



# **ENHANCEMENT OF FLOOD HAZARD MAPS FOR NATIONAL FLOOD FORECASTING AND WARNING SYSTEM UNDER *PROGRAM RAMALAN & AMARAN BANJIR (PRAB)***

by;  
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# INTRODUCTION

# BACKGROUND

## Northeast Monsoon Flood

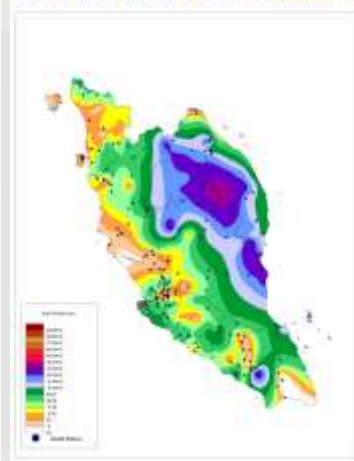
14 Dis 2014 – 10 January 2015

1. Encounter 8 States : Kelantan, Terengganu, Pahang, Perak, Perlis, Johor , Sabah and Sarawak.
2. Prolonged flood more than 15 days
3. Flooded Area = 11,500 km<sup>2</sup>
4. Flood depth; 1 – 12 meter

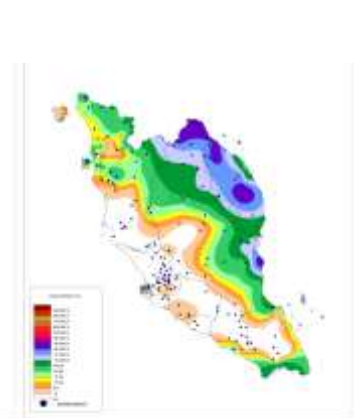
## Caused of flooding

1. Prolonged extreme rainfall up to 10 days.
2. *High tide*
3. *Constriction in the river*
4. *Land use changed*

DAILY RAINFALL STATUS 22/12/2014



17/12/2014



Isohyet Map

Flood Inundation Map



**WHAT IS  
PRAB?**

# ***PROGRAM RAMALAN DAN AMARAN BANJIR NEGARA (PRAB)***

**(National Flood Forecasting and Warning Program)**

## **Current System**



# ***PROGRAM RAMALAN DAN AMARAN BANJIR NEGARA (PRAB)***

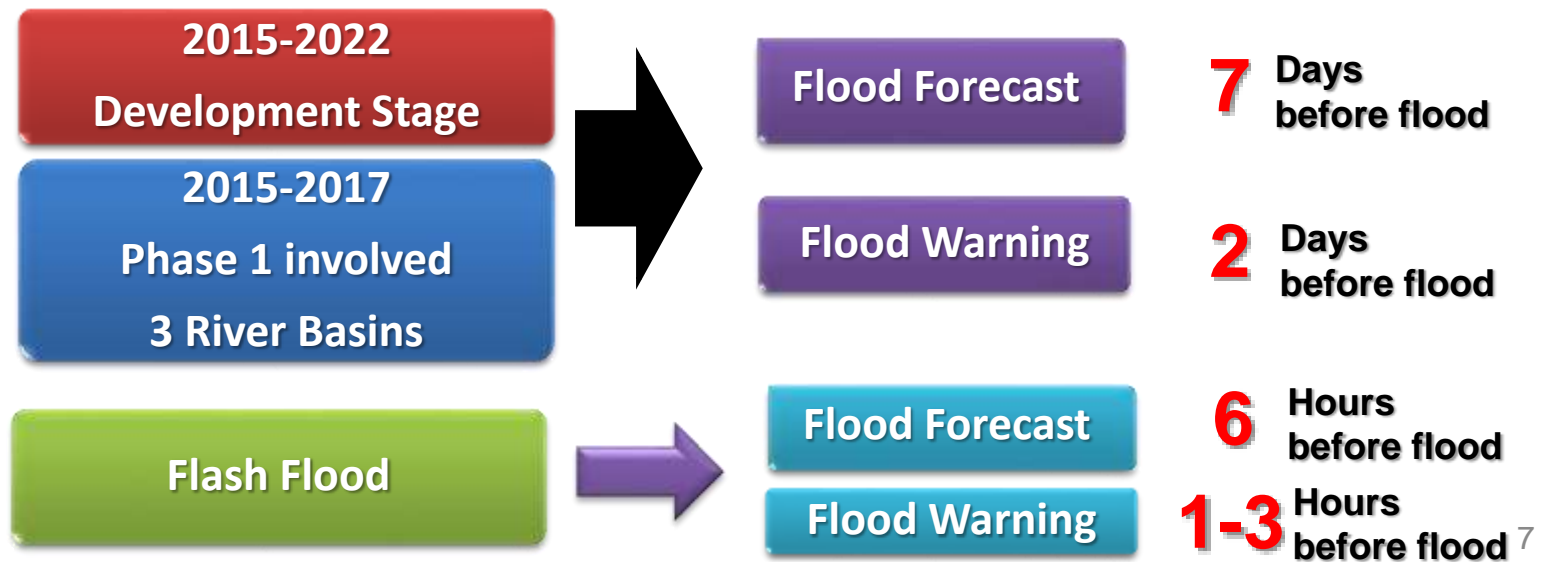
**(National Flood Forecasting and Warning Program)**

## Current System

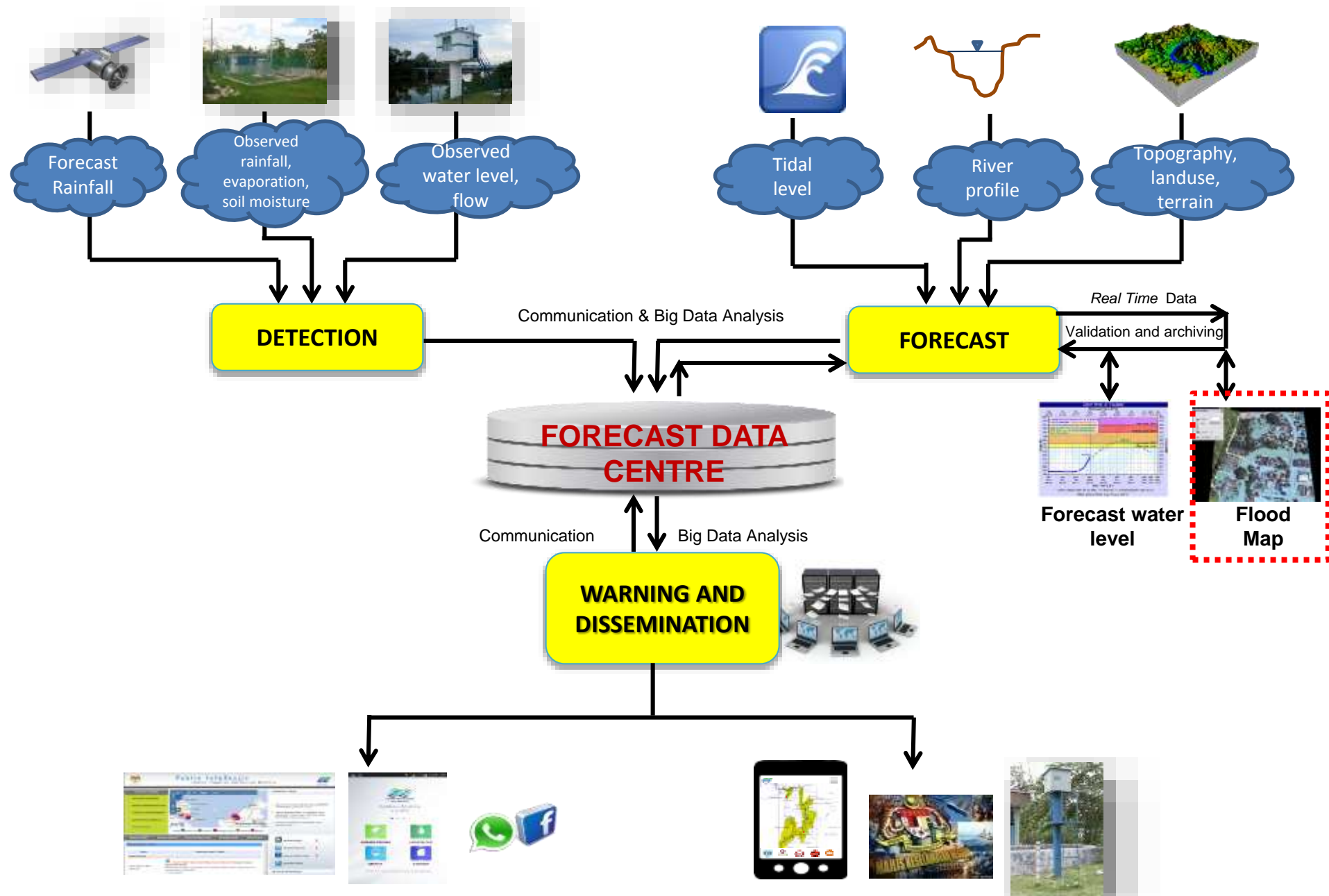


## PRAB

**40** River Basins



# PRAB MAIN COMPONENT





# FLOOD MAPS

# FLOOD MAPS DEVELOPMENT BY JPS

LATER

LATEST

## FLOOD INUNDATION MAP



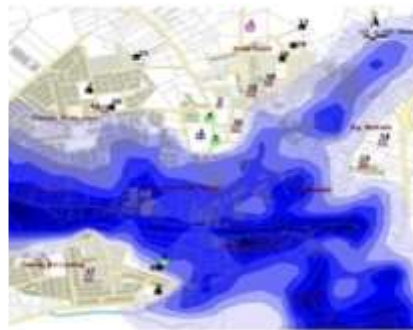
### Process

- ✓ Produced based on ground observations and satellite image of flood area.

### Output

- ✓ Flood extent.

## FLOOD HAZARD MAP



### Process

- ✓ Generated through a combination of model of river basin both hydrologic and hydrodynamic modelling

### Output

- ✓ Flood extent.
- ✓ Flood depth.
- ✓ Flood velocity.
- ✓ Flood propagation.

## FLOOD RISK MAP



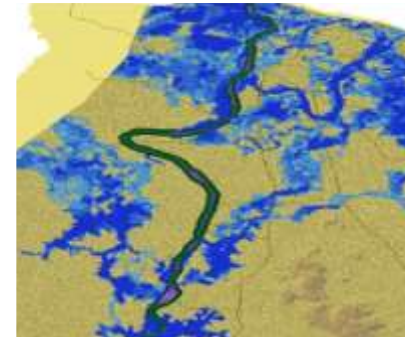
### Process

- ✓ Generated using hydrodynamic modelling methods.
- ✓ Combination of Flood Hazard Map and Vulnerability Map.

### Output

- ✓ Classification of flood risk zones.

## REAL TIME & FORECAST FLOOD HAZARD MAP



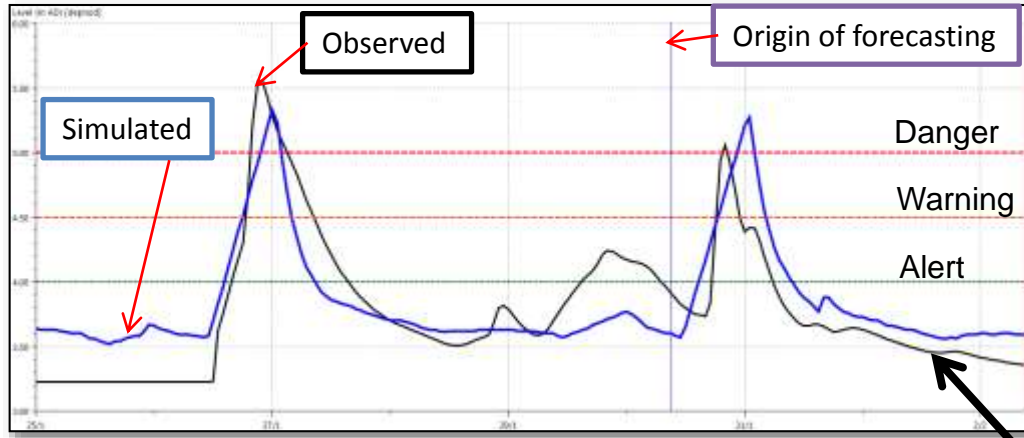
### Proses

- ✓ Generated by using multiple input of rainfall data such as rainfall gauge, rainfall RADAR, and Numerical Weather Prediction. Hydrodynamic modeling will take place to simulate and produce real time and predicted flood area.

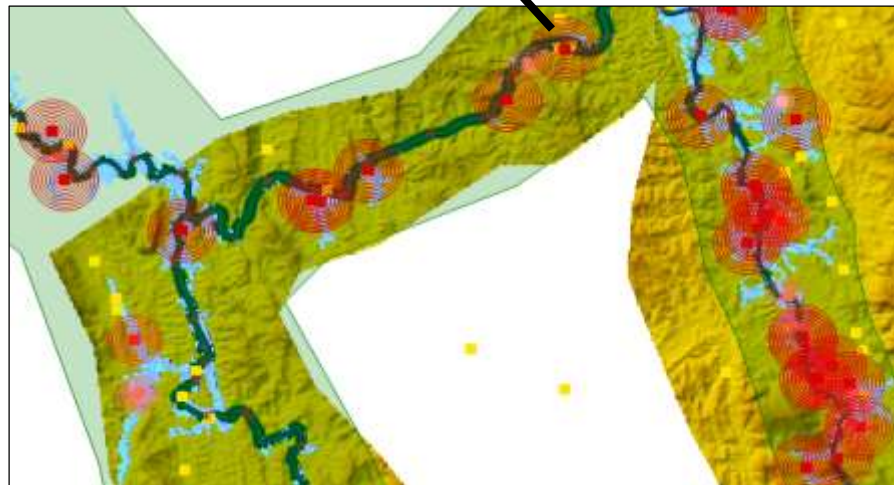
### Output

- ✓ Flood extent and depth
- ✓ Flood velocity and propagation
- ✓ Time of flood start and end

# FLOOD FORECAST OUTPUT

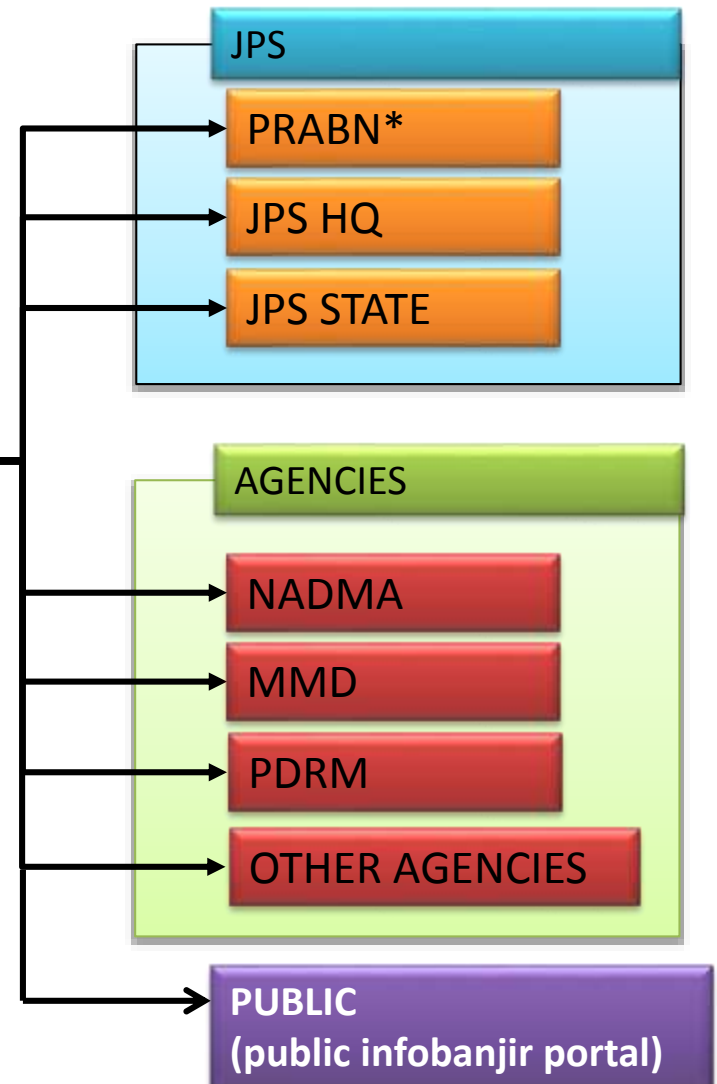
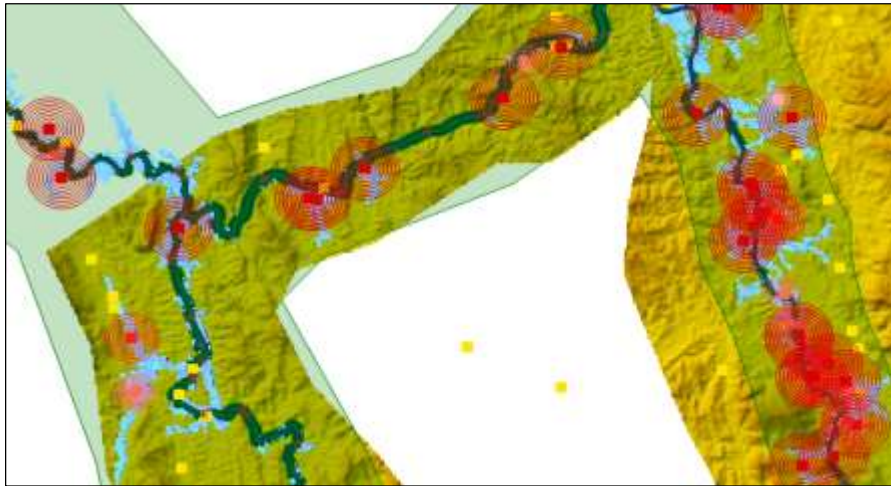


Example of comparison between forecasted and observed water level, showing threshold for flood alert



Example of flood alert visualization in 2D Model

# Where does the forecasted flood results go?



\*PRABN = Pusat Ramalan dan Amaran Banjir Negara  
(National Flood Forecasting And Warning Centre)



# CONCLUSION

- The overall PRAB program aim to reduce the impact of flood hazard and provide enhancement disaster risk reduction through a forecast system which able to forecast monsoon flood 7 days earlier based on weather forecast data from the Department of Meteorology, Malaysia
- **PRAB utilized science and technology application in flood forecasting to enable advance flood hazard warning to agencies and public.**
- Real time flood hazard map will able provide advantages in identification of priority area for evacuation and logistic management.



**THANK YOU**