

# FLOODS AROUND THE WORLD

No country is free from flood

Many remedial actions were taken, however the problem still occur

Many questions were asked....

Q1: What is still lacking in managing flood?

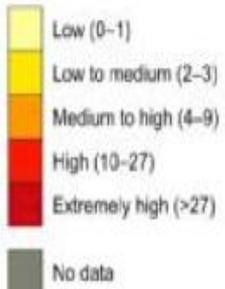
Q2: Who is responsible?

Q3: Where we should start?

Q4: When we can achieve zero flood?

## FLOOD OCCURENCE

# floods 1985-present



Flood occurrence is extremely high

Source: World Resources Institute (WRI), 2010

# Malaysia Towards Zero Flood: Assessment of Flood Mitigation and Management Measures from the Stakeholders' Viewpoints

*ASEAN ACADEMIC NETWORKING IN WATER DISASTER MANAGEMENT AND CLIMATE CHANGE  
CHULALONGKORN UNIVERSITY, THAILAND  
23-26 SEPTEMBER 2014*



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UNIVERSITI  
TEKNOLOGI  
MARA

*Marfiah Ab.Wahid and Wardah Tahir*

*Flood Control Research Centre*

*Faculty of Civil Engineering*

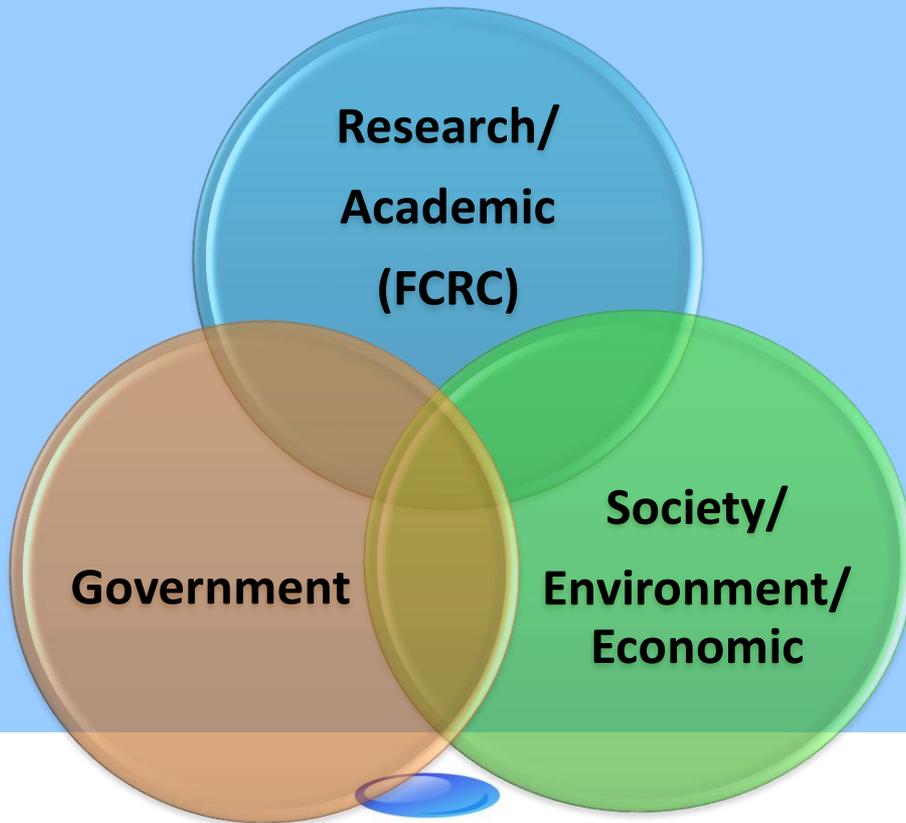
*Universiti Teknologi MARA*

*MALAYSIA*

*marfi851@salam.uitm.edu.my*



# Flood Control Research Center



- To identify important issues on flood
- To provide the solution for flood problems in Malaysia.
- To train young researchers/staff.
- To share the pool of expertise
- To go beyond Malaysian border

# Flood Control Research Center (FCRC) Universiti Teknologi MARA

Initiated by the Ybhg. Tan Sri Vice Chancellor  
5-University Collaboration  
in 2012





# Flood Control Research Center Task Force



## FLOOD MODELING

Assoc.Prof.Dr Wardah Tahir



## ENVIRONMENT QUALITY AND MONITORING

Dr.Marfiah Ab.Wahid



## WATERSHED MANAGEMENT

Dr.Mohd Fozi Ali



## ECONOMIC EVALUATION

Dr.Lee Wei Koon



## DISASTER MANAGEMENT

Dr.Siti Rashidah Mohd Nasir



## FLOOD STRUCTURE AND INFRASTRUCTURE

Ir.Turahim Abdul Hamid



# Flood Control Research Center library and website

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*Welcome to*  
**Flood Control Research centre Library**

Welcome to the Flood Control Research Centre Library. Here you will find educational material and other documents or informations pertaining to flood control.

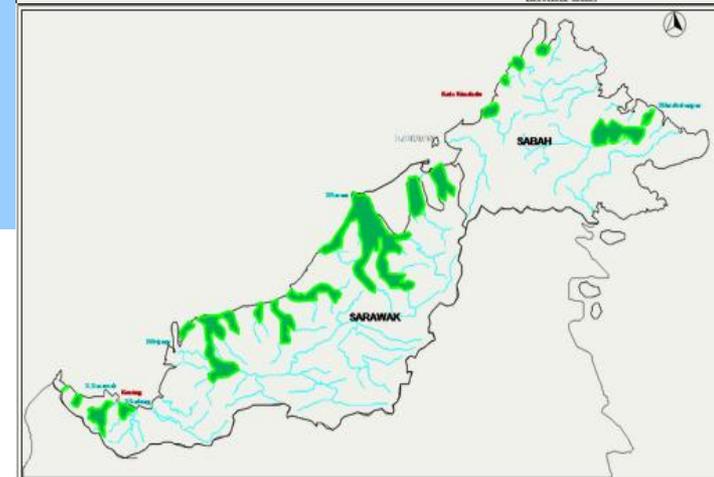
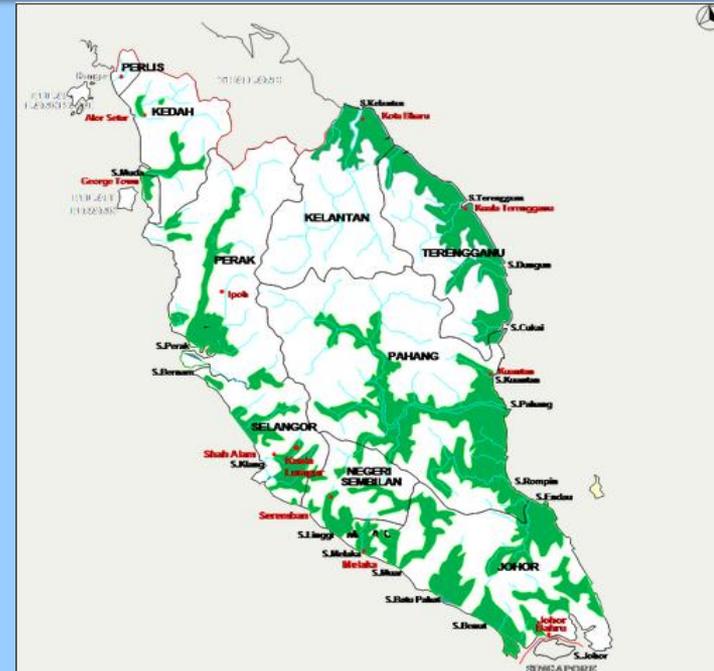
A flood is an overflow of water that submerges or "drowns" land. The European Union (EU) Floods Directive defines a flood as a covering by water of land not normally covered by water (Directive 2007/60/EC Chapter 1 Article 2.1). In the sense

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# Malaysia background

- **Climate:** Equatorial climate with constant high temperatures and high relative humidity
- **Annual average rainfall:** 2,420 mm for Peninsula Malaysia and 2,630 mm for Sabah, 3,830 mm for Sarawak
- **Flooding** is the most significant natural hazard in Malaysia in terms of population affected, frequency, area extent, flood duration and social economic damage.
- **East coast and southern part of Peninsula Malaysia, Sabah and Sarawak** – (northeast monsoon). **West coast** – affected by flood from **September to November**



Flood Prone Area in Malaysia



# Occurrence of Flood Events in Malaysia (Case study : Kuala Lumpur)



1926



2009



1971



2011



2012



2005



2013



# Causes of Flood

**The main causes of flooding in Malaysia :**

- **Loss of flood storage due to development taking over flood plains and drainage corridors**
- **Increased surface runoff due to urbanization**
- **Failure of drainage system**
- **Bridges and culverts**
- **Siltation in waterway channels**
- **Localised continuous heavy rainfall**
- **Tidal backwater effect**
- **Inadequate river capacity**



# Flood Control Measures

## Structural Measures



### Flood Control Dam

Klang Gates Dam, is located in Taman Melawati, a suburb of the Kuala Lumpur, Malaysia. The dam is the first reservoir in Malaysia and it was opened in 1958.





# Flood Control Measures

## Structural Measures



**Storage Ponds** is to divert the flood water through storage ponds and thus regulate the outflow so that the flood peaks are attenuated.

Example Sri Johor Pond at Kerayong River Kuala Lumpur





# Flood Control Measures

## Structural Measures



**Widening /deepening**Cross-section view of Sungai Kerayong

Rehabilitation 3.7 km of Sungai Kerayong from Jalan Loke Yew to Kampung Cheras Baru, Kuala Lumpur

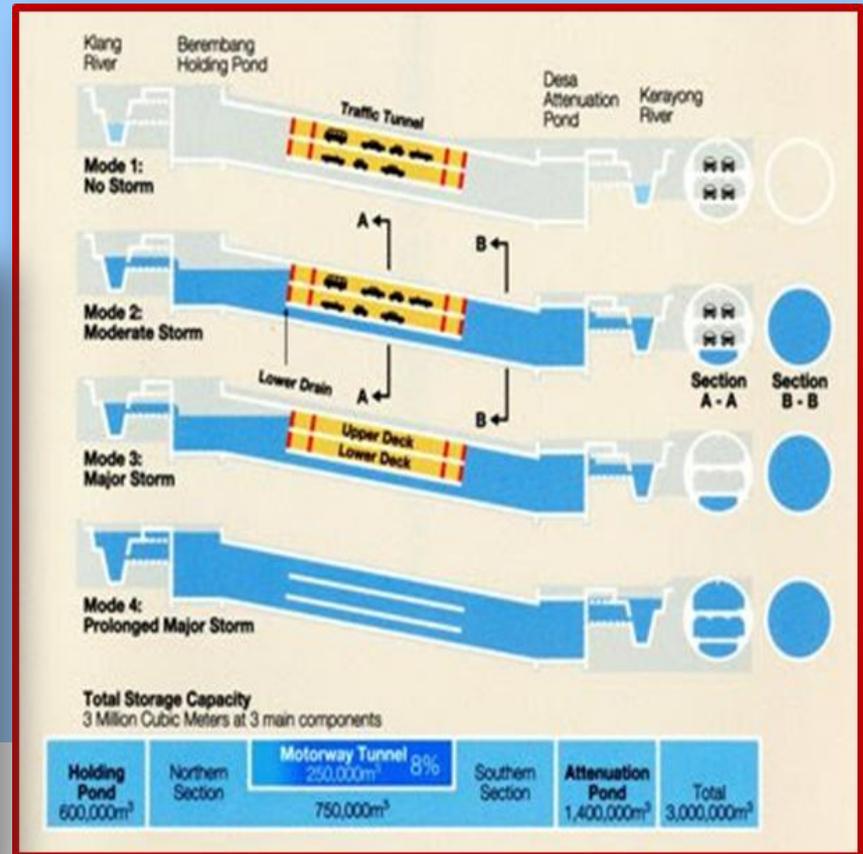
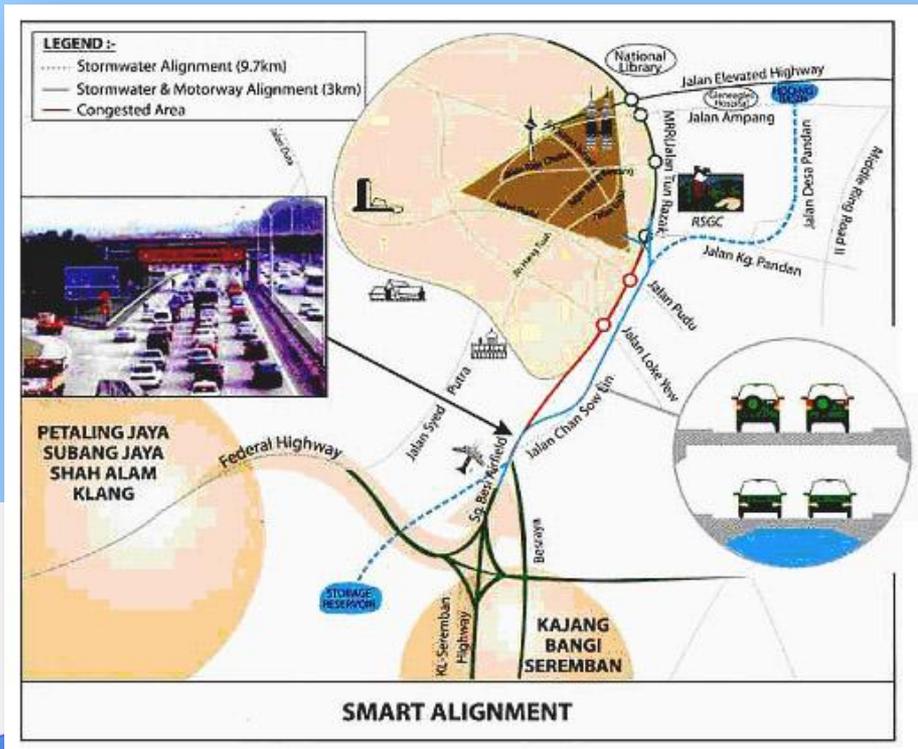




# Flood Control Measures

## Structural Measures

Flood diversion channel or tunnel :





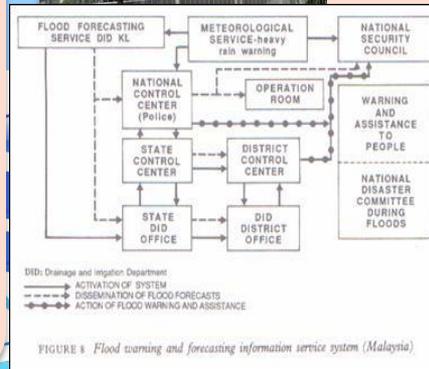
# Flood Control Measures

## Non-Structural Measures

### Rainwater harvesting system



### Flood Forecasting and warning system

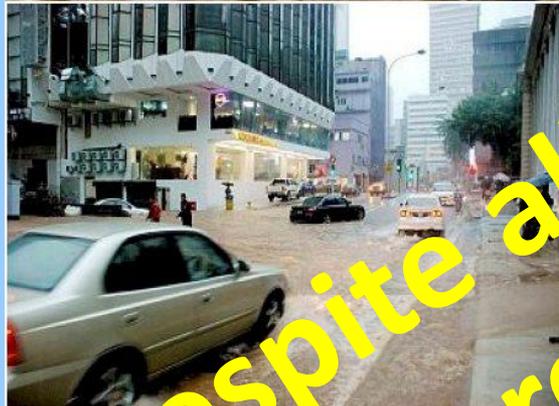


### Guidelines and Standards



### Integrated River Basin Management (IRBM)





Despite all flood mitigation measures we still face frequent flood problem



## Objective:

To assess the effectiveness, resource consumption, impact, related regulation and guideline on existing flood mitigation and management measures in urban area from the stakeholders' viewpoints.

## Methodology:

1. Roundtable discussion with agencies involved in flood management in Malaysia.
2. Questionnaires
3. Personal interview





# Evaluation framework

Principle	Evaluation Criteria
Has the control measures increase the effectiveness in flood management?	<ul style="list-style-type: none"><li>• Has the flood mitigation structure reduced the flood frequency?</li><li>• Has the flood mitigation structures beneficial to stakeholders?</li><li>• Were additional structures needed to increase the function of existing structures?</li></ul>
Has the control measures optimize the use of resources?	<ul style="list-style-type: none"><li>• Has the flood mitigation structures reduced the recourses consumption?</li><li>• Has the structure categorized as sustainable?</li><li>• Were the operation and maintenance of flood mitigation structures need external expertise?</li><li>• Has the staff posses sufficient training?.</li><li>• Has the continuous monitoring was conducted?</li></ul>
Has the control measures reduced negative impacts and created positive impacts to social, environment and economic	<ul style="list-style-type: none"><li>• Has the flood mitigation structure reduced impact on nature?</li><li>• Has the flood mitigation structure minimized the pollution?</li><li>• Has the flood mitigation measures reduced the impact of flood to the victim?</li><li>• Has the structure needed high cost to develop and maintenance?</li></ul>
Has the control measures engaging the stakeholders and improve the flood management?	<ul style="list-style-type: none"><li>• What is the impact to stakeholders?</li><li>• Any awareness campaign conducted to all stakeholders?</li><li>• What are the function and contribution of stakeholders&gt;</li></ul>



# Related Agencies

Agency	Department / sector	Function
<b>Ministry of Natural Resources and Environment</b>	Department of Director General of Lands and Mines (JKPTG) Department of Survey & Mapping Malaysia (JUPEM) National Institute of Land and Survey (INSTUN) Forestry Department Peninsular Malaysia (JPSM) Forest Research Institute Malaysia (FRIM) and Minerals and Geoscience Department Malaysia (JMG) Department of Environment (JAS) and Department of Wildlife & National Parks Peninsular Malaysia (PERHILITAN) Department of Irrigation and Drainage (JPS) and National Hydraulic Research Institute of Malaysia (NAHRIM) Department of Environment Department of Meteorology	Natural resources management. Forest management. Irrigation and drainage management. Wildlife management. Minerals management. Conservation and management of environment and shelters. Environmental conservation. Marine park management. Management of land survey and mapping administration. Land management and administration. Land surveying. Mapping processing.
<b>Ministry of Energy, Green Technology and Water</b>	Energy, Green technology, water supply, sewerage	Ensure the implementation of development policies in the power industry, water and green technology effectively; Ensure the provision of comprehensive infrastructure, an integrated, standards and quality; To provide a conducive environment for industrial development and technology; Ensure service delivery system that is efficient, effective and affordable; Ensuring that the regulatory mechanisms implemented in accordance with the provisions of existing legislation and



# Related Agencies

Agency	Department / sector	Function
<b>Ministry of urban wellbeing, housing and local government</b>	Solid waste and public cleansing management corporation (ppsppa) Federal town and country planning department (JPBD) Fire and rescue department of malaysia (JBPM) Local and national housing department (JPN) Local government department (JKT) National landscape department (JLN) National solid waste management department (JPSPN) Tribunal of housing and strata management (TTPS) Housing and local government training institute (ILPKT)	<p>Advising the federal government and state governments on matters related to planning, management, development and soil conservation in line with the national physical planning.</p> <p>Provide policy and advisory services planning, implementation and management of landscapes, parks and recreation for local authorities and government agencies.</p> <p>Provide policy, regulatory systems and the management of solid waste and public cleansing of an integrated, efficient, reliable and cost effective.</p>
<b>Ministry of Works</b>	Construction Industry Development Board Lembaga Lebuhraya Malaysia Lembaga Jurutera Malaysia Lembaga Arkitek Malaysia Lembaga Juruukur Bahan Malaysia	<p>To monitor the construction, operation, toll handling and maintenance of the tolled expressways; o plan the development of the Federal road networks nationwide;</p> <p>To coordinate and monitor the implementation of the Federal road projects and other projects under the supervision of MOW;</p> <p>To regulate the privatised maintenance work of Federal roads and ;</p>

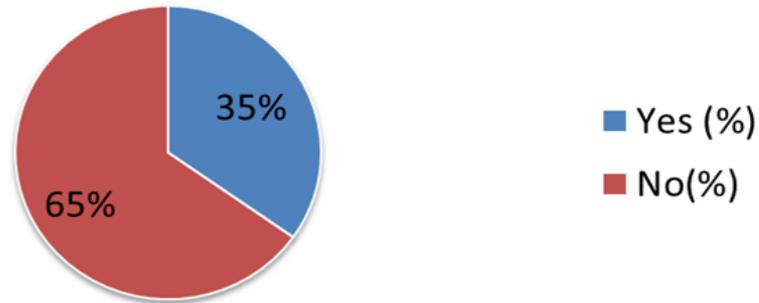
# Roundtable discussion, questionnaire and interview session



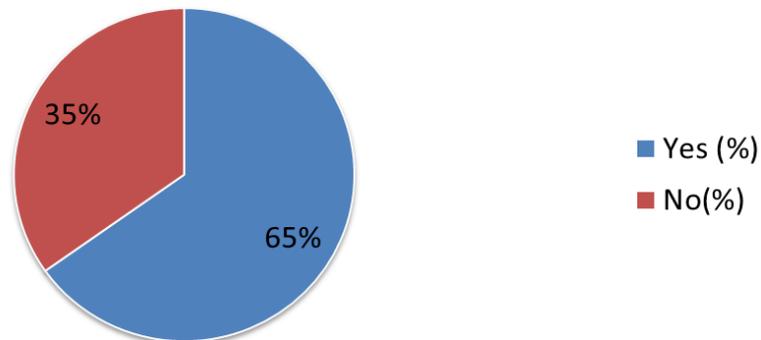


# Survey on Effectiveness of Flood Mitigation Measures

## Flood mitigation structures reduced flood frequency



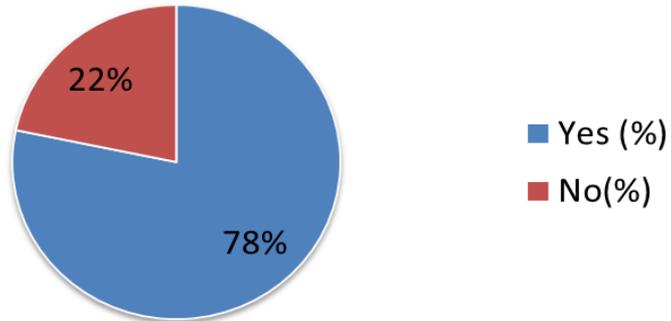
## Additional structure is needed to increase the function of existing structures



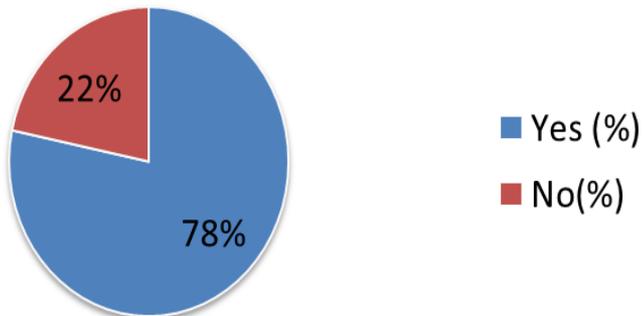


# Survey on Effectiveness of Flood Mitigation Measures

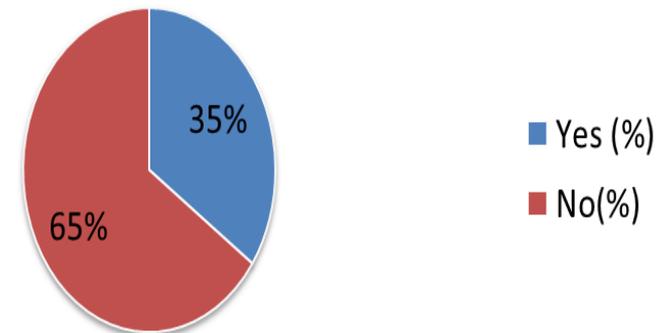
## Stored all historical flood data



## Involved other agencies for flood management planning



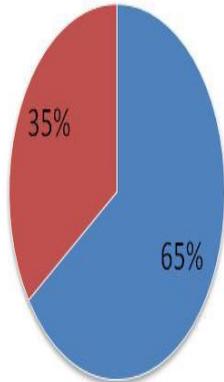
## Sufficient training was conducted for monitoring and operating





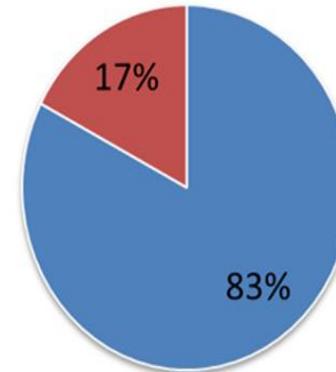
# Survey on Resource Consumption

Considered the assimilative capacity and carrying capacity of river



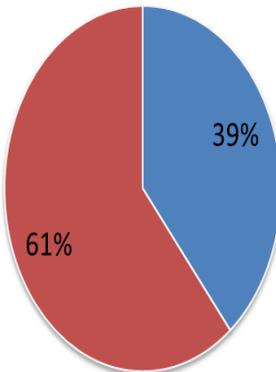
■ Yes (%)  
■ No (%)

Proper planning towards zero flood



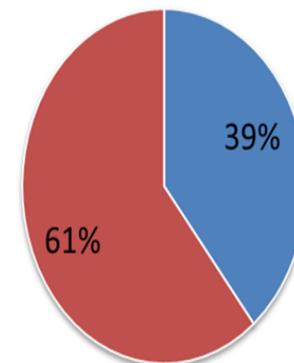
■ Yes (%)  
■ No (%)

Structure reduced resource consumption (ex.energy, water, land)



■ Yes (%)  
■ No (%)

Applied sustainable concept

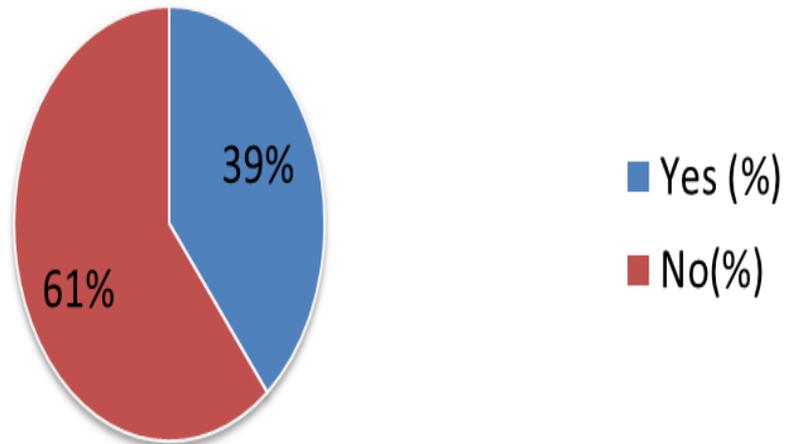


■ Yes (%)  
■ No (%)



# Survey on Impacts

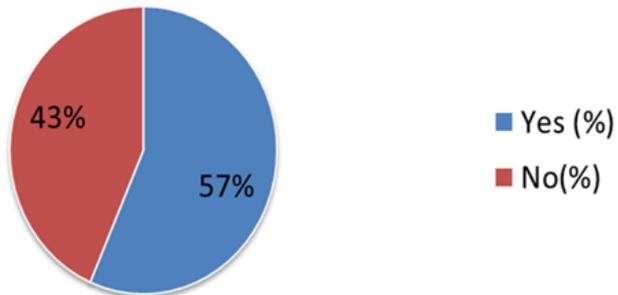
The flood mitigation structures  
minimized environmental pollution



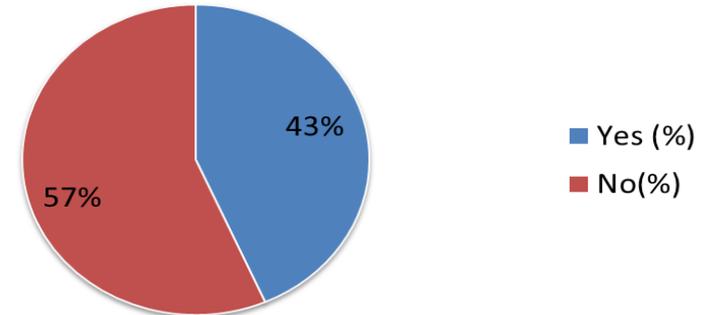


# Survey on Stakeholder Perception

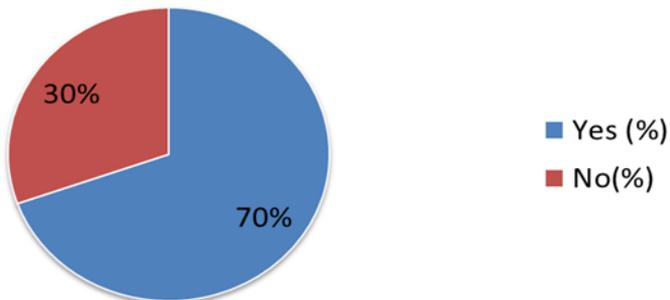
**Flood mitigation structures beneficial to stakeholders**



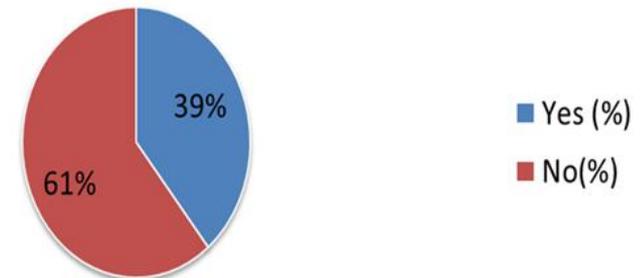
**Foreign expertise is needed to operate the flood mitigation structures**



**The flood mitigation structures reduced disaster impact to victim**



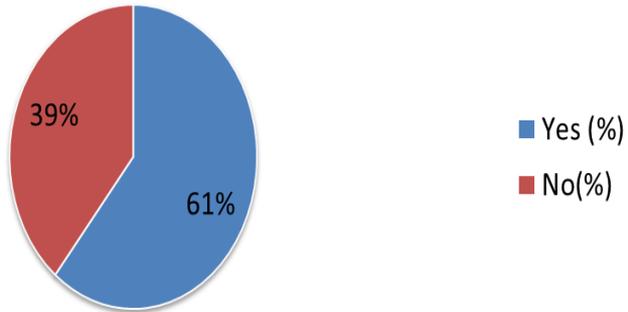
**Awareness campaign was conducted for public**



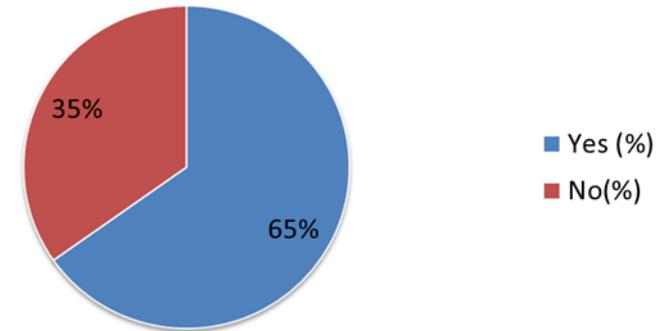


# Survey on regulation and guideline

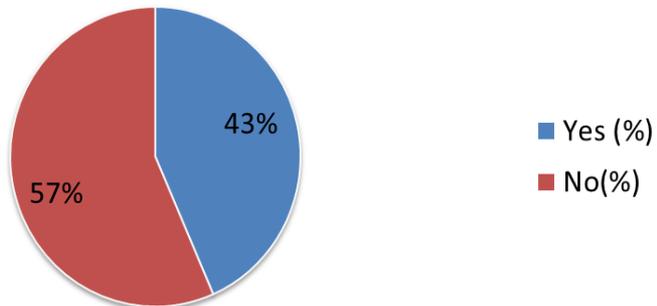
Existence of development in river reserve area



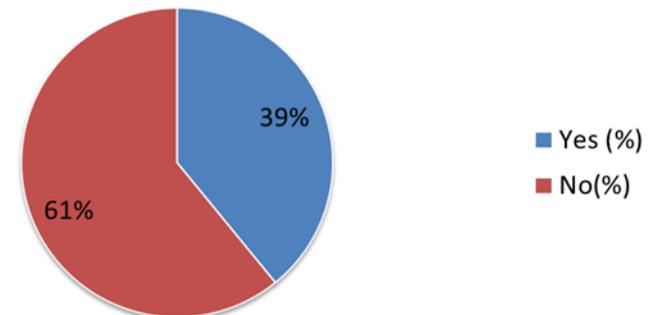
Strategic action plan for flood management



Agency took legal action for non-compliance parties



Agencies apply regulation and guideline for flood control





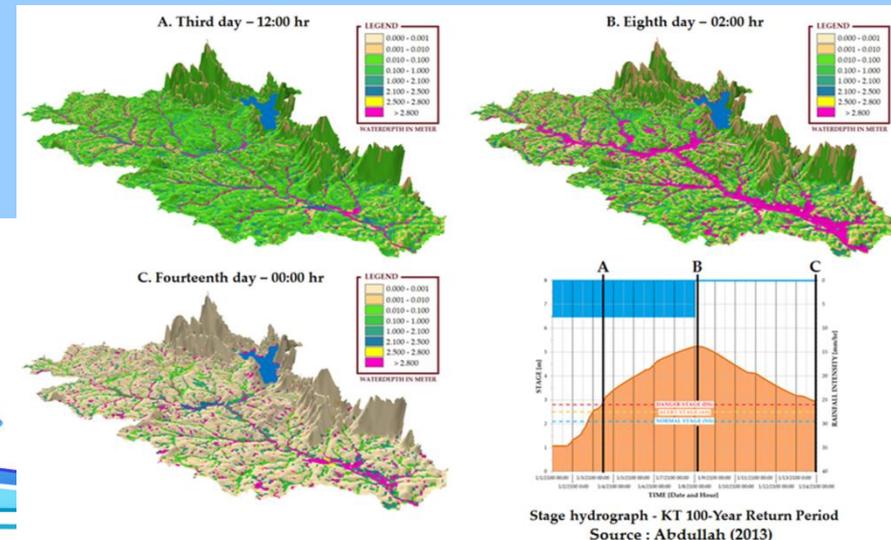
# Highlighted Issues

- Maintenance of flood mitigation structures
- Data sharing and data mining (research development in flood mitigation and management)/ Data not updated
- Solid waste problems
- Integration and coordination of the agencies function
- Financial implication for implementation of flood mitigation measures
- Focused on specific area (remove your problem to other area)
- Enforcement of law
- Drainage Master Plan
- Monitoring and continuous assessment



# Way forward

- 1 – Investigation on river capacity
- 2 – Detail assessment on existing flood control structures
- 3 – Analyze the practice from other countries – adopted an appropriate method for Malaysia
- 4 – Develop an integrated hydrodynamic model including hydrology, hydrodynamic, sedimentation and water quality.
- 5 – Produce real time simulation for urban area
- 6 – Propose the implementation of soft structures
- 7 – Assessment on existing regulation



Thank you for your kind attention

