Lessons on Resilience from the 2011 Central Thailand Floods

Gabrielle Iglesias

Climate Change and Climate Risk Management Department, ADPC

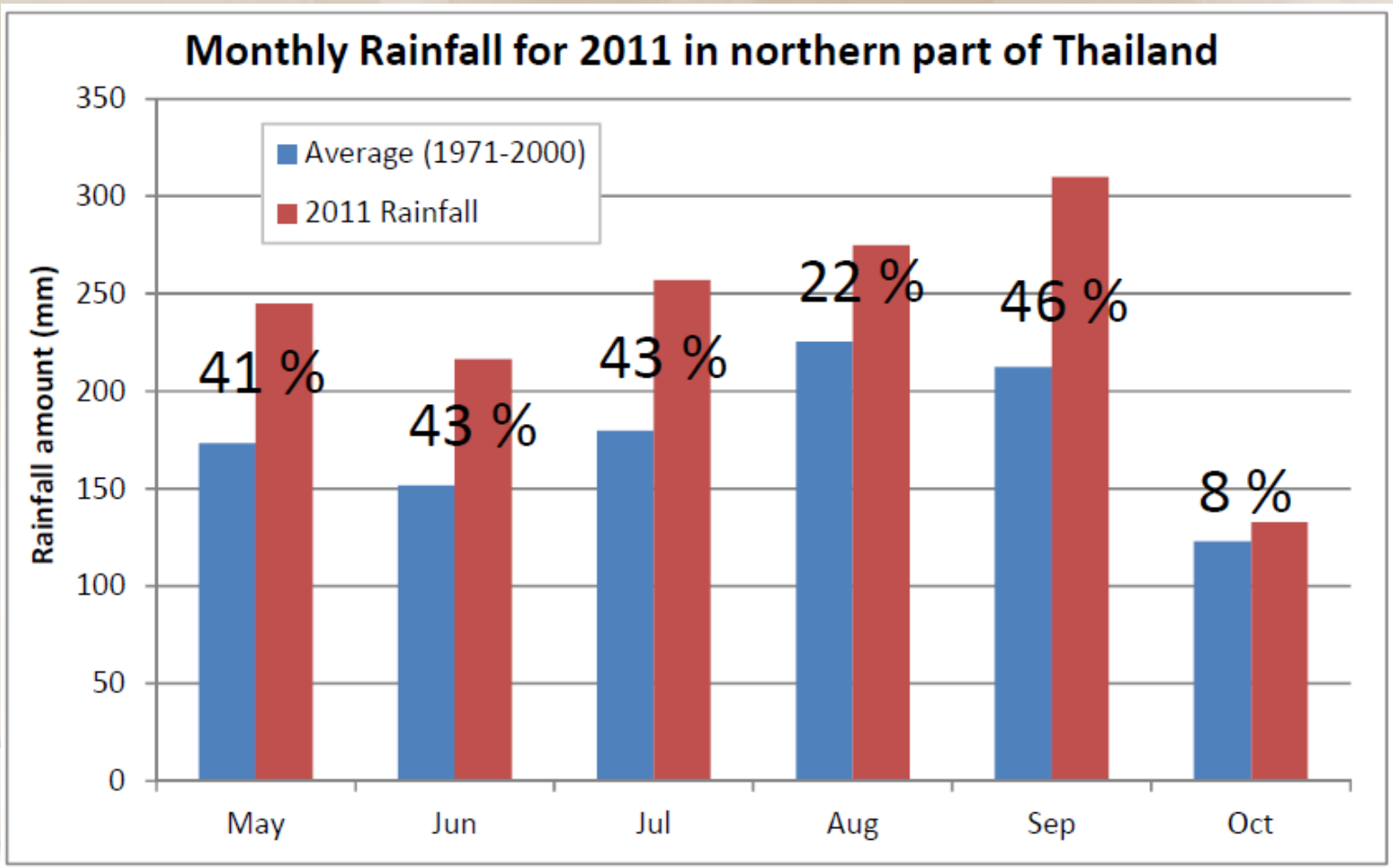
iglesias@adpc.net

Some disaster statistics

- Duration: 25 July 2011 – mid Jan 2012
- Affected region : Northern, Northeastern and Central regions (65 of 77 provinces)
- Affected people : Over 13.5 million people

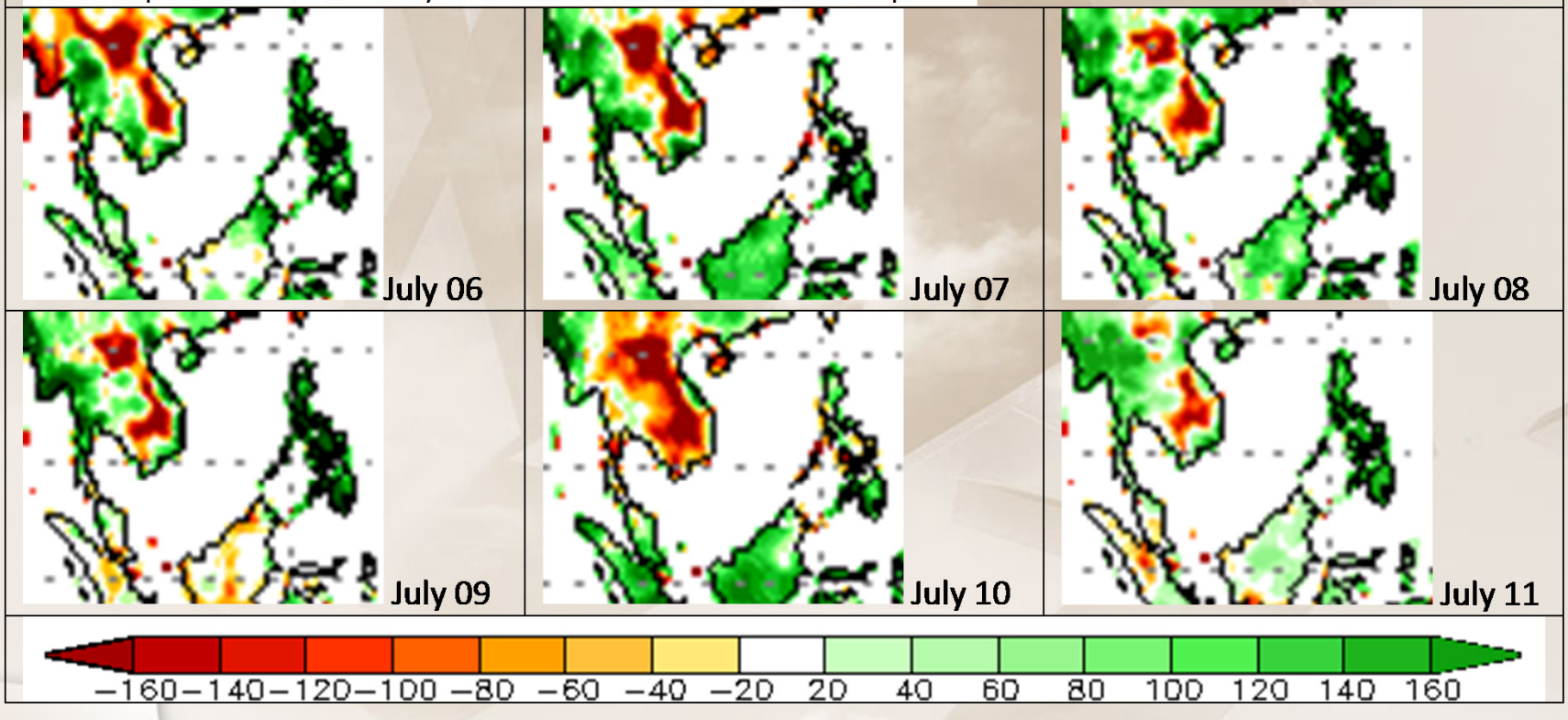
Source : Department of Disaster Prevention and Mitigation (DDPM)

Monthly rainfall over northern part of Thailand



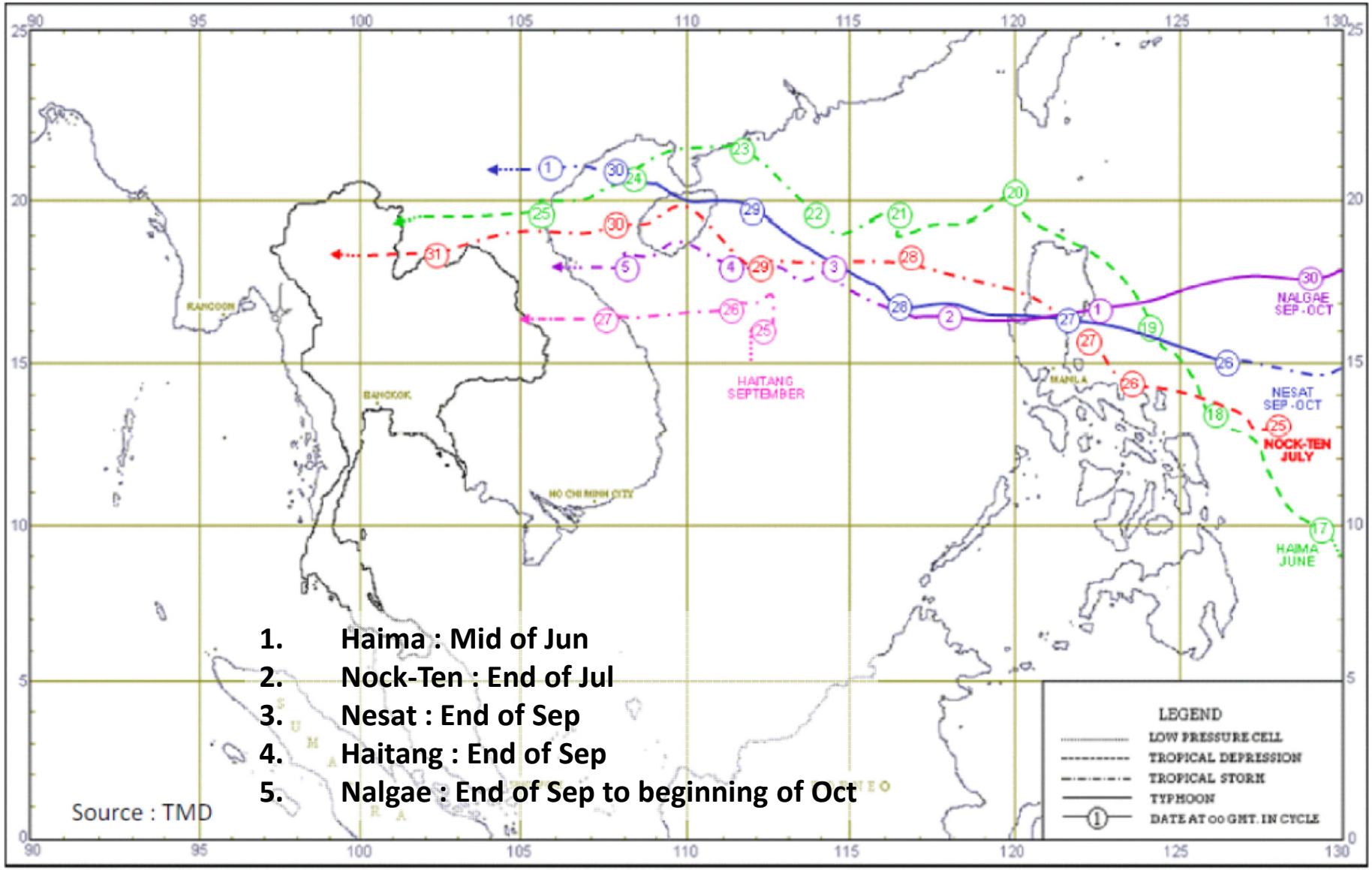
Monthly soil moisture anomaly for July

Calculated Soil Moisture Anomaly (mm) in July from 2006 to 2011
(http://www.cpc.ncep.noaa.gov/soilmst/leaky_glb.htm)
Note : departure from anomaly is calculated based on 1971-2000 period



The soil moisture was high since the beginning of the rainy season, thus rainfall was immediately turned into surface runoff once the soil was saturated.

5 Storms affected Thailand in 2011

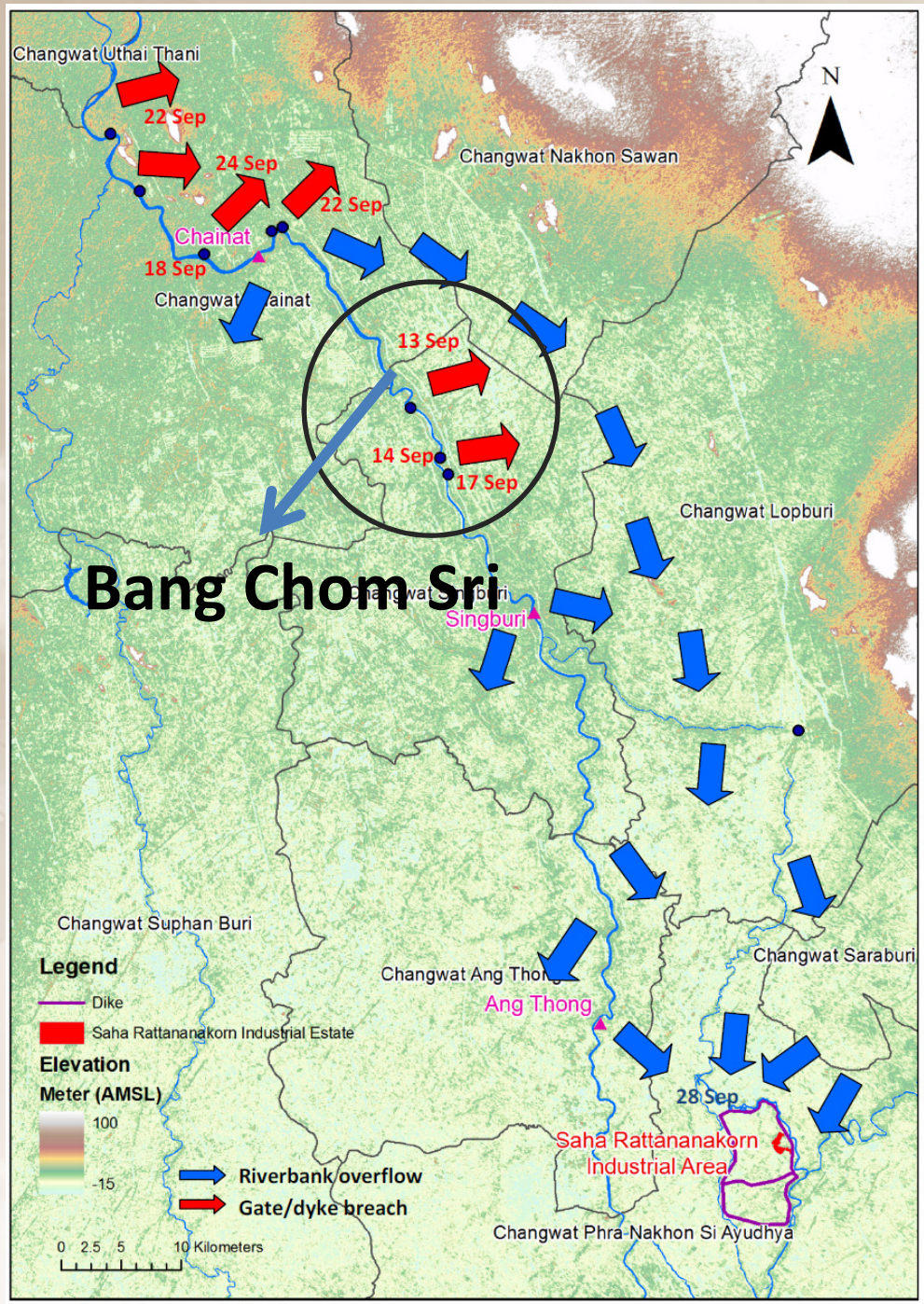


1. Haima : Mid of Jun
2. Nock-Ten : End of Jul
3. Nesat : End of Sep
4. Haitang : End of Sep
5. Nalgae : End of Sep to beginning of Oct

Source : TMD

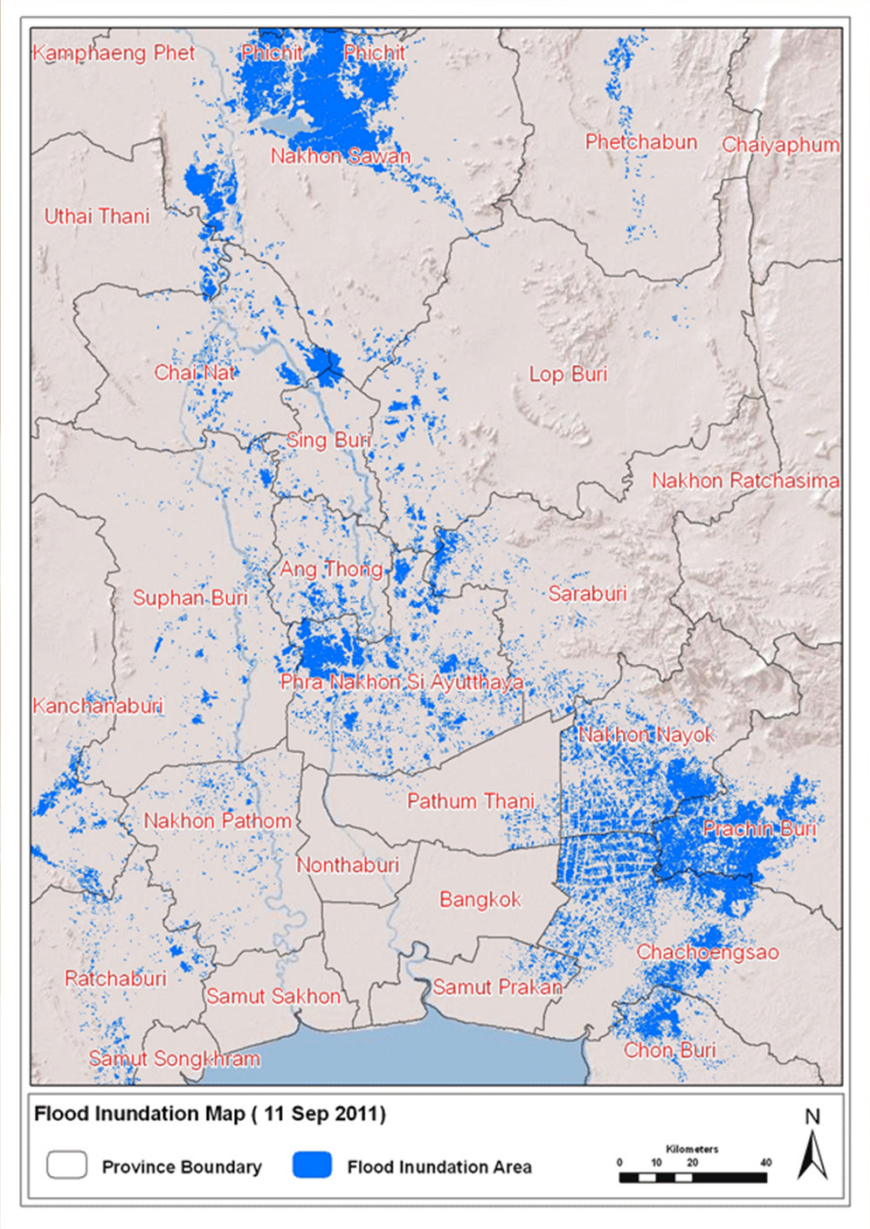
Flood trigger

- Bang Chom Sri flood gate breached : Sept 2011
- Bank overflows along Chao Phraya River due to limitation of river capacity
- Overflows from Pasak and Lopburi Rivers
- Caused '*<u>uncontrollable'</u>* flood flow in the floodplain



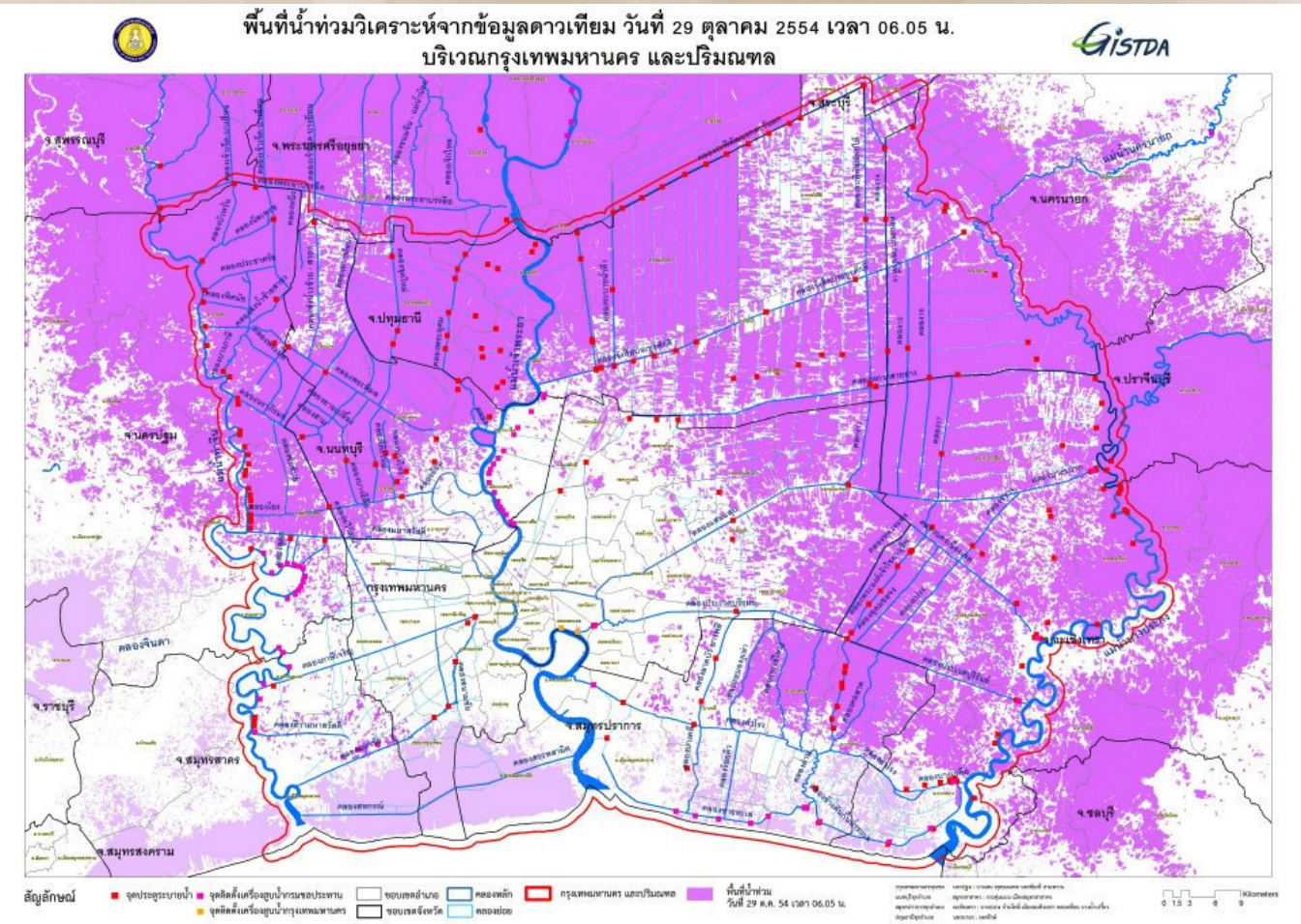
Source of Digital Elevation Model (DEM) : ASTER

Flood Extent: 11 Sept 2011 to 9 Dec 2011



Flood extent around Bangkok

29 October 2011



Causes of 2011 Central Thailand flood disaster

- Early onset of rainy season
- High volume of rainfall
- Rainfall from tropical storms

✓ Limited drainage capacity of rivers to the Gulf of Thailand

✓ Water management decisions

✓ Land-use planning for Chao Phraya river basin

✓ Development choices

2011 Flood impacts

- Fatalities : 813
- No. of unemployed: 100,000
- Damage & losses: THB 1.425 B (US$ 45 billion est. by WB); THB 1.007 B were in the manufacturing sector
- GDP Growth : -2.3% (from +3.8 to +1.5%)

Source : DDPM and WB

Flood Recovery

- THB 755 B (US $25 billion)for recovery according to the World Bank estimate
- Thai Government propose to spend THB 350 B for water management
- Master Plan for Water Resources Management

Approach :

1.Improving the existing flood prevention system,

2.Building confidence in flood prevention in communities, agricultural areas, industrial sites, and important economic zones,

3.Integrating the participation of stakeholders from all sectors for effective water management.

Source: http://www.reuters.com/article/2012/01/19/us-thailand-flood-fb-idUSTRE80I0C320120119

THE 'ACTION PLAN FOR INTEGRATED AND SUSTAINABLE FLOOD PREVENTION'

1. Develop effective and unified information, **forecast, and warning systems**, using modern technology
2. **Forest restoration** and conservation plus the **construction of dikes -** along upstream areas of the Ping, Nan, Wang, Yom and Sakae Krang river basins.
3. **Build reservoirs -** along the Yom, Nan, Sakae Krang and Pa Sak river basins
4. Setting up an integrated, unified and "**single command**" water management agency

THE 'ACTION PLAN FOR INTEGRATED AND SUSTAINABLE OF FLOODS' (CONT.)

5. **Improve relief and rehabilitation plans** with more participation from private and public sectors.
6. Convert 2 million rai (800,000 acres) of Chao Phraya plains farmland for the **retention of 6-10 billion cubic metres** of floodwater.
7. The construction of **floodways and flood diversion** channels allowing flows of at least 1,500 million cubic metres per second.
8. city and **land use planning**

Resilience in Cities

- Resilience can be understood as the ability of a system to absorb and recover from shocks and stresses without collapsing
- A city can be regarded as resilient if its inhabitants and institutions function effectively, enabling them to deal with unexpected disturbances and adapt to change

Challenges to Urban Resilience

- Uncontrolled urban growth, unplanned physical development, land scarcity, poor health and sanitation conditions, poverty as contributory factors
- Impacts of global factors such as climate change and globalization on exposure, severity and frequency of hydro-meteorological hazard events, and vulnerability to disasters
- Insufficient efforts to develop DRR policy framework linked to climate change adaptation
- Disaster risk reduction needs to focus on longer-term vulnerability reduction in order to respond to climate change adaptation needs

Hydrological characteristics of the Chao Phraya basin

- Seven groundwater sub-basins: Chiangmai-Lampoon basin, Lampang basin, Payao basin, Prae basin, Nan basin, Upper Chao Phraya basin and Lower Chao Phraya basin
- Four large tributaries (Ping, Wang, Yom, Nan) leading into Chao Phraya
- At the alluvial plain, Chao Phraya splits into channels (Tha Chin/Suphan/Chai, Noi, Lop Buri, Chao Phraya)
- Surface area : **159,283 km^2** (30% of land area)
- Annual precipitation: **1,179 mm/year**
- Annual discharge: **196 m^3/s**
- Annual potential evapotranspiration: **1,538 mm/year**
- Annual groundwater storage: **14.2 Mm^3**
- Annual average runoff: **37.1 Bm^3**

Source: Thailand case study, *UN World Water Development Report 2* (2006)

Existing Drainage and Bangkok Flood Protection System

Program for Reduction of Vulnerability to Floods in Thailand

Program Goal

- To promote sustainable development while enhancing Thailand's resilience to floods and other associated natural hazards

Program Objective

- Strengthen community, local and national capacities to undertake risk reduction measures through enhanced understanding of the vulnerabilities to floods and associated hazards

Program Activity

Component 1 : Training and Capacity Building

- Undertake **capacity building programs** for Department of Disaster Prevention and Mitigation (DDPM) that directly respond to the immediate needs of flood affected clients

Component 2 : Demonstration Activities

- Create a general awareness of community and build their capacity to reduce and respond to future flood events by use of **demonstration activities at community level** through the strengthening of CBDRM and EWS

Component 3 : Information and Networking

- Develop network among flood risk management organizations through the **flood forum organized before and after flood season** to share experiences and good practices on flood risk management

q&a

25 Years adpc
Since 1986
Communities • Partnerships • Resilience