CAPACITY BUILDING IN ASIA

EARTH OBSERVATIONS IN THE SERVICE OF WATER MANAGEMENT

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Presented by

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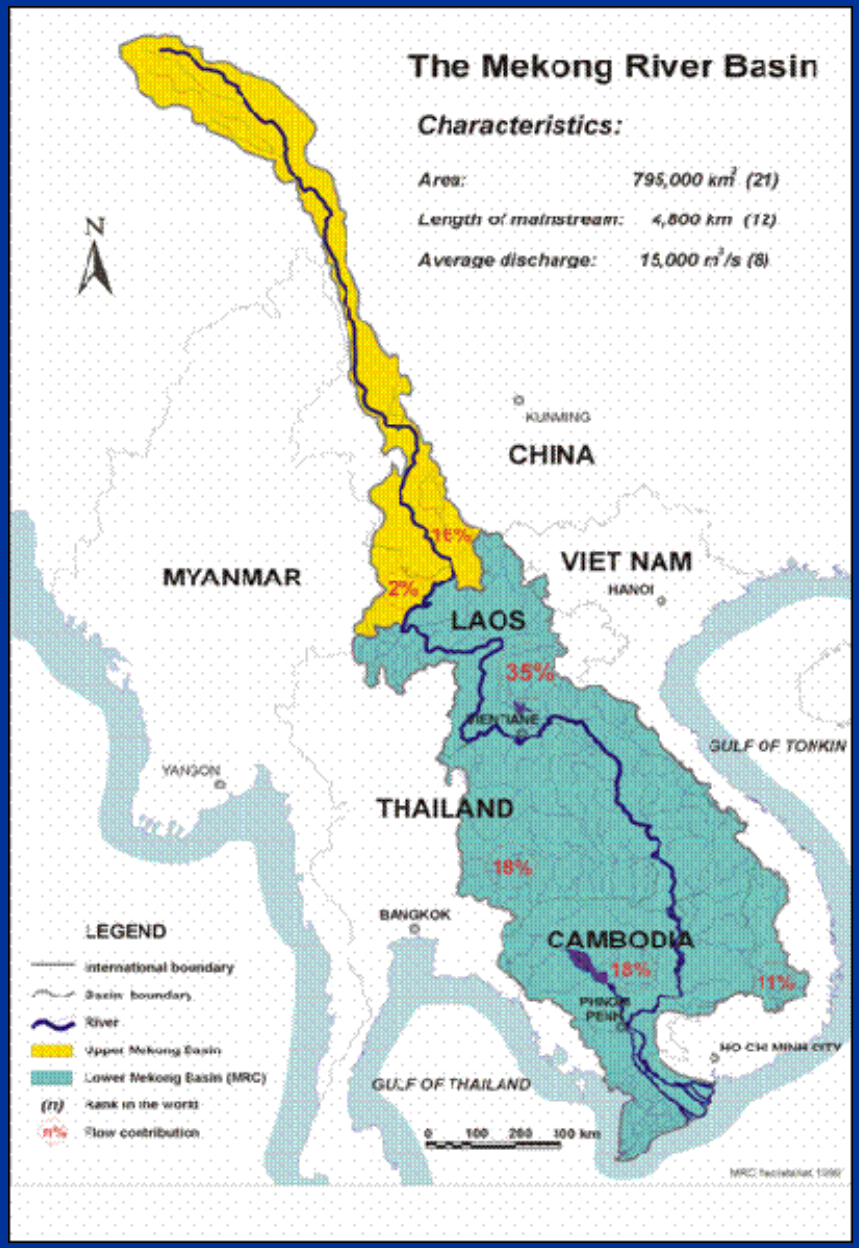
Flood Forecasting System (FFS) in Mekong River Commission (MRC)

- *Introduction to the MRC*
- *Status of the Existing FFS in MRC*
- *Plan for Improving the FFS*
- *Concluding Remarks*

Mekong River Basin & MRC



Mekong Catchment Area (km2)	*795,000 (21)*
Lower Mekong Basin (km2)	*606,000*
Length of mainstream (km)	*4,800 (12)*
Volume (billion m^3)	*475 (8)*

Mekong River Commission

International organization between the Governments of Cambodia, Laos, Thailand and Viet Nam

Established under a 1995 Agreement with the role:

To promote and undertake cooperation in all fields of sustainable development, utilization, management and conservation of the water and related resources of the Basin

Mekong River Flooding

- ***Tropical climate with two monsoon seasons Northeast : Dec – Apr, Southwest : May – Nov causing heavy and frequent rain***

- ***Average annual rainfall ranges 1000 – 4000 mm & flood occurs after heavy and frequent rainfalls from storms or typhoons***

- ***Recently, in 2000, 2001, and 2002, Mekong floods have caused extensive economic damage.***

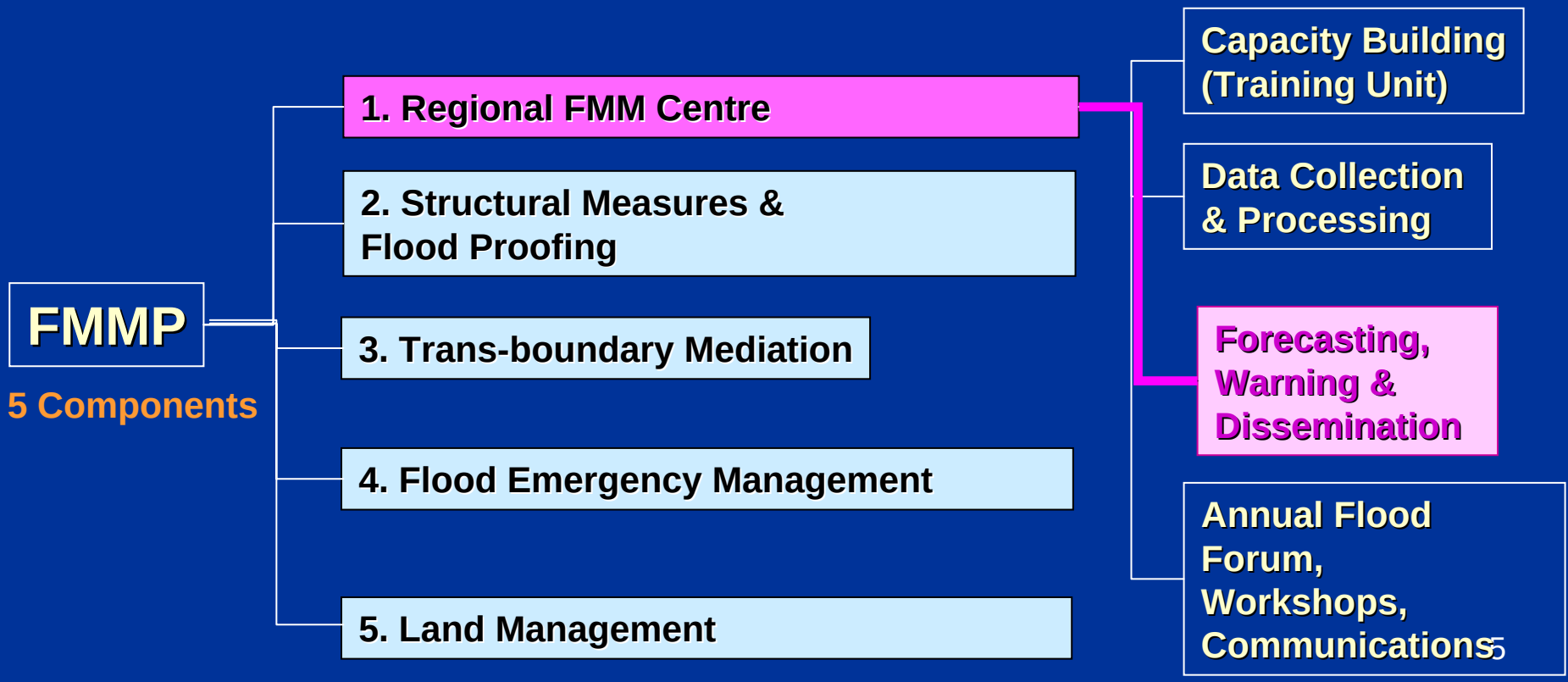
- ***Damage worth about US$ 1 billion; many lives have been lost (on the order of 2,000)***

Call for establishment of a basin-wide Flood Management and Mitigation Programme (FMMP) for the MRC in year 2001

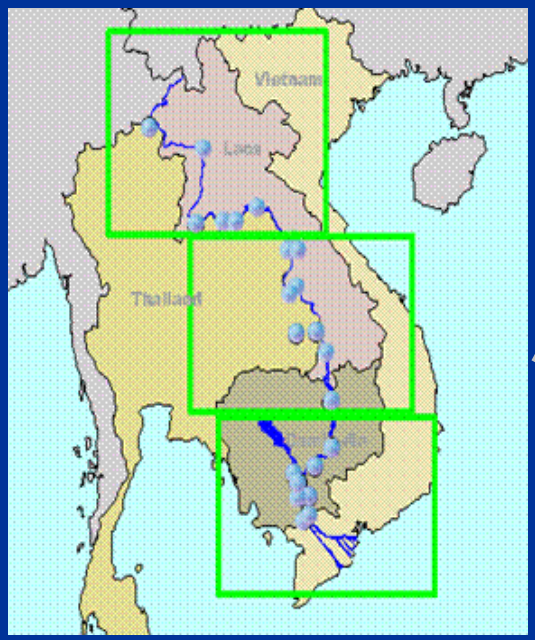
Flood Management and Mitigation Programme

- **People's suffering and economic losses due to floods are prevented, minimized, or mitigated, while preserving the environmental benefits of floods.**

- ***Implementation period : 6 years (2004-2010) with budget of 21 million USD***



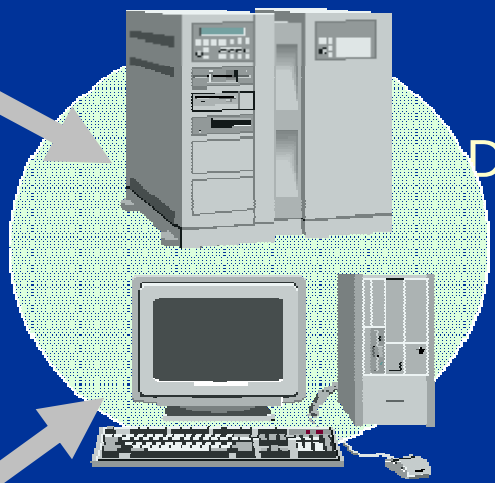
Flood Forecasting System in MRC



Hydrological Stations

Data collection and analysis

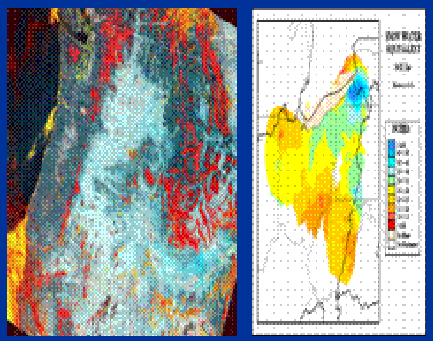
Provision of Forecasts



Disseminatio n

Forecast Dissemination

Web site, bulletin, e-mail, fax, radio, telephone, etc.



Rainfall Estimation/ Forecast (Satellite based)

Existing Systems & Models

Member	***Networks***	***Modelling System***	***Operational Models***		
			Regression	***Hydrologic***	***Hydraulic***
Cambodia	▪ **Relatively small number of stations** ▪ **Very limited rainfall with poor spatial and temporal distribution** ▪ **Mostly main stream water level** ▪ **Manually intensive**	**Excel Spreadsheet**	**X**		
Laos		**Excel Spreadsheet**	**X**		
Thailand		**FloodWatch RiverWorks**		**NAM***	**Mike 11***
Vietnam		**In-house**	**X**	**NAM Muskingham**	**Mike 11 VRSAP**
MRC		**In-house + Excel Spreadsheet**	**X**	**SARR**	

**** Only used on a tributary***

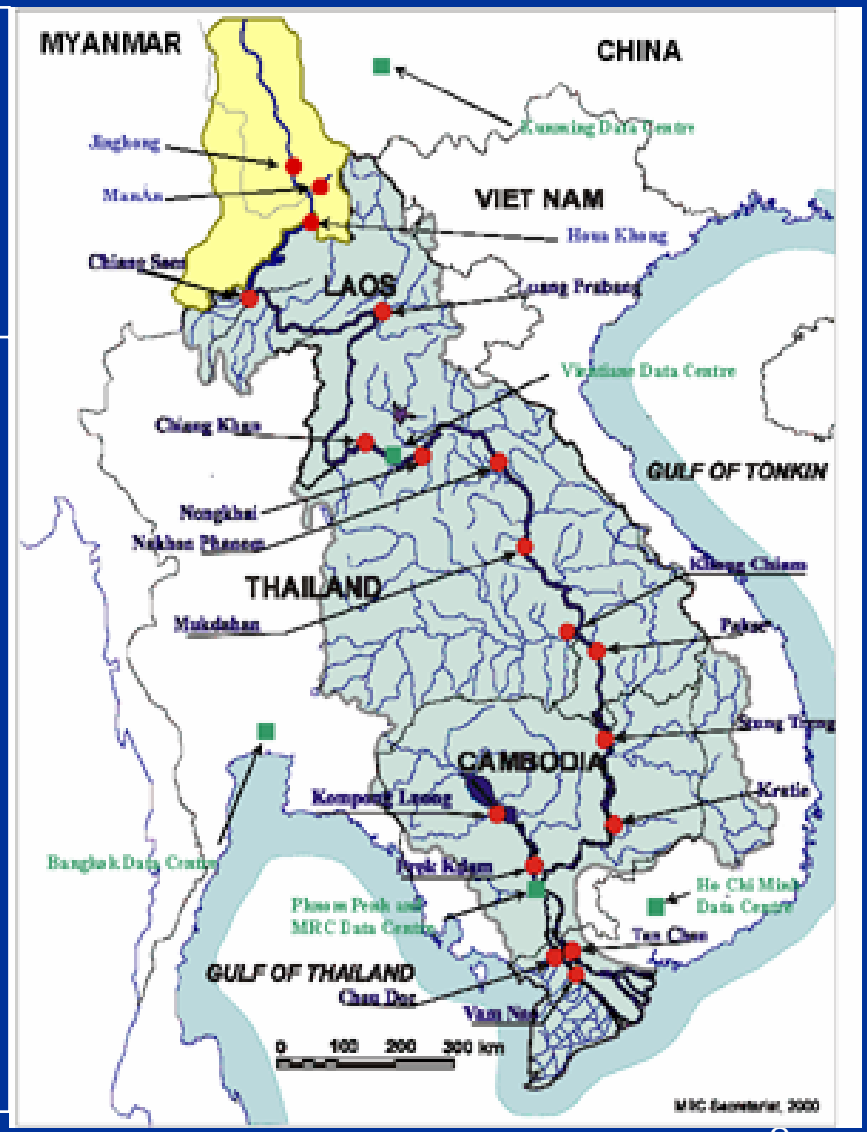
Current Forecasts & Data in MRC

Short Term Forecasts

1-5 days

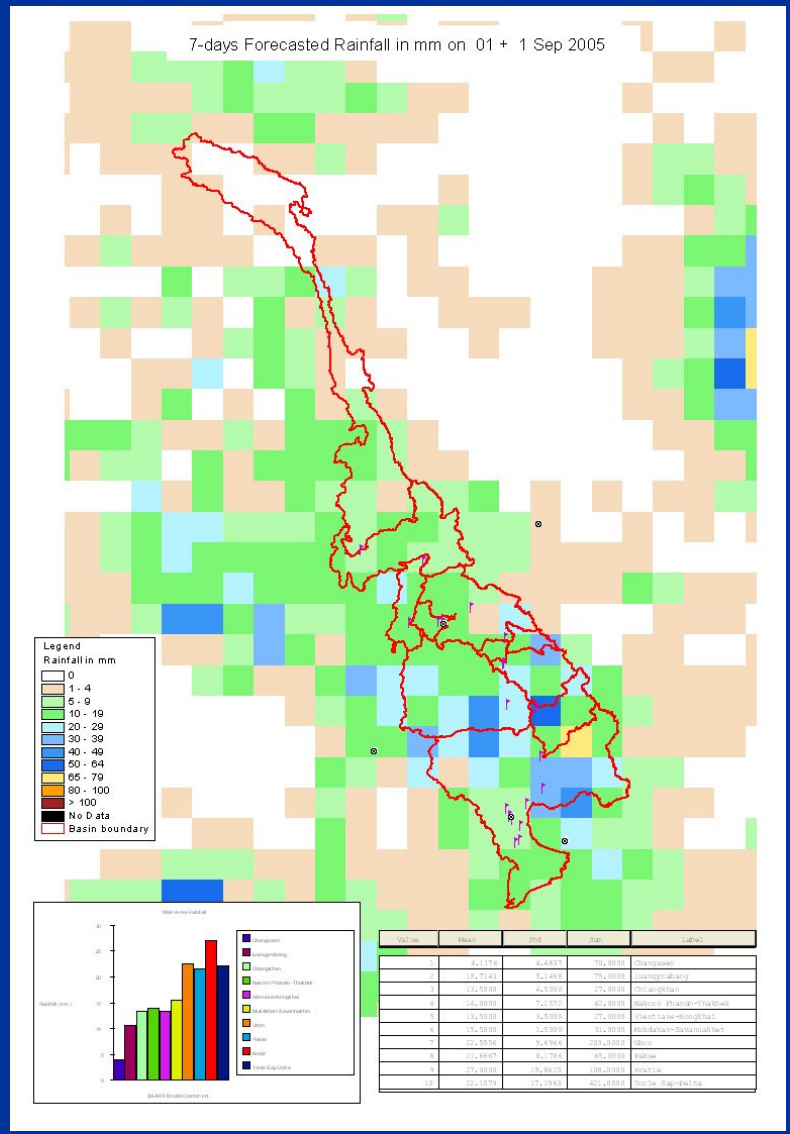
Current available in MRC

- **about 23 rainfall**
- **about 23 water level**
- **Estimates of observed & forecast areal rainfall of uncertain accuracy…**



Available Satellite Data

- **USGS**
  - NOAA (observed data)
    - 10 km X 10 km resolution
  - MM5 (3-day forecast rainfall)
    - 80 km X 80 km Resolution
  - Operational data requested by MRC (7-day forecasted rainfall)
    - 100 km X 100 km Resolution (used as input for flood forecasting)
- **Tropical Rainfall**
  - Measuring Mission (TRMM)
- **Precipitation Radar**
  - 25 km X 25 km resolution
    - 3-hour interval

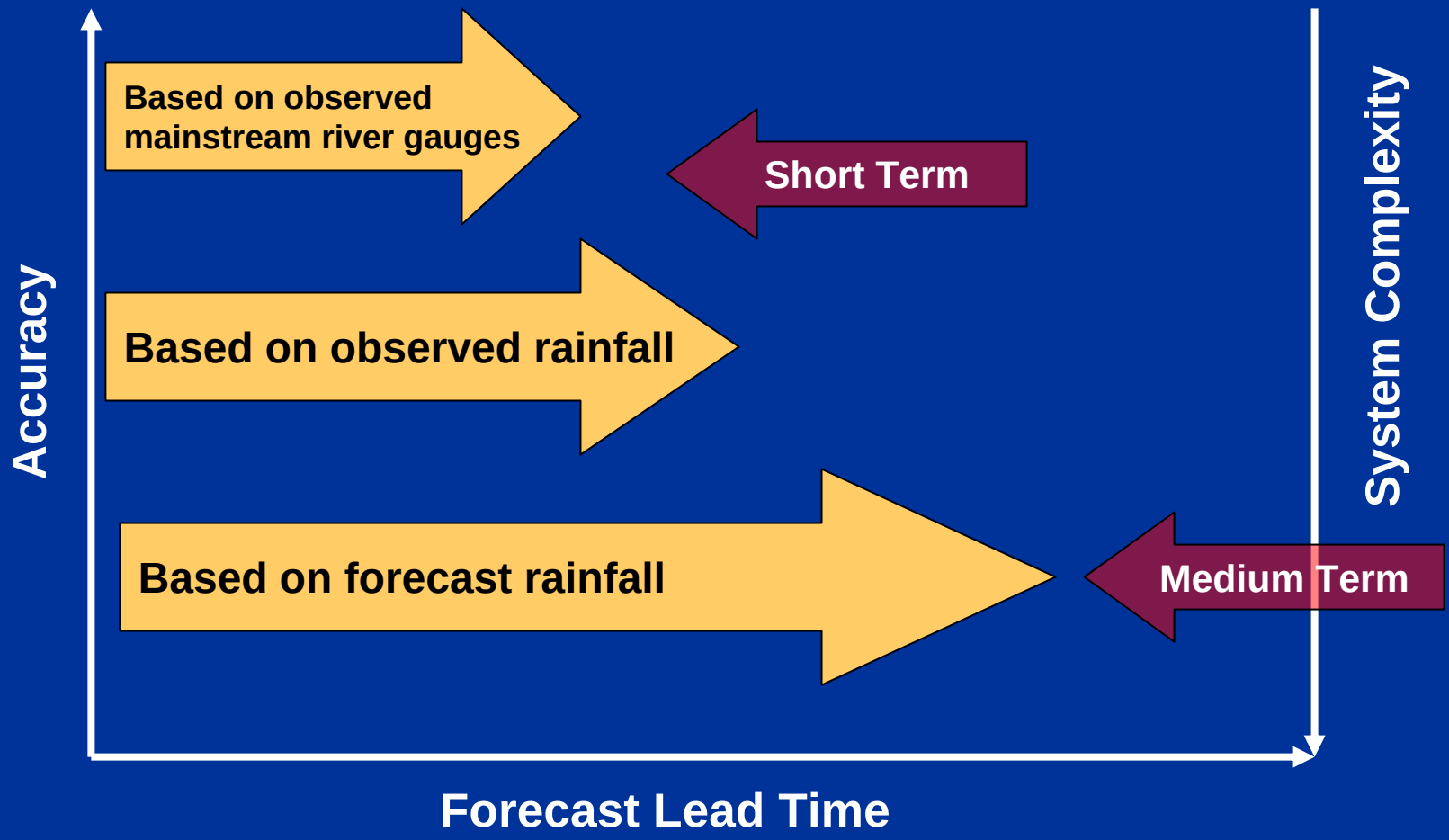


Current & Future Forecasts

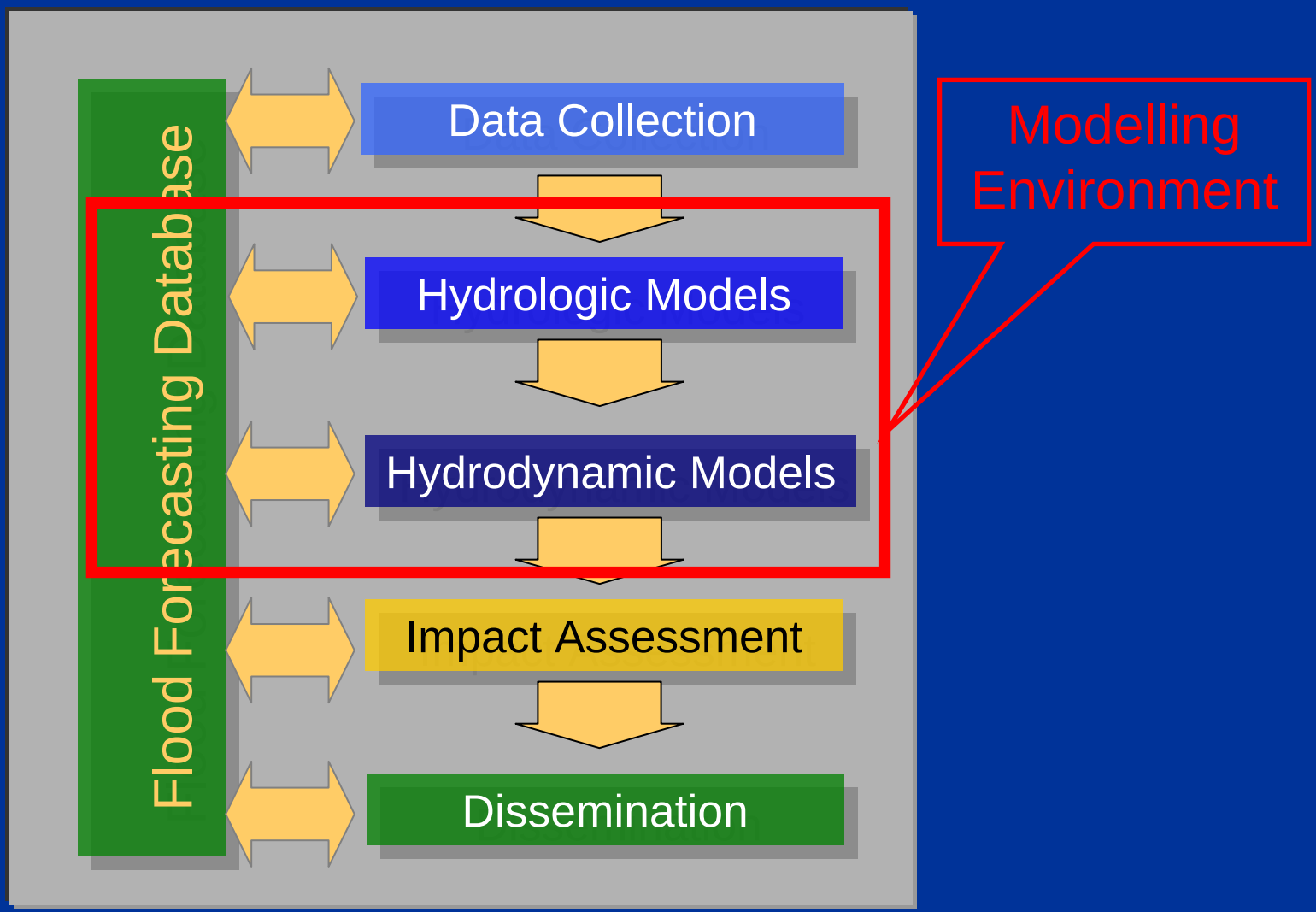
Short Term Forecasts 1-5 days	Medium Term Forecast 6-15 days
Current available in MRC • about 23 rainfall • about 23 water level • Estimates of observed & forecast areal rainfall of uncertain accuracy	Additional data available in national centers • about 75 rainfall • about 20 water level • other sources eg WMO, NOAA, MM5, TRMM
The amount of data currently available: • is probably appropriate to current level of modeling • does not justify use of more sophisticated models	The amount of data possibly available : • enables use more sophisticated models • enables modeling of tributaries

Flood Forecast Accuracy

- ***Accuracy decreases with longer lead times***
- ***Complexity increases with lead time***
- ***<u>Accuracy needs to be communicated!</u>***



Flood Forecasting System



Data Collection

Critical to FFS development

- **Metadata**
  - Station information
  - Ratings
  - Storage data
  - Topographic data
  - Other
- **Real time Data**
  - Rainfall
  - Water level
  - Storage levels

Basin	*Area (km2)*	*Rainfall*	*River*
Rhine	*200,000*	*100*	*50*
Rhone	*100,000*	*150*	*150*
Mekong	*800,000*	*23*	*23*

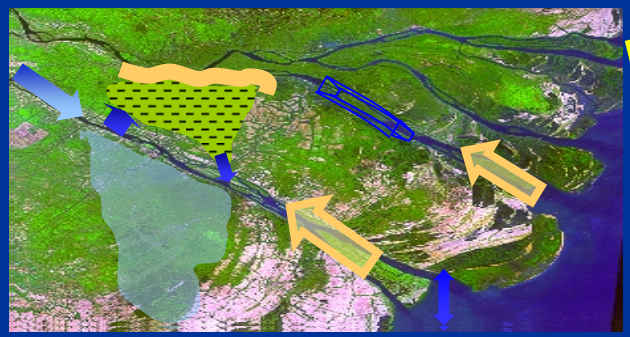
Sources

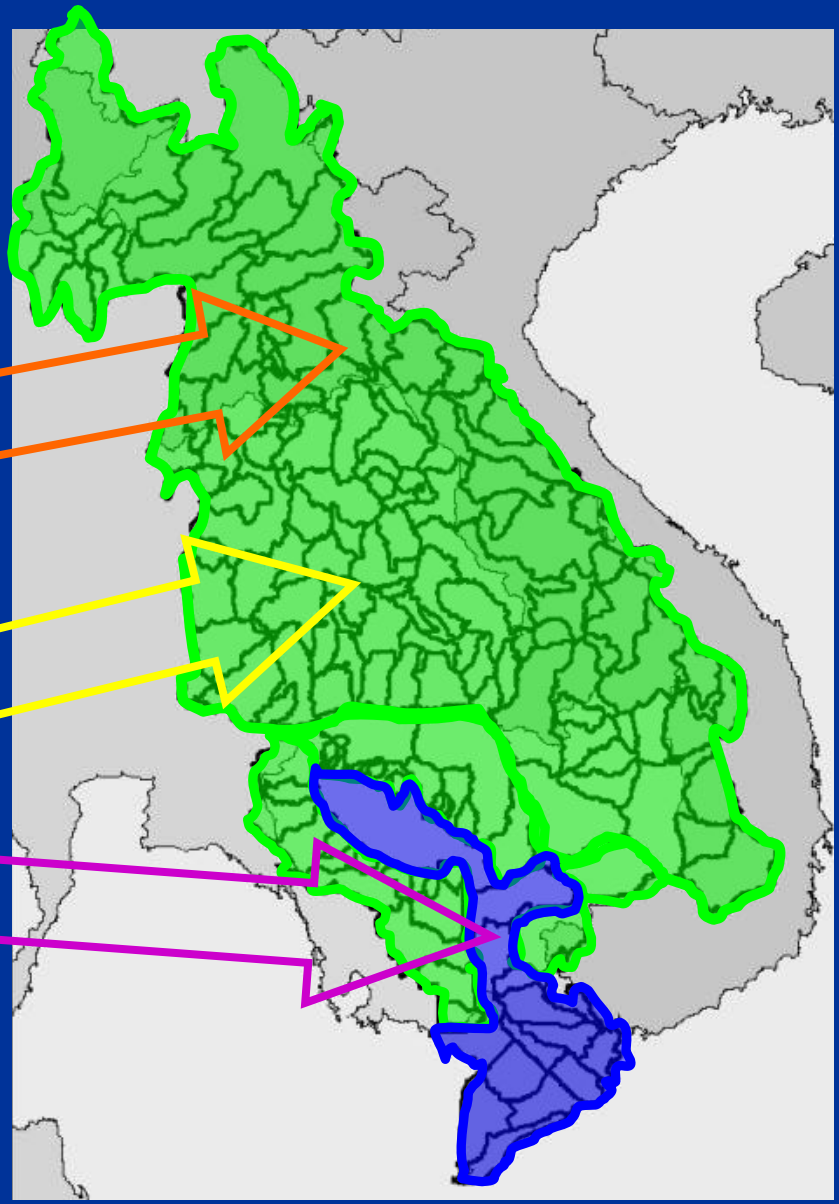
- Line agencies
- WMO, NOAA, MM5, TRMM
- MRC programs
  - ANHIP
  - HYCOS

The aim is to consolidate all available real time data in MRC

Model Development & Calibration

Hydraulic model





Model type selected to match the problem and available input data

Concluding Remarks & Recommendations

- *Current short term forecast practice matches available inputs.*
- *To provide medium forecast, more data, especially rainfall is required.*
- *The application of satellite rainfall data is needed, but correlation between forecast satellite and observed rainfall data should be carried out.*
- *Data collection phase is the first and critical phase in development of medium term forecasts.*
- *Close cooperation needed with weather services in the region for further improvement of regional weather forecast.*

Thank you very much
for your attention