

# 9<sup>th</sup> Meeting of the GEOSS Asian Water Cycle Initiative International Coordination Group (AWCI ICG)

## COUNTRY REPORT: MALAYSIA



**MOHD ZAKI M.AMIN**  
National Hydraulic Research Institute of Malaysia  
Ministry of Natural Resources & Environment



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## **ECONOMICS OF CLIMATE CHANGE FOR MALAYSIA - WATER RESOURCES, AGRICULTURE AND ENERGY SECTOR**

### **Objective of Water Resources Sector:**

**to carry out analysis on economic of adaptation to climate change in the water resources sector of floods and droughts-irrigation water supply (required reservoir storage capacity)**



## **1 FLOODS ANALYSIS**

- Designed Flood Peaks**
- Generated Floods Inundation Map**
- Adaptation Options – Low Impacts Development**

## **2 WATER SUPPLY – DROUGHT ANALYSIS**

- Dam Inflows**
- Projected Irrigation Water Demand**
- Analysis of Irrigation Water Demand and Availability:**
  - Surplus-Deficit Scenario and Planting Season; and**
  - Critical Period and Critical Drawdown of Reservoir Storage capacity**

## **3 ECONOMICS IMPACT ASSESSMENT – CBA & ADAPTATION POLICY**



# Generated Flood Extent Map

Location: Sg Skudai

Landuse: Future

Rainfall: 2060, 100y ARI

Time horizon	Area for flood depth (km <sup>2</sup> )			Sum
	0.01 - 0.5 m	0.5 - 1.2 m	>1.2 m	
Baseline	1.83	2.88	4.31	9.02

### Legend

River

### Projected Flood Depth (m)

- 0.0 - 0.5
- 0.5 - 1.2
- >1.2



# 2

## GUIDE TO HYDROLOGY PRACTICES ON ESTIMATION OF DESIGN FLOOD DISCHARGES IN MALAYSIA

1. INTRODUCTION
2. **ESTIMATION OF DESIGN STORMS**
3. ESTIMATION OF DESIGN FLOODS
4. FREQUENCY ANALYSIS
5. REGIONAL FLOOD FREQUENCY ANALYSIS
6. PROBABLE MAXIMUM PRECIPITATION AND PROBABLE MAXIMUM FLOOD
7. **FLOOD ESTIMATION USING RAINFALL-RUNOFF MODELLING**
8. **IMPACT OF CLIMATE CHANGE ON DESIGN FLOOD ESTIMATION**
9. SOME CONCLUDING REMARKS ON HYDROLOGICAL FLOOD ESTIMATION

**IMPACT OF CLIMATE CHANGE ON DESIGN FLOOD ESTIMATION: A NEW CONSIDERATION IN WATER RELATED INFRASTRUCTURE PLANNING & DESIGN BY MEANS OF "CLIMATE CHANGE LOAD FACTOR"**

### PROCEDURE

### FOR

### ESTIMATION OF CLIMATE CHANGE LOAD FACTOR FOR DESIGN FLOODS IN MALAYSIA

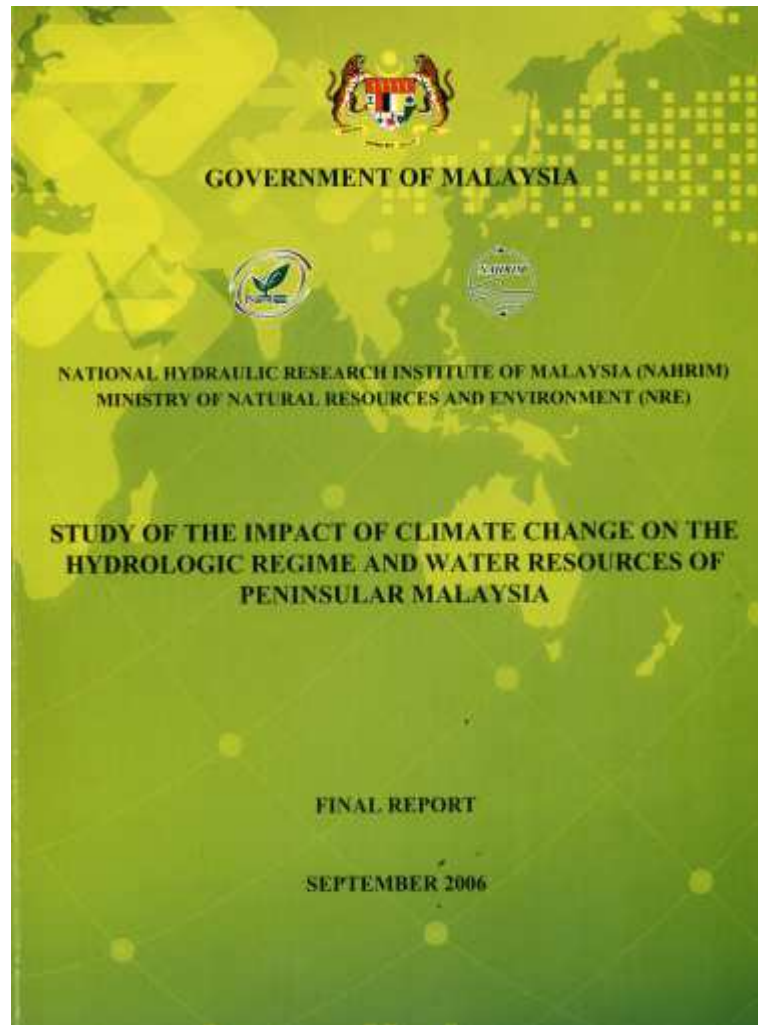


**DECEMBER 2012**



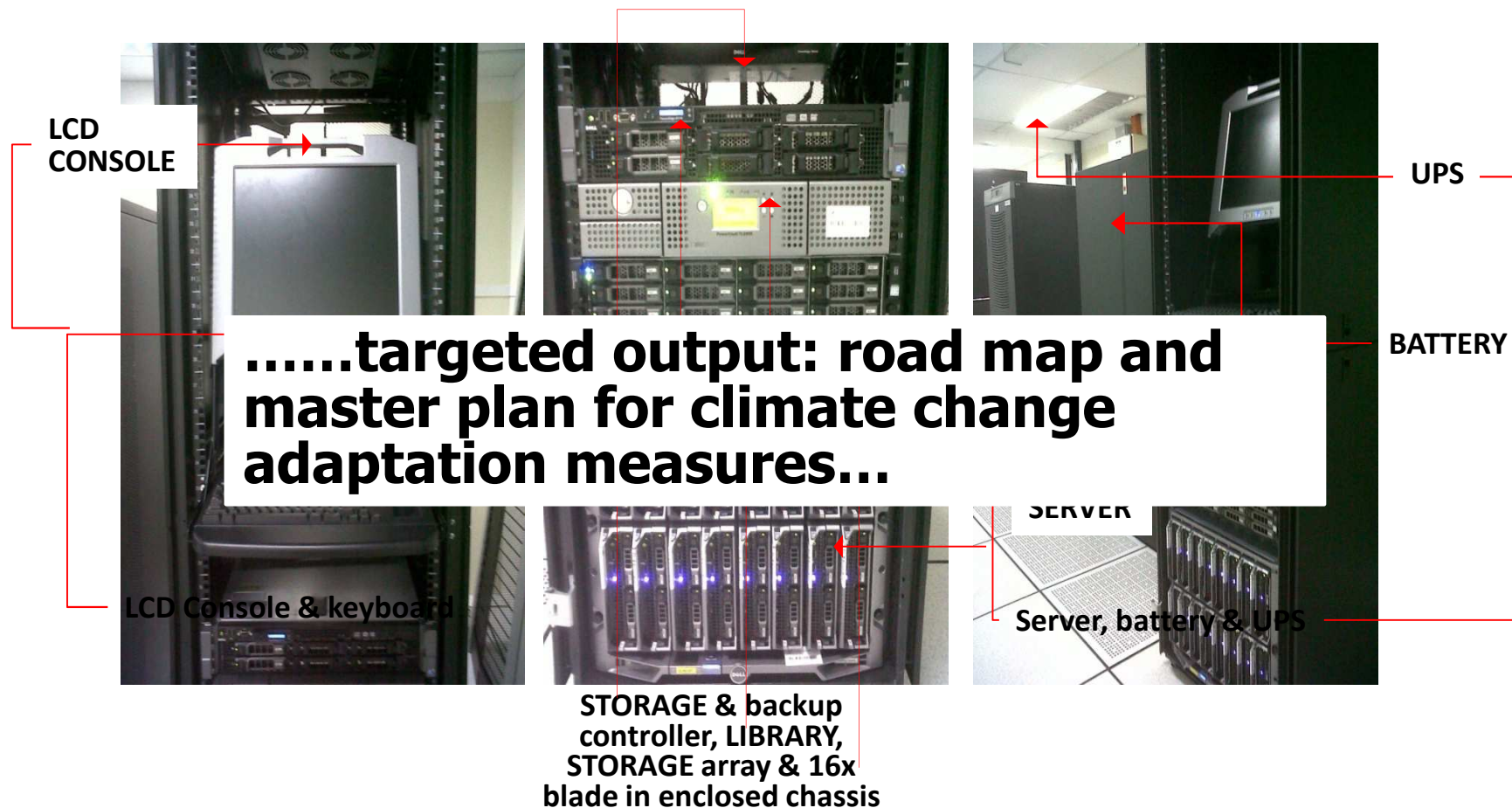
### 3

## EXTENSION OF THE FINE RESOLUTION STUDY OF THE IMPACT OF CLIMATE CHANGE ON THE HYDROLOGIC REGIME AND WATER RESOURCES OF PENINSULAR MALAYSIA



- **2006 - Downscaling** Canadian GCM1 (~ 410km resolution), to **fine spatial resolution** (~9km)
- **New study:**
  - **3 GCMs** – MPI-ECHAM5, CCSM3 and MRI-CGCM2.3.2
  - **15 scenarios** – SRES A1B (5), B1 (5), A2 (1) and A1Fi (1)
  - Downscaling GCMs (~150-310km) to watershed scale **spatial resolution of 6km**
  - **Hourly** time interval resolution
  - Study period – 18 months ( Sept. 2012 – Feb. 2014)

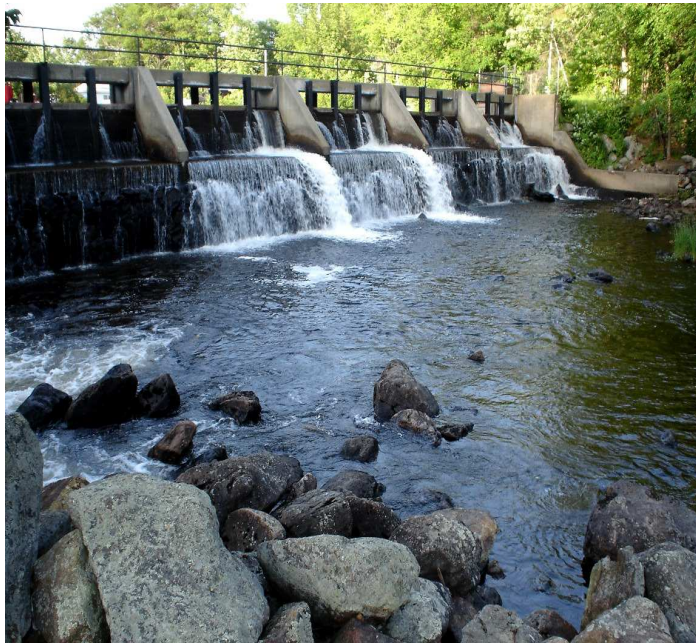
# HIGH PERFORMANCE COMPUTING (HPC) SYSTEM



- 16 blade cluster servers
- .....would be able to runs dynamic downscaling processes about 20 years simulation per day.....
- 192 CPU cores (3.0Ghz each) & clock speed of 2.304 teraflops

# 4

## **FUTURE PLAN FOR: WATER NEXUS OF CLIMATE CHANGE IMPACTS ON THE SAFETY OF HYDRO ELECTRIC DAM AND HIGHWAY DRAINAGE INFRASTRUCTURE**



**Bekok Dam**

- **Potential Impacts of Climate Change (increased in precipitation and extreme storm event) on Estimation of Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF) – Hydro Storage; and**
- **Impacts of climate change on small mini hydro (run-off river )**
- **Impacts of climate change and adaptation measures on highway drainage system – capacity size of drainage infrastructure**



# THANK YOU

[zaki@nahrim.gov.my](mailto:zaki@nahrim.gov.my)

<http://www.nahrim.gov.my>