Alternative sewerage systems for the provision of sanitation services

Main learning from a study in Africa, Asia and Latin America

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WHAT DO WE MEAN BY “ALTERNATIVE SEWERAGE?”

Different from "conventional" sewerage because of:

• their technical features (small diameter pipes, short length, decentralised, etc.)

or

• the decentralized-driven approach for the management of the service

Small bore sewers, simplified sewerage, condominial sewerage ...

Always considered in this study as a solution that encompasses the three segments of the sanitation chain
Figure 5.1 Model of the layout of a small condominial sewerage scheme similar to the one used for demonstrations in Rio Grande do Norte, Brazil.
Aims of our study

• **Identifying strengths and weaknesses, regarding technical, financial and management issues**

• **In which context** small-bore sewers are relevant?

• **Which recommendations** for implementation?
Case studies and littérature review

The study was based on

• case studies, done with the support of national consultant:
  – Ramagundam, India, with Asit Nema, Foundation for Greentech Technologies
  – Salvador, Recife and Brasilié, Brazil, with Antonio da Costa Miranda Nieto
  – Kumasi, Ghana, with Lukman Y. Salifu, WasteCare Associates
  – Bamake and Mopti, Mali, with Assétou Sokona and Youssouf Cissé, Water and Sanitation for Africa
  – Dakar and Saint-Louis, Senegal

+ visit in Vietnam

• literature review
Why to focus on management issues
Alternative sewerage systems are widely disseminated all over the world.
But lot of them face difficulties

- Linked to the conception and dimensioning: not enough slope, Pipes level higher than household sanitation facilities level, etc.

- But the main issue is linked to the question of Management of the services:
  - Institutional management: unclear responsibilities and missing contractual framework and monitoring
  - O&M management: O&M skills are missing, operator is not clearly identified for each level of maintenance
  - Financial management: recurring operating costs are under-estimated, too few connexions, low collection rate of the sanitation fee, etc.
  - User relation management
Main learning:
Small sewer system does not mean small management!
Institutional management

- Clear role and responsibility of each stakeholders
- Contractual framework
- Real ownership by the Public authority (contracting authority)
- Monitoring and regulation mechanisms
O&M management

– A clear responsible identified for each levels of O&M:
  • 1st level: household equipment maintenance
  • 2nd level: routine small-bore sewer maintenance
  • 3rd level: maintenance of the entire system and routine maintenance of the main sewer lines
  • 4th level: lift pump and wastewater treatment plant O&M

– Service providers have the required capacity
1st level: household equipment maintenance

2nd level: routine small-bore sewer maintenance

3rd level: maintenance of the entire system and routine maintenance of the main sewer lines

4th level: lift pump and wastewater treatment plant O&M
1st level: household sewer equipment maintenance

<table>
<thead>
<tr>
<th>Task description</th>
<th>Who is responsible for the task?</th>
<th>Who carries out the task (provider)?</th>
<th>Equipment and tools required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deal with blockages and leaks (plumbing)</td>
<td>The users</td>
<td>The users themselves or a small informal private provider (plumber)</td>
<td>Picks, brushes</td>
</tr>
<tr>
<td>Clean the grease trap and connection boxes</td>
<td>The users</td>
<td>The users themselves or a small informal private provider (plumber)</td>
<td>Picks, brushes, trowels, shovels</td>
</tr>
<tr>
<td>Settled sewerage: check the level of the settling tank and have this emptied if necessary</td>
<td>The users</td>
<td>Informal private sector (manual or mechanical pit emptier)</td>
<td>Vacutug or vacuum truck</td>
</tr>
</tbody>
</table>
| Settled sewerage: check the level of the condominial settling tank and have the domestic tank emptied when necessary | The users or
Sewer operator under contract:
Private operator or
Community-based operator or
National public or local public operator | Operator under contract or one of their contractors (Private pit emptying companies) | Vacuum truck                  |
2nd level: routine small-bore sewer maintenance

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| Clean the sewer and manholes and remove (frequent) minor blockages (except main sewer lines) | The users themselves or Sewer operator under contract or Private operator under contract or Community-based operator or National public or local public operator | The users themselves or a small informal private provider (plumber, pit emptier, garbage) or sewer operator under contract: Private operator or Community-based operator or Public operator | Hand tools: Picks, brushes, flexible rods, spades, cleaning balls  
Mechanical equipment: High-pressure sewer cleaning equipment (Brazil) |
| Carry out corrective maintenance on the upstream section of the sewer: illegal connections, cracks, breakages | Sewer operator under contract: Private operator under contract or Community-based operator or National public or local public operator | Sewer operator | Visual (surface) inspection  
Inspection camera (Brazil) |
3rd level: heavy maintenance, maintenance of the entire system and routine maintenance of the main sewer lines

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<td>Remove major blockages on the upstream section of the sewer (small diameter pipes)</td>
<td>Users or Sewer operator under contract: Private operator under contract or Community-based operator or National public or local public operator</td>
<td>Sewer operator or A service provider (pit emptying company, for instance, as in Brazil)</td>
<td>Sewer cleaning pump (truck or pick-up)</td>
</tr>
<tr>
<td>Clean out the main sewer lines and their manholes and remove blockages</td>
<td>Sewer operator under contract: Private operator or Community-based operator or National public or local public operator</td>
<td>Sewer operator or A service provider (pit emptying company, for instance, as in Brazil)</td>
<td>Sewer cleaning pump (truck or pick-up)</td>
</tr>
<tr>
<td>Carry out corrective maintenance on the upstream section of the sewer: illegal connections, cracks, breakages</td>
<td>Sewer operator under contract: Private operator under contract or Community-based operator or National public or local public operator</td>
<td>Sewer operator</td>
<td>Visual (surface) inspection Inspection camera (Brazil) Other inspection tools Internal inspection by technicians on sewers with access</td>
</tr>
<tr>
<td>Undertake maintenance: replace damaged pipework, manholes and covers</td>
<td>Sewer operator under contract: Private operator under contract or National public or local public operator</td>
<td>Sewer operator or A service provider contracted by the sewer operator (public works company, for example)</td>
<td>Hand or mechanical digging tools Transport truck Lifting equipment, if required</td>
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4th level: lift pump and wastewater treatment plant repair and maintenance

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<td>Routine operation and maintenance of the pumping station: mechanical, electrical and hydraulic equipment, fuel supply, etc.</td>
<td>Sewer operator: under contract&lt;br&gt;Private operator or&lt;br&gt;National public or local public operator</td>
<td>Sewer operator</td>
<td>Possibly a permanent on-site technician (both caretaker and electromechanic)</td>
</tr>
<tr>
<td>Heavy maintenance of the pumping station</td>
<td>Sewer operator: under contract&lt;br&gt;Private operator or&lt;br&gt;National public or local public operator</td>
<td>Sewer operator or specialist electromechanical or hydraulic contractor</td>
<td>Engineer or high-level technician specializing in electromechanics</td>
</tr>
<tr>
<td>Emptying the lift station (removing sludge and sediment) (about once a year)</td>
<td>Sewer operator: under contract&lt;br&gt;Private operator or&lt;br&gt;National public or local public operator</td>
<td>Sewer operator (or conventional sewerage operator if different)</td>
<td>Lifting equipment, if required (if no gantry above the station)</td>
</tr>
<tr>
<td>Routine operation and maintenance of the decentralized treatment plant</td>
<td>Sewer operator: under contract&lt;br&gt;Private operator or&lt;br&gt;National public or local public operator</td>
<td>Sewer operator (or conventional sewerage operator if different)</td>
<td>Pump</td>
</tr>
<tr>
<td>Monitor the quality of wastewater discharges</td>
<td>Sewer operator: under contract&lt;br&gt;Private operator or&lt;br&gt;National public or local public operator</td>
<td>Sewer operator (or conventional sewerage operator if different)</td>
<td>Possibly a permanent caretaker-technician</td>
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<tr>
<td>Bypass in the event of heavy rains</td>
<td>Sewer operator: under contract&lt;br&gt;Private operator or&lt;br&gt;National public or local public operator</td>
<td>Sewer operator (or conventional sewerage operator if different) or specialist contractor (WWTP emptying company)</td>
<td>Dedicated engineer for overall monitoring of the WWTP</td>
</tr>
<tr>
<td>Heavy maintenance of the treatment plant</td>
<td>Sewer operator: under contract&lt;br&gt;Private operator or&lt;br&gt;National public or local public operator</td>
<td>Sewer operator (or conventional sewerage operator if different) or specialist contractor (WWTP emptying company)</td>
<td>Specialist technicians Cleaning and pumping equipment</td>
</tr>
<tr>
<td>Empty or clean the treatment plant (every 1 to 5 years, depending on the type of WWTP)</td>
<td>Sewer operator: under contract&lt;br&gt;Private operator or&lt;br&gt;National public or local public operator</td>
<td>Sewer operator (or conventional sewerage operator if different) or specialist contractor (WWTP emptying company)</td>
<td>Specialist technicians Cleaning and pumping equipment</td>
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Financial management

• Revenue collection
  – collecting contributions to the connection fee from new users;
  – collecting the sanitation fee from users to finance operations (paid directly to the operator or via the water operator if the sanitation fee is levied on the water bill);
  – identify users that have defaulted on payment, issue reminders, then implement debt recovery measures;
  – collect any additional funding (for instance, a municipal operating grant to finance operations. However, this type of funding is not recommended as it is rarely reliable over the long-term).

• Management of the disbursing expenses
• Monitoring operating income
User relations management

• Listening the expectations of the users and their difficulties regarding the service

• “Awareness-raising”
  
  to foster the assimilation of a range of good practices among users (hygiene, maintenance of household facilities, payment of fees and charges).

• Marketting and “Promotion”
  
  In order to stimulate demand
Conclusions

• Alternative sewerage systems are appropriated to specific contexts
• There are strong constraints in terms of management
  → Clarification of roles and responsibilities is needed
  → Professional capacities for the service provider is required
Available in the next few days:
→ Country case studies and Analysis report

Coming soon:
→ a guidebook

www.pseau.org/mini-egouts