



Bangkok City

An urban resilience approach

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September 13, 2022

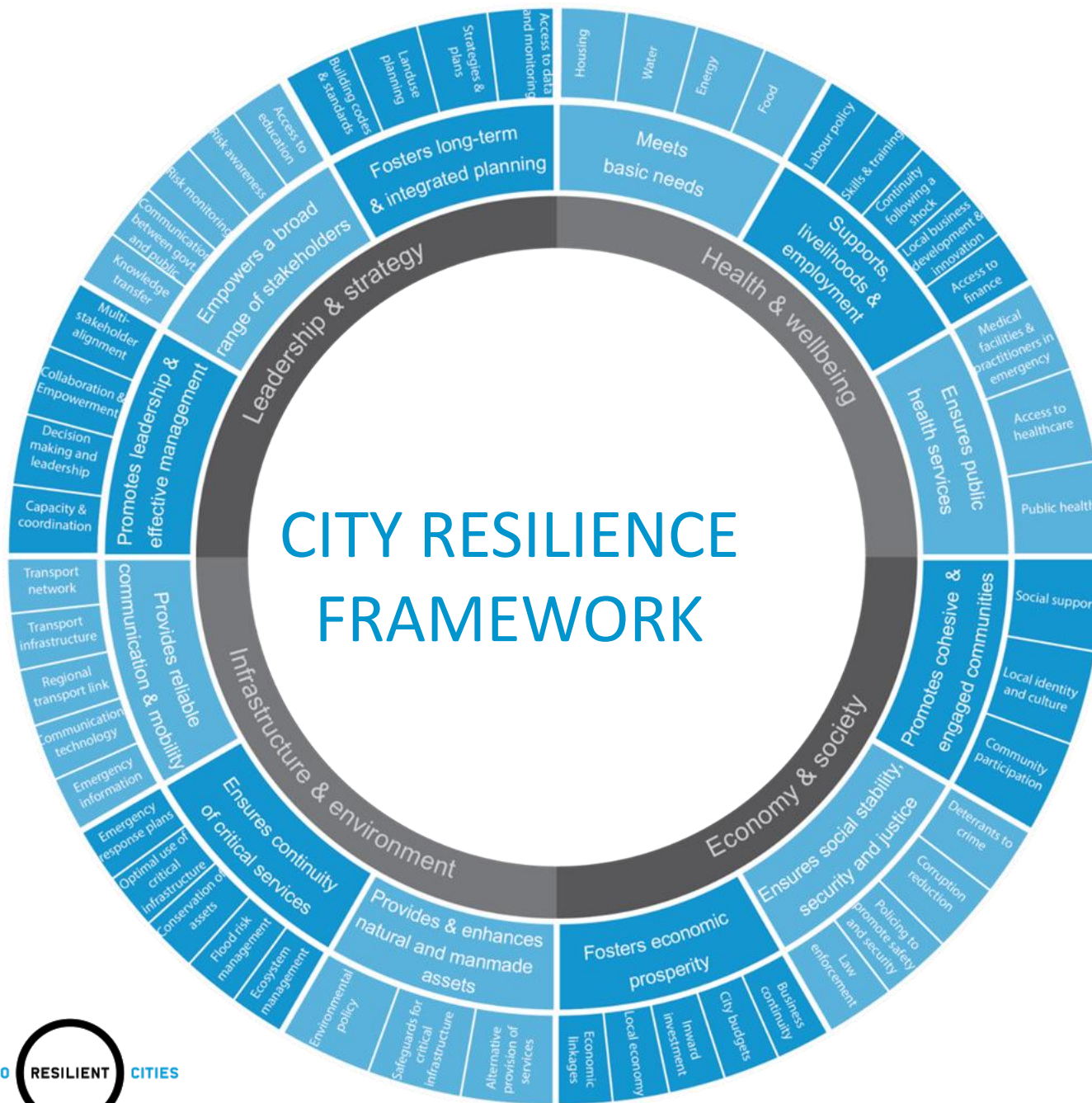


Urban resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.

Urbanization

Climate Change

Globalization



4 segments: Health & well being, Economy & society, Infrastructure & environment, Leadership & strategy determine the city's ability to withstand a wide range of shocks and stresses

City of Bangkok

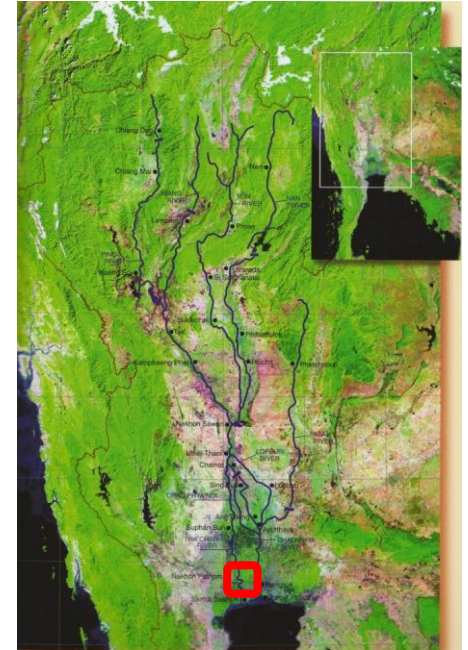
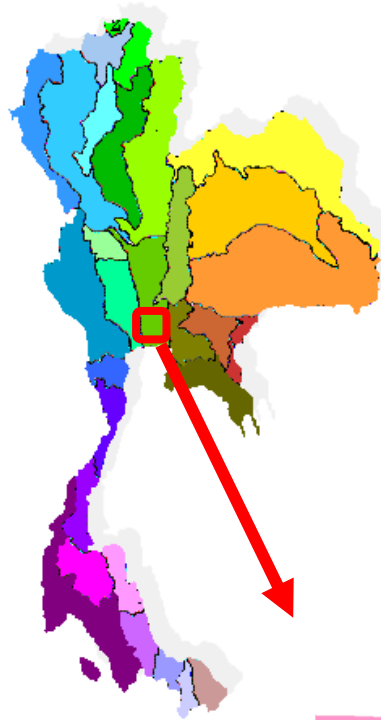
BANGKOK CITY: The Capital of Thailand

- Registered Population : approx. 6 million
- Total population: approx. over 12 million

NATURE AND THE CITY

- Land area: 1,569 sq.km.
- Situated on the low flat plain of Chao Phraya River which extends to the Gulf of Thailand.
- The elevation is from -0.5 m MSL to +2.5 m MSL
- 9,900 ton/day of solid waste generated

City Profile



City of Bangkok

Shocks & Stresses

Acute Shocks

Priority Shocks

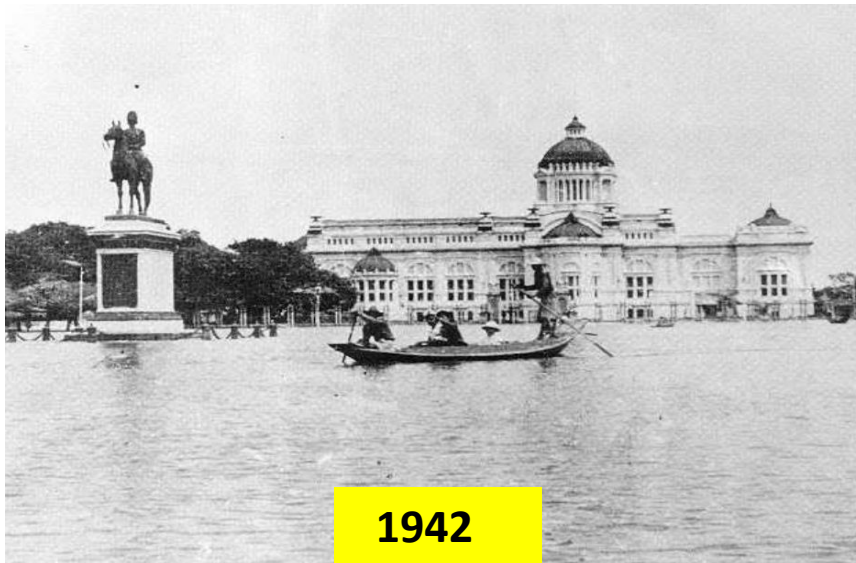
- Flood
- Earthquake
- Riot/civil unrest
- Economic crisis
- Traffic accidents
- Fire incidents

Chronic Stresses

Priority stresses

- Unemployment
- Poverty and inequality
- Traffic congestion
- Air quality
- Economic downturn





1942



1983



1995



1995



2011



2011



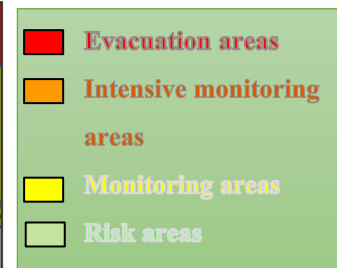
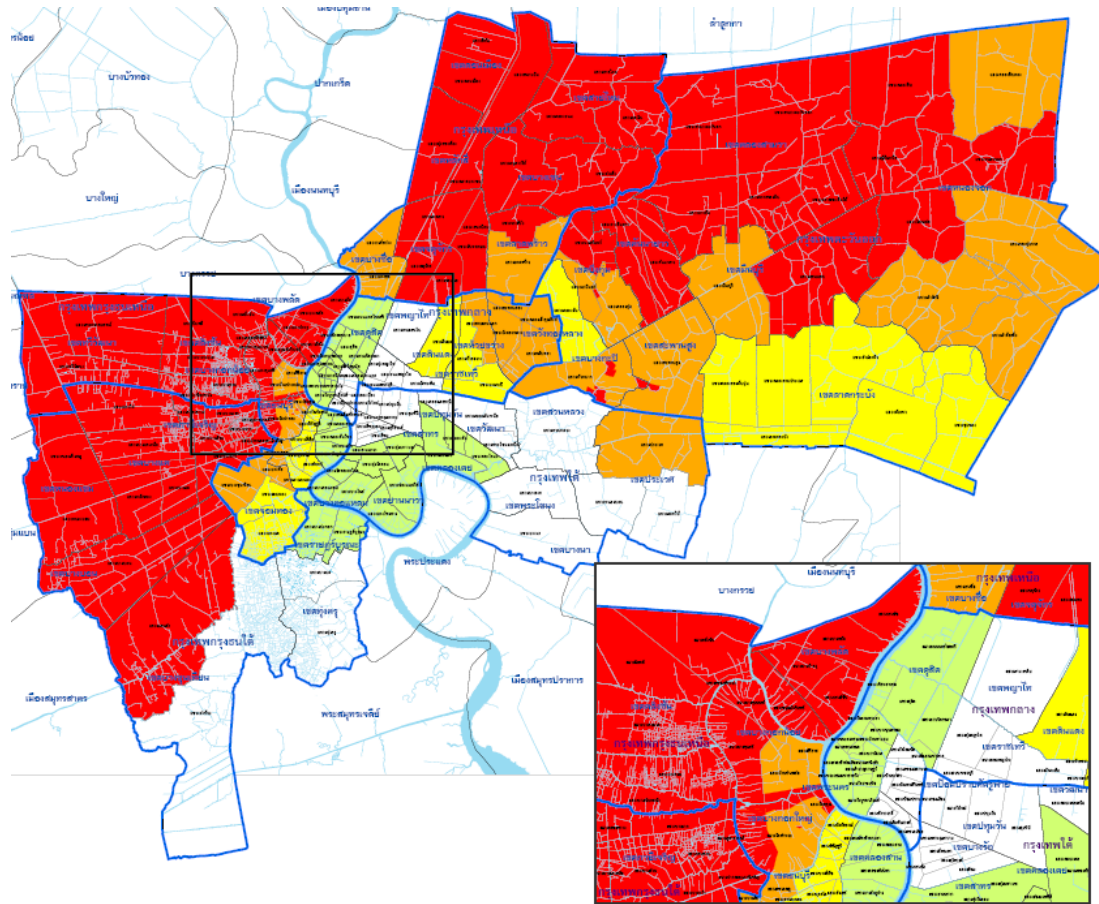
Present flood events in Chaophraya river basin.



Flood in 2011



Flood situation map of Bangkok on 16 November 2011





September 2022



September 2022



Causes of flooding

- Heavy rainfall
- High water level in the Chao Phraya River
- Inflow from the North and East
- Land subsidence
- Insufficient drainage capacity
- Urbanization
- Land use changes
- Climate change
- Sea level rises (4 mm per year)
- Socio-economic developments



Chao Phraya River and its tributaries

Watershed: approximately 35 percent of the nation's area, (157,924 square kilometer (60,975 sq mile))

Flow capacity: 2,300 – 3,600 cubic meter/s

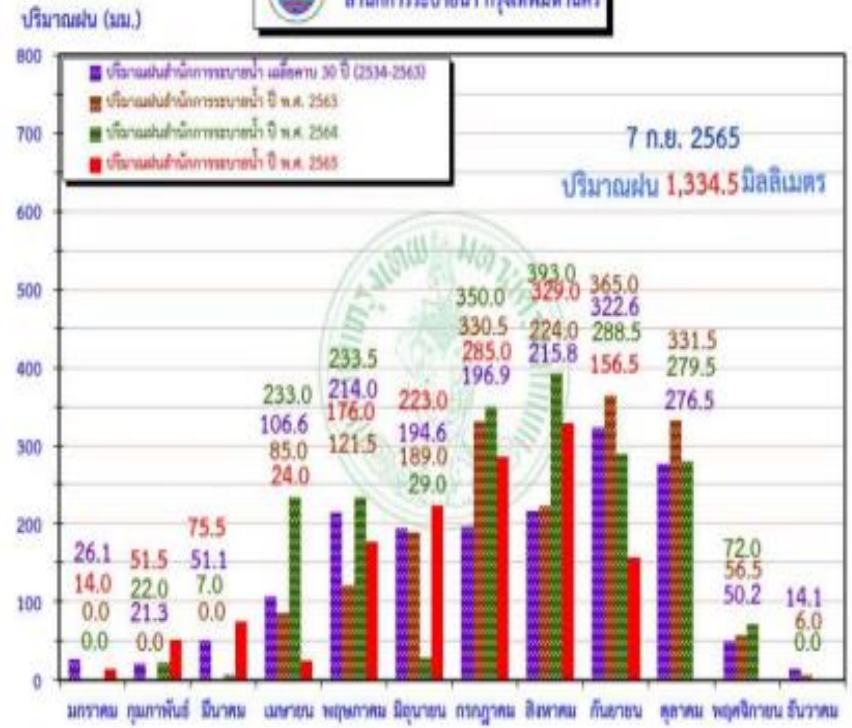
Accumulate rainfalls

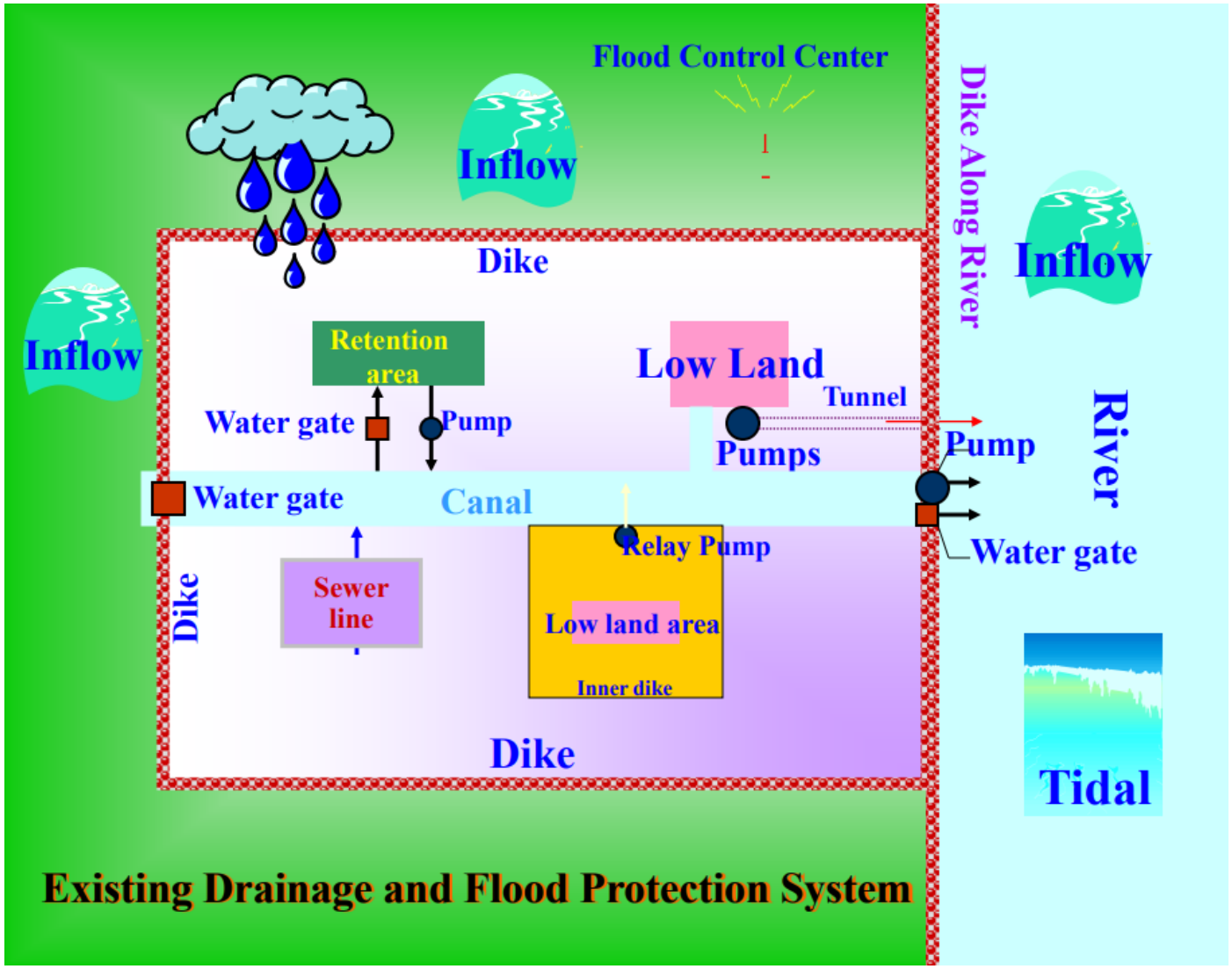
กราฟเปรียบเทียบปริมาณฝนรายเดือนสะสม
สำนักการระบายน้ำ กรุงเทพมหานคร



Monthly rainfalls

กราฟเปรียบเทียบปริมาณฝนรายเดือน
สำนักการระบายน้ำ กรุงเทพมหานคร

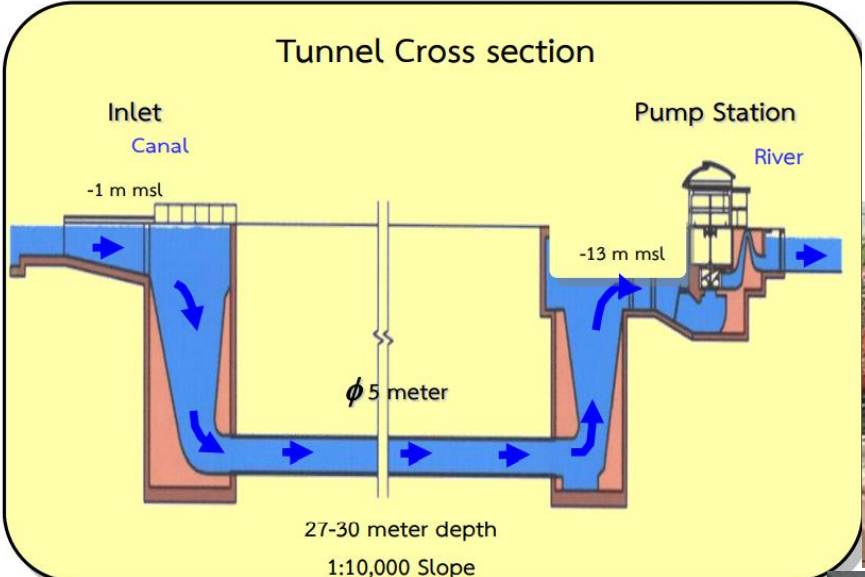




Flood mitigation

- Dike along the river and canals
- Drainage system was designed for rainfall intensity of 60 mm/hr (5 years return period)
- 1,682 canals, 2,600 km long
- 6,400 km long of drainage pipe (1,640 km in main roads)
- 409 pumping stations, total capacity is 1,690 cms.
- 7 tunnels with capacity of 155.5 cms, 19 km long.
- 25 retention ponds, a total volume of 13.03 milliom cms
- Flood control center





Repair flood walls along the River and Canal



Elevated of Existing Road at Eastern Bangkok (King's Dike)



Phracharoum-chai Road



Hathaimit Road

Concrete Barrier



Dredging of drainage Canals

Before



Dredging



After



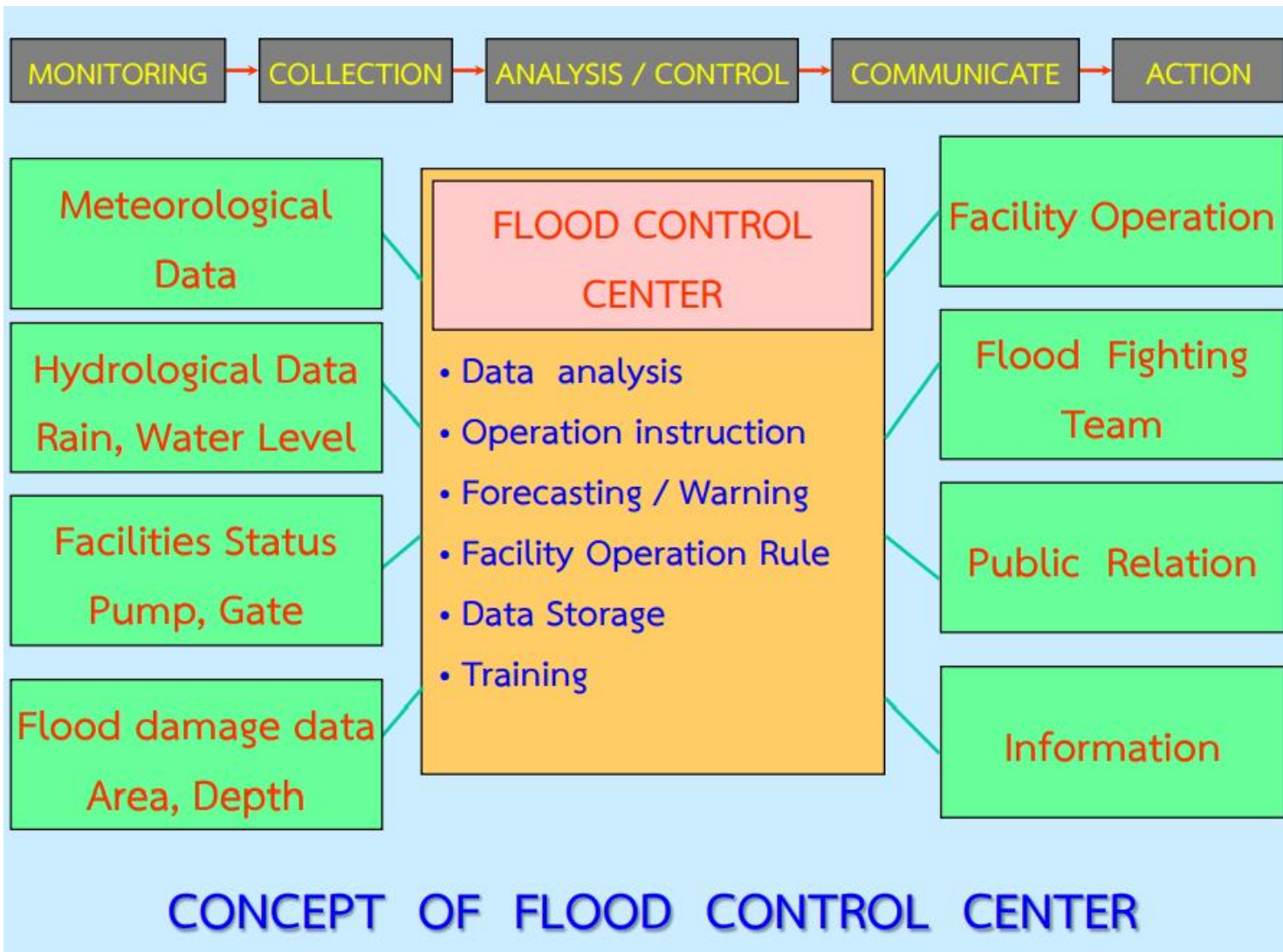
Khlong Mao Taek



Khlong Sam

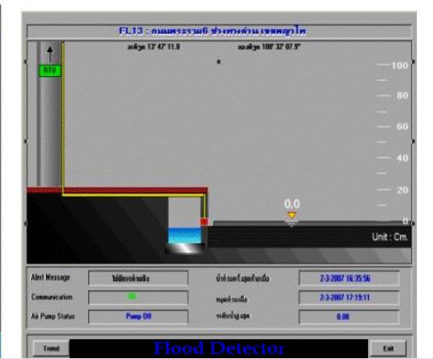
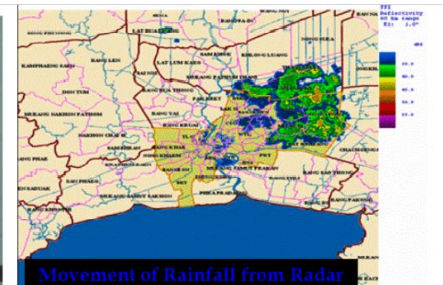


Khlong Nhung



Flood Control Center (FCC)

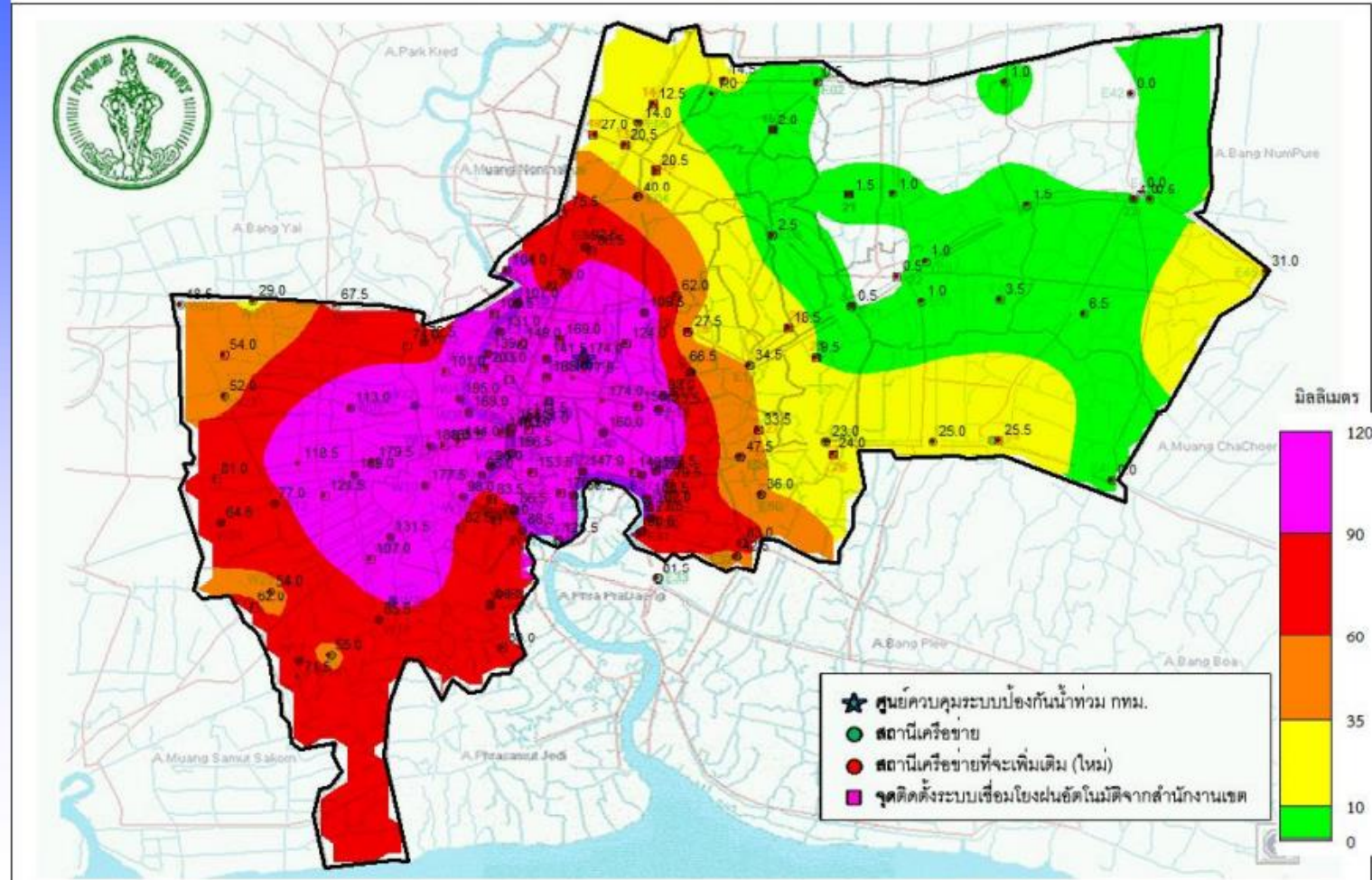
- Master Station
- 76 Remote Terminal Units (SCADA)
- A C-Band Radar Located at Phasi Charoen on the western side of Chao Phraya River. Extend 2 C-Band Radars in 2015, Located at Eastern and Western Bangkok.
- 127 Ground Rain Gauge Stations
- 71 Flood Detectors on the main road
- 113 Water Level Sensors in the main canal
- 54 Gate Opening Sensors
- 35 Pump Operation Sensors
- 17 CCTV Camera

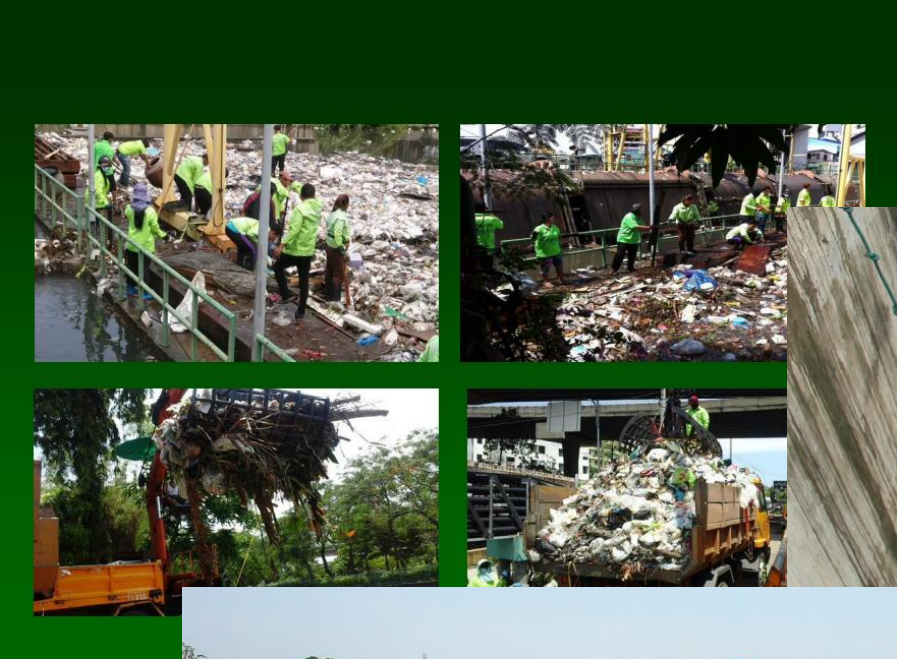


Accumulate Rainfall from SCADA

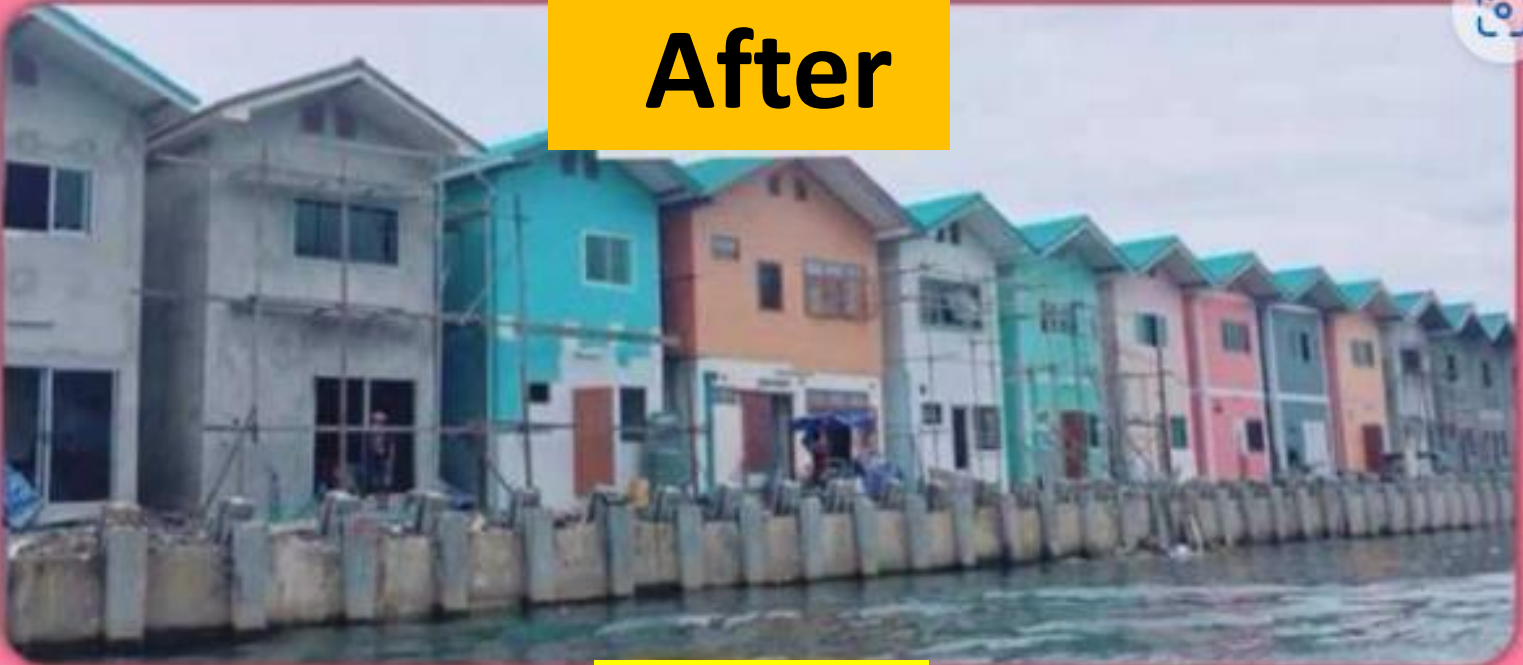
ปริมาณฝนสะสมในพื้นที่กรุงเทพมหานคร

วันที่ 13 ตุลาคม พ.ศ. 2560 เวลา 23.00 น. ถึงวันที่ 14 ตุลาคม พ.ศ. 2560 เวลา 05.00 น.





After



Before



BANGKOK RESILIENCE STRATEGY

SAFE, LIVEABLE & SUSTAINABLE CITY FOR ALL

Strategic Area

**#1:
INCREASING
QUALITY OF LIFE**

**#2:
REDUCING RISK
AND INCREASING
ADAPTATION**

**#3:
DRIVING A STRONG
AND COMPETITIVE
ECONOMY**

Goal

#1: Health and wellbeing for all city residents, now and into the future

#2: Safe, Accessible and Convenient Transportation Network

#3: Environmentally friendly Urbanization

#4: Improving the City's Flood Resilience

#5: Increase Public and Community driven action on awareness, preparedness and Adaptation

#6: Stronger Institutional Capacity and Regulation

#7: Facilitating City and Community-based economy

#8: Expanding Tourism, Service Industry and Hospitality

- 1.1 Promoting healthy living and lifestyles
- 1.2 Epidemic prevention in urban communities
- 1.3 Preparing for quality aging

- 2.1 Integrated mass transport system
- 2.2 Improving traffic flow in the city
- 2.3 Reducing road related deaths through influencing driver behavior and new technologies

- 3.1 Green growth: Supporting Environmentally Friendly Growth and Sustainable Waste Management
- 3.2 Encouraging low carbon transport
- 3.3 Growing green space

- 4.1 Catchment management strategy and vision for the Chao Phraya Basin
- 4.2 Community water resource management programs
- 4.3 Urban flood defence

- 5.1 Community based adaptation and disaster preparedness and communication
- 5.2 Making better use of technology for public communication and disaster preparedness

- 6.1 Capacity building for disaster risk reduction in BMA
- 6.2 Resources and infrastructure for better preparedness and response

- 7.1 Supporting economic resilience in communities and encouraging the preservation of agriculture in the city
- 7.2 Establishment of a Bangkok center for economic development, trade and finance

- 8.1 Providing skills development for tourism operators
- 8.2 Resources and Infrastructure for Better Response and Preparedness