

Disaster Management and Climate Change Adaptation

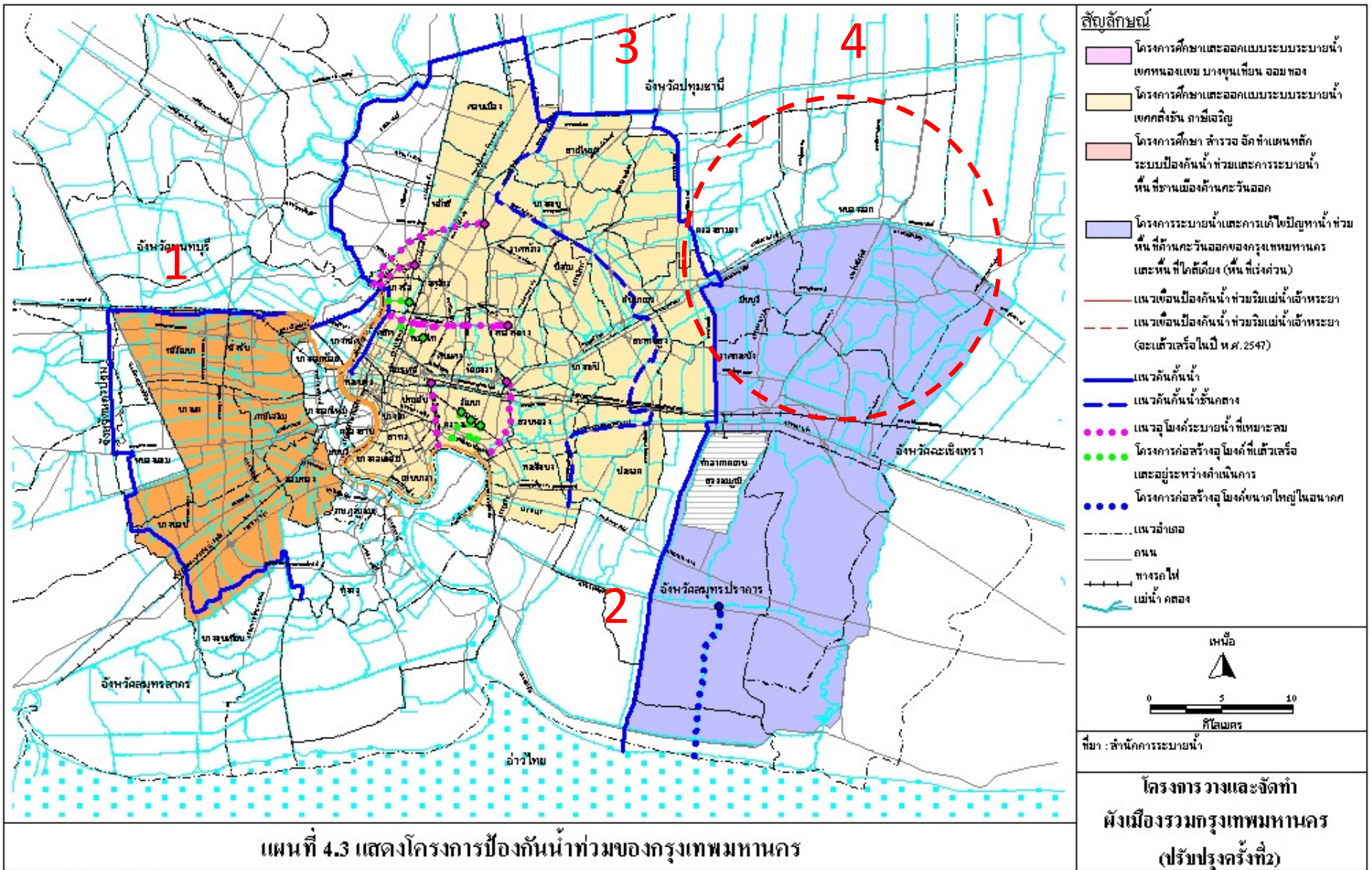
Part of the research called *“Enhancing adaptation to climate change by Integrating climate risk into long-term development plans and disaster management”* (Mumbai, Manila and Bangkok) funded by the APN (2010-2011)

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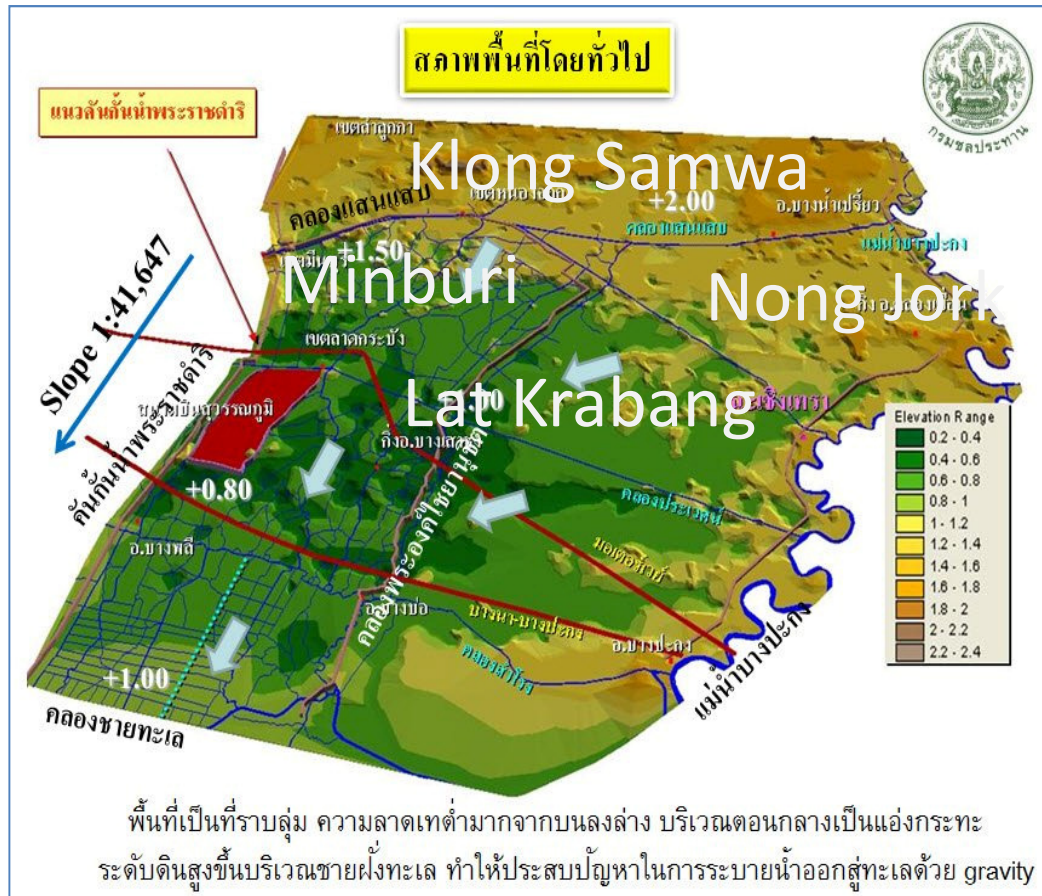
the 2nd Asia-Pacific Climate Change Adaptation Forum
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Bangkok's flood prevention plan



Study Areas

Case: 2006 Flood



The low-lying topography that characterizes much of the city is especially evident in eastern Bangkok. In the case study districts, the average land elevation is just 0.8-1.5 MSL, compared to 1.0-2.0 for Bangkok as a whole. The terrain slopes down from east to west and north to south

This study examines the impact of the 2006 floods, with a focus on four districts in the eastern region of Bangkok:

Minburi Area 63.6 km²
Pop. Density 2,092 person/km²

Nong Jork Area 236.3 km²
Pop. Density 625 person/km²

Lat Krabang Area 123.9 km²
Pop. Density 1,398 person/km²

Klong Samwa Area 110.7 km²
Pop. Density 1227 person/km²

Impact Assessment of the 2006 flood

12 communities in total from the 4 districts were selected for the surveys. These were a mix of poor and middle-income communities

Sample communities in case study districts

District	Communities	Income level
<i>Nong Jork</i>	Lampakchee and Lamtaoting	Poor
<i>Minburi</i>	Jairanai, Garden Home and Buakaw	Middle-income
<i>Ladkrabang</i>	Sudthawad and Leabklongmorn	Poor
<i>Klongsamwa</i>	Teerawan and Baanpoon	Middle-income

Proxies for gauging flooding effects, by sector

Sector	Proxies
<i>Household</i>	Flood level / Flood duration / Cost of physical damage / Work absence / Health (physical and mental)
<i>Agricultural</i>	Flood level / Flood duration / Cost of physical damage / Work absence / Product price
<i>Business</i>	Flood level / Flood duration / Cost of physical damage / Work absence / Stock / Custom and trade
<i>Industrial</i>	Flood prevention plan ^{civil}

Impact Assessment of the 2006 flood

Proxy measurements for flood-related costs of flooding, by sector

HOUSEHOLD SECTOR					
Proxy variables	Sub-proxies				Total
Loss Incurred	<i>Food and utilities</i>	<i>Transportation</i>	<i>Repairs</i>	<i>Flood prevention</i>	
	15,000	600	25,000	5,000	44,400
Work absence	<i>Daily income</i>	<i>Day (s) absent</i>			
	300	3			900
Health	<i>Medication</i>				
	300				300
					45,600

BUSINESS SECTOR					
Proxy Variables	Sub-Proxies				Total
Loss Incurred	<i>Lost customers</i>	<i>Stock damage</i>	<i>Repairs</i>	<i>Flood prevention</i>	
	15,000	5,000	5,000	5,000	30,000
Work absence	<i>Expenses (workers)</i>	<i>Day(s) absent</i>			
	300	3			900
					30,900

AGRICULTURAL SECTOR		
Proxy Variables	Sub-Proxies	
Loss Incurred	<i>Field damage</i>	<i>Flood prevention</i>
	30,000	12,000
		42,000
Work Absence	<i>Daily income</i>	<i>Day(s) absent</i>
	500	30
		15,000
		57,000

*Intensity of costs by month, district and sector, August-November
2006 and 2010*

MINBURI

Household Impact (2006)								
Month	Community			Home			Work	Health
	Level	No.	Loss	Level	No.	Loss		
August								
September								
October								
November								

Household Impact (2010)								
Month	Community			Home			Work	Health
	Level	No.	Loss	Level	No.	Loss		
August								
September								
October								
November								

NONG JORK

Household Impact (2006)								
Month	Community			Home			Work	Health
	Level	No.	Loss	Level	No.	Loss		
August								
September								
October								
November								

Household Impact (2010)								
Month	Community			Home			Work	Health
	Level	No.	Loss	Level	No.	Loss		
August								
September								
October								
November								

KLONG SAMWA

Household Impact (2006)								
Month	Community			Home			Work	Health
	Level	No.	Loss	Level	No.	Loss		
August								
September								
October								
November								

Household Impact (2010)								
Month	Community			Home			Work	Health
	Level	No.	Loss	Level	No.	Loss		
August								
September								
October								
November								

LAD KRABANG

Household Impact (2006)								
Month	Community			Home			Work	Health
	Level	No.	Loss	Level	No.	Loss		
August								
September								
October								
November								

Household Impact (2010)								
Month	Community			Home			Work	Health
	Level	No.	Loss	Level	No.	Loss		
August								
September								
October								
November								

Key to table

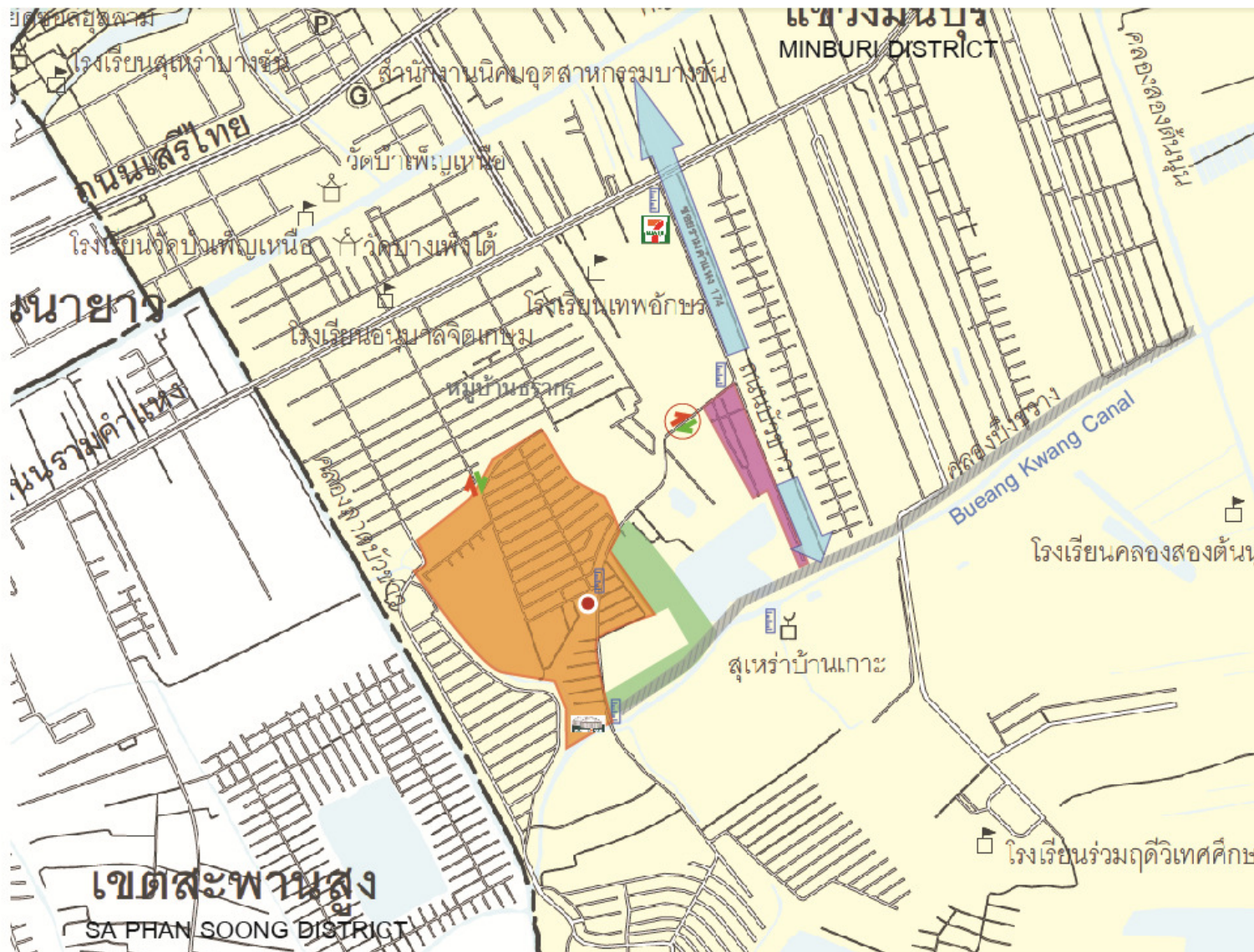
	Flood Level	No.of flood days	Loss Incurred	Work Absence	Health
High	30 cm	> month	>10,000	> week	Admission
Medium	15 cm	1-4 week	5,000-10,000	3-5 days	District Officer
Low	5 cm	< week	<5,000	1-2 days	Store Purchases
No Impact	No impact	No impact	No impact	No impact	No impact

2006 Flood

PROXY PARAMETERS	Household Sector (300HH)								Agricultural Sector(50)			Business Sector(30)	
	Community				Home								
	<10,000	10,000-30,000	30,000-50,000	>50,000	<10,000	10,000-30,000	30,000-50,000	>50,000	Farm	Livestock	Fishery	Consumer Goods	Services
Flood Level	57.14%	54.07%	52.22%	63.16%	32.14%	41.48%	47.78%	42.11%	45.45%	66.67%	60.00%	68.75%	57.14%
No. of Days Flooded	62.50%	47.41%	52.00%	52.63%	57.14%	38.52%	44.44%	42.11%	78.79%	75.00%	80.00%	56.25%	57.14%
Loss Incurred	44.64%	43.70%	45.56%	31.58%	30.36%	28.15%	28.89%	36.84%	42.42%	50.00%	40.00%	43.75%	50.00%
Work Absence	*	*	*	*	80.36%	87.41%	85.33%	84.31%	90.91%	91.67%	80.00%	56.25%	42.86%
Health	*	*	*	*	66.07%	59.26%	74.44%	68.42%	*	*	*	*	*
Production Price	*	*	*	*	*	*	*	*	75.76%	58.33%	100.00%	*	*
Stock	*	*	*	*	*	*	*	*	*	*	*	31.25%	*
Customer	*	*	*	*	*	*	*	*	*	*	*	43.75%	64.29%

Key to table

	Flood Level	No.of flood days	Loss Incurred	Work Absence	Health
High	30 cm	> month	>10,000	> week	Admission
Medium	15 cm	1-4 week	5,000-10,000	3-5 days	District Officer
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No Impact	No impact	No impact	No impact	No impact	No impact



BUA KHAOW COMMUNITY MINBURI BANGKOK

Legend

- Bua khaow Community
- Charoenchai Community
- Vangthongpatana Community

- Assembly Point
- Main Entrance
- Sub Entrance
- Water Level Point
- Treatment Plant
- Road
- Canal

- Flood Prevention Proposal 1
- Dyke
- Flood Prevention Proposal 2
- Drainage System

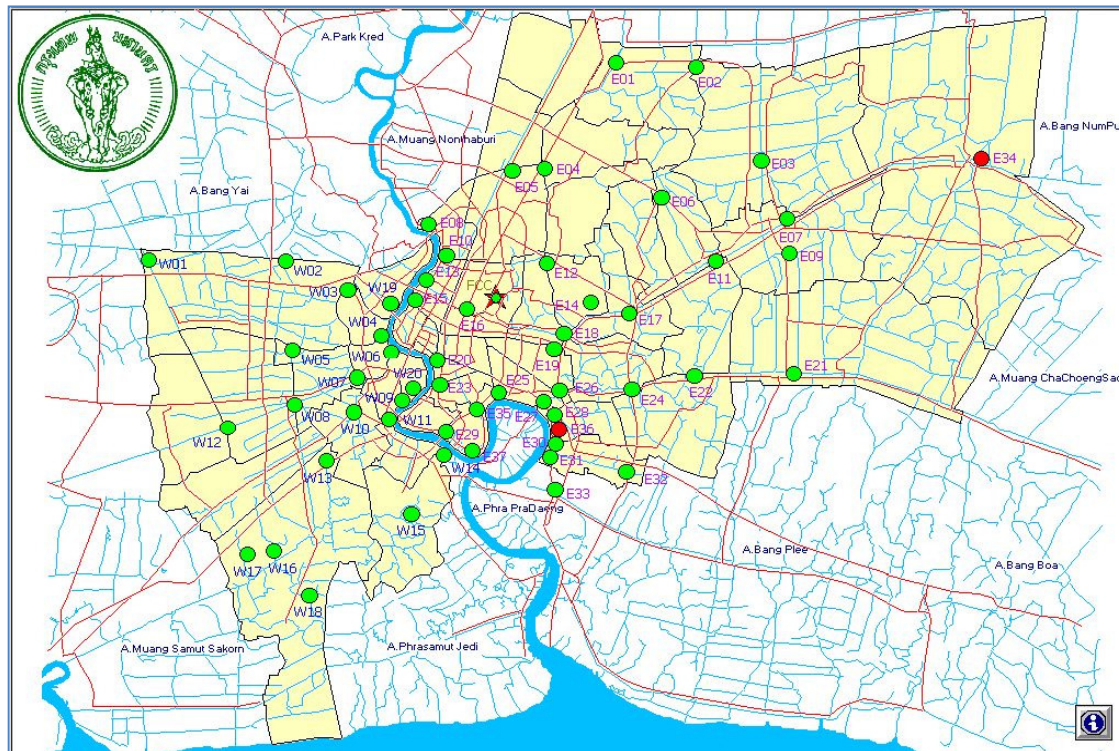


Current Adaptation Measures

Structural and non-structural flood prevention measures

STRUCTURAL MEASURES	NON-STRUCTURAL MEASURES	
Water management	Land use control	Loss reduction
Main pump	Land regulations	
Polder embankments	Public information/education	
Dykes	Flood proofing	
Retention area (basin)		
Canal improvement	Flood forecasting/ warning	
Drainage (inner pumps, sub-khlong, pipes)		Flood fighting

Flood control centers, Bangkok



To date, the emphasis has been weighted too heavily on mitigation and short term prevention, generally through structural means. The BMA's strategies focus primarily on three approaches

Flooding prevention: this is achieved through both structural and non-structural measures. While the former is typically employed in dense, inner city districts, the latter is often favored in low density residential and agricultural areas.

Post-flood disaster recovery: focused on immediate mitigation through operating and maintaining pumping and drainage capacity, as well as developing a short term action plan.

Medium-term post-flood disaster recovery: maintaining existing infrastructure and constructing additional capacity to sustain and enhance protective capacity, accompanied by measures to prevent and resolve flooding. Careful coordination, monitoring and evaluation is necessary to achieve this.