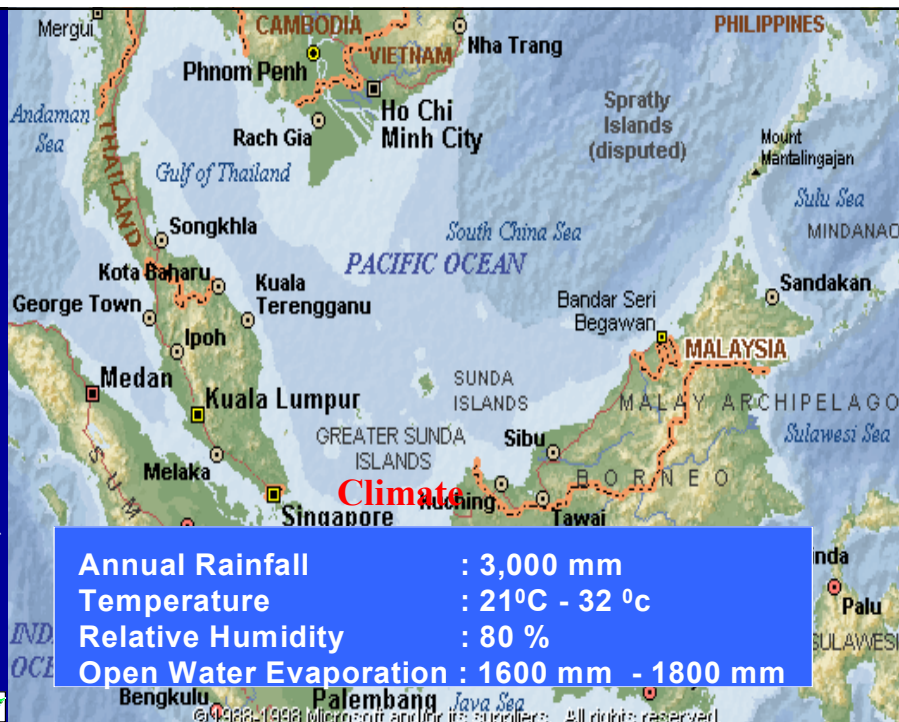




Flood Management In Malaysia

by

Paridah Anun bt. Tahir
Department of Irrigation and Drainage
Malaysia



Climate

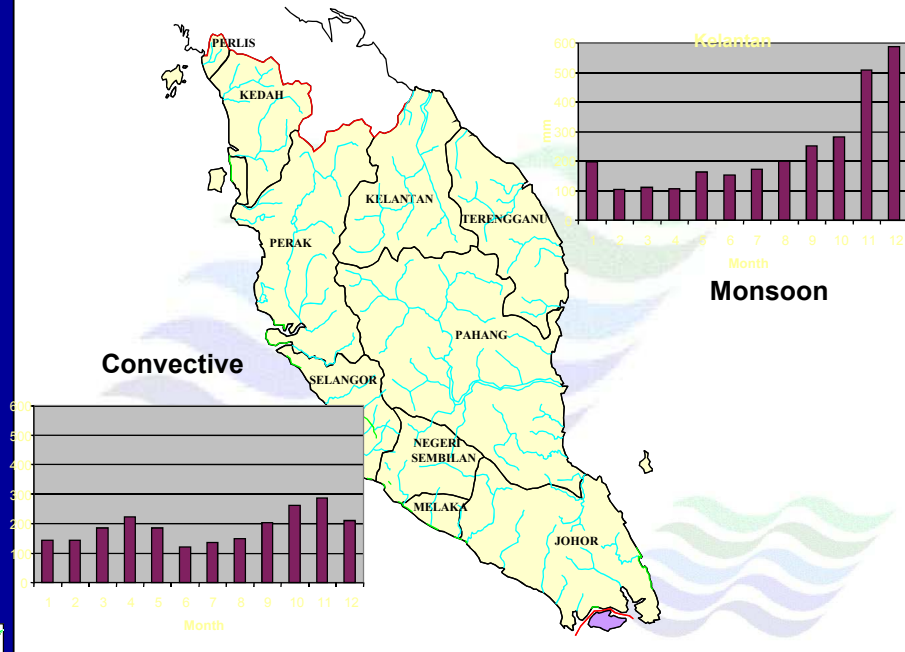
- Heavy Rainfall during North East Monsoon affecting East Coast States (Widespread floods)
- Intense rainstorms during inter monsoon periods of April-May and August-October (causing flash floods in major towns)

Annual Average Rainfall

Peninsular Malaysia	2,500 mm
Sabah	3,000 mm
Sarawak	3,500 mm

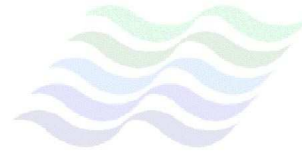


Monsoon and Convective Rainfall Pattern



Topography

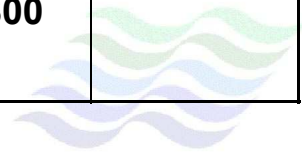
- Hilly upper reaches
- Normal sloping middle reaches (1 in 2,000)
- Gentle sloping lower reaches (less than 1 in 5,000)
- Mostly subject to tidal influence downstream
- Shallow river bed in flood plain due to sedimentation
- High tidal influence can cause flooding in coastal areas



Flood Events in 2008

	No of events	No of evacuees	Highest depth
West Malaysia	111	13,900	2.0 m
East Malaysia	8	4,900	3.0 m
Total	119	18,800	

22265



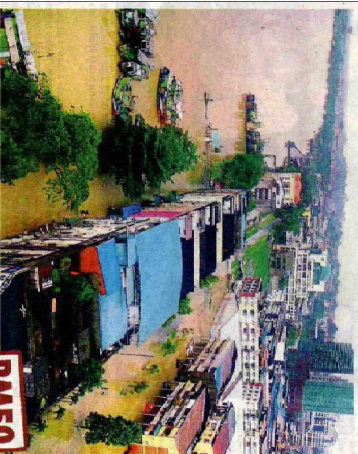
Flood Events in 2009 (up to Feb)

	No of events	No of evacuees	Highest depth
West Malaysia	5	4800	2.0 m
East Malaysia	6	17,450	4.5 m
Total	11	22,250	

Second round of floods in Sarawak

800 villagers evacuated

14 FEBRUARY
The worst overall rain zone in Sarawak has been hit by a second round of floods, forcing 800 villagers to evacuate.



Along the western Baram valley through the flooded Luluva town, which is part of the flood zone in Sarawak.
The worst overall rain zone in Sarawak has been hit by a second round of floods, forcing 800 villagers to evacuate. The rain zone is 300 km long and covers 100,000 sq km. It is the largest rain zone in Sarawak and has caused a lot of damage to the state's infrastructure. The rain zone is expected to last for several days.

Worries for the worst



Nine villages in Keningau flooded
The worst overall rain zone in Sarawak has been hit by a second round of floods, forcing 800 villagers to evacuate. The rain zone is 300 km long and covers 100,000 sq km. It is the largest rain zone in Sarawak and has caused a lot of damage to the state's infrastructure. The rain zone is expected to last for several days.



Worries for the worst
The worst overall rain zone in Sarawak has been hit by a second round of floods, forcing 800 villagers to evacuate. The rain zone is 300 km long and covers 100,000 sq km. It is the largest rain zone in Sarawak and has caused a lot of damage to the state's infrastructure. The rain zone is expected to last for several days.



DISASTER MANAGEMENT



Flood Management in Malaysia

- Establishment of the Permanent Flood Control Commission
- Carrying out basin studies
- Implementation of structural measures
- Implementation of non-structural measures
- Flood forecasting and warning systems
- Establishment of flood disaster relief machinery



The Permanent Flood Control Commission

- Established on 21 December 1971 following the big flood of 1971
- Presently chaired by the Minister of Natural Resources and Environment

Terms of Reference

- To carry out flood mitigation measures and reduce flood occurrences
- In the event of floods, to reduce damages, loss of lives and properties

Flood Management in Malaysia

● Structural Measures

- Flood Mitigation Dams
- Detention Ponds
- Pump Stations
- Flood diversion channels
- River bunds
- Widening and Deepening of rivers





FLOOD HAZARD MAPPING SEMINAR 2009
MANILA, PHILLIPINES 17-19 FEBRUARY 2009



Detention Pond

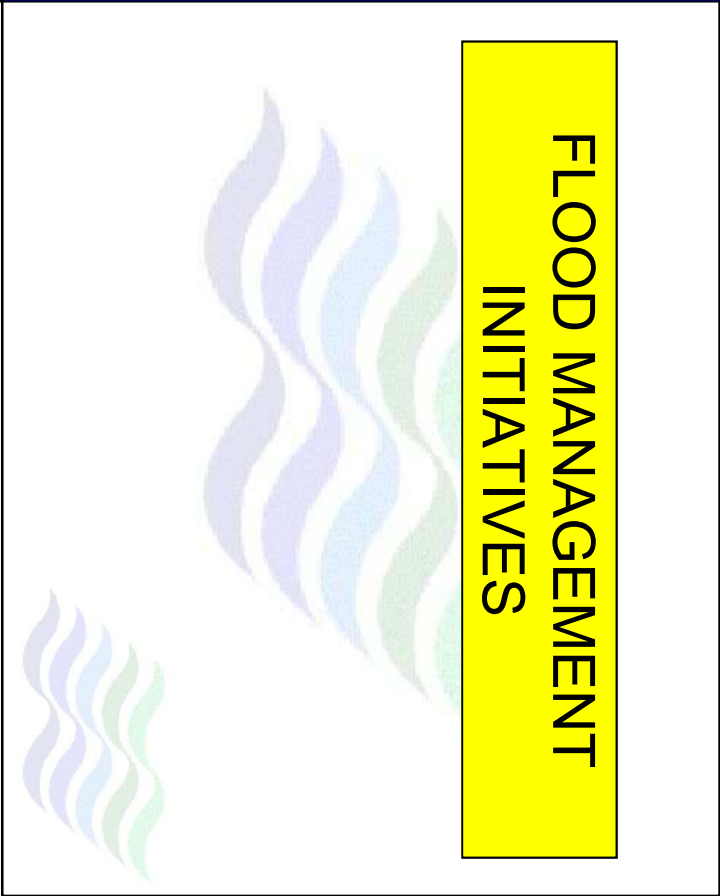


FLOOD HAZARD MAPPING SEMINAR 2009
MANILA, PHILLIPINES 17-19 FEBRUARY 2009



Flood mitigation dam

FLOOD MANAGEMENT INITIATIVES



Urban Stormwater Manual (MSMA)

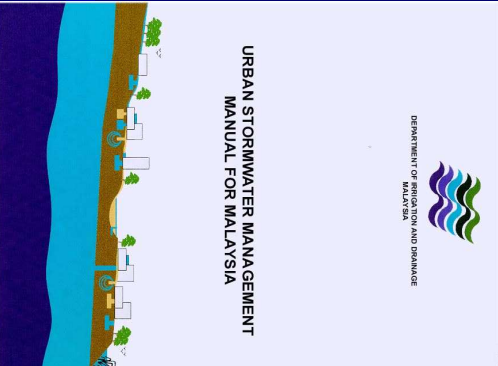
New guidelines for developers

DID manual introduced in move to stop urban flash floods, preserve environs.

By the Mirror Staff — The Department of Environment and Natural Resources (DENR) has introduced a new manual to guide developers in managing urban stormwater runoff. The manual, titled "Urban Stormwater Management Manual for Malaysia" (MSMA), is a comprehensive guide that provides developers with the latest information on how to manage stormwater runoff in urban areas. The manual is designed to help developers understand the importance of stormwater management and how to implement effective measures to prevent urban flash floods and preserve the environment. The manual covers various aspects of stormwater management, including planning, design, construction, and maintenance. It also provides information on the latest technologies and practices used in stormwater management. The manual is available for free download from the DENR website.



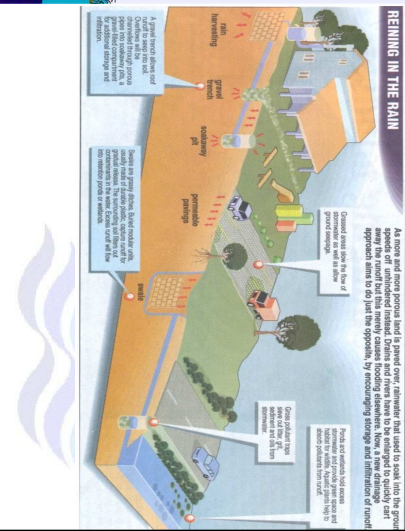
URBAN STORMWATER MANAGEMENT MANUAL FOR MALAYSIA



Managing runoffs

REIMING IN THE RAIN

As more and more porous land is paved over, untreated rain used to soak into the ground is now being carried off by storm drains. This runoff can cause flooding and pollution. A new approach aims to do just the opposite, by encouraging storage and infiltration of runoff.

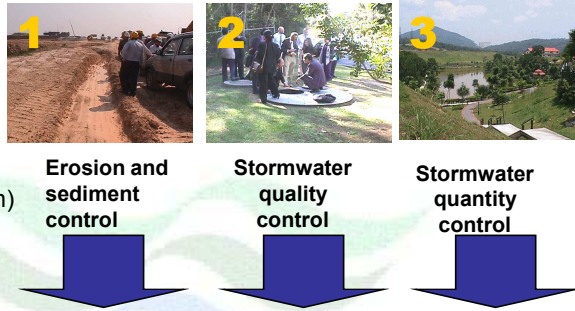


MSMA

(Manual Saliran Mesra Alam)

Concept

- Control at source



3 Main Components

Approach

- storage
- increase in permeability
- reduce flow

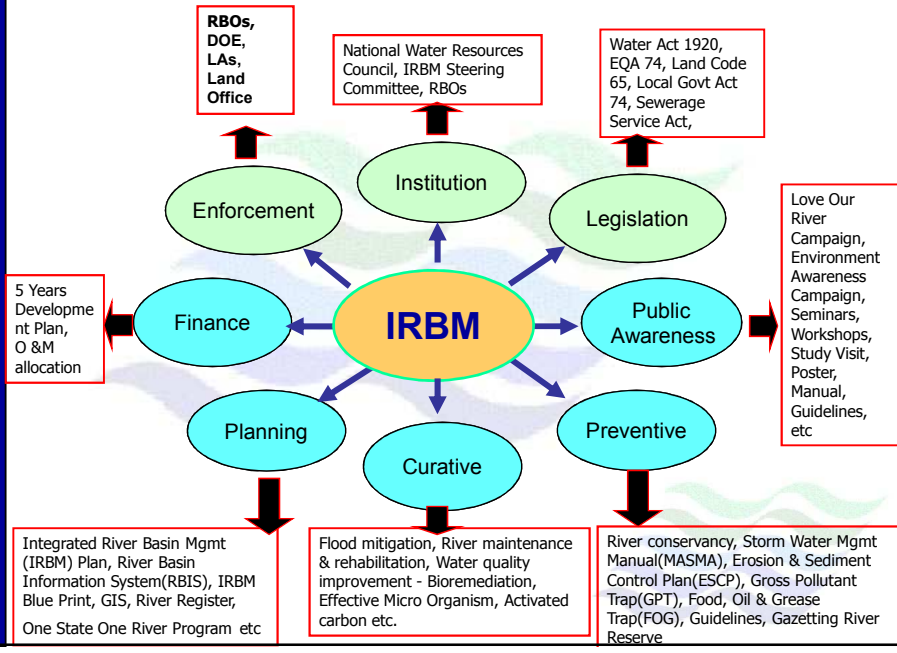


INTEGRATED RIVER BASIN MANAGEMENT (IRBM)

The process of coordinating conservation, management and development of water, land and related resources across sectors within a given river basin, in order to maximize the economic and social benefits derived from water resources in an equitable manner while preserving and, where necessary, restoring freshwater ecosystems.

(Adapted from Integrated Water Resources Management, Global Water Partnership Technical, Advisory Committee Background Papers, No. 4, 2000.)

Components of IRBM



Integrated River Basin Management Plan

1. RIVER CORRIDOR DEVELOPMENT AND MANAGEMENT PLAN
2. CATCHMENT MANAGEMENT AND MONITORING PLAN
3. WATER RESOURCES DEVELOPMENT AND MANAGEMENT PLAN
4. FLOOD MITIGATION MASTER PLAN
5. ENVIRONMENTAL MANAGEMENT PLAN
6. RIVER MOUTH IMPROVEMENT PLAN

Basically Taking Care of Quantity and Quality Aspect of Water Resources





WATER RELATED LEGISLATION

No	Legislation
1	Water Act, 1920
2	Geological Survey Act, 1974
3	Irrigation Areas Act, 1953
4	Streets, Drainage and Buildings Act, 1974
5	The Forest Act, 1984
6	The National Code, 1985
7	The Incorporation (State Legislature Company) Act, 1962
8	The Drainage Works Act, 1954
9	The Fisheries Act, 1985
10	Environmental Quality Act, 1974




No.	Legislation
11	Land Conservation Act, 1960
12	Town and Country Planning Act, 1976
13	Local Government Act, 1976
14	The Merchant Shipping Ordinance, 1952
15	The Port Authorities Act, 1963
16	The Emergency (Essential Powers) Ordinance, No. 7, 1969
17	Selangor Water Supply Enactment, 1997
18	The Mining Enactment, 1929
19	Selangor Waters Management Authority Enactment, 1999


Flood Forecasting and warning

- Rainfall and water level stations
- Transmission of data
- Forecasting using models
- Communications
- Flood Warning boards
- Flood siren stations

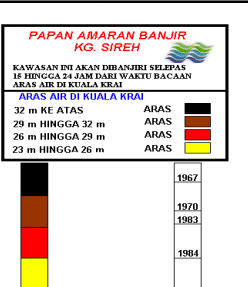




Flood Warning Siren Station



Flood Warning Boards



CONTOH PAPAN AMARAN BANJIR

Sg. Kinabatangan di Balat is at 10.49m, exceeded the alert level by 0.49m on 24/09/2003 08:00

SMS sent to DID officials

FLOOD INFO
<http://infobanjir.moa.my>



FLOOD HAZARD MAPS AND FLOOD RISK MAPS IN MALAYSIA



FLOOD HAZARD MAPS

- Policy
- Programme
- Implementation
- Experience
- Lesson Learnt
- What next





FLOOD HAZARD MAPS Policy



FLOOD HAZARD MAPS Policy

- **MITIGATION**

- **STRUCTURAL**

- INTERNAL DRAINAGE (LOCAL COUNCIL)
- CATCHMENT BASIS AND COASTAL FLOODS (DEPT OF IRRIGATION AND DRAINAGE)

- **NON STRUCTURAL**

- LANDUSE PLANNING (DEPT OF COUNTRY AND TOWN PLANNING)
- DEVELOPMENT CONTROL (DID AND DCTP)
- FLOOD FORECASTING (DID)

FLOOD HAZARD MAPS Policy

• PREPAREDNESS AND RESPONSE

SECRETARIAT

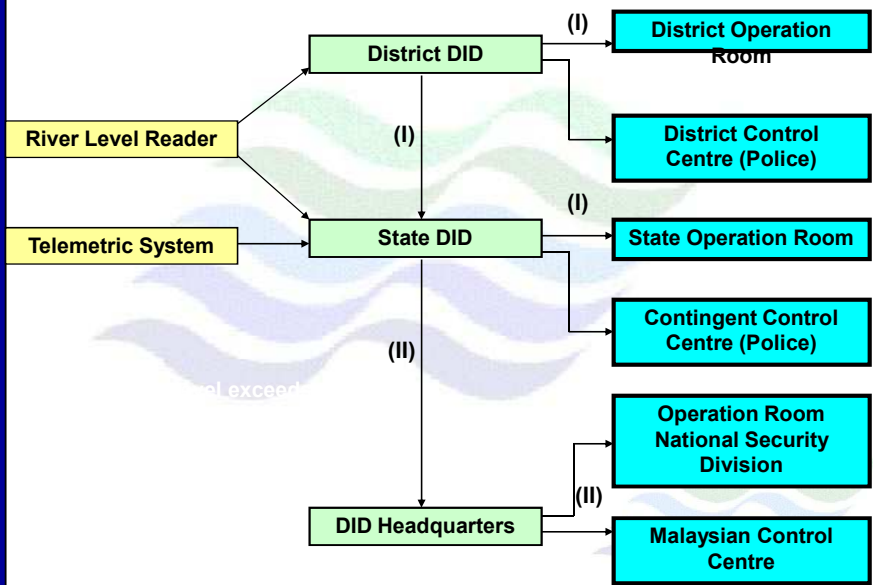
- NATIONAL SECURITY DEPARTMENT

MEMBERS

- POLICE, ARMY, PDP, FIRE AND RESCUE DEPT, (EVACUATION)
- WELFARE DEPT, RED CRESCENT (SHELTER, FOOD AND AID)
- DID (FLOOD FORECASTING AND WARNING)
- HEALTH MINISTRY (MEDICAL AID AND ADVISE)
- INFORMATION MINISTRY AND REMOTE SENSING MALAYSIA (INFORMATION)
- PUBLIC WORKS DEPARTMENT, MHB (ROAD AND HIGHWAYS CLOSURES)
- NATIONAL ENERGY BOARD (DAM OPERATIONS)



DID'S OPERATIONAL STANDING ORDER FOR DISSEMINATION OF CURRENT RIVER LEVEL INFORMATION





New danger STAR 9/12
 (Top) A Fire Department rescue team was called in to evacuate four-day-old Norshamildah Kamaruddin and her mother from their home at Kampung Tanjung Minyak in Malacca yesterday. (Right) A view of the hillside area near Taman Bukit Segar Jaya in Cheras with the effects of soil erosion clearly visible. Residents there are now having sleepless nights. — LOH LAY PHON and A . MALEX YAHAYA / The Star

FLOOD HAZARD MAPS Policy

• REHABILITATION

SECRETARIAT

- ECONOMIC PLANNING UNIT, PRIME MINISTERS DEPARTMENT

REPAIRS AND REHABILITATION

- ROAD AND HIGHWAYS - PUBLIC WORKS DEPARTMENT, MHB
- RIVERS – DID
- FARMROADS – AGRICULTURE DEPARTMENT
- SCHOOLS – EDUCATION DEPARTMENT
- OTHERS



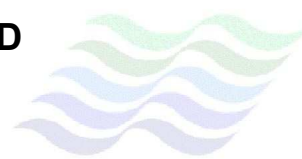
FLOOD HAZARD MAPS Policy

- NO LAW OR GOVT SYSTEM REGARDING FHM
- GOVT AGREE FRM TO BE REFERRED FOR DEVELOPMENT IN FLOOD RISK AREAS
- REQUESTED TO BE INCLUDED IN NEXT MALAYSIA PLAN
- **DEPARTMENT OF IRRIGATION AND DRAINAGE TAKING LEAD (CHAMPION)**
 - WITH COOPERATION OF GOVERNMENT AGENCIES, COMMUNITY AND NON GOVERNMENT ORGANISATION



FLOOD HAZARD MAPS PURPOSE

- **PLANNING PURPOSE (PLANNING DEPARTMENT)**
- **LAND USE ZONING**
- **LOCATION OF UTILITIES**
- **EVACUATION (FLOOD RESPONSE)**

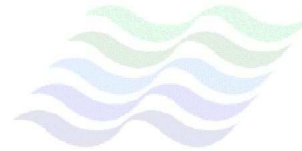




FLOOD HAZARD MAPS PROGRAMME

FLOOD HAZARD MAPS (FOR EVACUATION PURPOSE)

- PILOT PROJECT AS SAMPLE
 - KOTA TINGGI
 - TTDI JAYA
- PROCEDURE TO PRODUCE FHM
- ALL FHM IN GIS DATABASE
- TRAINING TO STATE LEVELS



FLOOD HAZARD MAPS PROGRAMME

FLOOD RISKS MAPS (FOR DEVELOPMENT AND LANDUSE PLANNING)

- PILOT PROJECT AS SAMPLE
 - TTDI JAYA
- ALL FLOOD MITIGATION STUDY TO INCLUDE FRM
- PREPARATION TERM OF REFERENCE
- FRM TO BE IN GIS DATABASE
- DISTRIBUTION TO DID STATES, LOCAL COUNCIL AND TCPD



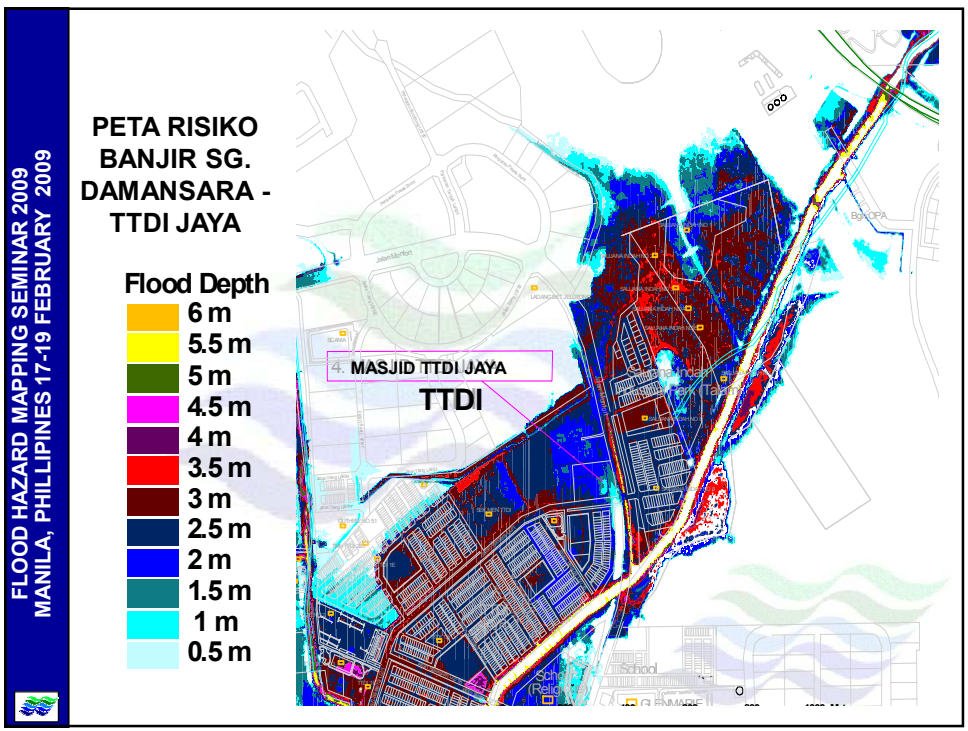
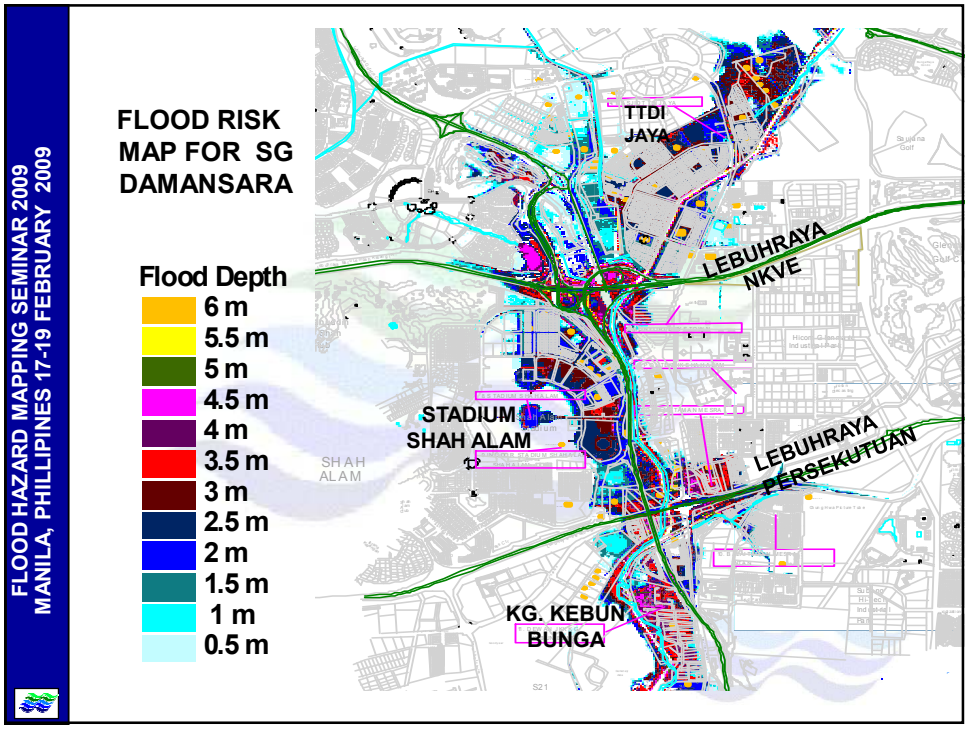


FLOOD HAZARD MAPS IMPLEMENTATION

FLOOD MAPS BASED ON PAST EVENTS	AVAILABLE FOR WHOLE COUNTRY, CONTOURS AVAILABLE FROM 20M. WITH FLOOD DEPTH FOR KOTA TINGGI ONLY.
FLOOD MAPS PRODUCED BY HYDRAULIC ANALYSIS	SG. DAMANSARA CATCHMENT AVAILABLE. SIX (6) CATCHMENTS IN PROGRESS.



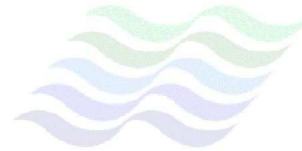
FLOOD HAZARD MAPS





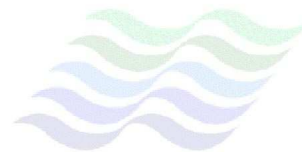
FLOOD HAZARD MAPS DISSEMINATION

- STATE OFFICIALS (AWARENESS)
- DISTRICT OFFICIALS (TO CARRY OUT)
- NGO (TO REACH OUT TO THE COMMUNITY)



Flood Hazard Maps ISSUES

- INSUFFICIENT DATA
- FUNDS LIMITED AND COMMITTED TO ENGINEERING STRUCTURES
- AWARENESS AMONG DIFFERENT AGENCIES AND COMMUNITIES
- LEGALITIES, SECURITY
- POLICY
- ACCEPTABLE ACCURACY
- HUMAN CAPACITY



DATA SITUATION IN THE COUNTRY (FOR ANALYSIS)

- HYDROLOGICAL DATA
 - AVAILABLE FOR MOST RIVER BASINS
- TOPOGRAPHY DATA
 - ❖ For all river basins contour up to 20 meters
 - ❖ For some areas, lidar data is available or in the progress of capturing
 - ❖ LIDAR VERY COSTLY
 - ❖ MUST FIND OTHER ALTERNATIVES



PROBLEMS IN DISSEMINATION


Saturation level of TV, Radio, TV, Internet and Newspaper

- ❖ Different between urban areas and rural areas
- ❖ Between different socio economic status



Saturation level

	Urban high SEG	Urban low SEG	Rural High SEG	Rural Low SEG
TV		XX	X	X
Radio	X	X	XX	XX
Internet	XX			
Newspaper	X	X	X	X


 * SEG – Socio economic group xx very influential x Influential

AWARENESS LEVEL

- ❖ Time of floods
 - High among rural communities
- ❖ Preparedness to evacuate
 - High among Urban communities

REGARDLESS OF FLOODS



KTUAL
beber
Tereng
an seli
rologi
M
dapat
meny
tumbuh
kotor p
Bebek, P
Pasir P
Pasir P
Jenanti
Jenanti
rang, H
Mesing
dan Seg
Hijau K
dapat
meny
tumbuh
kotor p
Bebek, P
Pasir P
Pasir P
Jenanti
Jenanti
rang, H
Mesing
dan Seg
Hijau K

PASUNGAN pengantin, Mohd. Azrul Azmi dan Khair Al Nisa Ismail meredah banjir untuk beresalam dengan tetamu yang hadir pada majlis...

PUBLIC AWARENESS & EDUCATION CAMPAIGNS MUST BE CARRIED OUT ALL YEAR ROUND (NOT JUST DURING THE FLOOD SEASON)



OII HELP ME!

Public awareness



PLANS FOR THE FUTURE UP TO 2010

FLOOD MAPS	FOR ALL FLOOD EVENTS
FLOOD HAZARD MAPS	30
FLOOD RISK MAPS	20



REASONS FOR DIFFERENT KINDS OF MAPS

Flood map based on inundation analysis for development permission in flood risk areas because

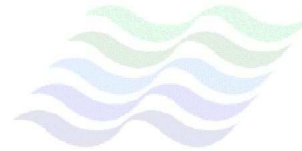
- i) More scientific, therefore trustworthy
- ii) In case of legalities
- iii) Higher sense of security



REASONS FOR DIFFERENT KINDS OF MAPS

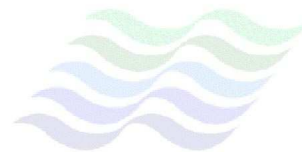
Flood map based on past inundation for evacuation purpose

- i) More believable for the community
- ii) Cheaper to produce
- iii) Easier to do



FLOOD HAZARD MAPS LESSONS LEARNT

- ❖ IMMEDIATE COLLECTION OF DATA ESPECIALLY FLOOD MARKS
- ❖ GOOD NETWORKING WITH RELEVANT PARTIES
- ❖ DO NOT HESITATE!!





THANK YOU

MARAMING SALAMAT PO

