Challenges in the Flood Management in Thailand

Connective Cities international Dialogue Event on
"Challenges of organizing flood management"
9-11 February 2015 in Cologne, Germany

Chaiporn Siripornpibul

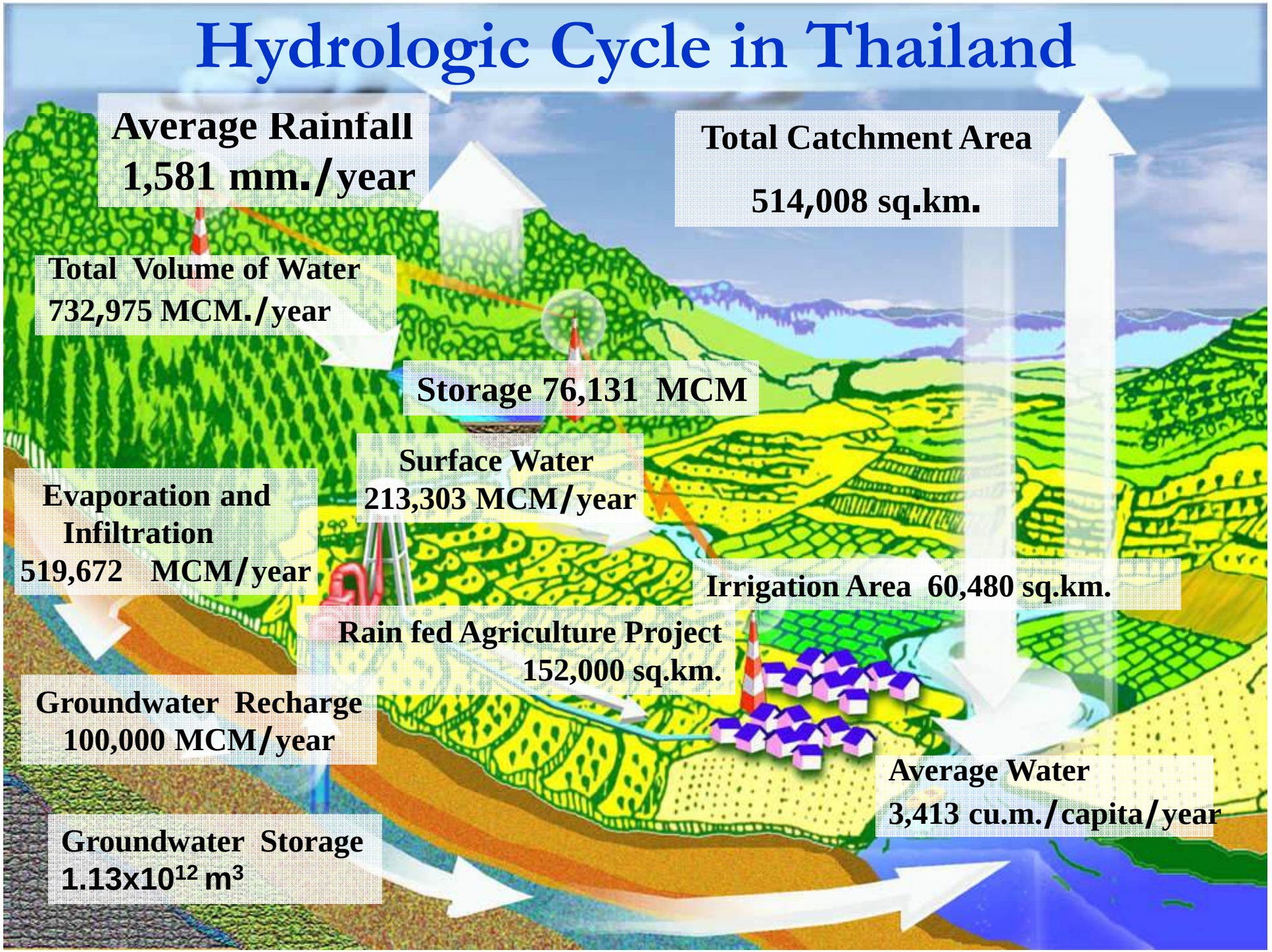
Inspector General

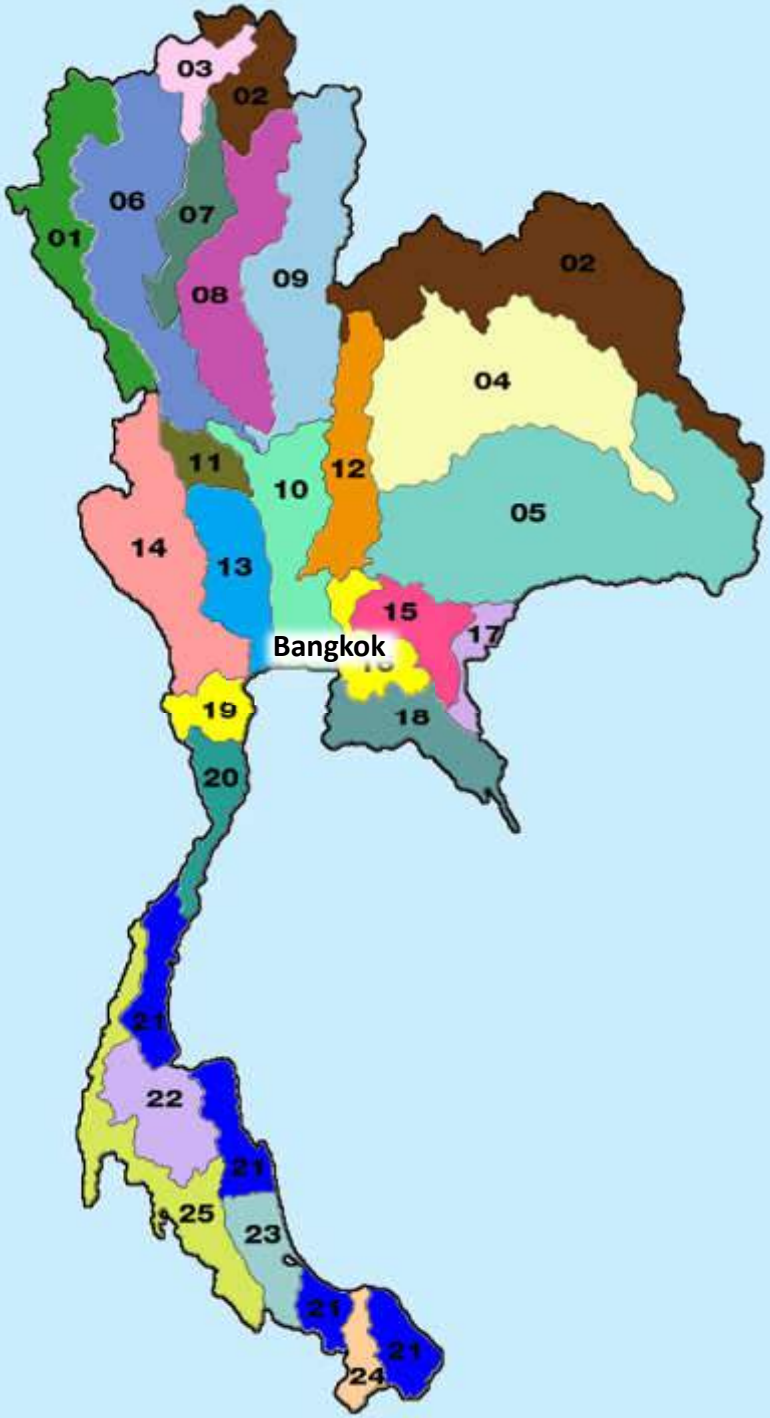
Ministry of Natural Resources and Environment, Thailand

CONTENTS

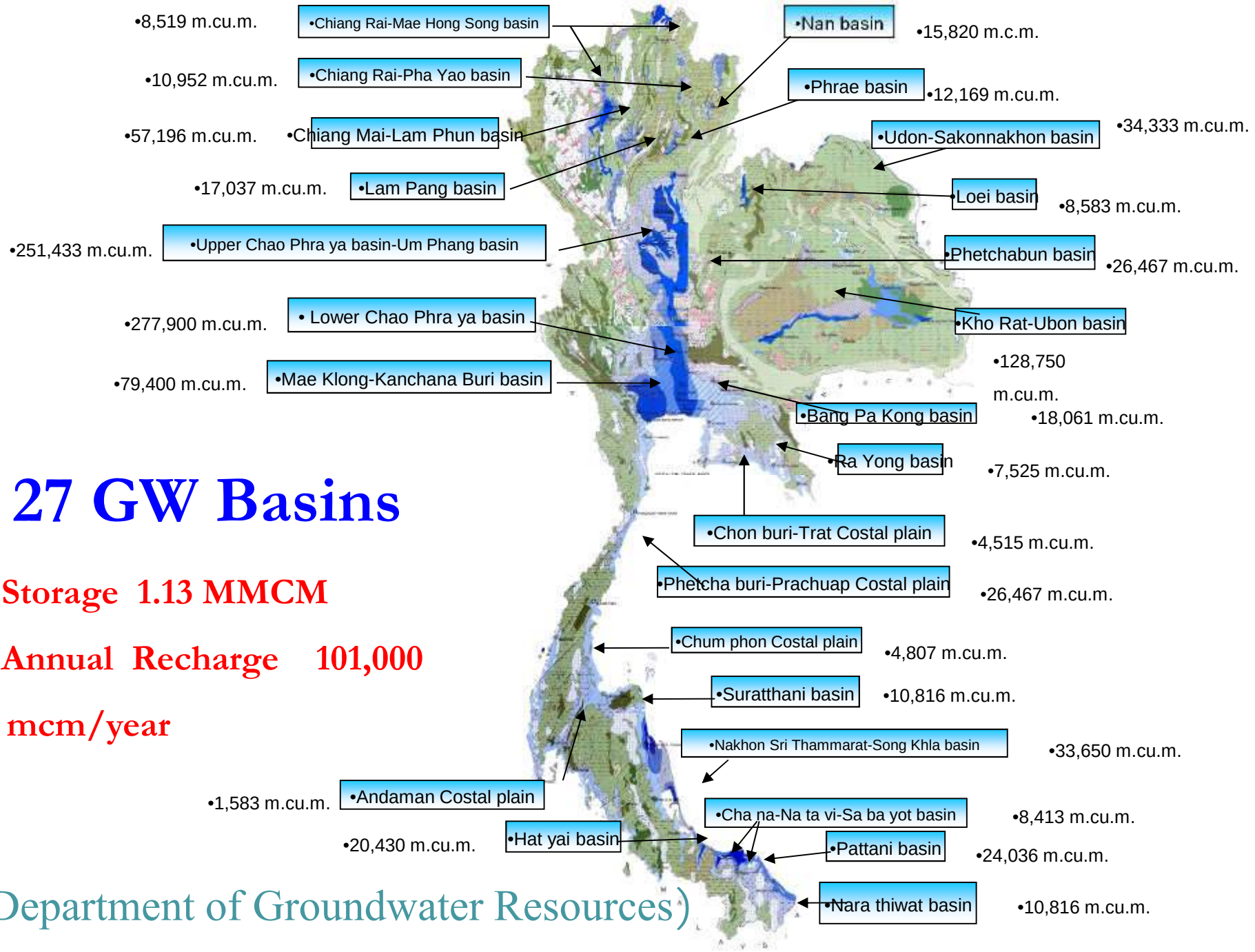
- Water Resources in Thailand
- Flood in 2011
- Challenges in the Flood Management in Thailand
- FED Triangle : A new hope for Water Resources Management in the rural areas in Thailand.

Hydrologic Cycle in Thailand





25 River Basins in Thailand	
1.Salawin	14.Maeklong
2.Kong	15.Prachin
3.Kok	16.Bangpakong
4.Chi	17.Tonlesap
5.Mun	18.Eastern Coast
6.Ping	19.Petchburi
7.Wang	20.Western Coast
8.Yom	21.Eastern South Coast
9.Nan	22.Tapee
10.Chaophraya	23.Songkla Lake
11.Sakaekrang	24.Pattani
12.Pasak	25.Western South Coast
13.Thachin	

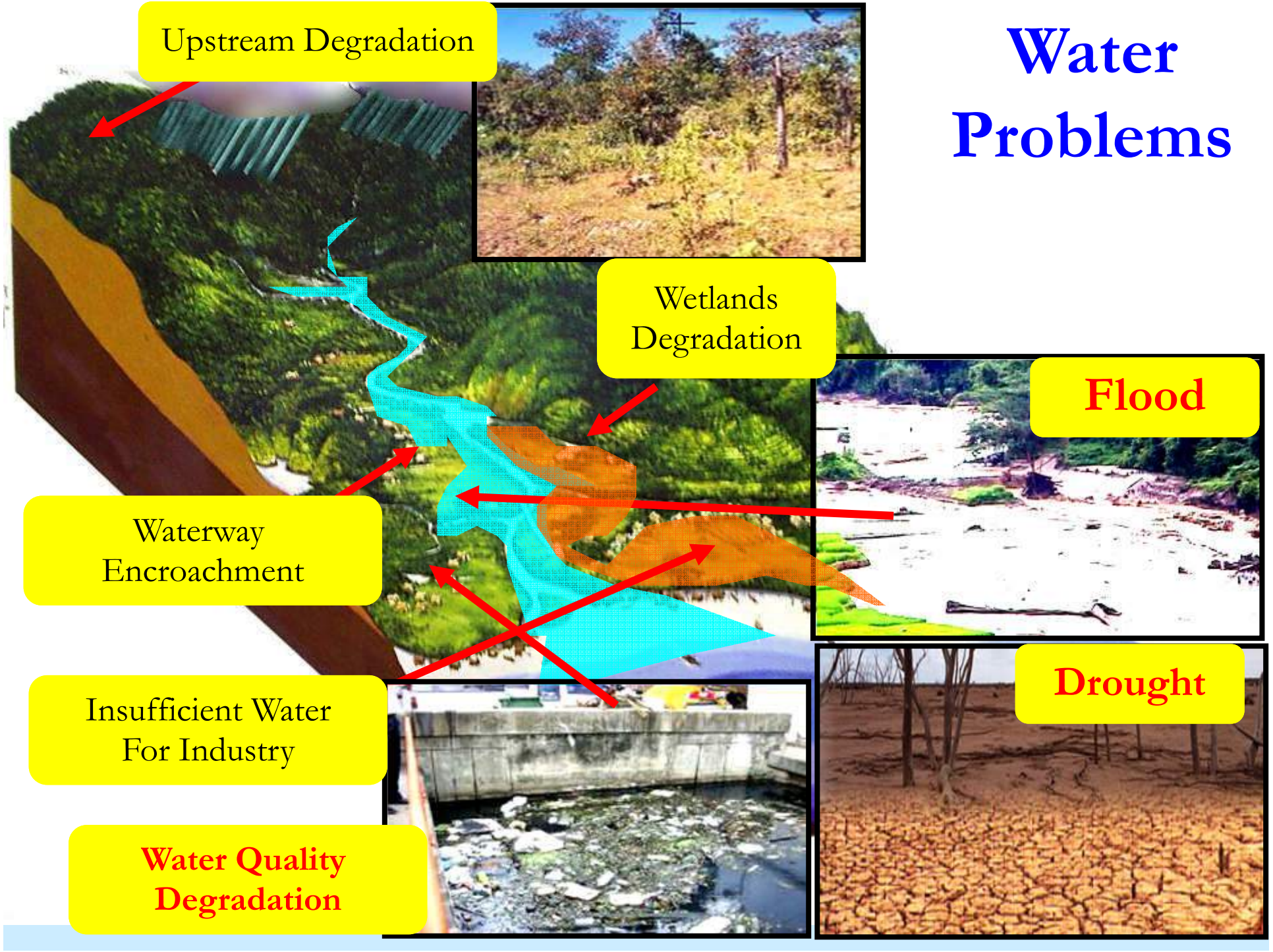


27 GW Basins

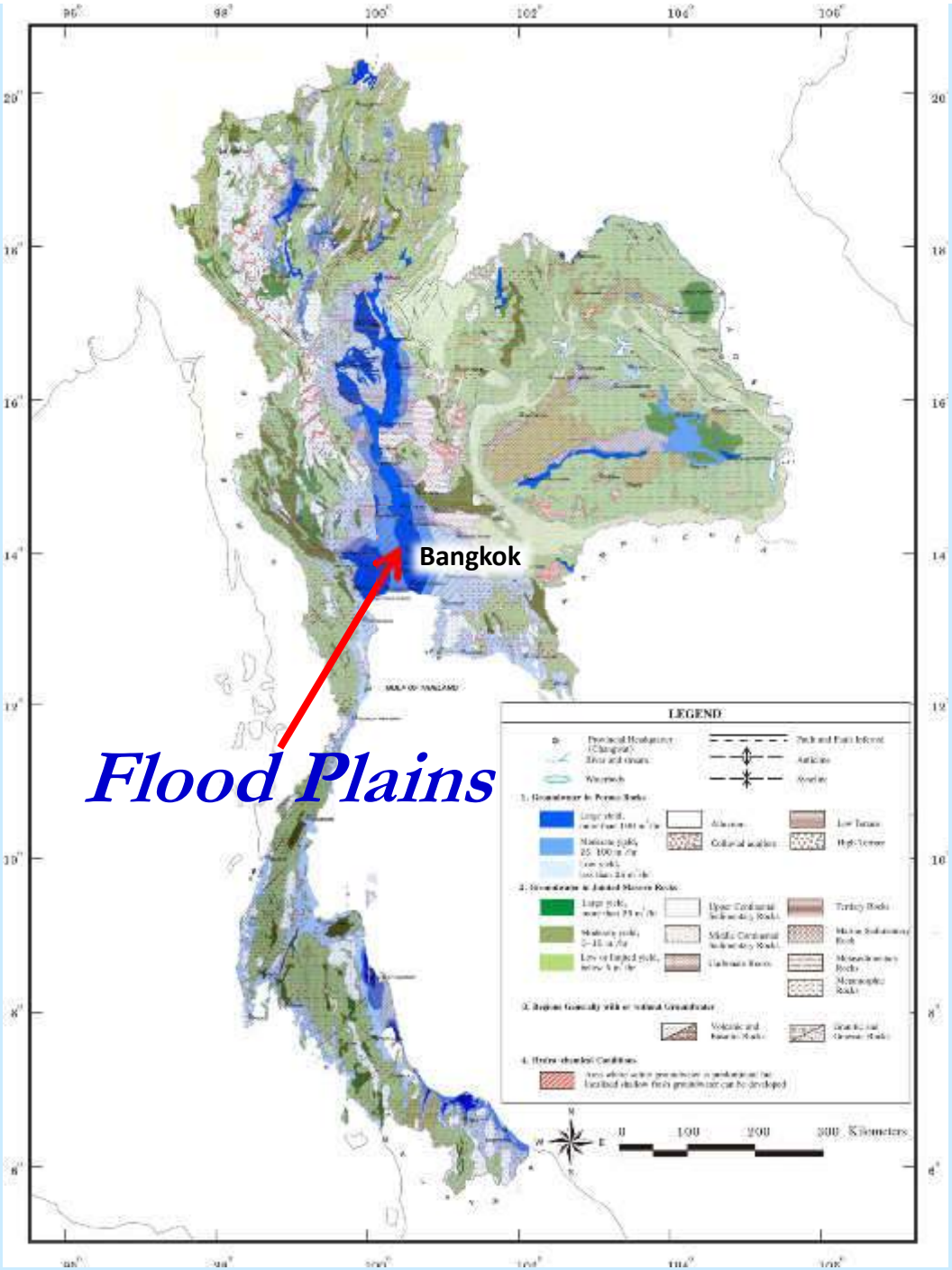
- **Storage 1.13 MMCM**
- **Annual Recharge 101,000 mcm/year**

(Department of Groundwater Resources)

Water Problems

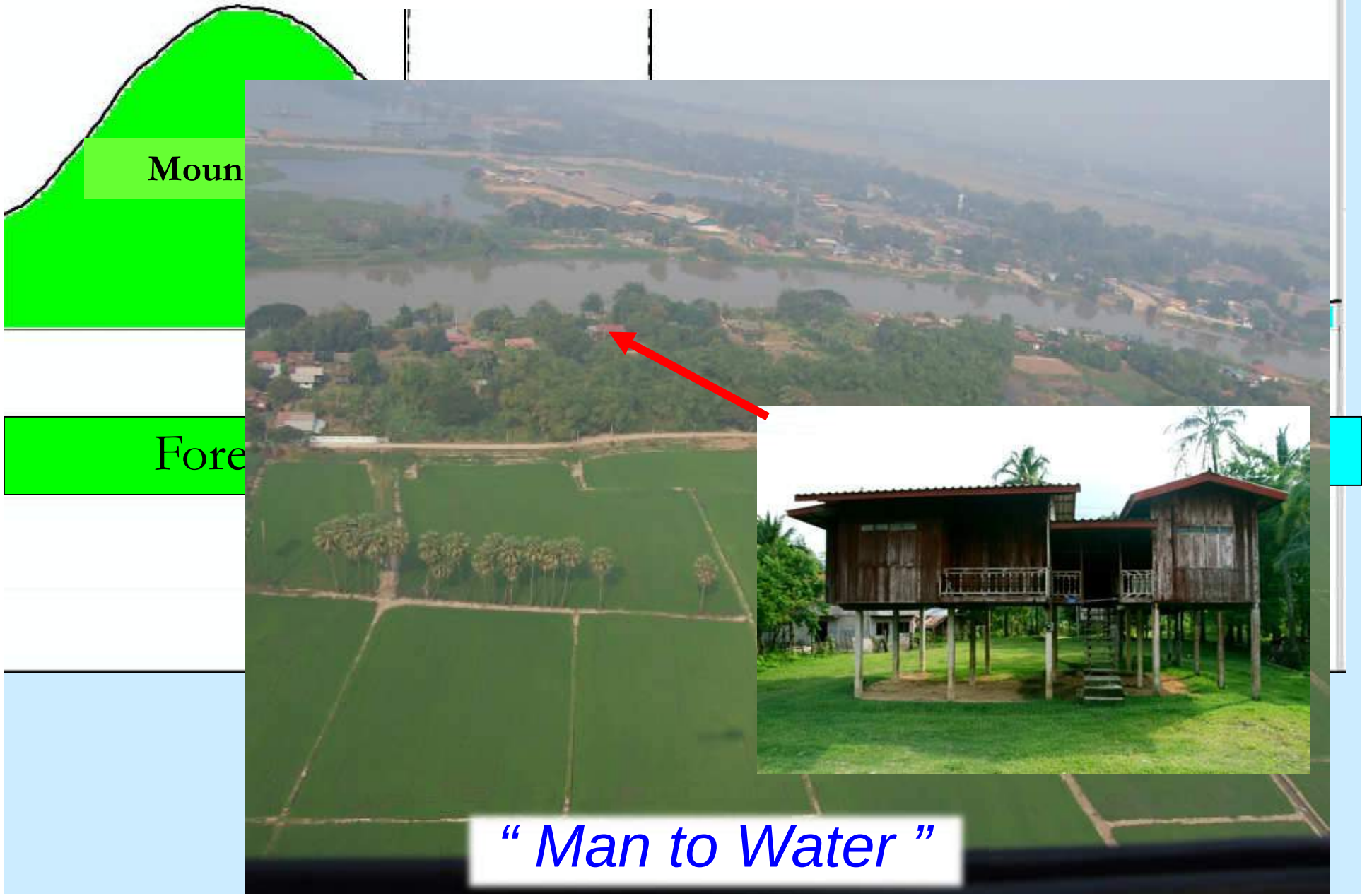


2011 FLOOD



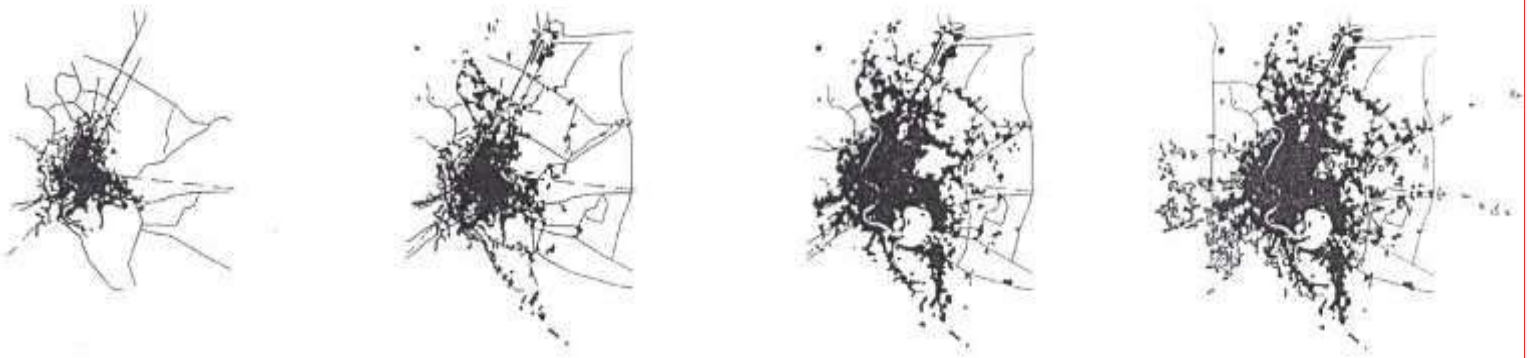
Hydrogeological Map or Groundwater Map of Thailand

People and Nature



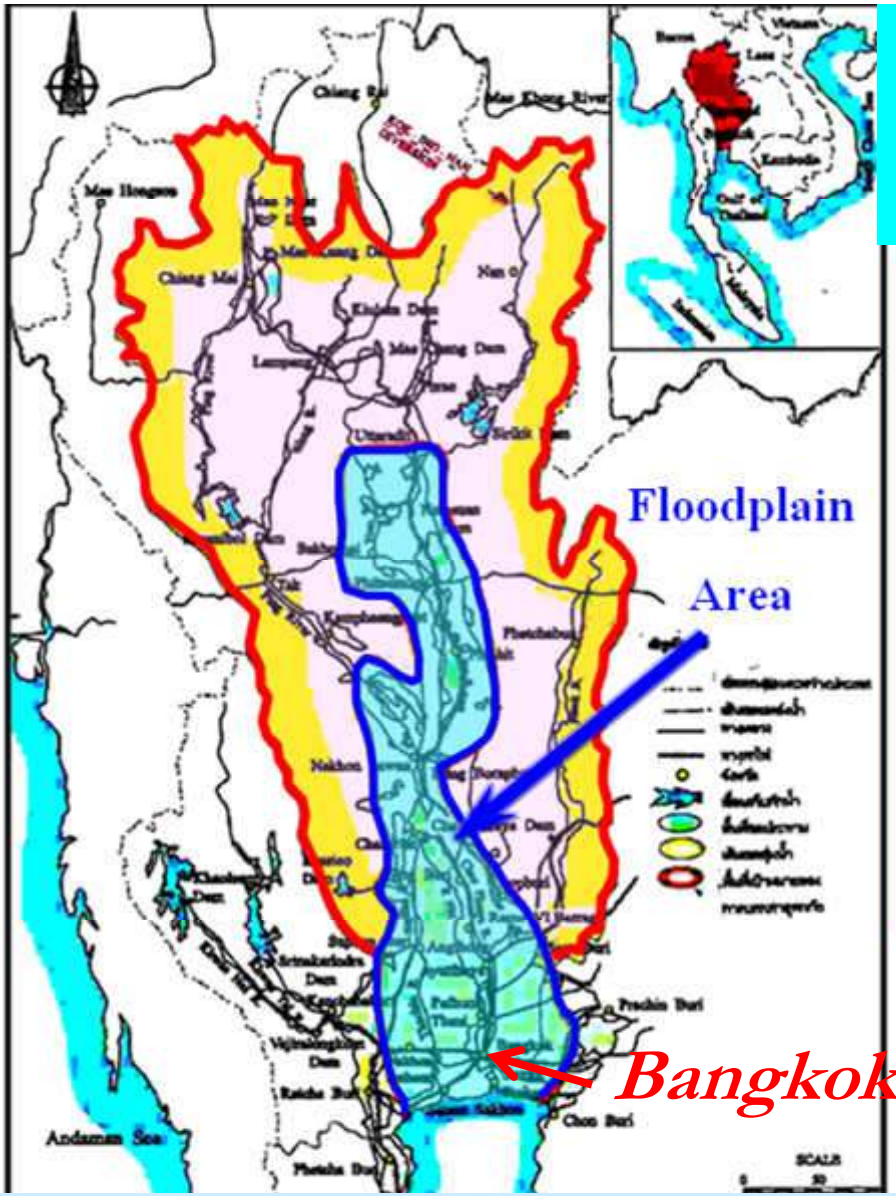
ภาพ 1-1 ประวัติการเติบโตและการขยายตัวของกรุงเทพมหานคร ระหว่างปี พ.ศ. 2503-2533

Growth of Bangkok and vicinity areas



1960 1970 1980 1990

Chao Phraya River Basin



Flood Plain Area
35,000 Sq.Km

- **Irrigated agricultural land and wetland - 80% - 5 million people**
- **Urban/commercial/industrial areas - 20 % - 13 million people**
- **Flood can cause a lot of damages.**

Source: Strategic Formulation Committee for Water Resources Management (SCWRM)

Causes of 2011 FLOOD

Unusual run off

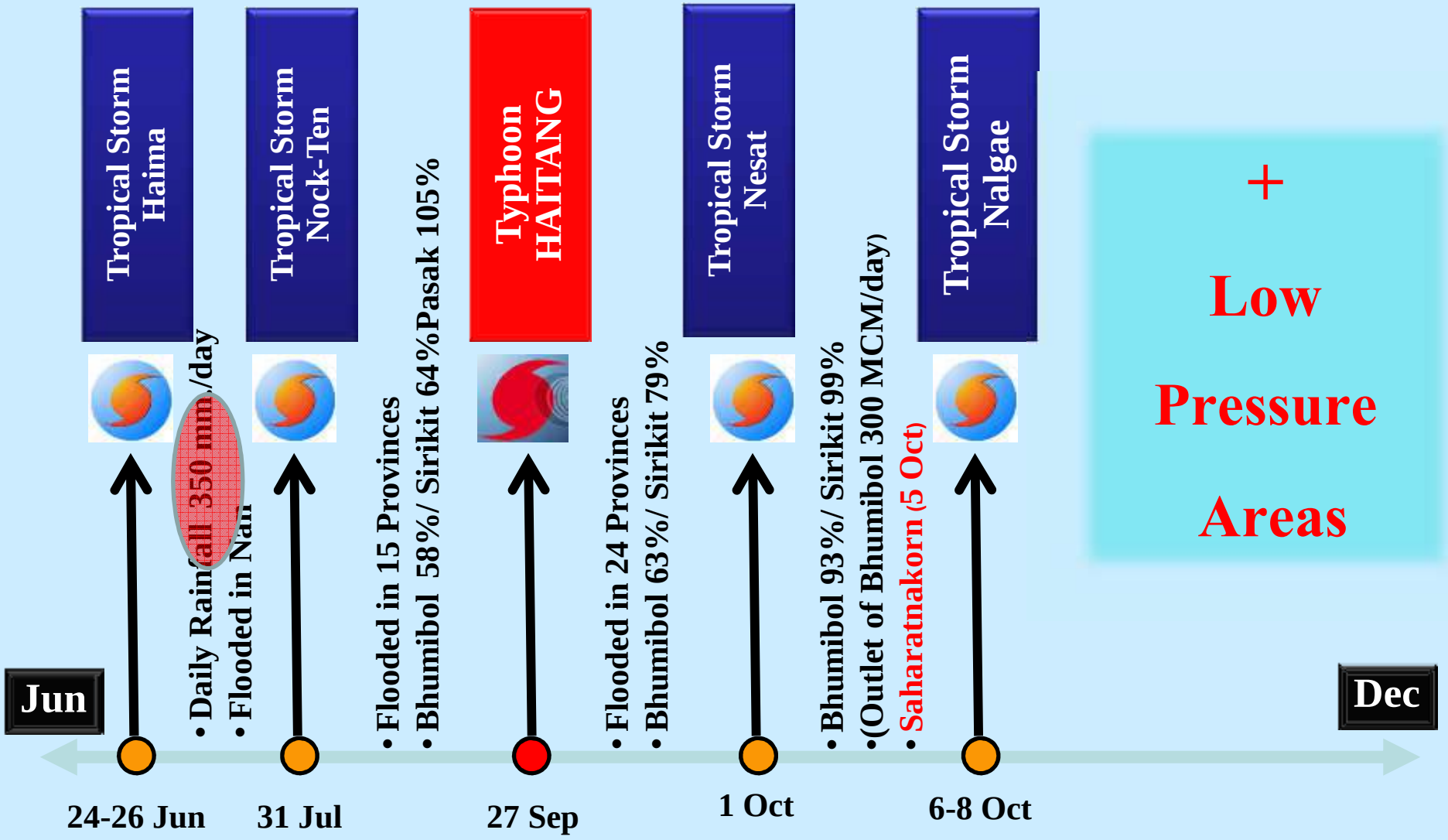
from August to October 2011 to Nakhon Sawan Province which **maximum flow of 4,686 cm./s,** volume of flow was 36,961 mcm. which **was 9,890 mcm. more than volume in 1995 flood.**

Water management : water resources development

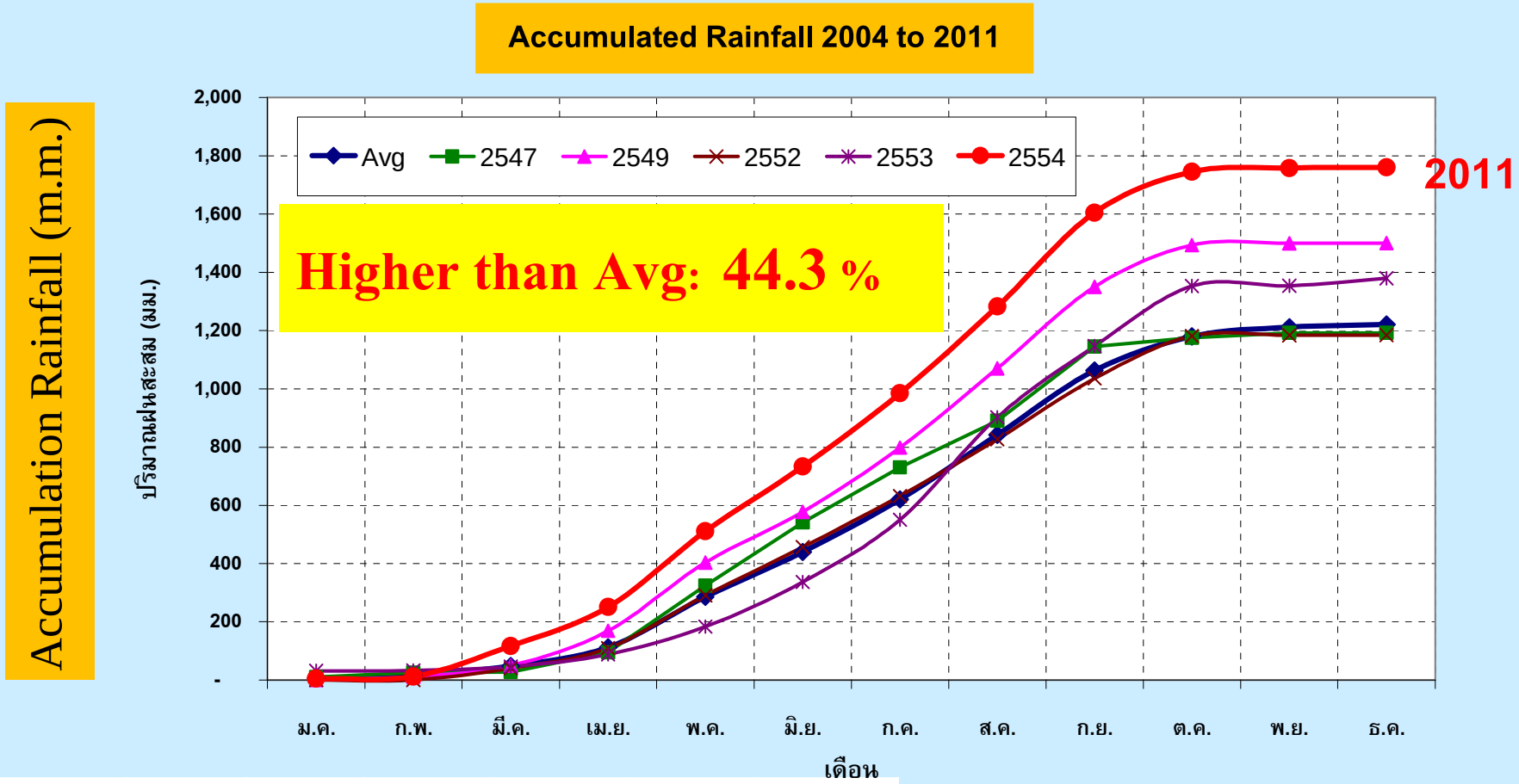
2.1 capacity and potential of water resources development projects was not enough to cope with unusual run off.

2.2 water management tools eg. Sluice gate, drainage systems, pumps etc. which is a limitation of present situation **but relevant to the past 50 years situation.**

Time line of Flood Events in 2011

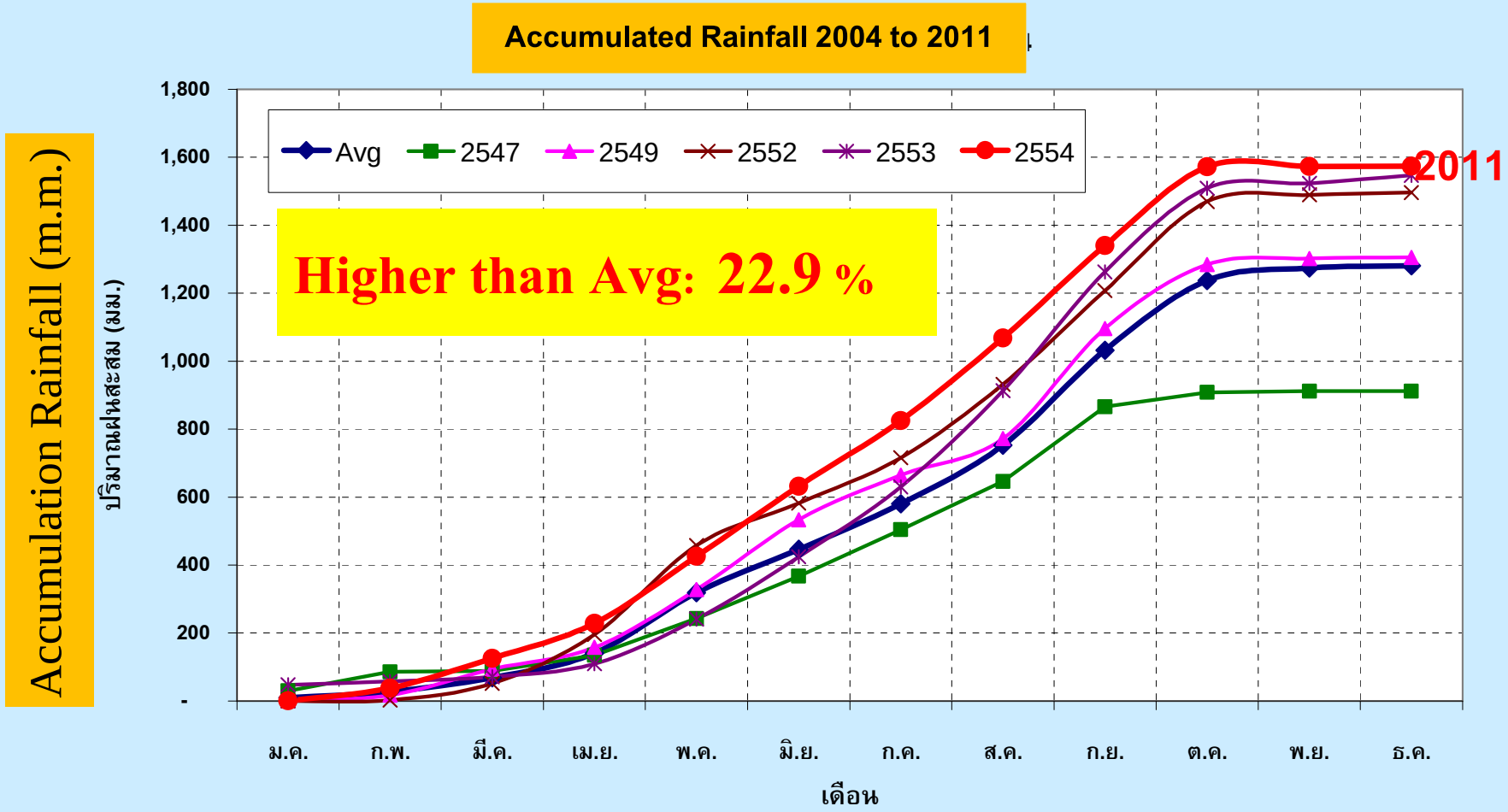


Rainfall in the North of Thailand



Year	Avg.	2004	2006	2009	2010	2011
Rainfall	1,220	1,191	1,500	1,184	1,379	1,760
(m.m.)		-29	+280	-36	+159	+540

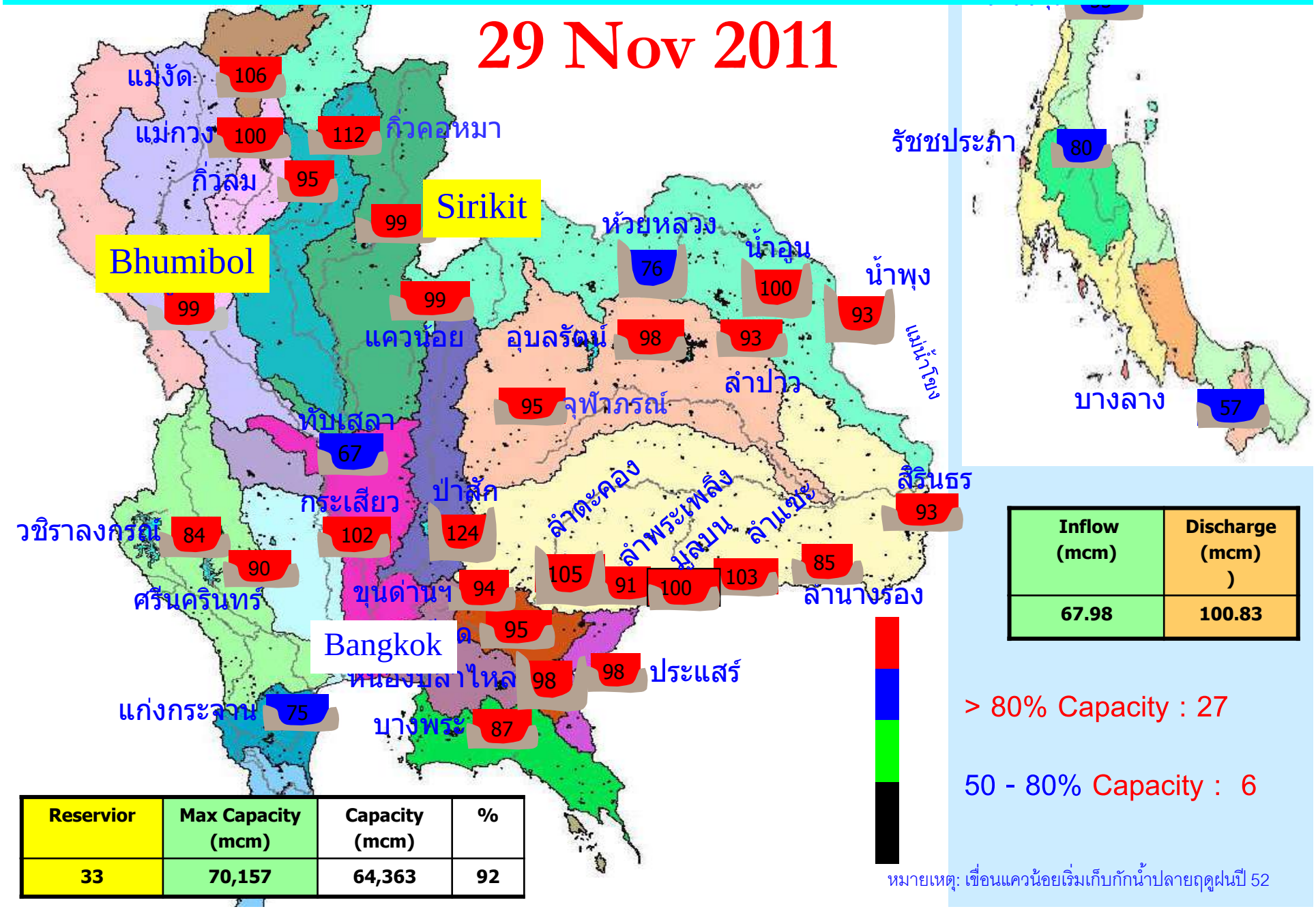
Rainfall in the Central Part of Thailand



Year	Avg.	2004	2006	2009	2010	2011
Rainfall	1,280	911	1,305	1,495	1,549	1,573
(m.m.)		-369	+25	+215	+269	+293

Status of 33 major Dams/Reservoirs

29 Nov 2011



Reservior	Max Capacity (mcm)	Capacity (mcm)	%
33	70,157	64,363	92

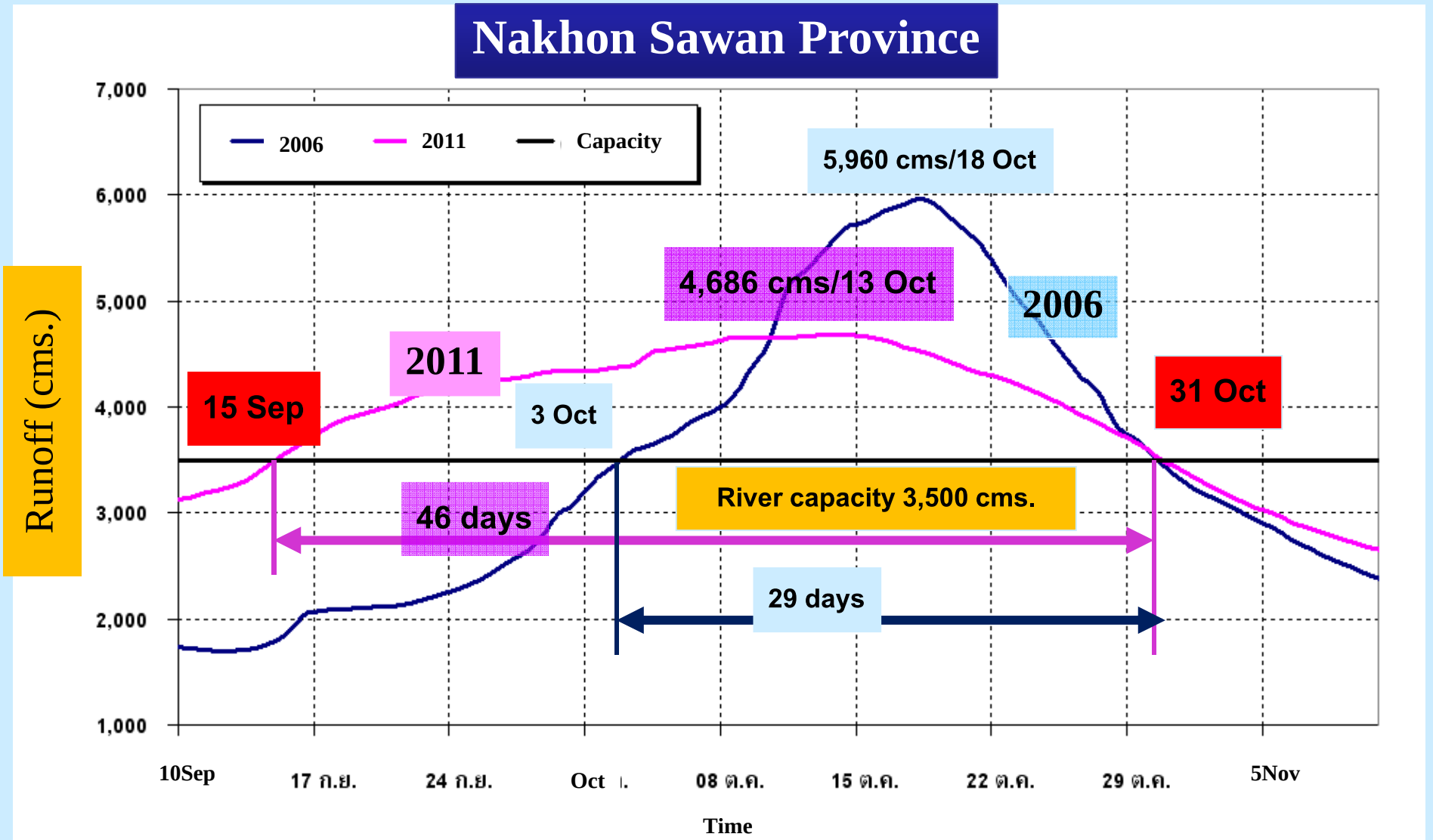
Inflow (mcm)	Discharge (mcm))
67.98	100.83

> 80% Capacity : 27

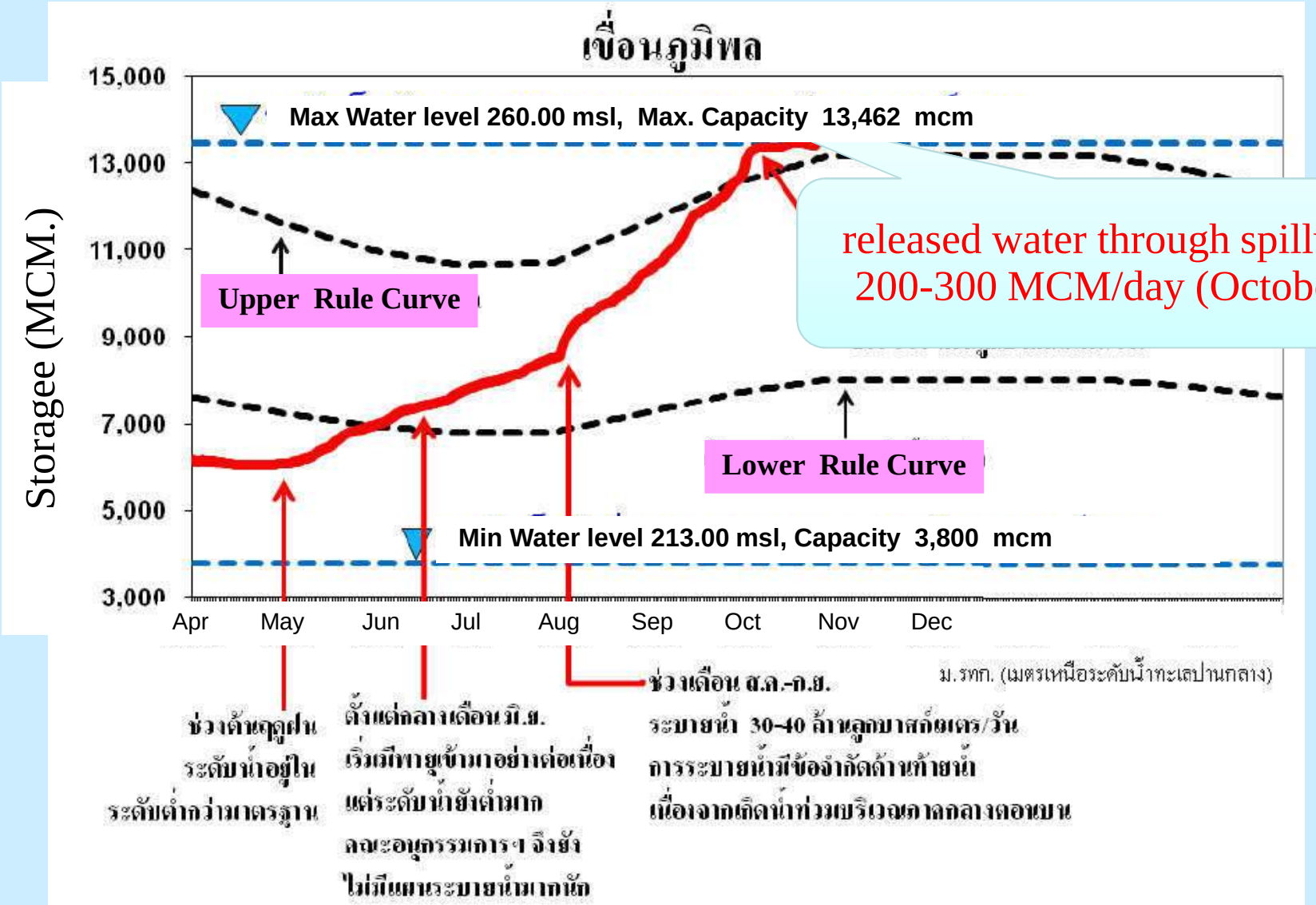
50 - 80% Capacity : 6

หมายเหตุ: เขื่อนแควน้อยเริ่มเก็บกักน้ำปลายฤดูฝนปี 52

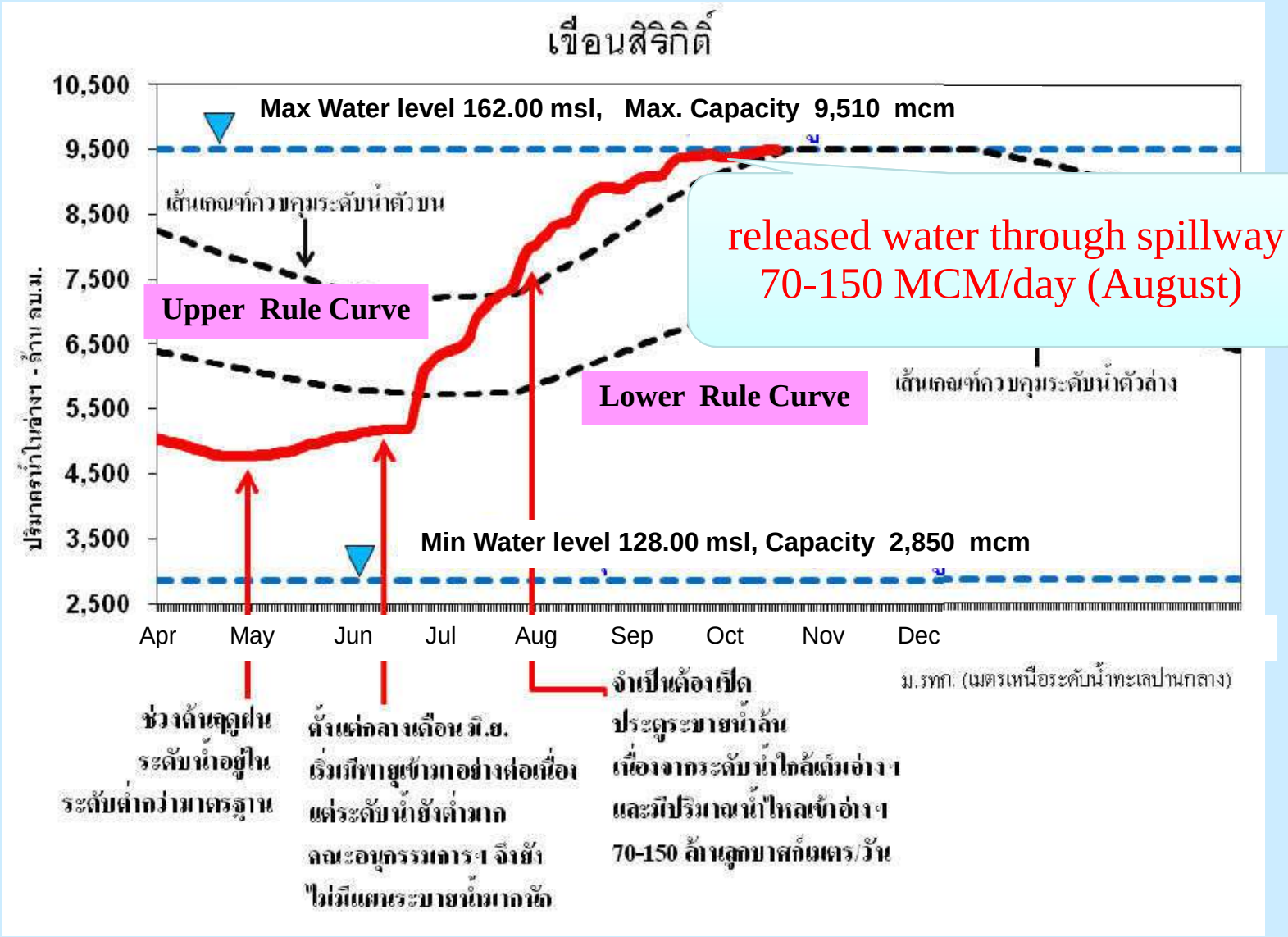
Runoff in Upstream Area of Chao Phraya River Basin



Water Storage in Bhumibol Dam

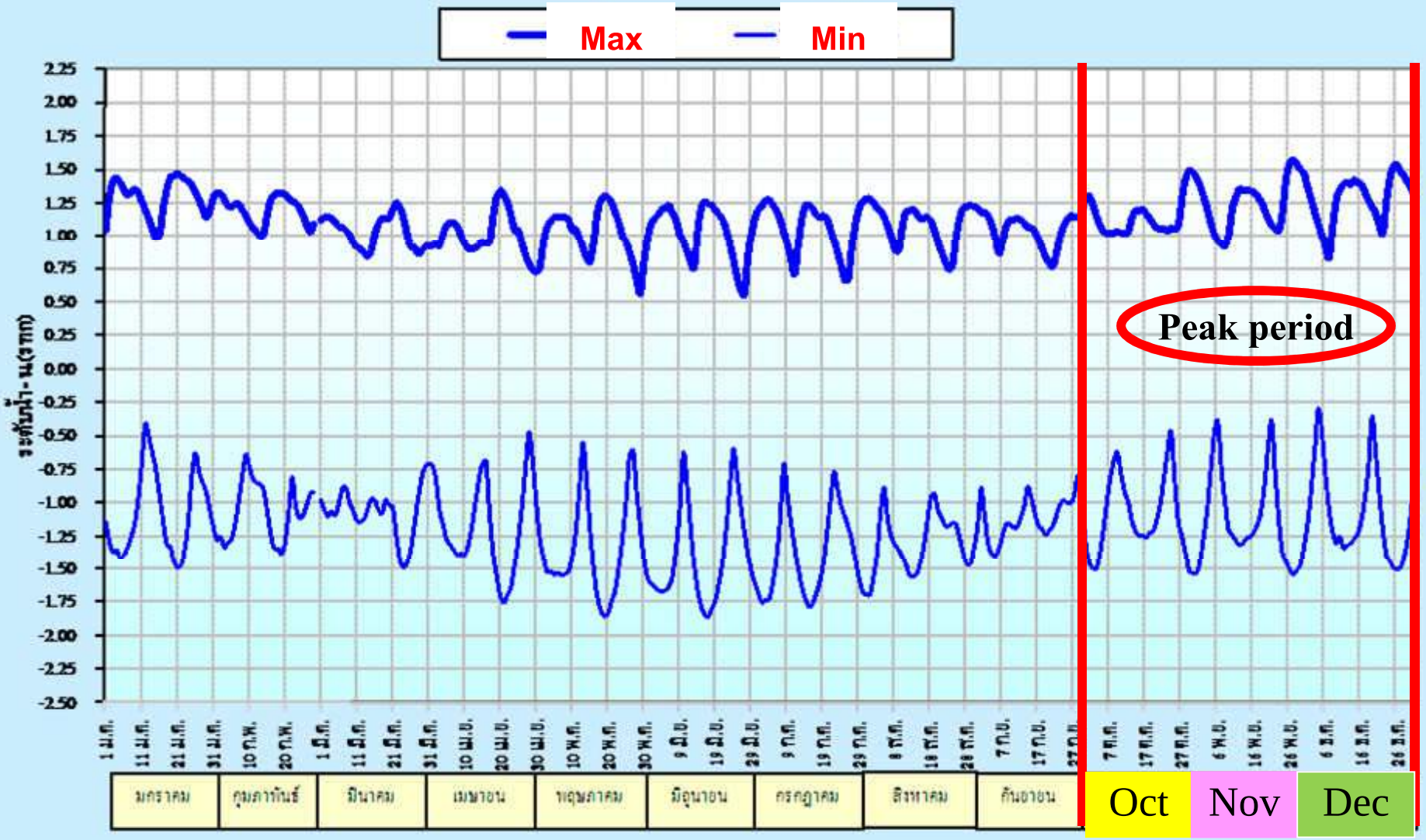


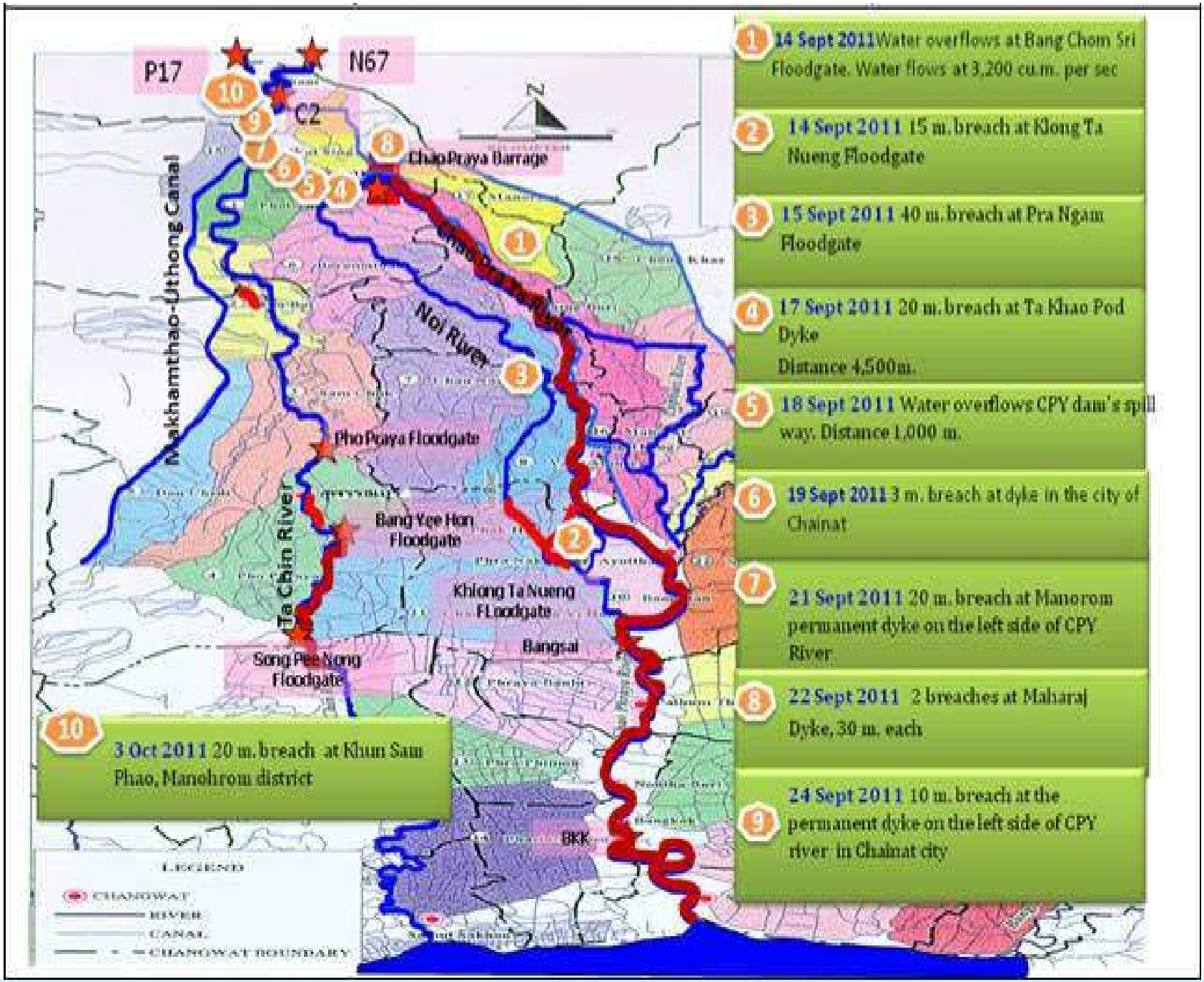
Water Storage in Sirikit Dam



Tidal Effect

Downstream of Chao-Phraya River





Major breaches of flood control infrastructure along Chao Phraya River

Damages and Losses

Affected 66 provinces out of 77 provinces

Deaths : 780

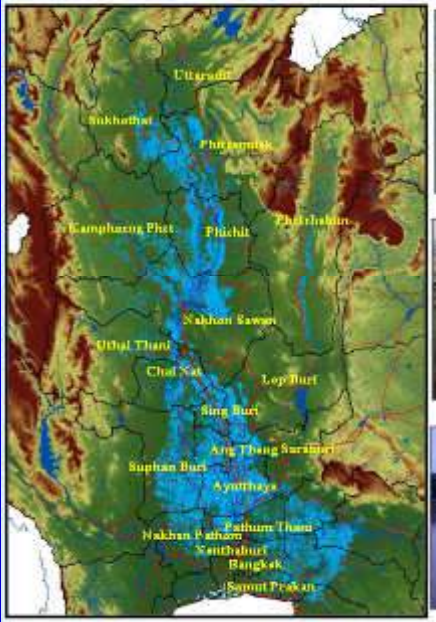
Population affected : 13,595,192

Sector affected:

- ***Infrastructures;*** flood control, drainage & irrigation, transport, telecommunication, electricity, water supply
- ***Productive sector;*** agriculture, industry & commerce, tourism, financial and insurance
- ***Social sector;*** health, education, housing, cultural heritage Environment

Total damages and losses: USD 46.5 billion

Flood in 2011: Rural/Agricultural Areas



Flood in 2011: Urban Areas

Flood in 2011: Industrial Areas and Major Infrastructure

Total Damages 1.4 Trillion Baht (WB estimate)


หน่วยงานช่วยเหลือยามฉุกเฉิน
รัฐบาล 1111 กด 5
สายด่วน กทม. 1555
กองทัพ 1131
สายด่วน ปภ. 1784
รถพยาบาลฉุกเฉิน 1669
เช็คเส้นทาง ขส.ทางหลวง 1193,191
ทางหลวงชนบท 1146
กรมทางหลวง 1586
บขส. 1490
ขสมก. 184
รถไฟฯ 1690
ตร.จราจร 1197
สวน.91 1644
จส.100 1137
การรถไฟพิเศษ 1543
แจ้งจับสัตว์ 1362
ไฟฟ้านครหลวง 1130
ไฟฟ้าส่วนภูมิภาค 1129
ประปา 1125
กรมชลประทาน 1460
กรมอุตุฯ 1182
ข่าวช่อง 3 0-2262-3331
ThaiPBS 0-2790-2111
รับมือน้ำท่วม!
การเตรียมตัวก่อนน้ำมาถึงพื้นที่
1
2
3
4
1:9 ส่วน





URGENT ! : ANNONCEMENT

Due to this lane was flooded already,

those waters who want to flow to the sea

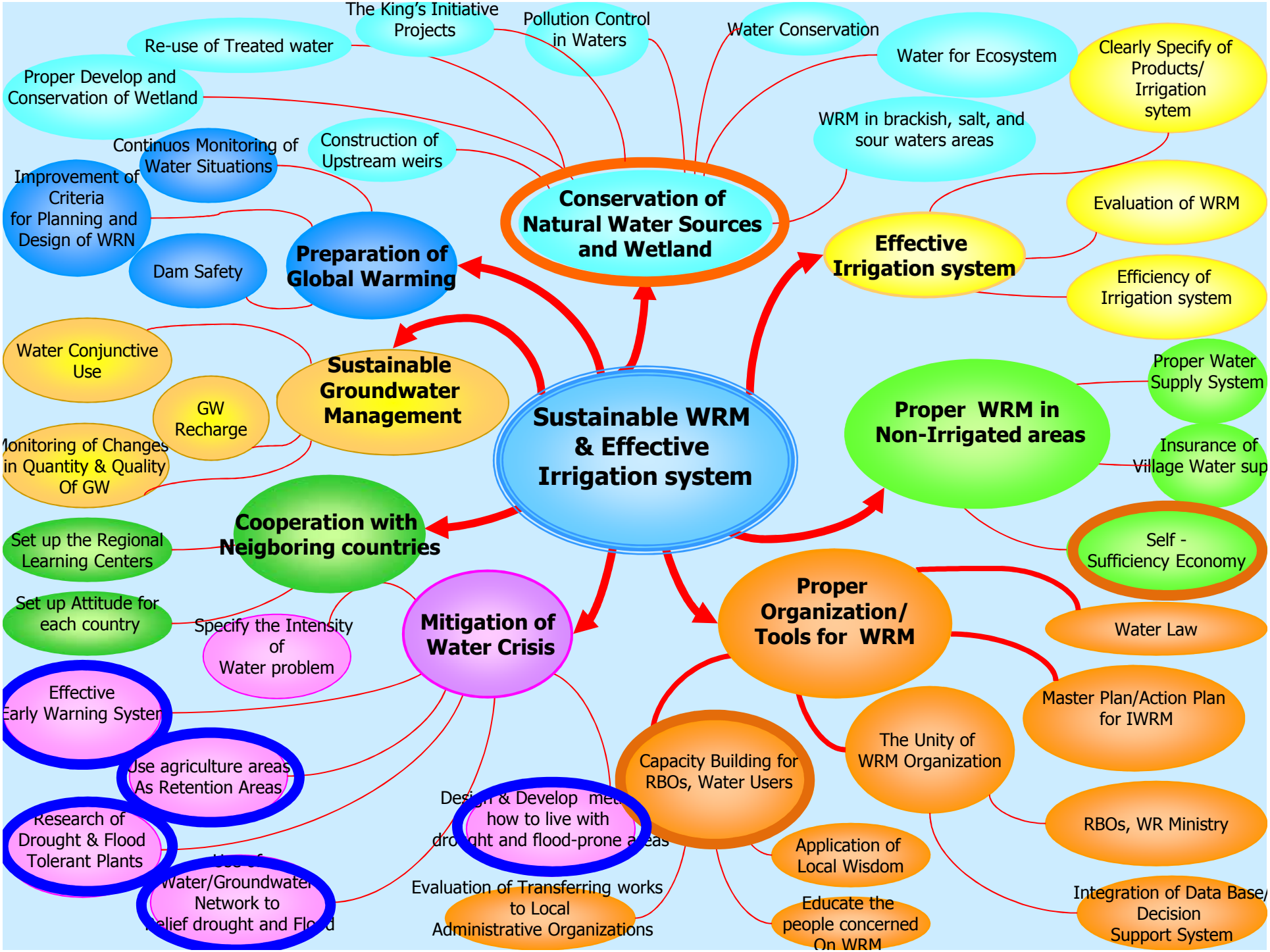
Please use the other way

Otherwise you can not make it !

(IAW : I'm Afraid of Water)

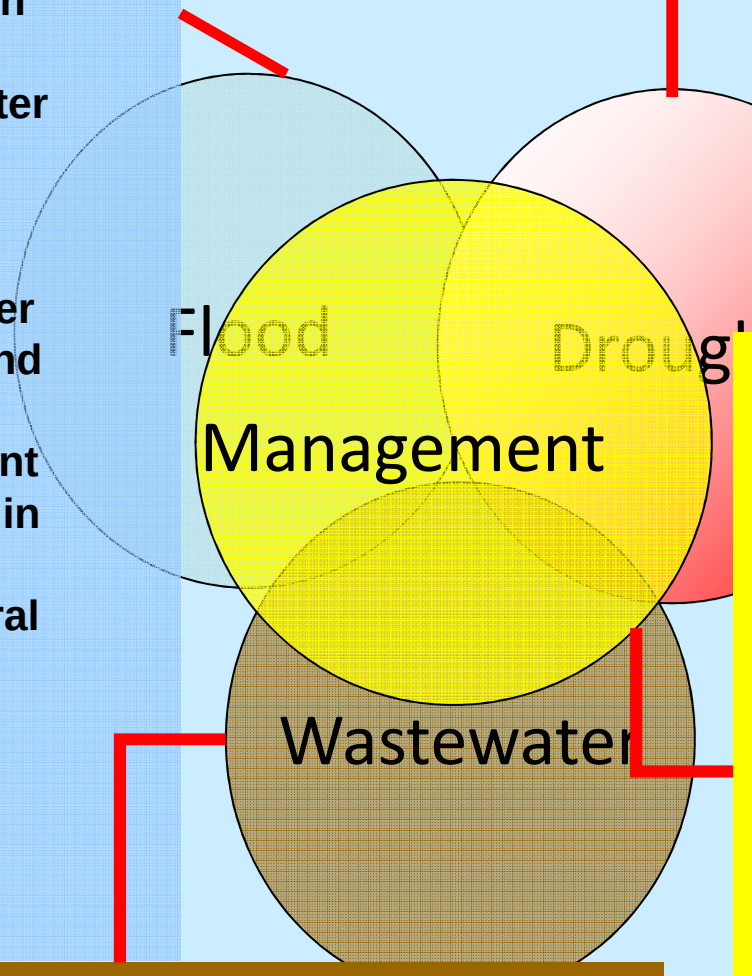
Challenges in the Flood Management in Thailand

Announcement of Water Resources as the National Agenda
21 May 2007


Sustainable WRM & Effective Irrigation system
Conservation of Natural Water Sources and Wetland
The King's Initiative Projects
Pollution Control in Waters
Water Conservation
Re-use of Treated water
Water for Ecosystem
Clearly Specify of Products/ Irrigation sytem
Proper Develop and Conservation of Wetland
WRM in brackish, salt, and sour waters areas
Continuos Monitoring of Water Situations
Construction of Upstream weirs
Improvement of Criteria for Planning and Design of WRN
Dam Safety
Preparation of Global Warming
Effective Irrigation system
Evaluation of WRM
Efficiency of Irrigation system
Water Conjunctive Use
Sustainable Groundwater Management
GW Recharge
Monitoring of Changes in Quantity & Quality Of GW
Proper WRM in Non-Irrigated areas
Proper Water Supply System
Insurance of Village Water sup
Cooperation with Neigboring countries
Set up the Regional Learning Centers
Set up Attitude for each country
Specify the Intensity of Water problem
Mitigation of Water Crisis
Self - Sufficiency Economy
Proper Organization/ Tools for WRM
Water Law
Effective Early Warning Syster
Use agriculture areas As Retention Areas
Research of Drought & Flood Tolerant Plants
Water/Groundwater Network to
Design & Develop how to live with drought and flood-prone areas
Evaluation of Transferring works to Local Administrative Organizations
Capacity Building for RBOs, Water Users
Master Plan/Action Plan for IWRM
The Unity of WRM Organization
RBOs, WR Ministry
Application of Local Wisdom
Educate the people concerned On WRM
Integration of Data Base/ Decision Support System

Strategies for 3 Basic Problems on Water Resources

1 Watershed protection and rehabilitation
2 Rehabilitation of water sources, waterway and wetlands
3 Development and improvement of water sources, drainage and diversion system
4 Land use management and flood protection in economic area
5 Improve of agricultural patterns
6 Flood management and rehabilitation

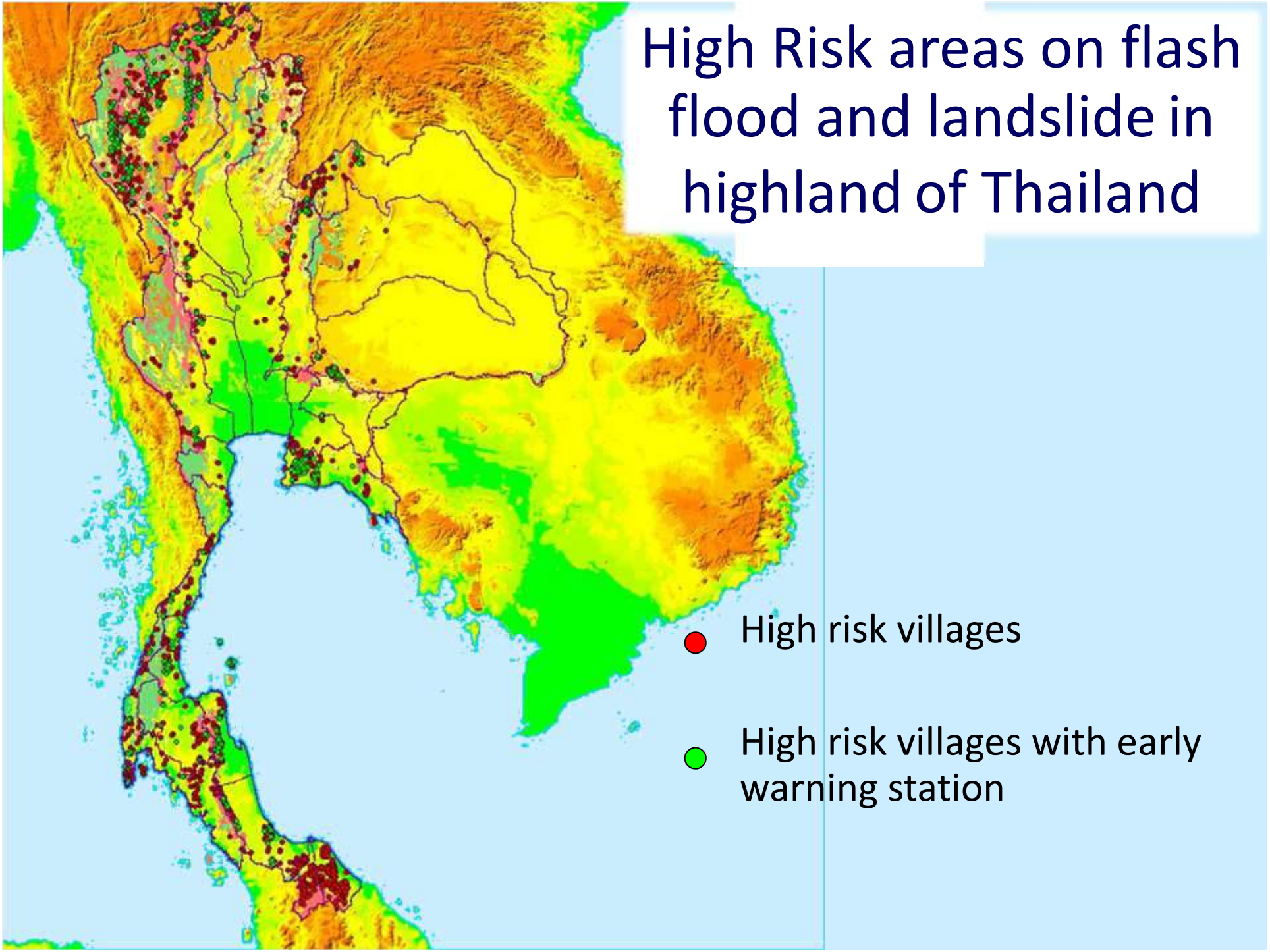


1 Increase water supply
2 Water Spreading
3 Increase an efficiency of water supply system
4 Management

1.Water Law Legislation
2.Organizations reform on water resources
3.Other related law legislation
4.Capacity building of RBC
5.Establishment of Water Resources Management Organizations for normal and critical situations
6.National Water Resources Information Center
7.Water Resources Fund
8.Projects of Sustainable Water Resources Research

1 Rehabilitation of water quality in critical and urgent river basin
2 Monitoring and supervision of point-sources waste and wastewater drainage
3 Strengthening of public and Local Administrative Organization participation

High Risk areas on flash flood and landslide in highland of Thailand



Flood Risk Area in Urban Community and Economic Area

32 Cities (15 Groups)

1) Ping
2) Nan-Yom
3) Chiang Rai
4) Chaopaya-Thachin
5) Chanthaburi
6) Bangsapan
7) Mae Kong
8) Mun
9) Surat THani
10) Chumporn
11) Nakonsitamrat
12) Had Yai
13) Yala
14) Takuapa
15) Trang

Inundated Areas

Proposed

Strategic Plan of Water Resources Management

By

Strategic Formulation Committee for Water Resources Management (SCWRM)

2014

Administrative Strategy for Water Resources Management

1. Rehabilitation of Upstream Forest and Prevention of Erosion

2. To solve the problem of Water shortage for Domestic Use

3. To solve the problem of Water shortage for Agriculture

4. To solve the problem of Water shortage

5. Flood Prevention and Mitigation

6. Water Quality management

7. Management

Flood Protection and Mitigation

1. Rehabilitation of Main Stream and Tributaries

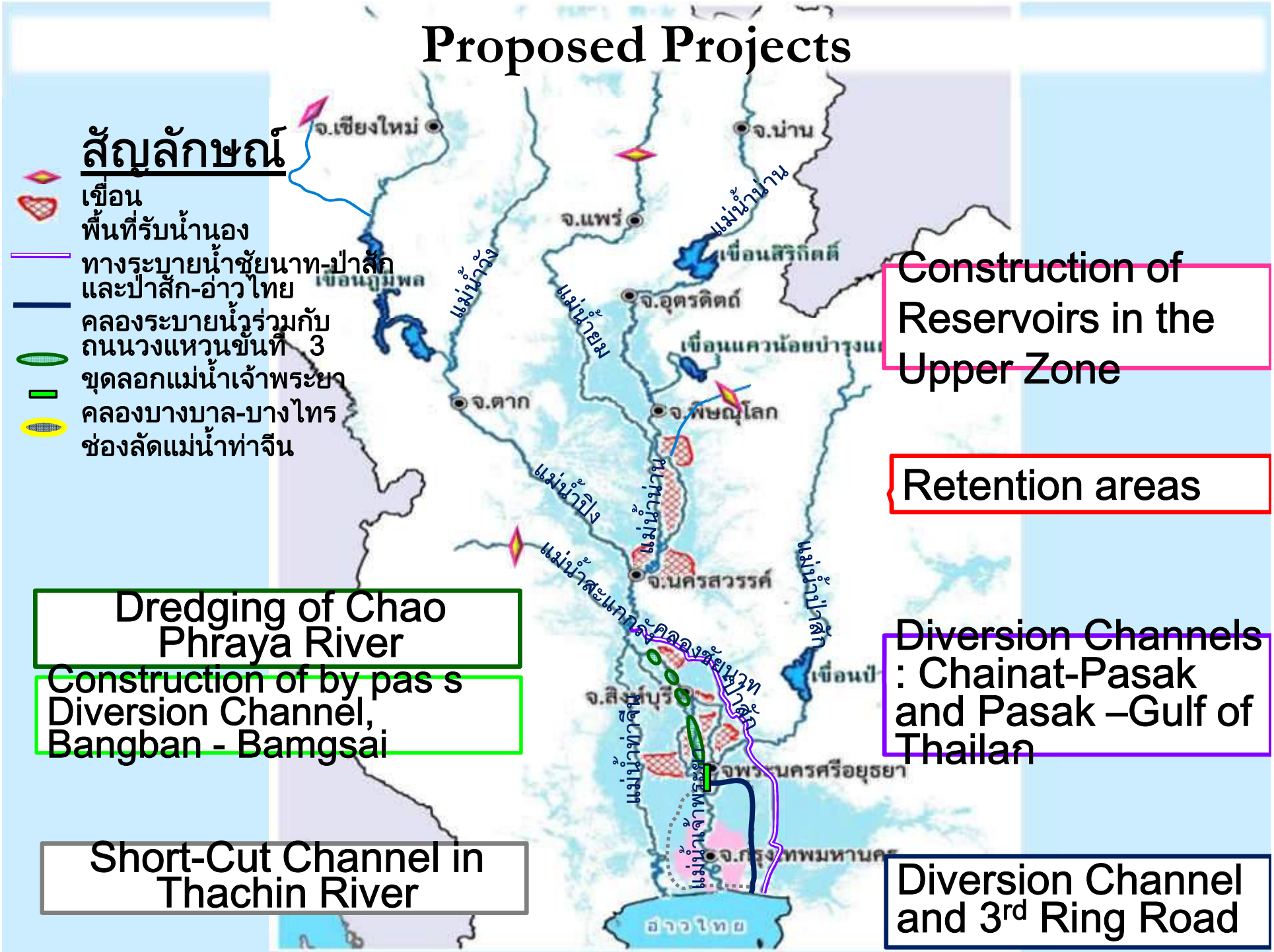
2. Develop Diversion Channels

3. Flood Protection program for Major Cities and Economic areas

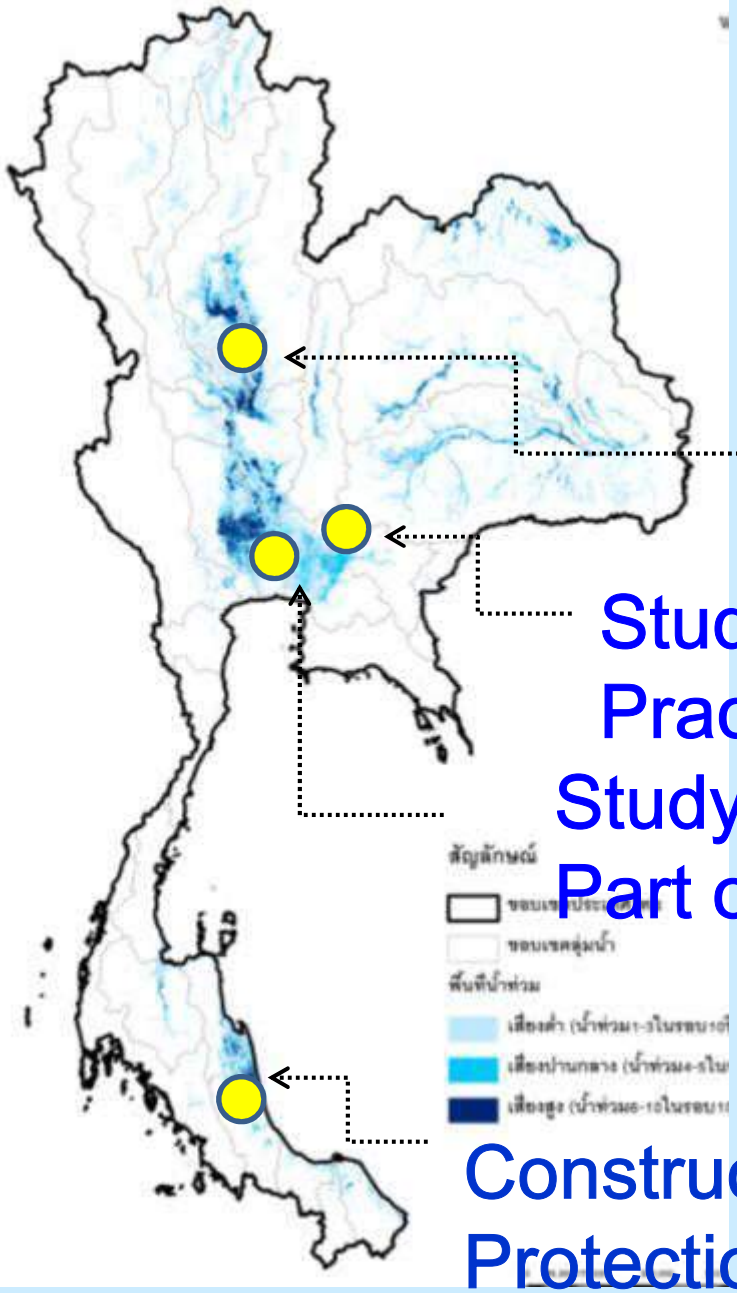
4. Improvement of City Planning

5. Preparation of the Retention areas for flood water

Proposed Projects



Urgent Diversion Plans



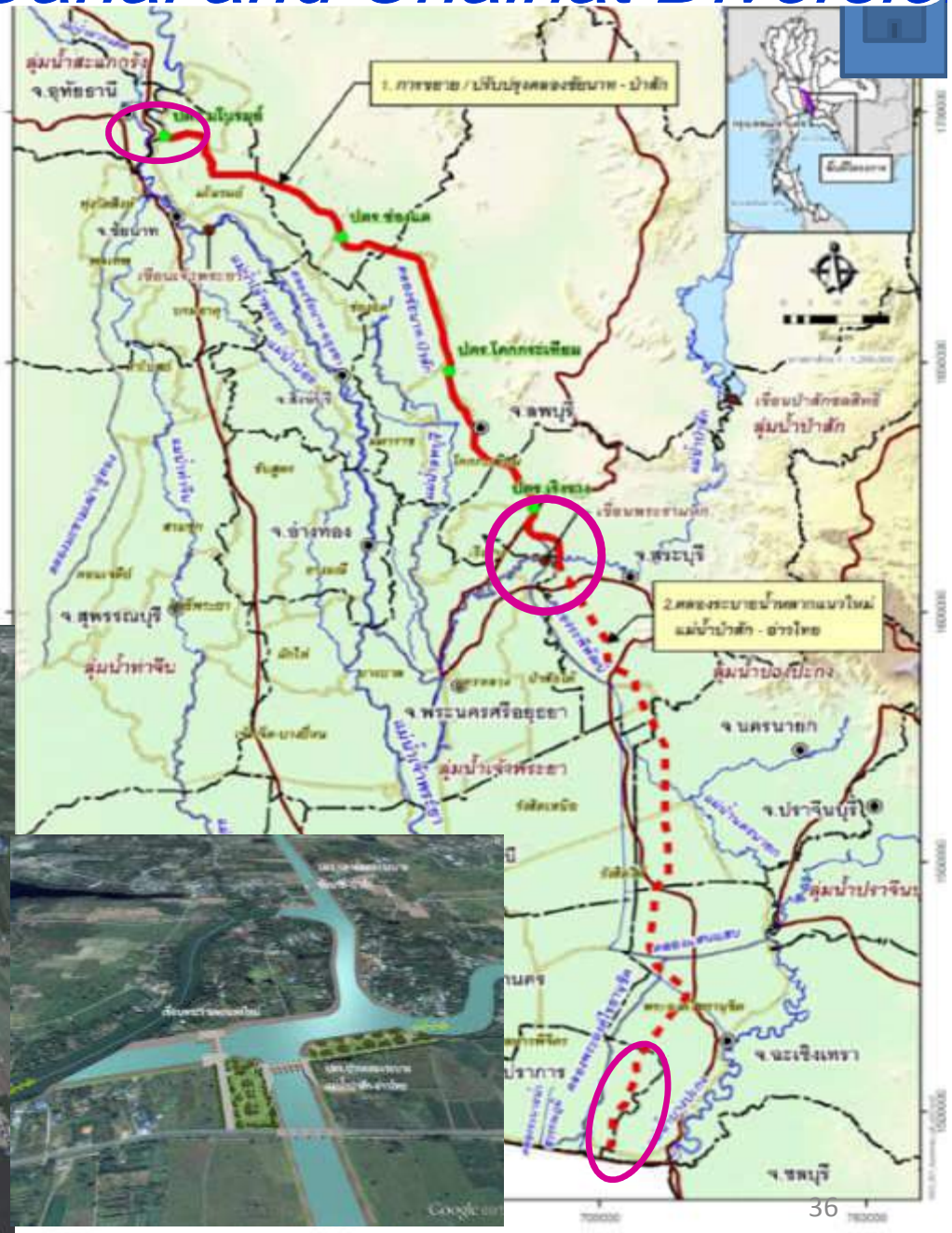
Increase the Diversion Efficiency in Sukhothai Province

Study of Flood Mitigation in Prachinburi River Basin

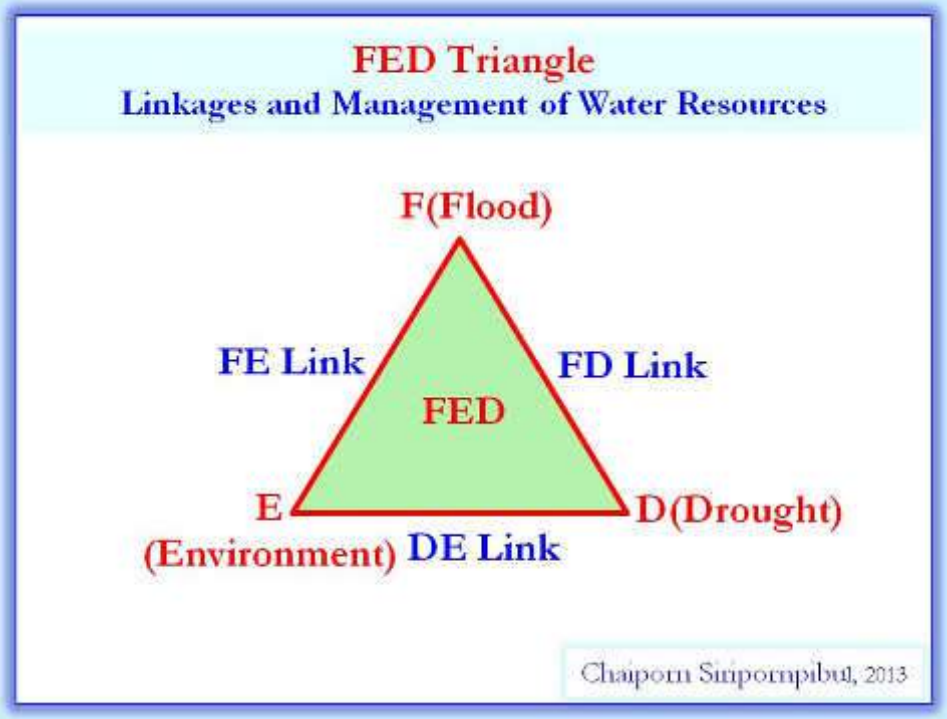
Study of Flood Mitigation in the Eastern Part of Chao Phraya River basins

Construction of Flood Protection in Hat yai

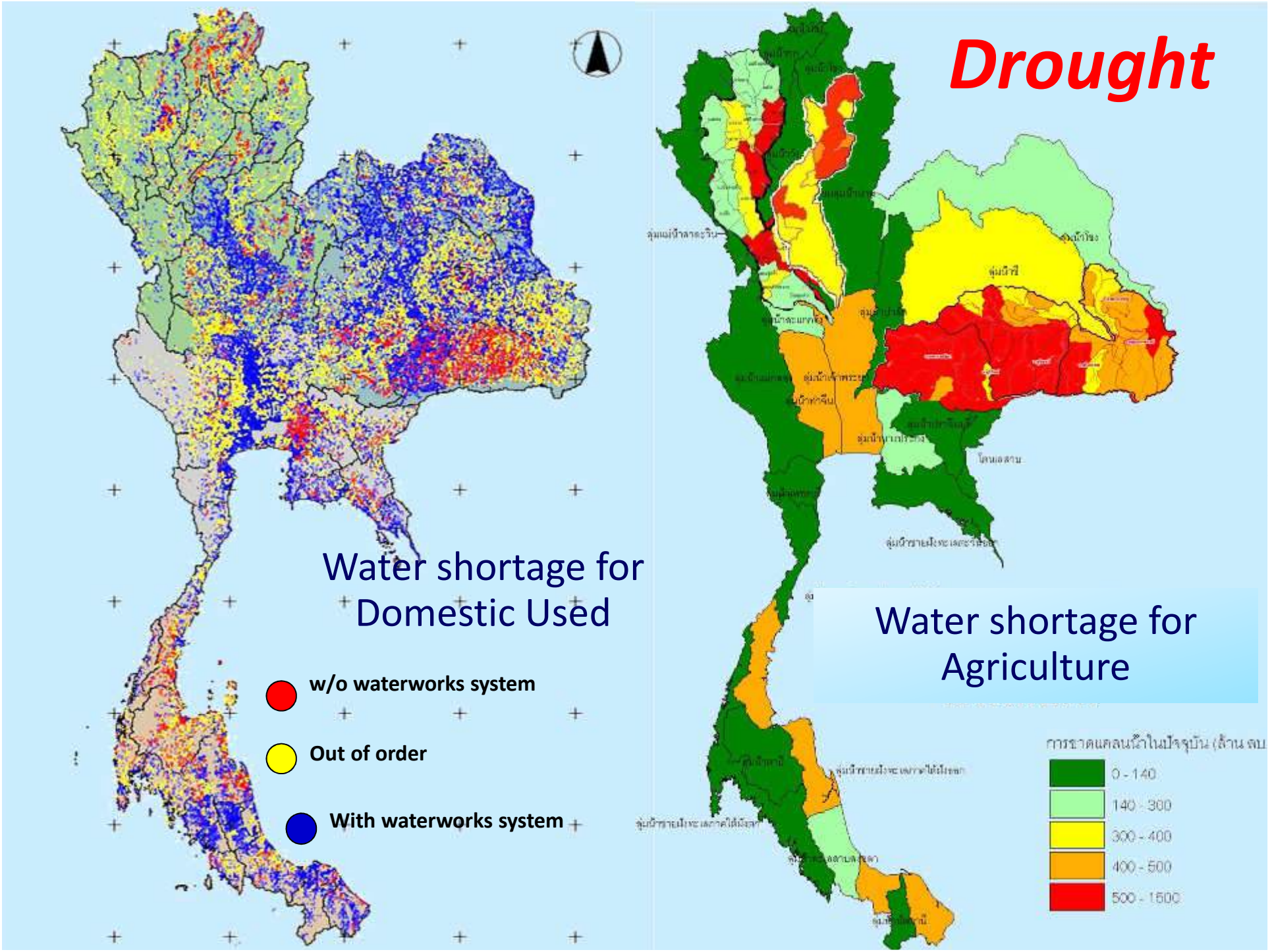
ate at Anusartsananan Canal and Chainat Diversio

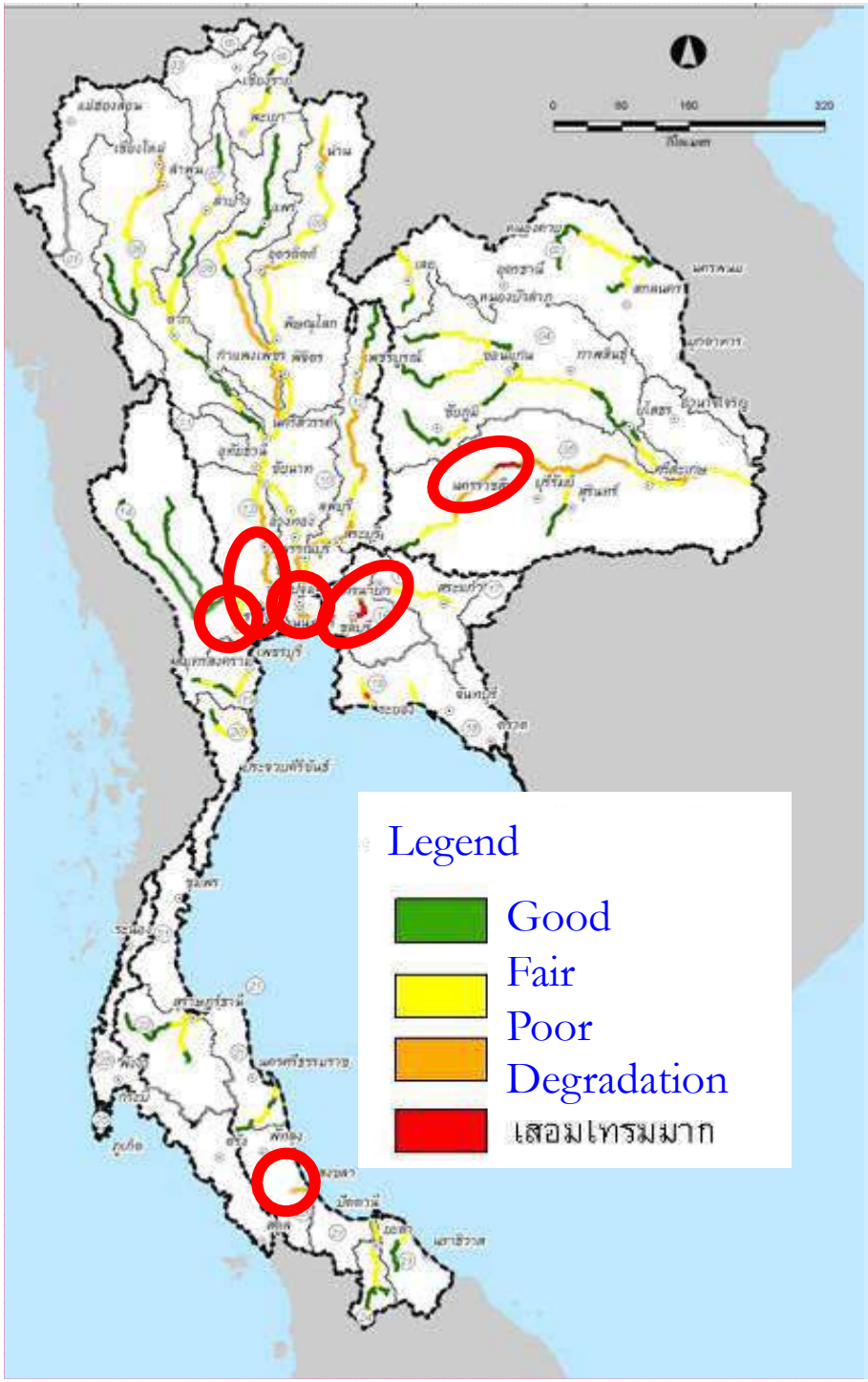


FED Triangle : A new hope for Water Resources Management in the Rural Areas in Thailand



Drought


Water shortage for Domestic Used
w/o waterworks system
Out of order
With waterworks system
Water shortage for Agriculture
0 - 140
140 - 300
300 - 400
400 - 500
500 - 1600



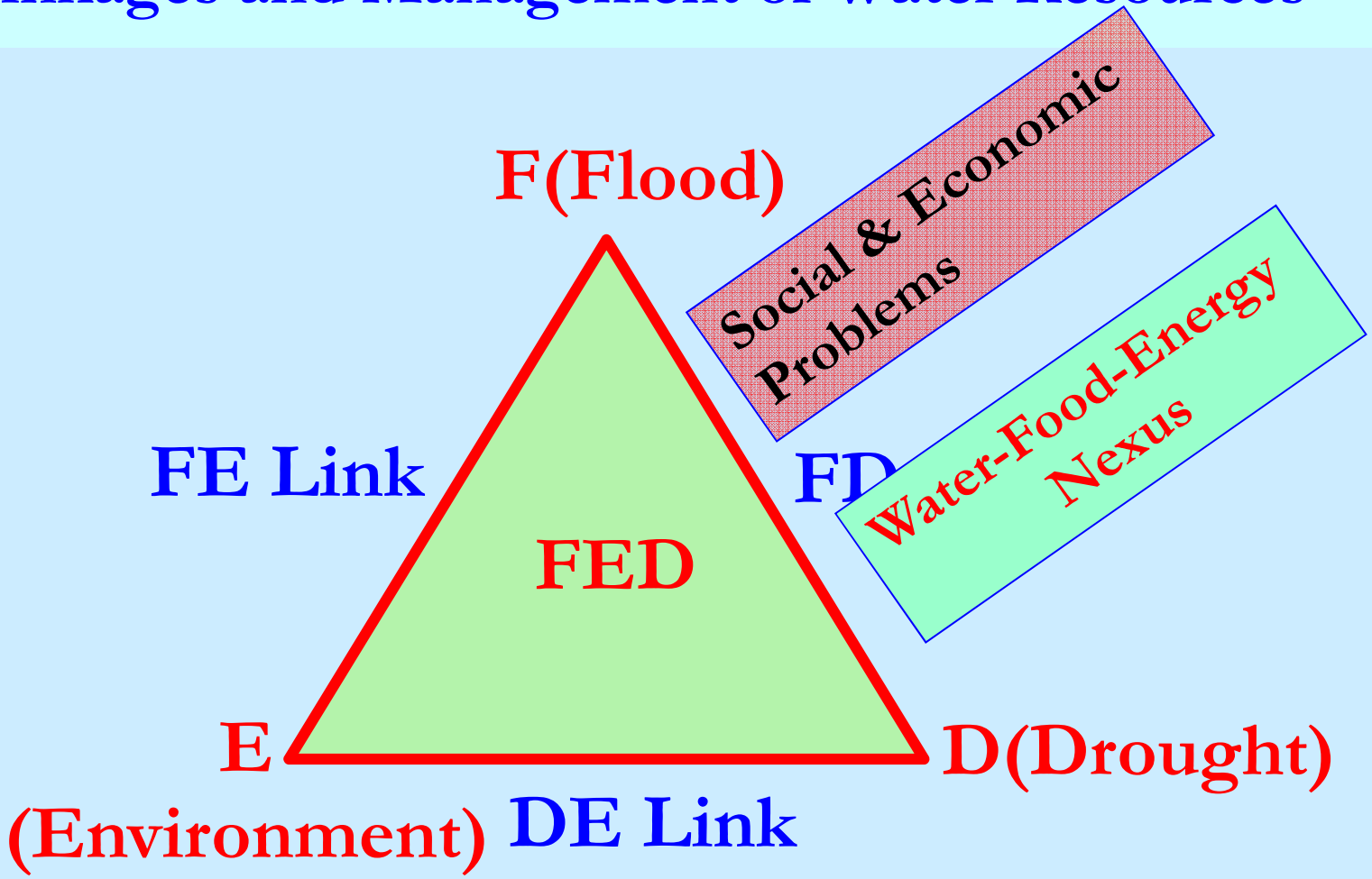
Water Quality

River Basins with critical water degradation

- Thachin
- Bang Pakong
- River mount of Chao Phraya
- Lower Lam Takong
- Songkhla Lake
- Mae Klong

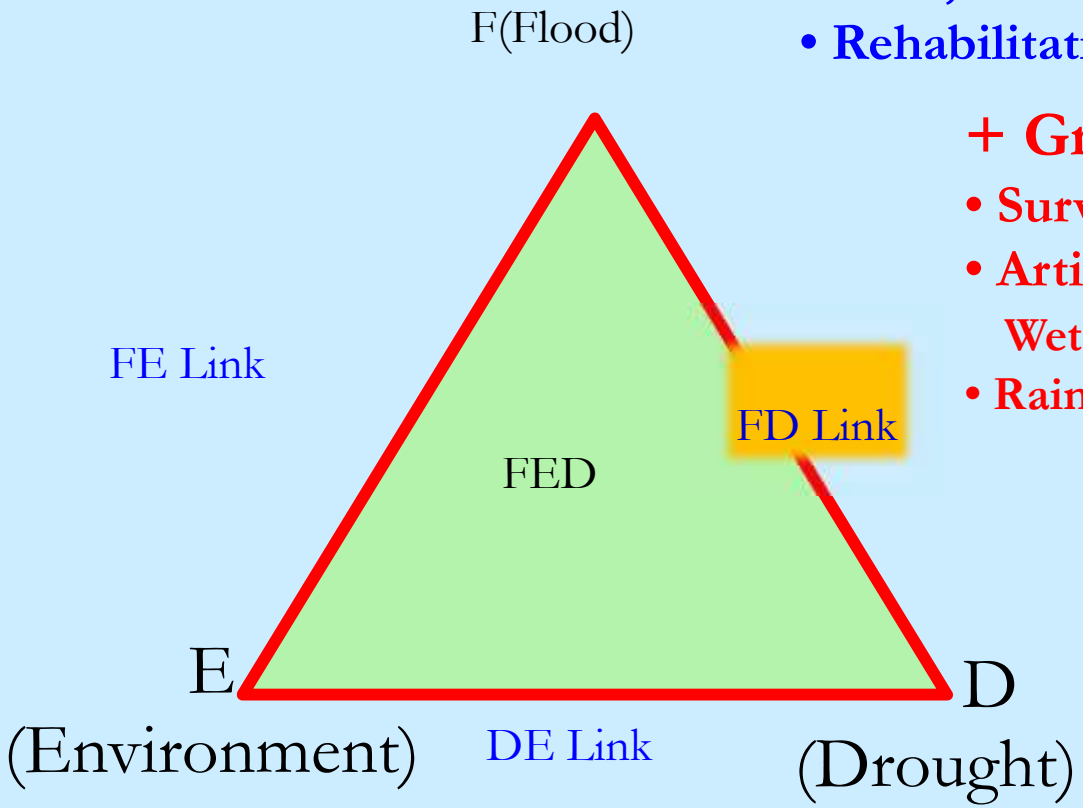
FED Triangle

Linkages and Management of Water Resources



Chaiporn Siripornpibul, 2013

Management of Dual Water Sources



+ Surface Water :

- **Dam, Reservoir, Retention area, etc**
- **Rehabilitation**

+ Groundwater :

- **Survey & Development**
- **Artificial Recharge(AR) in the Wet period**
- **Rain harvesting & AR**

CUP(Conjunctive Water Use Program)

+ Concept of CUP

+ People participation: data, Capacity building,..

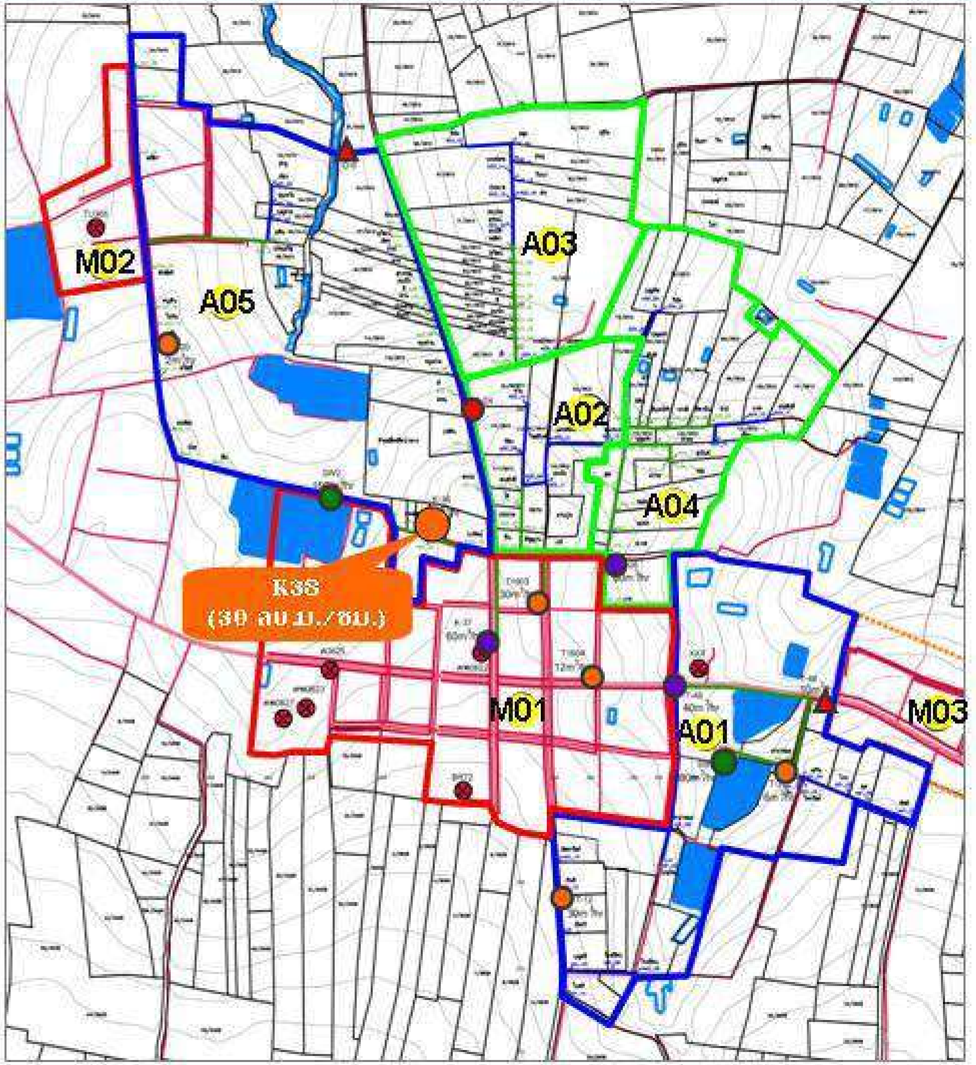
FED Triangle:

Linkages and Management of Water Resources

Chaiporn Siripornpibul, 2013

Conjunctive Use Pilot Project: Buriram province

Groundwater Drilling &Development



ลงท่อกรุและท่อเซาะร่อง

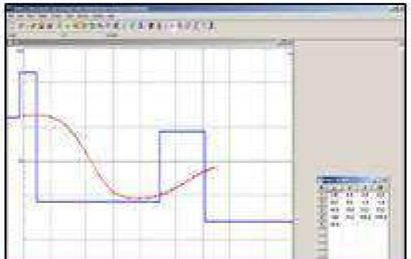
ลงท่อกรุและท่อเซาะร่อง

เป่าล้างบ่อ

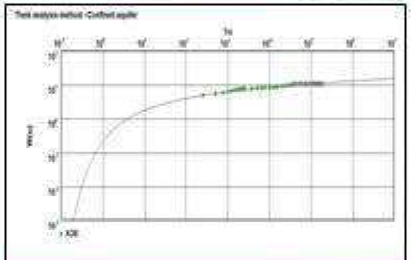
การสูบทดสอบปริมาณน้ำ

บ่อน้ำบาดาลเพื่อการเกษตรได้ติดตั้งเครื่องสูบน้ำ

Q = 30 ลบ.ม./ชม.



กราฟความต้านทานไฟฟ้าจำเพาะเฉพาะจุด



กราฟแสดงผลการสูบทดสอบปริมาณน้ำ

Pilot Project

Ban Sab Somboon,

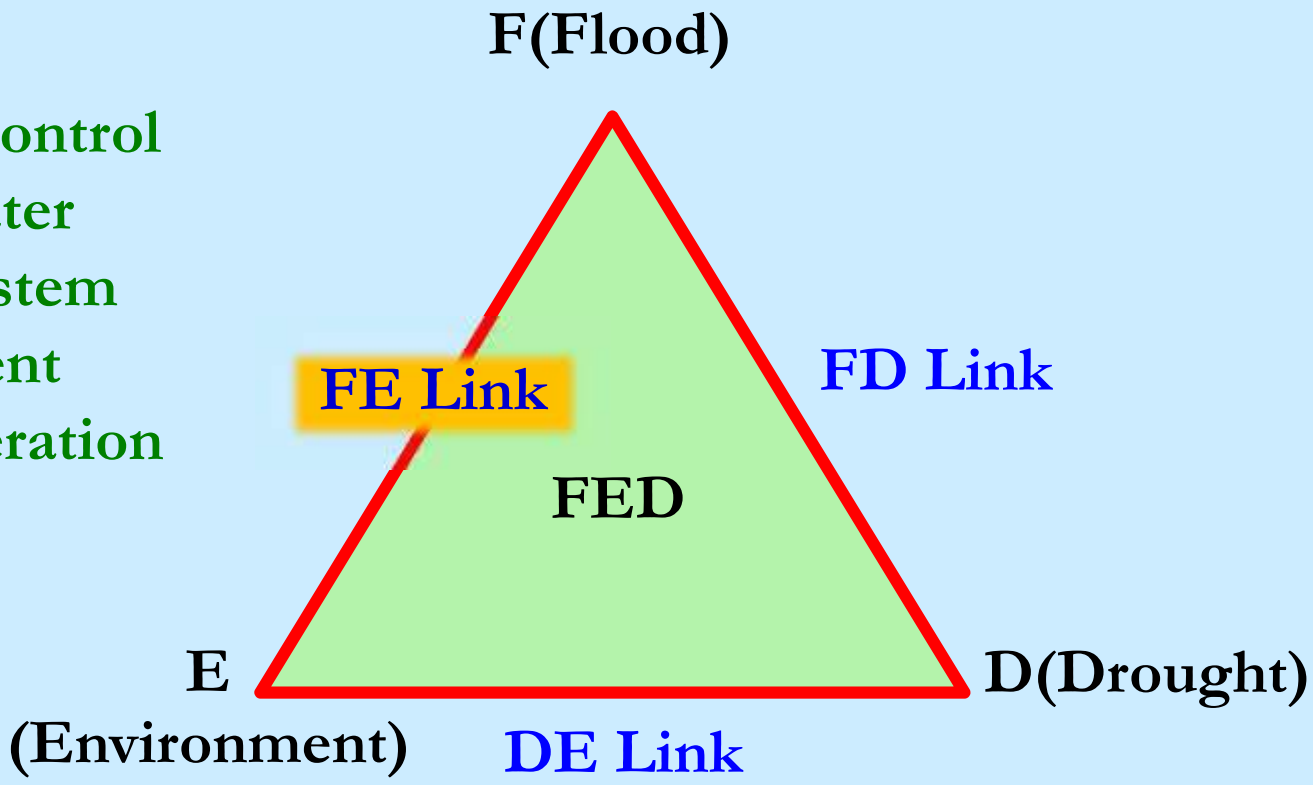
Non Somboon District , Buriram Province

Artesian Well

Mushroom Farm

Groundwater Development for Agriculture, Suphanburi Province

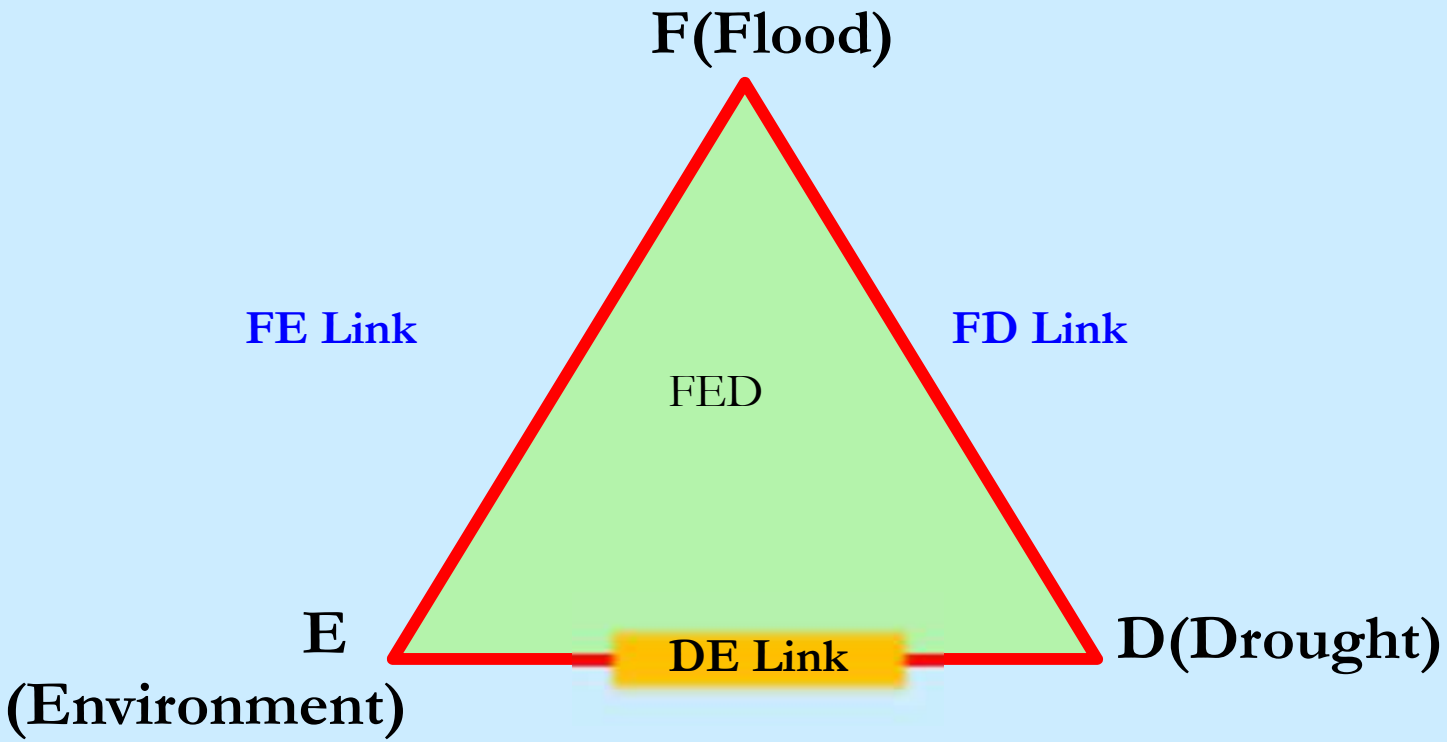
Water Quality Control
- •Polluted water
- • Monitoring system
- • Water Treatment
- • Reservoirs operation
- •,….



FED Triangle:

Linkages and Management of Water Resources

Chaiporn Siripornpibul, 2013



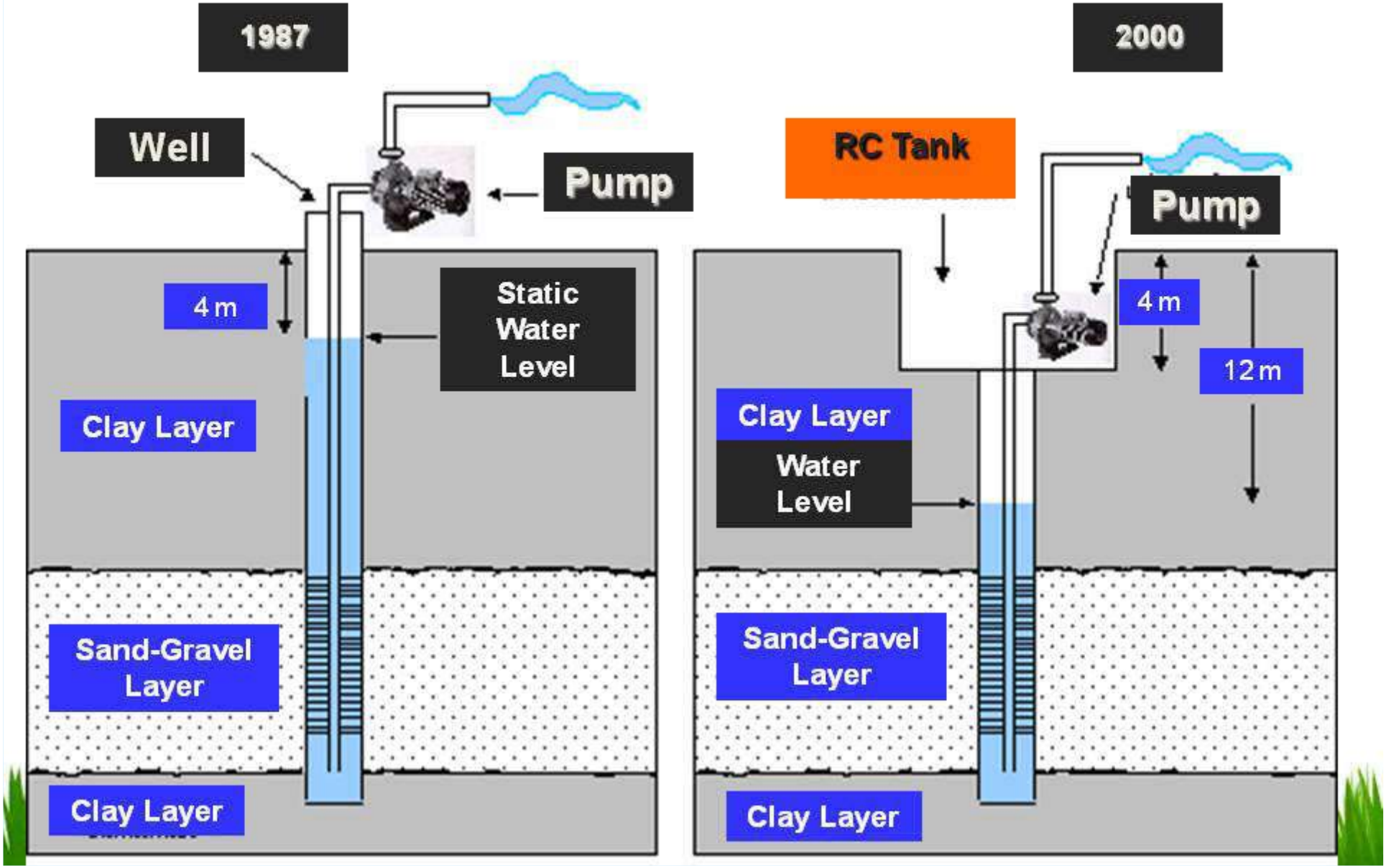
- **Water Quality Monitoring and Treatment**
- **Salinity Control: Regulation of discharge rate from reservoirs**

FED Triangle:

Linkages and Management of Water Resources

Chaiporn Siripornpibul, 2013

Heavily used of Groundwater In Chainat Province


1987
Well
Pump
4 m
Static
Water
Level
Clay Layer
Sand-Gravel
Layer
Clay Layer
2000
RC Tank
Pump
4 m
12 m
Clay Layer
Water
Level
Sand-Gravel
Layer
Clay Layer

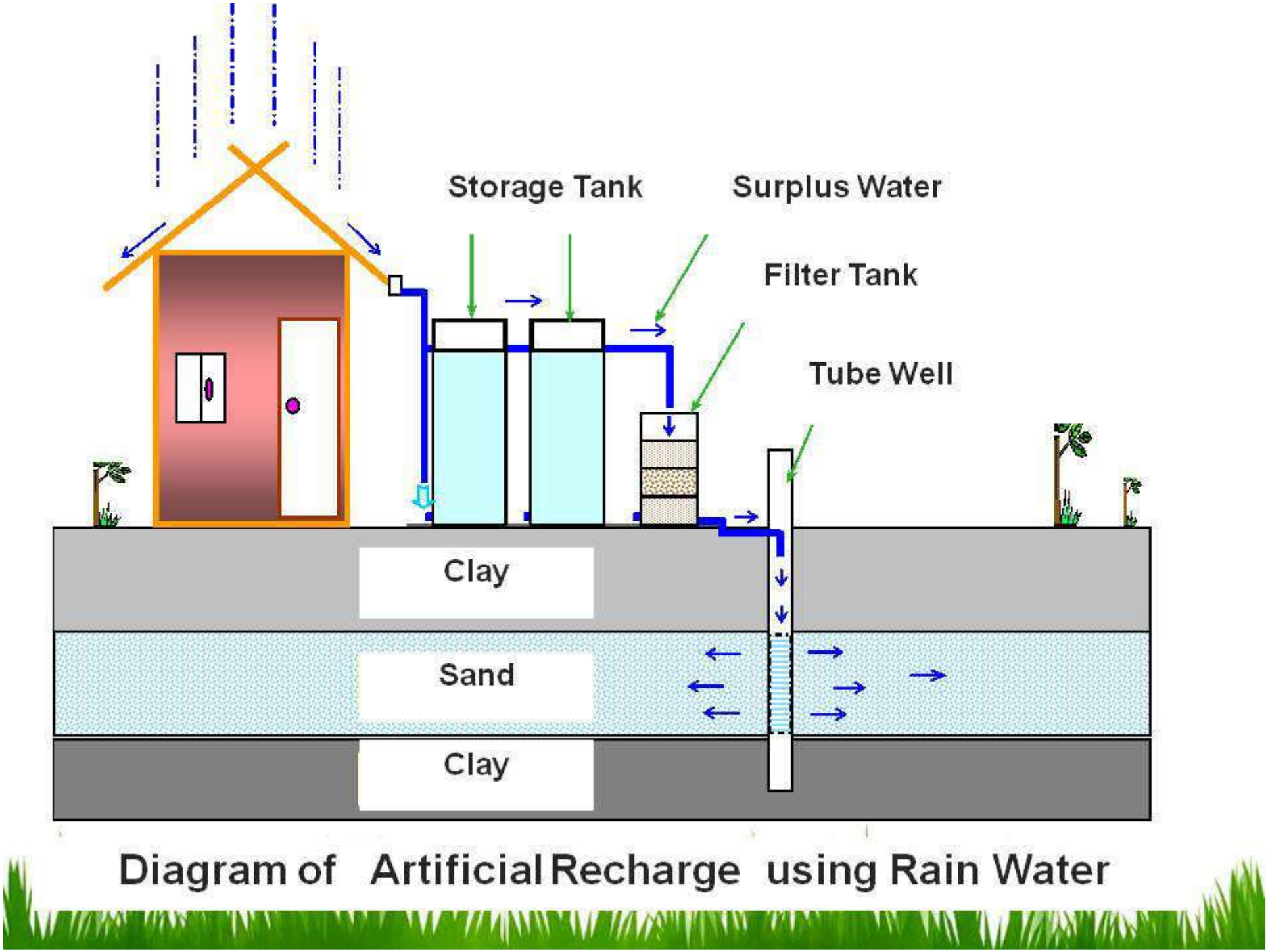
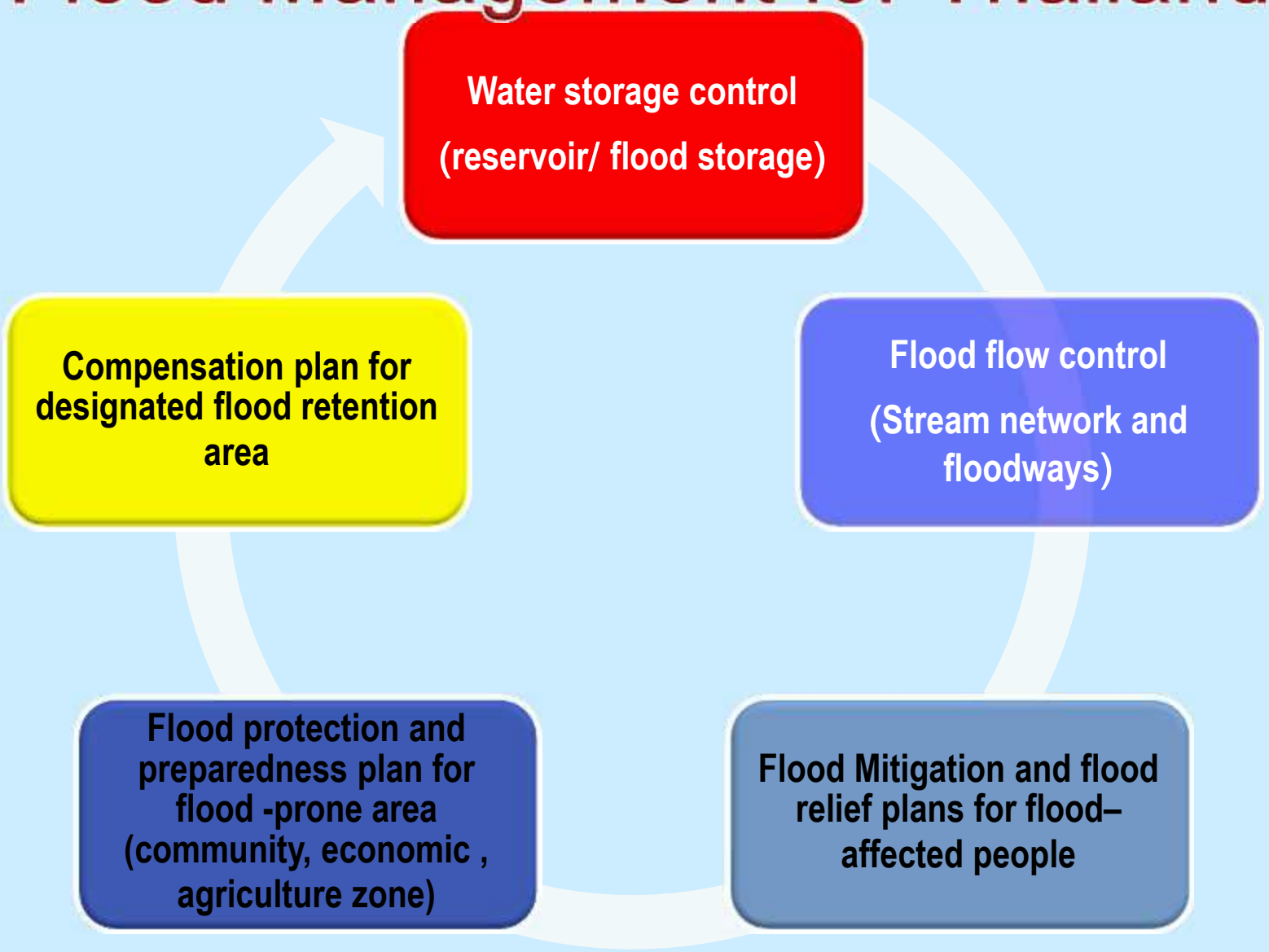


Diagram of Artificial Recharge using Rain Water

Conclusion : Basic Concepts of Flood Management for Thailand




Thank You
13maysa
www.13maysa.com / Facebook : 13maysa Fanpage