Action Plan toward Effective Flood Hazard Mapping in My Country in Malaysia

(Concluding report)

JICA region focused training course on flood hazard mapping

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A. THE ROLE OF FLOOD HAZARD MAPS TO MITIGATE FLOOD DAMAGES IN MALAYSIA

Flood Status in Malaysia

1. Flood is the most significant natural disaster in Malaysia in terms of frequency, inundated areas, population affected and economical loss. It has been estimated 9% of land area (29, 800 km^2) in the country is flood prone areas, 22 % of the population (4.82 million) is affected by floods and the average annual flood damage is about RM 1 billion.
2. Heavy rainfall during North East Monsoon affecting the east coast of Peninsular Malaysia (widespread flood). Intense rainstorms during inter monsoon periods of April-May and August-October causing flash floods in major towns such as Kuala Lumpur and Johor Bharu.
3. Climate and Topography in Malaysia

    - Annual average rainfall

      Peninsular Malaysia: 2500 mm

      Sabah: 3000 mm

      Sarawak: 3500 mm

    - Extreme events

      600 mm in 24 hours

      100 – 200 mm in 2 hours

    - Topography

        i. Hilly upper reaches
        ii. Normal sloping middle reaches (1 in 2,000)
        iii. Gentle sloping lower reaches (less than 1 in 5,000)
        iv. Mostly subject to tidal influence downstream
        v. Shallow river bed in flood plain due to sedimentation
        vi. High tidal influence can cause flooding in coastal areas

4. Types of Flooding and Causes of Flooding In Malaysia

   i. Extensive basin flood

      (Riverbank overflow)

   ii. Inundation basin flood

      (Backwater effect from tidal influence affecting lower reaches)

   iii. Inland flood

      (Poor drainage from inland flood prone area)

   iv. Urban flash flood

      (Inadequate drainage and storage systems to cater for rapid urbanization)

Table 1 – Flood Trends in Malaysia

Item / Year	**1982**	**2002**
Flooded Area ($km^{2)}$	29, 021	29, 799
People Affected (million)	2.7	4.82
Flood Damage	RM 326 million (1992)	RM 915 million

Present Countermeasures for Mitigating Flood Damages in Malaysia

Structural (curative) as well as non-structural (preventive) measures have been proposed to alleviate the flooding problem.

Structural Measures

The main structural measures carried out by DID are:

i) Flood Control Dams

Some examples of dams specially constructed for flood mitigation are Batu Dam and Semberong Dam while irrigation dams include Pedu and Beris Dam. Hydroelectric dams built by Tenaga Nasional Berhad among others are Kenyir Dam and Bersia Dam. The Klang Gates Dam is an example of a dam built for domestic usage and also serves as a flood mitigation dam.

ii) River Improvement Works

River improvement works, which are carried out, are realignment and canalisation of river channels, including widening and deepening to improve original undersized channels.

iii) Storage Ponds of Flood Attenuation

Disused mining pools can be used as detention or retention ponds to regulate floodwaters so that the flood peaks are attenuated. The Batu/Jinjang Pond Project in Kuala Lumpur diverts excess floodwater from Sg. Gombak into Batu Pond for temporary storage and from Sg. Keroh to Jinjang Pond. Water in the pond will be released slowly back to the river after the flood flow has subsided.

iv) Flood Diversion Channel or Tunnel

Certain river stretches especially in major city centres, due to intensive development along both riverbanks, can no longer be widened or deepened to accommodate the increasing flood discharges through the city. Under such circumstances, excess floodwater has to be retained upstream in storage ponds or diverted downstream through a flood diversion channel or tunnel. The Stormwater Management and Road Tunnel (SMART) Project implemented in Kuala Lumpur when completed will alleviate flooding in the city centre by diverting away large volumes of floodwater.

Non-structural Measures

Non-structural measures are carried out more for preventing floods from occurring and minimising losses due to flooding. Some of these measures are:

i) Integrated River Basin Management (IRBM)

Under the concept of Integrated River Basin Management, the whole river basin is planned in an integrated manner and all factors are taken into account when any development plan is proposed. Factors like zoning river corridors, riparian areas, natural flood plain, conservation of wetlands, storage ponds etc will be taken into consideration when preparing flood management plans.

ii) Preparation of Guidelines and Design Standards

The DID has published more than 20 Hydrological Procedures as well as the Urban Drainage Planning and Design Procedure No. 1 which specified clear requirements, both physical and

technical, for rivers and their reserves, as well as flood mitigation and urban drainage projects to be used as reference materials and guidelines.

In the year 2000, DID introduced the Urban Stormwater Management Manual (MASMA) which obtained Cabinet (central government) approval for implementation commencing 1 January 2001 and is to be complied with by all local authorities and the public and private sectors. The Manual provides control-at-source measures and recommendations on flood fighting by utilising detention/retention, infiltration and purification processes.

iii) Flood Forecasting and Warning System

Telemetric forecasting systems have been installed in the major river basins namely Kelantan, Pahang, Perak, Sadong, Kinabatangan, Klang, Terengganu, Besut, Dungun, and Johor whilst VHF flood forecasting systems have been established in smaller basins. In river basins prone to flash floods, flood warning sirens have been installed at strategic locations along certain urban rivers. These sirens will be automatically triggered once the flood level reaches a critical point to alert the local residents of impending floods. The Department also provides a web-based information system on flood warning and flood information through http://infobanjir.water.gov.my

Flood response will be functional after the flood event occurs especially during the monsoon season. It's included with the five main activities as below:

i. 'Pre' flood, 'During' flood and 'Post' flood

ii. Flood forecasting and warning system

iii. Flood disaster management, flood fighting, evacuation

iv. Flood operation and relief centres at District, State and Federal levels

v. Flood damage assessment

Flood Hazard Map In Malaysia

- As a non-structural measures, Flood Hazard Map is very useful and beneficial to the population.
- FHM which includes information on INUNDATION areas, EVACUATION centres and ALTERNATIVE routes in an easy-to-understand way where people can evacuate in a SAFE, SMOOTH and QUICK manner when disasters are anticipated to occurr
- The maps are produced for public awareness to deal with the problems and situation during floods.

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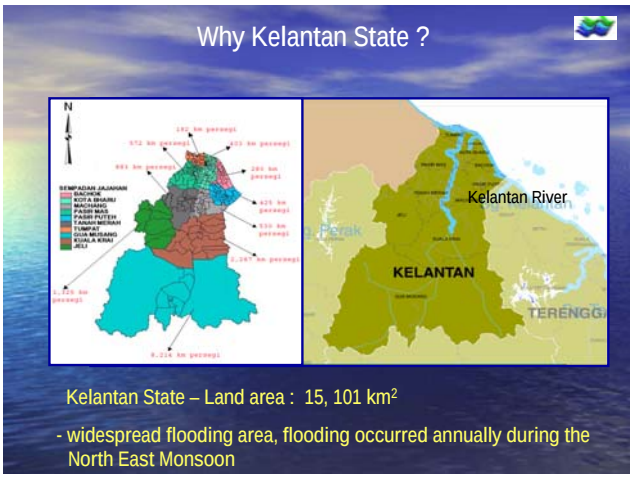
B. THE ALLOCATION OF ROLES IN MAKING FLOOD HAZARD MAPS IN MALAYSIA

No.	Organizations	Roles
1.	National Disasters and Relief Committee	Planning, coordinating and supervising relief operations during flood. Support the flood disaster preparedness activities among the committee members.
2.	Ministry of Finance	Prepare Malaysia's budgets for five yearly developments.
3.	Ministry of Natural Resources and and Environment	- Support and provide development allocation for flood mitigation projects at federal level. - Dissemination of the importance of Flood Hazard Map
4.	State Government	- Support and provide development allocation for flood mitigation projects at the state level. - Dissemination of the importance of Flood Hazard Map - Provide information on evacuation routes in their region.
5.	Department of Irrigation and Drainage	- Providing flood forecasting and warning service to the public. - Main organizations for planning, prepare and disseminate Flood Hazard Map.
6.	Department of Survey and Mapping	Providing the digital topographic map, DEM of the drainage basin.
7.	Meteorological Services of Malaysia, State Department of Information	Providing weather forecast information with regards to flood forecasting and warning activities.
8.	Malaysian Center For Remote Sensing (MACRES)	Providing the satellite images with regards to flood forecasting and warning activities.
9.	Department of Public Defence, State Fire and Rescue Department, Army and Police	Rescue works
10.	Department of Welfare	Providing the evacuation shelter information.

C. THE 'ACTION PLAN' OF MAKING FLOOD HAZARD MAPS IN MY COUNTRY

- Organising worksyops to introduced FHM to various agencies involved in development works
- Collection of datas
- Determine the effective evacuation route and centre
- Determine the basic needs e.g. utilities, convenient store near-by, mosque etc
- Conducting interviews with target groups. To improve the FHM accordingly.
- To disseminate the completed FHM to target group by early 2009.

Target Area: The state of Kelantan



Flood impact to the Kelantan State (1983 – 2004)

Year	Total of Evacueess	Total of Death People	Total amount of damages (in Ringgit Malaysia)	Total amount of damages (in USD)
2004	**10,476**	**12**	**14,317,800.00**	**3,767,842**
2003	2,228	2	5,554,400.00	1,461,684
2002	no record	no record	1,420,000.00	373,684
2001	**5,800**	**0**	**8,462,700.00**	**2,227,026**
2000	506	0	4,940,620.00	1,300,163
1999	no record	1	1,924,440.00	506,432
1998	136	0	1,628,455.00	428,541
1997	no record	no record	922,020.00	242,637
1996	no evacuation	0	735,795.00	193,630
1995	1,172	4	1,485,095.00	390,814
1994	441	2	2,413,922.30	635,243
1993	13,587	0	1,512,816.50	398,110
1992	743	0	329,256.05	86,646
1991	no record	2	1,427,872.45	375,756
1990	4,581	4	1,036,100.00	272,658
1989	no record	no record	-	-
1988	41,059	0	-	-
1987	402	0	3,338,589.00	878,576
1986	**7,968**	**0**	**6,092,454.25**	**1,603,277**
1985	no record	no record	-	-
1984	7,177	9	1,998,268.00	525,860
1983	33,815	0		-

Usefulness of Flood Hazard Map in Kelantan State, Malaysia

- To reduce property loss and casualties
- To help a smooth evacuation
- To give the awareness to residents the importance of FHM which lead to safe evacuation, thus lives and properties are safe
- The state of Kelantan has many telemetric stations (water level and rainfall)

KEADAAN bandar Kota Bharu, Kelantan yang 'lumpuh' setelah dilanda banjir hingga menyebabkan kebanyakan jalan utama di bandar itu terpaksa ditutup semalam. Gambar kiri menunjukkan petugas Hospital Kota Bharu memindahkan pesakit ke tempat selamat selepas hospital itu turut dinaiki air, semalam.

KEADAAN di jalan raya Bulatan Jam Besar, Kota Bharu yang ditenggelami banjir sehingga paras lutut semalam.

Flooding in Kota Bahru, Kelantan - 10 to 16 Dec 2004

Action Plan within the Next Five (5) Years

Year	Action Plan
2007	Dissemination of the importance of FHM ➢ Deliver presentation of FHM to my division ➢ Formed working group ➢ Organising worksyops ➢ To liase with the Department of Surveying and Mapping ➢ Carried out interviews with the target group
2008	Promote FHM to local government, schools and NGO's ➢ Town watching (participation from school children, local government etc.)
2009	Disseminate the completed FHM to the people of the state of Kelantan
2010	Carry out survey/interviews the effectiveness of FHM

Problems in Making Flood Hazard Map in Malaysia

•Insufficient data e.g DEM (digital elevation map)

• Priotised jobs

• To convinced the residents, local government and various agencies.

N

ISE CITY FLOOD HAZARD MAP

Legend

Inundation Depth

Value

High : 11.00

Low : 0.0002

Evacuation Centre

0 370 740 1,480 2,220 2,960

Meters

D Improvement From The FHM On Ise City

- The Flood Hazard Map provided is very informative.Updating from to time to time depending on the necessity and the urgency.
- FHM is very important and beneficial before any structural measures undertaken
- Town watching activities are very useful to gather the latest information, the needs of the residents during evacuation process and the needs of the Government to save lives and properties

- The cooperation between residents, Municipal Office and the Government will save a lot of lives and property loss.
- FHM is very importantant for town planners to develop any city to cope up with hazards

E Conclusion

- Knowledged and technical know-how acquired in Japan is a treasure, hence very beneficial to me and my department
- ICHARM/PWRI/JICA had successfully delivered the needs of the developing countries to safe lives and properties - for the sake of mankind through this FHM course

F Acknowledgement

I would like to take this opportunity to thanks ICHARM / PWRI / JICA for making this course a successful, enjoyable and a memorable event.

My deepest appreciation to all the staffs for their hardworking and understandings to bear with 16 participants of different personalities and character. It's really a good experience to be with you all and my dear participants.

My sincere gratitude and appreciation to TBIC for making my stay in Japan so enjoyable though sometimes 'homesick'.

Domo arigato gozaimasu. See you