Development of Klongs (Canals) and History of Sewage works in Bangkok

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December 2007

DO in major canals, mg/l

CITY OF BANGKOK
- 1569 km²
- 2.2 million Households
- 6000 km Combined Sewers
- 2284 km Canals
- 280 Sampling Points in 84 Main Canals
Forecasted Water Quality in Chao Phraya River
JICA, 1981

BOD (mg/l)

Future with no sewerage
RB : Rama VI Bridge
MB : Memorial Bridge
BP : Bangkok Port
SP : Samut Prakan

DO (mg/l)

Wastewater Quantity in
Bangkok Area

Household
Commercial Building
Industry
Total

2.7 million m³/day in 2007
1968  Sewerage Master Plan by CDM Cover 370 km²
1981  Sewerage Master Plan by JICA 37,000 ha divided into 10 Zones
1992  Master Plan of Wastewater Management by PCD and Macro Consult

1992  National Environmental Quality ACT
1998  Cabinet Resolution to Construct Wastewater Treatment Plant Cover 100 km² (inner city)
1999  Master Plan of Wastewater Sludge and Effluent Reuse by JICA Propose 20 Zones in Bangkok

Combined Sewer System

BOD   20 mg/l
SS    30 mg/l
Total Nitrogen 10 mg/l
Total Phosphorus 2 mg/l
DO     5 mg/l
Ammoniacal Nitrogen 5 mg/l
Bangkok Wastewater Treatment Plant

Bang Sue (Preparation for Bidding Process)
Thon Buri (Feasibility Study)
Rattanakosin (May 2000)
Nong Khaem (Feb. 2002)
Thung Khru (Feb. 2002)
Chon Nonsi (Dec. 2000)
Klong Toei (Forwarding)
Chet Tu Chak (Mar. 2005)
Din Daeng (Oct. 2004)
Si Phraya (Jan. 1994)

Muti Stories or Underground WTPs Require 0.10 – 0.50 m² / m³ per day

Chon Non Si Water Environment Control Plant

Bang Sue Environmental Education and Conservation Project
<table>
<thead>
<tr>
<th>Water Environment Control Plant</th>
<th>Area (km²)</th>
<th>Population</th>
<th>System</th>
<th>Capacity (m³/day)</th>
<th>Source of Fund</th>
<th>Cost (Million Baht)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangkok Wastewater Treatment Project</td>
<td>BMA. : GOV.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1. Si Phraya</td>
<td>2.7</td>
<td>120,000</td>
<td>Contact Stabilization A.S.</td>
<td>30,000</td>
<td>BMA. 100%</td>
<td>464</td>
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<tr>
<td>2. Rattanakosin</td>
<td>4.1</td>
<td>70,000</td>
<td>Two Stage A.S.</td>
<td>40,000</td>
<td>GOV. 100%</td>
<td>883</td>
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<tr>
<td>3. Din Daeng</td>
<td>37</td>
<td>1,080,000</td>
<td>Activated Sludge</td>
<td>350,000</td>
<td>25 : 75</td>
<td>6,382</td>
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<tr>
<td>4. Chong Non Si</td>
<td>28.5</td>
<td>580,000</td>
<td>Cyclic Activated Sludge System</td>
<td>200,000</td>
<td>40 : 60</td>
<td>4,552</td>
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<td>5. Nong Khaem</td>
<td>44</td>
<td>520,000</td>
<td>Vertical Loop Reactor A.S.</td>
<td>157,000</td>
<td>40 : 60</td>
<td>2,348</td>
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<td>6. Thung Khru</td>
<td>42</td>
<td>177,000</td>
<td>Vertical Loop Reactor A.S.</td>
<td>65,000</td>
<td>40 : 60</td>
<td>1,760</td>
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<td>7. Cha Tu Chak</td>
<td>33.4</td>
<td>432,000</td>
<td>Cyclic Activated Sludge System</td>
<td>150,000</td>
<td>60 : 40</td>
<td>3,482</td>
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<td>8. Community Plant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Plants</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SUM</td>
<td>191.7</td>
<td>2,979,000</td>
<td></td>
<td>1,017,700</td>
<td></td>
<td>19,871</td>
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</table>

<table>
<thead>
<tr>
<th>Future BMA. Wastewater Treatment Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bang Sue EEC</td>
</tr>
<tr>
<td>2. Klong Toei</td>
</tr>
<tr>
<td>3. Thon Buri</td>
</tr>
<tr>
<td>SUM</td>
</tr>
</tbody>
</table>

**Lessons Learned from BKK Wastewater Management**

1. **National and Local Government Policy & Planning**
   *(Master Plan → Action Plan), Government Subsidy*

2. **Project Feasibility**
   *(Service area, Population served, Land for construction of WWTP, Appropriate technology)*

3. **People Participation and Consultation**

4. **Outsource of O & M**

5. **Future of House Connection**
Thank You For Your Attention