

UNITED NATIONS ECONOMIC AND SOCIAL COMMISSION

FOR ASIA AND THE PACIFIC

AND

WORLD METEOROLOGICAL ORGANIZATION

REPORT OF THE TYPHOON COMMITTEE

ON ITS INAUGURAL SESSION

Bangkok, Thailand
17-20 December 1968

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Inaugural Session of the Typhoon Committee

17-20 December 1968

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DRAFT REPORT OF THE TYPHOON COMMITTEE
(FIRST SESSION)

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I. INTRODUCTION

1. In accordance with article 12 of the Statute of the Typhoon Committee (Annex 1) which states that "the first meeting of the Committee shall be convened by the Executive Secretary of the Commission in consultation with the Secretary-General of WMO after at least three Governments of ECAFE regional member countries have signified their intention of joining the Committee", the inaugural session of the Typhoon Committee was held at Bangkok from 17 to 20 December 1968. The meeting was attended by representatives of the following participating Governments in the Typhoon Committee: Republic of China, Hong Kong, Japan, Republic of Korea, Laos, the Philippines and Thailand. Representatives of Australia, France, the Netherlands, the United States of America and the USSR also attended as observers. The UNDP Regional Representative and observers from the ICAO and LRCS also attended the meeting. The list of representatives is shown in Annex 2 of this report.

2. A brief description of the events leading to the establishment of the Typhoon Committee is shown in Annex 3 of this report.

3. Mr. U Nyun, Executive Secretary of ECAFE, after welcoming the delegates, compared the typhoon damage control project with the Mekong project. He stated that the two projects were similar in many respects - in conception, objectives and approach. He pointed out that the new project enjoyed the special advantage of having the co-operation of the World Meteorological Organization. For the guidance of the Typhoon Committee, he offered some valuable suggestions drawn from the experience of the Mekong Committee. In concluding, he deemed it encouraging that the world as a whole was paying increasing attention to the provision of relief for the victims of natural disasters which indicated that the idea of assisting the economic and social development in developing countries by mitigating the adverse effects of natural disasters is likely to win world-wide support. He also reaffirmed the continuing support of ECAFE to the Typhoon Committee.

4. Mr. D.A. Davies, Secretary-General of WMO, greeted the delegates and expressed the keen interest of his organization in mitigating typhoon damage not only in the ECAFE region but also in all parts of the world where such a menace existed.

/He reported

He reported that the Executive Committee of WMO attached great importance to this project and had urged the organization to take a more active role in its implementation. He declared that the creation of the Committee was a timely step since modern scientific and technological developments such as meteorological satellites, new telecommunication system and high speed electronic computers opened up possibilities for establishing greatly improved typhoon warning systems in the individual countries which could save many lives and reduce typhoon damage. He also pledged the support of WMO to the Committee.

5. Vice-Admiral Sanit Vesa-rajananda, Director-General, Meteorological Department, Government of Thailand was elected Chairman and Dr. Roman L. Kintanar, Director, Weather Bureau, Republic of the Philippines was elected as Vice-Chairman.

6. After the adoption of the agenda, Mr. U Nyun and Mr. D.A. Davies outlined the broad approach which they believed the Committee might adopt in its work.

7. The Executive Secretary of ECAFE, Mr. U Nyun hoped that the activities of the Committee be problem-, action-, and result-oriented instead of being devoted to purely academic discussion. In outlining the broad strategy which he had in mind in implementing the typhoon damage control programme, he recommended the approach adopted by the Mekong Committee. First a comprehensive and practical action programme must be formulated. Then the countries must determine which portion of the programme could be implemented from national resources. The remainder of the requirements could then be sub-divided into components of reasonable magnitude for which financing could be sought from various sources such as assistance through bilateral or multilateral arrangements or through the UNDP or grants from regional financing institutions.

8. The Secretary-General of WMO, Mr. D.A. Davies, agreed fully with the general line of approach suggested by the Executive Secretary of ECAFE and stated that the two main tasks were to prepare a detailed plan and to develop a realistic implementation programme. The various components of the project, when established, would have to be implemented by all methods available. Whilst national resources should be used whenever possible, bilateral aid, UNDP and the new WMO Voluntary Assistance Programme should all be applied as and when circumstances required and permitted. He pointed out that any component forming part of the World Weather Watch could also be the subject of a request under VAP,

/submitted

submitted either on a national basis by the country concerned or in the form of a joint request from a body such as the Typhoon Committee comprising countries all of which are Member of WMO.

9. The meeting then discussed and finalized the programme schedule of the session. The meeting began with a review of the current meteorological, hydrological and telecommunication facilities for typhoon damage control, concentrating on changes which had taken place since the ECAFE/WMO Preparatory Mission on Typhoons completed its survey in 1967.

10. Following the review of current facilities for typhoon damage control, the Committee discussed and finalized an action programme to secure the establishment of the additional facilities required. The programme was comprised of the meteorological component, the flood forecasting and warning component and a component covering other complementary measures.

11. The Committee also discussed the financial and technical support required for new facilities, and mentioned possible sources of financing in addition to available national resources.

12. The representatives gave brief statements on the principal activities of their respective countries in the co-ordination of research and training activities related to typhoon and typhoon damage control. Some measures as regards training were discussed by the Committee.

13. The activities that the ECAFE/WMO Joint Unit on Typhoons was to carry out in the interval between the first and second sessions of the Committee were discussed.

14. The Committee decided that the time and place for the second session would be determined later by consultation among the Chairman, the Vice-Chairman, and the ECAFE and WMO secretariats.

15. After the vote of thanks, the meeting was closed on 20 December 1968.

/II. REVIEW

II. REVIEW OF CURRENT FACILITIES FOR TYPHOON
DAMAGE CONTROL

(Agenda Item 5)

16. The Committee was aware that to minimize typhoon damage, there must be basic meteorological, hydrological and other supporting facilities essential to an efficient detection, forecasting and warning service and considered that a review of the current facilities was necessary so that the major deficiencies could be identified. It was recalled that the ECAFE/WMO Preparatory Mission on Typhoons completed, in April 1967, a comprehensive survey of such facilities in each of the countries affected by typhoons.

A. Meteorological facilities

17. The Typhoon Committee first considered the information given in document "Review of Current Meteorological Facilities for Typhoon Damage Prevention" (WRD/TC1/3) on the meteorological observing and telecommunication facilities required for typhoon damage prevention but which do not yet exist in the countries affected by typhoons. The Committee learned with great interest of the action taken by a number of countries to implement new facilities and noted that further plans had been drawn up for the introduction of other facilities over the next few years. It felt that an encouraging start had been made in most of the countries concerned; it also recognized that there remain a number of very important facilities for which no implementation plans had been made at the time of its first session.

18. As the discussion on this item revealed that certain additions or allocations to the information contained in the appendices to Doc. WRD/TC1/3 were necessary, the Committee felt that the main changes reported and immediate plans by members should be recorded in the report of the session. They are accordingly given below.

/Observational

Observational activities

19. In the Republic of China, radiosonde/radiowind observations were currently made daily at 00 GMT as well as at 12 GMT at 46747 Tungkong. The station at 46734 Makung was also making radiosonde/radiowind observations at 12 GMT daily.

20. An APT station had been installed at Taipei. The weather radar to be installed at Kaohsiung under the UNDP (Special Fund component) was expected to come into operation before the beginning of the 1969 typhoon season.

21. The 12 GMT radiosonde observation required at 45004 King's Park, Hong Kong, will be introduced as from 1 January 1969 when new Vaisala equipment is installed.

22. Japan announced that a new APT station for routine operational use had been set up. Altogether 15 radar stations had been established and had contributed greatly to the prevention of typhoon damage. The network of weather radars was to be further reinforced by the setting up of additional stations from 1969 onwards.

23. An APT station at Seoul in the Republic of Korea would be established from national resources in 1969. Two of the six island surface observing stations in the Yellow Sea specifically recommended by the ECAFE/WMO Preparatory Mission were set up in 1968. The remaining four would be brought into operation by 1971. The weather radar requested at Seoul was scheduled to be installed in June 1969.

24. The radiosonde/radiowind station at 48940 Vientiane in Laos could be established as soon as negotiations regarding the offer of ground equipment from Finland had been completed and subject to provision of expendables for the first year's operation. After one year the Government of Laos would continue the operation from national resources. The surface station at 48924 Muong-Sing was in operation but the reports could not be received at present. This remark applied also to the additional surface observations required at 15 and 21 GMT from 48928 Sam Nena and 48935 Plaine des Jarres (Xiengkhoneang).

25. With references

25. With reference to the project for the extension of the runway at Vientiane airport, regarding which negotiations were in progress with the Government of Japan, it was hoped that a weather radar would be included in the project and installed as soon as possible.

26. The Weather Bureau of the Philippines set up a new surface observing station on Jomalig Island in October 1968. The importance of additional stations at Balabac and Cagayan Sulu for typhoon purposes had been recognized although financial difficulties prevented this immediate establishment. Ground equipment was expected to be installed at the radiosonde/radiowind station at 98645 Cebu and at the radiowind stations at 98618 Puerto Princesa and 98754 Davao in late 1969 or early 1970. These stations should all be operational by mid-1970. Full implementation of the radiosonde/radiowind programme at 98223 Laoag and 98836 Zamboanga was expected to be realized by mid- or late 1969 with the provision of additional consumables and personnel.

27. The weather radar station recommended at Guiuan was being established. The building was under construction and the equipment had been purchased. The station should become operational by late 1969 or early 1970. The cost of radar stations at Basco, Puerto Princesa and Manila could not be met from national resources at present. Equipment for the APT station at Manila was expected to arrive in early 1969 and to become operational in mid 1969.

28. Efforts were being made in Thailand to increase the programme at those surface stations where the 15 and 21 GMT observations were not made. The weather radar formerly at Khon Kaen had been transferred to Songkhla.

Telecommunication activities

29. The Republic of China reported that all national weather data were now collected within 10-15 minutes and disseminated immediately in accordance with international requirements. The proposed point-to-point link between Taipei and Hongkong was expected to be implemented in 1969. RTT and facsimile reception facilities had been installed at Taipei since 1961.

30. Work was in progress to establish RTT point-to-point connexions from Hong Kong to Tokyo and Bangkok. The Hong Kong-Tokyo portion would be by cable and the Hong Kong-Bangkok portion would be by radio with error correction. Both links would operate at speed of 75 baud and were expected to be established by April 1969.

31. In Japan the replacement of radio and landline Morse networks by landline teleprinter and VHF radio telephone networks would be completed in 1969. Progress was being made on the Main Trunk Circuit and for the Tokyo-Melbourne portion a 75 baud point-to-point teleprinter circuit would be inaugurated in April 1969. The Tokyo end of the Tokyo-Washington circuit was ready for operation. For both portions the further plan includes up-grading the speed to 2400 baud with target dates of January 1970 for the Tokyo-Washington portion, and January 1971 for the Tokyo-Melbourne portion. An Automatic Data Editing and Switching System (ADESS) was under test to meet the requirements for high-speed transmission. Improvements in the circuits from Tokyo to Khabarovsk and Seoul were not expected before 1971.

32. In Korea, the establishment of a RTT point-to-point connexion between Seoul and Tokyo will be undertaken when a bilateral agreement has been concluded between the Governments of Korea and Japan and the link is expected to come into operation during 1969.

33. In Laos, the SSB transmitter/receivers have been in service for a month already at the six basic synoptic observation stations, and collection takes place at the National Collecting Centre within 15 minutes, as stipulated by WMO regulations.

34. All the Philippine stations included in the basic synoptic network had been linked to Manila by SSB and the observations were received within 15 minutes. The RTT link between Manila and Bangkok came into operation in February 1968. The equipment for the reception of RTT transmissions from the RMC/RTHS as required was expected to be in operation by mid-1969. Manila International Airport, Cebu (Lahug Airport) and Zamboanga had been equipped with facsimile receivers for the reception and broadcasts from RMC/RTHS.

35. To improve the Bangkok RTT broadcast, Thailand would install a 10 kW transmitter early in 1969.

B. Hydrological facilities

36. The projects studied and recommended by the ECAFE/WMO Preparatory Mission on Typhoons as well as the progress reported during the second meeting of experts on typhoons were briefly mentioned in the introduction of this sub-agenda item. The member countries provided information on further progress achieved since the second meeting of experts on typhoons in October 1967.

37. In China (Taiwan) a telecommunication system had been established in the Tanshui River Basin for the transmittal of river stage data from six designated streamflow measurement stations for flood warning purposes. A scheme for the improvement of flood forecasting and warning network in the Tanshui River Basin had been formulated by the various agencies concerned. It was expected that this project would be implemented in the near future. Some assistance from the Typhoon Committee would be welcome.

38. The facilities for providing warnings for flash floods in Hong Kong were improved as recommended by the Preparatory Mission on Typhoons through increased radar observations.

/39. Under

39. Under the second five-year economic development plan of the Republic of Korea, there were increased efforts to control floods by constructing multiple-purpose dams on major rivers within the framework of the overall national construction programme taking into consideration the experience and accomplishments during the first five-year economic plan. Two essential principles adopted in the plan were the construction of multiple-purpose dams with provision for flood control and the establishment of efficient flood forecasting and warning systems in major river basins subjected to floods caused by typhoons.

40. In Laos the co-ordination between the meteorological and hydrological offices had been established for purposes of flood forecasting. At the start of the rainy season, outlook for weekly periods are made concerning the weather, particularly for typhoons and tropical depressions as well as two-day forecasts for the flood level fluctuations of the Mekong river.

41. In the Philippines efforts were continued by the Philippine Weather Bureau and the Bureau of Public Works in the prosecution of the pilot flood forecasting and warning system on the Pampanga River Basin. The Philippine Weather Bureau had to date established, and was now operating, five rainfall reporting stations (Cabanatuan, Nueva Ecija; Gabaldon, Nueva Ecija, Gapan, Nueva Ecija; Arayat, Pampanga; and Apalit, Pampanga) in the basin. In addition to the analysis of storm rainfall data, the Philippine Weather Bureau had been conducting studies in the estimation of rainfall over the Pampanga and Agno river basins by using radar observations in Manila. The results of these studies were promising and it was hoped that the Manila radar would eventually serve as an important tool in flood forecasting. The Philippine Government had requested technical assistance from the Japanese Government under the Colombo Plan for a comprehensive survey and study of the Pampanga River Basin with the end in view of preparing the detailed plans for the flood forecasting and warning system for the said basin.

/42. In Thailand

42. In Thailand, existing river gauging stations had been helpful for providing flood warnings a few days in advance in the plain areas. It was felt necessary to obtain rainfall data from the headwaters of the Chao Phya and Meklong Rivers through a telemetering system or by radar to provide more efficient flood forecasts and warnings for the plains as well as for the areas above the plains. As the Meteorological Department had planned to install a 10 cm radar in the northern part of the country, transferred the 5.7 cm radar in Khon Kaen to Songkhla, installed 3 automatic rainfall stations in mountainous parts of the country and increased the number of rainfall stations throughout the country from 600 to 750, together with about 600 rainfall stations operated by the Royal Irrigation Department and other agencies, some improvement was expected in the forecasting of floods.

C. Other supporting facilities

43. In China (Taiwan), 930 km of levees, 3,335 units of spur dikes and 128 km of revetment had been constructed by the end of 1967 protecting a total area of 321,584 ha of arable land. In addition, a long-term island-wide river regulation plan had been drawn up to construct 1,600 km of levee supplemented by appurtenant structures during the next 30 years. For this purpose, a River Improvement Fund had been established with a target of NT\$1 billion (US\$25 million equivalent). The Tanshui River Flood Control Project had been formulated and was scheduled to be implemented in 4 stages. Flood plain zoning had been undertaken for the left bank of the Tanshui river to reduce flood damage. A comprehensive river administration plan had been drawn up by consolidating in one Act all the different regulations to mitigate floods and to protect existing flood control works. Regulations for natural disaster prevention and rehabilitation were also promulgated. Under these regulations, the local government bodies such as the municipalities, prefectures together with other agencies of the government would form local typhoon centres under the supervision of the Provincial Government. Whenever a typhoon

/warning

warning was issued, the centres would be responsible for keeping the public informed of the typhon movement, preparing and providing facilities for evacuation and instructing the general public to adopt all possible protective measures. Immediate relief operations and emergency repair of public facilities were required to be taken when disaster occurred. The task of rehabilitation was assumed by the Government and was usually completed within a few months by mobilizing all available manpower and resources.

44. In Hong Kong, a report on the forecasting of storm surges had been prepared and published.

45. Besides the Philippine Weather Bureau's forecast and warning system, there had been created in the Philippines in 1967 a Committee on Warning System (COWS) under Memorandum Order No. 51 of the Office of the President "to provide advance and adequate warning information of impending actual disasters, calamities or emergency to the general public". Various agencies of the Government including the Weather Bureau, Armed Forces of the Philippines, National Civil Defense Administration, Bureau of Telecommunications, National Bureau of Investigation, Civil Aeronautics Administration, Bureau of Coast and Geodetic Survey, Philippine Atomic Energy Commission, Commission on Volcanology and certain private agencies were represented. The facilities of these agencies were availed of for warning purposes. For relief and rehabilitation, the government and semi-government agencies that were involved included the Presidential Committee on Relief and Rehabilitation (PCRR), the Philippine National Red Cross, and the Department of Social Welfare. The Press and the Radio and other media also joined hands in the rehabilitation and relief of disaster victims.

/III. PLANNING

III. PLANNING OF MAJOR METEOROLOGICAL, HYDROLOGICAL AND
OTHER IMPROVEMENTS URGENTLY REQUIRED

(Agenda Item 6)

46. In discussing this agenda item the Committee considered the document entitled "Tentative suggestions for an action programme on typhoon damage control" (WRD/TC1/5) which is attached as Annex 6. The document listed a number of tentative suggestions for an action programme which consisted of three parts. The first component was the meteorological component; the second was for the establishment of pilot flood forecasting and warning systems; and the third described the programme for the necessary complementary protective measures. Some general considerations for the implementation of the proposed action programme were also mentioned in the document.

47. The consensus of the Committee on the tentative action programme are described under the headings of the respective components to which they belong.

A. Meteorological component

48. For the meteorological component the Typhoon Committee was first given a detailed explanation of the considerations leading to tentative suggestions for an action programme as contained in the document WRD/TC1/5. It was explained that in making the suggestions for the meteorological component, it was not the intention that the preparatory work and the first and second stages of the action programme should be regarded as distinct phases. It was expected that action to implement some of the facilities urgently required would be taken from the start, simultaneously with the preparatory work. Nor was it intended that the items in the second stage should necessarily wait until all those in the first stage had been completed. The division into the stages was simply a recognition that not everything could be done at once and that programmes would unavoidably depend upon the availability of the financial and other resources required for their implementation.

/49. The Committee

49. The Committee then gave detailed attention to the proposals put forward. It felt that a very comprehensive report had been prepared on the problems and that the tentative suggestions included in the document would be most useful as general guidelines for the future work of the Typhoon Committee. It therefore generally endorsed the action programme as proposed by the Joint ECAFE/WMO Unit.

50. However, the Committee also drew attention to a number of points which it considered should be highlighted in the action to be taken as soon as possible. These points were of such importance in the development of an improved system for typhoon damage prevention as to merit special priority treatment. Thus several members of the Typhoon Committee referred to the fundamental need to complete the basic synoptic network and the associated telecommunications required under the World Weather Watch Plan as a matter of urgency as well as other hydrometeorological stations needed for typhoon damage prevention. The value of the present aircraft reconnaissance flights into typhoons was very widely acknowledged and it was the general hope of the Committee that they would be continued and, if possible, extended. It was pointed out that if the number of flights could be increased, the additional data would facilitate more precise typhoon forecasting. The importance of weather radar in tracking typhoons was also emphasized. The absence of observations from the sea areas east of the Philippines where many typhoons breed was considered to be another matter deserving urgent attention. In this context reference was made to the recommendations of the ECAFE/WMO Preparatory Mission on Typhoons for an ocean weather station near 16°N, 135°E and for a marine automatic weather station near 18°N, 128°E.

51. It was also noted that excellent typhoon warnings for the region are currently prepared by centres using advanced and costly facilities such as reconnaissance aircraft, satellite photographs, digitalized satellite photographs and the products of large computers. These centres have a large staff of experts and use the latest techniques developed from research carried out in several countries. The warnings are widely disseminated in regional broadcasts and on point-to-point circuits. The Committee noted that it is desirable to make full use of the warnings disseminated by these centres.

/52. Taking

52. Taking into account the various factors enumerated above, the Typhoon Committee generally agreed that priority be given:

- (i) To the full implementation of the basic synoptic networks of surface and upper-air stations and to the associated telecommunication network forming part of the WWW plan.
- (ii) To the continuation of aircraft reconnaissance flights into typhoons and, if possible, an extension of these flights;
- (iii) To the establishment of the ocean weather station near 16°N , 135°E and the automatic weather station near 18°N , 128°E as recommended by the ECAFE/WMO Preparatory Mission on Typhoons;
- (iv) To the establishment of weather radar stations at the locations recommended by the ECAFE/WMO Preparatory Mission on Typhoons.

53. Finally, the Committee was also of the opinion that cost and benefit considerations should be one of the factors used to determine the allocation of priorities.

B. Pilot flood forecasting and warning systems

54. The objective of this component of the action programme was to establish a pilot flood forecasting and warning system in a selected river basin in each of the following countries, namely: China(Taiwan), Republic of Korea, Laos, the Philippines and Thailand. The various steps required to realize this objective were described in the document WRD/TC1/5.

55. The Committee recognized the importance and necessity for the establishment of pilot flood forecasting and warning systems in key river basins of the member countries affected by typhoons. It reaffirmed the view that the availability of effective systems for flood forecasting and warning would considerably reduce loss of life and damage to property.

56. The Committee considered the action programme for this component of the project to be a very useful guide for the work to be undertaken by the Joint Unit and in general approved it except as noted in some of the subsequent paragraphs.

/57. Except

57. Except for the Nam Ngum river basin in Laos, all the other river basins recommended by the Typhoon Mission were confirmed by the representatives of the respective member countries concerned.

58. The Committee learnt that the flood problem on the Nam Ngum in Laos would be solved when the Nam Ngum reservoir is completed in two and a half years; therefore, the river basin recommended by the Preparatory Mission on Typhoons would not be required. In this connexion, in August and September 1968 the southern region of Laos suffered catastrophic floods caused by the floods on the tributaries of the Mekong, the Se Done and the Sé Bang Fai. The people living along these 2 tributaries suffered from destructive floods caused by 3 days of torrential rainfall associated with typhoon "Bess". For this reason, Laos decided to select the Sé Bang Fai river basin in which a pilot flood forecasting and warning system should be established.

59. The Committee was informed that the report of the ECAFE/WMO Preparatory Mission on Typhoons had served as a very important reference for the establishment of a pilot flood forecasting and warning network on the Tan-shui River Basin in China(Taiwan). Based on this report, a working group had been organized by the agencies concerned to undertake the implementation of the project. To insure the success of the project, the advice and assistance of the ECAFE/WMO Joint Unit on Typhoons would be sought from time to time.

C. Complementary protective measures

60. The Committee agreed that in addition to a meteorological observing network, telecommunication network and flood forecasting and warning services, a wider variety of complementary services must be available covering all activities necessary to reduce damage to property and loss of life. Such services, ranging from pre-disaster planning, through emergency disaster prevention measures, to relief operations and rehabilitation measures, must, however, be co-ordinated if they are to produce effective results. Therefore, the Committee agreed with the proposal in the tentative action programme that a comprehensive typhoon and flood protection plan must be prepared for each country affected by typhoons. Where assistance would be required by a member country in the preparation of such a plan, the Typhoon Committee, through the Joint Unit, would make arrangements to provide such assistance.

/61. The Committee

61. The Committee also generally endorsed this component of the tentative action programme.

62. The attention of the Committee was called to the UN ECOSOC resolution on "Activities of the United Nations family of organizations in connexion with natural disasters". The Committee expressed its appreciation to the United Nations for its cognizance of this problem and for the concerted action it was taking to solve the problem.

IV. RECOMMENDATIONS TO PARTICIPATING GOVERNMENTS

(Agenda Item 7)

63. On the basis of the detailed discussions on tentative action programme, the Committee reviewed under this item those parts of the recommendations which were directed to participating Governments. The Committee reiterated the importance of regional co-operation and the need for individual countries to intensify their efforts in improving the organization for Typhoon and Flood Warning Systems. It was also agreed that member countries be requested to make all possible efforts to implement expeditiously the recommended facility as far as possible with the available national resources and to provide necessary local support to any possible external aid programme for implementation of other facility. Attention was also drawn to the need for the preparation of a national plan for complementing protective measures against damage caused by typhoons. Reference was made to a detailed disaster prevention plan which already existed in Japan. The Committee also urged the participating Governments to lend their fullest co-operation and support to the Joint Unit in the implementation of the Committee's programme of work.

V. FINANCIAL

V. FINANCIAL AND TECHNICAL SUPPORT FOR NEW FACILITIES

(Agenda Item 8)

64. In opening the discussion on this item the need for the Typhoon Committee to consider how it could best assist countries in implementing the suggestions put forward in the document WRD/TCL/5 and to give clear directives was stressed. It was felt that a good deal of additional work was needed in order to ascertain how the various sources of aid should be tapped for different projects. Whilst the main source of action must remain with the national authorities responsible for implementation of a facility, bilateral or multilateral aid schemes, the WMO Voluntary Assistance Programme (VAP) and the Special Fund component of UNDP must also be considered. In each individual case it would be necessary to decide on the best method of approach and the contribution which particular projects could make to the general development of an efficient means of reducing typhoon damage. The thorough studies necessary for such decisions to be taken could best be carried out by the ECAFE/WMO Joint Unit on Typhoons.

65. The Committee agreed that at this stage, it would be practically impossible to determine precisely the sources of financial support for the implementation of the various components of the tentative action programme which it had just adopted. It was necessary to prepare the comprehensive and detailed plans first indicating which portions would be financed from national resources before external sources of assistance could be sought. The Committee agreed that all possible sources of assistance whether through bilateral or multilateral arrangements or through the WMO VAP, or UNDP should be tapped to implement the programme. The Committee therefore requested the Executive Secretary of ECAFE and the Secretary-General of WMO to assist the Committee in arranging financing from the various possible sources as may be appropriate on those parts of the programme which could not be met from national resources.

/66. With reference

66. With reference to the report of the Philippine representative on the progress of the pilot flood forecasting and warning system on the Pampanga River Basin in the Philippines, the Committee was pleased to learn that Japan was prepared to send a team of experts to conduct a survey and to assist in the preparation of a comprehensive plan for the project.

67. The Committee appreciated the interest of the UNDP Regional Representative in following the evolution of the Typhoon Committee. The Committee was informed that UNDP was always prepared to consider requests for assistance according to the merits of the requests and subject to the governing criteria and available resources of UNDP. In reviewing such requests, UNDP always considered the regional aspects in conjunction with UNDP projects of a similar nature existing in the countries concerned. The Committee learned that the preparatory mission procedure was being employed more often in the formulation of requests to UNDP. Some aspects of the UNDP procedures in the submission of requests were described. The Committee was encouraged to learn that requests from National Government which would be endorsed by the Typhoon Committee would probably be given more importance by UNDP.

68. The attention of the Committee was called to the following two recommendations on page 9 of the Report of the ECAFE/WMO Preparatory Mission on Typhoons:

- "2.2.2. An ocean weather station should be established in the South-West Pacific near 16°N, 135°E.
- 2.2.3. The possibility of installing a marine automatic weather station near 18°N, 128°E may be considered".

As the Committee had considered the installation of an ocean weather station as an item of priority during the discussion of agenda item 6, the USSR representative announced that the USSR was prepared to furnish such a station at 16°N, 135°E, as a contribution of the USSR to the WMO VAP, at no cost whatsoever to the member countries of the Typhoon Committee. The ocean weather station would be a standard weather ship belonging to the USSR Hydrometeorological Service equipped to carry out synoptic surface and upper-air observations and to transmit data through existing channels of communication.

/69. The Committee noted

69. The Committee noted with interest and appreciation the offer of the USSR and considered that the positioning of an OWS at the location proposed would contribute towards a fuller gathering of data in the area where typhoons originate and would constitute a valuable aid for typhoon forecasting and warning purposes. As the offer was made in the form of a proposed contribution to VAP, more details of the proposal would be required for consideration by the participating Governments. The Committee therefore requested the Secretary-General of WMO to secure more detailed information on the proposal and to explore the possibility of establishing an OWS at the location proposed under the Voluntary Assistance Programme. The Committee would give further consideration to this matter on receipt of information from WMO.

70. The Committee heard, with interest, France reiterate its interest in the ECAFE/WMO Typhoon Damage Control Project which was previously expressed at the 24th ECAFE Commission Session in Canberra. Close attention would be paid to the requirements of the Committee as soon as the comprehensive plans had been finalized. For the moment, the field in which France could assist the Committee was in the training of personnel.

71. The Committee listened with great interest to the expression of co-operation and support of the U.S.A. to the Typhoon Committee. It learned that the U.S.A. would follow the pattern of action it had adopted in the Mekong Committee and it would examine all proposals giving particular attention to those compatible with existing and similar programmes in the U.S.A. as it was expected that assistance could be more expeditiously provided to such compatible proposals rather than to new ones. For new proposals, concrete plans with corresponding priorities of the Typhoon Committee would have to be studied.

/VI. CO-ORDINATION

VI. CO-ORDINATION OF RESEARCH AND TRAINING ACTIVITIES
RELATED TO TYPHOONS AND TYPHOON DAMAGE CONTROL

(Agenda Item 9)

72. In its consideration of this item the Committee first heard brief statements from a number of members and observers on the activities in research and training being carried out in their countries.

73. The discussion revealed that research work was being carried out into problems associated with typhoon forecasting techniques in many countries. Studies of many aspects of typhoon structure and the heavy rains they cause were also in hand. The value of these studies and the need for the widest possible distribution of the results were emphasized by the Committee.

74. Similarly it was evident that training courses at many different levels on a variety of subjects connected with activities related to typhoons and typhoon damage control were being held in different countries in the ECAFE region. It was pointed out that many of these courses were open to nationals of other countries and that often attendance could be arranged without charge to the country sending students.

75. The Committee felt consequently that it would be useful if all countries holding courses open to other nationals would send full details of the scope of these courses to the ECAFE/WMO Joint Unit, together with information on the conditions attached to attendance, such as cost, etc. This information would be of considerable value to the Joint Unit which could thus act as a focal point for the collection and distribution of such information.

76. The Committee was also advised of Japan's intention to hold a seminar in 1969/1970 on flood forecasting mainly for member countries of the Typhoon Committee, full details of which would be provided at a later stage. Attention was also drawn to the desirability of countries providing information on the exact nature of their training requirements and the probable volume of trainees if the authorities were to give serious consideration to running courses for the benefit of nationals of other countries.

/77. It was

77. It was also agreed that there existed a need to work out a syllabus for the training of specialists in tropical meteorology with particular reference to typhoons and associated floods. The Committee was of the opinion that this task should be referred to the WMO Executive Committee Panel on Education and Training. It accordingly requested the Secretary-General of WMO to convey to the Panel its views on this need. The importance of training on flood forecasting and warning was also emphasized.

78. Reference was also made to the research aspect of damage control in relation to the design of buildings and other structures. The Committee was informed that the Asian Institute of Technology was prepared to give projects to graduate engineers at no cost. It suggested that this possibility should be investigated and instructed the Joint Unit to obtain further information for presentation at its second session. In this connexion it was also considered that the Joint Unit should act as a focal point for information on typhoon resistant structures. It would then be in a position to provide information on this subject to countries needing it. The Committee agreed that this function could be assigned to the Joint Unit.

/VII. THE PROPOSED

VII. THE PROPOSED REGIONAL TYPHOON CENTRE

(Agenda Item 10)

79. The proposal for establishing a Regional Typhoon Centre as originally made by the first meeting of experts on typhoons in December 1965 and the recommendations made by the Preparatory Mission under Chapter 5 of the Mission's report were briefly reviewed. Subsequent consideration given by the second meeting of experts on typhoons (October 1967) on the terms of reference of the proposed Regional Typhoon Centre and the composition of the Centre were also referred to. Lastly, the ad hoc Meeting on the Statute of the Typhoon Committee (February 1968) decided that the establishment of the regional centre should be deferred and that the Typhoon Committee established by the Governments of regional ECAFE member countries affected by typhoons should have a Technical Secretary and Secretariat Unit which could be expanded into the Regional Centre as the need arose.

80. The ECAFE/WMO Unit had started only recently with two experts and the Committee agreed that it would be premature at this stage to expand the Unit into a full Regional Typhoon Centre. The Committee thought it advisable to review this matter later after some progress is made with the recommended action programme. However, in consideration of the detailed action programme formulated by the Committee, the need for strengthening the ECAFE/WMO Unit by additional experts and supporting staff was considered. The need for adding to this Unit a Telecommunication and Electronics expert in the immediate future was specifically mentioned and endorsed by the Committee. It requested ECAFE and WMO to explore the various possibilities for financing the additional staff and also to investigate whether any of the additional staff might be provided on a non-reimbursable or fund in trust basis by countries interested in the project.

81. The representative of the League of Red Cross Societies emphasized the importance of community preparedness as an essential component of complementary protective measure. He suggested that addition of an expert on community preparedness to the typhoon unit could provide valuable

/assistance

assistance to the Unit and also attract external support for the project. On an enquiry whether the League of Red Cross Societies could provide such an expert from their own resources, the representative stated that his organization would be happy to explore the possibility of doing so. The Committee confirmed that the inclusion of an expert in community preparedness in the Unit would be of considerable value and expressed its appreciation to the LRCS for its support in this connexion.

83. The Committee noted that the Joint ECAFE/WMO Unit had not yet been provided with any supporting staff and is dependent upon the existing staff of the Division of Water Resources Development for secretarial help. The Committee considered that the work programme of the Unit as formulated by the Committee would necessitate early provision of some supporting staff for the Unit.

/VIII. ANY OTHER

VIII. ANY OTHER BUSINESS

(Agenda item 11)

84. Three proposals were put forward under this item. The first of these was for the establishment of an improved exchange programme for the dissemination of tropical cyclone warnings to national meteorological centres. The Committee agreed that exchange of such warnings was of vital interest and should be given high priority. It also felt that care would need to be exercised to avoid duplication of messages and congestion of communication circuits. The attention of the Committee was drawn to the responsibilities of World Meteorological Centres (WMCS) and Regional Meteorological Centres (RMCS) under the WWW Plan for issuing alerts of important meteorological phenomena and storm warnings. The Committee did not feel it necessary to make any specific recommendation on this point.

85. The second proposal was that radar fixes of tropical cyclones should be made and disseminated at 3-hourly intervals. These messages should be in plain language form and contain information concerning the characteristics of the eye and the accuracy of its determination. It was pointed out that for the 1969 typhoon season a very good network of radar stations would be in operation in the ECAFE region and that there is an urgent need to make satisfactory arrangements for the exchange of the resulting observations. It was generally agreed that an arrangement of world-wide application was needed, and some members of the Committee expressed a preference for a plain-language message rather than a coded one. The advantages of composite facsimile pictures were also mentioned.

86. The steps recently taken by a sub-group of the CSM Working Group on Data Needs and Codes in designing a code for the international exchange of radar data were reported to the Committee. It felt that the views expressed

/in the

in the above paragraph should be brought to the attention of the CSM Working Group with the request that development of the code for exchange of radar observations may be finalized as soon as possible.

87. The third proposal was that countries with mountainous terrain should consider making representative wind observations by setting up anemometers on high ground to facilitate the location of tropical cyclones. It is a common experience that tropical cyclones are difficult to track by means of low level winds alone when they cross mountainous territories. Remote reporting stations would therefore be of value for this purpose.

88. Several members of the Committee reported that they already had such stations or proposed to establish them. The Committee noted this information and decided that the question of such stations required further study by the Joint Unit.

IX. DATE AND PLACE OF THE SECOND SESSION
(Agenda Item 12)

88. The representative of the Philippines expressed the interest of his Government in holding the second session of the Committee in Manila and said that the official invitation would be extended at the appropriate time.

89. The Committee agreed that the date of the second session would be determined later by the Chairman in consultation with the Vice-Chairman, the Executive Secretary of ECAFE and the Secretary-General of WMO.

Annex 1

STATUTE OF THE TYPHOON COMMITTEE

Establishment

Article 1

The Typhoon Committee (hereinafter referred to as the Committee) is established by the Governments of regional ECAFE member countries affected by typhoons (hereinafter referred to as the participating Governments) under the auspices of the United Nations Economic Commission for Asia and the Far East (hereinafter referred to as the Commission) in co-operation with the World Meteorological Organization with a view to promoting and co-ordinating efforts to minimize typhoon damage in the ECAFE region.

Membership, composition and organization

Article 2

The Committee shall be composed of a representative from each of the participating Governments desiring to participate in co-operative efforts to minimize typhoon damage in the ECAFE region. The Executive Secretary of ECAFE and the Secretary-General of WMO or their representatives shall be ex-officio members of the Committee.

Article 3

The Committee shall have a Technical Secretary and Secretariat Unit, to be designated as the Regional Typhoon Centre. The Committee may decide, as and when appropriate, the terms of reference of the Regional Typhoon Centre which will function as its executive body.

Article 4

The Committee shall be assisted, when necessary, by an Advisory Group consisting of qualified experts from within and outside the region.

/Co-operation

Co-operation with the Secretariats of the Commission (ECAFE)
and the World Meteorological Organization (WMO)

Article 5

The secretariat of the Commission and the secretariat of the World Meteorological Organization shall co-operate with the Committee in the performance of the latter's functions.

Functions

Article 6

The functions of the Committee are to promote and to co-ordinate the planning and implementation of measures required for minimizing typhoon damage in the ECAFE region. It shall, to this end:

- (a) Review regularly the progress made in the various fields of typhoon damage prevention;
- (b) Recommend to the participating Governments concerned plans and measures for the improvement of meteorological, hydrological and other facilities needed for typhoon damage prevention;
- (c) Consider, upon request, the possible sources of financial and technical support for such plans;
- (d) Prepare and submit, at the request and on behalf of the participating Governments, requests for technical, financial and other assistance offered under the United Nations Development Programme and by other organizations and contributors;
- (e) Promote, prepare and submit to participating Governments and other interested organizations plans for co-ordination of research programmes and activities concerning typhoons;
- (f) Promote the establishment of programmes and facilities for training personnel from countries of the region in typhoon forecasting and warning, flood hydrology and control within the region and arrange for training outside the region, as necessary.

In carrying out those functions, the Committee will ensure that the plans adopted by the appropriate bodies of WMO including the implementation programme established by Fifth Congress of WMO as part of the World Weather Watch Plan, are fully respected at all times.

/General

General Provisions

Article 7

The Committee shall adopt its own rules of procedure.

Article 8

The Committee shall take no action in respect of any country without the agreement of the Government of that country.

Article 9

The Committee shall have authority, subject to established United Nations procedures and practice, to invite representatives of Governments and of specialized agencies to attend specific meetings of the Committee in the capacity of observers or in a consultative capacity on agenda items of interest to those Governments and organizations.

Article 10

The Committee shall submit annual reports to participating Governments, the Commission and the World Meteorological Organization. Such reports, or summaries thereof, may be made available to other Governments and international organizations on the recommendation of the Committee.

Article 11

Amendments to the present statute which may be proposed by any participating Government shall be examined by the Committee and shall take effect when approved by all participating Governments.

Article 12

The first meeting of the Committee shall be convened by the Executive Secretary of the Commission in consultation with the Secretary-General of WMO after at least three Governments of ECAFE regional member countries have signified their intention of joining the Committee.

RULES OF PROCEDURE OF THE TYPHOON COMMITTEE

Rule 1

The Committee shall hold at least one session annually. The venues and dates of its sessions shall be decided by the Committee.

Rule 2

The Executive Secretary of ECAFE shall, in consultation with the Secretary-General of WMO and the Chairman of the Committee, issue a notice convening each session of the Committee, together with copies of the provisional agenda, at least six weeks before the commencement of the session.

Rule 3

The Executive Secretary of ECAFE, in co-operation with the Secretary-General of WMO, shall provide the necessary servicing of the Committee's meetings.

Rule 4

All meetings shall be held in private unless the Committee shall decide otherwise.

Rule 5

English and French shall be the working languages of the Committee.

Rule 6

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.

Rule 7

A simple majority of the government members of the Committee shall constitute a quorum.

Rule 8

Decisions of the Committee shall be made by a majority of the government members present and voting.

Rule 9

In the event of any matter arising which has not been foreseen by the present Rules, the pertinent rules of the United Nations Economic Commission for Asia and the Far East shall be applied.

AND

Annex 2

LIST OF PARTICIPANTS

MEMBERS

AUSTRALIA

Representative: Mr. Robert B. Crowder, Meteorologist, Bureau of Meteorology, Melbourne, Australia

CHINA

Representative: Mr. Peter B.T. Chang, Minister-Counsellor and Permanent Representative to ECAFE, Embassy of the Republic of China, Bangkok

Alternates: Mr. Chieh-hsi Tang, Deputy Director, Taiwan Provincial Weather Bureau, Taipei, Republic of China

Mr. Yi-sheng Ou, Regional Director, Twelfth Regional Office, Taiwan Provincial Water Conservancy Bureau, Taipei, Republic of China

FRANCE

Representative: Mr. Michel Auchere, Représentant Permanent de la France auprès de la CEAE, Ambassade de France, Bangkok

JAPAN

Representative: Mr. Keitaro Mohri, Telecommunication Counsellor, Japan Meteorological Agency, Tokyo

Alternate: Mr. Masamichi Hanabusa, Second Secretary and Alternate Permanent Representative of Japan to ECAFE, Embassy of Japan, Bangkok

KOREA, REPUBLIC OF

Representative: Mr. Kim Chong Ku, Deputy Director, Central Meteorological Office, Ministry of Science Technology, Seoul

/...

LAOS

Representative: Mr. Khamtanh Kanhalikham, Directeur du Service National de la Météorologie, Vientiane

Alternate: Mr. Issara Katay Sasorith, Directeur de l'Hydraulique et de la Navigation, Vientiane

NETHERLANDS

Representative: Mr. L.H.J.B. van Gorkom, Minister Plenipotentiary and Permanent Representative to ECAFE, Royal Netherlands Embassy, Bangkok

PHILIPPINES

Representative: Dr. Roman L. Kintanar, Director, Weather Bureau, Manila

Adviser: Dr. I.E.M. Watts, Project Manager of WMO Special Fund Project in the Philippines for Research and Training related to Typhoons, Manila.

THAILAND

Representative: Vice-Admiral Sanit Vesa-Rajananda, R.T.N., Director-General, Meteorological Department, Office of the Prime Minister, Bangkok

Alternates: Captain Kajit Buajitti, R.T.N., Special Grade Meteorologist, Meteorological Department, Office of the Prime Minister, Bangkok

Mr. Damrong Jaraswathana, Assistant Head, Hydrology Section, Survey Division, Royal Irrigation Department, Ministry of National Development, Bangkok

Mr. Thongterm Yugtunantana, First Grade Engineer, Hydrology Section, Survey Division, Royal Irrigation Department, Ministry of National Development, Bangkok

UNION OF SOVIET SOCIALIST REPUBLICS

Representative: Mr. Mikhail A. Petrossiants, Director, Institute of Experimental Meteorology, Moscow

Alternate: Mr. Yakov Y. Polikarpov, Commercial Attaché, Deputy Permanent Representative of the USSR to ECAFE, USSR Embassy, Bangkok

UNITED STATES OF AMERICA

Representative: Mr. William J. Tonosk, First Secretary, United States Embassy Bangkok

Alternates: Mr. Paul H. Peridier, Meteorologist, Environmental Science Services Administration, Rockville, Maryland, USA

Mr. Reginald C. Price, Water Resources Adviser, Office of Southeast Asia Regional Economic Affairs, United States Embassy, Bangkok

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ASSOCIATE MEMBER

HONG KONG

Representative: Mr. G.J. Bell, Director, Royal Observatory, Government of Hong Kong

Alternate: Mr. Ping-chuen Chin, Senior Scientific Officer, Royal Observatory, Government of Hong Kong

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

Mr. Peter Aylen, Regional Representative of the United Nations Development Programme in the Far East, Bangkok

SPECIALIZED AGENCY

International Civil Aviation Organization (ICAO)

Mr. F.A.L. Oliveira, Technical Officer, Far East and Pacific Office, Bangkok

NON-GOVERNMENTAL ORGANIZATION

League of Red Cross Societies (LRCS)

Dr. Gerhard Svedlund, Geneva

ECAFE SECRETARIAT

U Nyun	Executive Secretary
Mr. P.T. Tan	Chief, Division of Water Resources Development
Mr. A.S. Manalac	Economic Affairs Officer, Division of Water Resources Development

ECAFE/WMO Joint Unit on Typhoons

Dr. S.N. Sen	Chief, ECAFE/WMO Joint Unit on Typhoons
Mr. A. Mizuno	Flood Forecasting and Warning Expert
Mr. C. Suriyakumaran	Special Assistant to the Executive Secretary
Mr. Maurice Gauvreau	Officer-in-Charge, Division of Administration
Mr. Henry P.T. Willis	Chief, Building Management and Internal Services Section, Division of Administration
Mr. S.V. Swami	Chief, Conference and External Services Section, Division of Administration
Mr. Aldo G. Manos	Chief, Technical Assistance Unit
Mr. J.R. Herbin	Chief, Information Services
Mr. Satis Indrakamhaeng	Information Officer
Mr. Prayoon Na Nakorn	Information Officer
Mr. J. Marchat	Chief, Language Services
Mr. G.R. Frank	Interpreter
Mrs. Francoise Sala	Interpreter
Mr. F. Siegenthaler	Interpreter

WORLD METEOROLOGICAL ORGANIZATION (WMO)

Mr. D.A. Davies	Secretary-General
Mr. P. Rogers	Telecommunications and Networks Section, Technical Division
Mr. Harold Bogin	Project Manager of the WMO/UNDP Project on Typhoon and Flood Warning Service, Taipei

Annex 3

BACKGROUND HISTORY OF THE TYPHOON COMMITTEE

1. At its twentieth session in March 1964, the Economic Commission for Asia and the Far East recommended that the secretariat, in co-operation with WMO, study practical means of initiating a joint programme of investigations of typhoons in the ECAFE region. Accordingly, a meeting of Experts on Typhoon was organized by ECAFE and WMO with financial assistance from UNDP in Manila in December 1965 which was attended by experts from China(Taiwan), Hong Kong, Japan, the Republic of Korea, Laos, Philippines, the Republic of Viet-Nam, Thailand and the United States of America (E/CN.11/WRD/TYP/L.3). The experts noted that the extensive annual typhoon damage in the region amounting to \$500 million was a negative factor which retarded the economic development in this region. Expressed in relation to their gross national products, the average annual typhoon damage was about one-half to one and a half percent of the GNP of the countries concerned. Therefore, the Group recommended that a preparatory mission on typhoons be organized to visit the countries in the ECAFE region and neighbouring countries which are affected by typhoons in order to formulate an action programme which would mitigate typhoon damage. It also recommended that a second meeting be convened to examine the report of the mission.

2. Consequently, the ECAFE/WMO Preparatory Mission on Typhoons was organized during the period from December 1966 to February 1967 with financial assistance from UNDP. The mission visited the Philippines, Hong Kong, China(Taiwan), Republic of Korea, Japan, Guam, Laos, Republic of Viet-Nam, Cambodia and Thailand (WMO - RR.TC.11; ECAFE - WRDP/TYPM/1). Broadly, the report of the mission covered three aspects: meteorological, hydrological and the establishment of a Regional Typhoon Centre. Recommendations under the meteorological aspect were concerned with the requirements for the improvement of existing meteorological observing networks, telecommunication facilities, typhoon forecasts and arrangements for warnings. The hydrological aspect described the requirements for the improvement of the existing or establishment of pilot flood forecasting and warning systems on a key river basin in each of the countries visited. The third aspect dealt with the establishment of a Regional Typhoon Centre.

/3. The second

3. The second meeting of Experts on Typhoons which was held at Bangkok in October 1967 was attended by representatives from China(Taiwan), Hong Kong, Japan, Republic of Korea, Laos, Philippines, Thailand, the U.S.A. and the U.S.S.R. (E/CN.11/L.189). The meeting examined the report of the Preparatory Mission and reiterated the need for early action to mitigate typhoon damage as a means of speeding economic development in the region. It also reaffirmed that national as well as joint efforts were necessary to combat effectively the detrimental effect of typhoons; therefore, regional co-operation was of paramount importance in solving common problems associated with typhoons. The Group agreed that there was a need for comprehensive measures in an integrated approach to deal effectively with the typhoon problem. Such measures include data collection, analysis, forecasts, dissemination of warnings and also complementary protective measures. The comprehensive programme recommended by the mission as revised and endorsed by the meeting was considered practical and realistic and should be implemented as soon as possible. To facilitate expeditious implementation of the programme, it was considered necessary to establish a regional inter-governmental body to promote and co-ordinate activities relating to typhoon damage control. Accordingly, it recommended: that a Typhoon Committee with a Regional Typhoon Centre as its executive arm be established under the auspices of ECAFE in co-operation with WMO; that the ECAFE and WMO secretariats draft jointly the statute and rules of procedure of the proposed Typhoon Committee and convene an ad hoc meeting of government representatives to consider and finalize these drafts.

4. The ad hoc meeting on the statute of the Typhoon Committee was held at Bangkok from 29 February to 2 March 1968. The meeting was attended by government representatives from the Republic of China, Japan, Republic of Korea, Laos, the Philippines, Thailand, the Republic of Viet-Nam and Hong Kong. Representatives of the United States of America and the USSR also attended as observers (E/CN.11/L.206). This meeting besides finalizing and adopting the statute and rules of procedure of the Typhoon Committee recommended that the statute of the Typhoon Committee be submitted to the 24th Commission session of ECAFE and the appropriate body of WMO for their consideration. It also recommended that ECAFE and WMO provide as soon as possible a small staff to undertake the preparatory work required for the implementation of the programme recommended by the mission.

/5. At its 24th

5. At its 24th session at Canberra in April 1968, the United Nations Economic Commission for Asia and the Far East endorsed the establishment of the Typhoon Committee in accordance with the statute as adopted by the ad hoc meeting (E/CN.11/824). In a parallel action, the WMO Executive Committee at its 20th session held at Geneva in 1968 also endorsed the establishment of the Typhoon Committee.

6. After the Republic of China, Hong Kong, Japan, the Republic of Korea, Laos, the Philippines and Thailand had signified their intention to join the Typhoon Committee, the Executive Secretary of ECAFE and the Secretary-General of WMO considered it appropriate to organize and convene the inaugural session of the Typhoon Committee. At the same time, the two agencies established an ECAFE/WMO Joint Unit on Typhoons located in the ECAFE secretariat to assist the Typhoon Committee, pending the establishment of the Regional Typhoon Centre.

/Annex 4

4. Programme of work of the session
A tentative programme for the session will be prepared for the consideration of the Committee which may also wish to decide on any other questions relevant to the organization of its work.
Annex 4
5. Review of current facilities for typhoon damage control

The Typhoon Committee has been established by the Governments of regional ECAFE member countries affected by typhoons with a view to promoting and co-ordinating efforts to minimize typhoon damage. Virtually all such efforts must be based on a system providing the basic meteorological, hydrological and telecommunication facilities essential to an efficient detection, forecasting and warning system. Accordingly, some facilities for the Committee to begin its work with a review of the current facilities so that the major shortcomings in the present system can be isolated. It should be mentioned at this point that the ECAFE/WMO Mission on Typhoons carried out in the period December 1966 to April 1967 a comprehensive survey of the facilities in each of the countries affected by typhoons. This survey, together with the changes which have since taken place, forms the basis of the Committee's consideration of this item. To assist the Committee further, additional

ANNOTATED AGENDA

1. Opening of the session

The first session of the Typhoon Committee will take place from 16 to 20 December 1968 at Sala Santitham, headquarters of the Economic Commission for Asia and the Far East, Bangkok.

2. Election of the chairman and the vice-chairman

Rule 6 of the Rules of Procedure of the Typhoon Committee stipulates that "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." The Committee should, therefore, first elect these officials.

3. Adoption of the agenda

The provisional agenda was distributed with the invitation to the first session of the Typhoon Committee. Representatives of participating Governments may wish to propose additions or changes to the provisional agenda.

4. Programme of work of the session

A tentative programme for the session will be prepared for the consideration of the Committee which may also wish to decide on any other questions relevant to the organization of its work.

5. Review of current facilities for typhoon damage control

The Typhoon Committee has been established by the Governments of regional ECAFE member countries affected by typhoons with a view to promoting and co-ordinating efforts to minimize typhoon damage. Virtually all such efforts must be based on a system providing the basic meteorological, hydrological and telecommunication facilities essential to an efficient detection, forecasting and warning service. It would accordingly seem advisable for the Committee to begin its work with a review of the current facilities so that the major shortcomings in the present system can be isolated. It should be mentioned at this point that the ECAFE/WMO Preparatory Mission on Typhoons carried out, in the period December 1966 to April 1967, a comprehensive survey of the facilities in each of the countries affected by typhoons. This survey, together with the changes which have since taken place, forms the basis of the Committee's consideration of this item. To assist the Committee further, additional information on each aspect of the facilities is given below.

5.1 Meteorological facilities

The principal lacunae in the present meteorological and associated telecommunication system are shown in the appendix to the document on this item. The main facilities required have already been laid down by various WMO bodies as part of the plan for the World Weather Watch (WWW). WMO is already carrying out, on a continuing basis, fact-finding inquiries with its Members to ensure that the latest information on the implementation of the required facilities is available. Details of Member's plans for the implementation of the deficiencies are also obtained. The information given in the appendix to document WRD/TC1/3 therefore shows all those facilities forming part of the World Weather Watch plan which have not yet been implemented,

/together with

together with the plans of Members where these are available. For a few countries, the Preparatory Mission recommended some additional facilities which have been listed separately in the document.

5.2 Hydrological facilities

Adequate measures to minimize typhoon damage can only be taken if there are efficient flood forecasting and warning systems in major river basins subjected to floods caused by typhoons. A well-organized system of flood prediction providing timely warning is a vital ingredient in the fight to limit the loss of human life and excessive damage caused by typhoons. The Typhoon Committee will no doubt wish to review the proposals contained in the report of the Preparatory Mission which provides a wealth of background material for each of the countries concerned. Information on any steps which may have been taken by the countries concerned since the report was published would facilitate the work of the Typhoon Committee.

5.3 Other supporting facilities

The Preparatory Mission pointed out that it is not sufficient to provide flood forecasting and warning services to reduce flood damage. A wide variety of complementary services, including long-term pre-disaster planning, emergency disaster prevention measures, relief operations and rehabilitation measures, must be provided if damage, loss of life and suffering are to be reduced. The discussion of this item should therefore cover the extent to which these supporting facilities are already available in the countries affected by typhoons and the additional facilities needed to bring the system to the desired level.

6. Planning of major meteorological, hydrological and other improvements urgently required

Following its review of the current facilities for typhoon damage control under item 5, the Committee will be in a position to determine the improvements which are most urgently needed. It is suggested that the Committee may wish to set up an action programme to secure the establishment of these additional facilities in the shortest possible time. In drawing up

/such a

such a programme, full account should be taken of the priorities already laid down as part of the World Weather Watch plan and also those proposed by the Preparatory Mission. To assist the Typhoon Committee in its work some tentative suggestions for an action programme will, if possible, be prepared by the joint ECAFE/WMO unit which has been established within the ECAFE secretariat at the request of the Working Group of Experts on Typhoons.

7. Recommendations to participating Governments for specific projects

While the regional nature of typhoons implies that action on a regional scale is the only way in which they can be successfully combatted, the improved system must, for a large part, depend upon national initiative in providing the components making up the system as a whole. The Committee should therefore address clear and precise recommendations to the participating Governments on the part they must play in the action programme.

8. Financial and technical support for new facilities

In general it is expected that the facilities required in each country will be provided from national resources. However, it is recognized that it may not always be possible for individual countries to provide all the facilities in the near future. In such cases it will be necessary to explore other possibilities of financing projects. The Committee may wish to stress the fact that some projects are not of purely national benefit and can have a considerable impact regionally. It may also wish to consider other possible sources of financing these projects such as the United Nations Development Programme, special development funds of international and regional financing institutions and bilateral and multilateral aid programmes.

Mention should also be made of the WMO Voluntary Assistance Programme (VAP), though this aid is restricted to projects forming part of the WWW plan. As can be seen from plans already announced, a few projects have already been provisionally approved under VAP.

9. Co-ordination of research and training activities related to typhoons and typhoon damage control

The functions of the Typhoon Committee include the promotion and co-ordination of research and training activities concerning typhoons and typhoon

/damage control.

damage control. It is suggested that the representatives attending the first session of the Typhoon Committee should be prepared to make a brief statement of the principal activities of their countries in these fields and of the main shortcomings. On the basis of these statements the Committee may wish to recommend measures for early action, especially as regards training. It may also decide to instruct the unit acting as its executive body to prepare, before its second session, proposals for further action in the co-ordination of both research and training activities related to typhoons and typhoon damage control.

10. The proposed regional typhoon centre

At the ad hoc meeting on the Statute of the Typhoon Committee it was decided that the establishment of a regional typhoon centre should be deferred and that a small unit should carry out the objectives of the Committee for the time being. Later this unit could gradually expand into a regional typhoon centre, the functions of which would be decided by the Committee itself in the light of experience and other factors.

The unit has now made a small start with two experts. At this early stage the Committee will, probably, consider it premature to discuss the expansion of the unit into the Regional Typhoon Centre. It should, nonetheless, consider in detail the programme of activities that the unit is to carry out in the interval between the first and second sessions of the Committee. It may also discuss other organizational aspects of the Unit's work, including staffing and the financing of its activities.

11. Any other business

Other matters not included in this agenda and which the Committee may wish to consider may be discussed under this item.

12. Date and place of second session

In accordance with Rule 1 of its Rules of Procedure, the Committee may wish to consider when and where its second session should take place.

13. Closure of the session.

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Annex 5

LIST OF DOCUMENTS

Title	Symbol	Language
1. Provisional agenda	E/CN.11/WRD/TC1/L.1	English French
2. Annotated provisional agenda	E/CN.11/WRD/TC1/L.2	English French
3. Note on the session	WRD/TC1/1	English French
4. Tentative programme of work	WRD/TC1/2	English French
5. Review of current meteorological facilities for typhoon damage prevention	WRD/TC1/3	English French
6. Provisional list of documents	WRD/TC1/4	English French
7. Tentative suggestions for an action programme on typhoon damage control	WRD/TC1/5	English French
8. Typhoon investigations in the USSR	WRD/TC1/6	English

Annex 6

TENTATIVE SUGGESTIONS FOR AN ACTION PROGRAMME:
ON TYPHOON DAMAGE CONTROL

Note by the

ECAFE/WMO Joint Unit on Typhoons

(WRD/TC1/5)

The sum of the above amounts (\$7,520,000 equivalent) represents about 30 per cent of the average annual typhoon damage in the Philippines (accounting for monetary terms). This constitutes an estimate of the extent by which typhoon damage in the country could be reduced through an effective typhoon damage control programme. Keeping in mind that the average annual damage inflicted by typhoons in the member countries of this Committee amounts to \$250 million per year, a reduction of damage by 30 per cent would amount to \$75 million per year. Thus a small expenditure of a few million dollars a year to alleviate the damage could yield a very real benefit on the investment.

The following recommendations on typhoon damage control activities in the Philippines are based on the findings of the Committee, 18 April 1967.

1. INTRODUCTION

The task of minimizing the enormous damage caused by typhoons and associated floods in the ECAFE region is a complicated one involving the application of interdisciplinary practices in the technological, economic and social fields. That task cannot be undertaken haphazardly but must be based on a pragmatic and co-ordinated action programme, both at national and regional level.

It would be difficult to estimate the benefits which could be realized from such a programme but an idea of the order of magnitude involved is provided by the report^{1/} of the United States Typhoon Mission to the Philippines in 1967 which said:

"With improvement in the typhoon warning system and increased community preparedness, we believe typhoon losses could be reduced as follows:

- (a) Loss of life by 85 per cent
- (b) Average annual marine losses by \$800,000
- (c) Average annual agricultural losses by \$5,000,000
- (d) Average annual building damage by \$1,000,000
- (e) Average annual livestock loss by \$850,000."

The sum of the above amounts (\$7,650,000 equivalent) represents about 30 per cent of the average annual typhoon damage in the Philippines accountable in monetary terms. This constitutes an estimate of the extent by which typhoon damage in the country could be reduced through an effective typhoon damage control programme. Keeping in mind that the average annual damage inflicted by typhoons in the member countries of this Committee, amounts to \$500 million per year, a reduction of damage by, say 20 per cent, would amount to \$100 million per year. Thus a small expenditure of a few million dollars a year to alleviate the damage could yield a more than tenfold benefit on the investment.

/This document

1/ "Survey and recommendations on typhoon damage control activities in the Philippine Weather Bureau" by Gordon Dunn and Sidney Teweles, 18 April 1967.

This document lists a number of tentative suggestions for such a programme. They are based on the recommendations contained in the report^{2/} of the ECAFE/WMO Preparatory Mission on Typhoons. The note is divided into three major parts; the first comprises the meteorological component; the second is the programme for the establishment of pilot Flood forecasting and warning systems, and the third describes the programme for the necessary complementary protective measures. In addition there is a chapter on general considerations for the implementation of the action programme.

The separation of these three parts of the programme is a matter of convenience due to the different types of activity involved in each it does not in any way denote the order of implementation. The three parts could be implemented concurrently and it is highly desirable that all of them be implemented as soon as possible.

However, it must be stressed that those responsible for each component of the typhoon damage control programme, be it the meteorological, flood forecasting, or the complementary protective measures, must be aware of the developments in the other components so that all activities can be properly co-ordinated and the maximum efficiency achieved.

II. METEOROLOGICAL COMPONENT

A. Preparatory work

As the Preparatory Typhoon Mission made a preliminary survey about two years ago, the initial task of the Typhoon Committee will be to carry out a systematic and detailed review of the latest position in respect of meteorological facilities available in each country for typhoon warning services. Such a review, which should be undertaken by the Committee with the Joint ECAFE/WMO Unit on Typhoon acting as its secretariat, should obviously take into account the Preparatory Mission's report, the latest recommendations of the World Meteorological Organization and any other requirements for effective typhoon warning system that are deemed necessary by the national agencies. Besides listing current deficiencies, the review should include consideration of priorities for the proposed improvements, feasibility of implementation, national plans, the requirements for financial assistance, etc. The various items to be reviewed in the preparatory stage of the action programme are elaborated below:

/1.

2/ "Report of the ECAFE/WMO Preparatory Mission on Typhoons" (WMO.RP.11, ECAFE-WRDP/TYPM/1), May 1967.

B. The suggested action programme

After the preparatory work is completed, it is envisaged that work associated with the implementation of recommended programmes will be carried out in two stages. In the first instance, the country may be assisted in implementing speedily such improvements for typhoon warning services as are possible with the available national resources and also in initiating action for the implementation of all other recommended programmes, including requests for external assistance where appropriate. In the second stage, implementation of the remaining recommended programmes should be carried out on the understanding that these programme will unavoidably have to be implemented by phases depending on availability of facilities and funds required for each programme. Tentative suggestions for the action programme of the Committee under these two stages are elaborated below:

1. First stage

a. To assist countries in the establishment of new stations (synoptic and hydrometeorological stations, RS/RW, Radar, APT etc.) that will remove serious deficiencies in the network. In this connexion, choice of equipment, its cost and arrangements for procurement, installation and maintenance will have to be considered. Countries may also be advised on appropriate steps for improving the coverage of ships' weather observations. Where recommended improvements in the network of observations cannot be effected with the available national resources, the possibility of obtaining external assistance may be explored and countries assisted in the preparation of requests for it.

b. To assist countries in improving their telecommunication facilities for the collection of meteorological data within their territories and also to initiate action for implementing the regional telecommunication plan for exchange of meteorological data between countries. Countries may be advised on the choice of telecommunication equipment, cost, procurement and maintenance. Where appropriate, the possibility of obtaining external assistance may be explored and countries assisted in the preparation of requests for it.

/c.

c. To assist countries in organizing programmes for training of personnel in telecommunication and radio-electronics and for forecasters in tropical meteorology. Also to assist countries, where appropriate, in preparing requests for assistance (fellowships, expert services, etc.) for such training.

d. To assist countries in implementing improved procedures for dissemination of typhoon warnings within their territories, to the extent feasible with the available facilities in the first instance, and in initiating further improvements as soon as additional facilities become available.

e. To liaise with the countries concerned to promote co-operation in research activity aimed at gaining a better understanding of the characteristics of typhoons and thereby improving typhoon forecasting methods.

2. Second stage

a. To assist countries in effecting full implementation of the recommended network and telecommunication facilities and also in preparing requests for financial assistance where necessary. At this stage, the possibility of establishing ocean weather stations, marine automatic weather stations and RS/RW observations aboard merchant ships may be explored.

b. To assist countries in the implementation of training programmes so that the requisite number of trained personnel become available for effective operation and maintenance of the meteorological and telecommunication equipment and for manning the typhoon forecasting centres.

c. To assist countries in ensuring the most effective means of dissemination of typhoon warnings within their territories.

d. To study typhoon disasters and review forecast failures and weaknesses in the organizational structure and suggest remedial measures.

e. To review the results obtained by improved facilities and the typhoon damage control measures already implemented.

/f.

f. To conduct research on specific problems concerning typhoons that would facilitate carrying out more effectively the functions of the ECAFE/WMO Unit.

To review results of hurricane modification experiments being conducted by the United States and explore the possibility of extending such experiments on typhoons to the Pacific.

Note: Items 2(d) to 2(f) may be undertaken after the ECAFE/WMO Unit has been strengthened.

III. PILOT FLOOD FORECASTING AND WARNING SYSTEMS

In its report, the ECAFE/WMO Preparatory Mission on Typhoons proposed the establishment of a pilot flood forecasting and warning system in a key river basin for each of the following member countries of the Typhoon Committee: China (Taiwan), the Republic of Korea, Laos, the Philippines and Thailand. This report and its recommendations were endorsed by the Working Group of Experts on Typhoons which met at Bangkok from 5 to 10 October 1967 for the purpose of reviewing and discussing it.

No schemes, however, were proposed for Hong Kong and Japan. In Hong Kong, flooding by rainfall as a result of typhoons was not considered a major problem. As for Japan, it was not considered necessary to make any recommendations on this aspect of the typhoon damage control project because that country was already providing such services on seventeen major rivers and had acquired considerable experience and expertise in this field.

A. Schemes proposed by the Mission

The river basins for which pilot flood forecasting and warning schemes were proposed by the Typhoon Mission for the member countries of the Typhoon Committee are:

Country	River basin
China (Taiwan)	Tan-Hshui
Republic of Korea	Han
Laos	Nam Ngum
Philippines	Pampanga
Thailand	Meklong.

/Due

Due to time limitations, the Mission could stay only for one or two weeks in each country; therefore only a general scheme for each pilot basin could be prepared. The requirements described in the Typhoon Mission's report represent only the preliminary requirements for the first stage of the recommended schemes. The additional requirements for the first stage and all requirements for the second stage were presented to the Working Group of Experts on Typhoon which met in October 1967 (see table 1). It was explained that the provision of the additional requirements for the first stage and the implementation of the second stage would provide more adequate protection.

Table 1. Required number of slave and relay stations

Country	Item	First Stage		Second Stage	Total
		Preliminary	Secondary		
CHINA	Slave: Rainfall	3	2	10	22
	Rainfall/Stage				
	Stage		5		
	Relay		2		
KOREA: Rep. of	Slave: Rain	2	5	15	31
	Rain/Stage		4		
	Stage		1		
	Relay	1	3		
LAOS	Slave: Rain	*	1	10	17
	Rain/Stage	3*			
	Stage	1			
	Relay		1		
PHILIPPINES	Slave: Rain	7		10	22
	Rain/Stage	2*			
	Stage	1*			
	Relay	2			
THAILAND	Slave: Rain	4		10	19
	Rain/Stage	2*			
	Stage				
	Relay	2	1		

* Completely new installations, the cost of which is double that of modifying the other installations.

/E.

B. Confirmation of pilot river basins

The first task of the Committee will be to secure confirmation of a country's acceptance of the river basin recommended by the Typhoon Mission for a pilot project. It will be recalled that almost two years have elapsed since these proposals were made. It is quite possible that changing conditions, the availability of data, the inaccessibility of certain areas and other relevant factors may make it necessary to establish a pilot project not in the basin selected by the Mission but in another that is more desirable from practical considerations or on account of its greater economic significance to the country.

Where a country desires to establish the pilot project in a basin other than that proposed by the Mission, the newly selected basin must meet certain requirements that will make the early establishment of a pilot flood forecasting and warning system feasible. One of the most important requirements is the availability of hydrological and meteorological data without which the effectiveness of the system cannot be assured.

Where a flood forecasting and warning system already exists, it is more convenient for the country to concentrate on improving it rather than on starting up a new project, as that will be easier and less costly. Moreover, the personnel required to operate the system could be trained within a very short period so that the country could embark sooner on the investigation of other systems.

C. Preparation of comprehensive plans

Once the choice of a pilot basin has been confirmed by the country concerned, the next step will be the preparation of a comprehensive plan and detailed programme, including an estimate of the personnel, equipment and financing required for implementation. There are three stages involved in the preparation of these plans: (1) investigation, (2) data analysis, and (3) preparation of a comprehensive plan.

1. Investigation

The most important activities at this stage include the field survey of existing hydrological and meteorological facilities within the catchment; study of the major features of the topography in relation to meteorological

/characteristics

characteristics and telecommunication requirements; collection and collation of rainfall and streamflow data, flood stage-damage relationships, cost data; review of existing facilities and organization for preparing and issuing flood forecasts and warnings.

It is estimated that three or four experts will be required for a period of two to three months to complete this part of the work for basins with an area of about 9,000 sq km drained by a river with a large number of tributaries. Work on smaller basins with fewer streams will of course require less time.

2. Data analysis

Detailed analysis of the available data for the purpose of formulating a flood forecasting and warning scheme should include a study of typical major rainstorms experienced over the catchment and even over the whole country, the characteristics of the corresponding floods produced by these storms, relationship between rainfall depths and river stages, travel time of flood peaks and effect of antecedent conditions.

Depending on the amount of available data and the complexity of the basin, this work may take two to four man-months. The availability of a computer would expedite the data analysis and the formulation of the flood forecasting and warning scheme. In such cases, the implementation of the scheme could be phased in stages - the first stage being based on the available data and the succeeding stages on additional data which would become available later.

3. Preparation of a comprehensive plan

A comprehensive plan including the detailed programme for implementation in various stages will be similar in most respects to engineering feasibility studies in that it should state the problem, the setting, the available data, the results of the data analysis, the proposed scheme for flood forecasting and warning, the equipment, personnel, financial requirements and stages of implementation.

Understandably, the major portion of the plan will be devoted to a detailed description of the proposed scheme and its operation. In addition, however, it should specify the co-ordination between the meteorological and hydrological

hydrological departments required at all stages of the operation. Co-ordination of activities should start as soon as the approach of a typhoon is detected by the meteorological department. Communication should be maintained between the two departments so that the meteorological department can continuously supply meteorological data including radar estimates of rainfall, if available, to the hydrological department.

The plan should describe in detail how the flood forecast and warning is to be disseminated as quickly and as widely as possible, after it is prepared, especially to the areas likely to be affected. This will require an explanation of the communication facilities needed and of the co-ordination necessary with other agencies in case the responsibility for the preparation of forecasts and issuance of warnings does not rest with a single agency.

Finally, the plan should list the fields in which training will be required for the efficient operation and maintenance of the proposed scheme.

The preparation of a comprehensive plan by the experts who conducted the investigation and data analysis should take about two months.

D. Installation of schemes

After the completion of the comprehensive plan and its acceptance by the Government concerned, funds to finance the project will have to be obtained. At this time, it may be premature to discuss the various possible sources of financing the pilot flood forecasting and warning projects. Some countries may be in a position to finance their own projects. Where this is not possible, it is hoped that special development funds from international and regional financing institutions or multilateral and bilateral aid programmes can be tapped for this purpose.

IV. COMPLEMENTARY PROTECTIVE MEASURES

The ECAFE/WMO Preparatory Mission on Typhoon emphasized in its report that it is not sufficient to provide typhoon and flood forecasting and warning services to minimize damage caused by typhoons and floods. A wider variety of complementary services must be provided for the comprehensive coverage of various activities necessary to reduce damage, loss of life and suffering. Such activities range from long term pre-disaster planning, through emergency disaster

/prevention

prevention measures, to relief operations and rehabilitation measures. The necessity for such complementary measures is obvious since, even with the availability of efficient typhoon and flood warning and forecasting services, typhoons and floods cannot be prevented from proceeding along their natural course.

It is therefore necessary to prepare a typhoon and flood protection plan for each of the countries concerned. A detailed disaster prevention plan already exists in Japan which is kept under continuous review for amendment whenever considered necessary. Once a proper plan on protective measures (short-term and long-term emergency measures) is drawn up, its implementation rests primarily with the government of the country concerned which may, in some cases, receive assistance from certain agencies such as the League of Red Cross Societies or from the Regional Typhoon Centre when it is established.

A. Compilation of information

The first step at this stage of the programme should be a compilation of all available information on existing facilities, organizations, plans and procedures concerning long-term pre-disaster planning, emergency disaster prevention, relief operations and rehabilitation. For this purpose, all the agencies, whether public or private, involved in the above activities should be identified. The information should include the name of each agency, its category (whether public or private), its principal function, a detailed description of the portion of its functions devoted to typhoon and flood protection measures and the corresponding organization, available equipment and facilities to implement these functions, sources of funds, and the amounts allotted to the activities pertinent to this programme. Meanwhile, each Government should identify the areas which are often subjected to damage from typhoons and associated floods.

B. Analysis and formulation of short-term protective emergency measures

The above information should then be analysed to determine if the existing organization and facilities are adequate for carrying out disaster prevention measures at short notice for the areas concerned and for providing sufficient rescue and relief to victims of typhoon and flood disasters. The deficiencies of the existing organizations, facilities, plans, and procedures should be noted

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so that corrective measures and the corresponding requirements can be determined. A very important aspect of this analysis concerns the communication facilities between agencies issuing typhoon and flood warnings and also between warning centres and the recipients of warnings.

Although the basic principles of emergency disaster prevention and rescue and relief operations remain essentially the same, the plans and procedures for such activities will vary from country to country depending on the existing organizations and facilities which must be incorporated and utilized in the national plans. Tailoring the new plan accordingly considerably reduces the cost of implementing it. Consideration should also be given to assistance which may be available from international organizations in the event of emergency disasters.

C. Long-term measures

After the preparation of plans for emergency measures and while they are being implemented, attention can be focussed on the preparation of a programme for long-term protective measures which should include: survey of low-lying areas to determine those easily subjected to flooding; flood plain zoning; construction of levees and river improvement works; construction of places of refuge for population and livestock; afforestation along coastal belts subject to storm surges; review and revision of building codes; study of typhoon resistant type of construction materials; research on appropriate structural design practices; provision of adequate drainage facilities; education of the public regarding the hazards due to typhoons and floods; study of measures needed to keep cities and towns prepared for typhoon and flood emergencies; and research on the flood hydrology of major river basins.

D. Rehabilitation measures

Preparation of plans for rehabilitation measures is also an activity involving long-term planning. Obviously it poses difficult problems because of the unusually large sums required which cannot be foreseen and immediately provided for in the national budget. Furthermore, the government may be able to restore damaged public utilities but the rehabilitation of private property remains the burden of the private individual. Thus the process of rehabilitation drags on for years during which period the economic activity in the affected area is slowed down and a loss to the country ensues.

Therefore,

Therefore, this part of the programme will require that studies be undertaken in each country on ways and means to minimize the economic loss to the community in particular and to the country in general through a speedy rehabilitation programme for the damaged areas. For instance, the possibility of granting a subsidy for certain types of loss or damage caused by typhoons or floods may be considered. Or special loans at low interest rates may be made available.

E. Co-ordination of the activities of various agencies in the implementation of the programme

It is possible that the implementation of the complementary protective measures may be the most difficult facet of the programme. Unlike its other components, the responsibility for which clearly rests with a single agency of the government, this one, owing to its diversified nature, is the responsibility of several government agencies. Consequently, it is difficult to co-ordinate the implementation of the various activities. For this reason, each member of the Typhoon Committee may wish to consider the necessity for establishing a national co-ordinating committee, which should include its representative to the Typhoon Committee. The existence of such a national co-ordinating committee would facilitate the work of the Typhoon Committee in implementing this difficult part of its programme. In some countries, such a committee may already exist. For example, in the Republic of Korea, there is a Central Committee of Flood and Typhoon Damage Prevention and Rehabilitation which has five sub-committees. One of these, the Rehabilitation Sub-Committee which is under the Vice-Minister of Construction, prepares the financial plan for rehabilitation and takes charge of rehabilitation and reconstruction activities. The Typhoon Committee may wish to make a recommendation concerning this matter.

V. GENERAL CONSIDERATIONS FOR THE IMPLEMENTATION OF THE ACTION PROGRAMME

After the approval of these tentative suggestions for an action programme, it may be useful to consider ways and means for implementing it. The following paragraphs suggest possible means for carrying out certain activities unique to each of its components. The activities for which the responsibilities will be common to the three components are described together in the last part of this chapter.

/A.

A. Meteorological component

The Typhoon Committee supported by the Joint ECAFE/WMO Unit will assist the national governments not only in developing the plans and programmes for an effective typhoon warning system, but also in effecting their early implementation. For some of the preparatory programmes, such as training of personnel in telecommunication, radio-meteorology, tropical meteorology and typhoon forecasting, it may be necessary in some cases to obtain fellowships or expert services financed by UNDP or its special fund projects or by the VAP funds of WMO, or those available under bilateral, multilateral technical assistance programmes.

Primary responsibility for the actual installation of meteorological facilities such as network of stations and telecommunication facilities and for the organization of research activities will no doubt rest on the national governments concerned, but the Typhoon Committee through the Joint ECAFE/WMO Unit will assist the governments in all stages of implementation of the programmes meant to improve the typhoon warning system.

B. Flood forecasting and warning

The flood forecasting and warning component of the programme involves two distinct groups of activities the responsibilities for which may be indicated:

The first pertains to the confirmation or selection of the pilot river basin for the flood forecasting and warning project. The ECAFE/WMO Joint Unit may provide advice and guidance on this matter, but the final decision must be made by the national governments.

The second is the preparation of the comprehensive plans for a pilot basin. This is a task requiring teams of experts to undertake the investigation, data analysis and preparation of the comprehensive plans. The Joint Unit will seek the assistance of countries or institutions which are likely to be interested in helping to organize teams of qualified experts for the purpose. However, national governments must be prepared to provide the necessary field and office support to the teams.

C. Complementary protective measures

Three distinct groups of activities comprise this component of the programme.

The compilation of all available information on existing facilities, organizations, plans and procedures concerning complementary protective measures is expected to be carried out by the national governments, according to a format to be recommended by the Joint Unit, as their various agencies charged with these or related functions are in the best position to supply such information.

LIST OF DOCUMENTS		
No.	Title	
RD/TC4/1	Provisional list of documents	protective
RD/TC4/2	Provisional agenda	of
RD/TC4/3	Annotated provisional agenda	Red
RD/TC4/4	Note on the session	tions.
RD/TC4/5	Activities of the Typhoon Committee in 1971	tial.
RD/TC4/6	Programme for 1972 and beyond	rehabilitation
RD/TC4/7	Outline of a tentative request to UNDP for institutional support to the Typhoon Committee	governments
RD/TC4/8	Action related to United Nations General Assembly Resolution 2733 (XXV)	uable
RD/TC4/9	Proposed transfer of project Stormfury to the Pacific	nts. Such
RD/TC4/10	Co-ordination with other regional tropical storm projects	ncerned to
RD/TC4/11	Tentative programme	the extent
RD/TC4/12 Rev.1	Corrigenda	ed
RD/TC4/13	Report on basin-wide flood forecasting in the Lower Mekong Basin (Mekong Committee)	proposed
RD/TC4/14	Proposed transfer of project Stormfury to the Pacific (United States)	co-ordinated
		noon Committee.
		the Typhoon

A. Meteorological component

The Typhoon Committee supported by the Joint ECAFE/WMO Unit will assist the national governments not only in developing the plans and programmes for an effective typhoon warning system, but also in effecting their early implementation. For some of the preparatory programmes, such as training of personnel in telecommunication, radio-meteorology, tropical meteorology and typhoon forecasting, it may be necessary in some cases to obtain fellowships or expert services financed by UNDP or its special fund projects or by the VAP funds of WMO, or those available under bilateral, multilateral technical assistance programme.

Primary responsibilities of the Unit will be to assist the national governments in the development of facilities such as for the organization of governments concerned. The Unit will assist the national governments in the development of facilities such as for the organization of governments concerned. The Unit will assist the national governments in the development of facilities such as for the organization of governments concerned.

B. Flood forecasting

The flood forecasting programme is divided into two distinct groups indicated. The first group is for the flood forecasting basin for the flood forecasting basin. The second group is for the flood forecasting basin for the flood forecasting basin. The first group is for the flood forecasting basin for the flood forecasting basin. The second group is for the flood forecasting basin for the flood forecasting basin.

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However, national government and office support to the flood forecasting programme is essential.

C. Complementary protective measures

Three distinct groups of activities comprise this component of the programme. The first group is for the flood forecasting basin for the flood forecasting basin. The second group is for the flood forecasting basin for the flood forecasting basin. The third group is for the flood forecasting basin for the flood forecasting basin.

The compilation of all available information on existing facilities, organizations, plans and procedures concerning complementary protective measures is expected to be carried out by the national governments, according to a format to be recommended by the Joint Unit, as their various agencies charged with these or related functions are in the best position to supply such information.

The information compiled and made available by the national governments will have to be analysed and the corresponding protective measures formulated. Because of the numerous fields encompassed by this activity, various items comprising the comprehensive programme of short-term and long-term protective measures will have to be assigned to groups according to their fields of competence. These groups are the ECAFE/WMO Joint Unit, the League of Red Cross Societies, experts from interested countries and other institutions. In this activity, participation of the national governments is essential.

The third distinct activity is the preparation of plans for rehabilitation measures. This is essentially the responsibility of the national governments although the Joint ECAFE/WMO Unit may be in a position to provide valuable assistance.

D. Fields of common responsibility for the three components

1. Approval and acceptance of plans

After any part of the plans has been completed and submitted, its approval and acceptance is the prerogative of the national governments. Such approval and acceptance implies the willingness of the government concerned to proceed with implementing the plans and its readiness to provide to the extent possible whatever local resources may be required.

2. Financing arrangements

In cases where a country is not in a position to finance the proposed scheme, arranging for the financing of the projects may have to be a co-ordinated effort on the part of the national government concerned and the Typhoon Committee.

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The Typhoon Committee will assist the national governments at their request in seeking assistance from various sources such as the special funds of international and regional financing institutions or multilateral and bilateral aid programmes of prospective donor countries, or the VAP programme of WMO.

3. Implementation

It is highly desirable that the national governments should promptly implement, as far as available resources allow, those parts of the programme requiring immediate attention. The national governments should also assume responsibility for implementing the plans for which external assistance will ultimately be received from other countries and/or institutions. The Typhoon Committee will assist the governments to the extent possible to ensure expeditious implementation of the facilities recommended.

4. Training

As regards training, the Typhoon Committee through the Joint Unit will endeavour to arrange suitable training programmes in various fields which may be made available by interested countries or institutions. Selection of suitable candidates for training will be made by the national governments in consultation with interested countries and/or institutions.

5. Strengthening of the ECAFE/WMO Joint Unit

At some time during the next two years, it will become necessary to strengthen the ECAFE/WMO Joint Unit to enable it to cope efficiently with its growing responsibilities and to provide effective assistance to the member countries in implementing the programme. If the Typhoon Committee intends to seek institutional support for this purpose from the United Nations Development Programme, it will have to prepare the necessary request. This could be drafted by the Joint Unit on behalf of the Typhoon Committee and circulated to the governments concerned for their concurrence.