

Wastewater Management in Urban Area: Bangkok, Thailand



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Presentation Outline

- **Thailand at a Glance**
- **Urban Water Quality Management in Thailand**
- **Situation of Water Quality in Bangkok**
- **Current Measures on Water Quality Management in Bangkok**
- **Future Development Plan on Water Pollution Control in Bangkok**
- **Conclusion and Recommendations**

Thailand at a Glance



- Thailand is situated in the heart of the Southeast Asian mainland, covering an area of 513,115 sq.km. and extends about 1,620 km from north to south and 775 km from east to west.
- Thailand has a warm, tropical climate affected by a seasonal monsoon.
- Population 64 million and density about 132 people/km²
- Thailand can be divided into 25 river basins. The average of annual rainfall for the country is about 1,700 mm. The available water quantity was about 3,300 m³/ capita/year

Urban Wastewater Management in Thailand



1,687 Municipalities

MWW~2.5 M m³/d

BMA, Pattaya City

MWW. ~3.0 M m³/d

(6,089) LAOs

MWW~ 9.0 M m³/d

**The treatment capacity
~ 3.2 M m³/d
(~ 23 % of total MWW)**

**Total MWW~14.5 M
m³/d**

**Total BOD Loading
~ 2,600 Ton BOD/d**



Sources of Water Pollution in Thailand

Domestic :

- 1,687 Municipalities,
- 6,089 LAOs,
- BMA, Pattaya City
- Approximately 14.5 M m³/d

Industry :

- >120,000 factories
- Approximately 2.8 M m³/d

Agriculture :

- Pig farm+ Aquaculture (Point source) 0.1 M m³/d
- Paddy field (Non-point source) 150 M m³/d

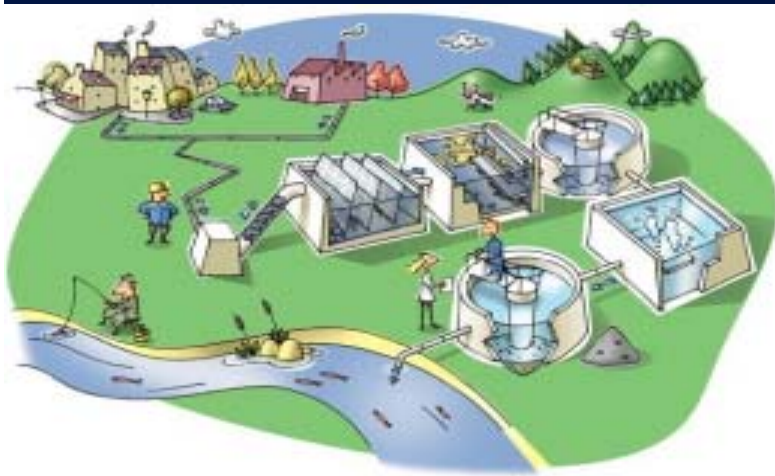


Urban Wastewater Management in Thailand

Urban Wastewater in the country:

- ❑ is one of the most serious environment problems.
- ❑ approximately 14.5 M m³/day of municipal wastewater generated by the population around the country (2008) :
 - ✓ (1,687) Municipalities ~ 2.5 M m³/d
 - ✓ (6,089) LAOs ~ 9.0 M m³/d
 - ✓ BMA, Pattaya City ~ 3.0 M m³/d
- ❑ 101 treatment plants in the country have been constructed (approximately 3.2 millions m³/day of the treatment capacity or 23 % of total wastewater)
- ❑ Major pollutant is organic waste.

Wastewater Collection and Treatment Systems



Central Wastewater Treatment

Design Criteria for Central Wastewater Treatment

The type of collection systems	BOD (mg/l)	SS (mg/l)
Combined Sewer System	65 - 110 (80)	40 - 110 (80)
Separate Sewer System	(160)	(160)

Combined Sewer System

: drain both rainfalls and wastewater within one system

Separate Sewer System

: the sewerage and drainage are collected in separate piping systems



Status of Municipal Wastewater Treatment Facilities in Thailand

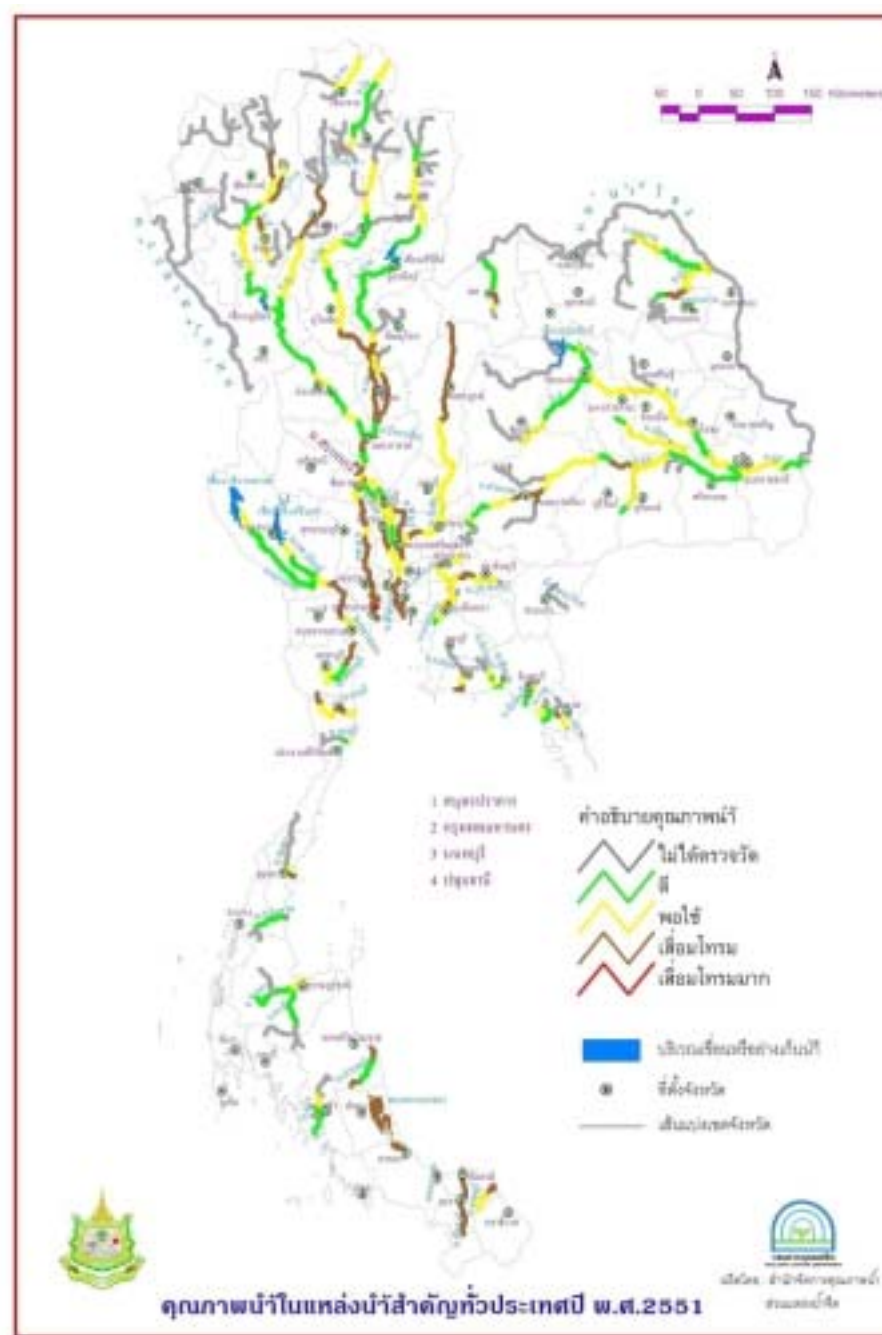
Location of 101 Municipal Wastewater Treatment Facilities in Thailand



- ● Constructed 90 Plants
- ▲ Under Construction 10 Plants
- Delayed (Samutprakan Province) 1 Plant



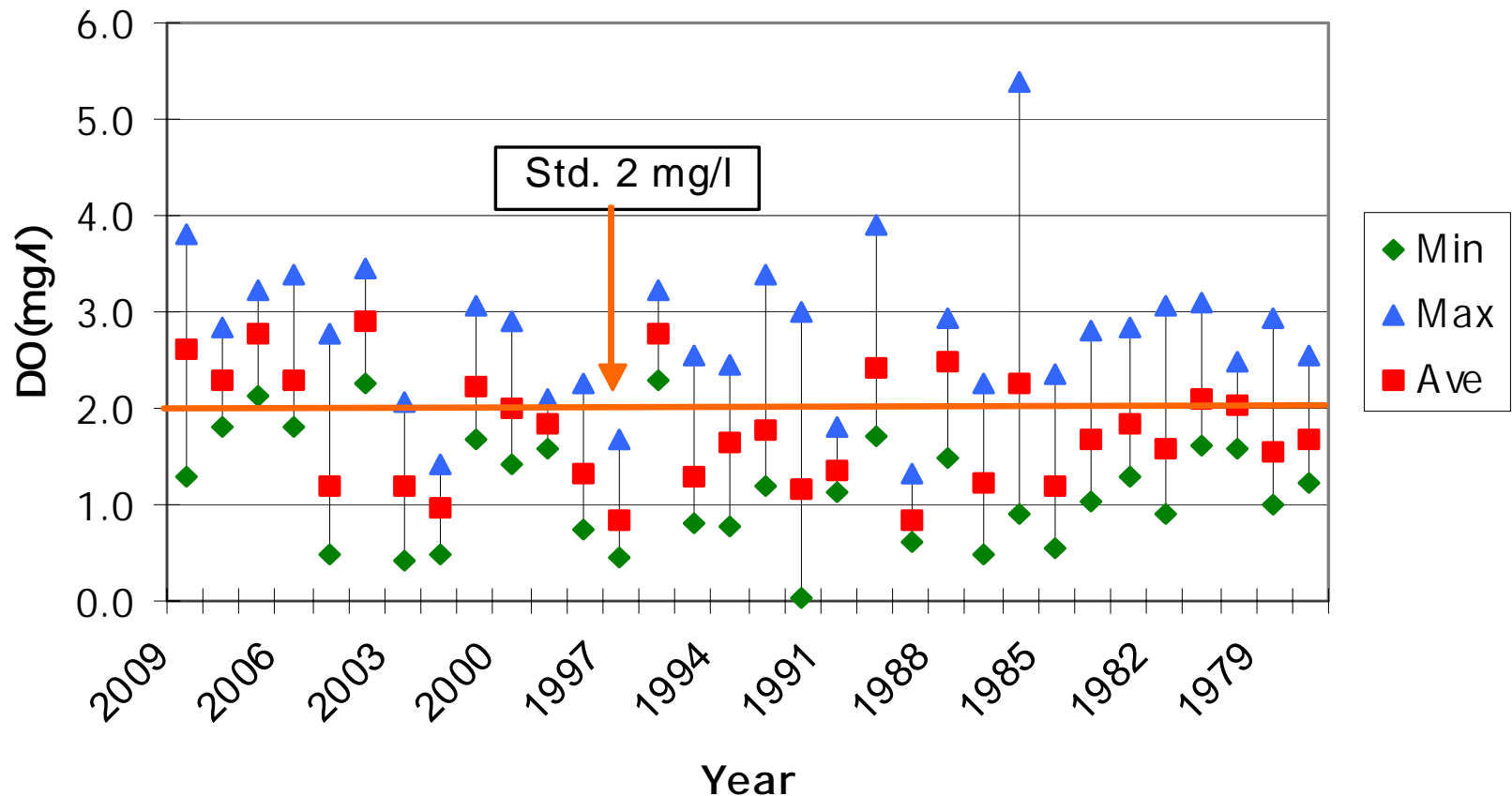
Situation of Water Quality in Thailand



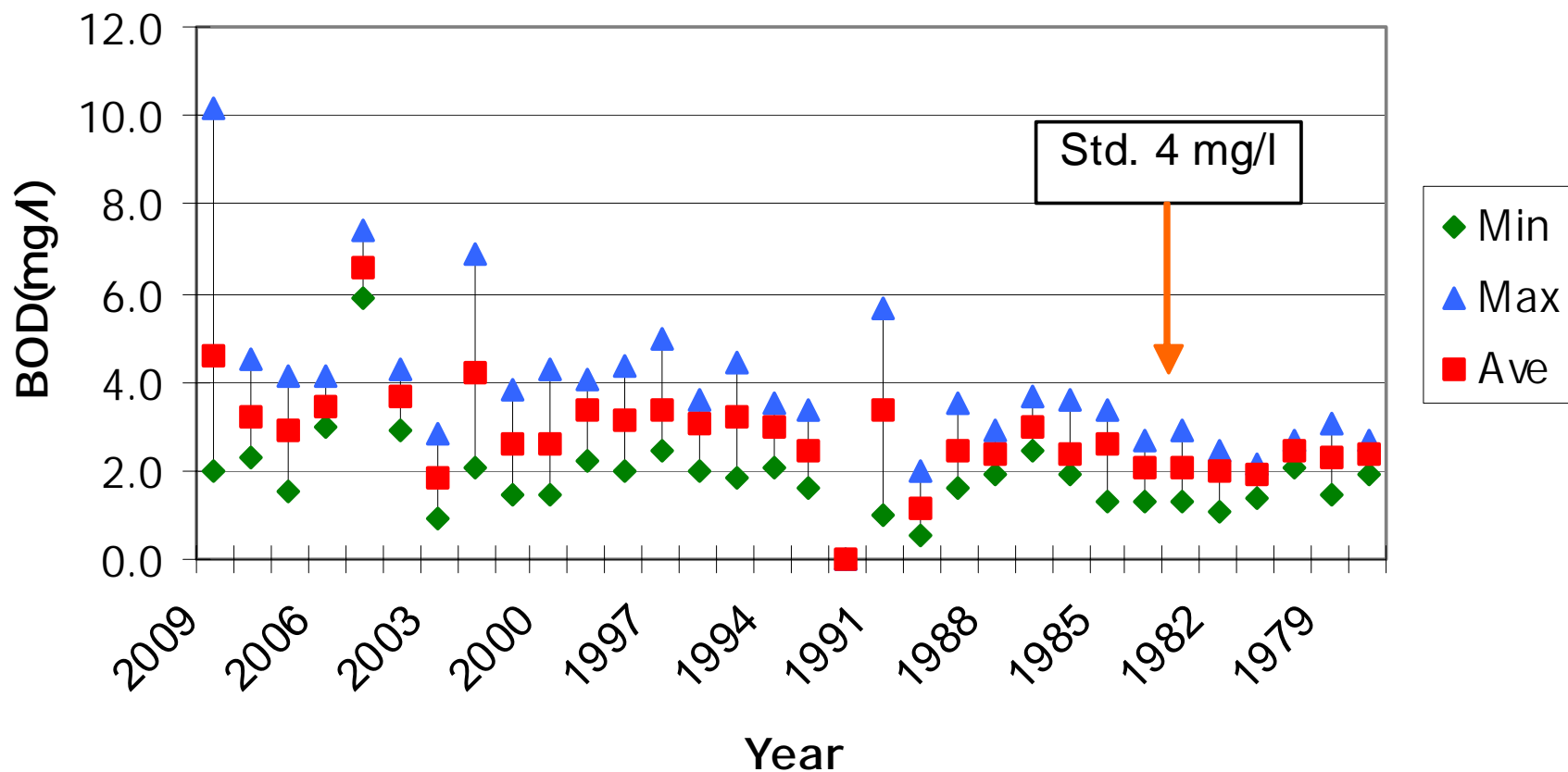
Situation of Water Quality in Bangkok



Dissolved Oxygen (DO) in the Lower Part of the Chao Phraya River from 1978 to 2009



Biochemical Oxygen Demand (BOD) in the Lower Part of the Chao Phraya River from 1978 to 2009



Current Measures on Water Quality Management in Bangkok

- **Implementation of Central Wastewater Treatment Projects**
- **Improvement of the Community Wastewater Treatment Plants**
 - The 12 community wastewater treatment plants from Housing Authority are now being operated by BMA with total capacity of 25,700 m³/day.
- **Canal Water Improvements**
 - The project provided re-circulation of clean water to the canals and to oxygenate canal water with aerators.
 - Three aerated lagoons systems for primary wastewater treatment in the city are operated.
- **Legislation Measures**
 - **Effluent Standards and enforcement**
- **Public Relation and Participation**
 - Public education and awareness raising
 - Canal clean up activities
 - Community participation e.g. water quality monitoring

Status of Central Wastewater Treatment Plants in Bangkok

Plants	Capacity (m3 / day)	Service Areas (km2)	Service Pop Treatment	Technology	Date of Operation
Si Phraya	30,000	2.7	120,000	Activated Sludge, AS (Contact Stabilization)	Jan 1994
Chong Nonsee	200,000	28.5	580,000	AS (Cyclic Sludge System)	Dec 1999
Ratanakosin	40,000	4.1	70,000	Two-Stage AS	May 2000
Thoong Kru	65,000	42.0	177,000	AS (Vertical Loop Reactor)	February 2002
Nong Kheam	157,000	44.0	520,000	AS (Vertical Loop Reactor)	February 2002
Din Deang (Phase I)	350,000	37.0	1,080,000	AS with Nutrient Removal	December 2003
Chatujak	150,000	33.4	432,500	AS	December 2005
Total	992,000	191.7	2,979,500		

Future Development Plan on Water Pollution Control

■ **Construction Measures**

- Three new wastewater treatment plants are to be constructed.

■ **Non-Construction Measures**

■ **Legislation Measures**

- Continue enforce of the effluent wastewater standards

■ **Public Relation Measures**

- Public participation and awareness raising

■ **Wastewater Discharge Fees**

- Implementation of the wastewater user charge

■ **Private Sector Participation**

- Public Private Partnership (PPP) for the management and administration of wastewater facilities

■ **Water Quality Monitoring and Evaluation**

- Routine water quality monitoring network set up and availability of water quality monitoring data

Conclusion and Recommendations

- Decentralized wastewater management systems would also be useful and appropriate for large and mega cities.
- Sustainable management wastewater reclamation requires synergistic interactions among the government, private sectors and community sectors.
- The lesson learned for the implementation of central wastewater treatment system in Bangkok,
 - Planning in advance and at the same time of city planning
 - Treatment technology depending on available land and the operation and maintenance the system
 - Public awareness and the acceptance of the treatment system to support willing to pay for user charges
 - Law compliance and enforcement for the effluent standards for individual buildings /factories /central wastewater treatment facilities

Conclusion and Recommendations (Cont.)

- Best management practices on water environment management for tropical region should be shared to cover both point and non-point sources pollution.
- Co-benefits approach of water environment management and climate change mitigation should be considered for the 2nd WEPA emerging activities;
 - Biogas production and utilization to reduce methane (GHG) emission from wastewater discharges
 - Wastewater reuse and recycle to land application

THANK YOU

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