COUNTRY REPORT
ON
NATURAL DISASTER REDUCTION IN MALAYSIA
FOR
THE ASIAN NATURAL DISASTER REDUCTION CONFERENCE
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INTRODUCTION

With a total area of 330,400 sq.km, Malaysia comprises two regions, namely Peninsular Malaysia and the states of Sabah and Sarawak. The two regions are separated by 640 km of the South China Sea. The country receives much of the rain during the Southwest and Northeast Monsoons; the latter brings rains to the east coast of Peninsular Malaysia, east Sabah and west Sarawak during November to February while the former, though less in effect, prevails in the period of May to August at the west coast of Peninsular Malaysia. Localized thunder-storms occur all the year round and at times could be very intense particularly during the intermonsoon months of April-May and September-October.

The average annual rainfall in Malaysia shows considerable spatial variability. The values for Peninsular Malaysia, Sabah and Sarawak are 2,420 mm, 2,630 mm and 3,830 mm respectively. Over the northern half of the east coast of Peninsular Malaysia, Sarawak and coastal areas of Sabah, rainfall exceeds 3,000 mm annually. However, in the mountainous areas of Sarawak the rainfall even exceeds 4,000 mm. The rest of the country generally receives rainfall in excess of 2,000 mm except over inland areas of Pahang and the Muar river basins.

Malaysia's topography is characterized by a steeply sloping core made up of a series of roughly north-south (for Peninsular Malaysia) and northeast-southwest (for Sabah and Sarawak) parallel ranges interspersed by less undulating country. The river courses are relatively short with steep gradients in the upper stretches and flat and meandering in the lower reaches so that flood flows are transient in the upper portions but increase in duration towards the coastal plains and swamps. The bulk of Malaysia's population is concentrated in towns and villages situated in the valley tracts and coastal plains and flood prone areas.

A) DISASTER REDUCTION MEASURES IN MALAYSIA

Flood Situation In Malaysia

1. Flooding is a major natural disaster in Malaysia. In keeping with the country's rapid development, many population centres and settlements have developed in coastal and inland valleys that are prone to flooding. In recent times, the severity of flooding has noticeably increased by changes in land use, such as the conversion of forest into agriculture land and that of agriculture to urban land. Malaysia experiences monsoonal flooding annually with variations in terms of severity, place and time of occurrences. During the period from November to February, the monsoonal activities are at its peak causing floods over the riverine areas lasting for as long as several weeks before receeding, causing widespread damage to crops and property, disrupting the livelihood of the people and even resulting in deaths. In 1971, Peninsular Malaysia was badly hit by a monsoonal flooding which caused extensive damage to

property and severe disruption to social and economic activities of the people in the states of Kelantan, Pahang, Terengganu, Kedah and Selangor.

2. Other than monsoonal flooding, **flash floods** have recently become a common and frequent phenomenon in Malaysia especially in the urban centers. It is caused by torrential downpours which are particularly active during the inter-monsoonal periods of March to May and September to November. Flash floods occur in low lying areas with poor drainage or where siltation has taken place due to housing or land development activities. Though lasting up to only several hours, flash floods are known to inflict severe damage to property and even claim lives.

3. The Malaysian experience shows that with proper planning and effective strategies, it is possible to mitigate the impact of floods particularly damage to property and losses in terms of human lives. Over time, the Malaysian government has implemented appropriate measures to mitigate the impact of natural disasters through the length and breadth of the country.

Flood Characteristics

4. Two basic rainfall types causing floods in Malaysia are:-

   4.1. moderate intensity, long duration rainfall covering a wide area; and

   4.2. high intensity, short duration localised rainfall.

5. Flood records point to a somewhat seasonal pattern of flood occurrences. The east coast and southern parts of Peninsular Malaysia, Sabah and Sarawak are mainly affected by floods during December to January when the North-East Monsoon prevails. Flooding is caused by widespread and prolonged heavy rainfall resulting in rivers breaking and over-spilling their banks. Extensive areas are often inundated.

6. The west coast of Peninsular Malaysia on the other hand is mainly affected from September to November during the inter-monsoonal period when convectional thunderstorms are common. Such storms bring along short but very intense rainfall causing severe overloading to drainage systems, resulting in localised "flash" floods.

7. Generally, flooding in Malaysia is the result of one or a combination of the following causes:-

7.1. localised rainfall;

7.2. overspilling of banks due to inadequate river channel capacity;

7.3. tidal effect and back water effect, causing flooding in the lower reaches and in the tributaries respectively; and

7.4. inland flooding due to poor or inadequate drainage.

8. Even where flooding is caused by overbank flows the velocity of the flood flow is relatively low due to the widespread flooded area and the flat gradient of the rivers. In most cases flood water is turbid and sediment-laden.

Flood Control Measures

9. Following the disastrous 1971 floods, several concrete measures have been undertaken. These were:-

   9.1. the establishment of a Permanent Flood Control Commission;

   9.2. the establishment of a Natural Disaster Relief Committee;

   9.3. implementation of structural measures; and

   9.4. implementation of non-structural measures.

Permanent Flood Control Commission

10. The Permanent Flood Control Commission was established by a decision of the Cabinet on 21st December 1971, to study short-term measures to prevent the occurrence of floods and long-term measures for flood mitigation. The Commission's terms of reference are as follows:-

   10.1. to take measures for flood control and to reduce the occurrence of floods; and

   10.2. in the event of floods, to minimise damage and loss to life and property.

11. Since its inception, the Commission's recommendations of projects for flood control have been made with the overall view of meeting the objectives of the New Economic Policy

of eradicating poverty and restructuring society. The Commission is chaired by the H'ble. Minister of Agriculture while the Drainage and Irrigation Department (DID) acts as its Secretariat.

The Natural Disaster Relief Committee

12. Headed by The Minister of Information, this national level Committee is endowed with such powers as declaring a state of disaster for areas affected by floods and ensuring the proper coordination of flood relief operations nationwide. Once declared a state of disaster, any district or state/states are entitled to Federal funds required for reconstruction or remedial works. To assist it in its relief operations, the Committee is well supported by the entire nation's network of related agencies such as the State Security Committees, the Police, the Armed Forces, the Welfare Services Department, the Information Department and various voluntary organisations. The Committee is well prepared to meet any contingency at any time.

Flood Relief and Evacuation

13. Preparedness is one of the key elements of Malaysia's preparations in facing the annual floods. Around September each year, The Natural Disaster Relief Committee will set in motion preparations at National, State and District levels directed at oiling both governmental and non-governmental machinery for search and rescue as well as relief and evacuation of victims.

14. The Police coordinates all rescue operations including evacuation of victims, assisted by such agencies as the army, navy and air forces. The Ministry of National Unity and Community Development is entrusted with the responsibility of carrying out relief and rehabilitation of victims. The Ministry of Health puts on alert all its hospitals in case of epidemics. For the years 1993 and 1994, a total of 25,678 and 1,733 victims were evacuated and placed in temporary relief centres nationwide. A total of 3,570 evacuation centres are put on stand by each year. These centres can accommodate a total of 881,508 victims.

Construction Of Structural Measures

15. In 1982, the Government undertook a National Water Resources Study to develop a comprehensive and integrated water resources development programme for the country. Based on the study, the Government formulated long-term structural measures aimed at mitigating floods. Such measures include improving river channel sections, building of flood bunds, levees, ring bunds or embankments to confine flows and by-pass flood ways to divert flows, use of mining ponds for flood attenuation and construction of flood retention dams to regulate flood flows and minimise flood occurrence.

16. Since 1971, Government expenditure on flood structural mitigation programmes has seen a steady increase. In the Second Malaysia Plan (1971 - 75) roughly RM$14 million was spent and this increased to RM55.6 million during the Third Malaysia Plan. In the Fourth Malaysia Plan an even larger amount of RM141 million was allocated followed

the another RM142 million in the Fifth Malaysia Plan. For the 6th Malaysia Plan (1991 - 1995) a total of RM530 million has been approved for flood mitigation works, a jump of RM388 million compared to the previous Plan.

Implementation Of Non-Structural Measures

17. The Malaysian Meteorological Services (MMS) is the agency that provides weather forecast not only to the mass media for general purposes, but also to all members of the Natural Disaster Relief Committee, including the Department of Irrigation and Drainage (DID) which in turn will make use of the information for river stage forecasting in major rivers. When adverse weather is envisaged, advice is given at least 48 hours ahead to the public and government agencies.

Flood Forecasting and Warning Systems

18. The provision of flood forecasting and warning is an important, practical and lowcost measure to minimize flood losses. Flood forecasts, given early will enable people living in floodprone areas to be forwarned, allowing them to evacuate themselves and their belongings before the arrival of the flood. Following the 1971 floods, a total of 142 telemetric rainfall and/or river level stations have been installed by the DID in major river basins. Those river basins include *Sg. Kelantan, Sg. Terengganu, Sg. Pahang, Sg. Johor, Sg. Muar, Sg. Batu Pahat, Sg. Klang, Sg. Perak, Sg. Muda, Sg. Sarawak, Sg. Sadong and Sg. Kinabatangan.

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* Sg. means river.

Similar systems are being planned for another 10 river basins in the 7th Malaysia Plan. Flood forecasting models have been developed for 10 of the above river basins.

19. The DID has also established 133 manual flood level monitoring stations to supplement the telemetric system. Whenever a river level exceeds a pre-determined critical level, the local observer shall transmit continuously real time water level information to the DID state office via telephone or VHF radio equipment.

20. In river basins which are subjected to flash floods, little lead time is available for effective warning. Therefore a total of 60 flood warning sirens, which automatically trigger once the flood level reaches a critical point, have been installed at strategic locations along such rivers. These warning sirens are especially useful when flash floods occur at night.

21. Further a total of 60 flood warning boards have been installed in the major river basins. Levels marked on these warning boards are correlated to the levels at the observation points upstream. The warning boards are located at flood prone villages down stream of the observation points enabling residents of the villages to assess for themselves the situation in their areas.

Resettlement Of People In Flood-Prone areas

22. One positive measure to reduce the potential for damage to property as well as loss of life in flood-prone areas where floods cannot be reduced by structural measures is to resettle the affected people and to convert agricultural land use to

less damage susceptible crops. Since 1971, 1,672 families and 2,715 families have been resettled in the states of Kelantan and Pahang respectively.

Flood Proofing

23. Flood proofing consists of the implementation of protective measures to prevent the entry of flood water into individual houses and specific places e.g. by bunding a building with a wall so that the floor is not submerged during a flood thereby reducing flood damage. This is done for houses along the Kelantan and Pahang rivers and various parts of flood-prone areas in the country.

Public Education And Awareness On Disaster Reduction

24. In order to enhance disaster preparedness, the Malaysian government has continuously carried out public education on disaster prevention to the people living in flood prone areas with the ultimate objective of protecting of human lives and property, as well as avoiding or minimising social disruption and economic losses. Public education and awareness programmes are carried out through the various media including TV and radio broadcast, aimed at enchancing public awareness of the dangers of natural disasters. Civic education and practical training in life saving techniques are also conducted in the natural disaster prone areas. In addition, presentations on life-saving during floods have been made and pamphlets on disaster prevention targetted at children in flood prone areas during the monsoon season were also circulated.

25. Agencies such the Malaysian Red Crescent Society and Civil Defence Department have also played their part in educating the public especially children on how to protect themselves against floods. Therefore, public education and awareness on disaster reduction in Malaysia is aimed at creating a higher level of community awareness including the ability of putting into place appropriate emergency measures, so that they could withstand the impact of natural disasters and prepare for and survive disasters.

Flood Control And Future Development

26. Since 1971, Malaysia has adopted a positive approach in order to come to grips with the flood problem. Various measures by relevant agencies have been undertaken to study flood problems affecting an entire river basin, a city or a town, and to implement flood mitigation works to deal with flood problems, or to reduce damages through effective and practical non-structural measures. In this respect, investments in engineering works for flood mitigation can be justified in terms of economic or social benefits or both. The implementation of flood mitigation works is undertaken as a basic requirement for economic and social well being of the people. Most of the activities such as watershed protection and river dredging are therefore adressed in the context of national development, where the emphasis lies in sustainable development. In this way, disaster reduction becomes an integral part of the national development programme.

Landslides

27. Besides flooding, Malaysia is occasionally subjected to landslides. Just as flooding, landslides inflict a heavy toll on human life and property. Described as an abrupt and short-lived geomorphic erosion process, landslides can be attributed to the internal properties of earth materials, the geomorphic setting, and independent external factors that influence the stability of slopes. In addition, excessive precipitation and human activities have contributed to slope instability and set the stage for landsliding.

28. Of late, Malaysia experienced two major landslides. Farming activities involving indiscrimate clearing of land coupled with continuous downpour were partly blamed for landslides in Cameron Highlands over four days from 4th - 7th December 1994 resulting in the death of 7 people. Another landslide on 30th June 1995, took place about 39 Km from the capital city of Kuala Lumpur. The site of the tragic incident was a slip road leading to the Genting Highlands resorts. Part of the hill came crashing down as flood waters washed tons of earth and fallen trees down the hilly slope. About a dozen or so vehicles including cars, buses and vans which were on their way to Genting Highlands, were swept down. 21 people lost their lives, while 22 others were injured. The exact cause of the landslide has not been fully determined yet.

Landslide Reduction Measures

29. In spite of the growing geologic understanding of the landslide processes and a rapidly improving engineering capability for

landslide control, losses and casualties caused by landslides are on the increase. This is partly a consequence of residential and commercial development activities that are carried out on steep sloping terrain that is prone to landslips. In order to control and reduce the impact of landslides, the Government has undertaken legislative and non-legislative measures such as:-

29.1. Identification and mapping of landslides prone areas;

29.2. Adaptation of landuse regulation in landslip-prone areas;

29.3. Development of design and building codes that will ensure the construction practices appropriate to the maintenance or enhancement of slope stability;

29.4. Amendments to Land Conservation Act 1960 to enable the government to have a comprehensive monitoring of development activities on hillslopes; and

29.5. Amendments to Environmental Impact Assessment (EIA) Rules of the 1987. This is to enable the government to have a closer monitoring and enforcement over development projects on hilly areas for the construction of roads, buildings and recreational facilities.

The Formation Of Search And Rescue Teams

30. The development of search and rescue capability is an essential part of Malaysia's disaster preparedness. Various

search and rescue teams are already in existence to meet any emergency/disaster involving search and rescue operations. Some of the government agencies with their own Search and Rescue Teams are The Police, The Fire Services Department and The Army. In addition, the Kuala Lumpur City Hall, the Department of Civil Defence and Malaysian Red Crescent Society have also formed their own Search and Rescue Teams to assist where necessary in times of natural disasters.

31. Following the Highland Towers tragedy on 22nd December 1993 which claimed 48 lives, The Malaysian Government decided to form the Special Malaysia Disaster Assistance and Rescue Team (SMART) to carry out search and rescue operations in major disasters on land in a coordinated and effective manner. Comprising of 85 officers and personnel from The Fire Services Department, Royal Malaysia Police and the Malaysian Armed Forces, SMART is responsible for search and rescue operations beyond the capabilities of other existing search and rescue teams. The team would be deployed to carry out search and rescue operations in major disasters such as the collapse of tunnels, collapse of buildings and landslides where specialised skills and equipment are required in saving the lives of victims.

B) INTERNATIONAL COOPERATION IN DISASTER REDUCTION IN ASIA

32. The International Decade for Natural Disaster Reduction (the years 1990 - 2000, declared by the UN) has challenged all members of the international community that provide disaster assistance to take a proactive stance to reduce threats

before natural disasters strike. In Malaysia, government agencies and non-governmental organisations (NGOs) are actively engaged in cooperative regional and international efforts aimed at natural disaster reduction. These programs include assistance to disaster prone countries develop alert systems, mitigation capabilities, and the capacity to assess their vulnerability to natural hazards. In this respect, the Malaysian Meteorological Services (MMS) is working closely with the World Meteorological Organisation (WMO) in improving its capability in the detection of severe meteorological hazards including, improving and exchanging information on issues related to climate change. The MMS, as the national agency representing the country in the ASEAN Sub Committee on Meteorology and Geophysics, is actively involved in the formulation and execution of projects/activities aimed at natural disaster reduction. Among the projects are:-

32.1. ASEAN-EC Geological Project to study the earth deformation in the region;

32.2. ASEAN Monsoon Climatology project to improve understanding on winter monsoons; and

32.3. National involvement in the ASEAN Experts Group on Disaster Management. Malaysia hosted the last meeting of the Group at Langkawi from 9 - 11 August 1993.

33. Policy makers as well as disaster and development experts are recognising that each nation's ability to achieve sustainable economic development can be increased by reducing the

impact of disasters. Therefore, Malaysia is integrating disaster reduction in its international cooperation through enhancing regional cooperation in all aspects of disaster management, including prevention, mitigation, preparation, response and recovery, through more effective mutual assistance activities, in order to minimise the adverse consequences of disasters on the economic and social development regionally.

34. In the area of international cooperation, Malaysia is contributing through its membership in ASEAN Experts Group on Disaster Management which cooperates in the areas of:-

34.1. improvement of communication channels among themselves as regards disaster warnings;

34.2. exchange of experts and trainees;

34.3. exchange of information and documents; and

34.4. dissemination of medical supplies, services and relief assistance.

35. Much has been accomplished within Malaysia in terms of disaster reduction since the onset of the International Decade For The Natural Disaster Reduction (IDNDR). In the spirit of IDNDR, which seeks to support sustainable economic development, natural hazard risk assessment, mitigation and warnings must be embedded in development plans and processes of member nations.

36. Further, Malaysia is pursuing its efforts in international cooperation at least regionally within ASEAN in disaster reduction as follows:-

36.1. To consider the formulation of a mechanism that provides for rendering of cooperation and quick assistance to member countries affected by disasters. The mechanism would enable immediate relief to be dispatched without much hassle of cross border formalities. This mechanism could be called "ASEAN Emergency Relief Cooperation" and would therefore enhance ASEAN'S disaster relief cooperation and management, provided that:-

36.1.1. disaster prone countries should establish a resource management and utilisation system that will ensure the efficient management of disaster assistance;

36.1.2. the disaster management system should include the tasking of government agencies in times of disaster as well as a facility for receiving international assistance; and

36.1.3. disaster prone countries should conduct workshops for the purpose of forecasting relief and rescue operation requirements. Multi-sectoral and inter-agency perceptions would be valuable inputs to national planning programmes and for the information of international relief

organisations. Data gathered at an assessment exercise should be reviewed and updated especially after an actual validation in a disaster situation.

37. Except for flooding and occasional occurences of landslides, Malaysia is relatively not affected by other major natural disasters. However, our involvement in IDNDR is significant through our participation in a concerted international action aimed at reducing the impact of natural disasters in the Asian region. As a member of the UN, Malaysia fully supports and participates in the UN'S efforts in the reduction of natural disaster by observing the UN sponsored International Day for Natural Disaster Reduction on October 13th, aimed at enchancing public awareness on the effect of natural disasters and undertaking various activities towards reducing natural disasters.

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