Planning for Urban Wastewater Management

Outcomes through better data and planning
Data Sources

Primary Data (data collected by the investigator from primary sources for the first time from scratch)

- Observations
- Survey
- Questionnaire
- Meetings with locals

Secondary Data (data already in existence which has been previously collected by someone else for other purposes)

- Government records
- Previous reports
- Journals
- Satellite Imageries
Before Planning

• Objective
• Need for Planning
• Outcomes
• Basic Design Considerations
Basic Design Considerations

- Engineering considerations
- Institutional aspects
- Environmental considerations
- Treatment process
- Financial aspects
- Legal issues
- Community awareness
- Inter and Intra departmental coordination
Engineering Considerations

- Design Period & population
- Topography
- Depth of groundwater table
- Soil bearing capacity and type of strata
- On-site disposal
- Existing water supply, sewerage and sanitation
- Reuse Options & Potential
- No-Go Areas
Institutional Aspects

- Capability of existing local authority and their Guides
- Revenue collection and reliability
- Capacity building needs
- Public Private Partnership
Environmental Considerations

- Surface Water Hydrology and Quality
- Ground Water Quality
- Coastal Water Quality
- Public Health
- Landscaping
Where,

\[ Q = \frac{204}{\sqrt{t}} \]

Where,

- \( Q \) = max rate of discharge of effluent applied in l/day/m²
- \( t \) = Standard Percolation Rate in Minutes, required for water to fall 25 mm

<table>
<thead>
<tr>
<th>Soil type</th>
<th>Basic infiltration rate (mm/hour)</th>
<th>Typical Footprint Needed per Urban Household (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sand</td>
<td>&gt;30</td>
<td>&lt;17</td>
</tr>
<tr>
<td>sandy loam</td>
<td>20 - 30</td>
<td>19</td>
</tr>
<tr>
<td>loam</td>
<td>10 - 20</td>
<td>26</td>
</tr>
<tr>
<td>clay loam</td>
<td>5 - 10</td>
<td>35</td>
</tr>
<tr>
<td>clay</td>
<td>1 - 5</td>
<td>55</td>
</tr>
</tbody>
</table>

**Soil Percolation Rate**

- Sand: >30 mm/hour
- Sandy loam: 20 - 30 mm/hour
- Loam: 10 - 20 mm/hour
- Clay loam: 5 - 10 mm/hour
- Clay: 1 - 5 mm/hour
Urban Centre/ Ward
Population -100,000
HH- 22,000
Septic Tank Coverage- 60% (15,000 HH)

Partially treated Waste water Released into environment over two years period.
-15000*500*730
-= 5.475 Billion Litres
(@100 litres/capita/day)

If say 40% BOD removed in Septic Tank-
Then 300* 60%* 5.475 Bn= 985500 Kg
= Open Defecation (Excreta) from 45000 pers/ day
released Within the town environment
Treatment Process

- SEWAGE FLOW AND CHARACTERISTICS
- DEGREE OF TREATMENT REQUIRED
- PERFORMANCE CHARACTERISTICS
Financial Aspects

- Capital costs
- Operating costs
- Financial sustainability
GIS and AI in planning

- Data-driven “intelligent” applications
- artificial intelligence algorithms and big data analytics
- fully understanding the underlying assumptions - GIGO
- Modelling for Techno-Economics
- Supervisory Control and Data Acquisition (SCADA)
Thank you