# Development of real-time system for the Chao Phraya River

**Daisuke KOMORI and Eiji IKOMA (IMPAC-T)**



## Background -Activities after the 2011 Thai flood

The Japan International Cooperation Agency (JICA) launched a flood-control project following the massive flooding. We joined the project through the Integrated Study on Hydro-Meteorological Prediction and Adaptation to Climate Change in Thailand (IMPAC-T) project. The aim of the study was to determine the water-balance characteristics in the upper Chao Phraya River basin using a hydrological model.

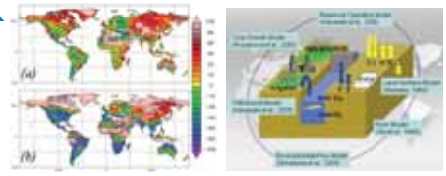
- **The committee on the flood countermeasure at the Chao Phraya River**
  - Preliminary runoff analysis by IMPAC-T.
  - Preliminary inundation analysis by International Centre for. Water Hazard and Risk Management (ICHARM).
  - Rainfall-runoff analysis, inundation analysis for designed flood, etc.

- **The committee on the development of the early flood warning system**
  - Runoff and inundation simulation using H08 and RRI
  - Real-time system for monitoring and forecasting

# Collaboration on the real-time system between IMPAC-T and JICA-FRICS project

**IMPAC-T**

Developing the National Strategic Plan in Water Sectors for the Adaptation Measures under Climate Change



Early warning system on the risks of water-related disasters by integrating observations and models

IMPAC-T data sharing system

**FRICS**

Early flood warning system

System development

**Early flood Warning system**

Model development
System development

Data input

Data integration system

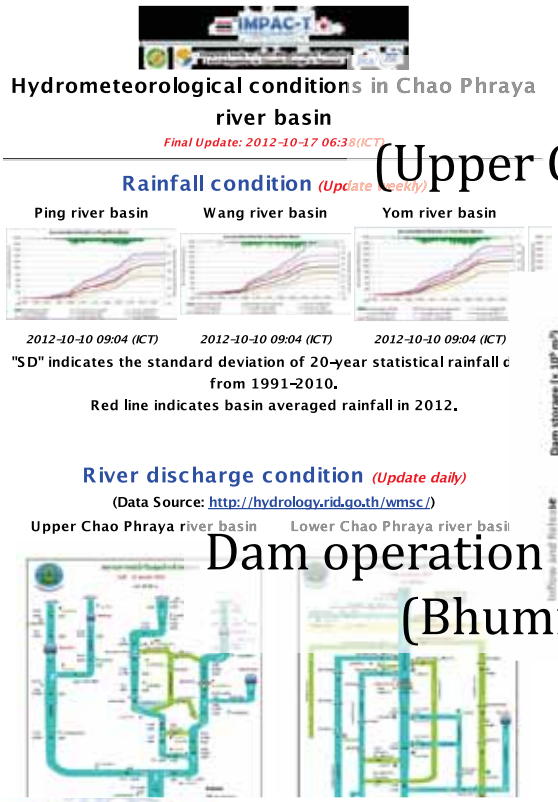
**Thailand**



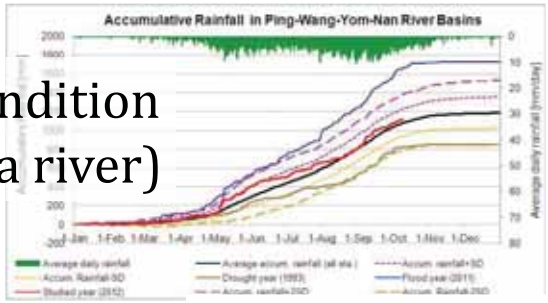
# Early flood warning system

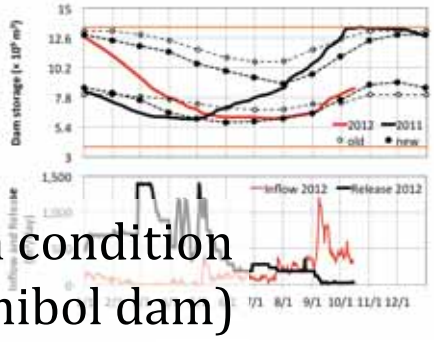
# Flood monitoring

http://impact-www.eng.ku.ac.th/chaophraya/




Rain condition
(Upper Chao Phraya river)



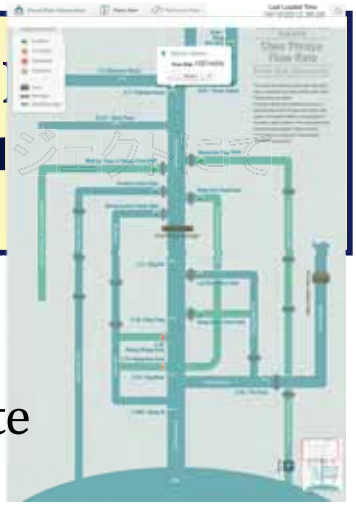

Dam operation condition
(Bhumibol dam)

River discharge condition
(Lower Chao Phraya river)

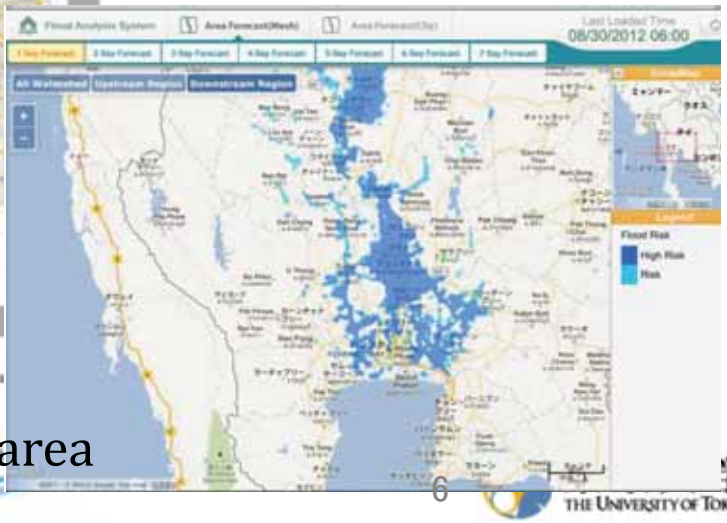


# Early flood warning syste

## （JICAチャオプラヤ川流域洪水対策支援プロ
## FRICSに協力して開発中。）



Flow Rate


Flood area



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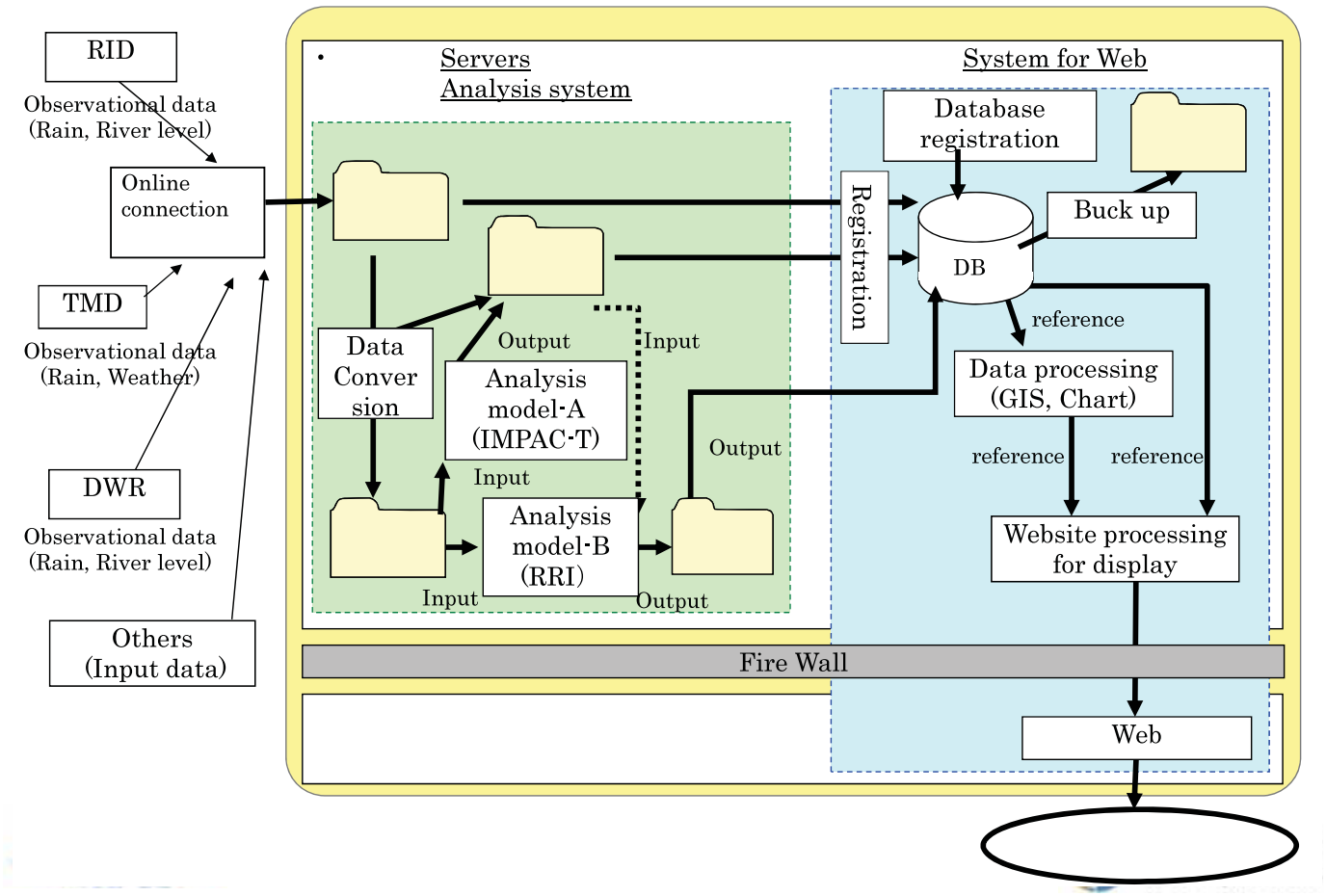
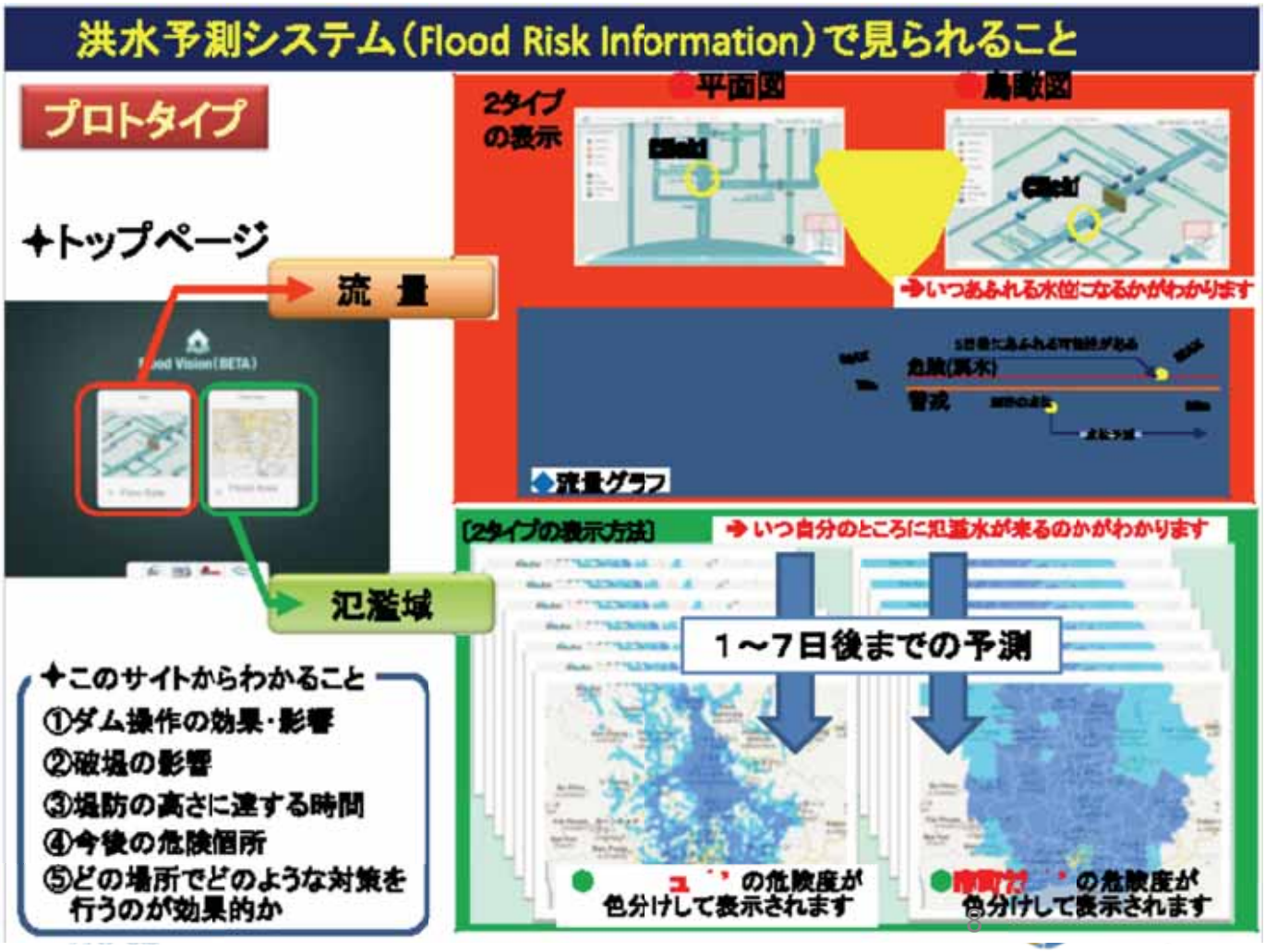
# 洪水予測システム（Flood Risk Information）の仕組み




# 洪水予測システム（Flood Risk Information）で見られること



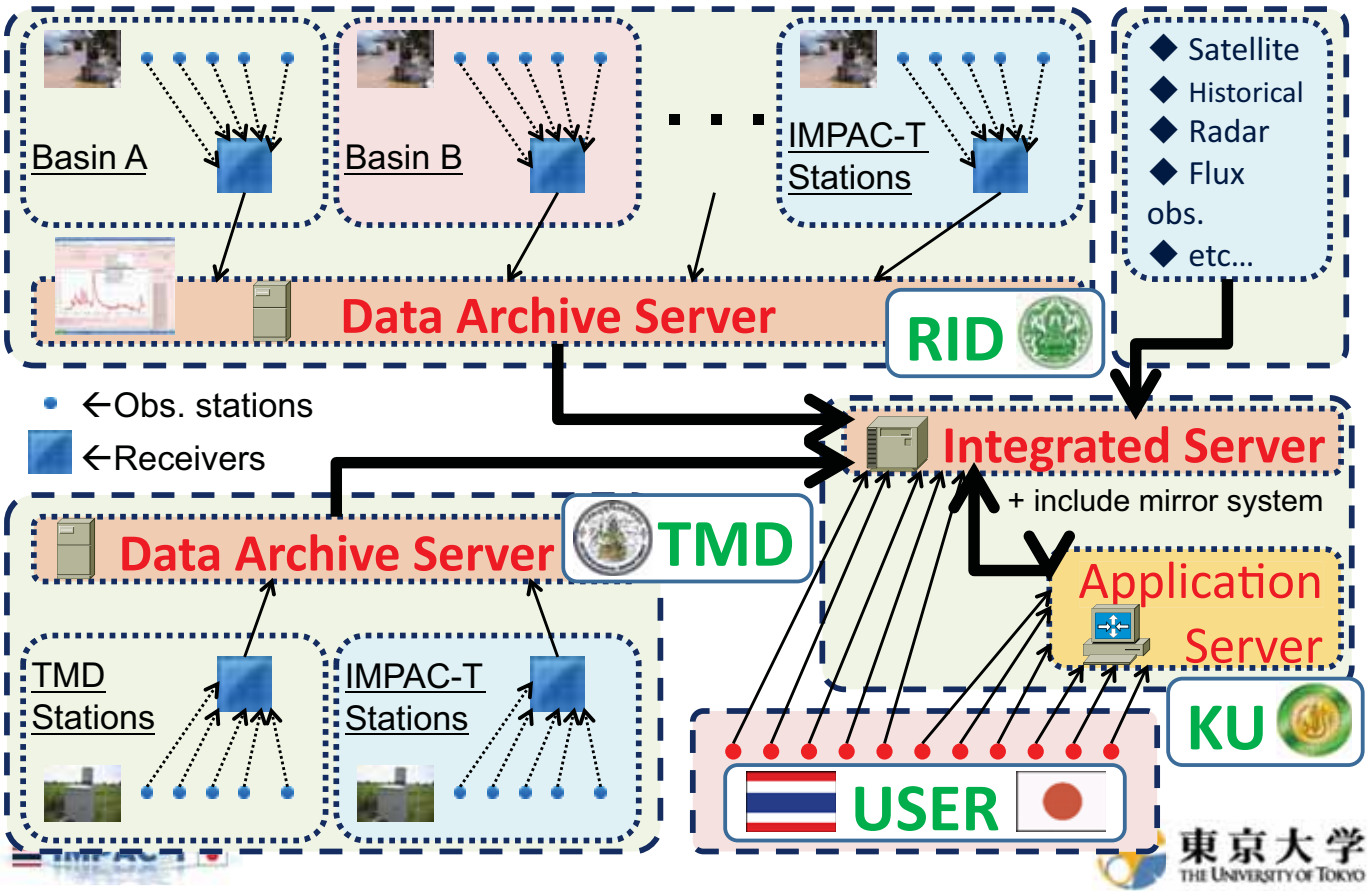
# Thank you for your attention

# ขอบคุณ ครับ



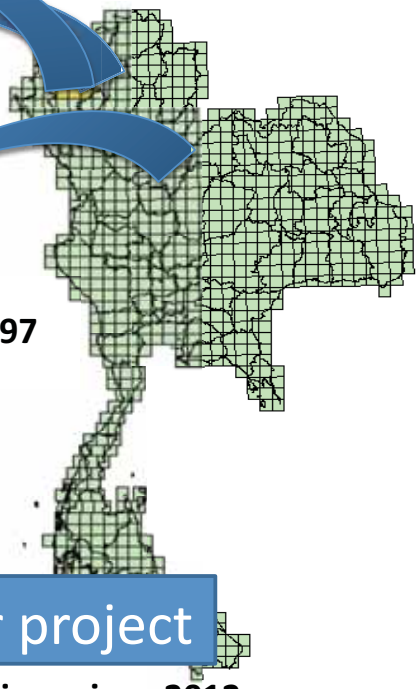
## DATA SHARING SYSTEM

# Design of IMPAC-T Data Center




## QUASI-REAL TIME MONITORING SYSTEM

# Enhancement of real-time Observation at orographical watersheds



**Mae Cheam Project**

**4 GPRS telemetry stations and 11 manual stations since 1997**

**Mae Waang Project**

**8 GPRS telemetry stations since 2006**

**Khwaenoi river project**

**12 GPRS telemetry stations since 2012**

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## Data acquisition and Telemetry system

**Data logger**

◆Data is logging every 10 seconds and recorded by averaging every 10 minutes.
◆Data can storage for 6 month.

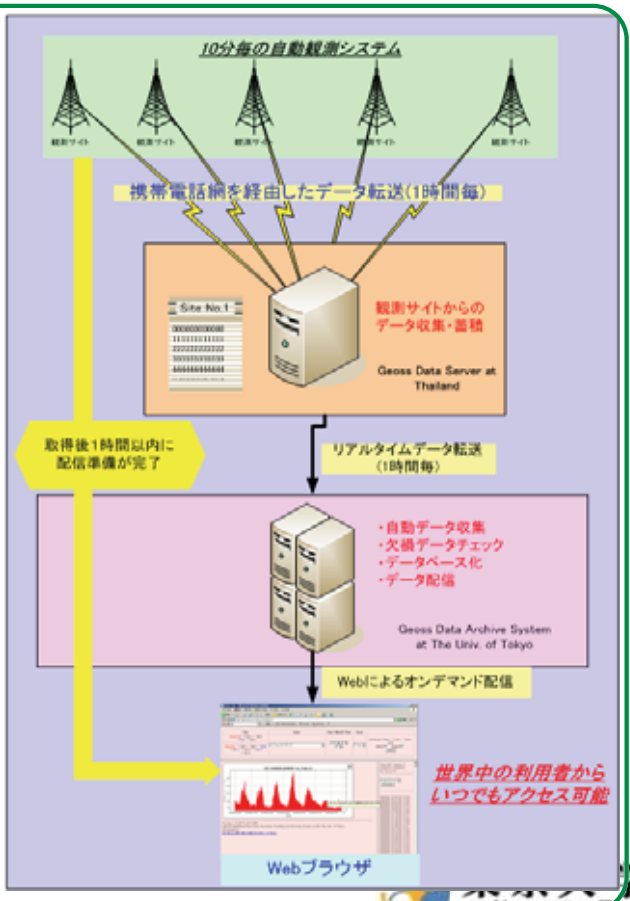
**GPRS modem**

◆Now a day, GPRS is able to connect at orographic area. GPRS (115 kbps) line is high-speed and cheaper than GSM (9.6 kbps).

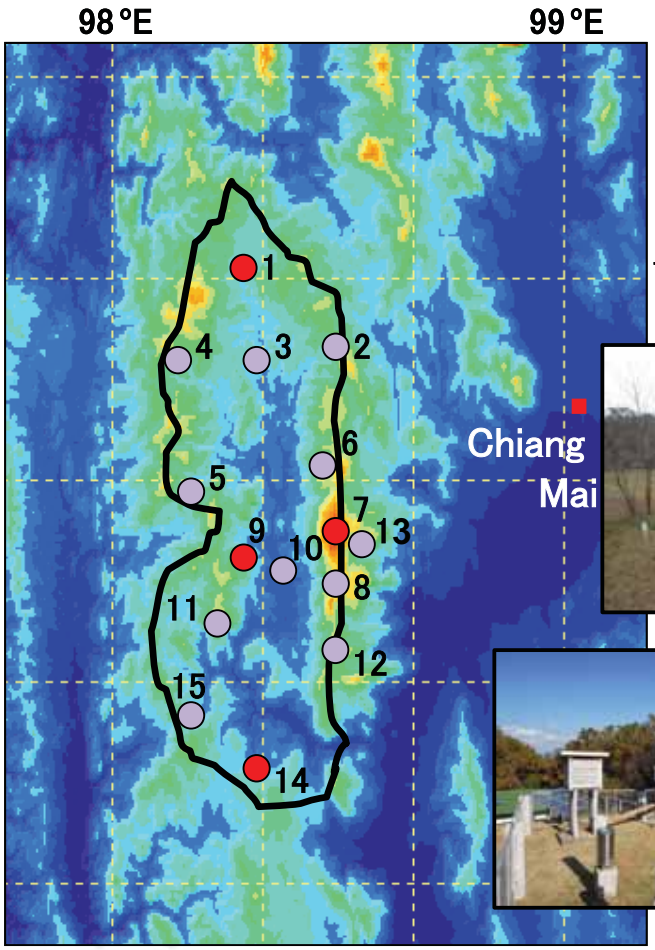
*Data transfer every 1 hour from all observation sites*

Telemetry server@RID

Data Archive System@RID



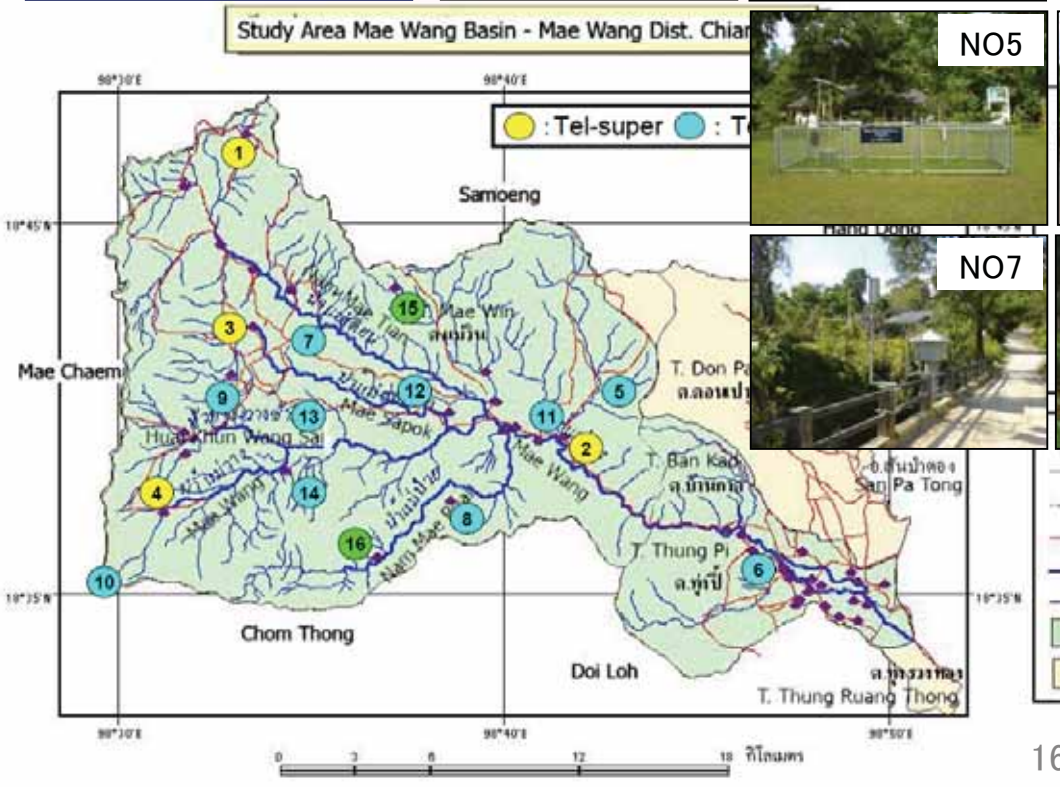
# Mae Cheam Project





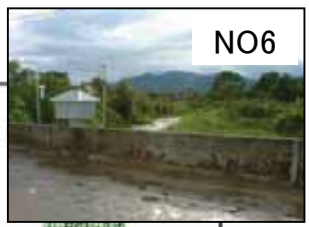

# Mae Wang Project



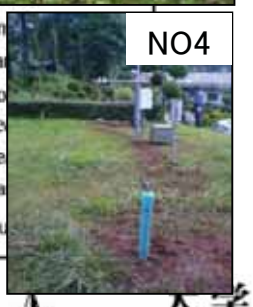








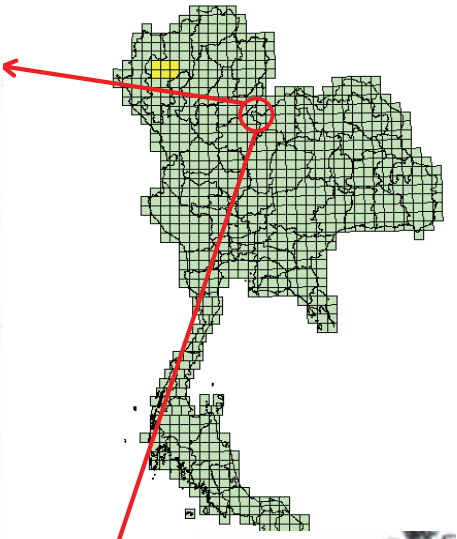


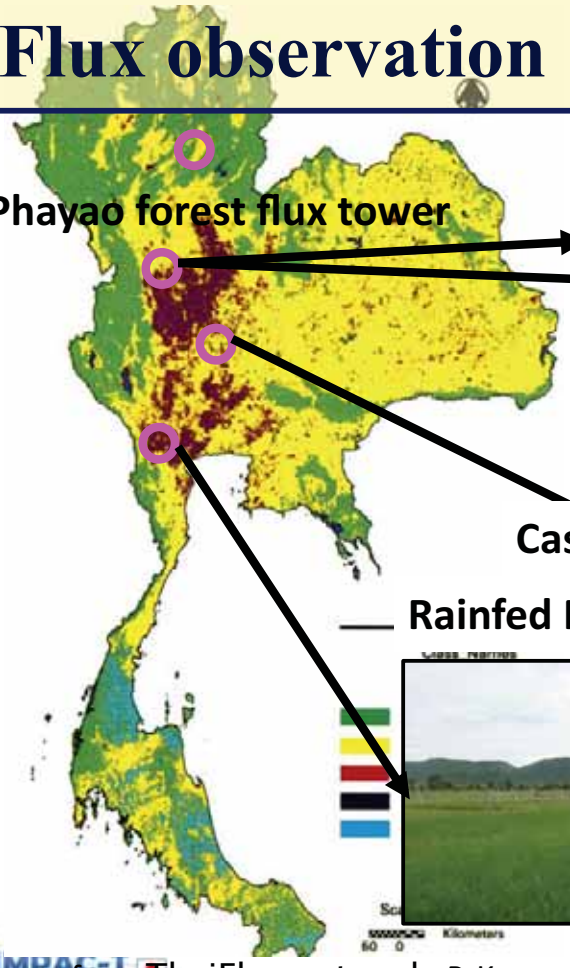
# Khwaenoi river Project

Khwaenoi river basin in Phitsanulok (basin area : 1500 km$^2$)

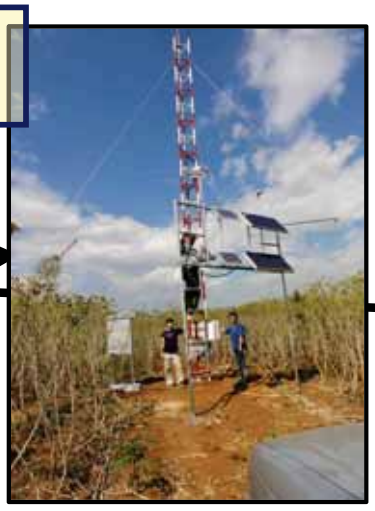




# Flux observation



Phayao forest flux tower



Tak flux tower

Cassava field flux tower

Rainfed Paddy field flux tower

Sugarcane field flux tower

Picture from ThaiFlux network: P. Kasemsap, 2006

# Overview of

# Integrated Study Project on Hydro-Meteorological Prediction and Adaptation to Climate Change in Thailand (IMPAC-T)



*IPCC AR4 noted that changes in precipitation and temperature lead to changes in water resources in some dry regions at mid-latitudes and in the dry tropics, due to changes in rainfall and evapotranspiration (IPCC, 2007).*

**Changes ... arge**
**---Ensemble ... AR4 ---**

http://www.bangkokpost.com/multimedia/photo

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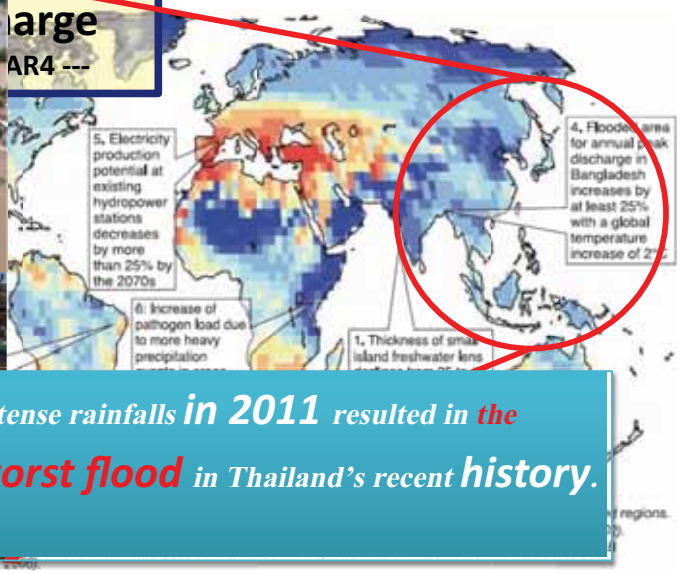


*Intense rainfalls* ***in 2011*** *resulted in the* ***worst flood*** *in Thailand's recent* ***history.***

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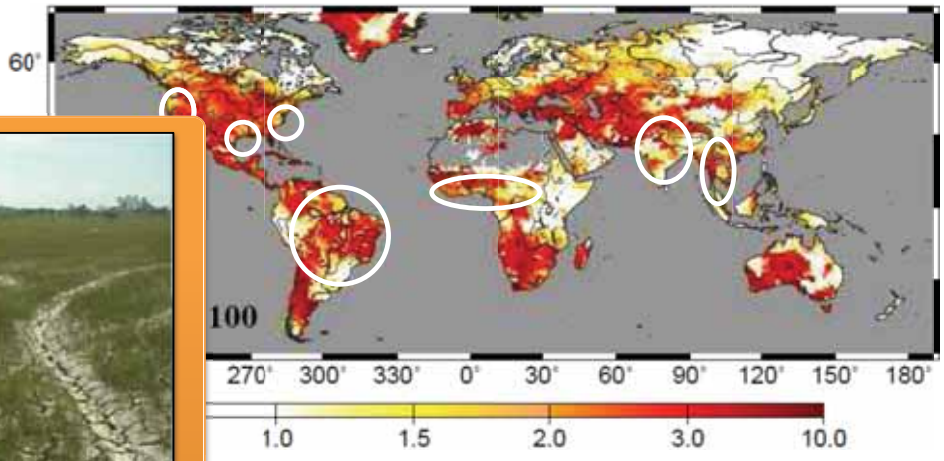
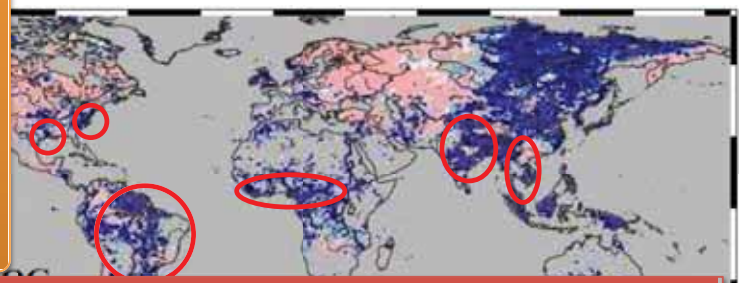
*In 2008, the population suffers from severe drought, million people in 71 provinces were affected by water shortages.*




e Drought Increase Drought



21st century AR [illegible]

year f[illegible]

*During the past decade, weather patterns in Thailand have fluctuated from severe droughts and floods*

Hirabayas
Based on

IMPAC-T



## Integrated Study Project on Hydro-Meteorological Prediction and Adaptation to Climate Change in Thailand (IMPAC-T)

**Climate Change** is the major security issue for human beings for both developing and developed counties.

**Human Activity** is one of the major factors threatening the sustainable development of the world particularly by the demographic & economic growths.

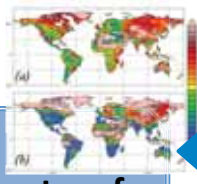
**Earth observation**

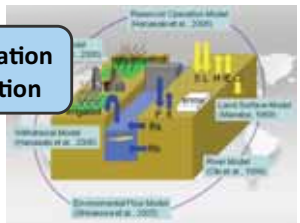
Validation Analysis

**Natural-anthropogenic model for Hydrology and Water Resources Assessments**

Assimilation Monitoring

Assimilation Prediction





**Impact assessment on Decision-making support system for adaptation in water-related areas under climate change**

**Water related information integration system**

**Developing the National Strategic Plan in Water Sectors for the Adaptation Measures under Climate Change**

**Early warning system on the risks of water-related disasters by integrating observations and models**

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