TOWARDS A NEW FLOOD FORECASTING SYSTEM FOR THE LOWER MEKONG RIVER BASIN

Regional Flood Management and Mitigation Centre (Cambodia)
SunWater (Australia); HKV Consultants (The Netherlands)

Introduction

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Future
Conclusions

- RFMMC flood forecasting at present
  - Short term 1-5 day forecasts
  - 23 locations along Mekong River
  - SSARR model
  - Published at website
  - Distributed by email

Introduction

- Road Map Mission of May 2006
  - identified need for more accurate medium to long term flood forecasts
- Improvements required:
  - Real time data (observations & communication)
  - Flood forecasting techniques
  - Access to results
  - Integration of available expertise
- New models are just one part of achieving the objective

Data Requirements

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- Water level data
  - Near real time water level main stream
  - Near real time water level main tributaries
- Rainfall Data
  - WMO GTS rainfall data
  - Existing near real time rainfall data at agencies
  - Extension of network of near real time rainfall stations
- Satellite Rainfall Estimates
  - Satellite Rainfall Estimates
  - Satellite Rainfall Estimate Forecasts

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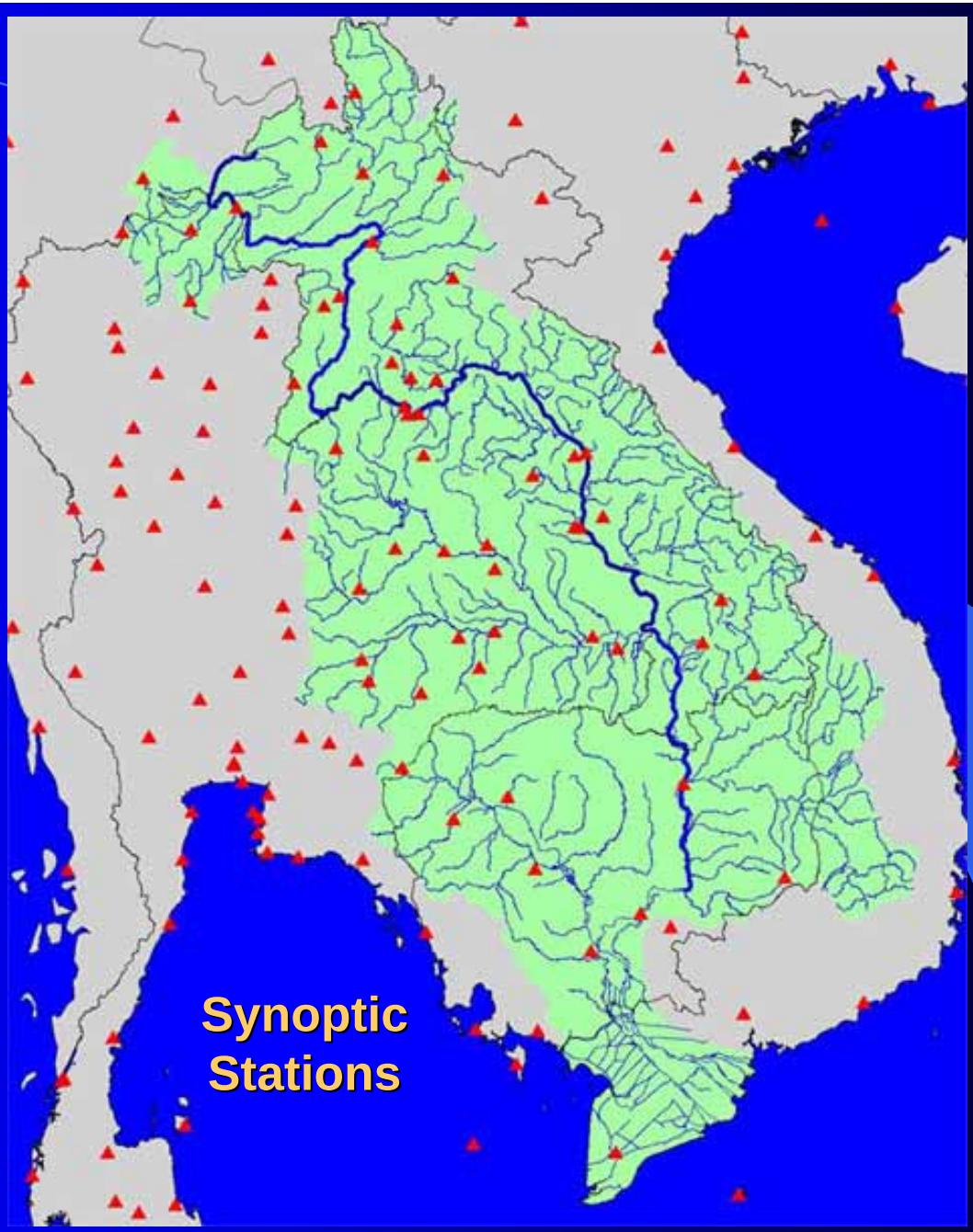

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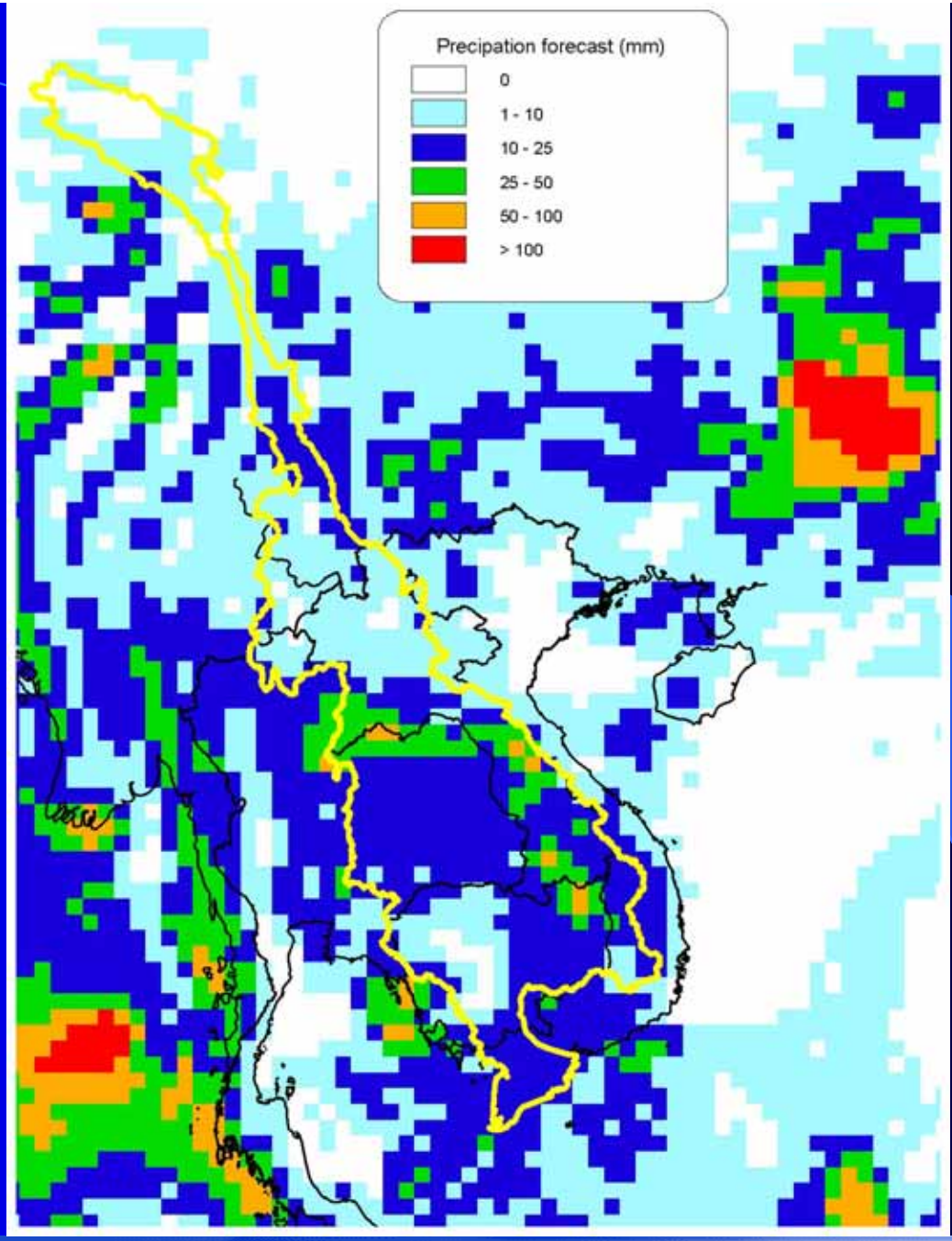
Satellite Rainfall Estimate



Rain Gauge Network

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- Network Coverage
  - Average coverage good in Thailand and Viet Nam
  - Spatial distribution may need improvement
  - Both are insufficient in Cambodia and Lao PDR
- Operation and Maintenance
  - Thailand and Viet Nam need little support
  - Cambodia and Laos face problems
  - Historical stations need attention

Analysis Cambodia

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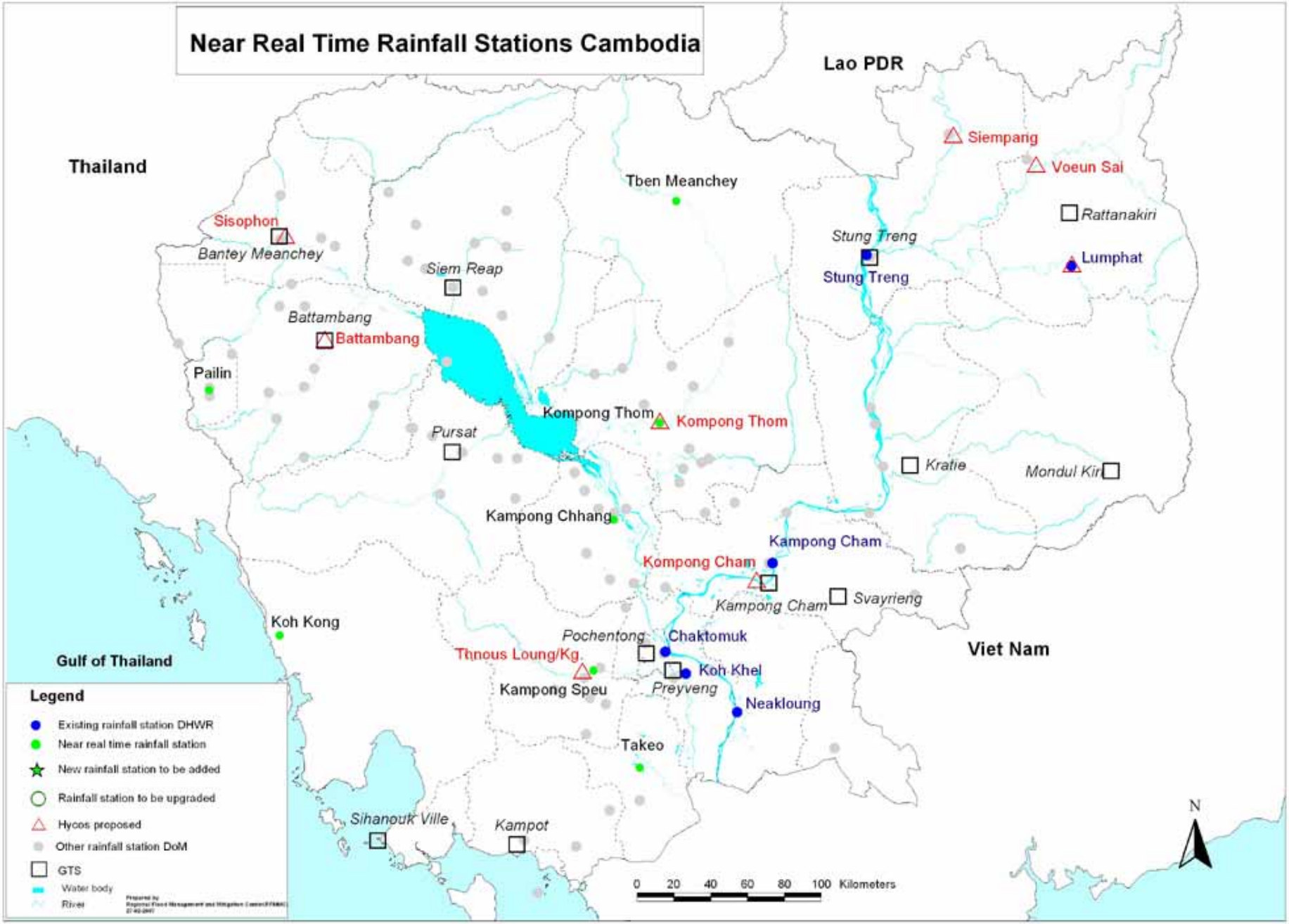
- Department of Hydrology and River Works, Ministry of Water Resources and Meteorology
  - Presently 5 rainfall stations reported
  - After upgrade 9
- Department of Meteorology (MOWRAM)
  - Presently 21 rainfall stations near real time
  - After upgrade 36
  - First phase (upgrade of 9 stations) started
  - Second phase (6 new stations) in November 2007
- M-HYCOS
  - 7 stations proposed


Near Real Time Rainfall Stations Cambodia
Lao PDR
Thailand
Viet Nam
Gulf of Thailand
Siempang
Voeun Sai
Tben Meanchey
Rattanakiri
Sisophon
Bantey Meanchey
Stung Treng
Stung Treng
Lumphat
Siem Reap
Battambang
Battambang
Pailin
Kompong Thom
Kompong Thom
Pursat
Kratie
Mondul Kir
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Pochentong
Chaktomuk
Thnous Loung/Kg.
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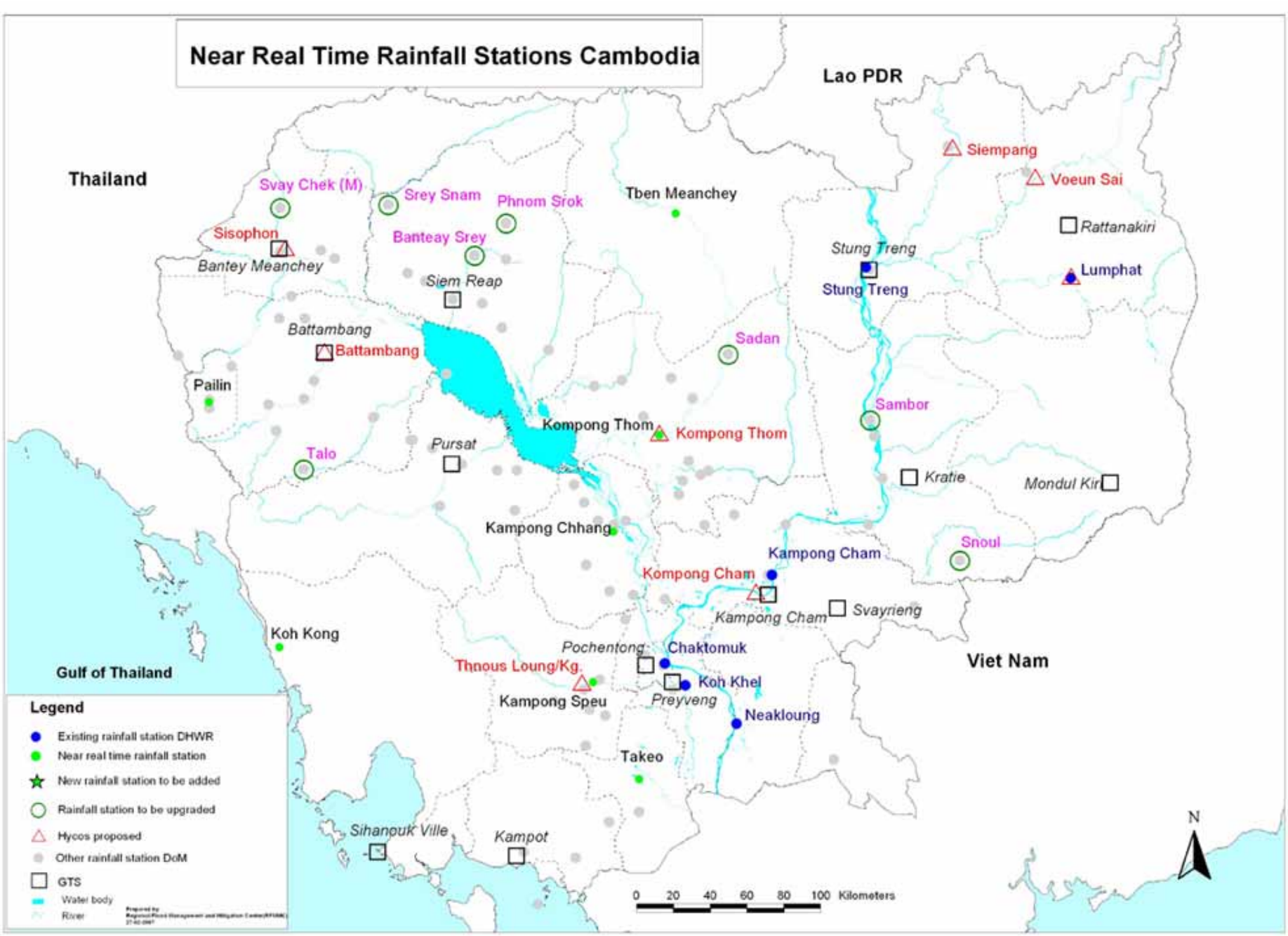
Kampot
N
0 20 40 60 80 100 Kilometers
Legend
Existing rainfall station DHWR
Near real time rainfall station
New rainfall station to be added
Rainfall station to be upgraded
Hycos proposed
Other rainfall station DoM
GTS
Water body
River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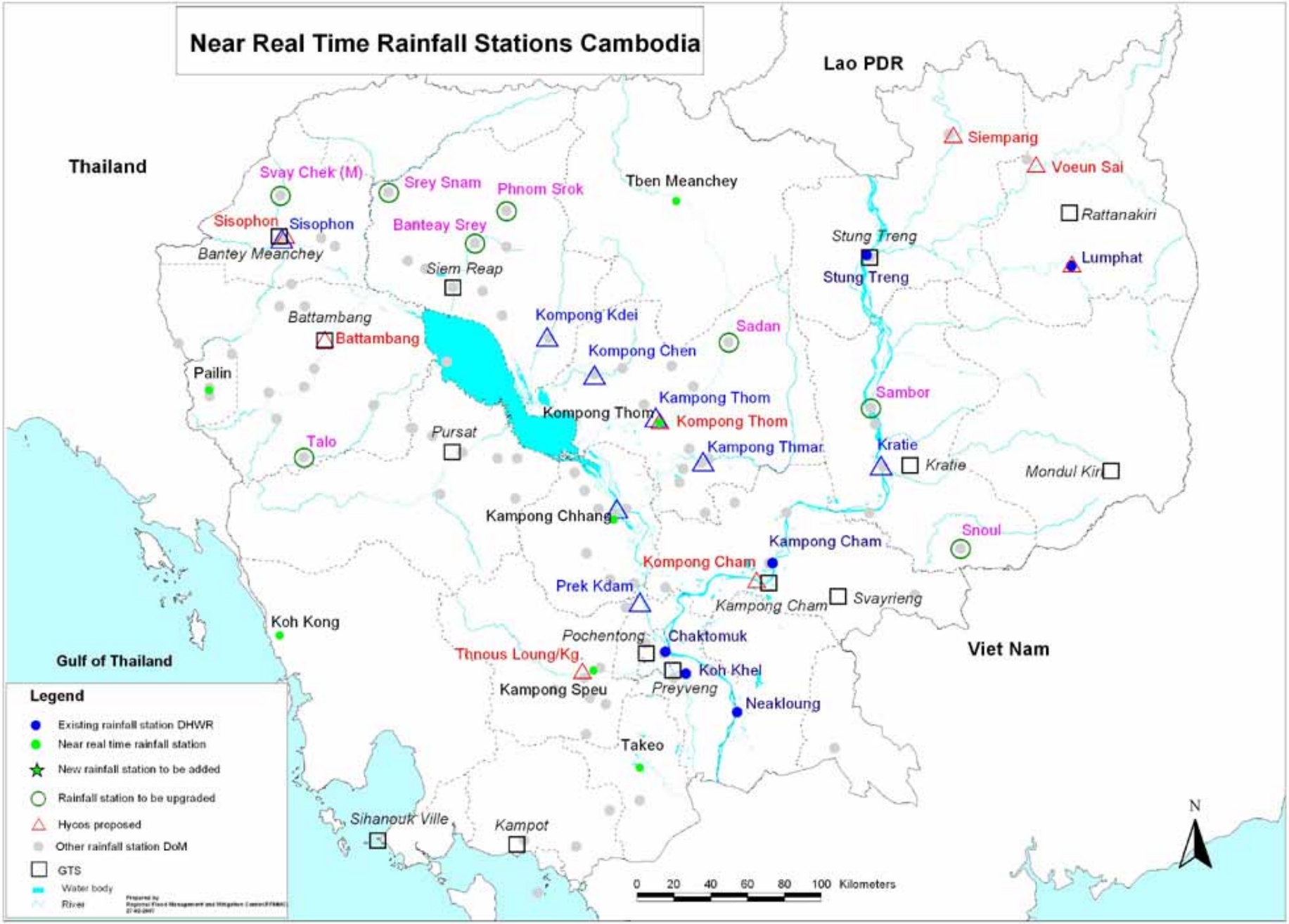
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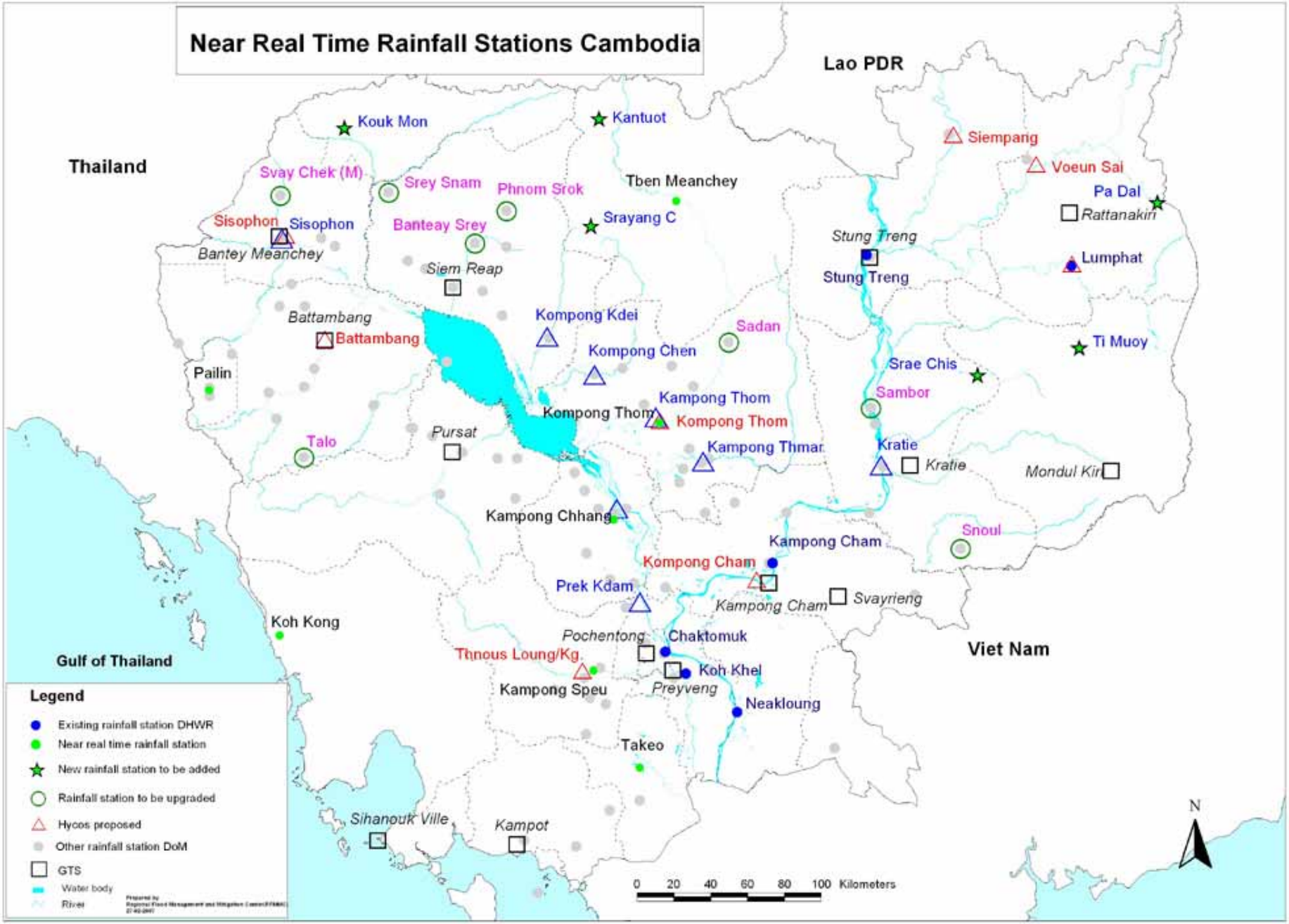
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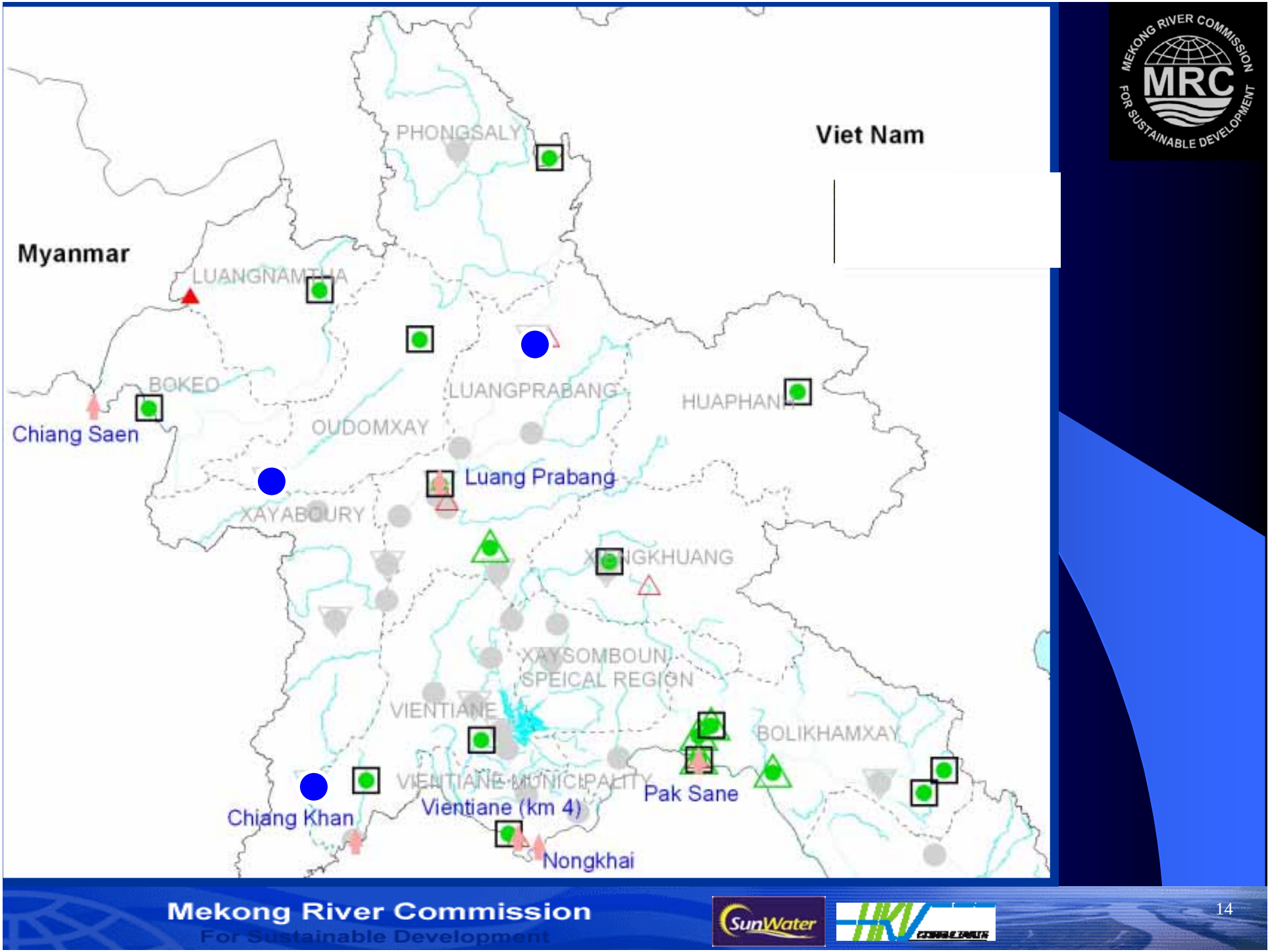
Analysis Lao PDR

- Waterways Administration Division, Department of Roads, Ministry of Communication, Transport, Post and Construction
  - Presently 8 rainfall stations reported
  - After upgrade 10-12
- Department of Meteorology and Hydrology, Ministry of Agriculture and Forestry
  - Presently 25 rainfall stations near real time
  - After upgrade 31-33
  - After extension network up to 40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Myanmar
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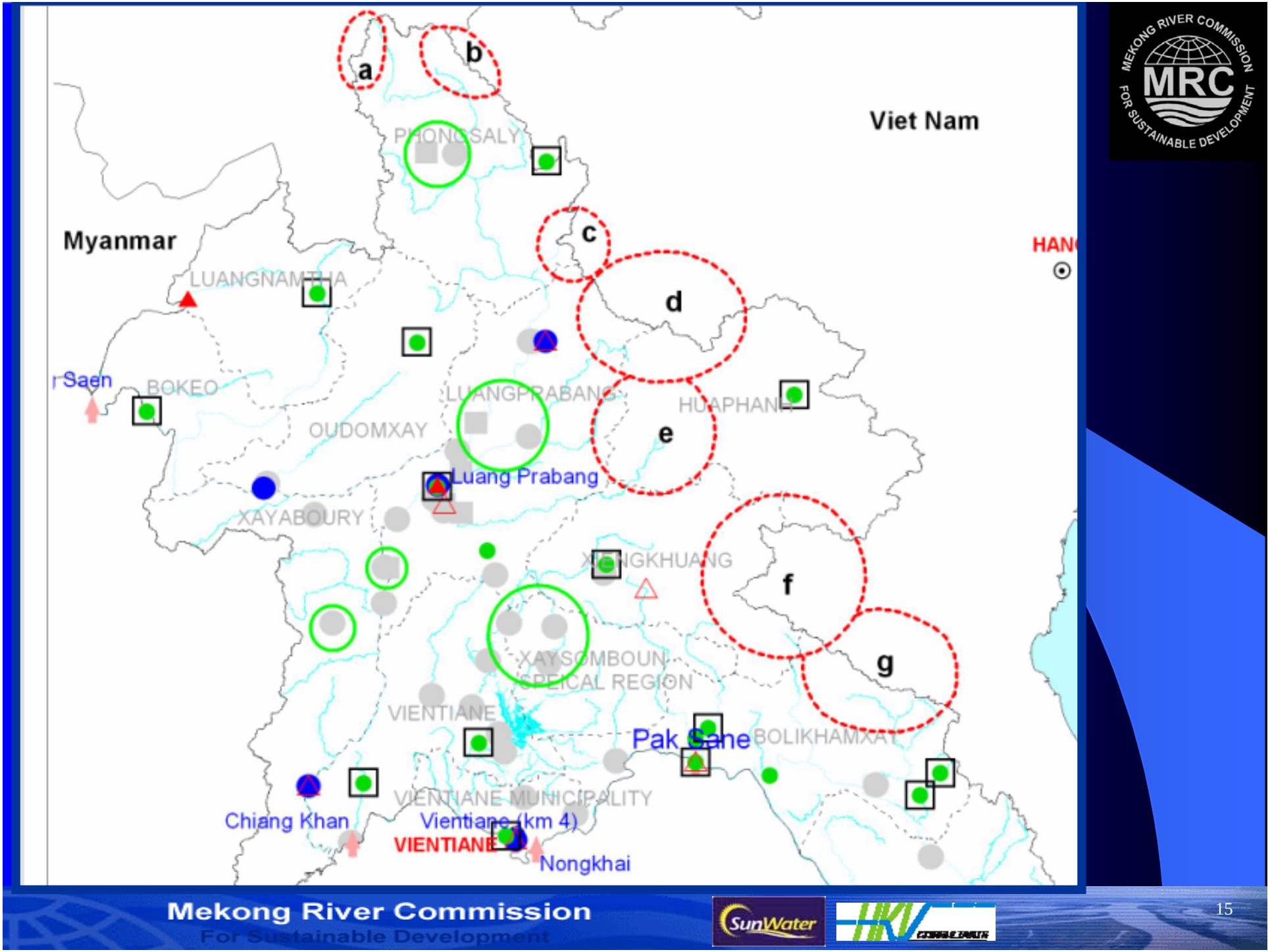
LUANGNAMTHA
BOKEO
Chiang Saen
LUANGPRABANG
HUAPHANH
OUDOMXAY
Luang Prabang
XAYABOURY
XIENGKHUANG
XAYSOMBOUN
SPEICAL REGION
VIENTIANE
BOLIKHAMXAY
VIENTIANE MUNICIPALITY
Pak Sane
Chiang Khan
Vientiane (km 4)
Nongkhai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Models

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- Development of new system based on URBS
  - Conceptual hydrological flood routing
  - Parameter-poor
  - Robust operational
  - Input primarily rainfall data
- Advantages
  - Lack of data from one station or one data supplier permitted
  - Minimum set of rainfall data from WMO-GTS always available

URBS

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- URBS is now used at the RFMMC
  - as trial model
  - to build expertise
- URBS has the following characteristics
  - Semi-distributed non-linear network model
  - Combines rainfall-runoff and runoff-routing
  - Ability to model spatial & temporal variability of rainfall
  - Proven record in large rivers

URBS

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- Features of URBS include
  - Enhanced Data Management
  - Robust Performance
  - Forecast Rainfall
  - Linked Ratings
  - Reservoir Behavior
  - Adaptability

CatchmentSIM

Introduction

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- GIS topographic parameterisation & hydrologic analysis software
- Automatically delineates watersheds & sub-catchments
- Includes a flexible macro language to fully couple the output with any hydrologic model
- Uses publicly available digital elevation data from the NASA Shuttle Radar Topography Mission

Se Bang Fai

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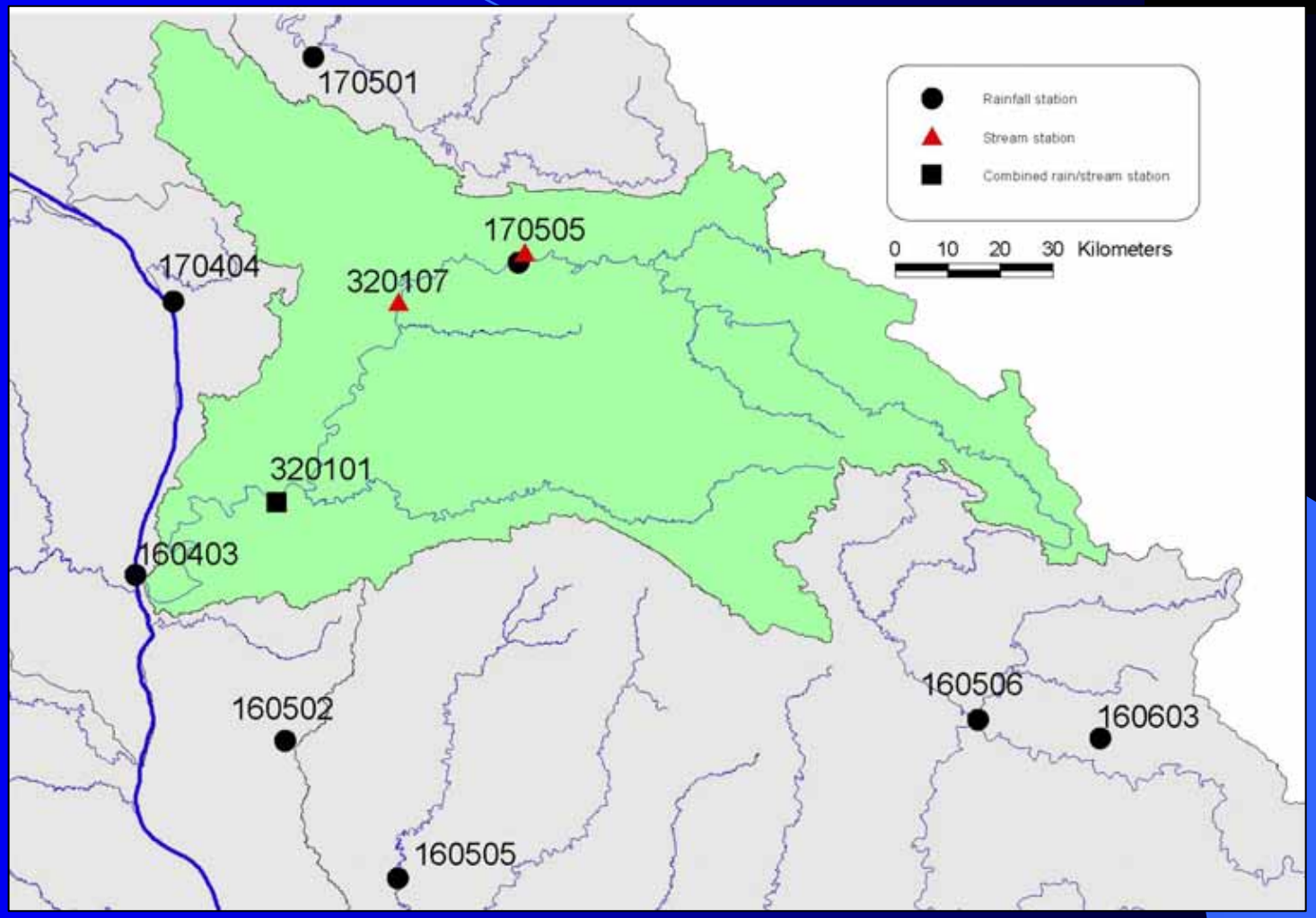

Se Bang Fai

Introduction

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CatchmentSIM

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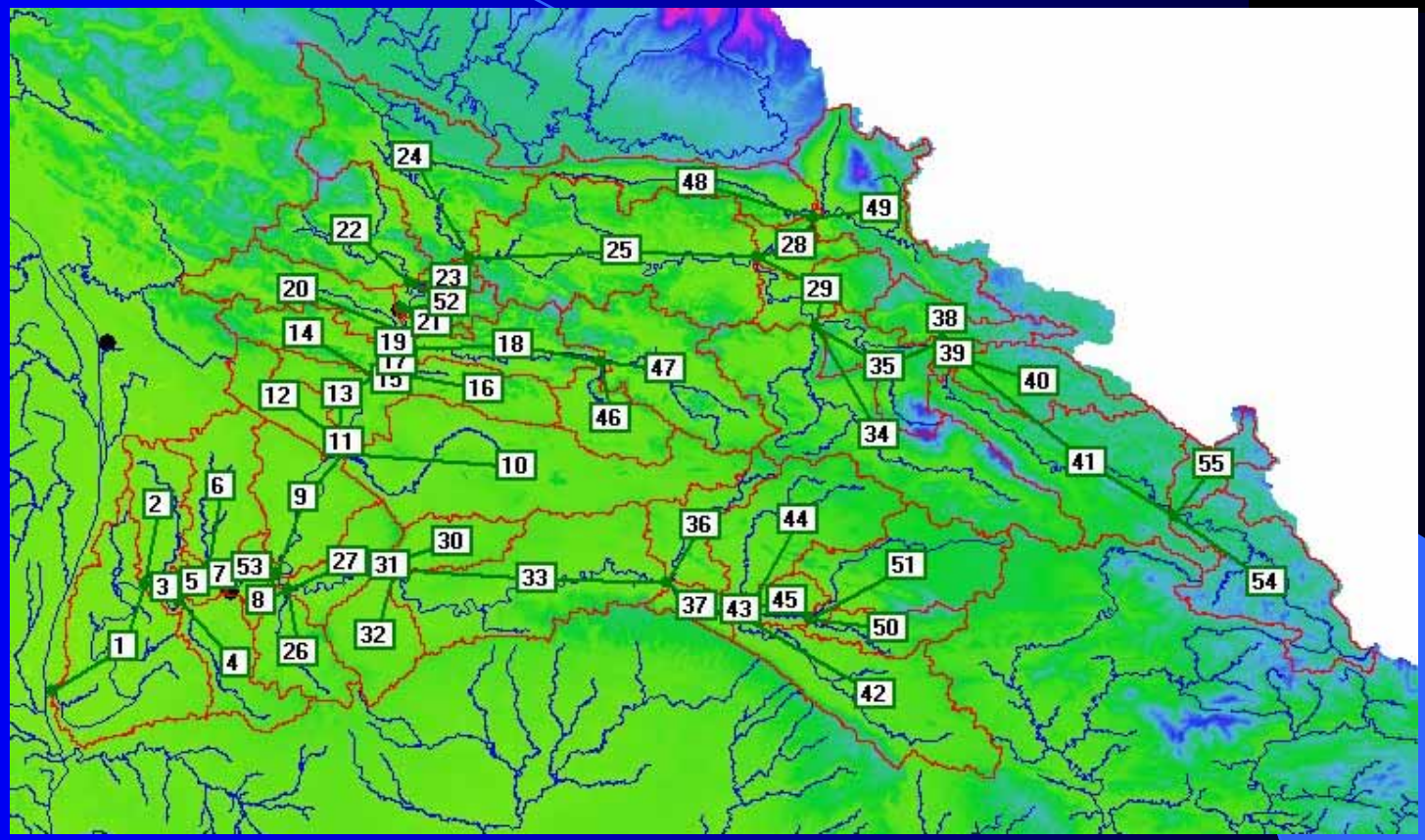

- Flow at any location
- Height at any location with a H-Q relationship

Se Bang Fai

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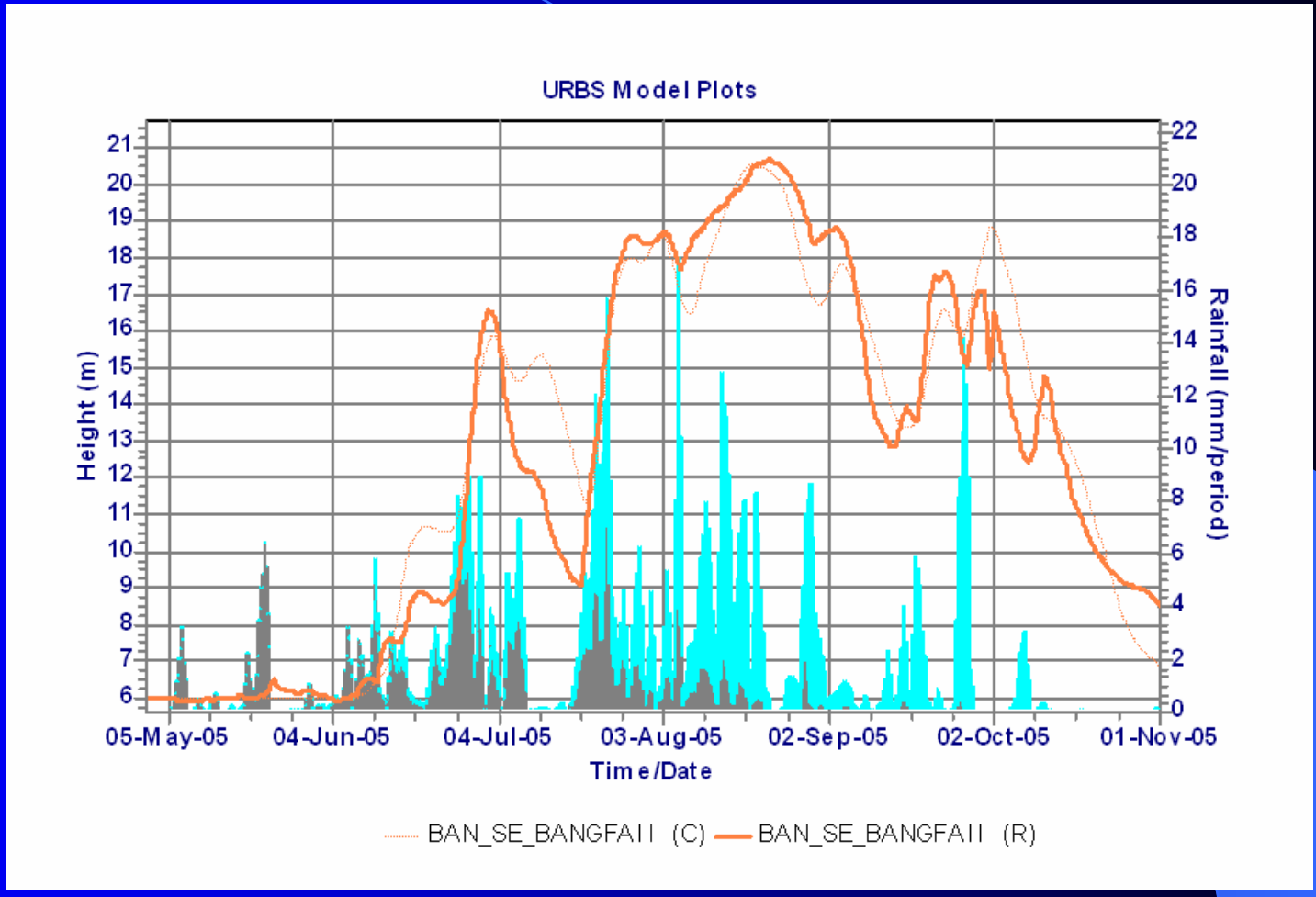

Future Steps

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- 50 models to be developed
- Stage 1 upstream of Kratie
  - 40 models
- Stage 2 downstream of Kratie
  - 10 models
- Special module for Tonle Sap / Great Lake system
- Ultimately linked to hydrodynamic models

Conclusions

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- Data
  - Upgrade existing historical rain gauge stations
  - Extend existing rain gauge station network
  - Use mobile phone – SMS
  - Use manual rain gauges
  - Low tech, low budget, low O&M
  - Complementary to AHNIP and M-HYCOS
  - Secure direct access to AHNIP and M-HYCOS
  - Secure GTS connection for RFMMC

Conclusions

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- Models
  - URBS model selected as trial flood forecasting model
  - Basic and advanced training of staff completed
  - Example on Se Bangfai developed using CatchmentSIM shows the model has potential
  - Program to develop & calibrate 50 models almost completed (September 2007)
  - Overall Mekong model set up
  - Work on Cambodian floodplain and Great Lake system ongoing
  - Possible use during 2008 flood season if sufficient real time data is available

Thank you very much for your attention !