NARBO Thematic Workshop
On Water Related Disaster and
Its Management in Asian Countries
26-29 Yogyakarta 2007

Flood and Drought Management in Thailand

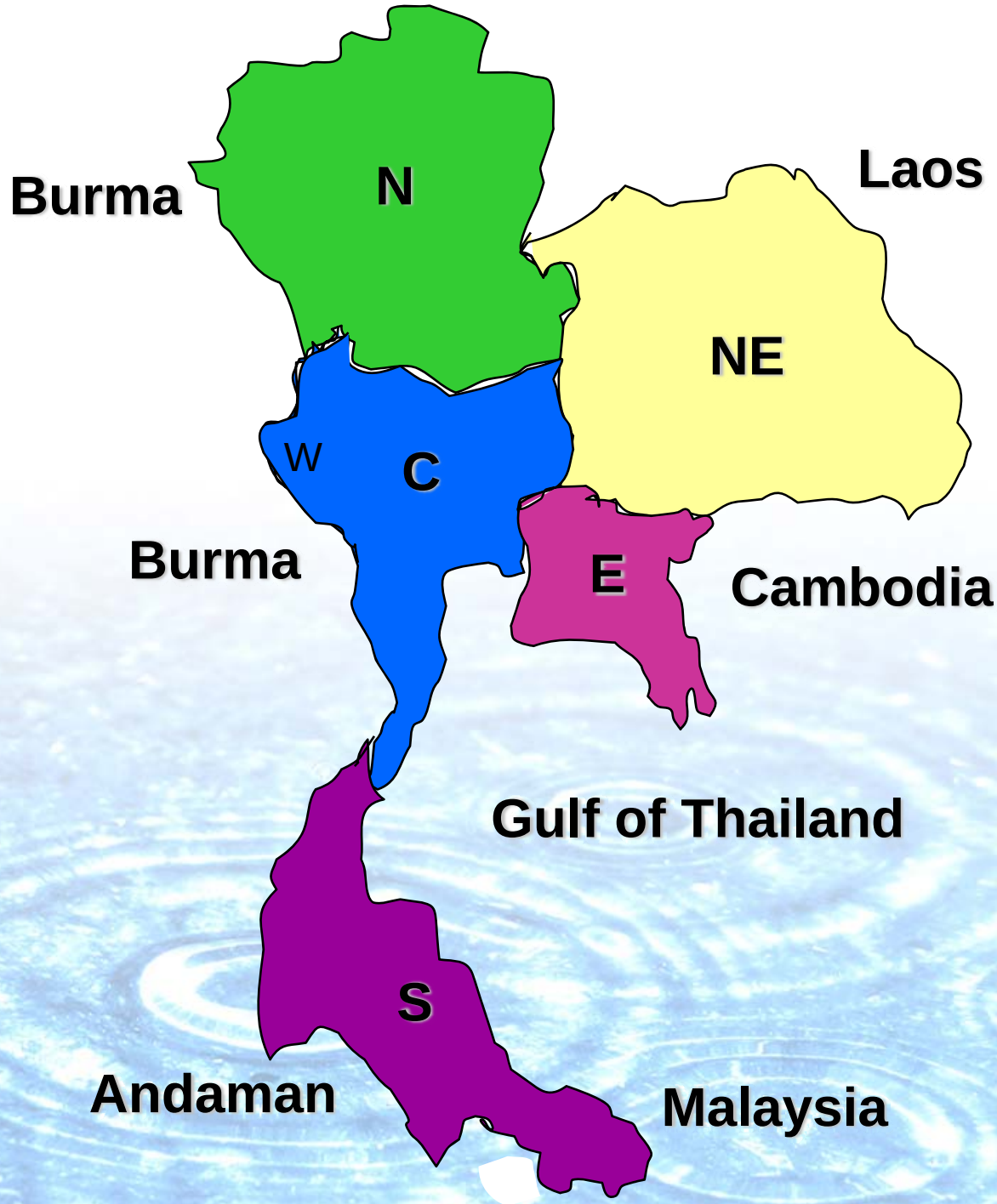
Department of Water Resources
Ministry of Natural Resources and Environment, Thailand

General Information about Thailand

- bordered on the north by Lao PDR
- on the east by the Laos PDR and Cambodia
- on the south by the Gulf of Thailand and Malaysia
- on the west by Union of Myanmar and the Andaman Sea

Fact about Thailand

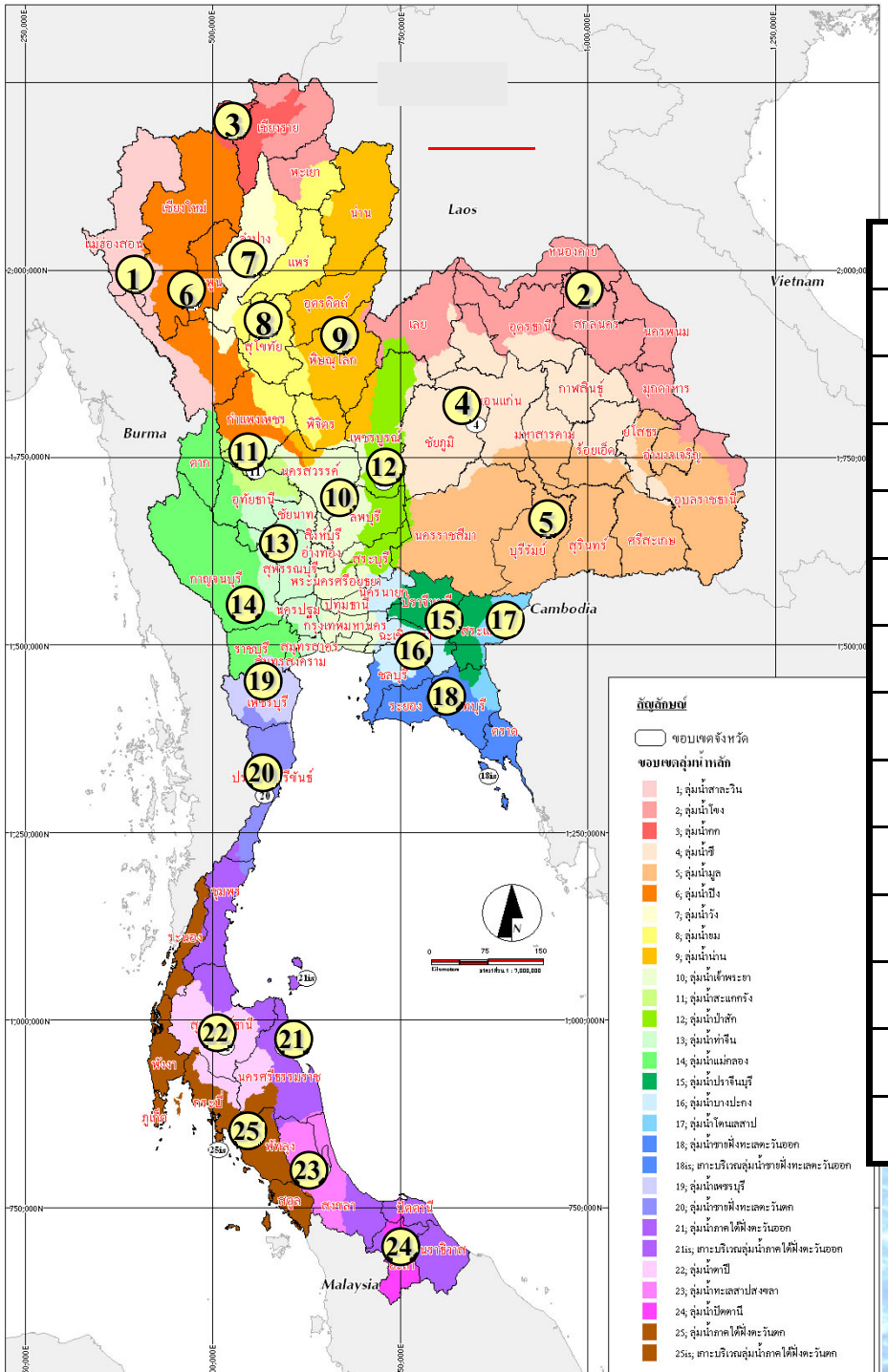
- The total area 512,000 km2.
- population 63 million
- 11 million people living high concentration in the capital (Bangkok)
- total agricultural area 265,200 km2. (52%)
- more than 60 percent of the population are in agricultural.



Total area
512,000 km²

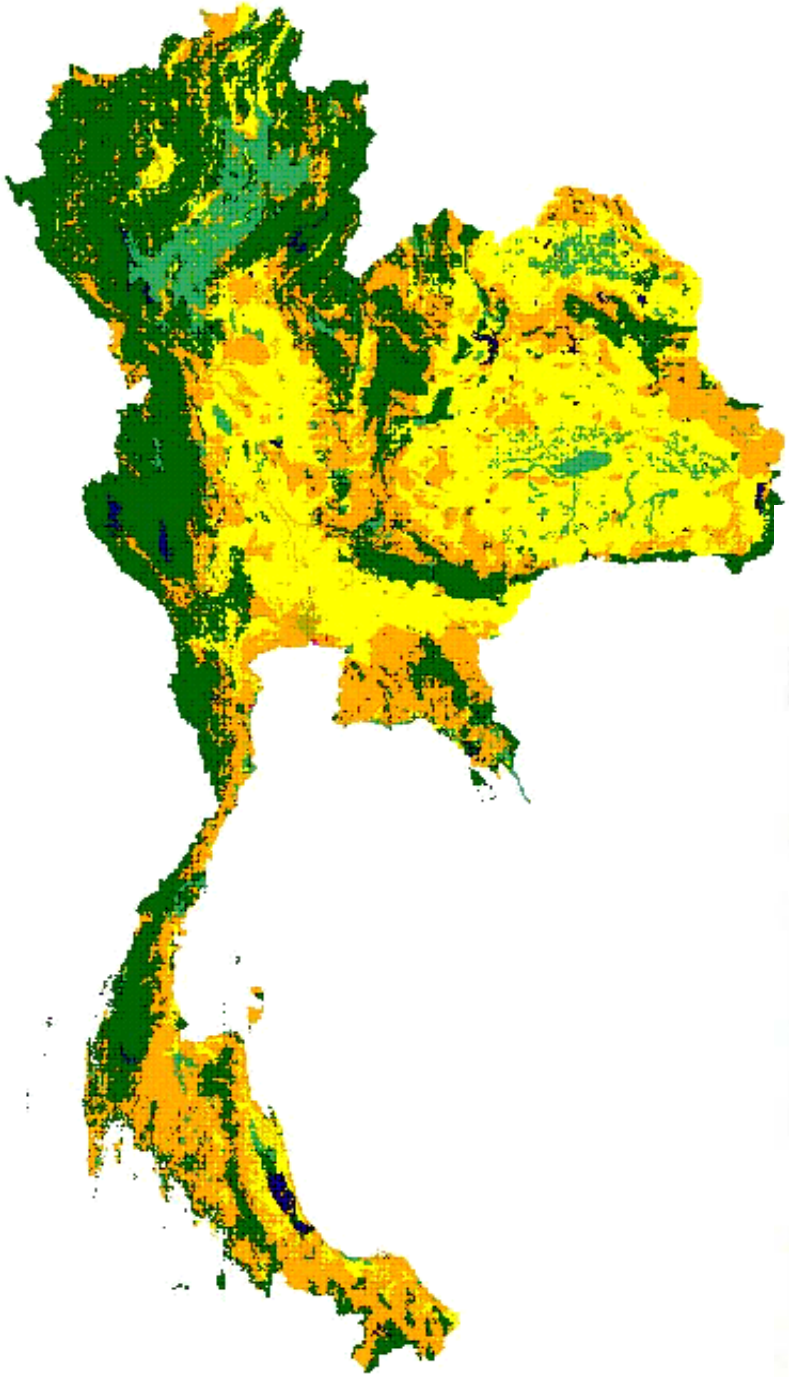
Mainstream of each main basin

Total length of mainstream 87,200 km.



25 Main Basins	
1.Salawin	14.Mae Klong
2.Mae Khong	15.Prachin
3.Kok	16.Bangpakong
4.Chi	17.Tonle Sap
5.Mun	18.East Coast
6.Ping	19.Phetchaburi
7.Wang	20.West Coast
8.Yom	21.South East Coast
9.Nan	22.Ta Pi
10.Chaopraya	23.Songkhla Lake
11.Sakaekrang	24.Pattani
12.Pasak	25.South West COast
13.Thachin	

Land Use in Thailand



Rice Area

Others

Cultivated Area

Forest Area

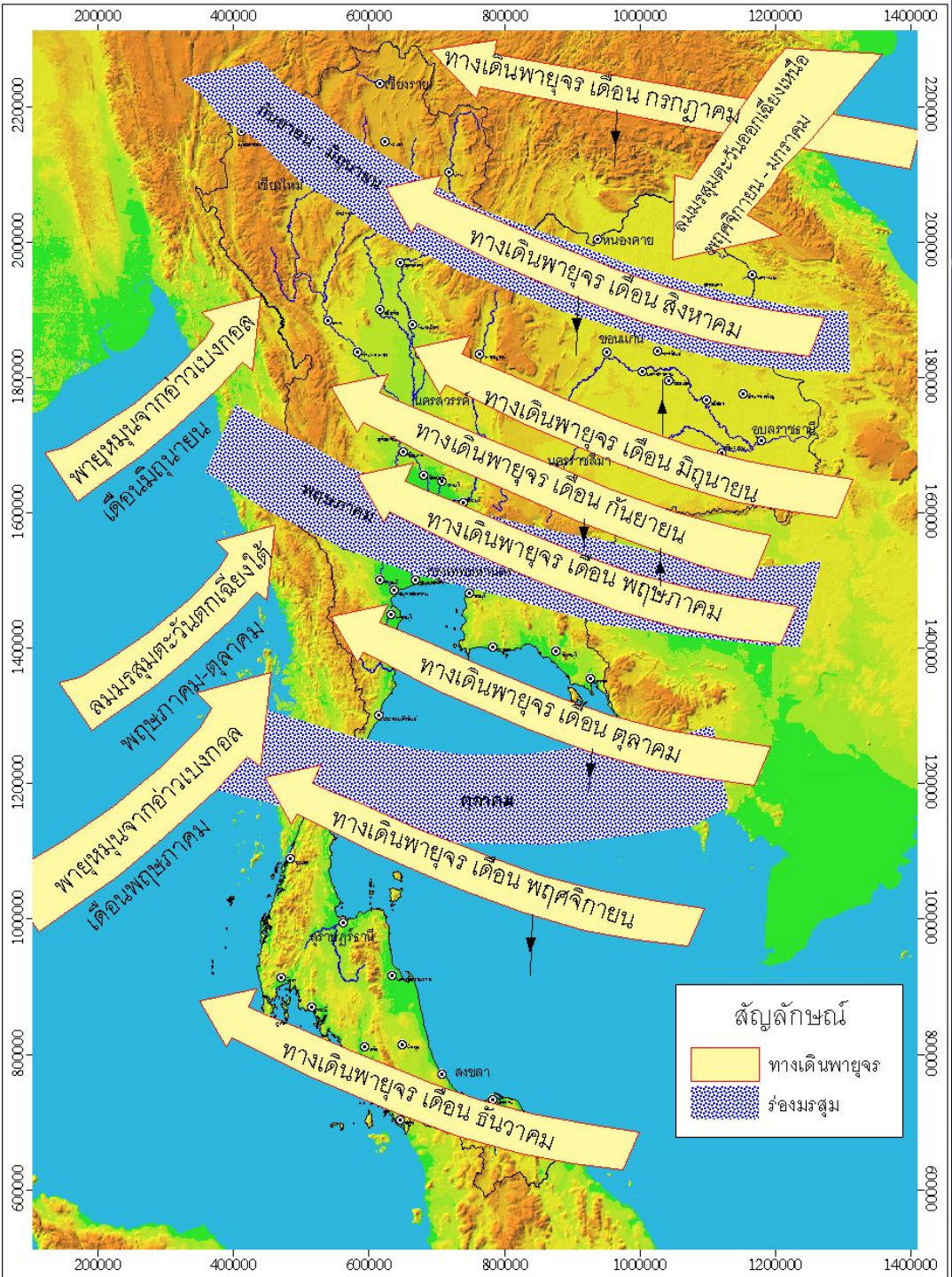
Tourist Attraction & Golf

Industry

Wet Land

Urban/Village

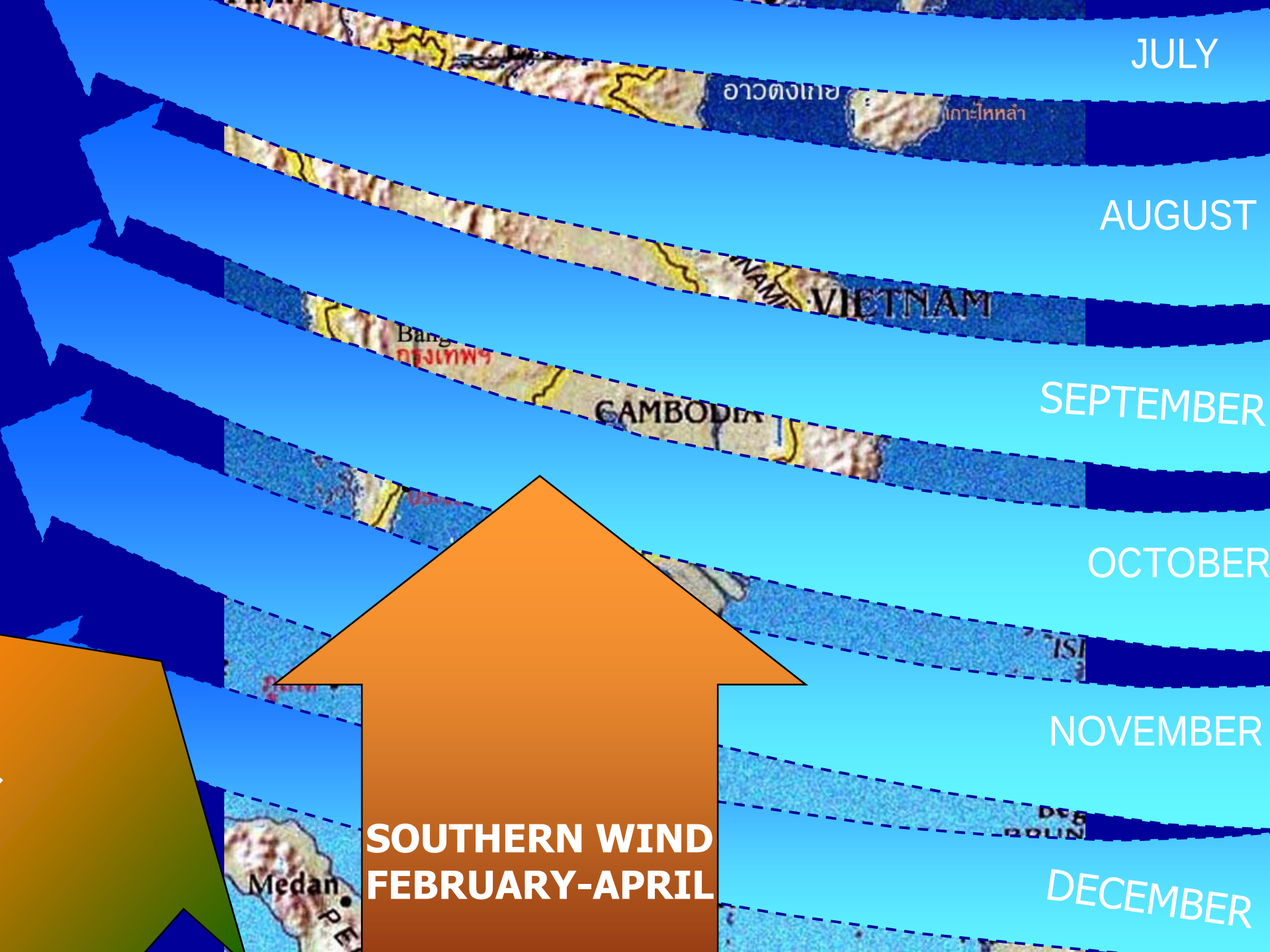
Water Sources

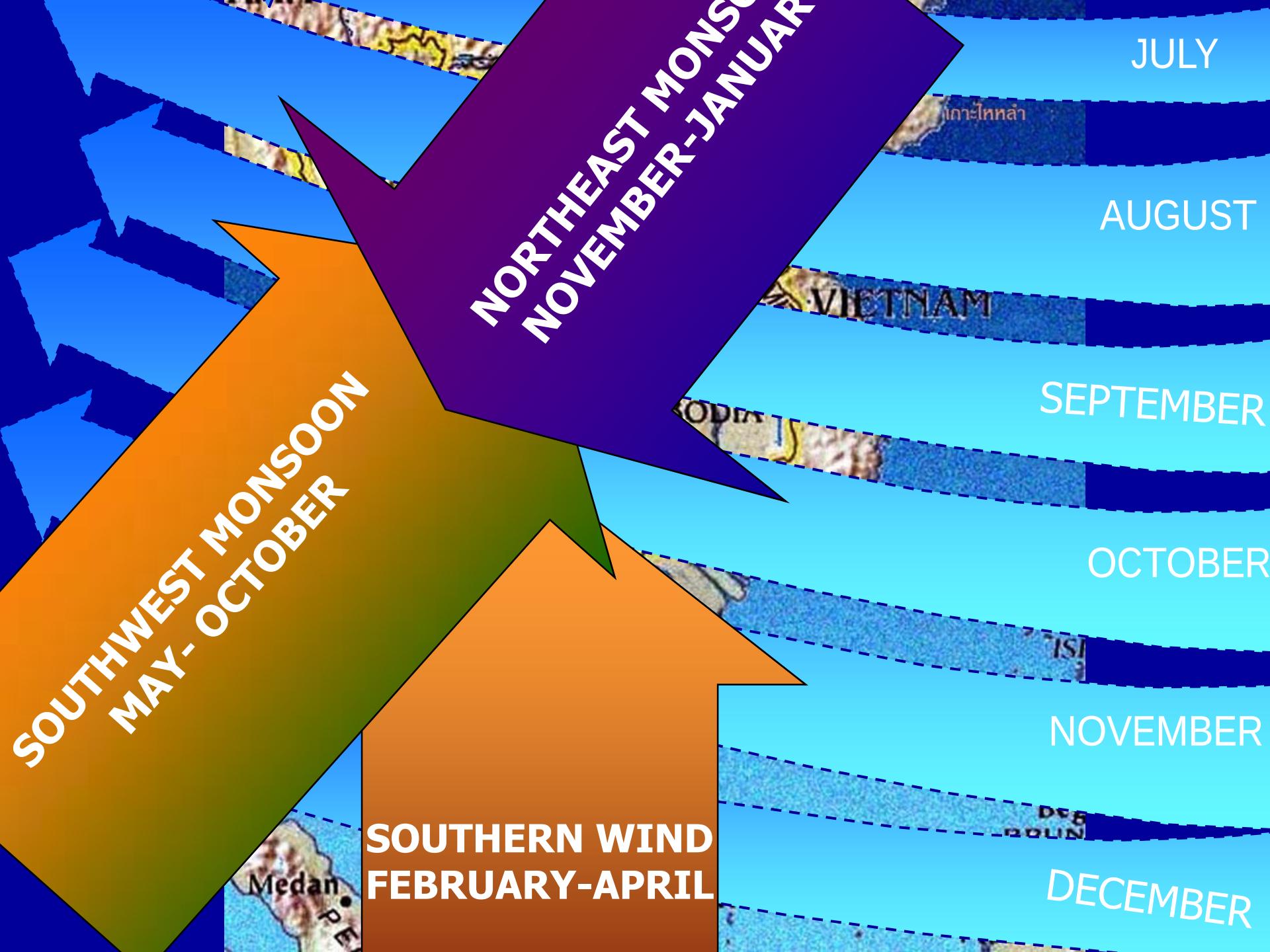


Wind Direction and Monsoon Trough Lay across Thailand

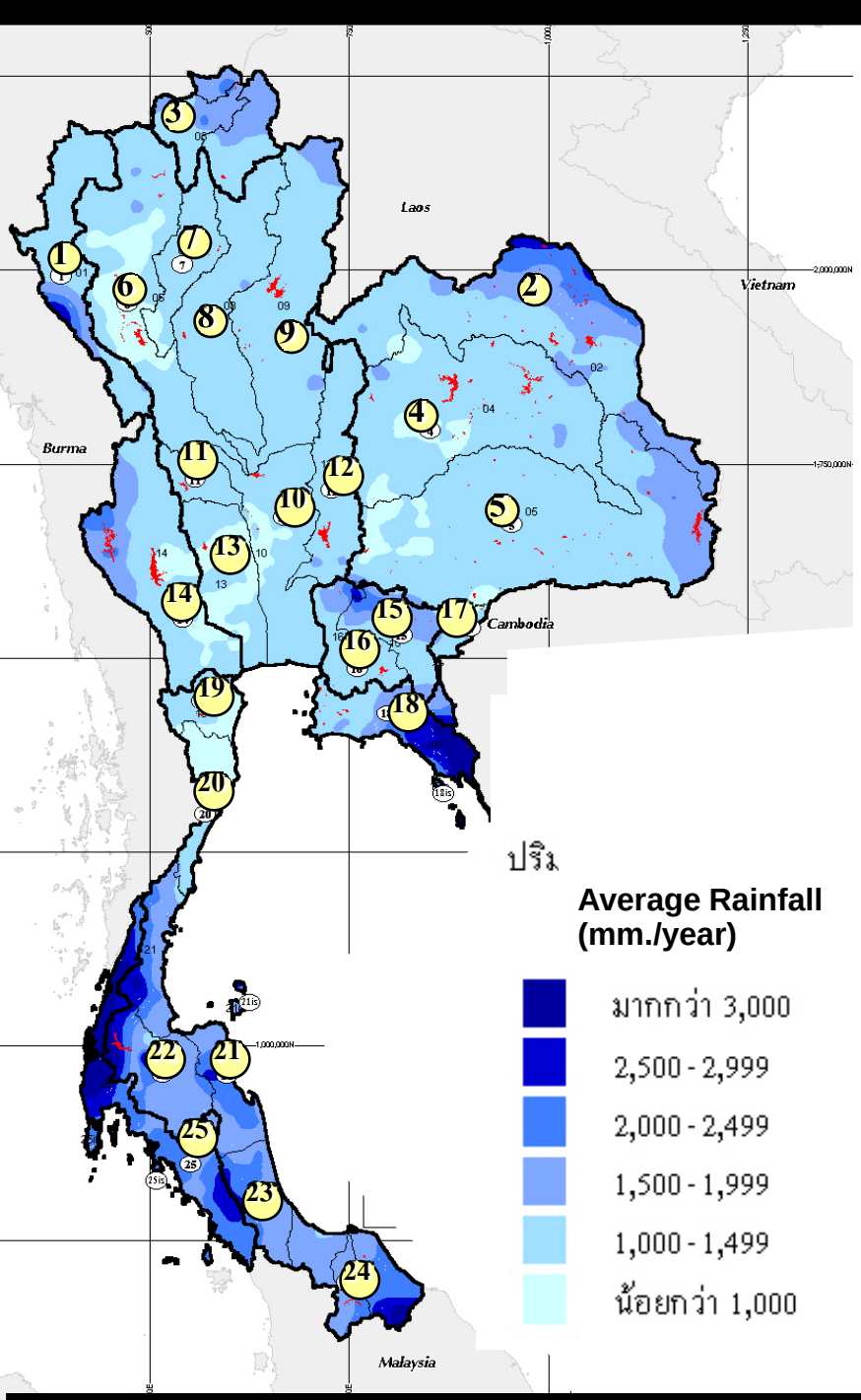
season

winter	November - February
summer	March - mid May
rainy	mid May - October


JULY
AUGUST
VIETNAM
SEPTEMBER
CAMBODIA
OCTOBER
NOVEMBER
DECEMBER
SOUTHERN WIND
FEBRUARY-APRIL
Medan


NORTHEAST MONSOON
NOVEMBER-JANUAR
SOUTHWEST MONSOON
MAY- OCTOBER
SOUTHERN WIND
FEBRUARY-APRIL
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
VIETNAM
Medan

Annual Rainfall Average 1,426 mm./year



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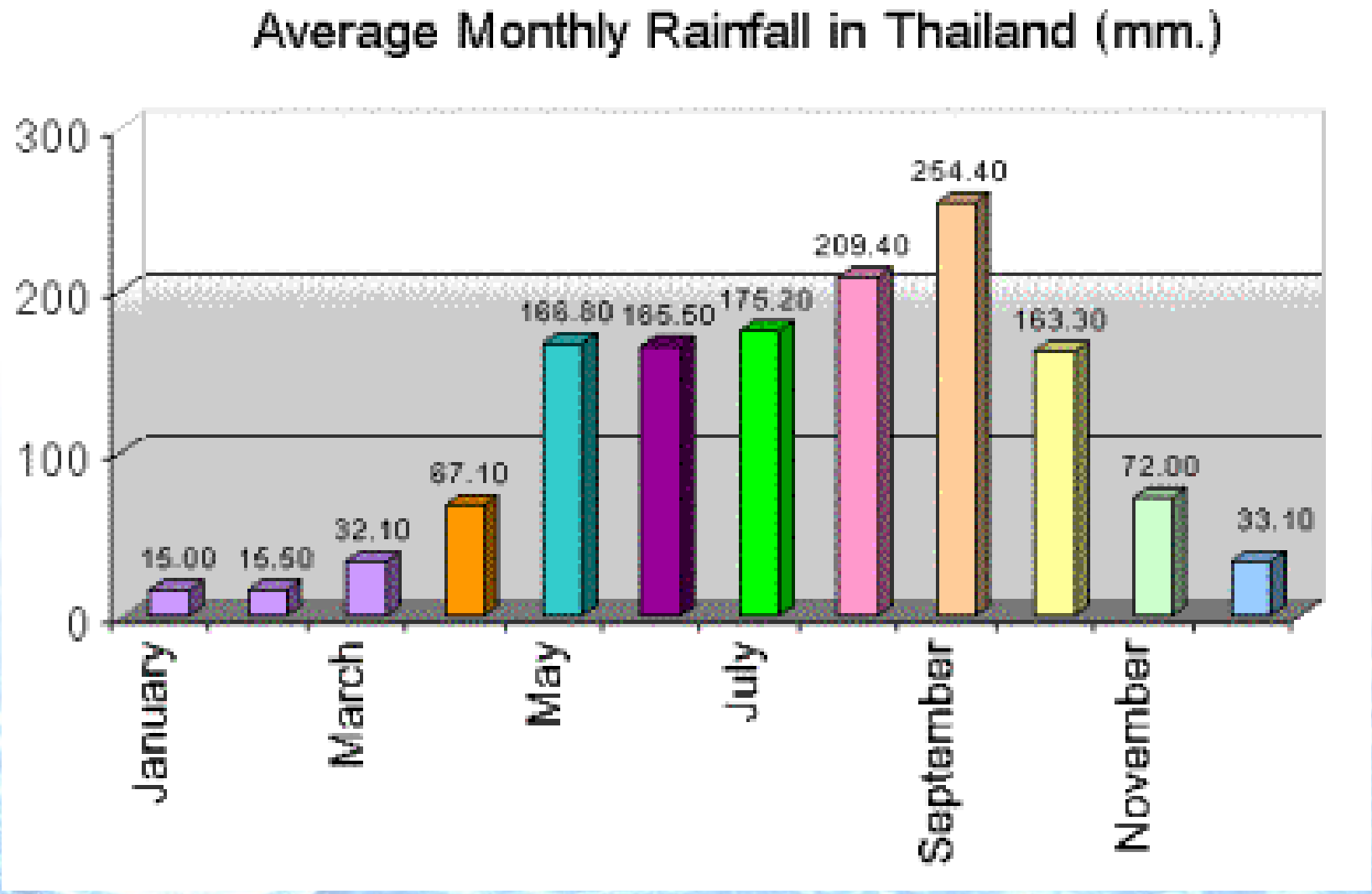
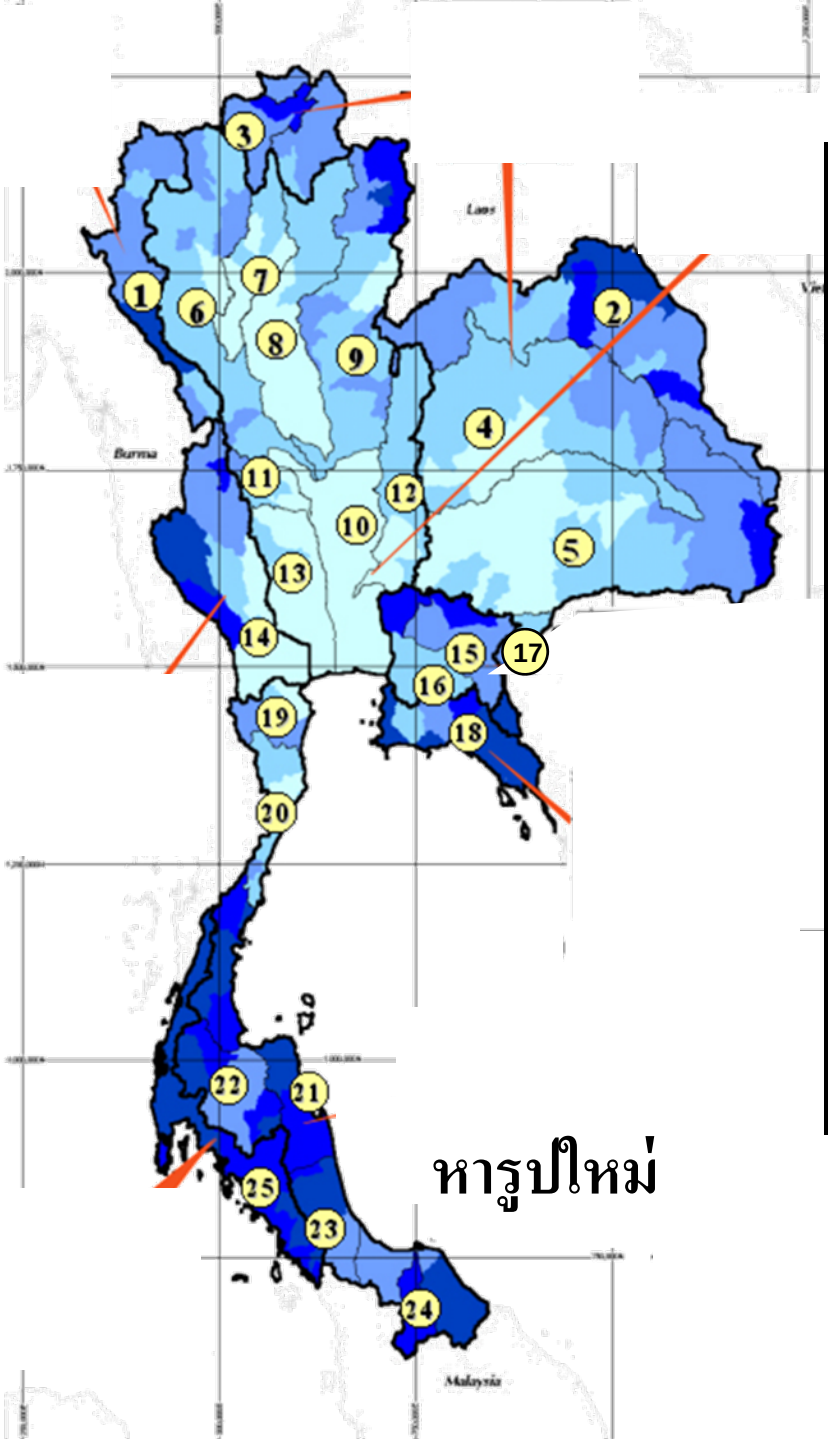


Average annual rainfall 1,426 mm./yr

Runoff Yield Distribution in the Basins



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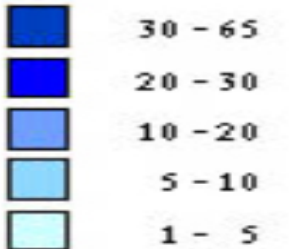
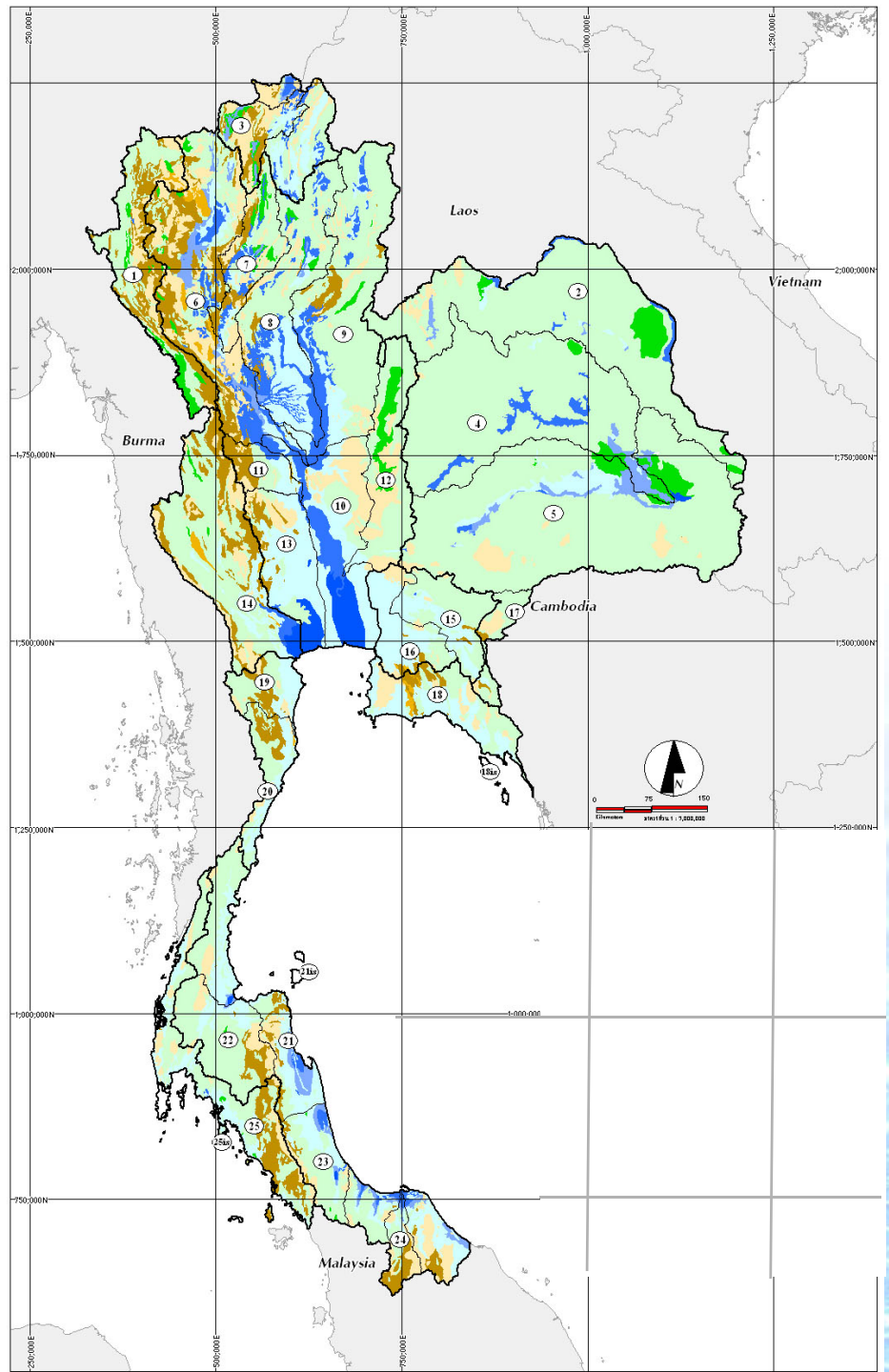


Lit/sq. km

Yield of Groundwater



Ground Water In Porous Rock

- 1-30 m^3 /hr
- 30-50 m^3 /hr
- 50-200 m^3 /hr

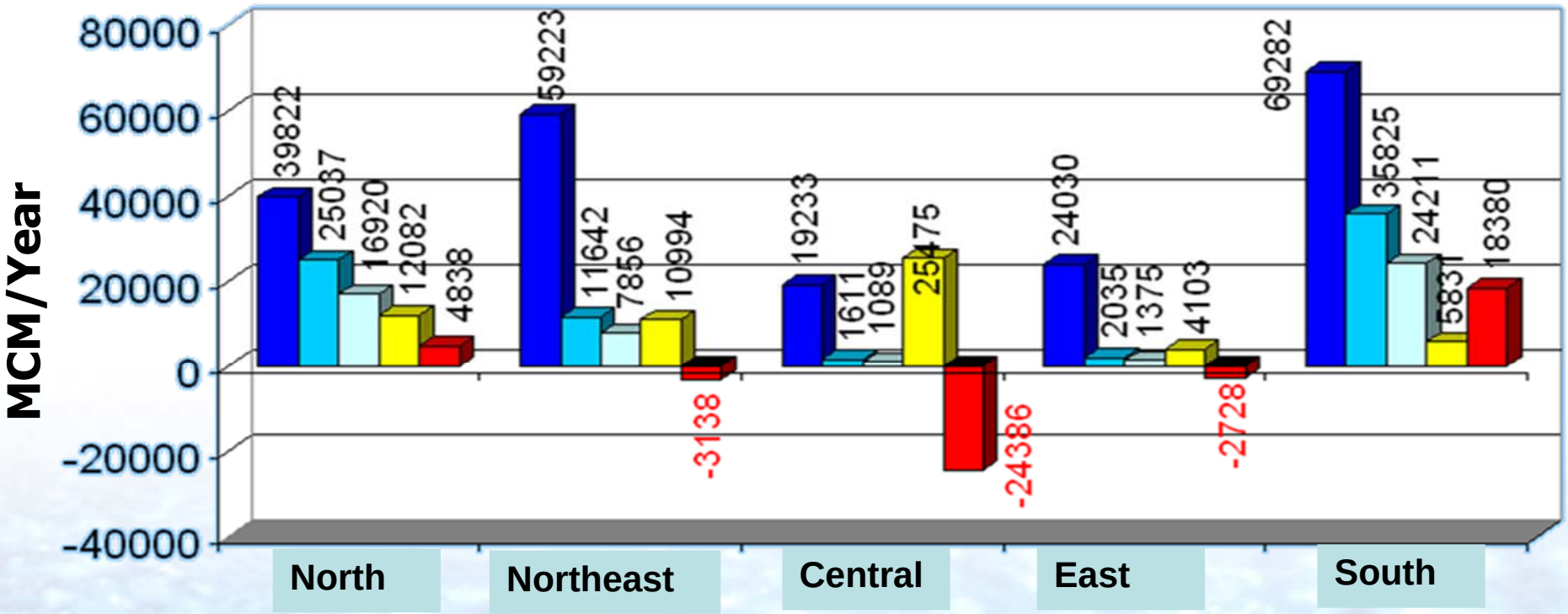
Ground Water In Jointed Massive Rocks

- 1-20 m^3 /hr
- 20-50 m^3 /hr

Regions Generally With Or Without Ground Water:

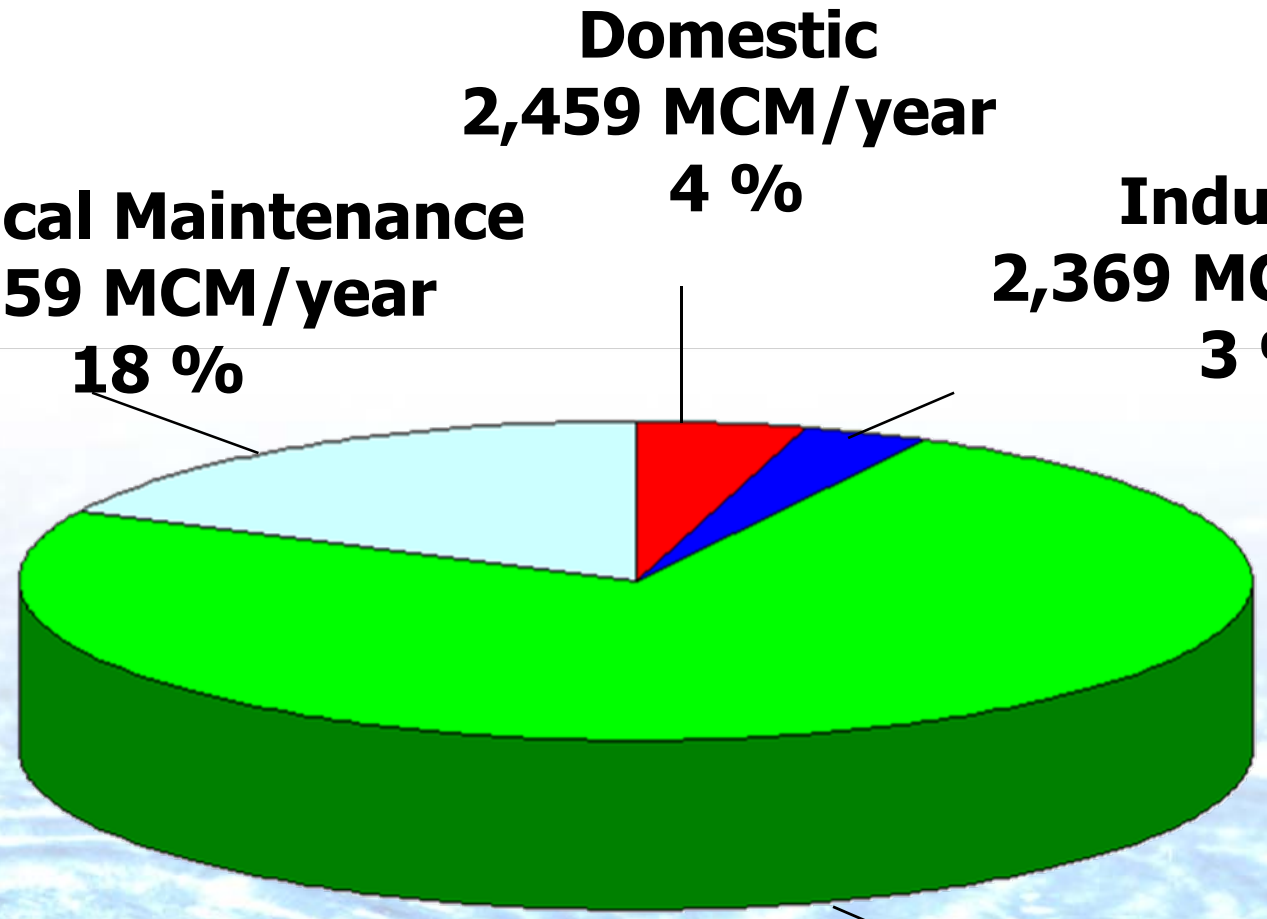
- 5 m^3 /hr
- 7 m^3 /hr
- 20 m^3 /hr

Present Water Situation in Thailand



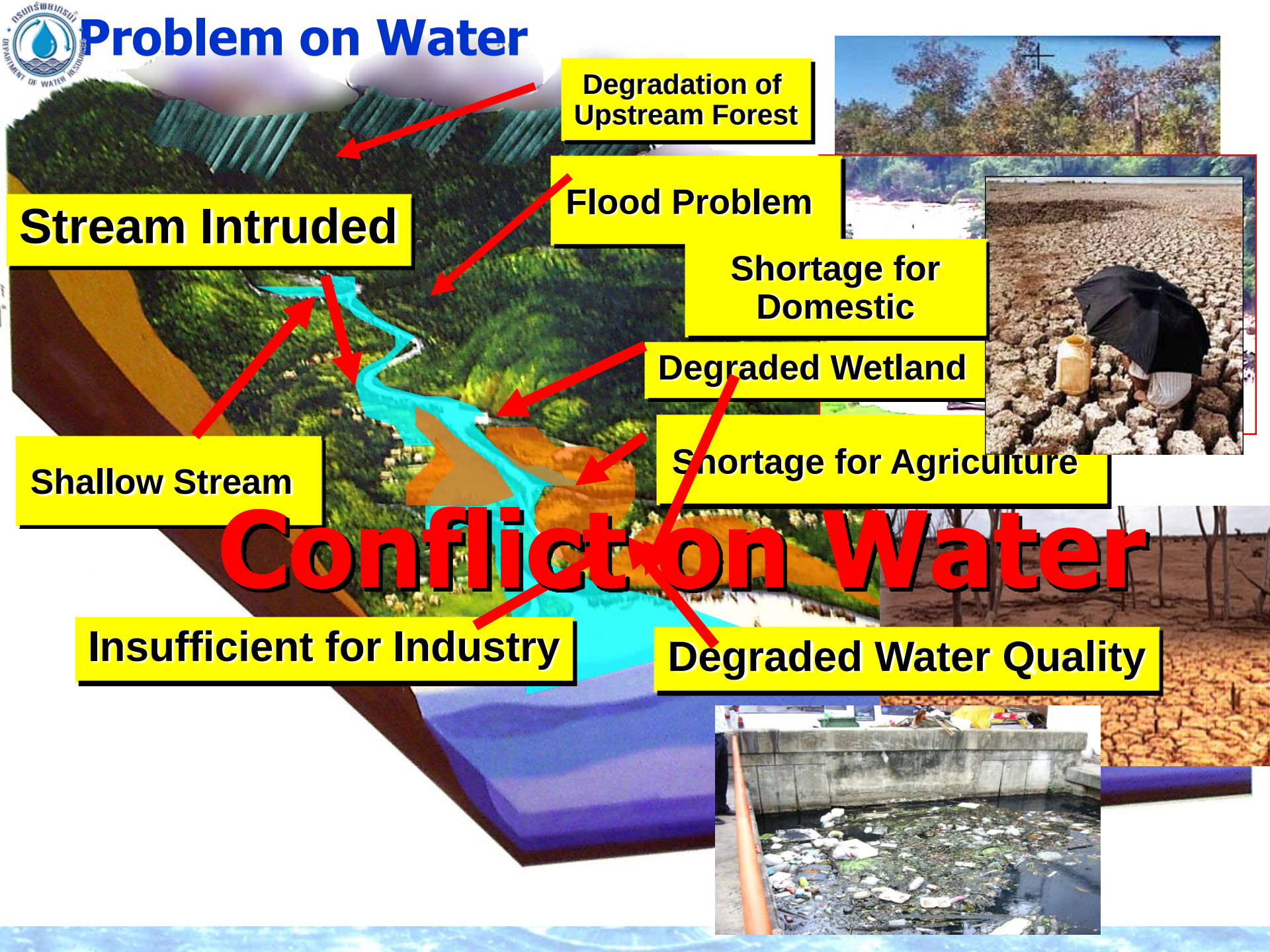
- Surface runoff 213,303 MCM/year
- Maximum Storage in medium to large dam scale 76,132 MCM/year
- Normal Storage operate to use in all sector 45,434 MCM/year
- Water demand 57,890 MCM/year
- Shortage 12,456 MCM / year

Present Water Demand

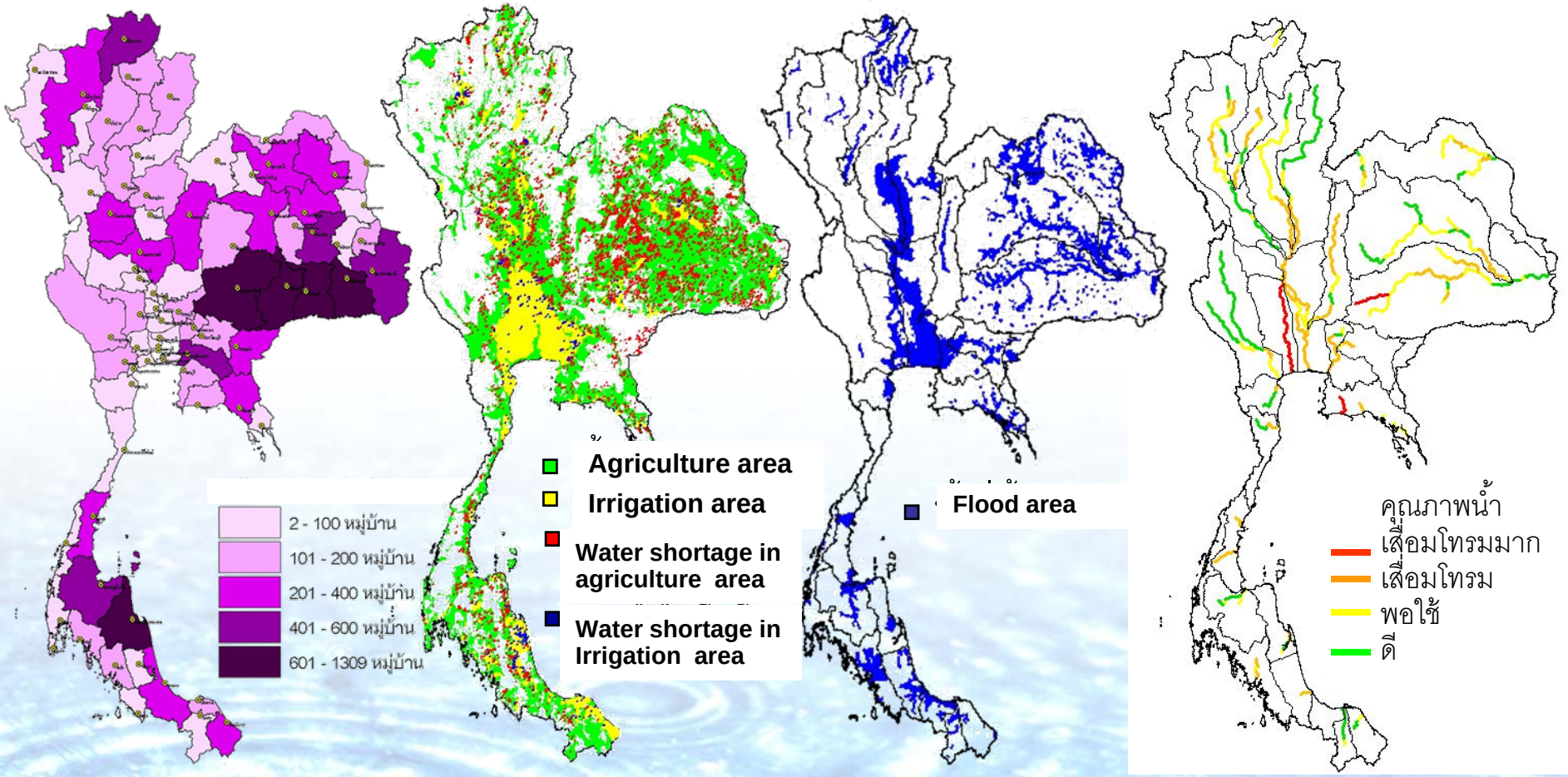



Problems on
Water

Problem on Water



WATER PROBLEM SITUATION IN THAILAND



DOMESTIC WATER SHOTAGE
7,479 VILLAGE
ต้องซ่อมระบบประปา 20,000 หมู่บ้าน

AGRICULTURAL WATER SHORTAGE
12,900 VILLAGES
IRRIGATED AREA
1,100 VILLAGES

FLOOD
RURAL 27 M.RAI (43,200 sq.km)
URBAN 3 M.RAI (4,800 sq.km)

WATER QUALITY DEGRADATION
4 RIVERBASINS

Water Resources Related Ministries

1. Ministry of Natural Resources and Environment
2. Ministry of Agriculture and Cooperatives
3. Ministry of Interior
4. Ministry of Transportation
5. Ministry of Information Technology and Communication
6. Ministry of Defense
7. Ministry of Energy
8. Ministry of Industry
9. State Enterprises

Flood Disaster

- **Categories in 2 type**

1. Flashflood/Land slide

2. Low lying flood/inundation

Flash flood-Land Slide Events

Oct. 2002
อ.แม่สะเรียง แม่ฮ่องสอน

May 2004
อ.สบเมย แม่ฮ่องสอน

Sep. 2004
อ.เมืองแม่ฮ่องสอน

Sep. 2004
อ.แม่สะเรียง แม่ฮ่องสอน

Sep. 2005
อ.ปางมะผ้า แม่ฮ่องสอน

May 2004
อ.แม่ระมาด อ,แม่ตื่น ตาก

May 2001
อ.วังชิ้น แพร่

Sep 2004
อ.ลอง แพร่

May 2006 แพร่

พย. 13
อ.ทับสะแก
ประจวบคีรีขันธ์

Oct 2004
อ.เมือง กระบี่

Oct 2001
อ.กะทู้ จ.ภูเก็ต

Dec 25
อ.ศรีบรรพต พัทลุง

May 2004
อ.อมก๋อย เชียงใหม่

May, Sep. 2004
อ.แม่แจ่ม เชียงใหม่

Jul,Sep. 2004
อ.แม่อาย เชียงใหม่

Sep 2004
อ.ฝาง เชียงใหม่

Sep 2002
อ.แม่แจ่ม เชียงหม่

May 2006
อ.ลับแล, อุตรดิถย์

May 2006 สุโขทัย

Aug 2000
อ.หล่มสัก, อ.เมือง เพชรบูรณ์

Aug 2001
อ.หล่มสัก เพชรธูรณ์

Aug 1999 ,2001
อ.เขาคิชกูฏ จันทร์บุรี

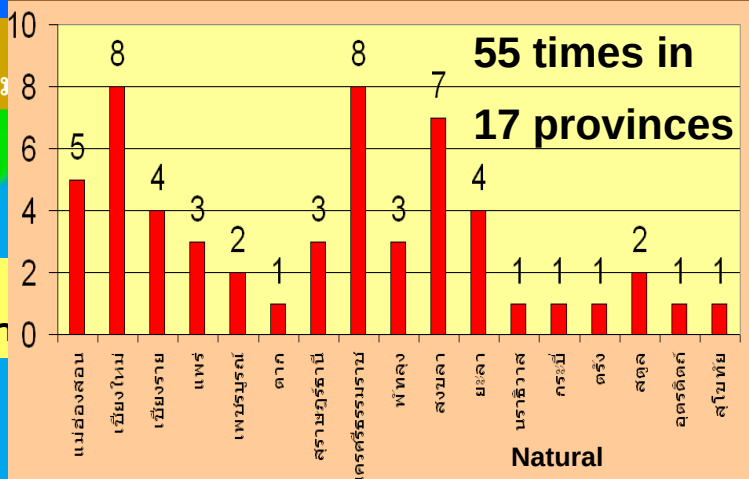
มค 18
อ.ร่อนพิบูลย์ นครศรีธรรมราช

พย. 31
อ.พิปูน อ.ลานสกา นครศรีธรรม

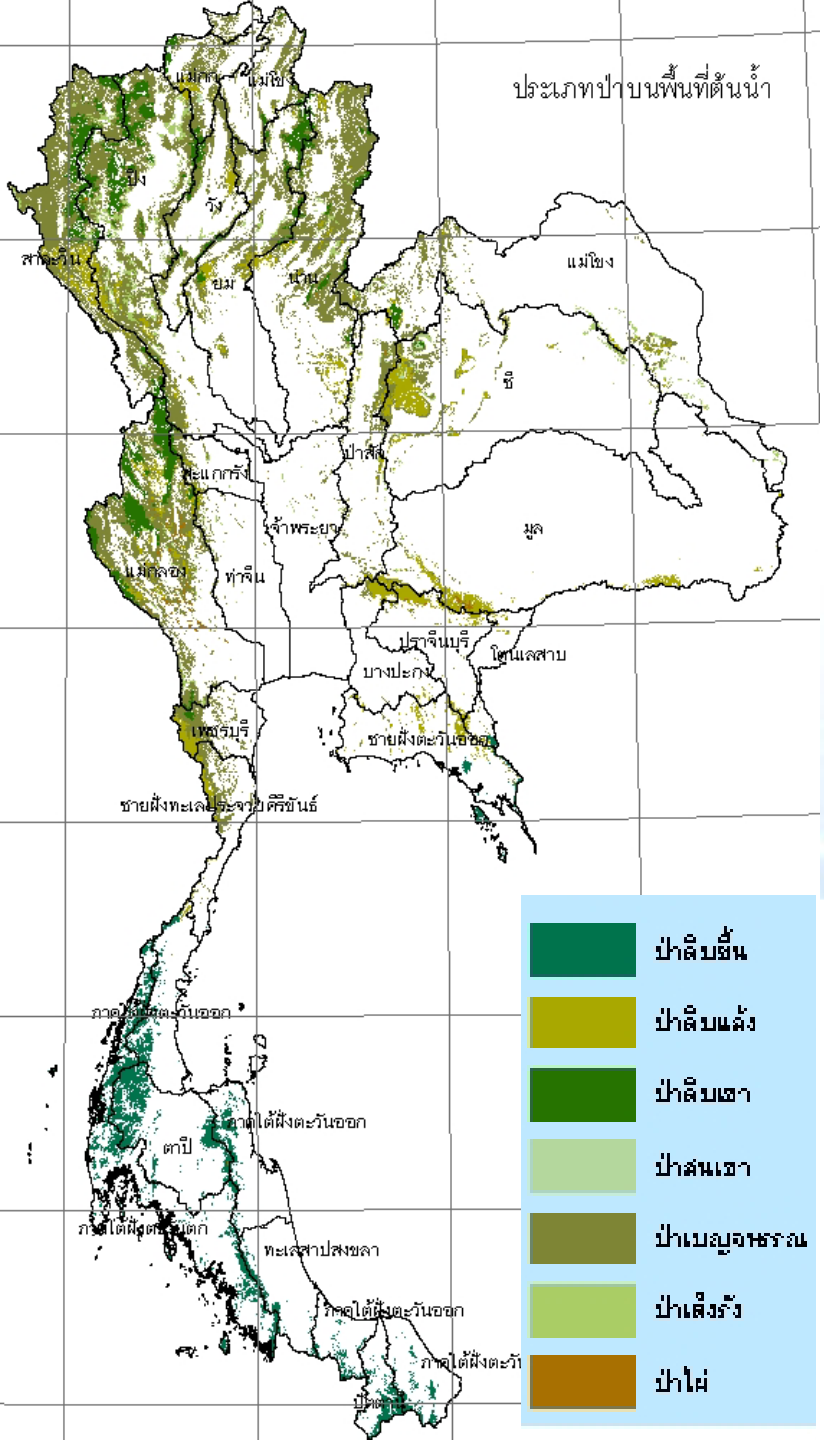
May 2004
อ.ธารโต จ.ยะลา

Dec 2005
อ.บันนังสตาร์ ยะลา

No. of Land Slide



Degradation of Upstream Forest



Type of Upstream Forest	Current Situation (sq.km)	**Degraded Forest& used for other Benefit (sq.km.)**
Rehab. U/S Forest	**167,792**	**22,768** **14%**

Man made

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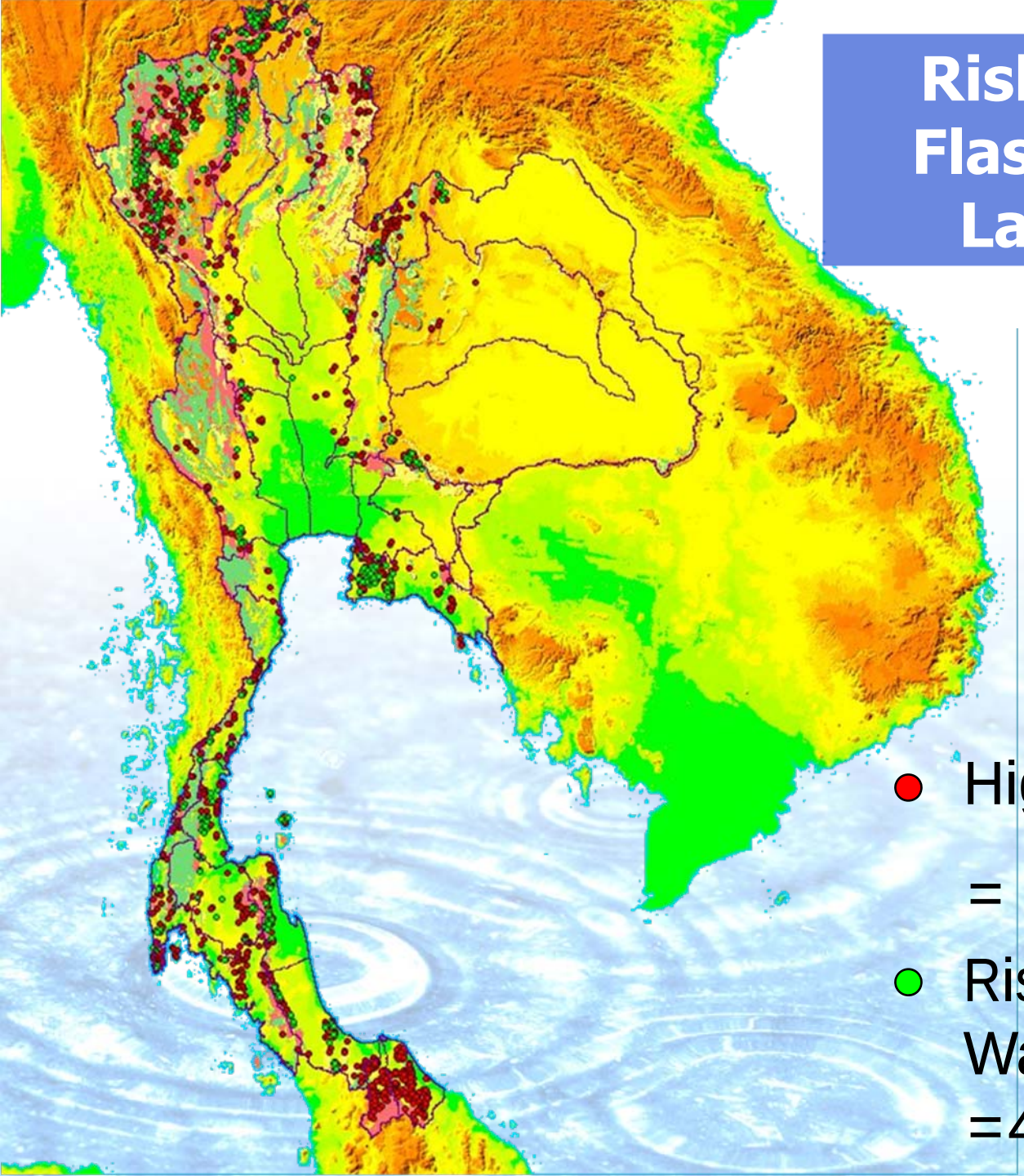
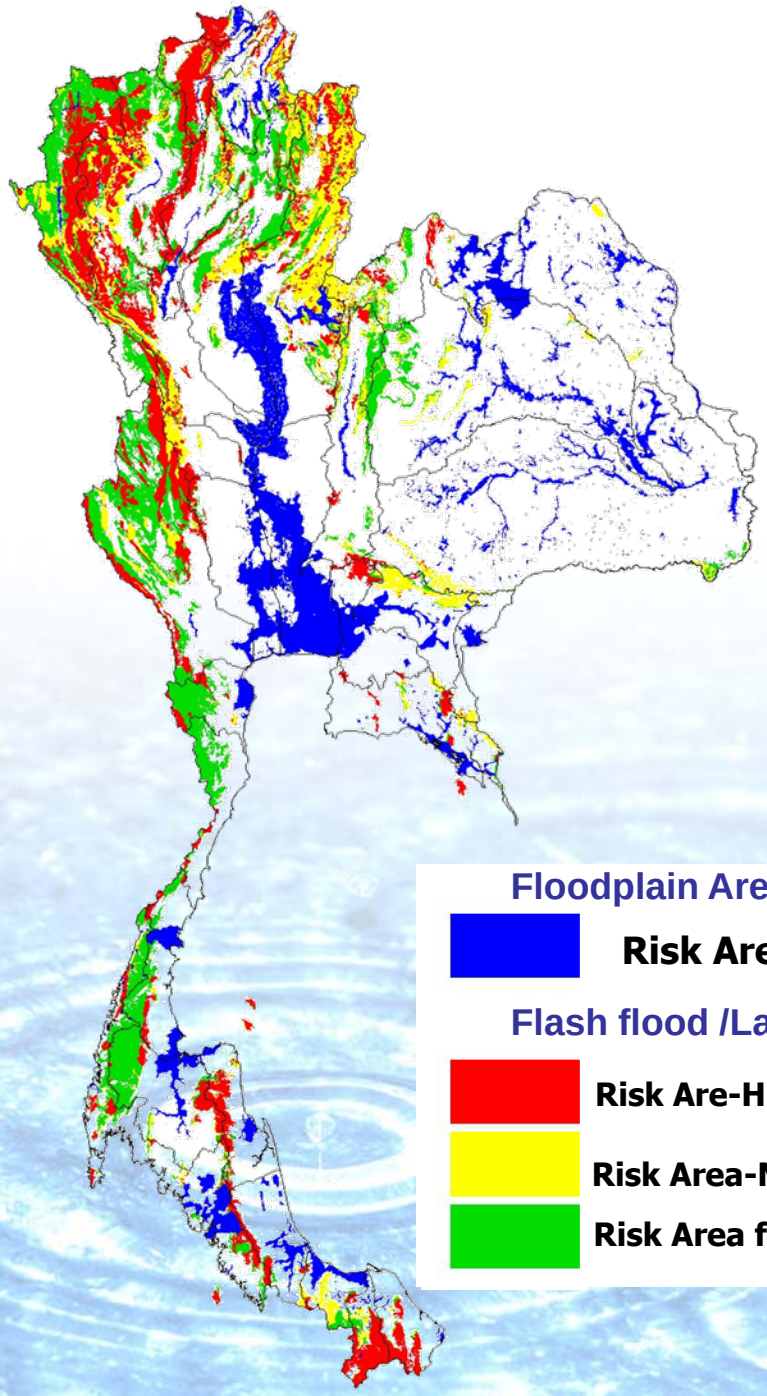
Risk Area for Flash Flood & Land Slide



- High Risk Villages
  = 2,370 Villages
- Risk Villages Installed Warning System
  =404 Villages

Flood

Flood Risk Map



- Flood events from satellite images 13 years (1993-2005)
- Hydrological data
- Data information from other Department

Floodplain Area

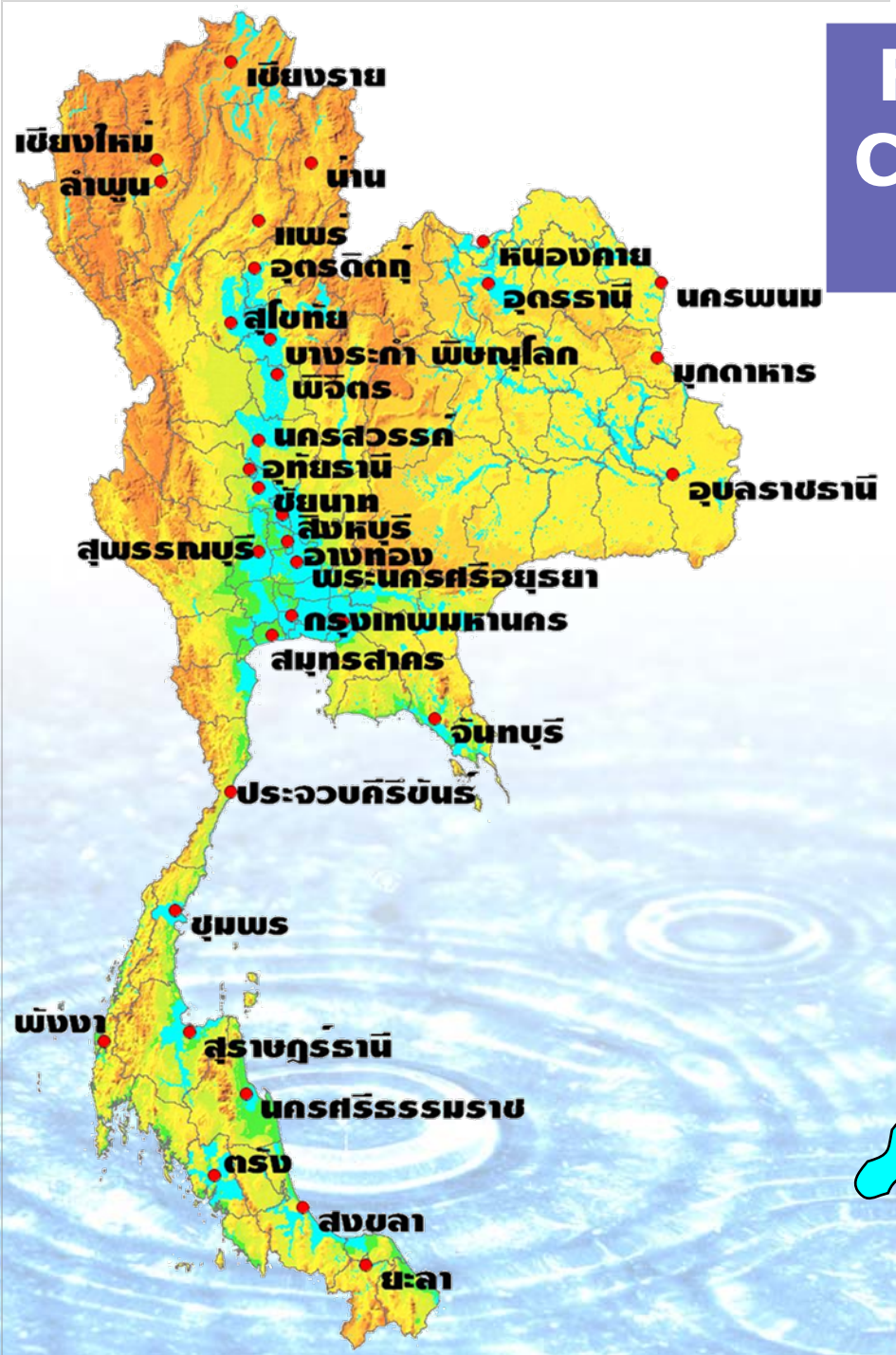
Risk Area for Inundation

Flash flood /Land slide Risk Map

Risk Are-High Flood & Land Slide

Risk Area-Medium Flood & Land Slide

Risk Area for Low Flood & Land Slide



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) Chanthabur
6) Bangsapan
7) Mae Kong
8) Mun
9) Surat THani
10) Chumporn
11) Nakonsitamrat
12) Had Yai
13) Yala
14) Takuapa
15) Trang

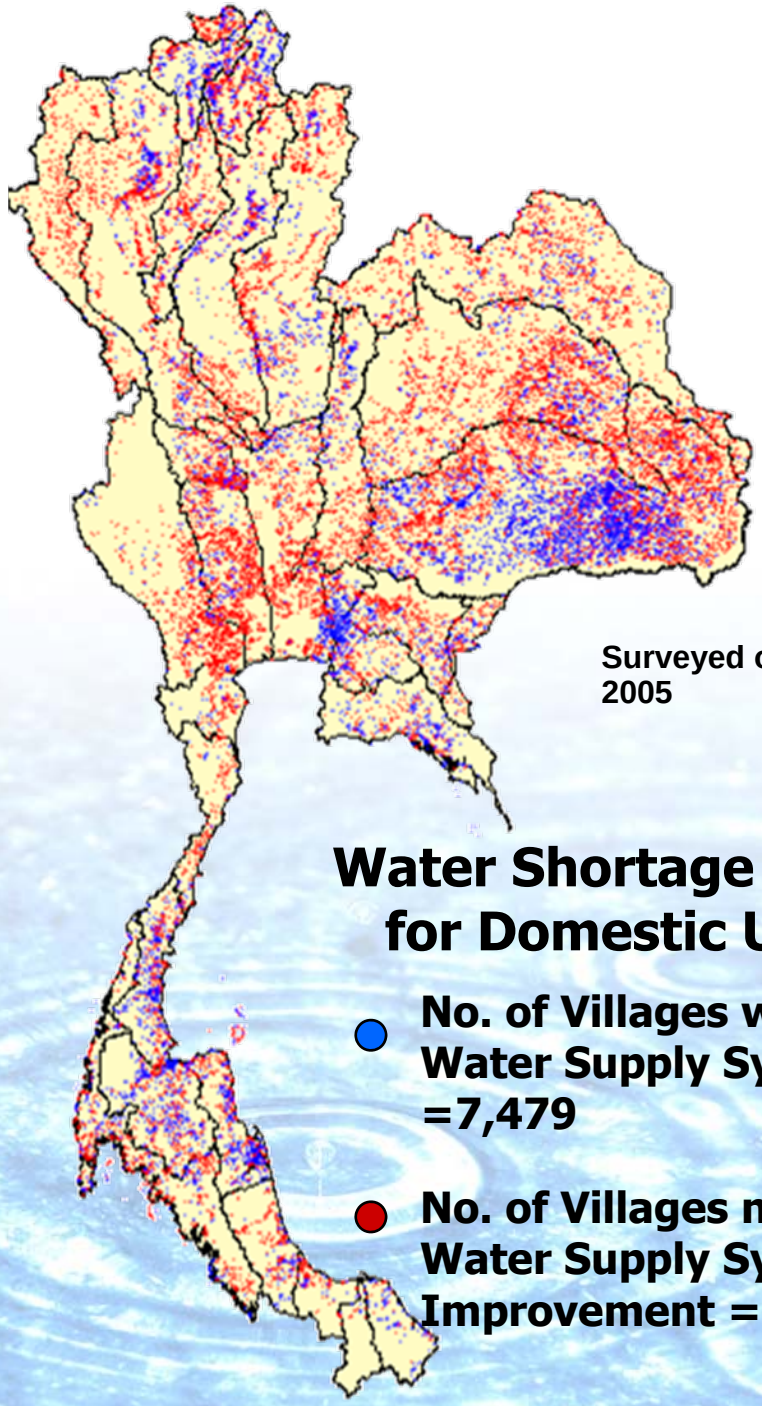
- **Inundated Area in Flood Plain 43,520 sq.km.**

Drought Disaster

- **Occurred during dry season every year. Critical time on March-April**

- **Categories in 2 type**

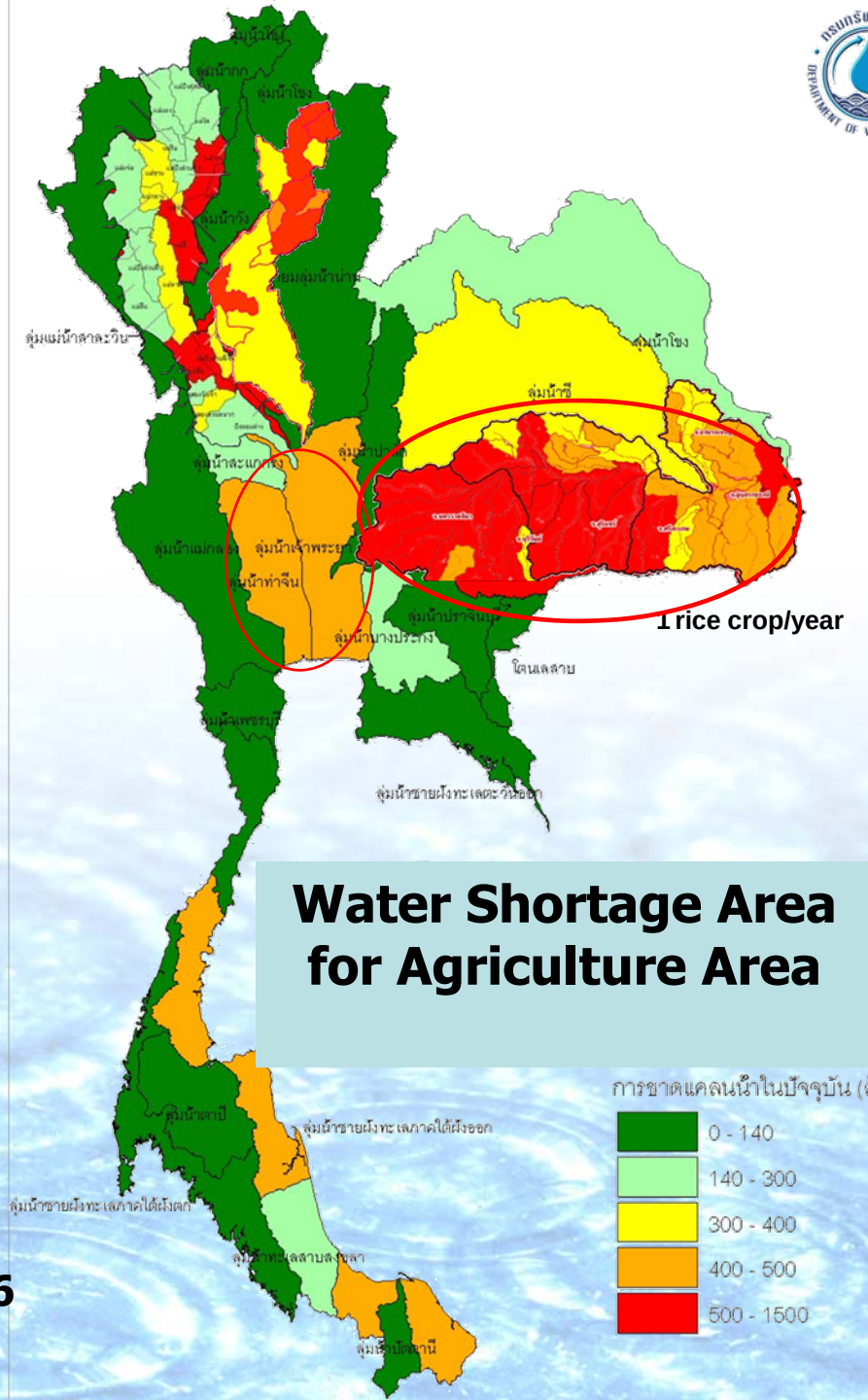
1. **Consumptive water shortage / Domestic water**
2. **Agricultural water shortage**



Surveyed on 2005

Water Shortage Area for Domestic Use

- No. of Villages without Water Supply System =7,479
- No. of Villages need Water Supply System Improvement = 21,336



Water Shortage Area for Agriculture Area

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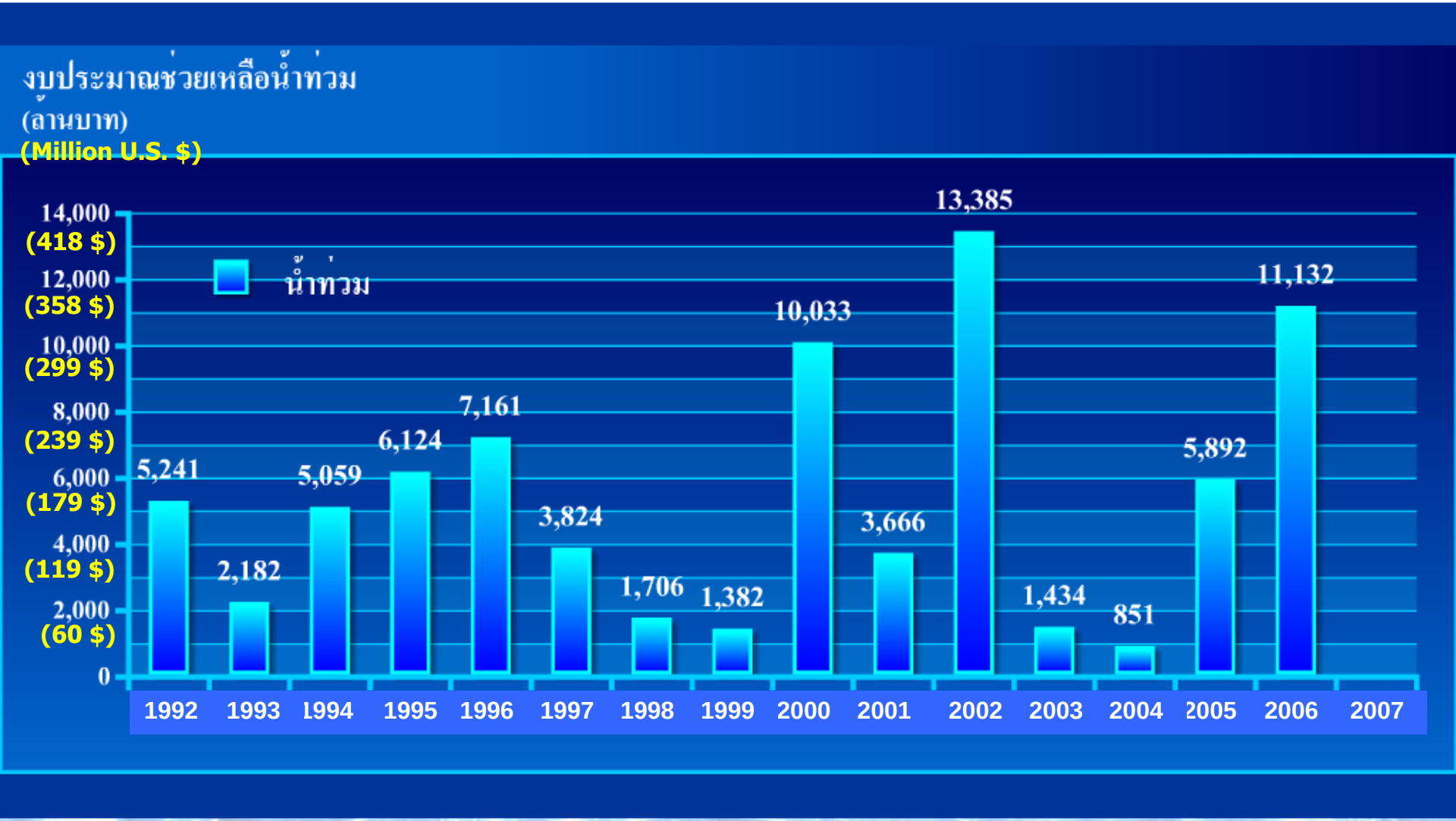
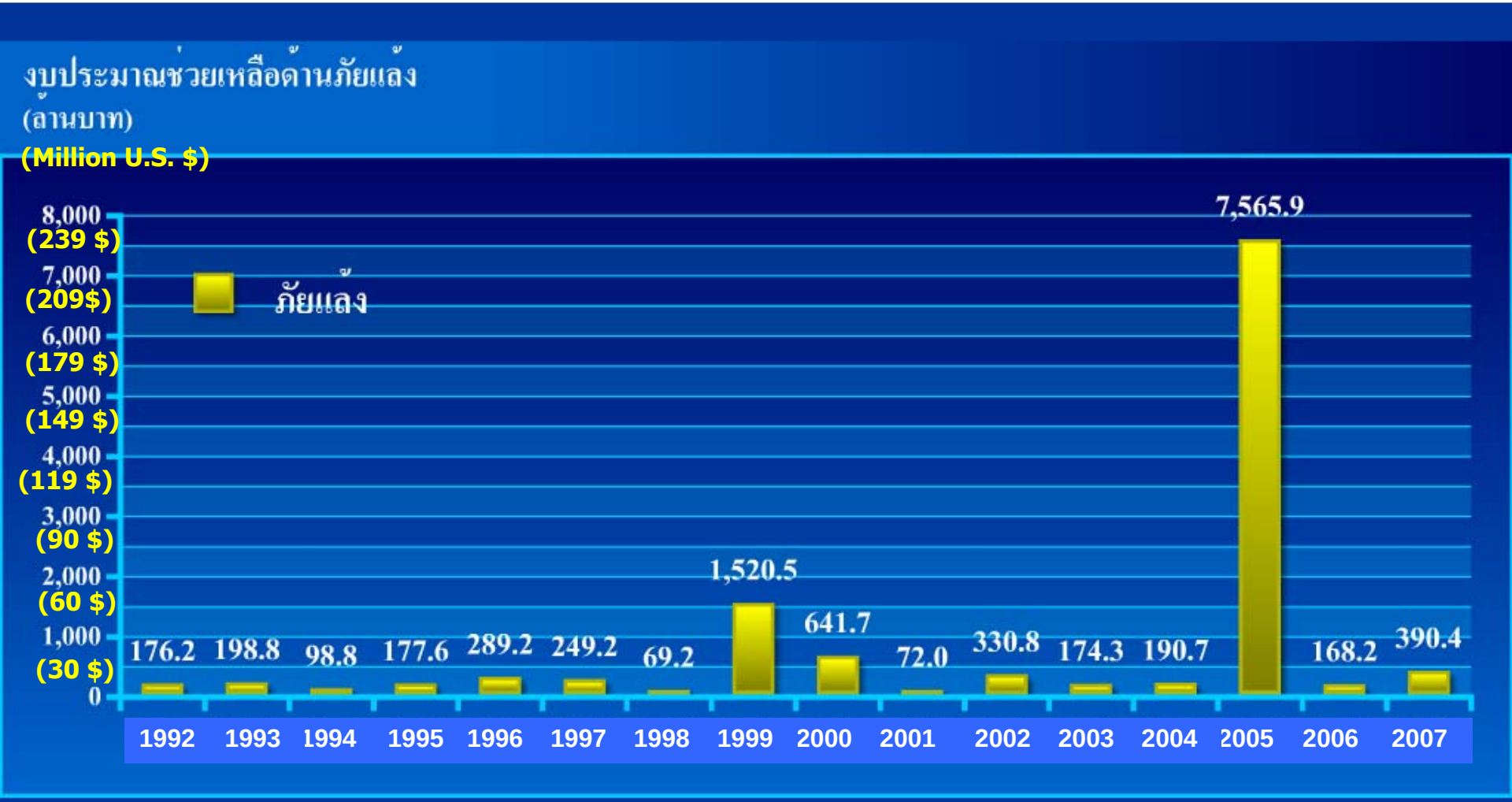
Budget to mitigation in Flood disaster



ที่มา : กรมป้องกันและบรรเทาสาธารณภัย

Budget to mitigation in Drought disaster



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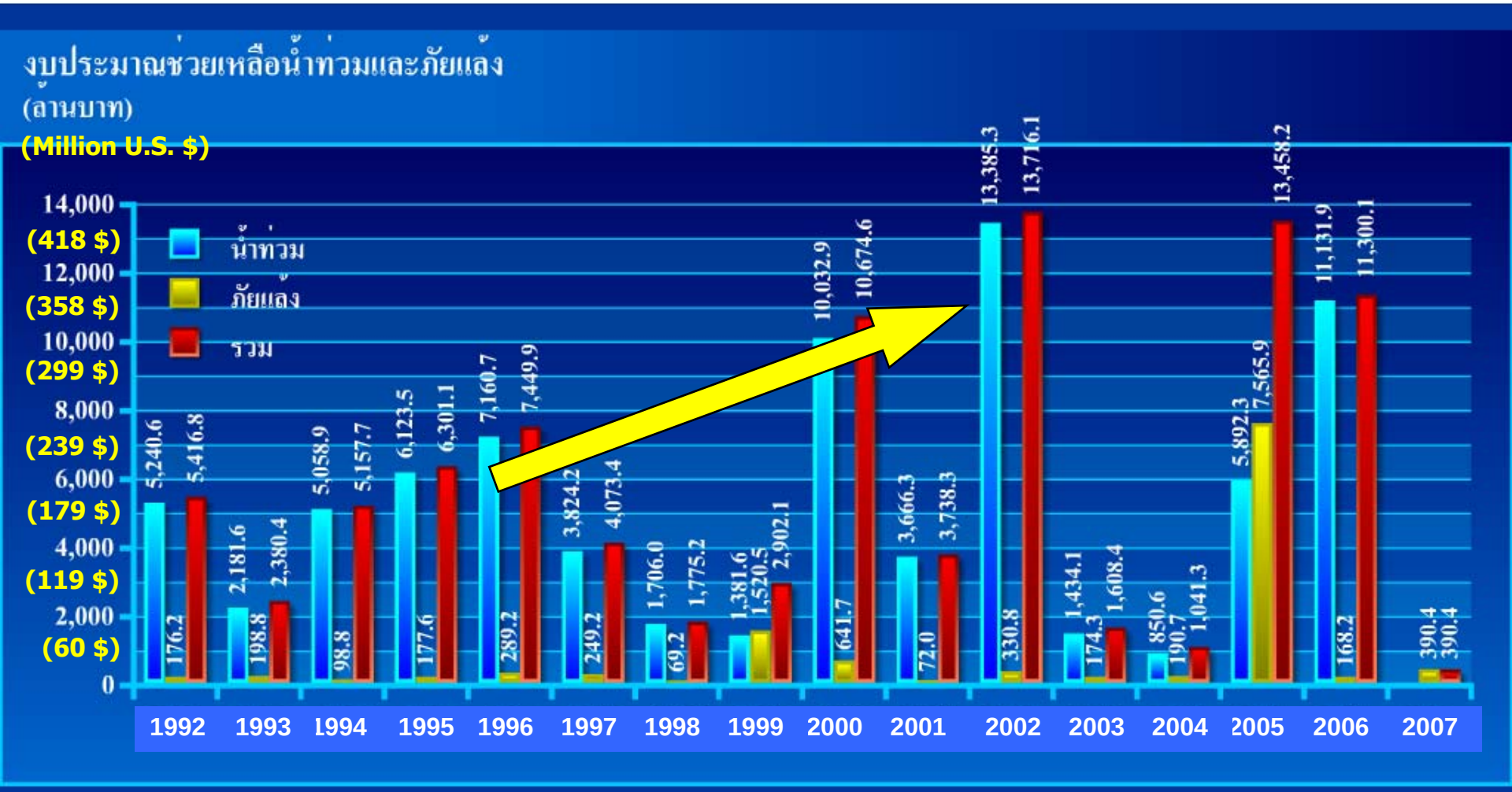
Drought & Flood Mitigation Budget



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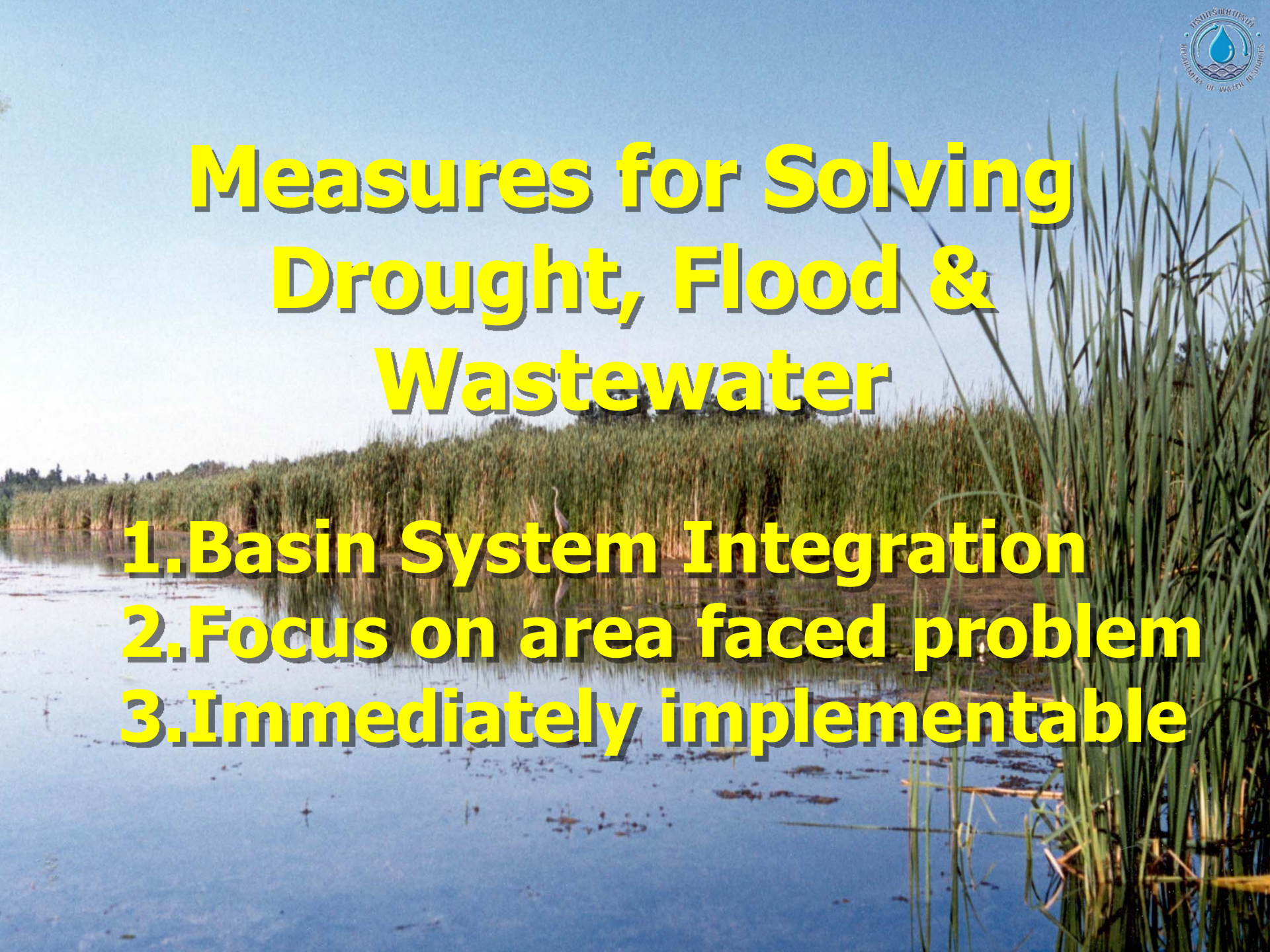
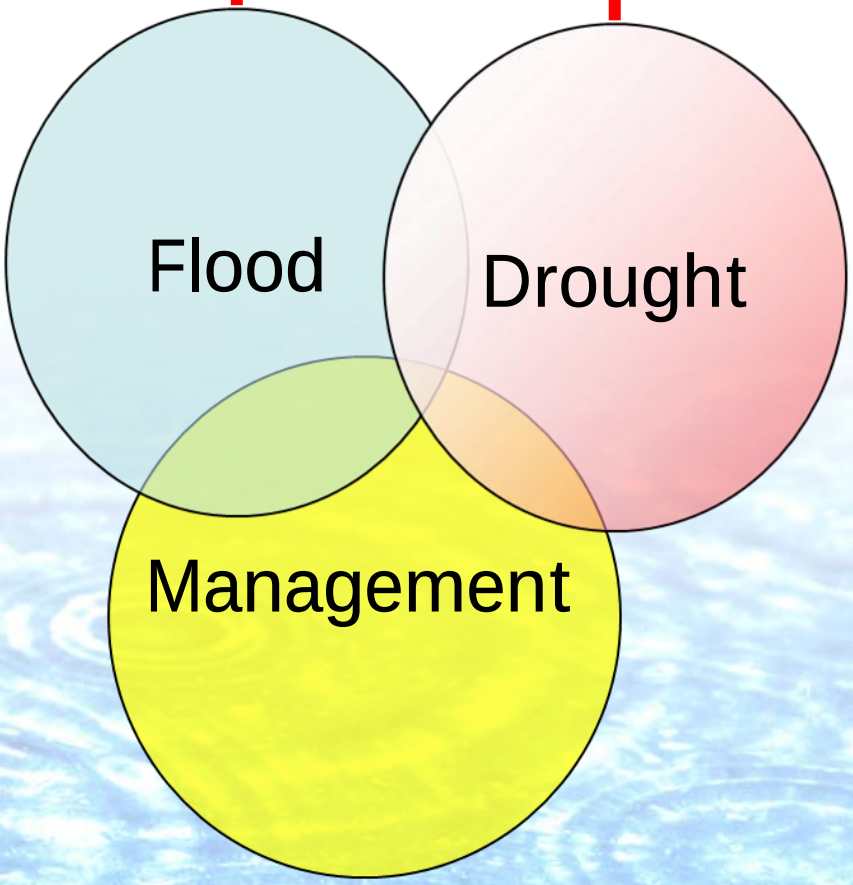


Measures for Solving Drought, Flood & Wastewater

1. Basin System Integration
2. Focus on area faced problem
3. Immediately implementable

Strategy and Measure

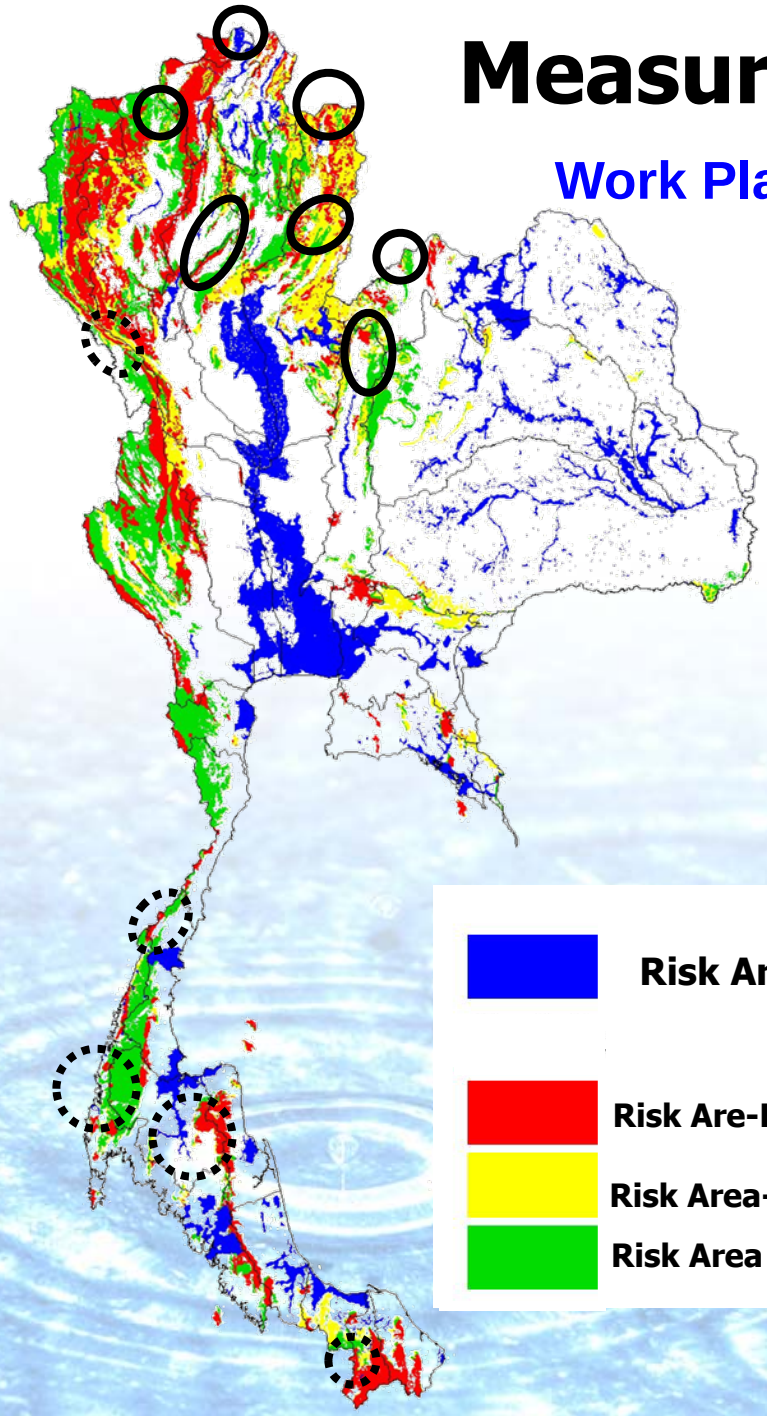
1 Protect & rehabilitate upstream
2 Rehabilitate water resources, water way, wetlands
3 Develop & improve water resources, drainage system & diversion
4 Manage land use & flood protection for economic area
5 Improve agricultural pattern & use agricultural area as retarding pond
6 Flood management



1 Increase Water Supply system
2 Water Distribution
3 Increase efficiency of Water Supply System
4 Water Management

Measure on Flood Mitigation

Work Plan and Project for Flood Mitigation



1. Protection & Rehabilitation of Upstream Forest for Healthy Ecology

1.1 Upstream Rehabilitation(Reforestation)

1.2 Upstream Weir Construction

1.3 Reed Cultivation/Vetiver grass plant in high areas

1.4 Soil & Water Conservation

Risk Area for Inundation

Risk Are-High Flood & Land Slide

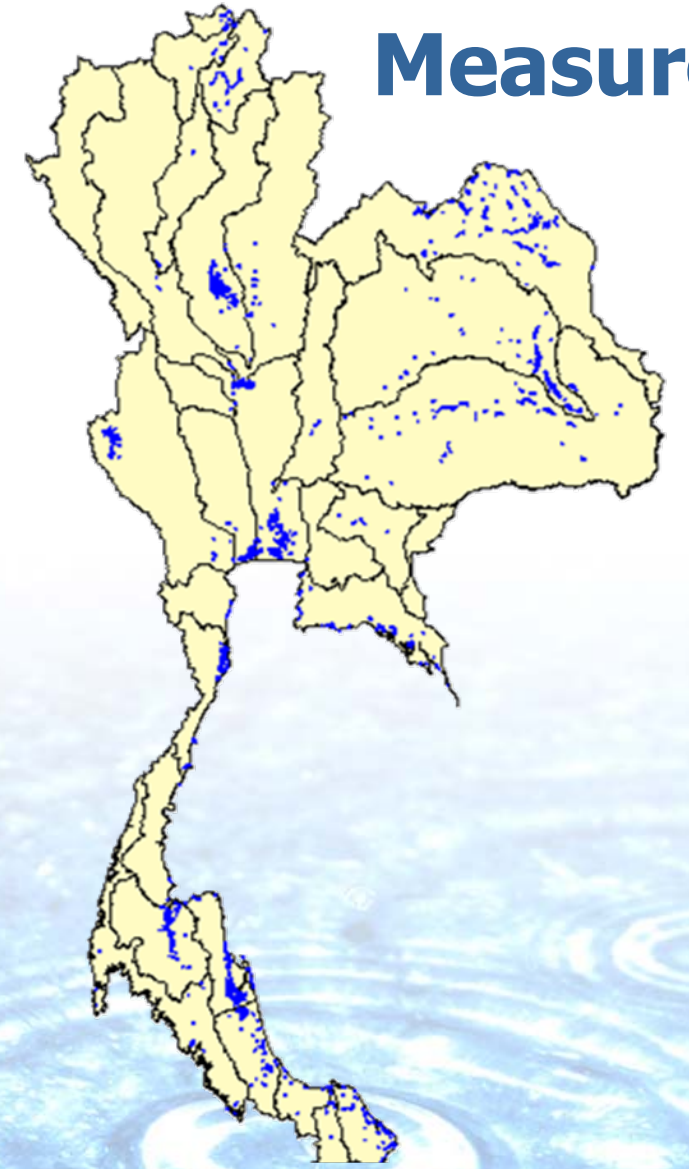
Risk Area-Medium Flood & Land Slide

Risk Area for Low Flood & Land Slide

Urgent

Next Phase

Measure on Flood Mitigation



Wetland area 50,000 sq.km.

2. Rehabilitation on Water Resources, Water Way, & Wetland

Work Plan and Project for Flood Mitigation

2.1 Survey & Make Inventory of Wetland, Water Resources, & Natural Stream

2.2 Define Guidelines on Sustainable Use of Wetland

2.3 Improve/Rehabilitate Stream, Water Resources, Wetland in Pilot Area

2.4 Dredge the Stream for Drain& Boundary Marking

2.5 Retaining Wall for Bank Protection

Measure on Flood Mitigation

3. Development/ improvement of Water Resources, Drainage System &Diversion

Work Plan and Project for Flood Mitigation

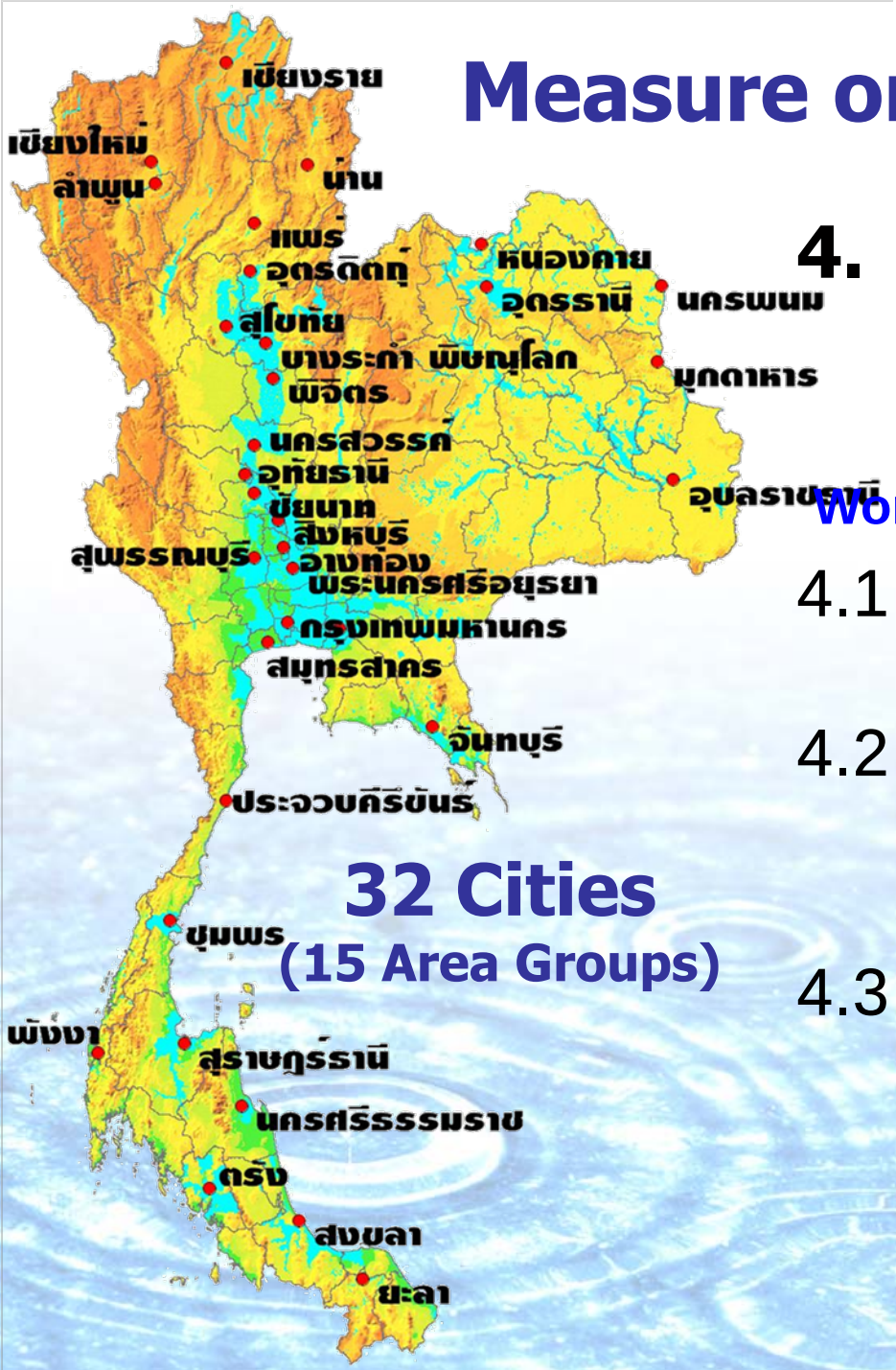
3.1 Reservoirs

3.2 Develop/Improve Diversion System

3.3 Develop/Improve Water Resources & Drainage System

3.4 Groundwater Management

Measure on Flood Mitigation



32 Cities
(15 Area Groups)

4. Management of Land Use & Flood Protection in Economic Area

Work Plan and Project for Flood Mitigation

4.1 Plan, Layout, Define the Land Use Measure

4.2 Improve the Structures Obstructing water way along Communication Routes

4.3 Study & Construct the Flood Protection System in Community & Economic Areas

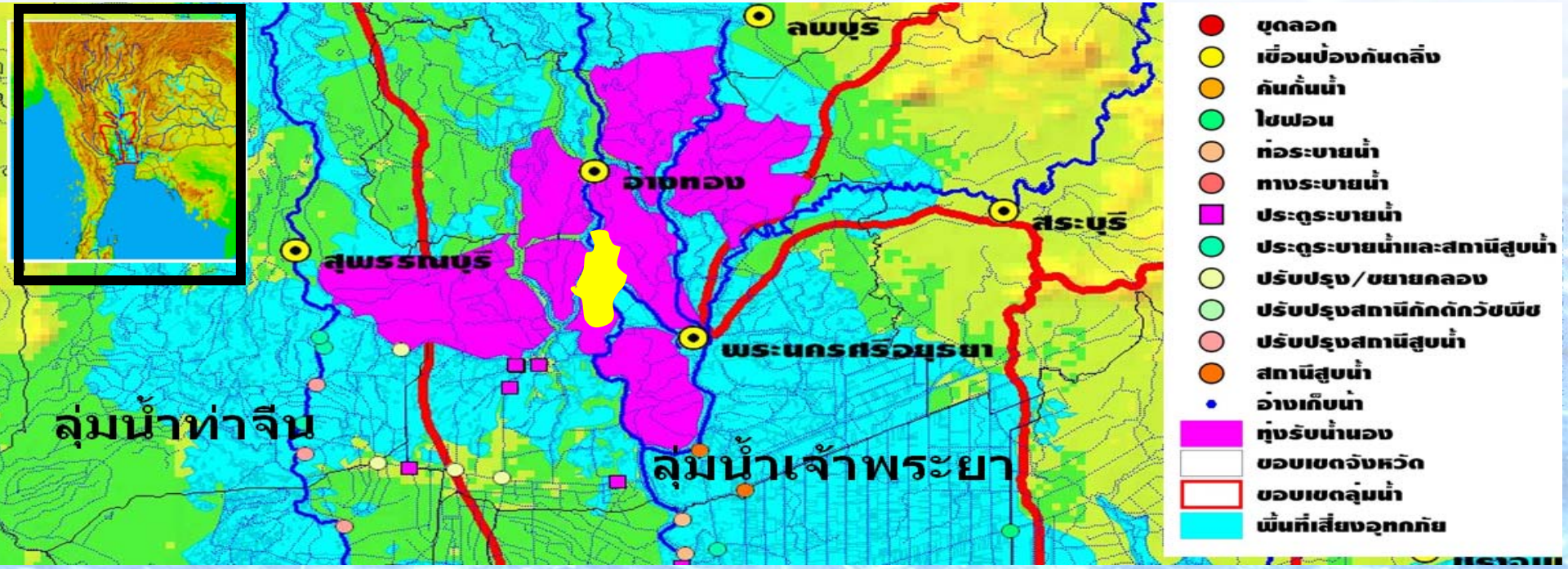
Measure on Flood Mitigation

5. Improve Agricultural Pattern & Use Agricultural Area as Retarding Pond

Work Plan and Project for Flood Mitigation

5.1 Pilot Project on Use of Agricultural Area as Retarding Pond

5.2 Develop Rice Cultivation in Flood Risk Area



Measure on Flood Mitigation

6. Flood Mitigation Management

Work Plan and Project for Flood Mitigation

6.1 Enhance the Participation of Local Administration Organization & People

6.2 Develop Tools & Mechanism for Management e.g. National Water Center, Decision support System. Etc.

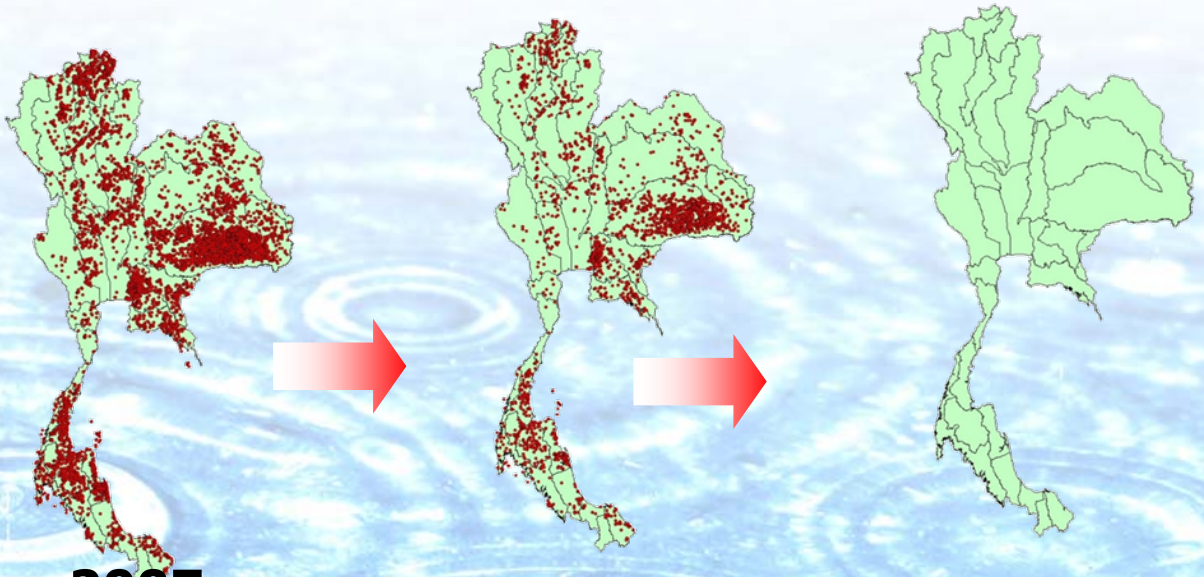
6.3 Research on Flood Prevention & Mitigation

6.4 Oversee & Monitor the Project Implementation

Work Plan and Project for Drought Mitigation

1)Measure on Increased Water Provision

1.1 Artificial Rain Project
1.2 Upstream Weir
1.3 Water Resources Rehabilitation
1.4 Water Resources Development
1.5 Water Quality Improvement for Shallow Well
1.6 Construction of Water Supply System & Groundwater Well
1.7 Farm Pond



2007
No Water Supply
7,479 Villages

2008
No Water Supply
2,579 Villages

2009
Water Supply
provided for all Villages

Work Plan and Project for Drought Mitigation

2) Measure on Water Distribution

2.1 Water Conveyance System

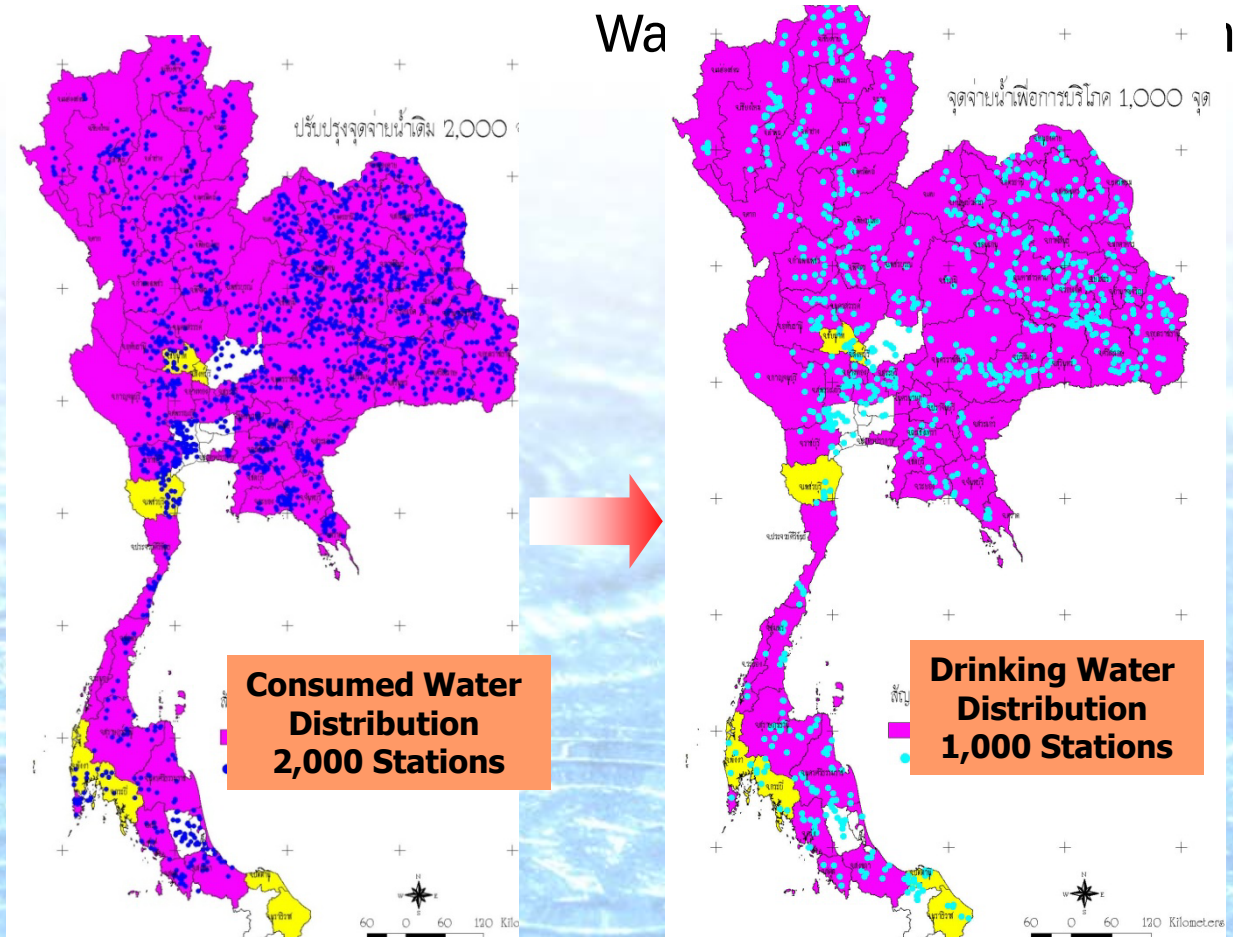
2.2 Field Water Supply System

2.3 Pumping system

2.4 Mobile Unit of Groundwater Quality Improvement

2.5 Improvement and construction outlet

Wa ıprovement/

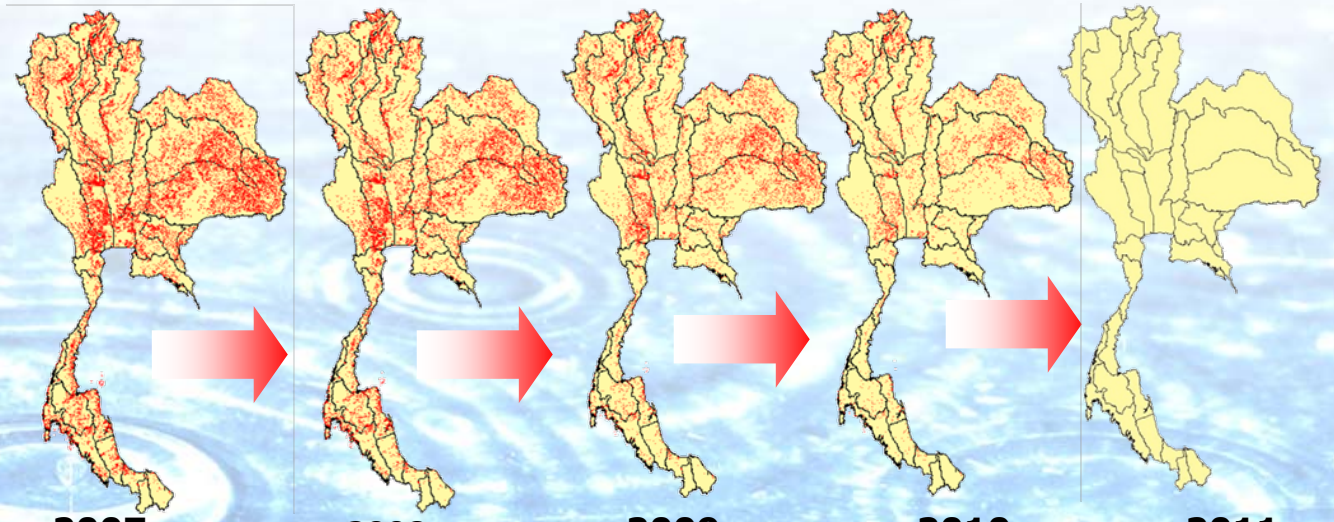


Work Plan and Project for Drought Mitigation

3) Measure on Increased Efficiency of Water Supply System

3.1 Village Water Supply System Maintenance

3.2 Groundwater Well Washing



Work Plan and Project for Drought Mitigation

Increase Water Use Efficiency in Irrigation Area

4) Measure on Water Management

4.1 Increase Water Use Efficiency
4.2 Improve Dry Season Crop
4.3 Training on Water Supply Maintenance
4.4 Reservoir Control
4.5 Investigation on Status of Water Resources
4.6 Orient & Monitor the Water Quality
4.7 Research & Study for Drought Mitigation
4.8 Public Relation & Campaign for Water Saving
4.9 Knowledge transfer on Farm Pond
4.10 Drought Management Organization


Efficient Water Management, Equity and Sustanability
Well being of Societies