of appropriate models for the region, and

(d) Further study on application of meteorological inputs to flood forecasting.

Disaster Prevention and Preparedness

(a) Studies on socio-economic impact of disasters;

(b) Vulnerability and risk assessment of disaster-prone areas, and

(c) Socio-economic implications of inaccurate typhoon and flood forecasts and warnings.

Action proposed

The Committee is invited to:

(a) Formulate the programme for 1984, comprising items selected from the above list with suitable modifications;

(b) Urge members to take all possible measures, with the assistance of TCS, to implement the programme.



TYPHOON COMMITTEE SECRETARIAT
PAGASA, QUEZON CITY



United Nations
Economic and Social Commission
for Asia and the Pacific

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TCS/TC/25(a)/16


15 August 1983

Dear Dr. Zaitsev,

We are sending herewith the draft document
WRD/TC.16/5, Programme for 1984 for the sixteenth
session of the Typhoon Committee.

One set of the above document is also being
sent to ESCAP by pouch.

Yours sincerely,


ROMAN L. KINTANAR
Co-ordinator

Dr. A. S. Zaitsev
Director
Research & Development Programmes Dept.
WMO Secretariat, Case Postale No. 5
CH-1211, GENEVA 20
SWITZERLAND

cc: Mr. A. S. Mañalac
Officer-in-charge
Natural Resources Division
ESCAP Secretariat
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Bangkok 10200, THAILAND

WRD/TC.XVI/5
15 August 1983

ORIGINAL: ENGLISH

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

Typhoon Committee
Sixteenth Session
6-12 December 1983
Tokyo

PROGRAMME FOR 1984
(Item 8 of the provisional agenda)

Note by the Typhoon Committee Secretariat

At its fifteenth session, the Typhoon Committee decided that a medium- to long-term plan covering all its activities in the post-TOPEX period should be drawn up for the years 1984-1992.

To carry out this task a meeting by Working Group on programme planning consisting of representatives of China, HongKong, Japan, ESCAP, WMO and the Co-ordinator of the Typhoon Committee Secretariat and its staff was held at Manila/Baguio City in June 1983.

In considering the Committee's programme for 1984, the Committee may wish to take into account the medium- to long-term plan for the Committee drafted by the above-mentioned Working Group and also to consider the short and long term programme of activities approved at its eleventh session.

The execution of TOPEX Sub-experiment will bring new activities and the additional support required in 1984 for this purpose should also be considered.

It is accordingly proposed that special attention should be given, with the assistance of TCS to the following items of work in 1984.

(a) Meteorological component

(i) Operation and maintenance of electronic equipment (R/W, radar, radar picture transmission, satellite receiving and telecommunication equipment);

(ii) Establishment of new radar stations in the Philippines, the Republic of Korea and Vietnam;

(iii) Replacement and/or upgrading of old radar sets in Malaysia, the Philippines, the Republic of Korea and Thailand;

(iv) Provision of equipment and spare parts and training of technicians in proper calibration and maintenance of weather radars and satellite data receiving equipment;

(v) Provision or improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;

(vi) Establishment of satellite data receiving equipment for reception of cloud imagery and other data from GMS and TIROS-N satellites;

(vii) Installation of a computer processing system with a view to integrating satellite, radar and rainfall data so as to provide a spatial distribution of rainfall amount over a large region;

(viii) Review of the efficiency of data exchange on existing point-to-point telecommunication circuits with a view to their improvement, where necessary;

(ix) Enhancement of TC members facilities for reception/dissemination of meteorological information with automation and upgrading of GTS centres to accommodate higher speed data transmissions;

(x) Improvement of data completeness and quality, including real-time and non-real time monitoring;

(xi) Review of national data collection facilities and data exchanges needed for typhoon warning services, taking remedial measures when necessary;

(xii) Review of the existing arrangements for dissemination of typhoon and flood warnings with a view to introducing improvements, where necessary;

(xiii) Procurement and installation of equipment and spare parts for telecommunication, radar, satellite data receivers, etc., under the UNDP fund for 1984;

(xiv) Development of instruments to meet specific needs in tropical cyclone areas;

(xv) Improved operation of those centres with responsibilities for the provision of processed information needed by TC members for their forecasting and warning systems;

(xvi) Co-operation in typhoon monitoring, forecasting and warning;

(xvii) Exchange of forecasts, including products of different objective methods;

(xviii) Commission of a comprehensive study on ways to provide adequate data over tropical cyclone-prone ocean areas;

(xix) Preparation for and execution of the evaluation for TOPEX and its Sub-Experiment on the basis of the programme recommended by the planning meetings and the decisions made by the Management Board for TOPEX; and

(xx) Collection and dissemination of the tide gauge and water level data for use in storm surge prediction.

(b) Hydrological component

(i) Establishment of flood forecasting and warning systems in the Nam Ngun and Se Bang Hieng River basins in Lao People's Democratic Republic, the Kinabatangan basin in Sabah and the Sadong basin in Sarawak, Malaysia, the Pasak River basin in Thailand and one river basin to be selected in Viet Nam;

(ii) Improvement of existing flood forecasting and warning systems, making use where appropriate, of the results of TOPEX;

(iii) Establishment and operation of new flood forecasting and warning system.

(iv) Establishment and operation of flood forecasting and warning systems for dam operations;

(v) Missions of experts to provide technical guidance on items (i) to (iv) at the request of members, with bilateral or multi-lateral support if available;

(vi) Symposium on results of the hydrological component of TOPEX. To be convened by WMO in late 1984;

(vii) Selection of pilot area for establishment of comprehensive flood loss prevention and management;

(viii) Investigation, survey and study of the pilot area selected for comprehensive flood loss prevention and management;

(ix) Missions of experts to provide technical guidance to members on items (vii) to (viii) at request of members, with bilateral or multi-lateral support if available; and

(x) Preliminary survey and formulation of detailed implementation programme for flood risk analysis and mapping in demonstration area(s) including the expert group meeting at request of TC, with multi-lateral support (ESCAP/XB).

(c) Disaster Prevention and Preparedness Component

(i) Follow-up action on the joint LRCS/WMO/ESCAP missions in 1973-1976, the recommendations of the regional seminar at Tokyo in 1976, the review mission in 1976, the consultant's report on Malaysia, the Philippines and Thailand in 1978-1979, the recommendations made by the consultant in 1981 and the recommendations of the roving mission in 1982;

(ii) Follow-up action on the Philippine project to establish a Philippine training and research center for disaster prevention and preparedness, through consultancy services where appropriate;

(iii) Advice and assistance with training in disaster prevention and community preparedness, through consultancy services where appropriate;

(iv) Improvement in the dissemination of timely warnings on typhoons, floods and storm surges, with particular attention to remote areas and to facilitate speedy relief operations with improvement of communication facilities;

(v) Compilation of information on damage caused by typhoons covering the disaster situation as regards loss of human life, damage to houses, public facilities, agricultural products etc.;

(vi) Promotion of interdisciplinary co-operation and research programme among the meteorological, hydrological and disaster prevention and preparedness components;

(vii) Improvement of public awareness on storm warnings coupled with studies of human response to warnings;

(viii) Production of materials related to public information and education on the activities of the Typhoon Committee, particularly on storm warning, disaster prevention and preparedness;

(ix) Establishment/updating of disaster prevention and preparedness plans at different levels;

(x) Strengthening national co-ordination and co-operation between departments/agencies involved in disaster prevention and preparedness activities;

(xi) Improvement of communication systems for warning dissemination and relief operations;

(xii) Improved damage assessment and reporting;

(xiii) Development and exchange of information and guidance materials on structural and non-structural measures for mitigating disasters;

(xiv) Case studies in response to major disasters;

(xv) Joint missions to evaluate DPP procedures and to provide advice on local problems;

(xvi) Establishment of disaster research and training institutes; and

(xvii) Enhanced co-operation among members on DPP matters.

(d) Training

(i) Training of personnel through group training courses in Japan, through fellowships made available under UNDP assistance or TCDC, from VCP and through bilateral assistance schemes. Short-term training courses and fellowships on maintenance of satellite data-receiving equipment, radar and telemetering equipment might be given special consideration;

- (ii) Assistance to members in exploring the possibility of providing long-term training courses in meteorology, hydrology and electronics. The VCP scheme might be further exploited for that purpose;
- (iii) Training by TCS experts, assisted by counterpart staff, in meteorology and hydrology including on-the-job training particularly in the operation and maintenance of radar, satellite data receiver and telecommunication equipment;
- (iv) Exchange of information and identification of training facilities available among WMO members in areas of concern and a survey of available fellowships and scholarships assistance;
- (v) Participation in study tours and seminars relevant to the Committee's programme organized by members or international bodies;
- (vi) Organization of training under TCDC in flood forecasting, including study tours;
- (vii) Provision of short-term fellowships and organization of training in storm surge prediction, in the utilization of software for integrating satellite/radar/rainfall data, in quantitative precipitation forecast models and in tropical cyclone forecasting;
- (viii) Exploration of the possibility of providing facilities for training of trainers for the disaster prevention and preparedness component;
- (ix) Establishment of TC Training Centres e.g., for the maintenance of electronics equipment;
- (x) Exploration of the possibility of providing facilities for training in Flood loss prevention;
- (xi) Organization of training of disaster managers and trainers, test exercises and Regional DPP seminars.
- (xii) Organization of seminar on socio-economic impact of disasters, vulnerability and risk assessment and seminar on technology for disaster prevention.

(e) Research

(i) Stimulation of research activities through consultancy services, visits of study groups and exchange visits by research personnel;

(ii) Undertaking of research on typhoons, (detailed research topics vide item (vii)) and promotion of joint collaboration on selected topics, such as studies directed towards the development of improved storm surge prediction methods, and flood forecasting;

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

(iv) Initiation of studies on disaster risk evaluation in typhoon-prone areas, including flood risk mapping;

(v) Encouragement of co-operation between meteorologists, hydrologists and social scientists in the study of the social and economic impact of typhoons, including response to warnings, estimation of damage etc.

(vi) Undertaking of research on post-TOPEX matters under the following topics;

1) Utilization of TOPEX data set (radar, satellite, upper-air soundings, etc.) in tropical cyclone numerical and physical modelling and with the aim of improving existing methods of predicting formation, development and steering;

2) Establishment and operation of a tropical cyclone data bank for the Western Pacific and East Asia with compatible software exchange between members; and

3) Development of an operational NWP model for typhoon movement and development.

(vii) Undertaking detailed research on typhoons under the following topics:

- methods of typhoon location and accuracy;
- development mechanism and forecasting ;

- disastrous weather associated with typhoons ;
- objective forecasting of precipitation ;
- meso- and micro-scale weather systems related to typhoons ;
- interaction between typhoons and the tropical circulation ;
- the possibility of extended track forecasting methods ;
- sensitivity of objective methods to initial data distribution and quality ; and
- compilation of a forecasters guide for Western North Pacific typhoon prediction .

(viii) Undertaking of research on hydrology as follows:

- 1) Research and study on comprehensive flood loss prevention and management;
- 2) Research and study on flood risk analysis including flood risk mapping;
- 3) Review of the existing flood run-off models and development of appropriate models for the region; and
- 4) Further study on application of meteorological inputs to flood forecasting.

(ix) Undertaking of research on Disaster Prevention and Preparedness as follows:

- 1) Studies on socio-economic impact of disasters;
- 2) Vulnerability and risk assessment of disaster prone areas; and
- 3) Socio-economic implications of inaccurate typhoon and flood forecasts and warnings.

Action Proposed

The Committee is invited to:

- (a) Approve in principle, or modify as it may wish, the items of work outlined above to which special attention should be given in 1984; and
- (b) Urge members to take all possible measures, with the assistance of TCS, to accelerate implementation of its programme.



TYPHOON COMMITTEE SECRETARIAT
PAGASA, QUEZON CITY



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TCS/TC/25(a)/16

10 August 1983

Dear Dr. Zaitsev,

We are sending herewith the following draft document for the sixteenth session of the Typhoon Committee.

WRD/TC.16/1 - Committee's Activities
during 1983

One set of the above-mentioned draft document is also being sent to ESCAP by pouch.

Yours sincerely,


ROMAN L. KINTANAR
Co-ordinator

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Director
Research & Development Programmes Dept.
WMO Secretariat, Case Postale No. 5
CH-1211, GENEVA 20
SWITZERLAND

cc: Mr. A. S. Mañalac
Officer-in-charge
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ESCAP Secretariat
UN Bldg., Rajadamnern Avenue
Bangkok 10200, THAILAND

General

1. At its thirty-ninth session (Bangkok, April 1983), the Economic and Social Commission for Asia and the Pacific (ESCAP) expressed its satisfaction on the work of the Committee during the year, including the successful conclusion of the First Operational Experiment (FOE) of TOPEX held during the period 1 August to 15 October 1982. It also expressed the hope that the Second Operational Experiment (SOE) of TOPEX in 1983 would be successful. Appreciation was expressed by the Commission for the considerable support of UNDP, and the members of the Typhoon Committee to its activities particularly for TOPEX.
2. The Commission noted with appreciation the announcement by the representative of Japan that his Government will host the sixteenth session of the Typhoon Committee in December 1983.
3. The third Planning Meeting (PM-III) for TOPEX was held from 17-21 February 1983 at the JMA headquarters in Tokyo. The report of the meeting will be discussed (Document WRD/TC/16/2) under item 5(a) of the provisional agenda.
4. The sixth and seventh sessions of the Management Board for TOPEX were held from 16-18 November 1982 (Bangkok) after the fifteenth session of the Committee, and 22-23 February 1983 (Tokyo) after PM-III, respectively. Reports on these meetings will be discussed (Document WRD/TC/16/3) under item 5(b) of the provisional agenda.
5. In accordance with views of members at its fifteenth session, that it was considered necessary to draft a new medium- to long-term plan for the Committee, the Working Group, composed of representatives from China, Hong Kong, Japan, the Philippines, ESCAP, WMO, LRCS, UNDRO and TCS Co-ordinator and staff, convened in Manila/Baguio City and prepared a draft plan in accordance to its terms of reference. The report of the Working Group will be discussed (Document WRD/TC/16/4) under item 6 of the provisional agenda.

6. Members of the Typhoon Committee have made considerable efforts to mobilize their resources and manpower required for the Second Operational Experiment (SOE) from 1 August to 15 October 1983. China, HongKong, Japan, Malaysia, the Philippines, the Republic of Korea, Thailand and Vietnam had nominated scientists to be seconded to the International Experiment Center (IEC), Tokyo. National Experiment Sub-centers (ESC's) have also been established by members participating in TOPEX.

7. ESCAP planned to organize a roving mission during the later part of 1983 with the financial and technical support of the Government of Japan. The mission will stay one week in each member, and conduct studies of the present systems of damage survey with a view to identifying deficiencies and recommending improvements. It is also planned that the mission will conduct training seminars on the subject in each of the members visited.

8. In accordance with the decision of the fourteenth session of the Typhoon Committee to strengthen co-ordination with other regional cyclone bodies, the TCS was represented at the tenth session of the WMO/ESCAP Panel on Tropical Cyclones held from 22-29 March 1983 at Dhaka, Bangladesh.

9. The fifth session of RA-II Working Group on Meteorological Telecommunications will be held in Tokyo during 19 to 28 October 1983.

10. A Seminar on Automated Message Switching Systems for Regional and National Meteorological Centres in Southern Asia will be held in Hong Kong during 23 to 29 November 1983.

11. Other missions made by TCS staff during 1983 included:

Telecom & Electronics
Expert

: Japan (February, July to August,
October),

Bangladesh (March),
Thailand (July),
Republic of Korea (July),
Malaysia (August),
China (September)

Hydrologist

: Republic of Korea (July),
Japan (July-August),

Malaysia (August)

Meteorologist

: Japan (February, August, October)

Republic of Korea (July),
Malaysia (August), China (September)

Assistant to the
Co-ordinator

: Thailand (July)

A. METEOROLOGICAL COMPONENT

Meteorological Satellites

12. GMS-2 is continuing its operation at 140°E over the equator since 1 April 1982 and 3-hourly observations are being made regularly and hourly special observations were made during TOPEX TTE period. These GMS data were disseminated by HR and LR facsimile. Cloud wind vectors and sea surface temperatures derived from the satellite data were also disseminated over GTS.

Members of the Committee experienced the importance of GMS information to be used in improving weather forecasting particularly for typhoon and flood warning services in the region.

13. In Japan, an SDUS (Small Scale Data Utilization Station) was installed at Fukuoka and Okinawa in March 1983. Similar equipment will be provided to Sapporo, Sendai, and Osaka in March 1984. An IMOS (Image Monitor Operating System), which is an equipment for animated presentation of false colour GMS images, will be installed at JMA Headquarters in March 1984.

14. In the Republic of Korea, 4 sets of LASER-FAX, which has the capability of receiving good quality satellite imagery from the Seoul head office via land lines, were installed at the three regional forecast centers of Busan, Kwangju, and Kangreung and also at the Kimpo International Airport Meteorological Office. The computer component of the satellite receiver at Seoul was repaired with the spare parts provided through WMO under the UNDP regional typhoon project.

15. Most members are now able to intercept satisfactory either GMS or TIROS-N satellite picture imagery. However, as in the past, members experienced difficulties in obtaining replacement parts for repair and maintenance from abroad. For this reason some members has requested WMO through TCS to provide necessary replacement spare parts to be used for emergency repair. However, provision of spare parts has not been very

satisfactory due to its high cost and insufficient project funds. Members were advised to stock sufficient spare parts to maintain their equipment without long interruption in case of breakdowns.

Radar and Upper-air Observations

16. A special network of 27 strategic upper-air stations were designated to make four observations daily throughout one full TTE-period of five days during the SOE composed as follows: China (10), Hong Kong (1), Japan (5), Korea (1), Malaysia (3), Philippines (3), Thailand (2) and Viet Nam (2).

✓ 17. In support of the SOE, China inspected and calibrated the radar systems at Nanhui, Dongtou, Shantou, and Xisha Dao. It also made available the equipment and expendables used at the committed upper-air stations for the implementations of the intensified observations. A comparison between the newly developed radar prototype and the radar in use at Shangtou was made during the typhoon season.

18. In Hong Kong, a new radar system with CAPPI and DVIP display units was installed in July to replace the existing Plessey 10-cm radar. It is expected that the routine operation could be commenced by the latter part of 1983.

19. In Japan, the weather radars at Kushiro and Akita were renewed in March 1983. The one at Naze will be renewed by March 1984. A radar echo processing/transmitting equipment with automatic elimination of ground clutters was added to the radar at Niigata in March 1983 and will be added to the Mt. Fuji radar by the autumn of 1983. Similar equipment were provided to the radars at Nagoya and Fukui in 1982. The composite echo charts for the areas covered by these radars are being produced for dissemination over the national facsimile network. The ^{composite} ~~comparison~~ charts of radar rain data were calibrated by the AMeDAS data.

20. The Philippines has installed a new 10-cm WSR-77 model radar at Baler, Quezon province in the island of Luzon. This set is provided with DVIP and colour display units. A similar radar is expected to be operational by the end of 1983 in Busuanga, Palawan Province. Hydrogen generators acquired under USAID assistance were installed at Laoag (98223), Mactan (98646) and Zamboanga (98836).

21. In Thailand, following the installation of a new upper-air sounding ground receiving equipment (403 MHz, OMEGA systems, Buekers, USA) in 1983 in Bangna station, Bangkok the installation of the similar sets at Chiangmai and Songkhla are under progress. These were expected to be operational by the end of 1983.

22. With a view to participate effectively in the TOPEX special observations the radars in the Republic of Korea and Thailand were inspected and calibrated by the Telecom and Electronics Expert of TCS.

Meteorological Telecommunications

23. A test exercise on data exchange between the IEC and ESC's conducted on 13 May 1983 was successfully undertaken. As in the FOE, the object of the test was to check the efficiency of transmissions on existing GTS links between the IEC and ESC's and to ensure prompt and reliable data exchange.

24. In Hong Kong, the computer system was enhanced in February 1983. A twin Eclipse S130/S140 computer with 1.5 megabyte CPU, 400 megabyte DISC, 16 terminals graphic VDUS and plotters was installed.

25. In compliance with the request of the members of the Typhoon Committee for the improvement of data exchanges between RTH, Tokyo and NMCs of members, JMA has planned to up-grade the following circuits:

Tokyo-Hong Kong, Tokyo-Seoul with 200 bps by January 1984

Tokyo-Beijing with 9600 bps by January 1985

Tokyo-Bangkok, Tokyo-Manila with 200 bps by April 1985

26. In Malaysia, a new computer system (Perkin Elmer 3230) was installed in May 1983 at the Malaysian Meteorological Service, consisting of 2 processors each of capacity 1 MB, and 6 disk drives of 80 MB each, to implement message-switching of GTS data.

27. In Thailand, with a view to improving the night time data collection 15 sets of SSB transceivers were purchased in 1983. The request was made for allocation of proper frequency bands from concerned authority to be used in night time communications. The Meteorological Department expressed the view that external assistance to Thailand in carrying out the survey of the telecommunication facilities and to draw up the improvement plans would be welcomed.

28. In the Republic of Korea, 4 sets of Automatic Send/Receive Teletype with 8K memory, acquired through WMO under the UNDP regional typhoon project were installed in April 1983. These teletypes have been used effectively to improve national data collections and transmission in Korea.

29. Following the first and second mission for the survey of the meteorological telecommunication systems in the Philippines, a preliminary study was completed with the assistance of the Japanese Government. Feasibility study including radio wave propagation tests are to be conducted during the later parts of 1983.

30. TCS continued to receive quarterly statistics of national data collection and transmission from the members of the Typhoon Committee in order to review the efficiency of its operation. The statistics were analyzed and the summarized results were circulated to members.

Ocean Weather Ships and Buoys

31. The Japanese ocean weather ship "Keifu-Maru" (20°N, 130°E during August-September 1983 and at the vicinity of Torishima Island in October 1983) made 3-hourly surface observations at 00 and 12 GMT, echorawin or rawin observations at 06 and 18 GMT, radar observations at 00 and 06 GMT, and BT observations once daily. Keifu-Maru also participated in the intensified upper-air observations during the TOPEX TTE periods. Japan continued to operate ocean buoys Nos. 3, 4, 6, 7, and 8 at their usual locations.

Exchange of Radar Fixes

32. Regular and prompt exchange of radar fix messages through the GTS were undertaken by members and in response to the decision of the Committee at its 15th session, these radar fix messages were included in RTH radio broadcasts for the benefit of those members which have not yet established point-to-point GTS circuits.

Meteorological Reconnaissance Flights

33. Reconnaissance flights by United States aircraft continued to provide valuable information for typhoon warning and tracking purposes. At its 15th

session, the Committee welcomed the information that the United States of America was likely to continue its programme of typhoon reconnaissance in the years ahead.

Action Proposed

34. The Committee is invited to :
- (a) revise its list of priorities;
 - (b) recommend further measures to expedite implementation of the required meteorological observing and telecommunication facilities;
 - (c) record its appreciation to Japan for maintaining the GMS operations.
 - (d) records its gratitude to USA for providing aircraft reconnaissance information.

B. HYDROLOGICAL COMPONENTGeneral Activities

35. Continued efforts were made to improve the flood forecasting and warning systems in the major river basins in the Philippines, China, Malaysia, Thailand and the Republic of Korea. Based on the programme for 1983 agreed upon during the 15th session of the Typhoon Committee, the following activities were undertaken by members:

Japan

36. Five radar raingauges established until 1982 were operated satisfactorily during 1983. Two additional systems in the southern area of Japan are expected to be established in 1983.

Malaysia

37. Pre-construction steps were undertaken to establish flood forecasting systems in Sabah and Sarawak, in accordance with the technical feasibility studies carried out with the assistance of the Japanese Government in 1979-1980. The systems are expected to be completed in 1984.

38. The Drainage and Irrigation Department has started the study of flood risk mapping in the Klang River Basin, to promote comprehensive flood loss prevention and management.

Philippines

39. The flood forecasting systems in the Agno, Bicol and Cagayan River Basins, which were established before and rainy season of 1982, were fully operational during the rainy season of 1983. The flood forecasting system in the Pampanga River basin was also operated. The system was established in 1973 as a pilot project of the Typhoon Committee and rehabilitated in 1982 with the assistance of the Japanese Government. To further improve the system, PAGASA has began a detailed survey for establishing additional two raingauge stations and a water level gauge station. Government agencies have been conducting detailed design survey for establishing flood forecasting and warning systems for five dam operations project in Luzon Island to reduce

the damage caused by water released from dams. These systems are expected to be completed in 1985.

Hong Kong

40. A flood warning system covering both urban and rural areas was introduced in 1983. A rainfall data collection system consisting of about 40 automatic telemetering raingauges is providing input data for the operation of the warning system. The network will be extended to a total of 60 raingauges by the end of 1983.

Republic of Korea

41. The flood forecasting system in Han River basin operated well during typhoon season in 1983. Chungju Multipurpose Dam is under construction and is expected to be completed in 1985. With a view to a more accurate flood forecasting in Han River basin, additional rainfall and water level gauging stations are being installed. Furthermore, the existing flood forecasting method is reviewed and more suitable flood forecasting system for Han River basin are expected to be established until the completion of the multipurpose dam. A Japanese hydrologist was sent to the Han River Flood Control Office for the improvement of the system in August 1983 for one year.

42. In the Anyang River basin, survey for comprehensive flood loss prevention and management, including existing data and data observed in the past two years is in the final stage.

China

43. Further improvement of the semi-automatic telecommunication system which was completed in the Puyang Jiang River basin in 1982, has been planned. In the Xishi Jiang River basin, improvement of the telecommunication facilities of flood forecasting system is underway, consisting of additional telemetering stations and telecommunication line connecting to the hydrological center and by installing a computer system in Guangzhou. Establishment of an experimental flood forecasting system is under preparation in the Yihe River basin.

Flood Loss Prevention and Management

44. As a part of comprehensive flood loss prevention and management, Japan has been promoting a comprehensive mudflow countermeasure which consist of promotion of sabo-works, publication of mudflow risk area for

public use, establishment of warning and evacuation system, promotion of removal of residences in mudflow risk areas, and collection, and dissemination of information on mudflow.

Action Proposed

45. The Typhoon Committee is invited to:
- (a) Note the above information;
 - (b) Consider steps for the establishment of pilot area of comprehensive flood loss prevention and management by each member; and
 - (c) Consider steps to be taken for flood risk analysis and mapping.

C. DISASTER PREVENTION AND PREPAREDNESS (DPP) COMPONENT

General Activities

46. To further improve gathering of disaster statistics, members, in co-operation with UNDRO and LRCS, adopted a standard format for damage assessment.
47. Case studies formed an important activity under Warning Dissemination and Information Exchange Component of TOPEX. Public education and training also received increased attention by members. Publication of pamphlets containing information on typhoons, flooding and measures for community preparedness were likewise undertaken.

National Activities

Hong Kong

48. The Natural Disaster Emergency Organization has been thoroughly reviewed. Warning systems covering tropical cyclones, storm surges, flooding and landslips due to heavy or prolonged rainfall, etc. have been streamlined. Dissemination lists were updated for all warnings, advice and precautionary announcements originated by the Royal Observatory. In addition, the Information Service Department ensured that all public notification regarding the operations and decisions of government department and other organizations in respect to closure of schools, suspension of public transport services, etc. were promptly disseminated for broadcast. The public has been kept informed by broadcasts of the extent of the disaster and the arrangements made to ensure safety and provisions for relief. Improvements were also introduced in the collection of operational data, e.g., real-time wind, rainfall and tide in the territory. The Royal Observatory also carried out a programme of press, radio and TV interview to publicize the various warning services.

C h i n a

49. Activities were carried out mainly on the improvement of the capability of the communication network by setting up radio links, provision of

audio-visual facilities for public education and information, and development of training for trainers.

50. Weather forecasting offices along the coastal areas were requested to implement the system for rendering typhoon forecasting services and reporting timely disaster information.

J a p a n

51. In support for TOPEX the seminar on Hydrology and WD/IE was organized in Tokyo through the assistance of Japan International Co-operation Agency (JICA). This seminar is aimed at, among others, ways and means of improving member's systems for typhoon disaster mitigation.

Malaysia

52. A case study was made on the heavy monsoon rainfall of 13-16 December 1982 causing flood over the Kelantan river basin. Approximately 4,900 people were evacuated to higher grounds by providing advance warnings but several lives were still lost.

53. The Ministry of Welfare Services was given the responsibility to identify and establish evacuation centers, to manage such centers during disaster periods, to provide rehabilitation facilities needed for the victims. A total of 2,234 evacuation centers capable of giving care and protection to 604,000 were identified for the whole country. Welfare and other officials, as well as volunteers, were also identified to manage the evacuation centers in times of disasters. Members of 102 "Forward Supply Bases" whose tasks were to stock food and other necessities were also identified in isolated areas where the likelihood in breakdown in transportation and communication systems would occur. The services of the Malaysian Air Force were also recruited for short notice airlifting of supplies to disaster affected areas.

The Philippines

54. Illustration pamphlets on the precautionary measures to be taken in the event of typhoons, floods and landslips were made and distributed in typhoon-prone areas, river basins, coastal areas and areas on mountain slopes.

55. Test exercises were carried out to test the dependability and reliability of the warning systems, e.g., the siren system used in the downstream area of the Angat Dam in Bulacan (Central Luzon). Evacuation drills were also conducted and the damage assessment scheme based on the manual published by the Office of Civil Defense in 1982 in "How to Assess Damage Impact" were tried. A committee was formed to handle matters relative to the conduct of survey on the efficiency and effectivity of warning dissemination especially to disaster-prone areas.

Thailand

56. The Meteorological Department and the Local Administration Department (LAD) implemented the plan which the focal points of the three components of TOPEX worked out during the experiment period for better interaction between local governments and the general public. The LAD planned to establish a Civil Defense School for the training of volunteers and to undertake case studies.

57. A case study on historical floods and losses was conducted. Pamphlets for community education and awareness of natural hazards were published and circulated. Standardization on the assessment of damage caused by tropical cyclones since 1981 were undertaken using the recommended format adopted at PM-III.

58. All emergency communication network, disaster prevention wireless system and warning dissemination systems were activated in support of TOPEX/SOE.

Action Proposed

59. The Committee is invited to:

- (a) note the above information; and
- (b) consider further the action necessary to ensure effective work in the field of DPP with reference to recommendations made by consultations and roving missions in the past and the medium- to long-term plan of the Committee (1984-1992).

D. TRAINING COMPONENTGeneral Activities

60. Members availed of the opportunity to participate in the Regional Training Seminar on Flood Forecasting organized within the framework of ESCAP/WMO Typhoon Committee held in Bangkok on 21-25 February 1983, at the Asian Institute of Technology (AIT). Members also availed of the offer of the British Meteorological Office College, Shinfield Park, Reading, U.K. for two-year course in Basic Electronic Instrument Maintenance starting September 1983.

61. In support of TOPEX, Japan conducted a seminar on Hydrology and Warning Dissemination and Information Exchange (WD/IE) components from 1 July to 6 August 1983 in Tokyo. This seminar was participated by focal points of TOPEX or those nominated by them.

62. Group training courses were also held in Japan for the benefit of members of the Committee on the following subjects:

- (a) river engineering (July to November);
- (b) flood loss prevention and management (July to September);
- (c) technology for disaster prevention (September to December);
and
- (d) training course in meteorology (October to January 1984).

63. On-the-job training on radar maintenance and calibration was provided by TCS expert in Malaysia, Thailand and the Republic of Korea.

64. Short training on application of satellite picture for typhoon and heavy precipitation forecasting was also provided by TCS experts in Malaysia and Korea.

National ActivitiesC h i n a

65. A national level meeting including training for TOPEX was held in Shanghai in May 1983. Discussions included the result of FOE and arrangements for the SOE.

⊗ Members availed of the WMO sponsored "Training course on the use of Satellite Data for Operational Purposes" at Fort Collins, Colorado, 11 Nov 1983

Hong Kong

66. The Royal Observatory conducted for the first time an in-house course on meteorology of Southeast Asia, for a number of forecasters, from April to June 1983. Particular emphasis was placed on regional forecasting and tropical cyclone forecasting.

Malaysia

67. An engineer from the Drainage and Irrigation attended the training course in Hydrological Forecasting held at the University of California, Davis, USA from 5 July to 23 September 1983.

The Philippines

68. A regional training seminar-workshop on Disaster Preparedness was conducted for field meteorological personnel each for a duration of 10 days, conducted for Mindanao, Northern Luzon, Southern Luzon and the Visayas during December 1982 May, June and July 1983, respectively.

Thailand

69. Seven personnel underwent training in Remote Sensing on three occasions held from January to April, May to August and September to December 1983, respectively, conducted by AIT in Bangkok.

70. Participation was also undertaken on the HOMS Workshop on Application of Micro-Computer to Primary Forecasting of Hydrological data held at the AIT from 4-16 July 1983.

71. A participant was sent to the sixth FAO/UNDRO/WMO/SEA training course on Satellite Applications to Flood Control and Forecasting held from 7-18 November 1983 in Italy.

72. The Seminar on Automated Message Switching Systems held from 23-29 November 1983 in Hong Kong for Regional and National Meteorological Centers in Southeast Asia has also been availed of.

Action Proposed

73. The Committee is invited to :
- (a) note the above information;
 - (b) record its gratitude for the assistance provided by the government of Japan in organizing seminars and training courses for members of the Committee; and
 - (c) advise members to take full advantage of the various training facilities offered by members, UNDP and through the WMO/VCP.

E. RESEARCH COMPONENTGeneral Activities

74. At its 15th session members agreed to expand their research activities to include not only the Meteorological Component but also the Hydrological and the Disaster Prevention and Preparedness components. Attention was drawn to the system whereby members had, in the past, designated research correspondents whose responsibility were to collect and exchange information on research activities and to participate jointly in selected projects. The members stressed that it would be beneficial to reintroduce that system and requested TCS to initiate action. Accordingly, some members have re-designated their research correspondent(s) to undertake actions.

National ActivitiesC h i n a

75. Three studies titles namely, "Diagnostic analysis of abnormal typhoon tracks", "Generation and development of off-shore typhoon and its intensity" and "Development of a NWP model for typhoon tracks" were submitted to the Sub-Committee for the TOPEX Sub-experiment. These studies are now underway. A national-level workshop for TOPEX was planned after the SOE ends in 1983, at which time, the results of these research work will be presented. Eleven typhoon objective forecasting methods were put in operation and evaluation was undertaken to select the best to be used in typhoon forecasting operations.

Hong Kong

76. An objective method to forecast tropical cyclone movement based on a combination of statistics and synoptic pattern was developed using upper-air and tropical cyclone data of 1973-1980 and it would be tested using data of 1981-83. Work was also in progress to find an alternative way of combining persistence and climatology in tropical cyclone movement forecasts.

77. Simulated tropical cyclone movement forecasts using several common objective methods were carried out in which random errors with known statistics properties were added to initial best-track positions. The results were used to evaluate the extent to which initial position errors contribute to forecast position errors.

78. A critical review of climatological data on tropical cyclones before 1940's was carried out. A summary of tropical cyclone making land-fall was also prepared. The life spans of various categories of tropical cyclones were examined.

Japan

79. Research activities were centered mainly on the sub-experiment of Meteorological Component of TOPEX, especially those endorsed by Third Planning Meeting for TOPEX (PM-III).

80. The HITAC 8800 computer at JMA for NWP was replaced by a HITAC M-200H which became operational in March 1982. Performance of the old and the new computers were compared. Details in the changes in the NWP models associated with this renewal of computer will be given in the publications entitled "Outline of operational NWP at Japan Meteorological Agency, August 1983" for distribution from WMO soon.

Malaysia

81. National efforts for the Sub-Experiment of TOPEX have been initiated using FOE data. Research activity is focused on the development of convective systems and the large-scale influence of typhoons over Equatorial Southeast Asia. A preliminary study on this subject has already been completed and the paper will be distributed to members in due time.

Philippines

82. Continued effort had been undertaken in relation to DPP research on social behaviour of communities during disasters and also on the translation of technical terms of tropical cyclone warning terminologies into terms understandable of laymen.

83. Under the Meteorological Component continued effort were undertaken on the sub-experiment of TOPEX, especially those involving typhoon forecasting methods.

Republic of Korea

84. Research had been planned on typhoon climatology, forecasting typhoon movement and intensity change using objective methods with dynamic techniques and using non-divergent barotropic model with empirical techniques from the results of George, J.E. and W.M. Gray.

Thailand

85. Studies had been executed, under the Hydrological Component, on short-term forecasting using the stage-correlation model and SARP Model from the existing hydrological network of the Pasak river basin, and on the long-term forecasting using seasonal stream flow forecasting.

86. Continued effort were made on research on DPP involving case studies on warning dissemination and information exchange of TOPEX.

Action Proposed

87. The Committee is invited to:

- (a) note the above information; and
- (b) consider further action necessary to ensure effective collaboration in typhoon and associated flood research and to exchange the results amongst members.

No. 34.234/R/CY/TC.1

GENEVA, 8 June 1983

Sir,

On behalf of the Executive Secretary of the Economic and Social Commission for Asia and the Pacific, and on my own behalf, I have the honour to write to you in connexion with a decision made by the ESCAP/WMO Typhoon Committee at its fifteenth session held in Bangkok in November 1982.

At each of its annual sessions the Committee reviews not only its programme of work but also the resources that are necessary to maintain these humanitarian activities. As you will be aware, the programme is carried out with assistance from a variety of external sources which supplement the national input made by the ten member nations themselves.

Over a period of many years the United Nations Development Programme has been one of the major external sources of support to the Committee. The Typhoon Committee Secretariat (TCS), with its small number of professional staff, was originally established with UNDP support and, throughout the Committee's existence, UNDP has made large contributions to programme activities. These contributions have taken the form of equipment purchases, training through fellowships and seminars, consultant services and support for TCDC activities.

In accordance with the UNDP policy in regional projects of this type that the countries themselves should progressively assume greater responsibility, in recent years the members of the Committee have largely taken over the staffing and operation of the TCS. Thus counterpart staff are being provided by Japan (a hydrologist) and by the Philippines (a meteorologist). Only the post of Telecommunications and Electronics Expert is still provided by UNDP and that for a limited period. All the facilities for the TCS in Manila including office accommodation and supplies, supporting staff (secretaries and drivers) and local transport services are also provided by the Government of the Philippines.

In application of its policy, UNDP has expressed the wish that members should continue to demonstrate their intention of becoming increasingly self-reliant. Further progress in this direction would enable UNDP, within the limits of the budgetary resources available to it, to consider providing support of programme activities under the project.

To Ministers of Foreign Affairs of members of the Typhoon Committee

For these reasons the Committee at its fifteenth session proposed that consideration be given by members to making annual cash contributions in support of its work. It was decided that the views of members should be sought by correspondence and that information be given to enable governments to reach a decision.

The objective of seeking these contributions would be to continue and strengthen the role of the TCS in the management and execution of the Committee's programme. As already mentioned, such an arrangement would, in addition, help to justify further UNDP support for this important work. An assessment of the minimum needs for each year suggests that the initial total target should be US \$120,000 per annum. This sum would provide for:

- (a) the Telecommunication and Electronics Expert (12 man-months),
- (b) consultancy services in disaster prevention and preparedness (3 man-months),
- (c) mission travel for counterpart TCS staff assisting members,
- (d) programme support cost as necessary.


In support of these proposals I should like to comment that the vital nature of the expert services in (a) above has been widely recognized by all members of the Committee. Successful forecasting and warning of typhoons is highly dependent upon the smooth functioning of a complex operational system. The expert's services for this purpose are of the highest importance. Regular consultancy services (b) in disaster prevention and preparedness would meet a long-felt need of the Committee. They are directly related to the safety of human life and to economic and social development. Finally, if counterpart TCS staff are to fulfil their function of advising members, occasional visits are essential. A small provision has been included in the target total for this purpose.

It would therefore be greatly appreciated if you would give your earnest consideration to this proposal which has been designed to give each of the members the maximum return in services for a minimum financial contribution. As may be seen, if all ten members were to contribute equally the annual cost to each would be of the order of US \$12,000. On the other hand, default in contributing by one or more members would lead either to increased cost to the remaining members or to a reduction in the level of the services available. It is therefore highly desirable that each member should participate in this scheme of considerable benefit to all. Contributions higher than the minimum level necessary to provide these services would, therefore, be especially welcome. I need hardly add that appropriate arrangements would be made, with the consent of members, to ensure the sound and efficient management of the available funds.

In order that the necessary steps may be taken to organize the above-mentioned services as soon as possible, receipt of your decision on these proposals by 1 September 1983 would be greatly appreciated.

A copy of this letter is being forwarded to the Permanent Representative of your country with WMO.

Accept, Sir, the assurances of my highest consideration.


for (A.C. Wiin-Nielsen)
Secretary-General

07 VI 83

Summary of recommendations of the consultant on disaster
preparedness (Dr. K. Seevaratnam) and the Roving Mission
of the Government of Japan*

China:

1. Improvement of capability of communication network by setting up radio telecommunication links.
2. Provision of audio-visual facilities for public education.
3. Development of "training of trainers".

Japan:

1. Further training Seminars particularly for the "Training of Trainers".
2. Computerisation of data on impact of typhoon and related disasters in the Typhoon Committee member countries be undertaken together with information on action taken by the different agencies in those countries, including deficiencies, etc.
3. Know-how on vulnerability studies, data collection/damage assessment, etc., be shared with Typhoon Committee member countries not having developed such activities.
4. The document entitled "Disaster Prevention System in Japan" prepared by the Disaster Prevention Policy Planning Division, National Land Agency, be given wide circulation among countries developing a Disaster Prevention and Preparedness System, with a view to being used as a guide.

Malaysia:

1. Interested agencies be linked in not only test exercises but also in the training programmes, with accent on the training of trainers.
2. Frequent meetings between agencies to discuss common problems and work out solutions.
 - a. Installation of additional notice boards in the Kelantan river basin particularly in rural areas, and application of similar systems to other river basins.
 - b. Compilation of records of past floods particularly on maximum water levels. Photographs taken during floods in the past may provide useful information.
 - c. Drills for flood fighting and evacuation.
 - d. Attention to flash flooding being aggravated by urbanization in the watershed.

*Those in numerals are recommendations of the consultant, while those in small letters are of the roving mission.

Philippines:

1. Improvement of communication networks linking remote disaster-prone areas.
2. Development of an effective system of damage assessment.
3. Training of trainers.
 - a. Review of the form of warning "Typhoon Signals".
 - b. Streamlining of flow of information between all levels.

Republic of Korea:

1. A greater use of audio-visual means and print media for public education during non-disaster times.
2. Closer co-operation of agencies concerned, not only in test exercises, but also in the training programme, etc.
 - a. Publication of pamphlets to improve public awareness of danger.
 - b. To record the arrival time at the lowest level in order to investigate the time required for warning dissemination.
 - c. Collection and analysis of old documents on past disasters.

Thailand:

1. Closer co-operation among agencies concerned for a more efficient counter-disaster programme.
2. Provision of more communication facilities for a rapid assessment of damage as well as for conveying warnings to remote areas.
3. Development of training programmes.
 - a. Publication of a pamphlet on flood information: How high will be the flood level, under what conditions and how to react to it.
 - b. Collection and analysis of old documents on past disasters.
 - c. Improvement of the communications network linking the various agencies concerned, especially at town or village level.

Viet Nam:

1. Closer co-operation of agencies concerned.
2. Development of public information and education programmes.
3. Assistance in the areas of damage assessment, training of trainers and the community in disaster preparedness.