

# Alternative sewerage systems for the provision of sanitation services

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



Christophe Le Jallé, pS-Eau  
Jean-Marie Ily, pS-Eau



# 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**

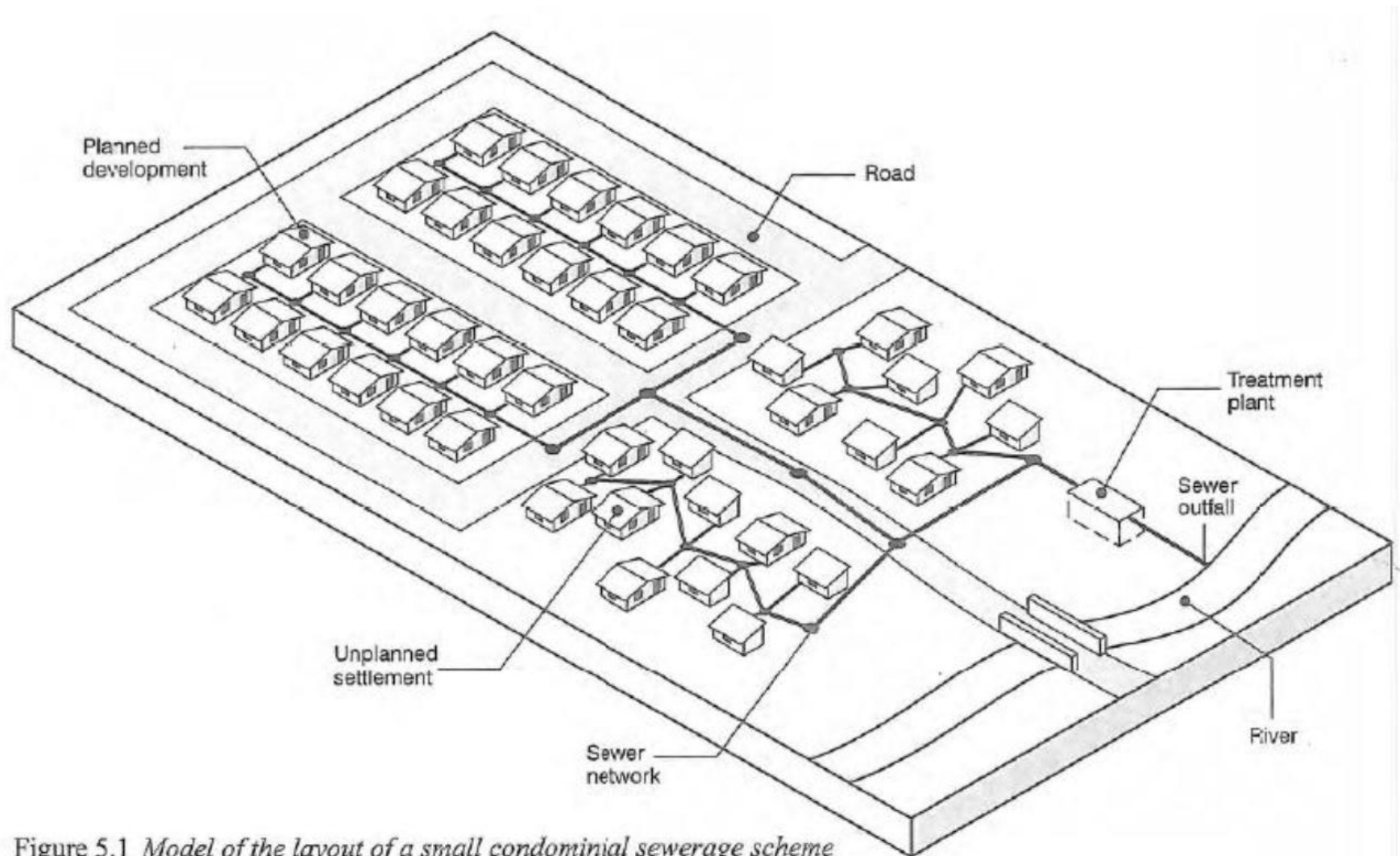


Figure 5.1 Model of the layout of a small condominial sewerage scheme similar to the one used for demonstrations in Rio Grande do Norte, Brazil

# 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**

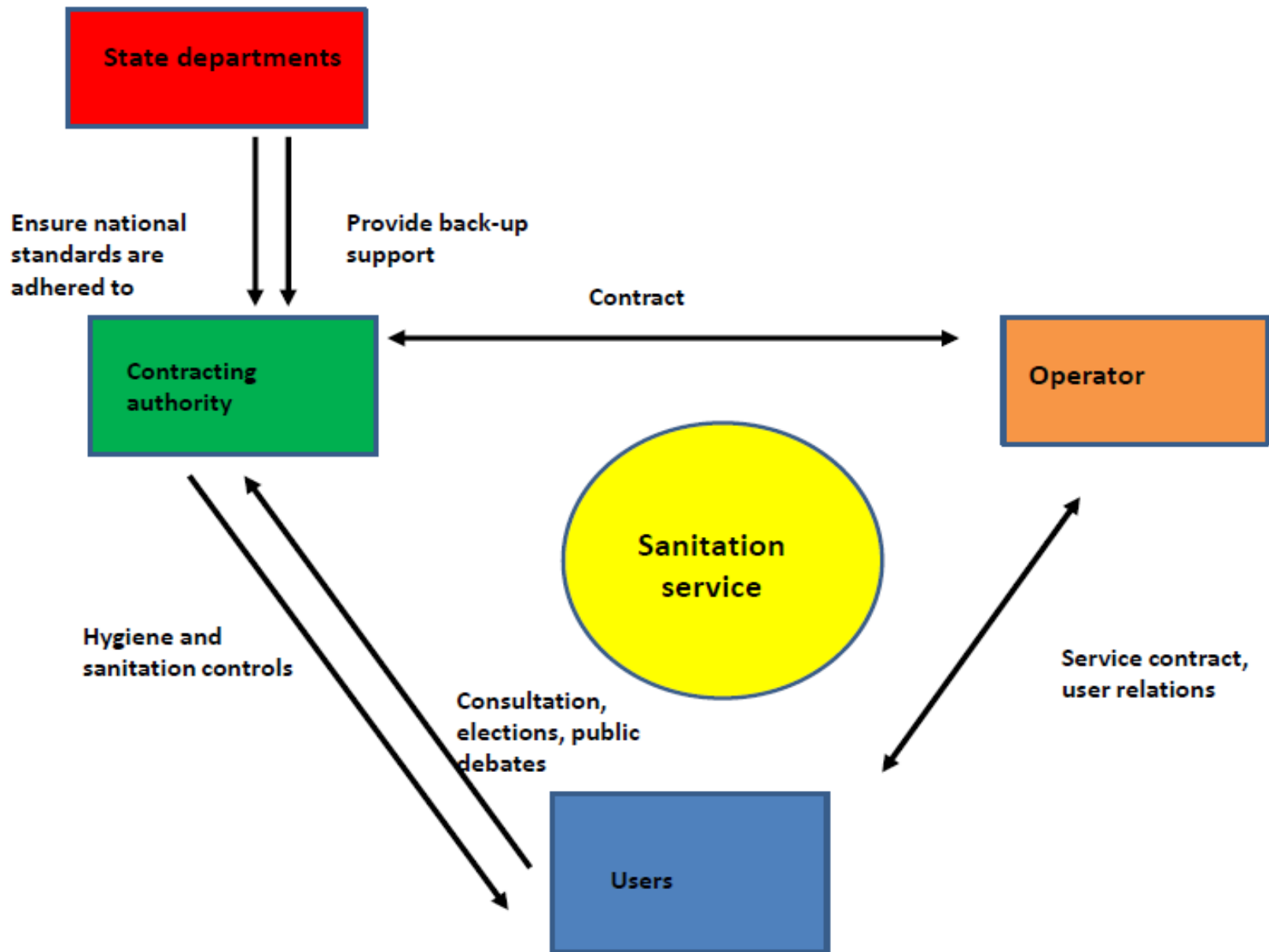


**Main learning:**

**Small sewer system  
does not mean small  
management!**

# Institutional management

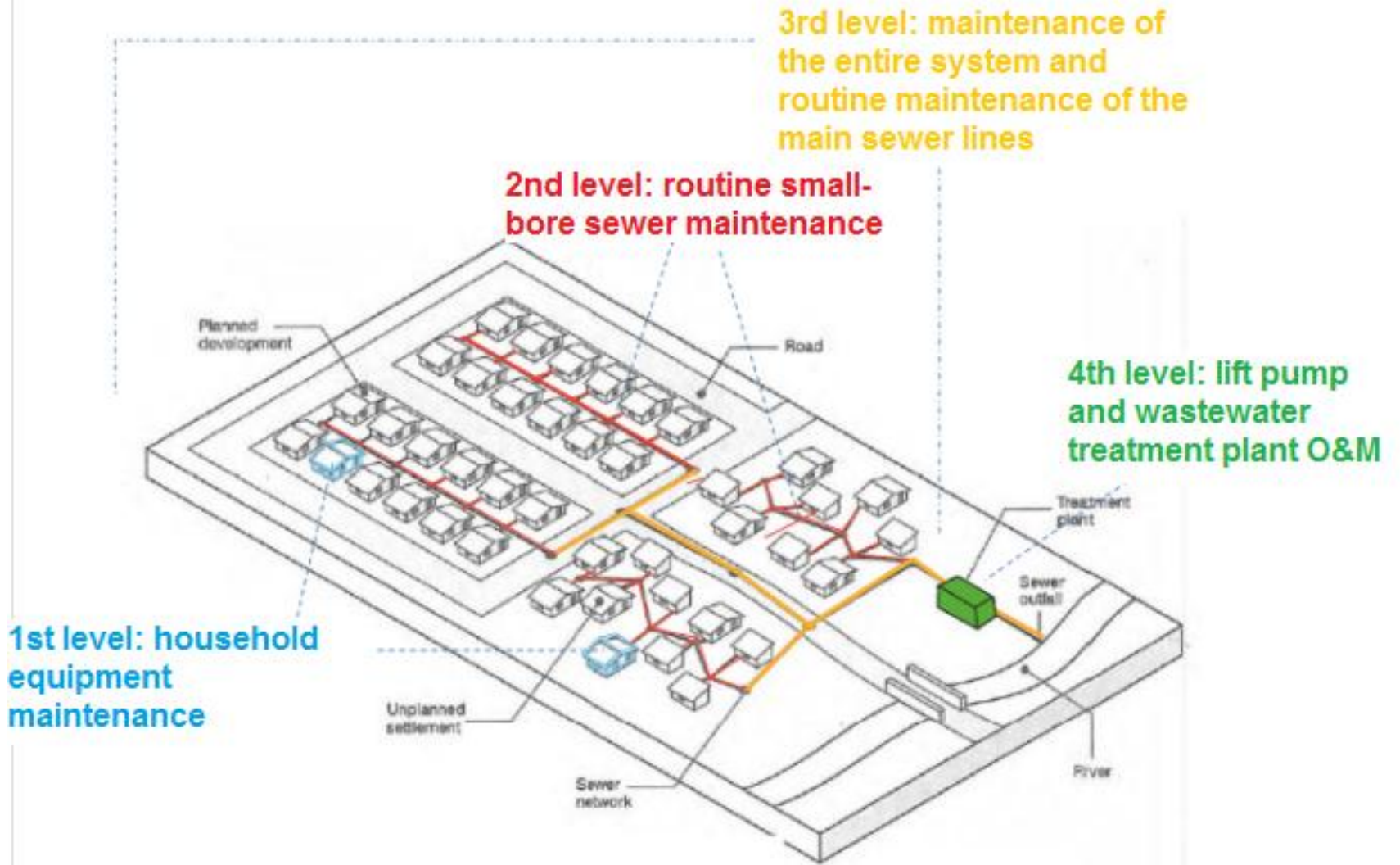
- Clear role and responsibility of each stakeholders
- Contractual framework
- Real ownership by the Public authority (contracting authority)
- Monitoring and regulation mechanisms



# O&M management



- A clear responsible identified for each levels of O&M:
  - 1<sup>st</sup> level: household equipment maintenance
  - 2<sup>nd</sup> level: routine small-bore sewer maintenance
  - 3<sup>rd</sup> level: maintenance of the entire system and routine maintenance of the main sewer lines
  - 4<sup>th</sup> level: lift pump and wastewater treatment plant O&M
- Service providers have the required capacity



## 1<sup>st</sup> level: household sewer equipment maintenance

Task description	Who is responsible for the task?	Who carries out the task (provider)?	Equipment and tools required
Deal with blockages and leaks (plumbing)	The users	The users themselves or a small informal private provider (plumber)	Picks, brushes
Clean the grease trap and connection boxes	The users	The users themselves or a small informal private provider (plumber )	Picks, brushes, trowels, shovels
Settled sewerage: check the level of the settling tank and have this emptied if necessary	The users	Informal private sector (manual or mechanical pit emptier)	Vacutug or vacuum truck
Settled sewerage: check the level of the condominal 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

## 2<sup>nd</sup> level: routine small-bore sewer maintenance

Task description	Who is responsible for the task?	Who carries out the task (provider)?	Equipment and tools required
<p>Clean the sewer and manholes and remove (frequent) minor blockages (<i>except main sewer lines</i>)</p>	<p>The users themselves or Sewer operator under contract: Private operator under contract or Community-based operator or National public or local public operator</p>	<p>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</p>	<p>Hand tools:  Picks, brushes, flexible rods, spades, cleaning balls  Mechanical equipment:  High-pressure sewer cleaning equipment (Brazil)</p>
<p>Carry out corrective maintenance on the upstream section of the sewer: illegal connections, cracks, breakages</p>	<p>Sewer operator under contract: Private operator under contract or Community-based operator or National public or local public operator</p>	<p>Sewer operator</p>	<p>Visual (surface) inspection  Inspection camera (Brazil)</p>

### 3<sup>rd</sup> level: heavy maintenance, maintenance of the entire system and routine maintenance of the main sewer lines

Task description	Who is responsible for the task?	Who carries out the task (provider)?	Equipment and tools required
Remove major blockages on the upstream section of the sewer (small diameter pipes)	Users or Sewer operator under contract: Private operator under contract or Community-based operator or National public or local public operator	Sewer operator or A service provider (pit emptying company, for instance, as in Brazil)	Sewer cleaning pump (truck or pick-up)
Clean out the main sewer lines and their manholes and remove blockages	Sewer operator under contract: Private operator or Community-based operator or National public or local public operator	Sewer operator or A service provider (pit emptying company, for instance, as in Brazil)	Sewer cleaning pump (truck or pick-up)
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) Other inspection tools Internal inspection by technicians on sewers with access
Undertake maintenance: replace damaged pipework, manholes and covers	Sewer operator under contract: Private operator under contract or National public or local public operator	Sewer operator or A service provider contracted by the sewer operator (public works company, for example)	Hand or mechanical digging tools Transport truck Lifting equipment, if required



# 4<sup>th</sup> level: lift pump and wastewater treatment plant repair and maintenance

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

# 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**



**Thank You!**

**Available in the next few days:**

**→ Country case studies and Analysis report**

**Coming soon:**

**→ a guidebook**

**[www.pseau.org/mini-egouts](http://www.pseau.org/mini-egouts)**

