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GLOBAL WATER SECURITY & SANITATION PARTNERSHIP

# Connecting The Unconnected

## Approaches for Getting Households to Connect to Sewerage Networks

*A Product of the Water Global Practice*

Ruth Kennedy-Walker, Nishtha Mehta,
Seema Thomas, and Martin Gambrill

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# Abbreviations

| | |
|---|---|
| AMRUT | Atal Mission for Rejuvenation and Urban Transformation |
| Caesb | Companhia de Saneamento Ambiental do Distrito Federal |
| CAPEX | Capital expenditures |
| CBOs | Community-based organizations |
| CEM | Contribucion Especial de Mejoramiento |
| CESAN | Companhia Espírito Santense de Saneamento |
| CMA | Commissionerate of Municipal Administration |
| CMWSSB | Chennai Metropolitan Water Supply and Sewerage Board |
| CWIS | Citywide Inclusive Sanitation |
| EIB | European Investment Bank |
| EMAPAG-EP | Empresa Municipal de Agua Potable y Alcantarillado de Guayaquil |
| ES | Espírito Santo |
| ESCALSA | Espírito Santo Centrais Elétricas S. A. |
| FOCAUP | Community Fund for the Sanitation of the Poor Urban Area |
| GIS | Geographic information system |
| GIZ | German Agency for International Cooperation |
| GoE | Government of Ecuador |
| GoI | Government of India |
| GoTN | Government of Tamil Nadu |
| GPOBA | Global Partnership on Output-Based Aid |
| GPRBA | Global Partnership for Results-Based Approaches |
| GVMR | Greater Vitória Metropolitan Region |
| IDB | Inter-American Development Bank |
| IDT | Institutional diagnostic tool |
| IPVS | Paulista Social Vulnerability Index |
| JNNURM | Jawaharlal Nehru Urban Renewal Mission |
| KII | Key Informant Interviews |
| LWSC | Lusaka Water and Sanitation Company |
| MA & WS | Municipal Administration and Water Supply |
| M&E | Monitoring and evaluation |
| MVCT | Ministry of Housing, City, and Territory (Ministerio de Vivienda, Ciudad y Territorio) |
| NMCG | National Mission for Clean Ganga |
| NCWSC | Nairobi City Water and Sewerage Company |

| | |
|---|---|
| NGOs | Nongovernmental organizations |
| NRCP | National River Conservation Plan |
| OBA | Output-based aid |
| OECD | Organisation for Economic Co-operation and Development |
| O&M | Operation & maintenance |
| OPEX | Operating expenditures |
| PDA | Departmental Water Plans |
| PIR | Policy, institutions, and regulation |
| PPP | Public-private partnership |
| PRRC | Pasig River Rehabilitation Commission |
| RBA | Results-based approach |
| RBF | Results-based financing |
| Sabesp | Companhia de Saneamento Básico do Estado de São Paulo |
| SBM | Swachh Bharat Mission |
| SDGs | Sustainable Development Goals |
| SENAGUA | National Water Secretariat of Ecuador (la Secretaría Nacional del Agua-SENAGUA) |
| SFD | Fecal waste flow diagram |
| SSIs | Semi-structured interviews |
| SSPD | Superintendent of public utilities |
| STP | Sewerage treatment plant |
| TA | Technical assistance |
| TNUDF | Tamil Nadu Urban Development Fund |
| TNUDP III | Third Tamil Nadu Urban Development Project |
| TORs | Terms of reference |
| TUFIDCO | Tamil Nadu Urban Finance and Infrastructure Development Corporation |
| TWAD | Tamil Nadu Water Supply and Drainage |
| ULBs | Urban local bodies |
| UIDSSMT | Urban Infrastructure Development Scheme for Small and Medium Towns |
| WaSSIP | Water and Sanitation Services Improvement Project |
| WSP | Water and Sanitation Program |
| WSS | Water supply and sanitation |
| WWTP | Wastewater treatment plant |
| ZEIS | Zones of Special Social Interest |

# Executive Summary

Cities and towns in low- and middle-income countries tend to grow rapidly, and they struggle to maximize the number of households provided with safely managed sanitation services, as defined by the Sustainable Development Goals (SDGs). This situation results in negative public health and environmental effects not only in the most vulnerable communities but also across urban agglomerations. »

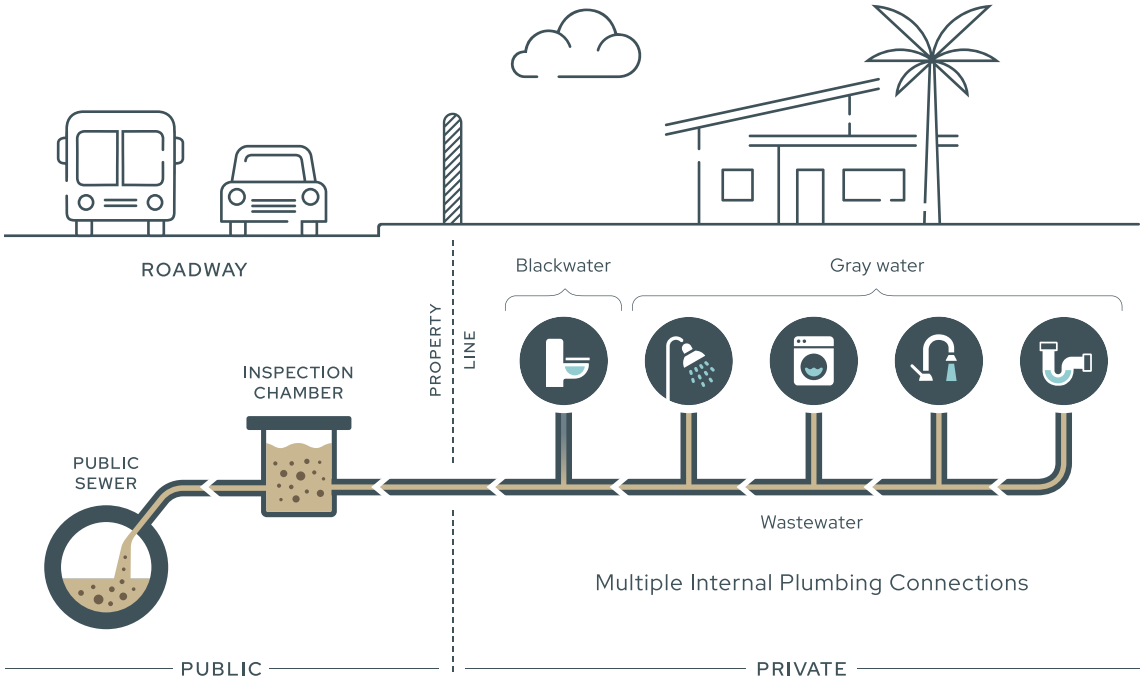
Providing sanitation services helps governments deliver on their commitment to SDG 6.2: achieving access to adequate and equitable sanitation and hygiene for all by 2030.[1] In cities with existing sewerage networks, we often find many households not connected to networks even when they pass in front of their houses.

In addition to negative public health and environmental effects, low sewerage connection rates mean that the wastewater treatment plants (WWTPs) to which the sewers should discharge are underutilized. This situation adversely affects the performance of treatment facilities, both from an operational and a financial perspective, reducing plants efficiency and returns on investments. For sanitation service providers, low household connection rates to sewers comes at a great cost, affecting their bottom lines, their financial sustainability, and their operational efficiency and ultimately creating a vicious cycle both financially and operationally because of lower-than-expected revenues.

Several reasons exist as to why households fail to connect to existing networks. Fortunately, successful programs around the world have tackled this challenge and, through a mix of responses, have managed to connect the unconnected.[2] This guide documents those experiences to help planners, engineers, decision makers, and other stakeholders navigate the process of increasing household connections to sewers. It also incorporates examples of condominial and simplified sewerage programs. The guidance and issues pertain to both conventional and nonconventional sewerage approaches.

This guide uses the World Health Organization (WHO) and UNICEF definition of a piped sewerage system: an active connection of sewerage pipes, also called sewerage, that receive both human excreta (feces and urine) and their flush water (collectively termed black water) and often handles "gray water" generated at the household level from sinks and showers. The combination of black water and gray

*figure ES.1* / **Household Sewerage Connection Detail**




1 The specific sanitation target is indicator 6.2.1, "Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water." It tracks the proportion of people using an improved sanitation facility that is not shared with other households and where the excreta produced is treated and disposed in situ, stored temporarily, and then emptied and transported to treatment off-site, or transported through a sewer with wastewater and then treated off-site. Improved sanitation facilities include flush/pour flush to piped sewerage system, septic tanks, or pit latrines; ventilated improved pit latrines, composting toilets, or pit latrines with slabs. (https://www.sdg6monitoring.org/indicator-621/)

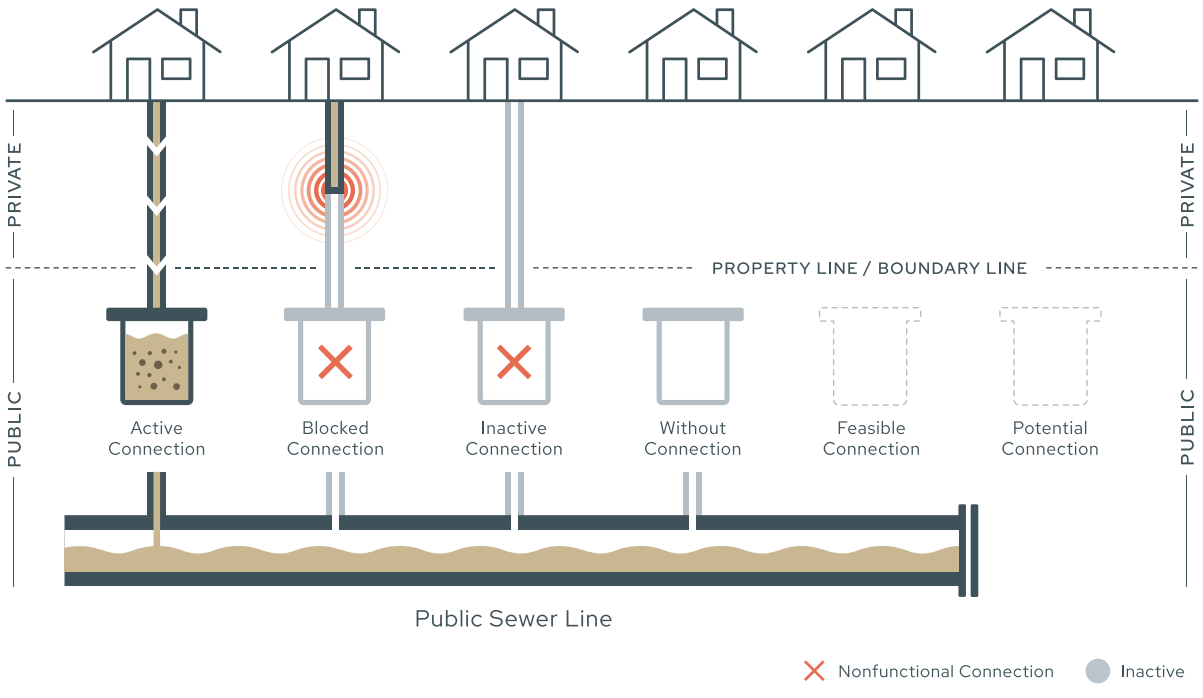
2 For more information, please watch the video Citywide Inclusive Sanitation: Connecting the Unconnected https://www.youtube.com/watch?v=67cDZWbW_vc&t=39s (available in English with subtitles in French and Spanish).

water is called wastewater or sewerage (WHO/UNICEF 2006). Sewerage systems consist of facilities for collecting, pumping, treating, and disposing of wastewater. Household connections covered in this guide consist of two parts: the sewerage connection from the public sewer to the inspection chamber (which is usually the service provider's domain and responsibility) and the pipework from the inspection chamber up to, and sometimes including, the internal plumbing of the household (which is usually the responsibility of the household). See figure ES.1 above.

This guide can help those involved in designing and implementing sewerage programs to think about household connections and figure out how to achieve them, whether retroactively after installation of a sewerage network or proactively during conception of a sewerage project so that household connections are part of the project concept from the outset. The guide defines the different typologies of connection (see figure ES.2) to allow for a better understanding of current situations and of technical and customer-related issues that need to be addressed to increase household connections.

While not intended to be exhaustive, this guide provides an overview of key considerations for developing a sewerage connection program for either existing sewers or for new sewerage projects. For each stage of the project cycle, the guide unpacks key dimensions of a sewerage connection program, namely the social; financial; policy, institutions, and regulation (PIR); and technical aspects. The guide reviews a selection of successful and less successful programs from cities across the globe to identify ingredients that can help maximize connections to sewers, including those for low-income consumers, while drawing on the principles of the Citywide Inclusive Sanitation (CWIS) approach.[3] All of the dimensions are critical, but the primary takeaway highlights the importance of community engagement—from inception through operation and management—thus underscoring the importance of the social dimension when undertaking the assessments, the designs, and the implementation of sewerage connection programs.

*figure ES.2* / **Defining Typologies of Household Sewerage Connections**




3 The concept of Citywide Inclusive Sanitation is described in more detail in the Citywide Sanitation Approach section.

# Introduction

## Objectives, Definitions, and Audience

Efforts to provide urban sanitation services should develop from a range of technical solutions to help ensure that everyone can access safely managed sanitation encompassing both onsite sanitation and management of fecal sludge, sewerage systems, and wastewater. »



To achieve the full health and environmental benefits of safely managed sanitation, all households must have access to these services. One of the many urban challenges in low- and middle-income countries centers on **how to increase the number of households that connect to sewerage networks.** This guide focuses on getting households to connect to sewers; the outlined approach also applies to businesses, industries, and other nondomestic customers that discharge wastewater directly to the environment.

As defined in this guide, a household connection comprises two parts: the sewerage connection from the public sewer to the inspection chamber (which is usually the service provider's domain or responsibility) and the pipework from the inspection chamber up to, and sometimes including, the internal plumbing of the household (which is usually considered the household's responsibility). See figure ES.1.

**The guide identifies key issues that require consideration and processes to be adopted when doing the following:**

- Planning, designing, and implementing programs that focus on maximizing household connections to new or expanded sewerage networks. The guide refers to these efforts as proactive sewerage connection programs.
- Undertaking postinvestment activities to ensure that all households connect to existing sewerage networks—herein referred to as retroactive sewerage connection programs.

Households fail to connect to existing networks for several reasons, but successful programs around the world have tackled this challenge and managed to connect the unconnected.[4] This guide draws on these experiences in cities and towns in low- and middle-income countries and on the principles of the Citywide Inclusive Sanitation (CWIS) approach. We also have found lessons to draw on and consider in countries belonging to the Organisation for Economic Co-operation and Development (OECD); in these countries, urban sewerage systems traditionally have developed through public funding and have mandated household participation.

The guide documents these experiences to help planners, engineers, decision makers, and other stakeholders navigate the process of increasing household connections to sewers. It incorporates examples of condominial and simplified sewerage programs, and the guidance and discussion pertain to both conventional and nonconventional sewerage approaches. We recommend using this guide when adequate assessments have concluded that sewers are appropriate solutions for the city, town, or neighborhood in question, a principle espoused by the CWIS approach.

## The Citywide Inclusive Sanitation Approach

The World Bank Water Global Practice and its sector partners[5] have developed an approach to tackling urban sanitation challenges called CWIS. This comprehensive approach aims to shift the paradigm of urban sanitation interventions by promoting a range of technical solutions that help ensure everyone has access to safely managed sanitation. The CWIS approach is achieved by promoting a range of technical solutions—both onsite and sewers, centralized or decentralized—which are tailored to the dynamics of the world's burgeoning cities and their large pockets of informality, by integrating financial, institutional, regulatory, and social dimensions, by supporting cities which demonstrate political will and technical and managerial leadership, and by harmonizing the sanitation solutions in line with related urban services, such as water supply, drainage, and solid waste management. CWIS strives to integrate financial, institutional, regulatory, and social dimensions, asking that cities demonstrate political will, and technical and managerial leadership, to identify new and creative ways of providing sanitation services for all.

As part of the implementation of these principles, the World Bank is developing a suite of tools and other material to support the World Bank teams,[6] their government counterparts, and their development partners when engaging in CWIS initiatives for the planning, design, and implementation of urban sanitation projects.



4 For more information, please watch the video Citywide Inclusive Sanitation: Connecting the Unconnected https://www.youtube.com/watch?v=67cDZWbW_vc&t=39s (available in English with subtitles in French and Spanish).

5 The Bill & Melinda Gates Foundation, Emory University, Plan International, University of Leeds, and WaterAid

6 For more information, please visit the Citywide Inclusive Sanitation website https://www.worldbank.org/en/topic/sanitation/brief/citywide-inclusive-sanitation.

## Structure of the Guide

This guide first lays out the primary concepts and definitions used in household sewerage connection programs. It next shares essential steps for designing and implementing such programs (that is, for spurring household connections to new sewerage networks and for retroactively getting households to connect to existing networks), based on a review of successful and less-than-successful programs from around the world. The guide focuses on the key stages in a typical project cycle (figure 1.1) and uses four key dimensions—social; financial; policy, institutions, and regulation (PIR); and technical—to outline the fundamental considerations that service providers should make at each stage of the project cycle. Finally, the case studies reviewed for this guide appear in more detail in appendix C.

The key dimensions are not exhaustive; they provide the reader with a multifaceted and systematic approach for making informed decisions to help develop and implement programs for creating additional household sewerage connections. The guide does not aim to be prescriptive; rather, it raises critical questions and provides illustrative examples throughout the four cyclical stages of a typical sewerage connection program, that is, assessing, planning and designing, implementing, and monitoring and evaluation.



*figure 1.1* / **Steps Required for, and Key Dimensions of, a Household Sewerage Connection Program**


**Note:** PIR = policy, institutions, and regulation.

# Context

## Significance

In the twentieth century, cities around the world built and expanded conventional sewerage networks. During the first two decades of the twenty-first century, condominial sewers and other types of "simplified," or "nonconventional," sewers have emerged as alternative approaches. They tend to use smaller bore sewers constructed at shallower depths (and on flatter gradients) with optimized layouts, resulting in lower capital costs. »

For some of them—notably, "condominial sewerage" projects—neighborhood and household participation is a central element of the intervention. Construction and expansion of sewers come with a high price tag ideally offset by benefits to public health and to the environment and by benefits associated with collecting and treating wastewater. Consequently, when households pass up opportunities to connect to a sewerage network, they inadvertently trigger several negative effects:[7]

- They do not receive anticipated returns on their investments.
- Associated wastewater treatment plants are underused, a situation that may lead treatment facilities to perform poorly, both in operational and financial terms.
- Residents do not maximize the health and convenience benefits associated with sewerage connections.
- The immediate area as well as surrounding areas do not accrue the environmental and health benefits associated with collection of wastewater.
- Service providers do not have as much interest in further expanding sewerage networks.

## Methodology

This guide draws on a desk review of household sewerage connection programs in four regions of the world. Table 2.1 summarizes the steps commonly followed in a household sewerage connection program. Table 2.2 provides the road map of questions used to create the case studies and to develop themes for the guide. Appendix B gives highlights of the case studies reviewed,[8] and appendix C provides overviews of and detailed information on selected case studies.

## Limitations

Through this guide, we want to share good practices, lessons learned, and recommendations based on our desk review of programs. The compendium is not exhaustive, nor is it intended to be. The reader should not feel limited to the suggested approaches. The intent of the document is to provide insights and potential approaches for increasing connections to sewerage networks. However, the reader should be mindful of the variability of contexts and the interpretation of different aspects and recommended approaches explored herein.



7 Drawn from the sample of reasons given by households to not connect as identified in the case studies and as further detailed in table 3.1.

8 Arab Republic of Egypt, Bolivia; Brazil; Cameroon; Colombia; Ecuador; India; Indonesia; Kenya; Morocco; Nicaragua; Paraguay; the Philippines; Peru; Senegal; South Africa; Tanzania; Vietnam; and Zambia.

*table 2.1*

# Steps Required for a Household Sewerage Connection Program

## 1

## Assess the Current Situation

**Social**
Social assessment of potential customers to develop behavioral categories. Analysts study current sanitation practices of residents and their attitudes toward sanitation. What are their sanitation habits? What drives their behavior? Are they willing to pay for sewage services?

**Financial**
Financial assessment of existing sanitation services. Analysts study funding sources and look for gaps in funding. What is the cost to the municipality or service provider? Is the service economically viable? What is the cost-benefit ratio?

**Policy, Insitutions and Regulation**
Policy, insitutions, and regulation assessment to map and evaluate institutions and stakeholders in the WSS sector/ sewerage connection program. Researchers identify problems to the extent possible and determine "entry points," places in the system where sustainable changes can occur.

**Technical**
Technical assessment to establish the status of sanitation service delivery and to determine the technical needs and requirements of a sewer connection program.

## 2

## Plan and Design the Intervention

**Design**
Design a marketing plan and strategy for implementation that considers people, place, price, product, and promotion.

**Financial**
Prepare a financial model for the sewerage connection program that considers costs and implications of different levels of connection rates. Update the model regularly. It should help set tariffs and appropriate connecton fees, allow implementers to explore funding sources and financing mechanisms, consider subsidies, and assess financial viability of the planned program.

**Policy, Insitutions, and Regulation**
Use PIR assessment to design program activities that address identified challenges.

**Technical**
Use findings from the technical assessment to identify potential areas for connections and to design technical requirements of the sewerage connection program.

## 3

## Implement the Intervention

### Pilot the Intervention

**Social**
Develop effective social engagement through communication efforts, capacity-building partnerships, behaviors, management of expectations, and monitoring. Maintain flexibility, a key component of effective social engagement.

**Financial**
Ensure effective financial management of program. Indicators include well-managed funds, subsidies that reach the target population, and funds to maintain quality and data and monitoring.

**Policy, Insitutions, and Regulation**
Ensure effective PIR environment as determined by financial resources, capacity, consensus, policy program, implemeneting entities, political economy and governance structures, behaviors, and data and monitoring.

**Technical**
Ensure effective technical implementation as determined by successful results, operation and maintenance, communication, robust solutions, quality assurance, availability of delivery of complementary services, capacity, and data and monitoring.

## 4

## Monitor and Evaluate

Creation and use of a robust M&E system at all stages of the program. The system should have specific and well-targeted results indicators, theory of change, and data-capturing capability.

**Note:** M&E = monitoring and evaluation, PIR = policy, institutions, and regulation, WSS = water supply and sanitation.

*table 2.2*

# Road Map for Connecting the Unconnected for Existing or Planned Sewerage Connection Programs

## 1

## Assessing

1. **Outline and clarify the current sanitation situation.**
2. **Identify gaps and challenges in sanitation services.**
3. **Understand how the current situation could affect the success of a sewerage connection program.**

### Social

» Assess customer behaviors.
» Segment customers by behavior.
» Document current sanitation practices of potential customers.
» Identify drivers of behavior.
» Build trust with communities.

### Financial

» Review existing financial framework.
» Assess how sanitation is funded.
» Identify gaps, constraints, and issues
» Develop relative costs for comparison.

### Policy, Insitutions, and Regulation

» Map stakeholders.
» Assess capacity of local service provider.
» Map all formal and informal service providers and sanitation service users.
» Assess current regulatory framework.
» Assess any existing city master plans or ongoing planning processes.

### Technical

» Review all existing or potential sanitation plans.
» Estimate current and projected quantities of wastewater.
» Document characteristics of the current (or planned) sewerage system.
» Assess relevant complementary urban services.
» Review interventions in comparable cities.

## 2

## Planning and Design

**Identify the intervention based on psychological and behavioral insights versus financial incentives or regulations while weighing its simplicity, cost effectiveness, and scalability.**

» Prepare sanitation marketing plan based on the "5 Ps assessment" (price, promotion, people, procedure, product).

### Financial

» Prepare a financial model for the sewerage connection program that considers costs and implications of different levels of connection rates.
» Explore financing mechanisms.
» Compare relative costs of investments.

### Policy, Insitutions, and Regulation

» Propose relevant organizational changes to incumbent service providers.
» Develop cost plans for the sewerage connection program and terms of reference (TORs) for various contractors and vendors.
» Develop M&E framework.
» Propose relevant legal, policy, regulatory, and organizational changes, and draft necessary decrees and regulatory measures to implement any changes.
» Draft relevant documents for licenses, leases, and all other government-related requirements.

### Technical

» Identify technical requirements for sewerage connections as indicated by physical environment, availability of supplies, affordability, and available technical capacities.
» Identify appropriate sewerage connections based on field realities.
» Estimate the demand.
» Identify and map the existing network.
» Estimate the capital and operation and maintenance costs of new connections.
» Develop implementation plan.
» Draft TORs, works bidding documents, and so on as necessary for implementing connection program.

## 3
## Implementing

Pilot and learn

### Social
» Continue communicating with the community on key aspects of the connection program and adapting the program based on inputs from customers. Document program effectiveness.

### Financial
» Secure funds and ensure flow of funds.
» Track and manage flow of funds.

### Policy, Insitutions, and Regulation
» Establish coordination platforms such as working groups and multistakeholder committees.
» Engage political, technical, and community stakeholders and leaders to ensure that they continue to champion the program.

### Technical
» Verify achievements.
» Develop as-built drawings.
» Prepare a clear operations and maintenance plan for sewerage systems, identifying roles and responsibilities for the service provider, private partners (if any), and customers.
» Do postconstruction recordkeeping.

## 4
## M&E and Learning

Record, document, track indicators, report, and compile

» Continue communicating with households on program successes and challenges to ensure long-term sustainability.
» Document findings to share lessons and guide future connection programs.

### Financial
» Allocate funds for evaluations

### Policy, Insitutions, and Regulation
» Develop indicators, data collection protocols, and reporting processes for the program.
» Designate a regulator or other public authority to set and monitor targets, to benchmark performances of service providers, and to publicly disclose relevant program details, including results, successes and challenges, disbursements, and other relevant information.

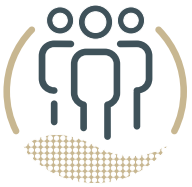
### Technical
» Conduct a summative evaluation.

**Note:** M&E = monitoring and evaluation, PIR = policy, institutions, and regulation, O&M = operation and maintenance.

STAGE I

# Assessing the Current Situation

Before embarking on a sewerage connection program, the implementation entity should conduct a multidimensional assessment of four key dimensions, shown here: »



# SOCIAL



## The 4 Dimensions *of* Assessment

1 **Social**
2 **Financial**
3 **Policy, Institutions and Regulation**
4 **Technical**

Led by the implementation entity (that is, the service provider), the assessment should involve the local and national stakeholders, as appropriate. It will seek to do the following: outline and clarify the current sanitation situation of the entire city and of the targeted areas of interest; identify gaps and challenges in sanitation service provision and determine ways to improve the situation through connections to an existing, new, or expanded sewerage system; and figure out ways that the current situation could undermine or enable the success of a sewerage connection program.

## Key Objectives *of* Social Assessment

1 To assess potential customers and to segment them into behavioral categories and identities. This helps service providers assess and understand drivers of customers' decision-making processes.

2 To assess customers' current sanitation practices and behaviors. Service providers also assess customer attitudes toward and satisfaction with existing service delivery options.

3 To assess drivers of behavior. Why do customers behave in certain ways? Service providers determine behavioral drivers for all population segments, trying to figure out why people do not connect to sewers. Some possible reasons include cost, perceived poor service, disruption of household during construction, and lack of clarity on benefits of switching.

4 To assess customers' willingness to pay for sewerage services. Service providers also determine the financial mechanisms and systems that each type of customer prefers. They should give special consideration to gender differences because incentives and drivers to pay may vary from men to women.

5 To assess current and previous information, material, and approaches to sanitation behavior change. Service providers focus on behavior change and sanitation marketing to promote higher sewerage connection rates.

Using a social lens to assess community organization is critical to building a successful sewerage connection program. Urban residents are not a homogenous group. Thus, understanding the composition of the local population is fundamental for planning tailored interventions. For example, it is critical to know if a project

area has a large percentage of migrants or ethnic minorities who speak a different language because this affects communication of the project material. Religion, caste, ethnicity, gender, age, social status, educational level (for example, literacy levels), and disability status influence people's decisions to connect and affect strategies and communication programs designed to increase connections. Post-conflict situations and other ingredients of fragility also can make developing a connection program more complex. Table 3.1[9] summarizes possible reasons for households to connect or not to connect to sewerage networks. The greater the range and number of reasons in any given context, the greater the complexity in designing a strategy to encourage connections.

The reasons outlined in table 3.1 below provide a basis to design behaviorally informed policies and associated intervention programs. Based on lessons learned from case studies, the guide later highlights specific considerations for assessing social situations related to sewerage connection programs. The key to achieving successful sewerage connections lies in understanding these social dynamics and in addressing them with care.



*table 3.1* / **Reasons for Connecting (or Not) to the Sewerage Network**

| Country | Reasons for Connecting | Reasons for NOT Connecting |
|---|---|---|
| Indonesia | • N/A | • Cannot afford the cost over the payment period specified<br>• Do not know what others think about the program<br>• Are happy with current solution<br>• Want to avoid rumors about personal wealth<br>• Are turned off by perceived poor standards of construction and poor opera¬tion and maintenance of drains and sewers, a situation that causes pollution and bad odors<br>• Want to avoid property damage caused by household connection<br>• Are not required by government |
| Latin America (Reasons given across cities in Bolivia, Brazil, Colombia, Ecuador, Nicaragua, Peru and Uruguay) | • Cleaner environment<br>• More comfort, satisfaction<br>• Higher property value with permanent installation<br>• Contribution to local development<br>• No risk of being fined | • Do not want to pay the tariff<br>• Lack information<br>• Lack incentives<br>• Want to avoid costs associated with connection, particularly high upfront costs<br>• Are not motivated to connect by government. No enforcement of sanctions for not connecting<br>• Lack understanding of complex procedures associated with connection and want to avoid the high transaction costs<br>• Consider utility or service provider inefficient |
| Cameroon | • Shame in relation to the neighbors regarding current sanitation situation<br>• Hygiene concerns | • Reasons for not connecting were not explored in the assessment |

**Source:** World Bank 2017a; pS-Eau 2003; Whittington 1997.

9 It is important to note that limited academic research and documented evidence exist about connection rates of households to sewers.

## Understand a household's motivations to connect or not

Any "behaviorally informed" project begins with understanding the diagnostic process (see table 3.2). The first step is understanding the baseline situation and defining the development objective. Next is identifying stages of the current decision-making process for households to connect to sewers and comparing these stages to the desired decision-making process in addition to assessing potential bottlenecks that deter individuals and households from behaving as desired. The analysis involves collecting information on local knowledge and cultural practices, observing the context of specified behavior, and analyzing existing secondary data.

## Assess household behavior, using a diagnostic process from the beginning of the project cycle

*table 3.2* / **Behavior Diagnostic Process**

| | |
|---|---|
| **The Vision** | Define the development objective. |
| **The Desired Behaviorial Change** | Identify a specific target behavior that needs to change to reach the development objective. |
| **Context & Analysis** | Identify the stage of the current and desired decision-making processes as well as potential bottlenecks that keep people from behaving in better ways. |
| **The Intervention** | Describe the solution to reach the development objective. |
| **Learning** | Pilot the solution and document its effectiveness. Assess both the decision-making process and the outcomes. |

## Acknowledge consumer segmentation and tailor a program to this



To understand critical considerations that affect household and utility behavior, the following steps and tools can be useful for a social assessment:[10]

- Key informant interviews (KIIs) with executives and staff to understand connection processes and initiatives and to discuss common factors that explain consumer behaviors; with social promotors and fieldworkers responsible for connections and inspections to enrich understanding of consumer regarding sewerage access and payment processes; and with other relevant actors.
- Semi-structured interviews (SSIs) and focus group discussions (FGDs) with the target population, already divided into such categories as those who comply, residents who default on bill payments, residents who connect illegally to the sewerage systems, and those who are not willing to connect for economic, social, or technical reasons or because of their status as tenants or landlords, among other possible explanations. Data from interviews can guide discussions.
- Field visits complement information received from both kinds of interviews as well as from focus groups.

Tracing the "consumer journey" from being an unconnected household to a connected one can help understand consumer needs and key actors involved in sanitation decision making. Interviews and focus groups increase understanding of what households currently are doing to acquire sanitation services and what barriers prevent them from connecting to existing sewerage networks or would prevent them from connecting to new sewerage systems. The following key questions can help service providers understand the consumer journey as they strive to improve or expand sewerage services: Who, specifically, are you targeting? What is the behavior you are trying to change? What is the desired behavior? Once the desired behavior has been identified, the context and analysis of the behavior merit consideration.

Low-income consumers make decisions for different reasons, so strategies to change behaviors should address the identified barriers, triggers, and motivators. It is also important to assess the level of trust that consumers have in existing institutions and actors such as public or private service providers because it may greatly affect consumers' openness to adopting new sanitation approaches. Knowledge of barriers, triggers, motivators, and the level of trust will inform the planning and implementation stage of the sewerage connection program by helping service providers engage with customers and respond to their corresponding behaviors while identifying key drivers.

10 The Lusaka City Council (Zambia) with support from Lusaka Water and Sanitation Company (LWSC) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) conducted a survey of households to learn about the knowledge, attitudes, and practices of communities relative to sanitation and hygiene. For more information, review the survey used in peri-urban areas.

# Build trust establishing a communication program based on knowledge gathered and past learning

**KENYA**
**BRAZIL**

Community members must value and trust the proposed technology and solution for service delivery. They should rest assured that the proposed sanitation solution is at least equal to—and hopefully better than—their current situation and that they will not experience issues with its operation and maintenance (O&M) in the future. Striving to improve resilience, the design and operation plans of the proposed solution should adequately consider potential disaster risks (such as flooding or droughts) and deliberate interfacing with complementary services (such as solid waste management and stormwater systems). Furthermore, communities should be confident that such aspects will not inhibit the functionality of the proposed sewerage system. Attention should be paid to the provider of the proposed sewerage services, especially in communities that have long been marginalized or neglected from a public service delivery perspective. Who provides the solution can be just as important as what the solution is. The following examples illustrate the importance of establishing trust with communities and learning about the importance of knowledge gathering:

**ZAMBIA**

In Zambia, because of a history of sewerage backups affecting homes as a result of blockages and flooding, many households were reluctant to pursue sewerage connections (World Bank, 2016a).

**KENYA**

In Kenya, ensuring a reliable water supply service, implementing water augmentation projects, and reducing nonrevenue water helped to improve trust between the service provider and its customers, thereby improving willingness to connect and to pay for sewerage services (World Bank, 2019b)(See appendix C: case study 6.).

# FINANCIAL

## Assess the existing financial framework for sewerage service delivery



Key aspects of the financial assessment are defined below. In addition, the following financial aspects of sewerage service provision warrant exploration

### Key Definitions *for* Financial Assessment

1 **Funding.** The source of money to pay for something.

2 **Financing.** The means, process, and/or mechanism of paying (for example, a bank loan).

3 **Subsidy.** A subset of funding flows between governments, service providers, and customers. With subsidies, a user or customer pays less for a product or service than it costs the service provider to produce, leaving a third party (for example, government, other users, future generations) responsible for covering the difference. Subsidies may take the form of explicit financial transfers between two entities (for example, a utility and a customer) or implicit transfers (such as nonpayment for electricity or deferred maintenance) that occur when products, services, or inputs are underpriced.

4 **Cross-subsidies.** A pricing structure in which a group of customers is billed a tariff above the average unit cost of provision, while another group is billed a tariff below the average unit cost of provision.

**Source:** World Bank 2017, 2019a.

### KENYA

The first step in the financial assessment is reviewing the existing financial framework for sewerage service delivery. It includes the following:

- Capital expenditures (CAPEX) and operating expenditures (OPEX)
- Cost-recovery mechanisms
- Payment systems, including processes, amount, frequency, collection mechanisms, financial management of payment systems, designation of who pays and who receives payments, and so on
- Current CAPEX and OPEX costs of sanitation services faced by households
- Households' ability and willingness to pay [11]
- Mechanisms for enforcing payments
- Allocations from government, service provider, or both for investment and operational costs.

#### KENYA

Experience in Kenya shows that costs for sewerage connections varied substantially among neighboring households. Variations related to differences in existing infrastructure. Costs for connecting to the sewer typically ran many times over the price that consumers were willing to pay, thus dampening demand for unsubsidized sewerage connections (see appendix C: case study 6).

11 When households are paying for current services, the ability to pay may be estimated by comparisons to current payments and service provision. If households do not currently pay for service provision, other estimates may be used, as appropriate, given the local context.

12 The Citywide Inclusive Sanitation Costing & Planning Tool is a free online platform that compares the costs (both CAPEX and OPEX) of different sanitation solutions. The tool is publicly available at https://n410.fmphost.com/fmi/webd#CWIS%20Planning%20Tool%201_4.

## Identify apparent gaps, constraints, and issues with the existing financial framework

### URUGUAY

In additional to analyzing aspects of the financial framework, the assessment should identify key gaps, considerations, and constraints that affect performance. The review of gaps and constraints can help determine the need for investors, use of revolving funds, use of subsidies (from government, from the service provider), and provision of incentives for payments.

#### URUGUAY

In Uruguay, the creation of a revolving fund, as a demand-driven solution, involved three subsidy options for the in-tradomiciliary works. Socioeconomic status of households determined which of the three subsidies they received:

- **Option 1.** The municipality provided technical assistance (TA) to help define the technical solution and to pay for materials, while the household paid for the labor (with a 25 percent upfront deposit).
- **Option 2.** The municipality provided TA to help define the technical solution and provides options for loans for the materials and the labor.
- **Option 3.** The municipality provided TA to help define the technical solution and paid for everything. Nevertheless, the municipality faced legal issues regarding both formal and informal tenants. The municipality stated that it took a long time to set up the revolving fund program and to get it running because it relied on customer demand, and initially, the municipality made no effort to advertise or communicate options to customers, an approach that is now changing. The municipality has started to organize workshops to show households how to undertake the intradomiciliary works themselves. Although the municipality allows households to undertake intradomiciliary works to encourage connections, it prefers doing this work itself to minimize future grievances from households (Brault 2018).

## Develop a financial and economic analysis

### CAMBODIA

Financial and economic analyses form a crucial part of feasibility studies to assess benefits and costs of improved sanitation. They influence policy decisions, sanitation programming, and project design. Economic and financial analyses enable comparisons of costs and benefits of sanitation options, including sewerage, and allow decision makers to allocate limited resources more efficiently. Financial analyses measure costs and revenues that have direct and measurable financial implications, and economic analyses cover all economic costs and benefits, including the opportunity costs of the next best use of the resources. In addition, analysts should consider quantifiable direct benefits (for example, land value increases and improvements in environmental conditions, water quality, public health, and so on) and anticipated indirect benefits such as an increase in attractiveness to tourists and the business community.

The Citywide Inclusive Sanitation Costing & Planning Tool[12] is another important resource that can quickly allow planners and service providers to compare capital and running costs of different types of sanitation solutions along the whole sanitation service chain at the component, system, and city levels.

#### CAMBODIA

A study in Cambodia indicated that only about 20 percent of targeted households were connected to the sewerage system network. While the design scenario had estimated that the cost of providing an existing private latrine with a sewerage connection at US$5,263, the actual cost for such an intervention was found to be US$17,537, or nearly 3.5 times more than had been anticipated at the design stage (WSP 2012).

## PIR



Another major consideration when designing a sewerage connection program is a review of the policy, institutions, and regulation (PIR) situation (also known as the enabling environment) to determine how to implement PIR interventions to align incentives for delivering sustainable water supply and sanitation (WSS) services and, in this case, for improving the chance for success.

### Key Definitions *of* PIR Assessment

1 **Policy/Policies.** They provide the framework by which governments make decisions that guide actions to achieve specific goals. Different processes and tools exist to create policies and implement them. Policies can promote development of underlying institutional and regulatory frameworks and engender incentives required to deliver sustainable services.

2 **Institutions.** Institutions include the rules of the game and the organizations and mechanisms established to formulate policy and implement actions on the basis of such rules, which reflect agreed-on principles established through political or social processes or both. They assign roles (or functions) to either organizations (that is, groups of people with a shared purpose) or institutional mechanisms (that is, institutional processes for delivering specific outcomes via rules and organizations). The rules of the game can be either formal (for example, laws, decrees, regulations) or informal (for example, customs, social norms, established relationships, and so on).

3 **Regulation.** Regulation in the broad legal sense is "the sustained and focused control exercised by a public agency over activities that are valued by a community" (Ogus 1994). It involves setting rules and ensuring that those rules are enforced.

**Source:** Mumssen et al. 2018.

In 2018, the World Bank developed a PIR framework to analyze how integrated PIR interventions can help align incentives for more sustainable WSS service delivery (Mumssen et al. 2018). This report and its associated framework and methodology are useful additional references to guide this stage of the development of a sewerage connection program. Figure 3.1 depicts roles and links in the enabling environment and of PIR incentives in driving reforms for sustainable WSS provision. Incentives are motivating influences or stimuli directing stakeholders to pursue defined objectives.

### The main defining principles of the PIR framework include the following:

» **Holistic.** A holistic approach requires consideration of the drivers of reforms; these drivers influence the design of institutional reforms. Holistic also describes the alignment of sector-specific policy, institutional, and regulatory frameworks.
» **Best-fit.** In line with the principles of contingency theory, the PIR framework promotes contextualized solutions to local WSS and PIR realities. There is no one-size-fits-all approach and no best-practice solution. The framework establishes areas for further assessment and exploration that can help in arriving at the most suitable context-specific solutions.

» **Incremental.** Implementing agencies are more likely to respond positively to incentives when drastic reorganization and changes are not required. This is because major changes are more likely to lead to "goal conflict" between different stakeholders, and "goal consensus" is usually highest when few changes are required. Therefore, incremental changes are more likely to lead to positive outcomes, so providing incentives to stakeholders already inclined to adopt policy measures could be one approach to increase efficiency of policy implementation.

**A recommended first step in undertaking a PIR analysis is to explore and understand the current PIR situation by employing the institutional diagnostic tool (IDT).**[13] **This tool can do the following:**

» Help map and evaluate institutions and stakeholders in the WSS sector, including those that provider sewerage service
» Pinpoint problems
» Determine "entry points" (points in the system where sustainable changes can occur)
» Design appropriate interventions to address the identified challenges.

**The tool gathers inputs on the institutional setup and performance in eight key clusters of the sector:**

» Legal framework
» Political economy, historical background, culture, and customs
» Human capital development
» Roles and responsibilities across all levels of government
» Financial sustainability
» Regulation
» Quality of service provision, including competition and private sector participation
» Civil society involvement

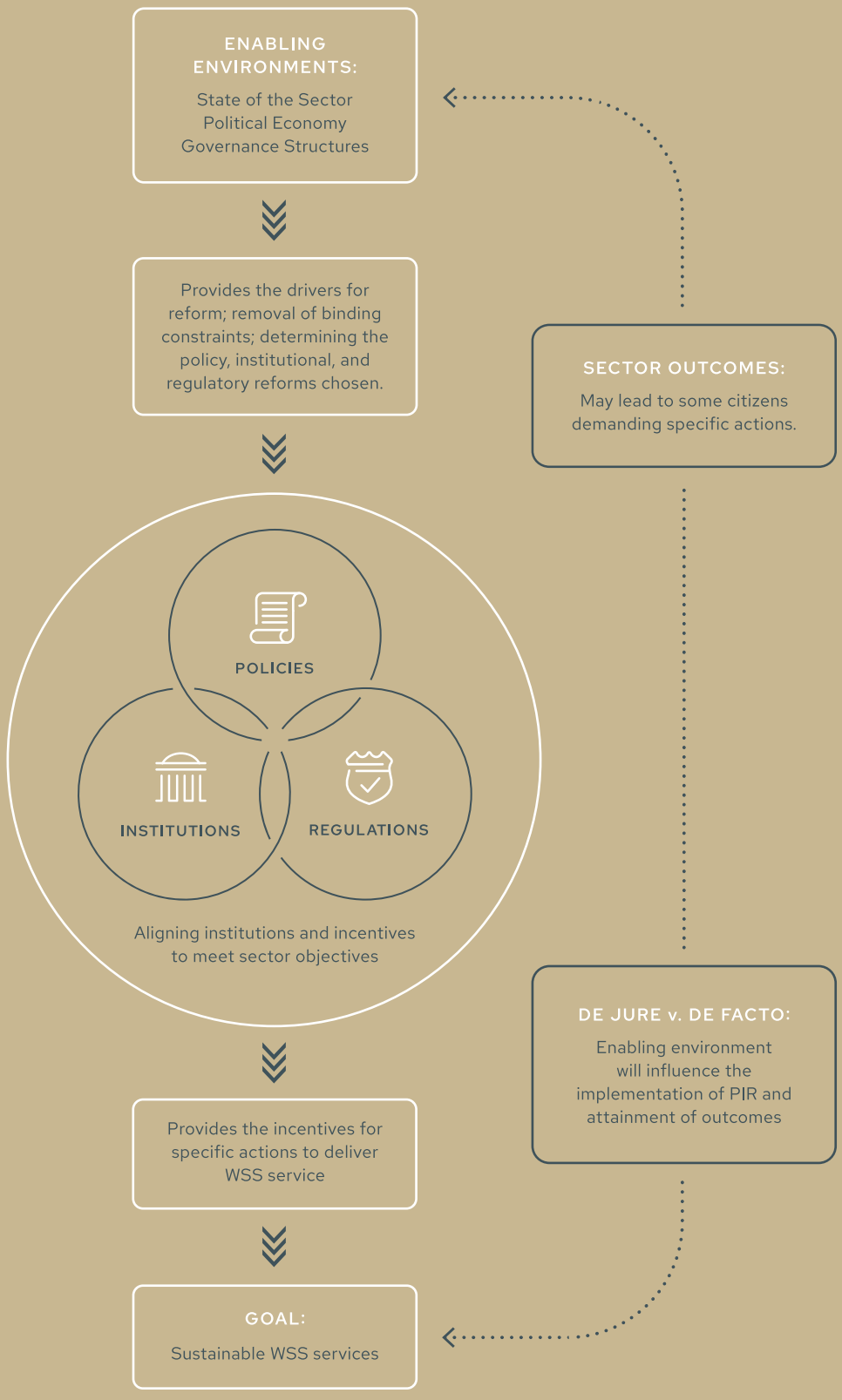
Because the tool helps users gather perceptions and experiences of different sector stakeholders, it can highlight priority areas and activities to prioritize. The tool is primarily diagnostic in; nature, but it is also useful for facilitating dialogue about reform priorities and opportunities based on the gathered information.

Based on lessons learned from case studies, specific considerations for assessing the PIR situation related to sewerage connection programs appear later in the document. For documenting the PIR situation, a careful assessment should study the plans made for household connections when the sewerage network was developed (in the case of existing sewerage systems) versus the actual work. Users should focus on how well incentives aligned with desired institutional behaviors to increase connections.

13 The IDT is an Excel-based tool developed by the World Bank, which guides the user through a list of targeted questions designed to identify institutional gaps, identify priority areas, and provide suggested interventions to address gaps and strengthen institutions in the WSS sector. The purpose of this tool is to point out current weaknesses and gaps in the WSS sector and to tease out potential reforms and incentives needed to address them.

*figure 3.1*

## Aligning Institutions and Incentives for Sustainable Service Delivery




**Source:** Mumssen et al. 2018.
**Note:** PIR = policy, institutions, and regulation; WSS = water supply and sanitation.

## Map all stakeholders involved in providing sewerage service

These stakeholders include the service provider; the government (at the national, regional, and local levels); the formal and informal private sector; nongovernmental organizations (NGOs); community-based organizations (CBOs); users; and so on. The mapping should include information about stakeholders' abilities to foster results and objectives in addition to their mobilization efforts, existing platforms, networks, and coalitions. Mapping will help identify potential partners that are well placed to contribute to the success of the sewerage connection program.

## Assess the capacity of the service provider

**BRAZIL**

Critical aspects include links between the capacity of those who will install and operate the sewerage network and the willingness—even the ability—of consumers to connect. In particular, it is important to analyze the local service provider's capacity and effectiveness with regard to the following:

- Communicating with and marketing to potential customers, people who may want to connect to the network
- Responding to user demands
- Developing relationships with customers and service providers
- Providing effective service (through existing services and, specifically, sewerage service)
- A specific assessment (including key informant interviews and focus group discussions) can shed light on these aspects in relation to the provision of sewerage services.

**BRAZIL**

In Salvador, Brazil, involved parties had to overcome the following key challenges:

- Breaking down barriers and opposition from the utility's engineers, who initially did not want to design unconventional solutions and who did not want to change their working methods (for example, by involving community members in defining solutions)
- Training technical teams (both utility and contractor) on the condominial approach, on social mobilization requirements, and on the execution of works in extreme environments
- Convincing the contractors (often the large ones) to construct condominial branches, which are closer to artisan works. They require less equipment but more intensive use of labor.
- Training operation and maintenance crews to do social outreach and communicate directly with residents (see appendix C: case study 8).

## Assess how successfully previous regulations have been created and enforced

## TECHNICAL

**URUGUAY**
**PHILIPPINES**

Experience shows that creation of clear regulations and enforcement of those regulations are critical factors in the success of sewerage connection programs. Therefore, assessing the general environment for the creation and enforcement of regulations is key to identifying possible challenges. For retrospective sewerage connection programs, the effectiveness of the existing PIR environment will be key to the program's success.

#### URUGUAY

Uruguay passed a law obligating households to connect to an existing sewerage network within one year and to a new network within two years wherever the sewerage network passes in front of a house. However, no one consistently enforces the law because instabilities in the electoral cycle of Uruguay and its municipalities can influence enforcement. This situation demonstrates the necessity of considering the political economy when developing a connection program (Brault 2018).

#### PHILIPPINES

In the Philippines, strong enforcement by the Department of the Environment and local governments ensures compliance with mandatory sewerage connection laws (see appendix C: case study 7).

The technical feasibility of the proposed sewerage connection program underpins the likely success of the program. A robust assessment of the current situation is key to designing and implementing a successful technical program. A technical assessment of sanitation service delivery should focus on the technical needs of and requirements for a sewerage connection program. Key objectives of the technical assessment can be found below.

**From the outset of conceiving a sewerage connection program, it is important to clarify the primary objectives of sewerage provision** to determine which areas of the city will receive priority for connection. Questions to answer include the following:

- Is the program intended to reduce pollution and improve water quality for environmental reasons?
- Is the program intended to combat a public health issue, such as a cholera outbreak?
- Is it intended to offer all citizens—including those living in low-income communities—universal and sustainable access to sanitation services, thereby upgrading their quality of life and making social improvements?
- Is the program intended to expand the customer base of the service provider and to increase associated revenues?

## Key Objectives *of* Technical Assessment

1 **To assess the current status of sanitation facilities.** This part of the assessment should focus on increasing sewerage connection by defining the functions of facilities, clarifying their ability to safely manage human excreta, and delineating users' acceptance (linked to the social assessment). An assessment of existing sewerage networks, including pumping stations and wastewater treatment plants, should occur. A fecal waste flow diagram[14] can illustrate current coverage and the benefits that increased sewerage connection could bring.

2 **To define the current situation, eligibility criteria, and types of connection to households.** This objective highlights either the existing typology of connections or a menu of future connecting options, aiming to identify potential areas to serve via existing, new, or expanded sewers and the corresponding connection program. (See figure 3.2.) Basic criteria to identify eligible households should be considered.

3 **To assess the status and management of relevant complementary services.** This objective encompasses such services as water supply, graywater management, stormwater management, road access, and solid waste management.[15] How do these services affect access to existing and proposed sewers and the corresponding connection programs? How do these services affect the use, control, and sustainability of existing and proposed sewers and the corresponding connection programs?

4 **To assess ground conditions and environmental factors.** Examples of such factors include rocky ground, a high groundwater table, and land-use topography. These factors may affect decisions on appropriate sewerage systems and connection options.

5 **To assess key hygiene practices.** This objective highlights water needs, sanitation, and related cultural habits that may affect preferences (such as "sitting" or "squatting" on toilets, practicing anal cleansing with water or with dry material, and so on).

6 **To assess national and local technical capacity.** What is the capacity to support the required technical response?

7 **To assess the existing standards/technical guidance (including for O&M).** To ensure that the design and the technical approach are appropriate and tailored to local conditions, the assessment must determine the relevance of existing standards and technical guidance with regard to implementation of sewerage systems and the connection program.

### KENYA

In Kenya, organizers collected insufficient data during initial stages on household compound characteristics and willingness to pay, a situation that necessitated a significant restructuring. This experience highlighted the need to understand granular details of the target program areas and households through high-quality data collection (World Bank 2019b).

14 A fecal waste flow diagram (also often described as shit flow diagram [SFD]) is a tool to readily understand and communicate how excreta physically flows through a city or town. https://sfd.susana.org/

15 Wastewater by definition includes graywater; however, in some situations households may use separate systems for blackwater and graywater, so management of these should be assessed separately.

Service providers may differ in their existing typologies of connections, but the case studies indicate that learning about and reporting on the range of typologies correlate with a better understanding of the current situation and of technical and customer-related issues that need to be addressed to increase household connections. As depicted in figure 3.2, at a minimum, the following typologies of household connection necessitate documentation if they exist in the service provider's target area of interest:

**Active connections.** These channel wastewater from the interior plumbing of the household to the public sewer (via the inspection chamber).

**Blocked connections.** The physical connection pipework is present from interior plumbing of the household to the public sewerage main (via the inspection chamber), but wastewater is not flowing from the interior plumbing or from the inspection chamber to the main because of a blockage.

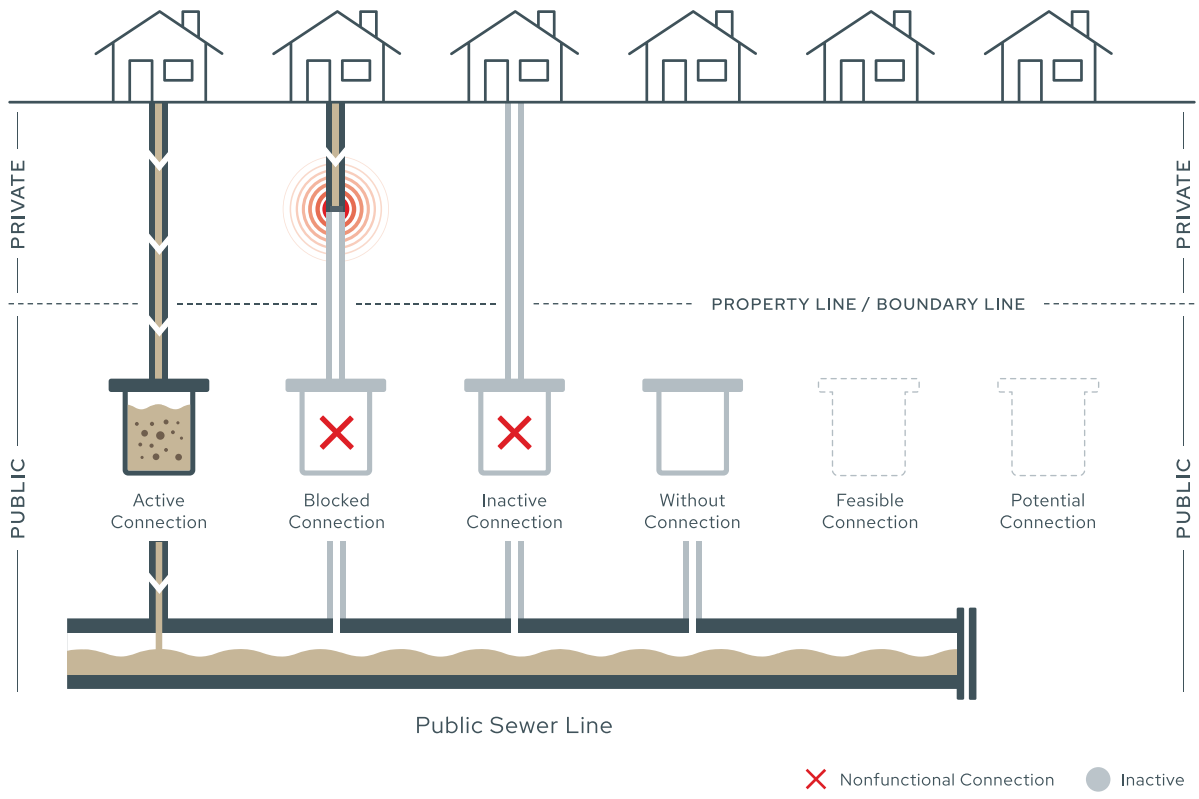
**Inactive connections.** The physical connection pipework is present from the interior plumbing of the household to the public sewer main (via the inspection chamber), but the wastewater is not being discharged from the interior plumbing to the public sewer.

**Without connection.** The physical connection pipework is present between the inspection chamber and the public sewer, but no physical connection pipework is present between the interior plumbing of the household and the inspection chamber.

**Feasible connection.** A sewer main is in the vicinity of the boundary of the household (for example, within 60 meters), but there is no physical connection pipework from the main. In addition, no inspection chamber has been installed. Therefore, no connection has been made.

**Potential connection.** There is no sewer main within a reasonable distance of the household.

*figure 3.2* / **Defining Typologies of Household Sewerage Connections**



It is important to know what liquid waste is being generated in the household and how the different effluents from the interior of the dwelling—and, in the case of stormwater, from the building's exterior—are currently being managed. Is blackwater, graywater, stormwater, or a combination discharged to the sewer? In addition to blackwater from the toilet, graywater from the bathroom, kitchen, and laundry should ideally also be collected and directed to the inspection chamber on the property's boundary; from this chamber, resultant wastewater is discharged to the sewerage main (see figure 3.3). When the wastewater sewerage system exists separately from a stormwater system (separate sewerage system), the household's stormwater drainage gutters, downpipes, or both should be connected directly to the stormwater drainage system and not to the sewer (see figure 3.4).

Another important factor to consider when designing a program concerns the number of connections that already exist in the target area and the number that fall into the typologies mentioned earlier in the chapter. It is also important to know whether the connections are stand-alone (that is, wastewater channeled from a single household is connected to the main via the inspection chamber) or clustered (that is, wastewater from multiple households connects to the public sewer via a single connection or inspection chamber) (see figure 3.5).

For retrospective connections to existing sewers, the following activities may be necessary:

» Assess the integrity of the existing system (status of the physical infrastructure, structural integrity or rate of deterioration, rate of blockages, and O&M requirements in theory and in practice).
» Map out the spatial relationship between the existing system and households that potentially can be connected.
» Complete a targeted assessment of how households have been connected to date. This assessment should cover the physical location of connections, the type of household connections, the responsibility for undertaking connections, the technical support provided to allow customers to realize their connections, and so on.

*figure 3.3* / **Household Sewerage Connection Detail**

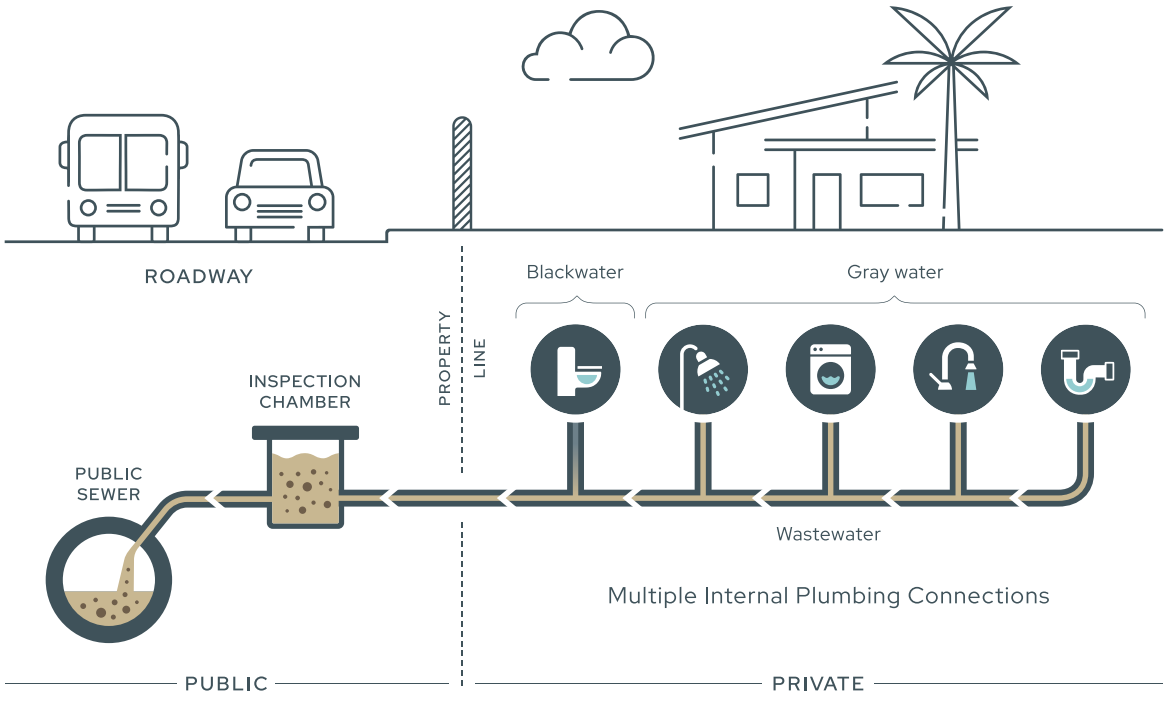


*figure 3.4* / **Schematic of Separate Wastewater Sewerage System and Stormwater System**

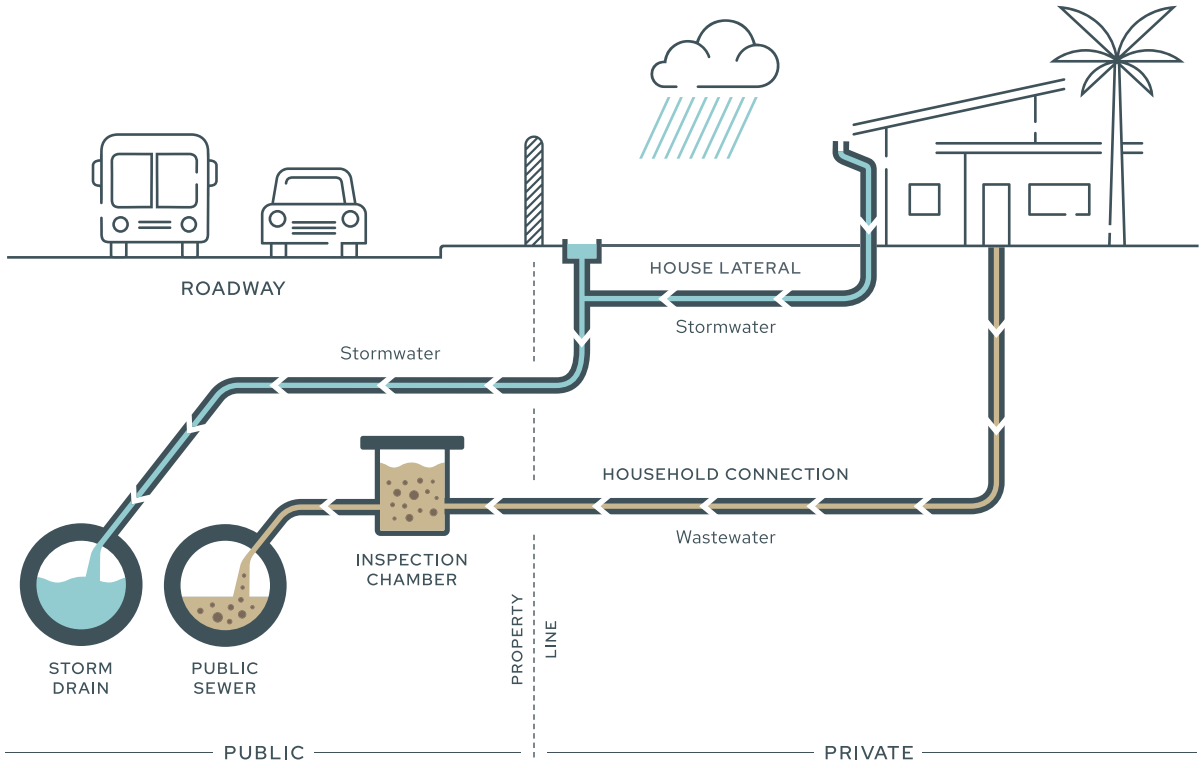
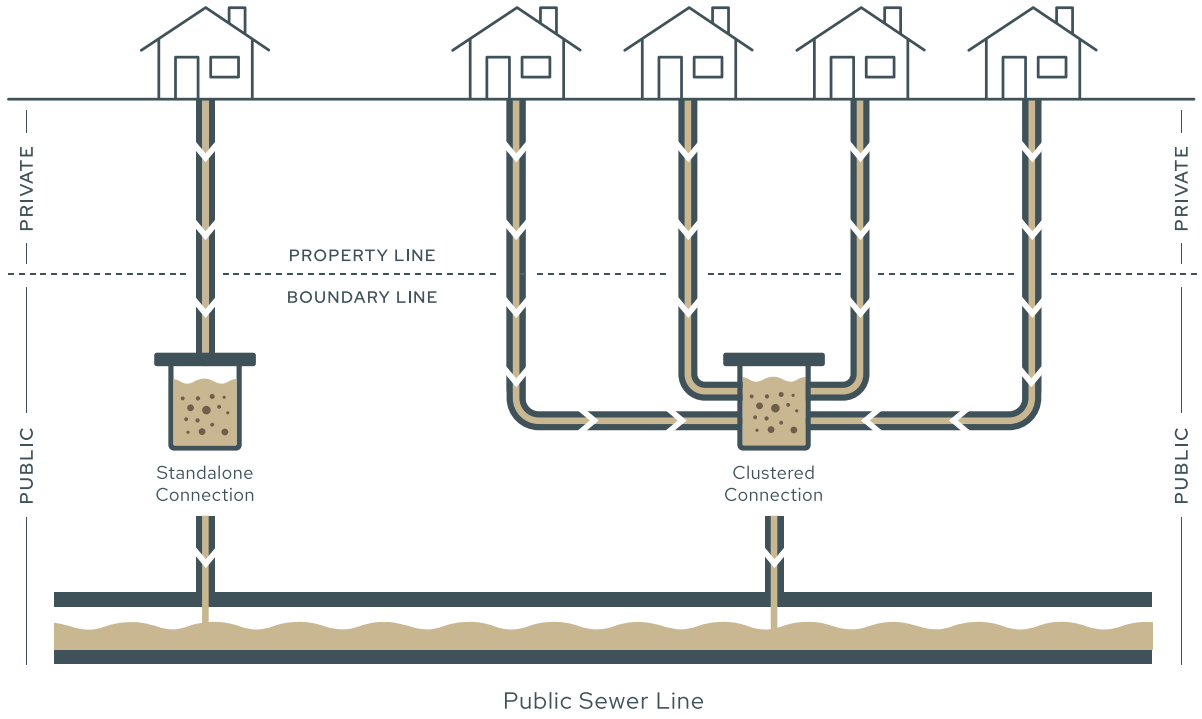



*figure 3.5* / **Schematic of Standalone and Clustered Household Connections**



STAGE 2

# Planning and Designing the Intervention

This stage uses the situational analysis information collected during stage 1 to understand the context, identify goals, and inform the planning of the proposed sewerage connection program. The planning should include the policies, strategies, and incentives designed to maximize household sewerage connections. »



## SOCIAL



Stage 2 constitutes the planning and the design of the proposed sewerage connection program, using the four dimensions for framing it. During this stage, stakeholders can discuss the program to help define and agree upon program indicators as well as expected outputs and outcomes. A theory of change, results framework, and monitoring and evaluation (M&E) plan can also be developed to map how the program will monitor and achieve the outputs and outcomes. (For details, see appendix B and the sixth chapter, "Stage 4: Monitoring and Evaluation.")

At this stage, the aim is to design and plan social interventions based on the information gathered during the assessment via interviews, focus groups, and field visits. The interventions should address social details relative to administrative and institutional arrangements as well as to technologies and service delivery (see below). These details and related issues can affect connection policies and initiatives.

### Designing Social Aspects—Guiding Principles

**To design a social marketing plan and strategy for implementation.** The plan can be a short reference document that includes the following:

- The objective of increasing sewerage connections.
- Clear roles and responsibilities of stakeholders, including government personnel and staff of the service provider plus representatives of categories of consumer groups and households
- Key milestones for the program
- The program's projected timeline and budget
- A research and monitoring plan to monitor the program's implementation. A marketing strategy should use a "marketing mix"' or "the 5 Ps." Table 4.1 details elements of the 5 Ps that should be part of the marketing plan.

- **Price.** The price refers to the affordability of sewerage connections, including monetary and nonmonetary costs.
- **Promotion.** The Promotion element is to target potential customers to inform them about the benefits of connecting to sewerage.
- **People.** The people element refers to the service provider, its staff, and potential customers for sewer connections.
- **Place.** The place element includes the physical location for signing up for connections and payments. Examples include households, businesses, utility offices, and the Internet (to sign up for new accounts).
- **Product.** The marketing plan should focus on the benefits of the sewer connections to the household instead of just presenting the attributes of the sewerage network. This will help increase willingness to connect.

**Source:** Devine and Kullmann 2011.

*table 4.1* / **The "5 Ps" of a Marketing Strategy to Consider for Sewerage Connections**

| The 5 Ps | Key Points to Consider |
|---|---|
| 1. **Price** | The price refers to the affordability of sewerage connections, including the financial cost of the connection; supporting services (operation and maintenance); and intradomiciliary costs (for example, floor repair) as well as any nonmonetary costs, such as time for installation. The cost should be commensurate with the customer's willingness and ability to pay (Pattanyak et al. 2006). |
| 2. **Promotion** | Promotions link households with suppliers, targeting potential customers with messages related to the availability of sewerage connections and the benefits of having them. By showing understanding of the supplier market and the customer base, effective messages can increase demand for sewerage connections. A starting point could focus on how the program will solve or improve the customer's sanitation problems. |
| 3. **People** | The people element refers to service providers, their staff, and their potential customers, that is, those involved in the business of providing new sewerage connections and those targeted as possibilities for acquiring new connections. Households generally prefer easy-to-use systems, companies with readily accessible customer service agents, and service providers that are attentive and responsive to their needs. Happy customers will refer new households. Service providers need to offer staff members ongoing capacity building and training, including sessions that teach effective communication and outreach skills. Also, given the complexity of sewerage connection programs, the landlord-tenant dynamic merits ample consideration. For example, while focusing on necessary skills for customer service, researchers should see if staff can answer basic questions, such as the following:<br>• How easy is it to apply for a new connection?<br>• How convenient is the billing process?<br>• How can customers file complaints?<br>• How quickly does the service provider address the complaints?<br>• How quickly does the service provider resolve blockages? |

*(table continues on next page)*

*(table 4.1 continued)*

| | |
|---|---|
| 4. **Point of purchase** *or* **Place** | The place element refers to how the service provider will deliver its product or service to customers. This might include details about the physical location (for example, the customer's home, the service provider's office, the contractor's office, or the distributor's office), for signing up, for making payments, and for undertaking the connection (this obviously takes place in the home).<br>The following questions are relevant:<br>• Where do households go to sign up?<br>• How do households sign up for their sewerage connections?<br>• What are the eligibility criteria for households to receive support?<br>• What are the procedures for getting a connection?<br>• At what stage in the implementation of a new sewerage project is the connection done?<br>• When do households sign up? |
| 5. **Product** | The marketing plan should focus on the benefits of sewerage connections to households rather than just presenting attributes of the sewerage network and related elements. Information should include products and services available for the households, ways in which the sewerage connection and related system differ from other commonly used sanitation services and highlight the value added, the branding, and the service and the O&M support provided. Service providers should rethink any understanding they might have that their products only constitute the physical connection to the sewer. For example, if the product is just seen as the act of reaching the household with the pipe, a service provider will not be taking the customer's perspective into account when designing the product and the service. From a marketing point of view, service providers should avoid making it difficult for potential customers to access the product and service, so they should adopt a customer-centric approach to product and service design. In other words, they should think about their customers and involve them in decision making whenever possible. |

A marketing plan that incorporates the "5 Ps" provides a general framework to include the customer perspective in a connection program. The case studies illustrate specific social factors to consider while designing a sewerage connection program.

## Understand the landlord-tenant dynamics

### TANZANIA

The motivations of landlords and tenants require consideration to overcome any mistrust between these key stakeholders.

#### TANZANIA

In Moshi, Tanzania, more than 90 percent of tenants were ready to pay higher rents (23 to 57 percent or more) to benefit from a household sewerage connection. This would have corresponded to the increase that the landlords would have sought to cover the cost of connection. However, in practice, most landlords and tenants failed to broker a deal that would have facilitated the household connections, in part because of "mistrust on both sides" (Mhina 2003).

## Develop incentives for households to connect based on data

### BRAZIL

Data collected during the assessment stage via key informant interviews, semi-structured interviews, focus groups, and field visits can boost understanding of incentives for households to connect. For example, the objective of pollution reduction may provide an incentive to connect for households in areas greatly affected by environmental concerns. However, not all targeted households may share the same collective common goal. Peer pressure and the belief that "everyone is connecting" can also be major influencing factors for driving a household's willingness to connect.

#### BRAZIL

In Salvador, Brazil, local conditions made it particularly challenging to motivate households to connect to the new sewerage system. Most households in the affected areas already had internal sanitary installations connected to the stormwater system, contributing to the pollution observed in the Baía de Todos os Santos (Bay of All Saints). From the households' perspective, this arrangement provided all the advantages of a sewerage system at zero cost. At the same time, switching to the new sewerage network entailed both monetary costs and disruption of service associated with the rerouting of plumbing from the existing sanitary installations to the sewer in addition to the subsequent ongoing obligation to pay a monthly sewerage bill. Moreover, because the resulting benefits took the form of general environmental improvements, these were not always immediately apparent to residents (see appendix C: case study 8).

## Communicate in an open and transparent way



### BRAZIL

Elsewhere in Brazil, the core of the condominial sewerage approach is community engagement, which has proven to achieve 100 percent sewerage connections in targeted areas. The final design of the collection networks and condominial branches occurs in the field with the participation of all residents of each "condominium" (block) involved. A condominium is defined as any set of contiguous lots or residences surrounded by vehicular or pedestrian traffic routes with any urban or natural element separating the condominium from other blocks in the area. It is worth noting that the experience of the large condominial sewerage program of the federal district's utility, Companhia de Saneamento Ambiental do Distrito Federal (Caesb), in Brasília and the surrounding area shows that from the beginning of the process (that is, community mobilization and preliminary designs) to construction, completion takes an average of three years; and the preliminary design process takes roughly one year (World Bank 2017a).

### COLOMBIA

The marketing strategy and the communications plan should provide comprehensive information to the target households on all relevant aspects of the connection program. For example, if the program will subsidize connections, but subsidies will end when the program ends, it is important to communicate this information clearly at the beginning of the program to manage expectations, allow households to plan accordingly, and minimize the risk of resentment between program beneficiaries and service providers.

### COLOMBIA

In Colombia, subsidies differ, depending on locations of households. The maximum subsidy level allowed per household for the different areas in the country is publicly available. This transparent communication creates trust between service providers and customers (see appendix C: case study 3). In Espírito Santo, Brazil, the utility offers subsidies to families registered in a pro-poor government program (see appendix C: case study 8). In Morocco, subsidies were provided for households in specific areas. Levels of subsidies and how these are provided should be clearly communicated to establish trust, expedite program implementation, and minimize resentment (Chauvot de Beauchene 2009).

# Communicate any cost savings

FINANCIAL

## BRAZIL

It is sometimes assumed that the costs of a new sewerage connection can compensate for the charges that a household incurs for the maintenance of its septic tank, but this is not systematically true. Because costs are one of the decisive factors in the decision-making process, it is essential to use any potential cost savings for communication campaigns and social promotion activities. It is also important in this communication to clearly differentiate between the upfront costs to cover the intervention works of the connection and the subsequent periodic costs related to the running of the sewerage system.

### BRAZIL

In Teresina, Brazil, for instance, the World Bank found that the costs of connection were higher than the recurrent costs of maintaining septic tanks (World Bank 2017a). In many countries the cost to maintain septic tanks is low because they often are not properly designed, built, or managed. For example, the septage leaks from the structure, or it is discharged on purpose; therefore, emptying is not required as frequently. By contrast, in Senegal, sewerage connections enable beneficiary households to save US$$27 per year because they no longer have to pay for emptying latrines (Independent Evaluation Group [IEG] 2015).

### Designing Financial Incentives—Guiding Principles

1 **Prepare a financial model for the sewer connection program.** The financial model should cover how much the scheme will cost; who will cover capital expenditures (CAPEX) and operating expenses (OPEX), household fees and tariffs, utility contributions, and government subsidies. The model also should consider the following:
   - » The costs of both large and small infrastructures, namely the wastewater treatment plants; the primary, secondary, and tertiary sewers; any pumping stations; and household connections.
   - » The implication of different levels of connection. The model should have upfront strategies to ensure the long-term financial sustainability of the service provider, even in scenarios where connection rates are lower than planned or difficulties in enforcing payment are encountered.
   - » The importance of regular updates to the financial model. This will provide the service provider with updated information on how much would be required to support all aspects of the connection program (such as the social marketing, program administration, agreed subsidy provision, and so on).

2 **Set tariffs.** The tariff-setting process should align with government priorities and existing or proposed programs in the sanitation sector, and it should incorporate global lessons and good practices as far as possible. It is also important to identify which authority has tariff-setting powers, for example, a regulator or other government body, and the extent to which the tariffs are set according to appropriate technical or financial criteria.

3 **Set appropriate connection fees.** Sewerage connection costs can vary considerably among regions and countries and within cities, and they depend on several variables, including the distance between the house and the sewer and the costs of materials and labor. The costs can also vary, depending on the technical design of the connection, including construction or installation methodologies, the fixtures and fittings, and so on. These fees are the most common barrier for households to connect. Determining fair prices and subsidies as appropriate and giving households options, such as paying the connection fee in smaller installments over a longer period, can make payment easier for them.

4 **Consider who pays for what.** Establishing upfront who finances which parts of the connection system (toilet, plumbing, connection box, and so on) and who pays for materials and labor is important.

5 **Explore additional sources of funds.** In addition to tariffs, the service provider should explore the availability of other sources of funding, including government transfers and funds raised through municipal, state, regional, or national taxes (for example, environmental taxes, property taxes, and so on).

6 **Consider subsidies.** When proposing household connection fees and sewer tariffs, the implementation entity should contemplate the targets of subsidies (for example, poor or wealthy households and so on). The subsidy type and amount will vary considerably, based on local context; for instance, they could depend on household characteristics (single parents, low-income families, employment status, and so on). Subsidies should be transparent in their amounts, recipients, and processes to prevent conflicts between different categories of users. A 2019 World Bank report on smarter subsidies is a valuable reference for service providers as they design their connection fee and tariff subsidies for sewerage services (Andres et al. 2019).

7 **Explore financing mechanisms.** Service providers should develop a list of financing mechanisms to implement as well as the costs to support these options. Financing mechanisms include revolving funds, subsidies, loans, microfinancing, saving schemes, output-based funding, private sector mobilization, and so on; these may be studied further to identify the most appropriate option for reducing upfront costs of the sewer connection program. This will allow service providers to develop additional ways to overcome the financial barriers that impede low-income households from connecting to a sewer and upgrading their existing sanitation system.

8 **Assess financial viability.** The financial model should consider how different scenarios (with varying projections for sewerage connections) will affect the financial viability of the proposed connection program and, consequently, how these will affect the financial sustainability of the service provider.

## Strengthen the supply chain and reduce transaction costs

**GERMANY**
**BRAZIL**

Some considerations may include activities aiming to reduce transaction costs of administrative procedures for contracting out the designing and installation of household connections. Particular attention should be paid to the integrity and efficiency of the procurement system used by the service provider to maximize monetary value for both it and its customers.

#### PERU

A program supported by the German Agency for International Cooperation (GIZ) worked with the municipal utility of Lambayeque, Peru to redesign the contracting process for the utility's sewerage connection service. The program streamlined the process to get a new connection by having the utility's technicians visit target households to "sell" the connections instead of requiring customers to visit the utility's offices, which was the case in the original sewerage connection application process (World Bank 2017a).

#### BRAZIL

The utility of the state of Santa Catarina, Brazil, arranged with households to hire certified engineers to inspect and certify in-house sanitary installations. The utility, itself, does not do this work. The arrangement minimizes the steps for the utility and the customer, reducing the program's transaction costs (World Bank 2017a).

## Consider approaches based on outputs or results

**SENEGAL**
**MOROCCO**
**KENYA**

The service provider prefinances services and the associated "outputs" (for example, a functioning household sewerage connection), and OBA/RBA[16] payments occur upon delivery and verification of the agreed-upon outputs (World Bank 2017b). Several programs have experimented with OBA schemes for sewer connections programs. The Global Partnership for Results-Based Approaches (GPRBA)[17] has been piloting OBA projects and exploring results-based financing (RBF) approaches to service delivery by working with both public and private implementing partners that receive payments to partially defray the costs of new sewerage connections. However, it is important to weigh the transaction costs associated with OBA because implementation challenges may arise, particularly if the service provider has no experience with these types of schemes (IEG 2015).
For OBA and RBF schemes, it is also important to avoid delays between completion of work and payment to the service provider because delays can affect the success of the program. Strong communication and grievance redress mechanisms are essential to ensure a flow of information between customers and service providers for all connection programs, including OBA and RBF schemes.

16 OBA = output-based approaches; RBA = results-based approaches.
17 The Global Partnership for Results-Based Approaches (GPRBA), known until February 2019 as the Global Partnership on Output-Based Aid (GPOBA), is a global partnership program administered by the World Bank Group.

## Consider the use of revolving funds

**SENEGAL**
**VIETNAM**
**URUGUAY**
**INDIA**
**PHILIPPINES**



**SENEGAL**

In Senegal, a GPOBA program sought to expand household sewer connections by building on an approach taken by a World Bank project that was already under implementation. However, procedures linked to GPOBA funding were complex, and the implementation arrangements were cumbersome. These factors delayed and hindered project implementation (IEG 2015).

**MOROCCO**

In Morocco, GPOBA successfully worked with public and private sector operators to extend connections to low-income neighborhoods in select areas of several cities. Demand drove participation, which created an incentive for operators to carefully assess requests from targeted beneficiary households during project preparation and to work with local authorities and partners during implementation to raise awareness and promote the program (Chauvot de Beauchene 2009).

**KENYA**

In Kenya, a successful GPOBA project used a blended finance model to reduce upfront connection costs; the model combined subsidies and credit. The project significantly increased connection rates among low-income urban households, despite relatively high prevailing interest rates for commercial loans. A note of caution: Although providing credit to households helps reduce upfront costs and increase connection rates, it can also lead to financial sustainability challenges if loan repayment rates are low. The project showed that commercial lending for sewer programs can be viable from the standpoint of commercial banks as well as utilities as long as there is demonstrated cash flow available to the households to service the loans (see appendix C: case study 6).

Revolving funds offer an alternative financial vehicle. They allow loan repayments (based on repaying the loan principal and the interest) to finance other projects or to assist in continuing to fund the program in question (World Bank 2016b). This option requires consideration of the payment capacity of the targeted households and other financial factors determined during assessments.

**SENEGAL**

The Community Fund for the Sanitation of the Poor Urban Areas (FO CAUP) revolving fund set up in Rufisque, Senegal, to promote connections to nonconventional sewers was not as successful. The revolving fund was supposed to provide small loans to spread the cost of connections over time. As users paid back loans, other households could get loans to finance more new connections. However, cost recovery was extremely low (less than 30 percent), a situation related to several factors:

- The "balance" to be paid by users (250 Euros) was more than what low-income households could afford. Furthermore, existing on-site sanitation options appeared to meet their sanitation needs just as well even though the fecal waste from the existing sanitation facilities was not well managed or treated adequately.
- Installation of connections occurred before collecting the money owed; thus, households did not face penalties for defaulting on payments, which left few incentives to pay.
- Poor quality of the sewerage service (technical issues, lack of clearly defined manager or operator, and so on) discouraged users from continuing to pay in the long term (pS-Eau 2003; Schrecongost 2016).

Difficulty in enforcing household repayments caused losses for the utility, which affected the implementing of the connection program (World Bank 2019b).

#### VIETNAM

The Vietnam Coastal Cities Environmental Sanitation Project established revolving funds in each city to provide small loans for constructing household sanitation facilities and sewerage connections. The local women's union managed the funds according to procedures in a dedicated program manual. The union followed clear poverty-focused eligibility criteria to select the first round of beneficiaries and had a long waiting list. The project also applied wastewater fees to all households with water connections, thus reducing disincentives to connect to the sewerage system once it was available. The revolving fund allowed about 8,236 households to install toilets, connect to the tertiary sewerage lines, or do both, an arrangement that benefited more than 37,000 people (World Bank 2015).

#### URUGUAY

In Uruguay, after connecting, a sanitation certificate is provided to the household, and the associated fees go into another revolving fund, which provides subsidies for emptying to low-income households that use on-site sanitation options (Brault 2018). This mechanism has helped the program respond better to the sanitation needs of low-income households.

#### INDIA

In Tamil Nadu, India, in Salvador, Brazil, and in Kenya, respective programs allowed households to pay in installments over a longer period (for example, monthly for five years), thus making the connection and operation fees more attainable for low-income households. In India, connection charges related to the size of household plots, with larger plots having higher charges. This addressed issues of equity and affordability (World Bank 2016c and 2019b; see appendix C: case studies 5, 6, and 8).

#### PHILIPPINES

In the Philippines, the sewerage connection program encouraged private sector participation to clean up receiving water bodies in collaboration with concerned government agencies. The program mobilized private sector concessionaire Maynilad, which not only contributed to program funding but also shared technical expertise and innovative ideas to help with clean-up activities and the sustainability of program benefits (see appendix C: case study 7).

## Consider how the rate of connection affects financial viability of the program and the service provider

### URUGUAY

The financial model should consider the medium- to long-term financial viability of both the program and the service provider.

**URUGUAY**

In Uruguay, low connection rates (3,000 of the planned 8,000 households connected by 2018) meant that the utility only used three of the eight wastewater treatment plants it had built. Because households were not connecting at the anticipated rate, the utility had to bear the financial costs of letting large-capacity treatment plants sit idle. These financial burdens included maintenance, repair, and depreciation costs (Brault 2018).

## The program can be based on supply-driven or demand-driven approaches

### PERU

Supply-driven sewerage connection programs focus on construction of the sewerage connection. Demand-driven programs include social marketing strategies that increase the demand for connections as well as associated infrastructure and services tailored to household needs (World Bank 2008). Subsidies can be introduced for each type of program, and they can vary in value from nothing to 100 percent within a program or between programs, depending on the design. For example, subsidized supply-driven sewerage connection programs are popular in some countries in Latin America. However, implementing these programs where the utility is not ready to provide high-quality sewerage services could be counterproductive.

To minimize these risks, the following ideas could work:

- The amount and the type of subsidies should correlate with relevant household characteristics (for example, income, single parents, low-income families, employment status, and so on).
- Financial planning related to the costs of connections and to the subsequent operation and maintenance (O&M) of the sewerage system should consider available subsidies and remaining funding gaps.

**PERU**

Led by the private sector, the Mi Baño initiative in Peru focused on increasing demand for appropriate sanitary installations in target households that could connect to adjacent sewers. The initiative focused on developing aspirational and affordable solutions that would both stimulate and satisfy demand (World Bank 2017a).

## Consider how the program will continue when financial support from other sources ends

**PIR**

**INDIA**
**PHILIPPINES**

Financial planning for connections and ongoing O&M needs consideration to ensure the long-term sustainability of the connection program.

#### INDIA

In Tamil Nadu, households must pay a user charge to cover O&M costs of the sewerage network and wastewater treatment plant. Whenever feasible, the wastewater treatment plant projects include an energy recovery component, which helps meet 60 percent to 80 percent of the plant's energy needs, and the sale of treated wastewater to industries. Both efforts help defray the system's overall O&M costs (World Bank 2016c; see appendix C: case study 5).

#### PHILIPPINES

In the Philippines, maintenance by different stakeholders contributes to the success of the program. The community maintains tertiary lines from houses to the main network, while Maynilad operates and maintains the rest of the system. As part of its network preventive maintenance program, Maynilad regularly cleans and checks the system, and it has dedicated teams that respond to sewer-related complaints that residents are not able to resolve themselves (see appendix C: case study 7).

Using the institutional diagnostic tool (IDT) or similar tools, a good policy, institutions, and regulation (PIR) diagnostic can help stimulate discussions among stakeholders and prioritize issues related to the design of a sewerage connection program. The diagnostic process should involve all stakeholders, and ideally, relevant government and sector entities should provide strong leadership. The establishment of a working group(s) with representatives from the full scope of relevant stakeholders (including specialists in policy, regulatory, technical, social, and financing, among other areas) can facilitate coordination throughout both the diagnostic and reform processes. Ensuring the participation of key players is key to the successful planning, design, and implementation of any PIR reform. Guiding principles to design PIR incentives are described in the text that follows.

### Designing PIR Incentives—Guiding Principles

1 **Identify key drivers and objectives of the sewer connection program.**

2 **Understand the institutional and policy environment for sewer connections.** Questions to address include the following:
- » Which entity is responsible for the sewer system and connections? This may differ for capital works development and expansion and for system O&M.
- » Who provides leadership (both formal and informal on sewer connections) within the sector?
- » Do political will and buy-in exist for a connection program?
- » Do a national policy and strategy exist for sewerage connections?
- » Is there a legal framework that provides the basic setup for a program?
- » What is the regulatory framework?

## Consider a range of program and service management models



3 **Understand the political economy of the country, sector, and proposed program.** Questions to address include the following:
   - » Where in the reform process does the water and sanitation sector currently lie?
   - » Do program designers need to consider any cultural influences?
   - » How will the program accommodate any cultural attitudes toward sewer connections?
   - » Which actors have vested interests in the status quo and which could be persuaded to advocate for the importance of sewer connections?
4 **Identify the intrinsic incentives of key actors.** Analyze intrinsic incentives of those who will implement the PIR measures to integrate their incentives with effective incentives identified or required for a successful connection program.

5 **Design institutional interventions that align exogenous and endogenous incentives.** Consider the specific characteristics of the connection program and aim to align its objectives and any interventions with the intrinsic PIR incentives of key actors.

6 **Consider a connection program that fits its purpose** Avoid a program that is overly complex for the given context and institutional capacities.

Based on lessons learned from case studies, several points merit consideration while organizers plan and design PIR incentives for a sewerage connection program.

Considering a range of program and service management models is important at the program design stage to ensure the best fit for the service provider and the potential customers. Understanding management models previously used by the service provider (even beyond sewer connectivity) and their effectiveness is important. Examples of program and service management models include:

- » The service provider contracts out and oversees connection services—technical, social, and other elements—but manages the sewerage network.
- » The service provider makes the connections and manages the sewerage network.
- » Participation by the private sector facilitates contracting of the connection work, management of the sewerage network, or both. This participation could take the form of a franchise arrangement.

## Determine the suitability of the program design by drawing on examples from comparable cities

**BRAZIL**

Identify where PIR approaches worked and failed in sewerage connection programs. Assess the suitability of the new program in the local context.

**BRAZIL**

In Salvador, Brazil, results of the first part of the sewerage network expansion did not satisfy involved parties. Complaints focused on the reportedly poor quality of work and on the unsuitability of conventional sewerage systems for low-income communities, most of which had unmet demands for sanitation services. As a result, the utility received support from other utilities in Brazil to design and implement a condominial sewerage system program to address these technical constraints (see appendix C: case study 8).

## Consider how the service provider's reputation affects program success

**BRAZIL**
**VIETNAM**

If significant operational and financial issues exist with the service provider's current management of any existing wastewater or water supply infrastructure, involved parties must address them before embarking upon a sewerage connection program.

**BRAZIL**

In Rio de Janeiro, Brazil, some residents sued the utility, claiming that it overcharged citizens for inferior sewerage services: it did not treat collected wastewater. The citizens' claim was not upheld in court, but the utility's reputation suffered. Subsequent efforts to connect citizens to sewerage networks failed because many refused to connect, citing the prior poor service.[18]

In Salvador, Brazil, the utility initially faced great reluctance from low-income households. Credibility of public services was not high, and low-income communities either did not want to connect or thought that they should get service free of charge. Many people living in these communities were reluctant to have outsiders do construction work not only inside their communities but inside their properties (see appendix C: case study 8).

**VIETNAM**

In Vietnam, poorly operated and maintained systems combined stormwater and wastewater. The systems contributed to pollution, produced foul odors, and degraded the environment. Thus, citizens had little confidence in sewerage systems and minimal interest in connecting to networks (World Bank 2015).

18 See https://www.washingtonpost.com/world/the_americas/rio-planned-olympic-scale-sewerage-project-but-citizens-say-no-thanks/2016/01/06/bcc13362-a91f-11e5-b596-113f59ee069a_story.html?utm_term=.d0ad8a69e81f [AQ: Give context to the website.]

## Indicate roles, responsibilities. and accountable entities upfront

### ECUADOR

Institutional clarity helps define responsibilities, identify institutional gaps, and promote coordination among key stakeholders during implementation.

#### ECUADOR

The case of Guayaquil, Ecuador, demonstrates complications that can arise because of conflicting responsibilities and a lack of coordination among actors. The connection program is successful, but coordination issues developed because of the discovery that new household connections were discharging directly into the estuary. The ministry's program for depolluting the estuary blocked any illegal discharges, so households had no outlets for their domestic wastewater unless they connected to the sewerage network. However, the ministry did not coordinate with the utility's connection program; consequently, the households in question had no assurance that they would always have a connecting network in front of their home. Without improved coordination, such situations can potentially erode trust (see appendix C: case study 4).[19]

## Strengthen institutional and legal frameworks in advance of program implementation

### BRAZIL

Upfront strengthening of institutional and legal frameworks helps establish an enabling environment and lay the necessary groundwork to support successful implementation of the program.

#### BRAZIL

In Salvador, Brazil, a state law requiring households to connect to the sewerage system came into effect only three years after the program began. This law was necessary to get customers who already had sewerage mains running close to their households to connect to the network (see appendix C: case study 8).



19 The terms of reference for SENAGUA's institutional strengthening project provide a useful reference tool to understand how successful Latin American experiences increased sewerage connection rates and assessed their applicability to different contexts in Ecuador.

## Achieve the buy-in of key institutions and identify champions early in the process

**INDIA**
**PHILIPPINES**

Prominent and powerful individuals and groups can influence the connection program's implementation and outcomes.

#### INDIA

In Tamil Nadu, the state government championed and drove the program, and elected officials participated in it and supported it from inception and planning through implementation. This involvement provided the key to the program's success (World Bank 2016c; see appendix C: case study 5).

#### PHILIPPINES

In Manila, the Philippines, the political leadership of the chairman of the Pasig River Rehabilitation Commission was instrumental in completing the connection program, coupled with effective community collaboration and participation by the private sector (see appendix C: case study 7).

## Consider the effects of land rights and tenure

**KENYA**
**ECUADOR**

If beneficiary households need formal land tenure to connect to the sewerage network, this may represent a significant obstacle.

#### KENYA

In Kenya, households initially needed formal land tenure to participate in the program, which provided reimbursable funds to install toilets both with and without sewerage connections, depending on the context. A subsequent redesign of the application process made it optional to provide a copy of the title deed. Instead, landlords could simply apply by providing a copy of their national identification. The assumption was that because landlords were investing their own money to cover at least 50 percent of the cost of the works, then they had an incentive and the necessary information to manage the risk of eviction or any land rights conflict (Schrecongost 2016; see appendix C: case study 6).

#### ECUADOR

In Guayaquil, Ecuador, eminent domain was used to acquire land to ensure the necessary rights-of-way for the sewerage lines and to avoid any conflicts over land rights during program implementation (see appendix C: case study 4).

## Consider how the complexity of the program could deter households from connecting

The design of the program should be as inclusive as possible by considering the needs of the most vulnerable (for example, the disabled, the elderly, the illiterate) to address and overcome specific needs of these groups at each stage of the connection program (from the sign-up period, through design and construction, to operation and maintenance).

## Consider how to handle enforcement as well as nonconnection and nonpayment

**SOUTH AFRICA**
**BRAZIL**
**KENYA**

In most of the cases reviewed, sewerage connections were often compulsory by law (for a household within a certain distance of the sewerage network), but fines were rarely enforced in practice, thereby limiting the success of programs. There are numerous references to "free riders," households that do not pay ongoing sewerage charges after getting free or subsidized connections. These households never pay the charges, or they start paying but later desist.

#### SOUTH AFRICA

In Durban, South Africa, households located within a specific distance of the network have been fined successfully for nonconnection. In this case, fines are issued in the name of the state rather than in the utility's name to avoid reputational issues.

#### BRAZIL

In Espírito Santo, Brazil, a law stipulates that when the utility has installed the network in front of a house, the customer starts to receive a bill for ongoing sewerage service. This measure provides an incentive for people to connect officially to the network. However, an issue arose with free riders after installation of the connection and any associated facilities because households didn't pay the subsequent sewerage fees (World Bank 2017a; see appendix C: case study 1).

## Provide legal clarity on responsibility for the final length of household connection



KENYA

In Kenya, strong enforcement of customer repayments has proven to be an effective tool to ensure financial sustainability, but this approach requires balance with associated social costs. For example, disconnecting water (or sewer) services in cases of nonpayment in formal (wealthier) areas has been effective. However, in informal settlements, a more lenient approach has been more successful; the service provider works with customers and community leaders to address repayment problems and to develop repayment plans (World Bank 2019b; see appendix C: case study 6).

It is important to clarify who is responsible for funding the connection, including who will design and construct the connection and who will ultimately be responsible for maintaining this portion of the connection (that is, from the inspection chamber to the internal plumbing of the house).

# TECHNICAL



Findings of the technical assessment should provide the technical, or engineering, basis for the proposed sewerage connection program. Guiding principles of designing a technical program are described below.

## Designing the Technical Program—Guiding Principles

» Ensure that the proposed plan aligns with any relevant broad and medium- to long-term city development plans and strategies.
» Based on the assessment and connection typology, map the active, feasible, and potential connections for the target areas. Incorporate numbers of connections (including growth rates over time); locations; likely situation constraints (for example, distance from trunk sewer as well as water access, topography, and hydrology); potential economies of scale (standalone or clustered connections); and user acceptability (willingness and ability to connect, both current and projected).
» Consider possible enhancements to relevant complementary services, including water supply, graywater management (if managed separately from blackwater at household), stormwater management, road access, and solid waste management. Such enhancements may be necessary to ensure viability of the sewer connection program. For example, organizers may want to consider a combined water and sewer enhancement program, a sewer and stormwater drainage program, or both.
» Consider the status of the existing sewer network, including secondary and primary mains, downstream pumping stations, and wastewater treatment plants. Identify the necessity to retrofit, upgrade, increase capacity, or to take multiple actions to accommodate the expected increase in wastewater flows and loading because of the increased number of connections.
» Consider a range of suitable sewerage connection options that are not overly complex for the given contexts (physical environment, availability of supplies, and affordability) and for available technical capacities. The cost-effectiveness of the sewer connection options (both CAPEX and OPEX) should also merit consideration. Also, decide if the connection program will include internal plumbing for all or some households; if so, decide what forms of internal plumbing it will include (toilet installation and associated plumbing, handwashing basins and plumbing, and so on).
» Design technical options that are suitable for the hygiene practices and cultural habits of the users.
» Provide technical capacity support and technical training to service provider, contractors, and households if required for the implementation of the program.
» Develop technical standards and guidance, including operation of and maintenance requirements for the new sewer connections, for both households and service provider.
» Ensure that the design adequately considers potential effects of climate change and incorporates ways to manage disaster risks.

## Understand the technical details and solutions of in-house plumbing



Users of this guide also should review the "condominial" sewerage approach and its relevance to the context because it has enabled universal sewerage coverage in many settings, including some in dense, unplanned, low-income urban settlements and in middle-class and wealthier neighborhoods.[20]

The case studies referenced show that planning and designing the technical part of a sewerage connection program should incorporate consideration of several aspects.

In addition to blackwater from the toilet, graywater from the bathroom, kitchen, and laundry should ideally be collected and directed to the inspection chamber at the property boundary. From the inspection chamber, resultant wastewater is discharged to the sewerage main. If the household relied on a septic tank, cesspool, or pit before being connected to the sewerage system and if the wastewater sewerage system is separate from the stormwater system, then this facility should be properly sealed. Afterward, the household stormwater drainage gutters and downpipes should be connected directly to the stormwater drainage system and not to the sewer.

20 The World Bank has compiled condominial sewer reference material, which is available on its website for Citywide Inclusive Sanitation (CWIS): https://www.worldbank.org/en/topic/sanitation/brief/citywide-inclusive-sanitation#3.

## Ensure the definitions for different connections are clear

Depending on the definitions and types of connections, the number of potential or feasible household connections may change significantly. For example, if the connection program is not going to extend the sewerage main, then the number of households that could connect under the program will be fewer than if the sewerage main were going to be extended.

## Determine alternative solutions for households that cannot connect

**INDIA**
**BRAZIL**

If there are households located below street level or if there is insufficient head to carry the wastewater by gravity out of the premises into the collector, then alternative technical arrangements may need to be established. If a straightforward technical solution to achieving connections is not available for a proportion of households because of ground conditions or other topographical reasons, the service provider should develop a corresponding narrative and communicate this clearly to concerned households. It may be necessary to have collector sewers run above ground in such circumstances, to establish unconventional routes for them through informal, densely occupied settlements, or to do both.

#### INDIA

In Tamil Nadu, India, contractors had some freedom to pursue innovations to overcome challenges of technical in-the-field realities, thus allowing projects to be implemented quickly and on time (World Bank 2016c; see appendix C: case study 5).

#### BRAZIL

In Salvador, Brazil, appropriate technical solutions proved necessary to connect households in high-density informal settlements on steep hillsides and along waterways. The first phase of implementation used conventional sewers that had to pass under peoples' homes; these were not feasible, so the program implemented condominial sewerage systems. The condominial approach allows for flexibility in locating branches and for inspection chambers to be located as close as possible to internal facilities of residences. The proximity between the connection site (the "inspection chamber" of the condominial branch) and the internal toilet facilities significantly reduced costs of the interconnection works of the internal facilities to the condominial branches (see appendix C: case study 8).

## Ensure program considers who is responsible for internal plumbing

### INDIA

Although internal plumbing may appear to be small-scale, low-cost, and simple work, if design and implementation plans do not consider it, then the internal plumbing may never reach completion. Thus, connecting households to the sewerage system will not occur.

#### INDIA

In earlier projects in Tamil Nadu, a sewerage connection meant that the pipe was brought up to the compound wall of the house and that the user was responsible for any internal plumbing to connect to the sewer. This led to delays, so for subsequent projects, the approach changed. As part of the sewerage service contract signed between the household and the service provider, the household's charges for obtaining the sewerage connection included the cost of internal plumbing (World Bank 2016c; see appendix C: case study 5).

## Evaluate capacity of sewerage networks at the planning stage

### SENEGAL
### VIETNAM

Often during design and project budgeting of large sewerage and wastewater treatment projects, planners may not only consider household connections insufficiently, but they also may not give enough attention to secondary and tertiary sewerage lines. Without sufficient planning, designing, budgeting, scheduling, and manpower for constructing, rehabilitating secondary and tertiary lines, or both, new connections may end up not being technically feasible, may require high costs for connecting households located far from mains, may lead to hydraulic overloading of the existing network, or a combination thereof. It is also important to consider whether graywater will be discharged to the sewer together with blackwater, and whether stormwater will also be discharged to the system in the case of combined sewerage systems.

#### SENEGAL AND VIETNAM

In Senegal, the utility underestimated the quantity of secondary and tertiary networks required to complete the sewerage connections program (IEG 2015). The reallocation of funds during project restructuring covered the corresponding cost overruns. In Vietnam, the lack of tertiary networks was the main reason households didn't connect to the sewers because the main sewerage lines were located too far from households, thus imposing a heavy price on households wishing to connect (World Bank 2015).

## Consider how rates of connection affect wastewater treatment

### URUGUAY

The rate of connection to the sewerage network is an important factor to consider in the design stage of the connection program. This information will do the following:

- Help to establish the required or target connection numbers needed for the optimum functionality of the wastewater treatment plant (WWTP) into which the sewers discharge
- Help define the WWTP design and reactor sizing and any possible phasing of parallel treatment streams
- Provide an incentive for the success of the connection program because the success of the connection program will have a direct effect on the successful operation of, and benefits from, downstream investments, that is, the main sewers and the WWTPs, which are normally larger and more costly elements than the sewerage connection program.

#### URUGUAY

In Uruguay, low connection rates (3,000 of the planned 8,000 households had connected) meant that only three of the planned eight WWTP reactors built by the utility were being used. In addition to the idle capacity of the WWTPs, another issue focused on transport of fecal sludge. Households not connected to sewerage continued to send fecal sludge to the WWTPs, causing them to malfunction over time. The utility designed the treatment plants to receive a small percentage of fecal sludge, anticipating that most households would connect to the sewerage network and, consequently, the WWTPs would receive wastewater, not a disproportionate mix of fecal sludge and wastewater. This unplanned hydraulic and organic and solids loading of the WWTPs affected their performance (Brault 2018).

## Ensure customers understand the technical requirements and different options as early as possible

### BRAZIL

To ensure that potential new customers understand the technical requirements and the menu of possible interventions, they must understand the following information:

- Siting of the sewerage inspection chamber (or connection point)
- Location and line of the connection pipeline. Will this disrupt the household, and, if so, what are the mitigating actions of this disruption?
- Toilet facility. Will it be required, or will a retrofit suffice?
- Toilet facilities that could be constructed. Will they include a shower room and handwashing facilities?
- New water supply service. Will this be necessary to complement the toilet intervention to allow the sewer to function? It is also important for households to understand what role they will play in the O&M of their new sewerage connections and to clarify handling of the O&M of the main sewerage network. How will this differ from the household's O&M responsibilities, especially with respect to the part of the connection that is within their pri-vate property. The service provider, household, and other relevant stakeholders must understand the following issues, among other related consid-erations:
- Who will pay to cover the O&M costs? Will the tariff or other mechanisms cover any of the costs?
- Who will carry out the O&M, and who will ensure the quality of any O&M work?
- Who will be responsible for reporting blockages, and what will be the channels for reporting complaints?
- To whom will blockages be reported and how will reports be managed? Will a centralized call center send out teams? Will the number of blockages and response times be tracked?

## Acknowledge previous sanitation investments and preferences of households

### VIETNAM

**BRAZIL**

In Salvador, Brazil, social mobilization activities began before construction started to secure community buy-in. These activities focused on facilitating agreements among residents about organizing "condominiums" (groups of households sharing a condominial branch connection) and choosing the condominium representatives who would take responsibility for maintaining the network and representing their neighbours in negotiations with the utility (see appendix C: case study 8).

A household's willingness to invest in a sewerage connection scheme may be hindered by the amount of previous investment that they have made in the sanitation facilities of the dwelling and by their preference to continue to use a tried-and-tested technology. They may also have concerns with respect to the technical requirements for the connection (for example, the need for extensive excavation).

**VIETNAM**

In Vietnam, many households did not connect because their septic tanks were located in the backyard, which would have required excavation through the middle of the living room to connect with the sewerage line at the front of the house (World Bank 2016a).

STAGE 3

# Implementation

This stage draws on the work of the prior two stages—the situational analysis and intervention design—to effectively implement the program and measure its progress. The next section addresses how to consider the four dimensions during the implementation stage and highlight relevant examples drawn from the case studies. »



# SOCIAL



A good first step during the implementation stage is to learn by doing, preferably by piloting, which plays a central role in the implementation stage. Decision making is highly contextual, and results of the pilot will inform future decisions. An evaluation should determine the effectiveness of the pilot and inform any adaptations. A feedback loop can then continue to inform either a continuation or expansion of the pilot or the implementation of the program itself.

### Sample questions to ask include the following:

- How does the pilot intervention affect your target audience?
- Does it achieve the desired outcomes?
- Is there anything to tweak to improve the pilot or the program itself?

### Some specific questions to consider for the pilot might include the following:

- How many observations will you be able to measure?
- How many treatment arms (targeted subgroups for approach to be piloted) can you test?
- What is your "without intervention" comparison group?
- What are your outcome variables? Are they consistent with the desired behavioral change?
- What other measurements do you want to capture?
- How will you record and analyze data?

The pilots can provide the principle framework for the subsequent scale-up of the connection program. Even during implementation, the most successful programs are the most adaptable. They accommodate modifications according to feedback about methodologies and outcomes throughout the implementation period.

Below are the key ingredients of an effective social engagement program. The case studies highlight the importance of considering social factors for effective program implementation.

### Determinants *of* Effective Social Engagement

- **Effective communication.** A well-designed communication campaign that extends beyond the life of the connections program is key to addressing the sustainability issue and to managing expectations of the beneficiaries.
- **Capacity.** Hiring adequate staff to manage communication and customer interface is important. Building staff capacity for communicating, raising awareness, and promoting behavioral changes at the community level also is important.
- **Building partnerships.** Civil society and media organization can work together to raise awareness about sanitation and sewer connection issues. Building partnerships can help establish trust within the community. As a part of this, support from political and media champions can help strengthen the message about the connection program.
- **Behavioral factors.** Community attitudes toward and beliefs about sanitation should be a part of the social aspects of the program.
- **Managing expectations.** Once awareness is raised, it is important that the program meet and manage community expectations by providing sufficient infrastructure, maintaining transparency about costs, and so on.

- **Monitoring.** Communication efforts and a campaign to raise awareness need regular monitoring to ensure that residents understand the program. Program implementation should be adapted based on feedback on its effectiveness.
- **Flexibility.** The program should modify communication efforts and messaging to suit different customer segments.
- **Funding.** There should be sufficient funds available for social programs and outreach.

## Social mobilization and communication activities should be continuous

**EGYPT**
**BRAZIL**

The social mobilization and communication activities should start well before construction and should extend beyond the end of the construction period. The overall objective is to encourage all unconnected households to connect to the sewers. Public awareness of the benefits of connecting should not be a one-off activity (World Bank 2015).

#### EGYPT

In Egypt, minimal consultation occurred until a firm was hired after the associated works had already started. This led to objections from the targeted households, which slowed construction and delayed completion of the works (World Bank 2016d).

#### BRAZIL

In Salvador, Brazil, over 10,000 community meetings took place during project implementation. This outreach ensured community buy-in and contributed to the eventual success of the program (see appendix C: case study 8).

## Establish trust within the community

**BRAZIL**
**URUGUAY**

Ensuring that those who undertake social mobilization and communication activities are trusted by the community solidifies the relationship between the customer and the service provider.

#### BRAZIL AND URUGUAY

In some cities, such as São Paulo, Brazil, residents were more receptive to sewerage connection messages communicated by local leaders, particularly women. Media messages and door-to-door efforts conducted by other people were not as effective. The gender aspect of social mobilization merits consideration to maximize impact. (See appendix C: case study 2.) Uruguay presents a rare case: social mobilization is limited. The sewerage connection program is advertised in the water bill, and customers apply over the phone or over the Internet (World Bank 2017a).

#### BRAZIL

In Salvador, Brazil, community organizers inspired a high level of trust among residents, allowing them to act effectively as conflict mediators. They reinforced their standing in the community by their involvement in volunteer work: they used their positions to help community leaders gain access to other branches of state and municipal governments to pursue requests for other neighborhood support issues (see appendix C: case study 8).

## Establish direct communication between service provider and customers and include a feedback mechanism

**ZAMBIA**

Clear communication lines between the service provider and customer households facilitate better program outcomes. Customers receive answers to their questions on program implementation and effectiveness as they arise.

#### ZAMBIA

Although working through community management structures was shown to be effective in Lusaka, Zambia, in some cases it resulted in the distortion of information and subsequent misunderstandings. Therefore, complementary direct household communication became a priority to avoid miscommunication. The incentives that motivate different stakeholder groups must also be considered when undertaking outreach work (World Bank 2016d).

## Sewerage connection programs take time

FINANCIAL

### SENEGAL

Communications and mobilization activities require a lot of effort, time, and coordination with the different stakeholders. Thus, a long implementation period and slow disbursements in the first years of the program should be expected. An iterative approach to implementation takes into account feedback from stakeholders, households, and communities as well as a review of the effectiveness of the program's governance structure and implementation modality, thereby improving the program's effectiveness and scale.

**SENEGAL**

Under the Senegal Global Partnership on Output-Based Aid (GPOBA) project, one-third of the facilities were built in the last three months of the project's implementation period. Floods partially contributed to the overall delay (IEG 2015).

### Determinants *of* Effective Financial Management and Procurement

- **Availability of well-managed funds.** Regardless of whether households, the service provider, or the government is paying for the connection program (in full, with differing contributions, through a grant or subsidy, or a combination thereof), the funds need to be available and well-managed at appropriate stages of project implementation, including for construction and O&M.
- **Ensuring subsidies and cross-subsidies reach the target population.** During the planning stages, if tariffs are going to cover running costs of the sewers (which is normally the case) and possibly recover some of the connection costs (this can be the case, depending on the service provider's mandate and approach), then tariff setting and application processes should ensure that any CAPEX and OPEX subsidies or cross-subsidies actually reach intended households.
- **Access of funds.** When the program uses different financing mechanisms (for example, revolving funds, subsidies, loans, microfinancing, saving schemes, output-based approaches, and so on), attention should be paid to the ways in which households will access funds.
- **Costs to maintain quality.** It is important to set applicable standards of quality and to determine the associated costs. It will be necessary to determine whether any requirements will change in the future and whether any special consumers or requirements exist within the community that will affect costs.
- **Capacity building.** Effective financial management requires adequate capacity building to manage finances, regularly update the financial model, and make smart financial decisions.
- **Data and monitoring.** It is essential to regularly collect financial data to monitor costs and to modify the program as needed.

## Tendering contracts requires effort

### BRAZIL

It is important to consider the amount of effort and time involved in tendering contracts, including those for the social marketing and communications, engineering design work, and the construction work itself, especially when the targeted areas, or users, are dispersed. This situation will require either separate contracts for different geographic areas or a larger value contract to cover all areas. Both approaches have advantages and disadvantages.

#### BRAZIL

In Brazil, it took a year for Companhia Espírito Santense de Saneamento (CESAN) in the state of Espírito Santo and Sabesp in the state of São Paulo to determine that sharing the workload among several contractors was better than having a single contractor. New users lived in small household groups in various parts of the city, which complicated logistics for larger construction firms trying to work across all areas simultaneously (World Bank 2017a; see appendix C: case studies 1 and 2).

## Monitoring financial aspects and options is important

### ZAMBIA

Careful monitoring of financing aspects and options—including households' willingness to pay—should happen throughout the implementation period to determine whether changes are necessary over time.

#### ZAMBIA

In Lusaka, Zambia, surveys about residents' willingness to pay provided an initial indication of households' commitment to pay for condominial sewerage service; however, this willingness to pay changed during project implementation, a change caused largely by the operating environment (World Bank 2016a).

## Service providers should ensure consistent approaches to financing and subsidies

A consistent approach ensures that households gain universal access to the same benefits, no matter where they live, which external or internal program funds the initiative, or how the financing and subsidies are provided. An inconsistent policy or approach to financing and subsidies could undermine existing or future programs because beneficiaries might question why they cannot access the same benefits that other households are able to access through a different program.

## Providers should strive to have user-friendly, transparent, and accurate billing systems

The billing system is one of the main interfaces between a service provider and its customers, so it should be user friendly, transparent, and accurate as well as reliable. If this is not the case, it can lead to the erosion of trust between customers and the service provider and can cause a breakdown in the relationship, which can ultimately lead to nonpayment of bills and possible service disconnections in the future.

# PIR



The policy, institutions, and regulatory (PIR) changes required to achieve the proposed objectives for the sewerage connection program can take considerable time. Ideally, these changes occur in advance of program implementation. PIR determinants of effective program implementation are highlighted below.

## PIR Determinants of Effective Program Implementation

- **Capacity of implementing authorities.** Factors such as poorly trained staff, insufficient information, lack of financial resources, and unrealistic time constraints can affect the implementing agency's capacity. The effectiveness of the program design hinges upon the following factors:
  - The strength of the implementing entity's internal organization, including its resources, processes, and organizational norms
  - The quality of the implementing entity's leadership and the leadership of other sector stakeholders (the regulator, the parent ministry, and so on). Are their intrinsic incentives aligned for or against the program?
  - Prior experience of the institution in implementing similar programs
  - The general capacity of the implementing agency to meet the program's objectives.
- **Political economy and social norms.** The design and implementation of connection programs occur amid differing cultural, social, political, and economic conditions, all of which can influence a program's outcomes. For instance, cultural attitudes and beliefs of sector stakeholders determine whether residents perceive high risks associated with current sanitation practices. Programs that recognize context will accommodate the particular conditions of areas for implementation.
- **Program design and goal consensus.** The magnitude of changes and the extent of goal consensus among stakeholders involved in implementation (service providers, contractors, communities, and households) can determine the program's success. Overly ambitious changes or complex interventions may stymie a program, but incremental changes can improve it and facilitate success. Other determining factors include the intensity of government support and commitment (in addition to support from other key stakeholders), the source of program design (top down versus bottom up), and program scope.
- **Financial resources.** Governments and service providers should make sure that a sewer connection program has adequate financial resources to facilitate its implementation. These resources may be direct in nature (for example, the government pays the full cost associated with connection), or they may come from subsidies or other forms of financial assistance to specific parts of the connection program. In addition to public funding, governments and service providers should encourage private sources of finance whenever possible because investment needs will often outweigh available public funds. Thus, a range of funding sources and mechanisms can help scale up programs.
- **Data and monitoring.** The lack of data and information leads to increased costs of enforcement and implementation, thus disincentivizing program implementation.

Based on lessons learned from case studies, implementation requires specific considerations.

## Good collaboration and coordination with all stakeholders

To ensure satisfactory implementation and efficient operation, it is essential to have collaboration and coordination among stakeholders, including service providers; entities that enforce building and construction standards; entities that enforce public health standards; planning authorities; and city and municipal governments, including agencies that govern environmental health and protection and agencies responsible for complementary services, such as solid waste management and stormwater drainage.

## Create a dedicated implementation unit

**BRAZIL**
**VIETNAM**
**INDONESIA**

Creating a dedicated implementation unit—which can be embedded within the service provider but also have representation from other key stakeholders—helps ensure sustainability of the approach, even beyond an initial implementation period.

#### BRAZIL

In Espírito Santo, Brazil, the "Se liga na rede" (Connect to the Network) program was first implemented by a dedicated project implementation unit, but after two years of operations, the program became part of the day-to-day functioning of the water supply and sanitation utility administered by a committee of representatives from its different departments. The utility's regular staff implemented the program (World Bank 2017a; see appendix C: case study 1).

#### VIETNAM AND INDONESIA

In Da Lat, Vietnam, and in Yogyakarta and Denpasar, Indonesia, utilities achieved high connections rates by establishing dedicated utility teams to interact with the community and with customers. The teams implemented a proactive plan for increasing connections (WSP 2015).

# The use of legal instruments to enforce household connections

## TECHNICAL

### BRAZIL

Fully enforcing requirements for households to connect to a sewerage network will be possible only if appropriate legal instruments oblige households to connect. If such legal instruments exist before conception of the connection program, organizers should identify, review, test, and strengthen them, as appropriate, during the design phase. If the legal instruments do not exist, they will need to be created to support successful implementation of the program.

**BRAZIL**

In Espírito Santo, Brazil, a state law allowed a fee to be charged to those households not connected to a sewer, despite having one running in front of their homes. The law also authorized the state utility to connect properties to a network without the express permission of owners (see appendix C: case study 1).

See below for determinants of effective technical implementation. According to lessons learned from the case studies, the technical aspects of a sewerage connection program require special considerations.

#### Determinants *of* Effective Technical Implementation

- **Results.** Connections established through the program target "feasible" and "potential" connections.
- **Communication.** Customers understand the technical and individual requirements (if any, including specific operation and maintenance requirements), thanks to clear, well-aligned communication during the program's implementation period.
- **Robust solutions.** Consideration of situational constraints and cultural requirements and provision of appropriate solutions demonstrate that the program accommodates realities of the local context.
- **Quality assurance.** Based on the agreed technical standards, the new household connections align with mandated standards for quality, and the service provider or a third party has verified that the work meets the standards. There are minimal postconstruction issues.
- **Complementary service needs.** The program has worked on or with other entities to improve complementary services that directly affect the functionality of the sewerage connections and the sewer network. Such complementary services include water supply, graywater management, stormwater management, road access, and solid waste management.

- **Downstream sewer network.** Any necessary enhancements to the existing sewer network, including pumping stations and wastewater treatment plants, have transpired to complement the sewer connection program.
- **Capacity.** The program has strengthened support for technical capacity, for example, by training staff and developing standards and guidelines.
- **Data and monitoring.** Georeferenced "as-built drawings" have been developed for each new household connection; photographic evidence of the new connections is also advantageous. The use of technology, as appropriate, helps streamline implementation processes (such as contract management, procurement of materials and equipment, communications, and so on).

## Ongoing communication is key

**MOROCCO**
**ECUADOR**
**BRAZIL**

It is important for communication and outreach efforts to continue during implementation and afterward: outreach efforts should align with the associated technical intervention. Using construction workers as part of the social mobilization team can be advantageous, and in some programs, the works contractors have been responsible for the social mobilization, the design of household connections, and for constructing the connections.

### MOROCCO

In Morocco, these dimensions aligned as part of network expansion contracts. Social teams alerted technical teams to go into a neighborhood when they had achieved a pre-set percentage adherence by the households; they signed agreements with the utility and consequently would be charged the connection fee through the utility bill. Connections were part of the network expansion contracts, which included flexibility provisions to add amendments, depending on the number of new connections the firm was able to install (Chauvot de Beauchene 2009).

### ECUADOR

In Guayaquil, Ecuador, postconstruction monitoring was renamed "social co-responsibility." When the connection rate reaches more than 90 percent of the targeted community, each user is asked to sign a "connection certificate," which outlines the responsibility of the user for the management of the system and the payment of the tariff (World Bank 2017a; see appendix C: case study 4).

## Align subwork programs and their timelines

**BRAZIL**
**COLOMBIA**



**BRAZIL**

In Salvador, Brazil, the utility created a social mobilization unit with its own team of community workers, most of whom had formal training in social work. In addition, the utility required all the construction firms involved in the program to hire community workers to accompany their interventions. This approach greatly aided the direct interaction with and feedback from the community. The mobilization team had less contact with the communities postconstruction, a situation that had implications for the sewerage operation and maintenance (O&M). Households asked the utility to undertake these maintenance functions instead of performing these tasks themselves as the program originally envisioned. (The program gave residents the option of doing O&M in exchange for lower tariffs.) This situation led to unforeseen costs for the utility but also weakened the sense of ownership of the system by the community, which is important for ensuring that it stays in good order, protected from misuse postconstruction (see appendix C: case study 8).

The period between undertaking social mobilization and getting households to sign "connection contracts" should align with the execution of associated civil works, and the latter should occur shortly after the former. If this does not happen, customers may begin to mistrust those affiliated with the program. Customers will be dissatisfied with the program outcomes if they have to wait for the household connections that they signed up for and, in some cases, paid for upfront.

**BRAZIL AND COLOMBIA**

In Espírito Santo, Brazil, engineers were responsible for making connections within 15 days of agreements. In Colombia, about two months are given for physical execution of works and final approval (see appendix C: case studies 1 and 3).

## Have robust supervision of construction quality and standards

**BRAZIL**
**COLOMBIA**

The quality of household connections require verification. The service provider or a contracted third party can supervise the work to verify construction quality and standards.

#### BRAZIL AND COLOMBIA

In some cases in Colombia and São Paulo, Brazil, program workers took georeferenced photographic evidence of the house before and after undertaking the connection works to avoid any potential conflicts and to satisfy ex-post verification requirements established by the programs. These programs also required the landlord or tenant to sign a certificate of conformity once the works had been completed and before the contractors left the neighborhood to provide additional household verification (World Bank 2017a; see appendix C: case studies 2 and 3).

## Have the works contractor focus on the end user and the "connection experience"

**ECUADOR**

For the majority of programs, households will interact most with the civil works contractor during implementation of the connection program, particularly during the technical design and construction stages. Because these workers represent the "front line" of the implementing agency, the workers should focus on ensuring a positive household user experience throughout their engagement. This is critical to the overall success of the program.

#### ECUADOR

In Guayaquil, Ecuador, the civil works contractors were obliged to establish "customer service centers" to handle complaints and to provide the public with information and news about the program and the work in progress (see appendix C: case study 4).

## Be aware of, and adaptable to, unforeseen externalities

**BRAZIL**

When undertaking a connection program, the implementing agency must accept unforeseen circumstances and adapt to them. Fluctuations in water supply, problems with solid waste management, and extreme climate events (drought or flooding) could all potentially have direct and even long-term effects on the implementation and success of the connection program.

**BRAZIL**

In Espírito Santo, the Brazil water crisis of 2014–15 slowed down the sewerage connection program because during this crisis, the connection program was given a lower priority (see appendix C: case study 1).

## Monitoring and contact with customers should continue postconstruction in a bid to sustain benefits

**BRAZIL**

This provides an opportunity for continued support and interaction with households. Technical monitoring of the sewerage networks can occur simultaneously.

**BRAZIL**

In Salvador, Brazil, the mobilization team had less contact with the communities postconstruction, a situation that had implications for the sewerage O&M. Households asked the utility to undertake these maintenance functions instead of performing these tasks themselves as the program originally envisioned. The program gave residents the option of doing O&M in exchange for lower tariffs. This situation led to unforeseen costs for the utility but also weakened the sense of ownership of the system by the community, which is important for ensuring that it stays in good order, protected from misuse postconstruction (see appendix C: case study 8).

STAGE 4

# Monitoring and Evaluation

Monitoring and evaluation (M&E) track the success of a sewerage connection program. Design of an M&E framework should begin at the beginning of the project cycle. Robust evaluation can demonstrate the effects of new household sewerage connections on health and the environment. »



Although M&E is described as the final stage in the project cycle, creating the foundation for the M&E system should begin earlier, during the program's design stage, and the implementing entity should use this system. M&E throughout implementation or during set stages of implementation can indicate whether the proposed approach is producing the desired outcomes, identify any possible weaknesses, and determine improvements. Ultimately, these ideas for improvements can lead to modifications or redesign of the program (defined as formative M&E). During the final stages of program implementation, evaluations can provide details about the outcomes and effects of the program and create a learning agenda for future connection programs (defined as summative M&E). Elements of a robust M&E system may already exist. However, it's good practice for the service provider or implementing entity to assess periodically the value of the M&E system, notably its indicators, theory of change, and its guidelines for data capture and compilation. A robust M&E system yields useful insights to achieve outlined outcomes.

During the design stage (stage 2) stakeholder discussions can define and agree upon key objectives, outcomes, and outputs. Also useful at this stage are a theory of change (see appendix A) and an accompanying results framework and M&E plan (example provided in table 6.1). They can help articulate the overarching objectives and outputs of the sewerage connection program and map how the program will monitor and achieve them. Key stakeholders may need a presentation about the importance of collecting and analyzing relevant data and information for them to appreciate the role M&E can have in strengthening program implementation, overall success, and the design delivery of future programs.

Depending on the information gathered during the assessment of the situation (stage 1), tracking could include qualitative and quantitative indicators based on the four dimensions—social; financial; policy, institutions, and regulation (PIR); and technical. Those responsible for designing the connection program should review other M&E systems from within their city and from other cities to incorporate good practices as appropriate.

*table 6.1* / **Example Results Framework and M&E Plan**

| | | |
|---|---|---|
| **Indicator Name** | Sewerage Connection Strategy and Plan developed and implemented (yes/no). | New household sewer connections constructed under the program (number). |
| **Definition** | Preperation of a connection promotion strategy and plan to implement to maximize connections to sewers. | Total number of people who benefited from safely managed sanitation services through new household sewer connections as a result of program interventions. Safely managed sanitation facilities include use of improved facilities which are not shared with other households and where excreta are safely collected, transported and treated off-site to comply with country's discharge standards. |
| **Frequency** | Once | Quarterly |
| **Data Source** | Administrative data | Administrative data from service provider and private operator |
| **Methodology for Data Collection** | Household survey on project information conducted by third-party communication agency. | Household connection database maintained within the billing collection system and record of wastewater collected and treated at Treatment Plant. |
| **Responsibility for Data Collection** | Third-Party Agency | Project Implementers |
| **Baseline** | No | 0 |
| **End Target** | Yes | 10,000 |

**Note:** M&E = monitoring and evaluation

## Develop an M&E framework as early as possible in program design

Another key consideration focuses on identifying and allocating adequate resources for M&E up front. For cases involving detailed and long-term M&E studies (for example, to study environmental or health outcomes), it is important to define and align timelines of the connection programs and the M&E study timelines to set up appropriately timed data collections.

The financial resources for undertaking evaluations may be limited, so the implementing organization could investigate alternative arrangements to make the evaluations feasible. One possibility is to find partner organizations, including universities, to develop a collaborative research approach.

During the implementation stage (stage 3), incorporating learning and feedback loops into a connection program can increase the efficiency with which the implementing agency establishes new connections and maintains existing ones. Learning and feedback loops help program staff process new information and changes that affect the program. Learning plays an important role in scaling up the sewerage connection program and understanding the inflection points of increasing connection rates under the program. Feedback loops help staff reexamine program implementation strategies in general. What worked? What did not work? What changes had the greatest return on connection rates? Throughout implementation and conclusively during the M&E stage, it is useful to reflect on potential learning questions from the connection program to help frame a learning agenda for future programs.

Based on lessons learned from case studies, the M&E of sewerage connection programs benefit from several considerations.

### BRAZIL

Often no standard M&E system systematically tracks outcomes of a sewerage connection program, and M&E activities consist of just counting the number of new connections realized. A robust M&E system includes protocols for collecting relevant data about infrastructure assets, household profiles, customer satisfaction, financing, and other parameters, and it provides clarity on roles and responsibilities for all M&E aspects. For example, sector regulators could develop targets and indicators for sewerage connection, collect data directly or through service providers, analyze it (through benchmarking and other avenues), and disclose information to the public. Without the indicators, data, and related protocols, it would be difficult to assess progress and to course correct when needed throughout the life cycle of the sewerage connection program.

#### BRAZIL

In Espírito Santo, Brazil, a geographic information system (GIS) that shows all of the sewerage networks and the connections realized over time facilitates M&E and cross-analysis with other factors (environment, health, poverty). (See appendix C: case study 1.)

## Have a digital record of property conditions before program implementation

### BRAZIL

Keeping an accurate digital record before, during, and after interventions at target households is a robust and transparent way of capturing results of a connection program. Such an approach can help with quality control, with monitoring the works contractors, and with addressing any complaints and grievances that may arise from the works.

#### BRAZIL

In Espírito Santo, Brazil, digital photography facilitated the inspection and control of executed works and the resolution of conflicts between contractors and owners (World Bank 2017a; see appendix C: case study 1).

In São Paulo, Brazil, contractors take photographs of properties before and after work to demonstrate the completed activities before a formal inspection takes place. Photographs also provide contractors with evidence about the conditions of properties before works commenced in case of any claims or complaints by owners or tenants. Upon completion of the works, tenants or owners sign a note stating whether they accept the completed works and are satisfied with the quality. Owners or tenants raise complaints directly with the utility (see appendix C: case study 2).

## Maintain accountability of the lead entity

Monitoring results and maintaining a grievance redress mechanism, even after the end of construction, can enhance beneficiary satisfaction and also contribute to the accountability of the entity leading the connection program. For instance, a regulator or other public authority could help keep the implementation agency accountable by tracking its progress against targets and indicators related to the sewerage connection program.

## Conducting accurate and credible M&E studies can help elevate and publicize long-term and wide-reaching effects of the program on society

### BRAZIL

Using external credible partners in M&E activities can help verify and elevate project results.

**BRAZIL**

In Salvador, Brazil, two main studies used the program's financial resources. The first analyzed prevalence of water diseases before and after the connection program. Researchers from the Institute of Collective Health of the Federal University of Bahia conducted this study for the duration of the connection program. Students prepared several master's theses with information from this scientific work. The significant results appeared in a published book from the university. The second study evaluated environmental effects of the depollution of waters of the Bay of All Saints; for example, researchers monitored ability to bathe in the waters. This work led to the creation of a georeferenced database that guides pollution control and environmental management (see appendix C: case study 8).

# Conclusions

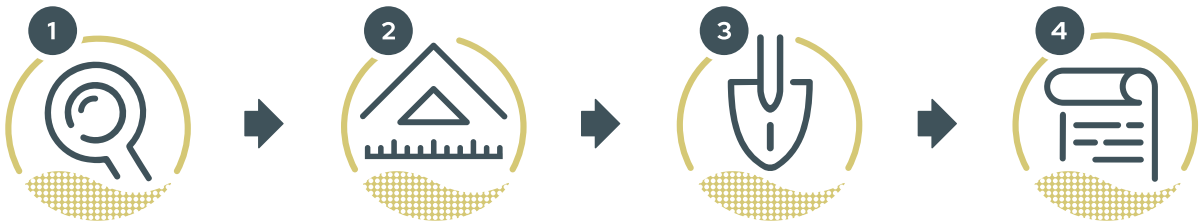
This guide draws on a selection of successful and less-than-successful sewerage connection programs from across the globe to identify and share key lessons and approaches. These programs provide useful material for designing new connection programs; in fact, they can help maximizing the effectiveness of new connections to sewerage networks. »

The guide outlines considerations for the four stages of a typical project cycle (assessing, planning, implementing, and monitoring and evaluating). It also identifies four key dimensions to be considered during each stage (social; financial; policy, institutions, and regulation [PIR]; and technical) and correlates recommendations with these dimensions to guide those designing a new sewerage connection program. Figure 7.1 summarizes the four-stage approach that practitioners can use to address the key dimensions deemed central to designing and implementing a successful sewerage connection program.

Although the guide's four steps are important, the case studies clearly demonstrate that community engagement is the core of an effective connection program. It is important to initiate community engagement as early as possible in the project cycle to facilitate customer acceptance of and buy-in to the program and to maximize the possibility that households will connect.



*figure 7.1* / **Process to Connect the Unconnected**




### Assessment

Outline and clarify the current sanitation situation within the social, financial, PIR, and technical dimensions. Identify gaps and challenges and understand how the current situation can affect success.

### Design

Identify intervention, based on behavioral insights, financial incentives, and regulatory changes while weighing its simplicity, cost-effectiveness, and scalability.

### Implementation

Pilot program and learn from pilot; continue sensitization; secure funds; ensure collaboration and coordination; and document lessons from program implemenation.

### M&E

Record; document; track indicators; report and compile results of program.

**4 KEY DIMENSIONS**

Social
Financial
PIR
Technical

**Note:** M&E = monitoring and evaluation

**Early community and household engagement is particularly important. This engagement will prove beneficial in many capacities:**

- By involving potential customers in the decision-making process, organizers establish a sense of trust from the outset between households and the service provider.
- Customers can understand the benefits of a sewerage connection to the household and to the community from a social, environmental, technical, and, when relevant, financial perspective.
- Customers gain understanding of technical requirements and available connection options as early as possible in the project cycle. They can make necessary decisions, including those about the following issues:
  - Siting of sewerage connection boxes
  - Layout of the connection pipeline. Will this disrupt the household?
  - Need to either build a new toilet or retrofit the existing one
  - Type of toilet facilities to be constructed (whether to include shower and laundry facilities, for example)
  - Provision of a new water supply system. Will this be provided?
- Customers can understand their obligations and the roles and responsibilities of both households and the service provider regarding such issues as financing of household connections, payment schedules, connection procedures, any legal requirements, operation and maintenance of the sewer and household connection, and so on.
- The service provider can better understand current drivers of household behavior (that is, why customers behave in a certain way). The provider can look for barriers, triggers, and motivators and adapt the program to maximize connection rates.

Community engagement and interaction are also critical elements of a successful sewerage connection program. They should continue throughout program implementation and even after the official program has concluded to ensure satisfactory operation and maintenance as well as protection of the connection from misuse.

The case studies reviewed in the guide also show that cities and service providers often have limited resources and numerous constraints and that they struggle to cope with rapid and unplanned urbanization. These challenges make the management of wastewater increasingly difficult. This guide consequently emphasizes the importance of designing technical and service delivery solutions that are context appropriate. See appendix C for more details on the case studies.

Although a more traditional approach to the design and implementation of sewerage networks may work in some settings, traditional sewers can be prohibitively costly or inappropriate in others. In such contexts, "condominial sewers" or other forms of simplified sewerage merit investigation. Regardless of whether organizers are considering conventional or simplified approaches to sewerage design and implementation, this guide can help those involved in conceiving sewerage connection programs to think about household connections and how to achieve them, whether it is retroactively, after installation of a sewer, or proactively, when a sewerage project is being conceived, thereby ensuring that the project integrates household connections from the outset.

This guide and its case studies highlight the importance of designing a connection program that considers contextual challenges and opportunities with the overall objective of maximizing household connections. The steps outlined in the guide consider the heterogeneity among and within cities across the social, financial, PIR, and technical dimensions of a connection program. It outlines a pragmatic approach to support the design of such programs, striving to maximize connections to either new sewerage networks or existing networks.

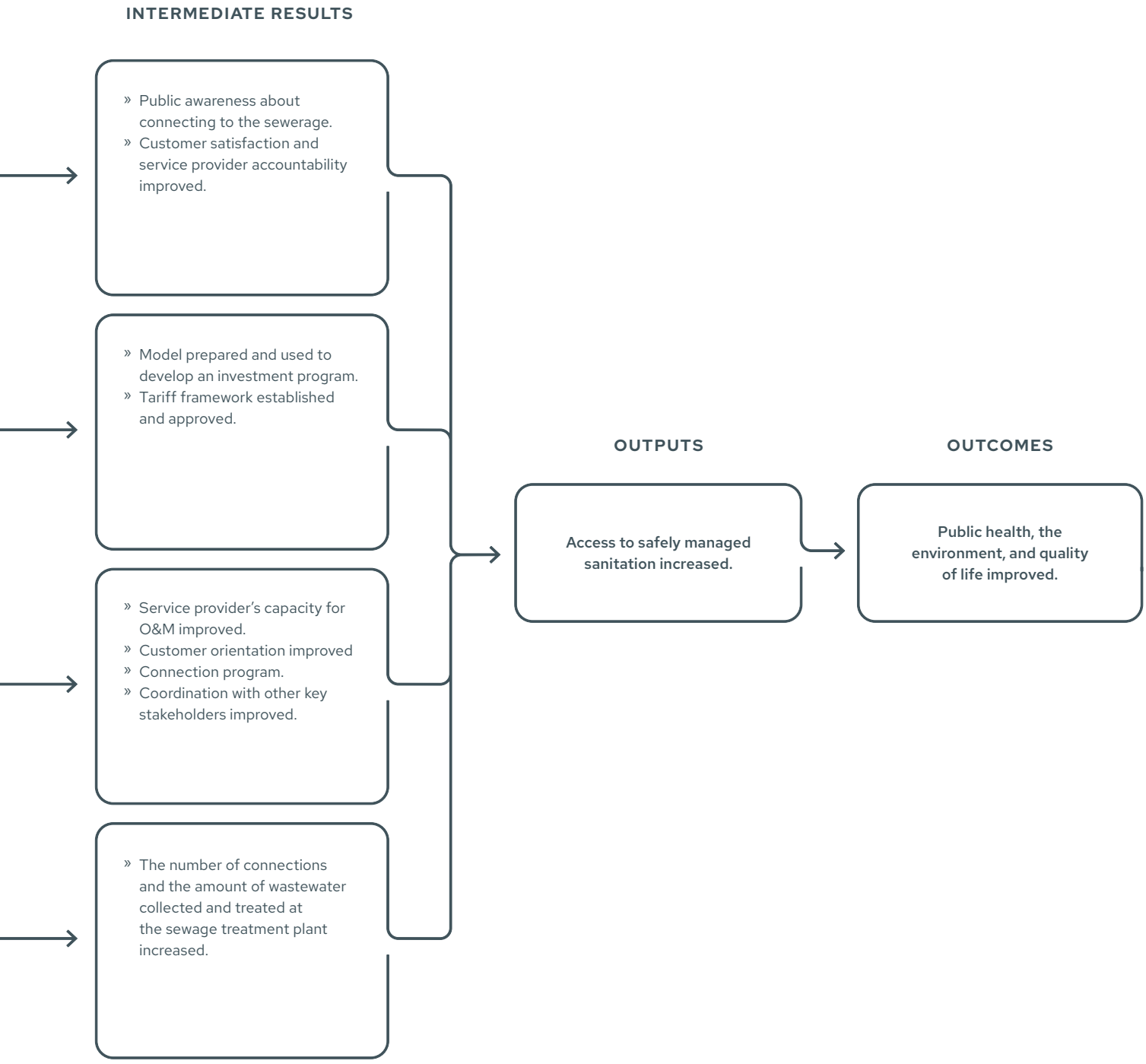
No matter whether a retroactive or a proactive sewerage connection program is being implemented, an adaptive learning approach can help increase efficiency and effectiveness by incorporating feedback from each stage of the project cycle. Designing and implementing sewerage connection programs for both existing and new networks can seem daunting, but the steps outlined in this guide can help implementing agencies draw on global experiences throughout the project cycle to design programs that can successfully connect the unconnected.

APPENDIX A

# Theory *of* Change

| PROBLEMS | ACTIVITIES |
|---|---|
| **1** Social »<br>» Customer orientation and citizen engagement need strengthening. | » Develop social marketing plan and strategy for implementation. |
| **2** Financial »<br>» Utility has constraints because of large capital investment.<br>» Tariffs setting requires reassessment. | » Prepare a model to assess financial viability of any new program and decide on alternate financial mechanisms (RBF, revolving funds, OBA), if necessary.<br>» Develop an incentives program, taking into consideration any existing or planned subsidies.<br>» Set tariffs and establish appropriate connection fee. |
| **3** PIR »<br>» Gaps in service exist because of poor coordination.<br>» There is a lack of institutional capacity for O&M. | » Design institutional interventions that align with incentives and provide capacity support to implementing agencies<br>» Establish a coordination framework with other public agencies. |
| **4** Technical »<br>» Existing sewers are old and dysfunctional. | » Consider a range of connection options that are fit for purpose, cost effective, and not overly complex.<br>» Assess gaps in existing sewerage infrastructure and design appropriate technical options to accommodate expected increase in wastewater flows.<br>» Plan for technical training and for capacity building. |

**Note:** OBA = output-based approaches; O&M = operation and maintenance; PIR = policy, institutions, and regulation; RBF = results-based approach.


INTERMEDIATE RESULTS
» Public awareness about connecting to the sewerage.
» Customer satisfaction and service provider accountability improved.
» Model prepared and used to develop an investment program.
» Tariff framework established and approved.
» Service provider's capacity for O&M improved.
» Customer orientation improved
» Connection program.
» Coordination with other key stakeholders improved.
» The number of connections and the amount of wastewater collected and treated at the sewage treatment plant increased.
OUTPUTS
Access to safely managed sanitation increased.
OUTCOMES
Public health, the environment, and quality of life improved.

APPENDIX B

# List *of* Case Studies Reviewed



| CASES | FEATURES | REFERENCES |
|---|---|---|
| Bolivia | La Guardia: Successful connection programs in low-income areas, with microcredit | Bankaari et al. 2016<br>World Bank 2017a |
| Brazil | Espírito Santo: Successful citywide connection program working with several municipalities. Good GIS-based M&E system. Program later incorporated into the utility (see appendix C, case study 1) | World Bank 2017a<br>(+ appendix C, case study 1) |
| Cameroon | Example of failed sewerage systems | Collingnon and Cheurfa 2019<br>Tanawa 2003 |
| Colombia | National sewerage connection program with pro-poor focus (see appendix C, case study 3) | World Bank 2017a<br>(+ appendix C, case study 3) |
| Ecuador | Guayaquil: Low-income community connection program with post-construction support (see appendix C, case study 4) | World Bank 2017a<br>(+ appendix C, case study 4) |
| Egypt | World Bank program with limited results for household connections to newly constructed centralized and decentralized sanitation systems. Key issues noted: high cost of connecting to the sewerage networks; limited community consultation; cluster-based project design (main focus on water quality so designed around water sheds rather than connecting all); difficulty in monitoring the number of household connections made and downstream main and wastewater treatment was incomplete. | World Bank 2016 |
| India | Sewerage schemes from Tamil Nadu (see appendix C, case study 5) | WSP 2016<br>(+ appendix C, case study 5) |

| CASES | FEATURES | REFERENCES |
|---|---|---|
| Indonesia | Two studies focused on the motivations for households not connecting to sewerage systems. Also an OBA approach implemented by AusAid (now known as Department of Foreign Affairs and Trade [DFAT]) that has low results in achieving household connections to sewerage. | Whittington 1997<br>WSP 2015 |
| Kenya | Upscaling Basic Sanitation for the Urban Poor (ex SafiSan) program: Demand-driven program implemented by utilities that were recently mandated with sanitation provision, with partial sewerage connections but interesting mechanisms to target landlords/ tenants.<br>Nairobi: Sanitation OBA Projects (P131512) and (P162248) - subsidizing costs of connecting and increase connection rates to water and sanitation services for low-income households in Nairobi (see appendix C, case Study 6) | http://www.waterfund.go.ke/safisan/<br>Schrecongost 2016<br>Schröder 2016<br>World Bank 2019a<br>(+ appendix C, case Study 6) |
| Morocco | Example of successful program to expand sewerage access in several cities, including Casablanca; includes OBA initiative. | GPOBA 2009 |
| Nicaragua | Managua: Successful connection programs in low-income areas with microcredit and condominial sewerage | World Bank 2017a |
| Peru | Sewerage connection program with branding of "Mi Baño" products to promote connections | World Bank 2017a |
| Philippines | Pilot and scaled-up supply-driven, subsidized sewerage connection program in Manila (see appendix C, case Study 7) | Information provided directly by Maynilad Water Services Inc.<br>(+ appendix C, case Study 7) |
| Senegal (Dakar, Saint Louis) | World Bank Long term Water sector Project (Loan no C3470) (2001–09) reaching more than 150,000, followed by OBA scheme (2009–13). Successful sewerage connection program in Dakar and secondary urban areas. Success also in peri-urban areas through connection to condominial systems. | IEG 2015<br>pS-Eau 2003 |

| CASES | FEATURES | REFERENCES |
|---|---|---|
| South Africa | Durban (eThekwini) and Cape Town: Examples of successful citywide programs to expand sewerage access and access to other types of sanitation services. | Schrecongost 2016<br>Macleod and Gounden 2018 |
| Tanzania | Example of failed sewerage connection systems in Moshi, Tanzania | Mhina, et al. 2003 |
| Uruguay | National connection program that initially had problems linked to revolving funds and lack of subsidies. | World Bank 2017a |
| Vietnam | • A 2015 WSP study provides findings on the institutional framework and on motivations behind households not connecting to sewerage networks.<br>• Several World Bank interventions since 2015 with well documented findings on household connection programs: including revolving fund approach to financing and connection program managed by the women's union with pro-poor criteria. | Beauséjour 2008<br>WSP 2015<br>World Bank 2015<br>World Bank 2020<br>World Bank 2020a |
| Zambia | Lusaka: Challenges of connection rate and operation and maintenance of condominial sewerage system in Kalingalina peri urban settlement. | World Bank 2016a |

**Note:** GIS = geographic information system; M&E = monitoring and evaluation; OBA = output-based approach; WSP = Water and Sanitation Program.

APPENDIX C

# Case Studies

ESPÍRITO SANTO, BRAZIL

SÃO PAULO, BRAZIL

COLOMBIA

GUAYAQUIL, ECUADOR

TAMIL NADU, INDIA

NAIROBI, KENYA

MANILA, PHILIPPINES

SALVADOR, BRAZIL

1

# ESPÍRITO SANTO, BRAZIL

## Connecting 192,000 properties to sewerage

**TYPE**
Subsidized, supply-driven program to connect 20,000 properties to new and existing sewers

**IMPLEMENTING ENTITY**
Companhia Espírito Santense de Saneamento (CESAN), the Espírito Santo State Water and Sewerage Utility.

**TOTAL COST**
US$8.7 million (over three years of targeted program)

**FINANCING**
Agreement between CESAN, the state of Espírito Santo, and the regional utility, Espírito Santo Centrais Elétricas S. A.[1] (ESCALSA)

**DURATION**
2012–15, three years of targeted program

**GEOGRAPHIC SCOPE**
Greater Vitória Metropolitan Region (GVMR) of the state of Espírito Santo (ES)

**OVERVIEW**
In 2012, Companhia Espírito Santense de Saneamento (CESAN) initiated a connectivity program called "Se liga na rede" with the objective of accelerating the expansion of sewerage network connections in the Greater Vitória Metropolitan Region (GVMR) of the state of Espírito Santo (ES). The state comprises nine cities, each with a population of 100,000 to 500,000; Vitória is the capital city. CESAN serves more than 50 percent of the municipal jurisdictions of ES. The salient features of the program are described below.

**SOCIAL**
» Extensive community mobilization efforts, an outstanding focus on customers, and an emphasis on environmental education.

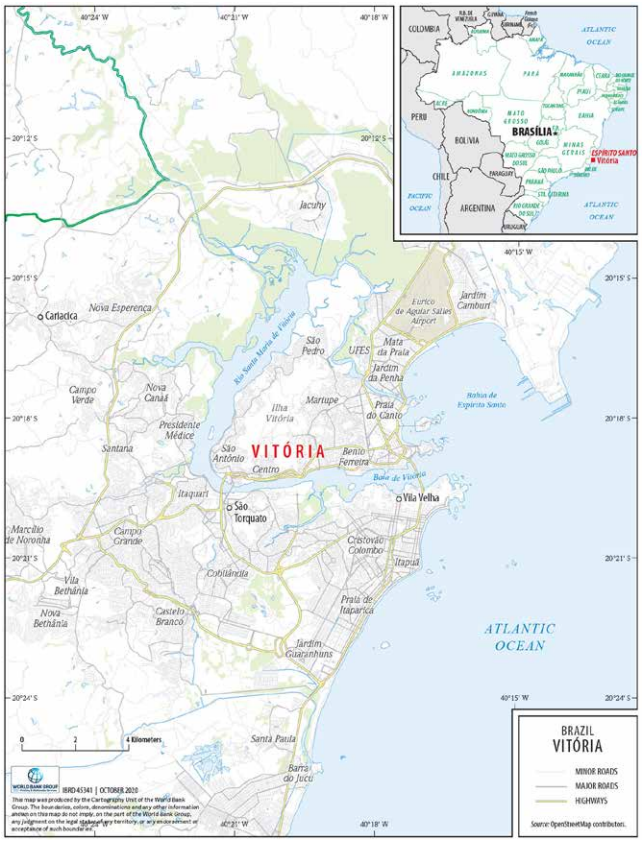
**FINANCIAL**
» Financing agreement between CESAN, the state of ES, and ESCALSA.
» Subsidies for low-income families to build free sewerage connections from households to inspection chambers.

**INSTITUTIONAL**
» Creation of a dedicated customer service department within CESAN.
» The use of digital photography–facilitated inspections, quality control of household connections constructed, and resolutions of conflicts between contractors and owners.

**LEGAL**
» Application of legal mechanisms targeting commercial buildings and households with the targeted offenders being identified, notified, and sanctioned.
» In 2016, a state law was passed allowing sanitation tariffs to be charged to households that were not connected, despite being in the vicinity of having access to the sewerage network. The law also authorized CESAN to connect properties to a network without the formal permission of property owners.
» Emphasizing compliance with the national law that required preparation of municipal plans for water supply and sanitation, the municipalities took advantage of the opportunity to align their multiyear plans with a bay sanitation program (see below for more details) to promote network connections.

**TECHNICAL**
» Application of a georeferenced database of sewerage connections and other basic services, which was linked to CESAN's database of customers and other municipal databases.

1 The company changed its name to Espírito Santo Distribuição de Energia Elétrica S. A. (EDP) in March 2017.




*Map C.1* / **Espírito Santo, Brazil**

## Overview

Espírito Santo (ES) is a state in southeastern Brazil with approximately four million inhabitants (map C.1). The state comprises nine cities, each with a population of 100,000 to 500,000, Vitória being the capital. The state water and sanitation services provider, Companhia Espírito Santense de Saneamento (CESAN), serves more than 50 percent of the municipal jurisdictions of ES. In 2012, CESAN initiated a connection program called "Se liga na rede" [2] with the objective of accelerating the expansion of sewerage network connections in the Greater Vitória Metropolitan Region (GVMR) of ES. The program was funded through a financing agreement between CESAN, the state of ES, and the regional utility, Espírito Santo Centrais Eletricas Sa (ESCALSA). The most salient features of the program were the extensive efforts to mobilize the community, an outstanding focus on customers, and an emphasis on environmental education.

## Background and Motivation

The GVMR lies near an expansive bay that is home to tropical beaches, mountainous nature preserves, and a maritime port. Pollution in the bay was identified as one of the issues hampering regional economic development; consequently, cleaning up the bay became a political priority. Following an environmental diagnosis in 2011 that identified neighborhoods responsible for the bay pollution, CESAN initiated the "Se liga na rede" program to promote household connections to the sewerage system.

## Intervention Design

The pilot program began in 2012, and, since then, 93 percent of the targeted population has connected to the network. The program's evolutionary design depicted in figure C.1 demonstrates an effective method of institutionalizing connection programs.

The program included distinctive features to promote connection:

- Creation of a dedicated customer service department within CESAN
- Construction contracts that included simultaneous installation of networks and home connections
- Communications and marketing campaigns aimed at potential customers
- Social rates for low-income clients
- Mass mobilization and community education activities
- Door-to-door campaigns to persuade the population to connect to the network
- Training of more than 130 private installers
- Subsidies for low-income families to build free connection of internal plumbing from homes to inspection chambers.

The program was financed through an agreement between CESAN, the state and the regional electricity utility. The agreement allowed CESAN to use a portion of its state energy consumption tax for two years (2012–14) for the installation of home sewerage connections, and for communication, social mobilization, and connection promotion campaigns. As part of the agreement, CESAN claimed about US$8.7 million in state energy consumption taxes and directed about 50 percent of these funds toward program initiatives, including sewerage connection subsides to low-income families.

2 Literally "connect to the network."

Between 2012 and 2014, about 150,000 households connected to the network. Of these households, only 10,000 qualified for the low-income subsidy, which provided a connection free of charge. The subsidy was available to households based on their classification under a federal benefit program or their residence in Zones of Special Social Interest (ZEIS).

The six municipal governments of the metropolitan region introduced three main initiatives that were complementary to the financial mechanisms to increase network connection:

- **Application of legal mechanisms targeting commercial buildings and households.** Offenders were identified, notified, and sanctioned. In 2016 (after the main two-year program from 2012 to 2014) a state law was passed, allowing a fee to be charged to households that were not connected despite being in front of a sewerage network. The law also authorized CESAN to connect properties to a network without the express permission of their owners.
- **Emphasis on compliance with the national law that required preparation of municipal plans for water supply and sanitation.** The municipalities took advantage of the opportunity to align their multiyear plans with the bay sanitation program to promote network connections.
- **Application of a georeferenced database of connection to basic services.** The georeferenced database was linked to CESAN's database of customers and other municipal databases. These databases were critical to the application of new regulations and long-term planning for CESAN.

## Program Implementation

Typical Steps to Connect (in Espírito Santo, Brazil)

**STEP 1**

Technicians hired by CESAN verified the property's sanitation situation and reported the results to CESAN.

**STEP 2**

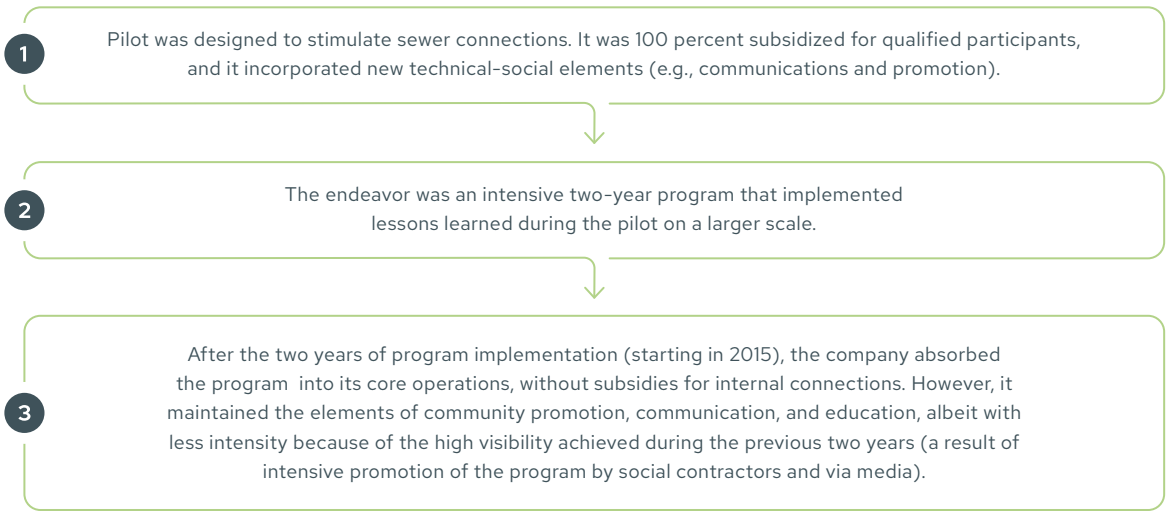
Technical and social contractors for CESAN visited unconnected properties with access to a network to sensitize the owners and sign a connection agreement. Social agents had an obligation to make up to three visits to properties to obtain owners' signatures. The cost of the social promotion component of CESAN was US$19 per signed agreement.

**STEP 3**

Engineers were then responsible for making the connections within 15 days following signing of the agreement. CESAN did not charge the installation fee to the owner. The average cost to CESAN of connecting a property was US$220.

Figure C.2 shows the progress made in 2012–16 (during the two-year program and beyond) highlighting the high expansion rate for network access and the even higher rate of connection: the number of household sewerage connections rose from about 13,000 to about 33,000 during that time.

*Figure C.1* / Evolutionary Implementation Design in Espírito Santo, Brazil




**Source:** Information provided by CESAN.

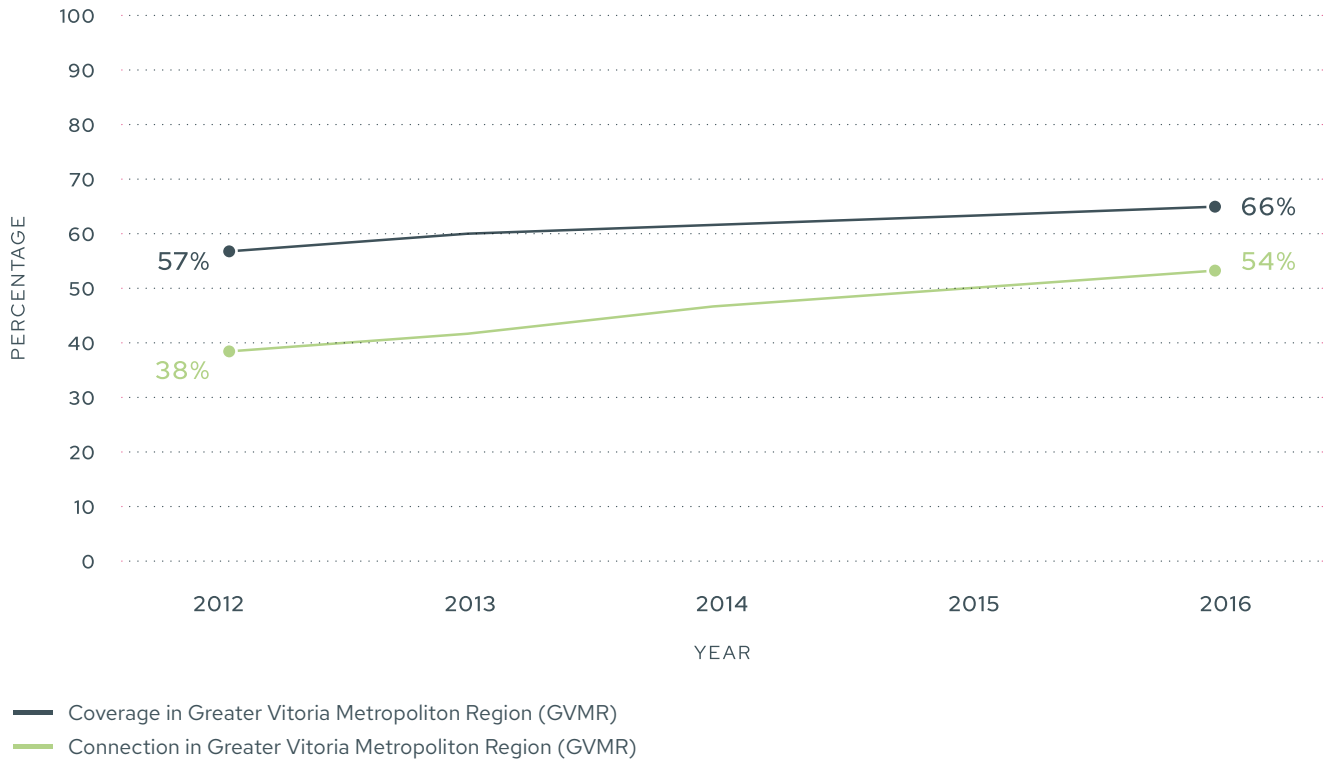
There were several challenges during implementation of the program. For example, the initial work areas and social work contracts were too large, which complicated logistics and planning; as a result, organizers later divided the work into smaller pieces. In some cases, contractors could not find owners (30 percent of visited properties), and in other cases, owners refused to sign agreements with contractors authorizing work. In such cases, CESAN notified the respective municipal governments. Each GVMR municipality had its own procedure for dealing with such cases. Typically, these procedures began with legal notices sent to owners warning them that if they did not complete the installations within a set period of time, they would be forced to pay fines. Owners who did not respond to the first warning or fine could be subject to a second warning and/or fine.[3]

A primary challenges was the inability to collect sewerage fees from some customers connected through the program (approximately 8.5 percent of customers, mostly from low-income families). Despite the inability of these customers to pay, the utility could not discontinue services because of public health risks, causing a free-rider problem.

Several setbacks materialized during and after implementation of the program; they included unacceptable quality of some facilities, poorly functioning networks, excessive turnover of contracted personnel, and local leaders advocating nonpayment of tariffs.



*Figure C.2* / **Percentage of People Covered and Connected to the Sewerage Network in GVMR, 2012–16**




**Source:** Data provided by CESAN.

3 Application of financial and legal penalties was lax within the two-year program and beyond such that only 58 fines were issued between the years 2012 and 2016.

## Monitoring and Evaluation

CESAN has not conducted any in-depth analysis of the connection program that would explain customer motivations, characterize program costs, and impartially evaluate results. The "Se liga na rede" program is still active, and it continues as part of CESAN's technical and administrative units. It no longer has a separate implementation unit with its own budget and staff. [4]

## Lessons Learned

The following lessons were learned.

- In contrast to other countries and cities, the people in GVMR mostly complied with the municipal law requiring mandatory connection to sewerage networks. Possible factors for legal compliance included citizens' concern for the protection of the environment and satisfaction with the services provided by CESAN and local governments.
- CESAN's willingness to modify the program management model based on feedback and outcomes contributed to the program's successful implementation.
- According to CESAN, a connection rate of more than 90 percent was achieved through the subsidized program, suggesting that application of municipal regulations and laws can work even in the absence of subsidies and other economic and financial incentives.
- The use of digital photography facilitated the inspection and control of executed works and the resolution of conflicts between the contractors and owners.
- Capacity-building activities were another instrumental factor in the successful implementation of the program. Program contractors underwent a three-day training course specifically focused on social mobilization and how to interact with households, which was indispensable for accurate performance of the required tasks.
- The ES experience suggests that connection program designers should put in place sufficient legal and administrative methods to prevent or address the free-rider problem (a situation in which some users do not pay their sewerage fees) after installation of facilities.
- Previous and relevant capabilities in program management and regional expertise accounting for local legal, economic, and cultural idiosyncrasies can significantly accelerate a connection initiative's pace and increase its chances of success.
- Based on this experience CESAN adapted its connection process to mainstream it during the construction of the sewerage network, aiming at connecting about 60 to 70 percent of households as the sewerage network was being built. This process also allowed them to better plan the sewerage system, and identify issues during investment execution, to avoid some of the issues they experienced while implementing the connection process (e.g., household located at a lower level than the mains it needs to be connected).





### Photographs of Multiple Initiatives under the Household Connection Program

Sanitation promotion in schools


Installer training

Technical checks

Source: World Bank, 2017.



4 Digital, B. (n.d.). Se liga na rede. Retrieved June 16, 2017, from http://www.cesan.com.br/seliganarede/index.php

2

# SÃO PAULO, BRAZIL

## Connecting 192,000 properties to sewerage

**TYPE**
Subsidized, supply-driven program to connect 192,000 properties to new and existing sewers.

**IMPLEMENTING ENTITY**
Companhia de Saneamento Básico do Estado de São Paulo (Sabesp), the São Paulo State Water and Sewerage Utility, a water services utility majority-owned by the state of São Paulo.

**TOTAL COST**
Estimated budget—US$115 million (2012–18)

**FINANCING**
80 percent from state government; 20 percent from Sabesp

**DURATION**
Active since 2012

**GEOGRAPHIC SCOPE**
Western and southern parts of the São Paulo Metropolitan Region

**OVERVIEW**
In 2012, the state government of São Paulo initiated a connection program to be implemented by the Companhia de Saneamento Básico do Estado de São Paulo (Sabesp). The program "Se liga na rede" was designed to achieve the objective of connecting 192,000 properties to the sewerage system.

**SOCIAL**
- The program's successful promotion largely depends on understanding clients' needs, attitudes, and socioeconomic situations.
- Hiring women for social promotion, and taking account of the reality of participatory neighborhoods, reflects the importance of flexibility in the program and the creativity of Sabesp.

**FINANCIAL**
- Connection and tariff subsidies are key to encouraging low-income households to connect, particularly if repair costs of damaged floors are included.
- Water and sewerage companies need to have sufficient liquidity to pre-finance expenses of a connection program when governments only reimburse connection costs upon completion.
- Average cost per connection is about US$780; this figure includes the program's administrative costs.

**INSTITUTIONAL**
- A regional (state) program depends on (and takes advantage of) preexisting programs and requires effective government administrative systems and capacities.
- There is a role for the private sector in program implementation if installers are professional firms and if program managers ensure that private implementers incorporate social elements.
- The state government is responsible for monitoring the overall program, and quality control of completed work is carried out by Sabesp.

**LEGAL**
- Since 2002, the city of São Paulo made it mandatory to connect to a sewerage network, if available nearby.

**TECHNICAL**
Two types of connections were offered:
- **Type 1:** sewerage pipe connects to a network without entering adjacent properties.
- **Type 2:** sewerage pipe must pass through other properties. This second type of connection assumes the technical characteristics of a condominial sewer, passing through three or more properties before reaching a network. On average, this type costs 34 percent more than the first type.


*Map C.2* / São Paulo, Brazil

## Overview

In 2012, the state government of São Paulo initiated a connection program to be implemented by the Companhia de Saneamento Básico do Estado de São Paulo (Sabesp) the water and sewerage utility majority-owned by state (see map C.2). The eight-year program, called "Se liga na rede,"[5] was designed to connect 192,000 households to the sewerage network. The program's estimated budget was US$115 million (from 2012-18). Eighty percent of the program's financing came from the state government and the remaining 20 percent from Sabesp. The program is active.

## Background and Motivation

The state of São Paulo in Brazil was home to more than 44 million inhabitants in 2018. Most of the state's population is served by the State Water and Sewerage Company, Sabesp, one of the largest water supply and sewerage service providers in the world. Since the 1990s, the company has focused on accelerating the pace of connection to its sewerage systems. Sabesp has been pursuing the objective of achieving 86 percent connection of its potable water customers to the company's sewerage system.

In 2018, Sabesp supplied water to 28.6 million people (directly to 25.5 million) in the state of São Paulo and sewerage services to 22.8 million people. About 3 million people are still without sewerage services in the state. The exact number of people who do not connect, despite having access to the network, is still unknown.

Since early 2000, municipal governments of São Paulo State have started promoting environmental protection, especially for water quality in rivers. Sabesp's interest in a household sewerage connection program stemmed from its desire to: (a) increase its client base and associated revenues, (b) display corporate social responsibility, and (c) pursue the fundamental national goal of attaining universal access to water and sanitation services.

Since 2002, it has been mandatory in the city of São Paulo to connect to a sewerage network if it is available.[6] In 2003-04, with funds obtained from the Inter-American Development Bank (IDB), Sabesp implemented a pilot project to increase sewerage connections in the western and southern parts of the São Paulo Metropolitan Region. Of the 9,087 feasible connections (that is, properties with closer access to the network), 3,323 properties were connected, which corresponded to a success rate of only 37 percent. At that point, three main reasons were identified by families for refusing to connect:

1. Lack of financial capacity to pay monthly sanitation tariff;
2. Preference for their existing wastewater disposal system; and
3. Difficulties in obtaining authorization of necessary easements.

In 2012, the state government of São Paulo, in collaboration with Sabesp, created the connection program "Se liga na rede." The eight-year program has a goal of connecting about 192,000 properties to the sewerage network with an estimated budget of US$115 million for the 2012-18 period. The state government is contributing 80 percent of the program financing and Sabesp the remaining 20 percent.

Each year Sabesp makes more than 230,000 new connections to its sewerage network. The number of participants in the program has been relatively low. From 2012 to 2020, the program connected 35,637 properties. Because of the water crisis of 2014–15, the program was significantly reduced in scope, as depicted in figure C.3.

## Intervention Design

Based on the baseline survey and previous experiences, organizers designed the program "Se liga na rede" to primarily address two key obstacles for potential clients: cost and

5 Literally, "connect to the network."

6 Law No. 13,369 of June 3, 2002, issued by the Municipality of São Paulo.

lack of information. The program adopted four basic criteria for a household or property to be eligible for a connection:

- Income up to three times the minimum wage or residency in areas officially classified as highly socially vulnerable according to the Paulista Social Vulnerability Index (IPVS)
- Property that is compliant with technical requirements for connection (water connection must be made, internal plumbing for the dwelling must be at a higher level than the network)
- Authorization of the owner
- Owner's willingness to sign a participation agreement with the company. For properties with tenants, the agreement must be signed by the client registered with Sabesp.

Connections for families in groups four, five, and six of the IPVS or São Paulo's Social Vulnerability Index[7] are subsidized. The subsidy for low-income families covers the total cost of connection, including installation of internal connections to carry wastewater and graywater to the grid, laying of pipes and fittings, construction of inspection chambers, establishment of the connection, and replacement of damaged floors. Although the program does not cover installation of sanitary appliances, it usually does allow minor repairs to ensure integrity and functionality of the internal plumbing systems. Sabesp does not charge for connection of an owner's first property. Low-income families pay less for monthly fees, thanks to Sabesp's water supply and sewerage tariff consumption subsidies for these households.

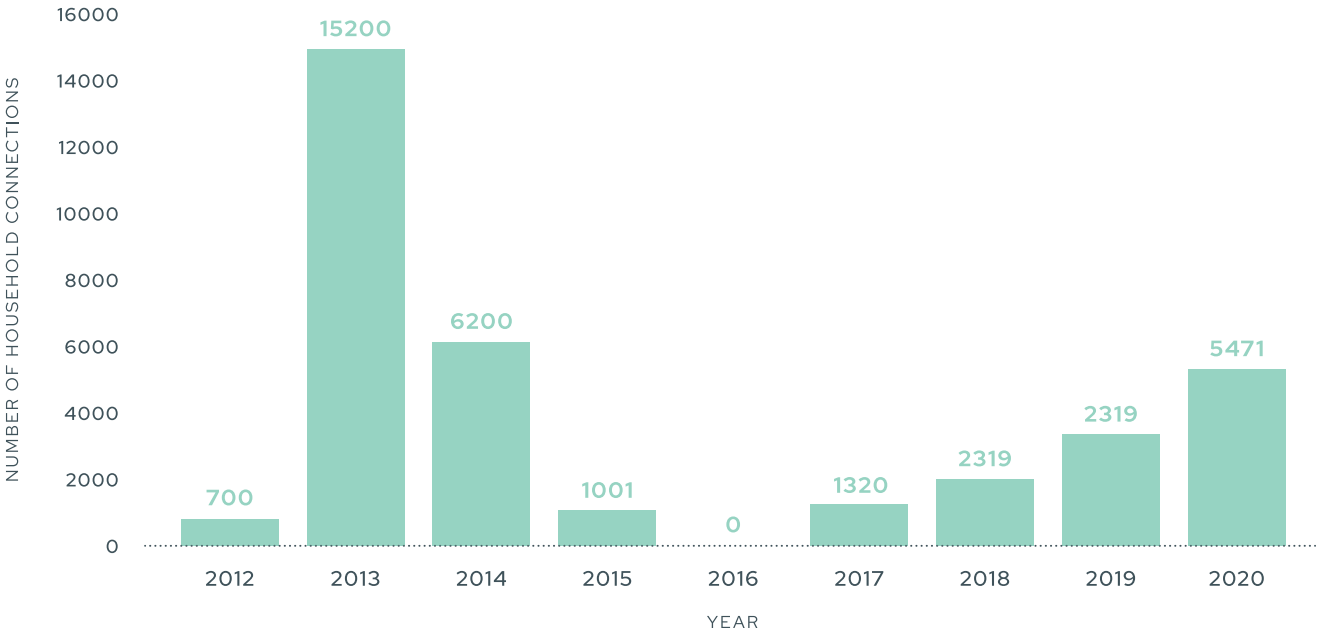
To address the potential lack of information and knowledge among customers, organizers emphasized individual contact with customers. The program recruited, trained, and deployed hundreds of social agents (all women over the age of 50) to visit customers.

Sabesp oversees the promotion, execution, and administration of the connection program. Its specific responsibilities include:

- Mapping the socioeconomic status of potential clients;
- Identifying reasons for not connecting;
- Understanding residents' perceptions of sanitation; and
- Designing a program promotion plan based on collected and analyzed information.

The state government supervises Sabesp's work through a review of periodically submitted reports and by directly contacting program beneficiaries via phone.

*Figure C.3* / **Connections Made by the "Se Liga Na Rede" Program between 2012-20 (São Paulo, Brazil)**




**Source:** Sabesp 2020; 2019; 2018; 2017; 2016; 2015; 2014; 2013.

7 Assembleia Legislativa do Estado de São Paulo. (n.d.). Retrieved June 21, 2017, from http://indices-ilp.al.sp.gov.br/view/index.php?prodCod=2.

Construction contractors are trained and certified by the company before installing connection facilities. Sabesp supervises its contractors by reviewing sample works.

### Program Implementation

An overview of the program cycle is provided in figure C.4. The state government informs Sabesp about the financing available for the year, and, based on the amount, municipalities prioritize neighborhoods. Based on collected information, the company prepares bidding requests, and contractors submit their offers. The state government reimburses Sabesp for executed works through quarterly proceeds justified by reports prepared for each property that was served. As a large and well-established company, Sabesp can prefinance the program with its own funds.

Sabesp carries out technical inspections and social promotion activities in identified neighborhoods. Next, the winning bidder evaluates the feasibility of each potential connection before the execution of works by verifying that target properties meet the program's eligibility criteria. The process involving technical evaluation and initiation of works typically takes seven days, and construction itself takes a maximum of three days. Owners and tenants must sign a document indicating their agreement to each of the outlined terms and conditions for the execution of the works.

Social promotors then visit potential clients and promote connections by highlighting multiple benefits, including improved quality of life and health. Social promotors are paid after household acceptance, a condition that serves as an incentive to "sell" connections to property owners.

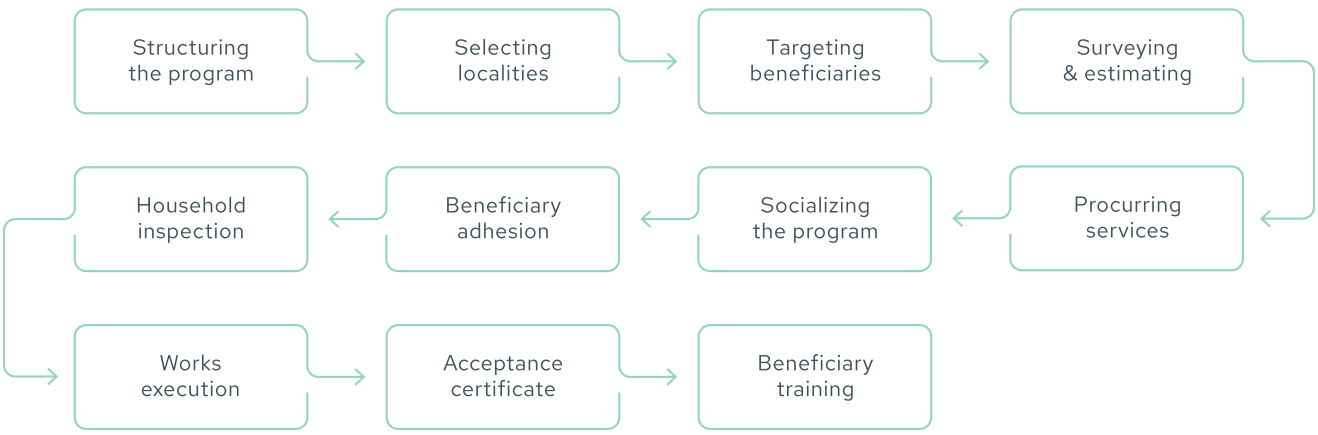
Nonetheless, development of trusted relationships and mutual respect between promoters and clients has been verified so that interactions do not become purely commercial transactions.

Contractors take photographs of properties before and after execution of work to demonstrate completed activities prior to an inspection. Photographs also provide contractors with evidence of property conditions before starting work in case of any claims or complaints from owners or tenants. Upon completion of the work, tenants/owners sign a receipt acknowledging acceptance of the work and of its quality. In case of complaints, owners or tenants raise them directly with Sabesp. Reportedly, about 95 percent of participating households are satisfied with the outcomes. Sabesp reports that 78 percent of new customers pay their monthly water and sewerage tariffs on time.

Sabesp indicated no problems with obtaining bidding offers. Contractors, in turn, reported incidents of theft and loss of contractors' equipment and materials have been rare. One dependable technique used to prevent loss and theft is to hire guards from among members of the local community. The practice ensures safety of workers, materials, vehicles, and contractor equipment. Although there is no program requirement to hire local labor, contractors often do hire local workers based on the recommendation of local leaders.

During program implementation, the importance of using technology to facilitate execution of technical work has become evident. For example, contractors easily resolve technical problems by circulating images and messages

*Figure C.4* / **Overview of the Program Cycle (in São Paulo, Brazil)**



among workers, engineers, and inspectors. It also is more efficient to order and ship materials with technology to avoid sudden suspension of work. In addition, contractors, supervisors, and inspectors communicate decisions and authorizations more fluidly, thereby avoiding problems with collecting worksheets or dealing with installation failures.

At the beginning of the program two connection types were applied:

- **Type 1:** the sewerage pipe of the property connects to a network without entering adjacent properties
- **Type 2:** the sewerage pipe has to pass through other properties.

The second type, on average, costs 34 percent more than the first (about US$800 versus US$625). Type 2 connections assume technical characteristics of a condominial sewerage network passing through three or more properties before reaching a network. The program also has used other types of connections, depending on the floors to be replaced (cemented areas versus those with tiles or other fine materials.) In 2017, the average cost per connection was about US$780, a figure that includes the administrative costs of the program. Since its inception, the program has operated in more than 110 São Paulo municipalities in neighborhoods identified by municipal governments.

## Monitoring and Evaluation

The state government is responsible for random monitoring and quality control of executed work. The best indicators of a job well done are the approval of the owner, who signs a form indicating acceptance of the finished work, and the approval of Sabesp because it oversees post-completion operations and maintenance of facilities.

The state government reimburses Sabesp through quarterly proceeds justified by reports prepared for each property serviced. Before and after photographs, acceptance forms signed by owners, and random inspections serve as control mechanisms for determining physical execution and for assessing quality. Sabesp believes that the connection program has reached a high efficiency level, and it proposes no modifications to the program design. However, the company does intend to improve the monitoring system. Sabesp acknowledges that an external and independent evaluation of the program has not occurred. Initially, the program team met monthly to analyze results; however, the frequency fell to quarterly.

## Lessons Learned

São Paulo's experiences with its connection program provide us with the following lessons:

- Connection subsidies and tariff consumption subsidies are key to encouraging low-income households to connect, particularly if repair costs of damaged floors are included in the connection subsidy.
- A regional (state) program depends on (and takes advantage of) preexisting programs and requires effective government administrative systems and capacities.
- Successful promotion of a program largely depends on understanding clients' needs, attitudes, and socioeconomic situations.
- There is a role for the private sector in program implementation if installers are professional firms and if program administrators ensure that private implementers incorporate social elements.
- Advances in communications and information systems positively influence efficiency and effectiveness of a connection program, a situation that manifests itself during planning, implementation, administration, and monitoring of the program.
- Hiring women over the age of 50 for the social promotion work has proved very effective and, together with taking account of the reality of participating neighborhoods, highlights the flexibility and creativity of Sabesp in implementing the program.
- Water and sewerage companies need sufficient liquidity to prefinance expenses of a connection program when governments reimburse connection costs upon completion.
- Situations, such as the São Paulo water crisis of 2014–15, can slow down connection programs unless they receive higher prioritization. The volume of subsidized work has been relatively low compared with the total number of sewerage connections installed per year. In fact, even during the program's initiation period, it was evident that the program would not meet its numerical targets.

Sabesp went through a trial-and-error period but eventually became highly efficient in program administration and management. Nevertheless, it has been noted that São Paulo's program would benefit from an external evaluation. Such an analysis would address the need to increase the program's annual scope of work and identify opportunities to improve quality and efficiency; furthermore, it would address reasons why the program is not meeting annual goals and recommend ways to move forward.

# COLOMBIA

More than 30,000 connections resulting in 75 percent connection to sewers

**TYPE**
New sewerage connections benefiting 30,159 homes through a subsidized, supply-driven program

**IMPLEMENTING ENTITY**
Ministry of Housing, City, and Territory (Ministerio de Vivienda, Ciudad y Territorio MVCT)

**TOTAL COST**
First phase—US$41 million; second phase—US$19 million

**FINANCING**
Predominantly funded by the central government

**DURATION**
First phase (2012–14); second phase (2015–18)

**GEOGRAPHIC SCOPE**
20 municipalities

**OVERVIEW**
Colombia's National Development Plan (2011–14), administered by the Ministry of Housing, City, and Territory (Ministerio de Vivienda, Ciudad y Territorio MVCT), initiated a connection program (Conexiones Intradomiciliarias) funded mainly by the central government of Colombia. The initial goal of the program was to connect 90,000 families with water and/or sewerage. During the period of 2012–14, the program invested approximately US$41 million, installing sewerage connections in 30,159 homes within 20 municipalities. The program resulted in 75 percent of households gaining access to basic sanitation. During the second phase (2015–18), the project aimed to prioritize concentrated population centers in rural areas. The project ensured integration of social and technical interventions into a single implementation contract. The introduction of legally binding criteria for subsidies ensured that they reached the neediest households, and the project was interdisciplinary in its design and execution.

**INSTITUTIONAL**
The program is financed with resources from the Departmental Water Plan (PDA), from municipal entities or from International Cooperation, among others.

**SOCIAL**
- Collaborates closely with Red Unidos (who represent the most vulnerable and needy households).
- Required time to build trust with population served. Many people lack faith in the program until construction begins.
- Maintained pro-poor approach. Concrete criteria ensured that subsidies reached the neediest.

**FINANCIAL**
- Funded mainly by the central government, which invested about US$41 million. The program installed sewerage connections in 30,159 homes across 20 municipalities in its first phase of implementation.
- Authorized subsidies for household connections.
- The average subsidy for residential facilities was high (close to US$2,700), a factor that limited the number of beneficiaries.

**LEGAL**
- Government entities received permission to cover the full cost of household access to sewerage connections.
- In 2012, regulations included in the national plan law established the maximum subsidy values and set criteria for targeting the program to specific population groups. The financial limit of the subsidy was 10 times the legal minimum monthly salary (SMMLV), an amount of approximately US$2,700.
- Potential participants were required to submit their deeds of ownership and sign participation commitments authorizing access to the property during construction. Tenants were cosignatories with owners.

**TECHNICAL**
- Integration of social and technical interventions into a single implementation contract facilitated coordination between the two components of the process.
- Use of low-water consumption equipment reflected a concern for the long-term integrity of the systems.


*Map C.3 /* **Colombia**

## Overview

Colombia's National Development Plan (2011–14), administered by the Ministry of Housing, City, and Territory (MVCT), initiated a connection program funded mainly by the central government. The initial goal of the program was to connect 90,000 families with water and/or sewerage. In 2012–14, the program invested about US$41 million, installing sewer connections in 30,159 homes across 20 municipalities (map C.3). The program resulted in 75 percent of households gaining access to basic sanitation. The project's second phase (worth approximately US$20 million) spanned 2015–18 and aimed to prioritize population-concentrated centers in rural areas.. The project integrated social and technical interventions into a single implementation contract and introduced legally binding criteria to ensure that subsidies reached the neediest. Furthermore, the project was interdisciplinary in its design and execution.

## Background and Motivation

About 93 percent of the urban population of Colombia has access to sewerage services, according to the National Administrative Department of Statistics (DANE), with 78 percent of the poorest quintile connected to sewerage. In 2011, the government approved the National Development Plan, which authorized subsidies for household connections. This led to the "connect-with-water program," which aimed to provide subsidies to connect 90,000 of the poorest families to water supply and/or sewerage services.

In addition to financial support from the central government, the program received resources from the Departmental Water Plans (PDA) for ongoing monitoring by MVCT. Funding also came from the Inter-American Development Bank (IDB), the Family Foundation, the Spanish Agency for International Development Cooperation (AECID), and the Foreign Ministry. During its second phase (2015–18), the program collaborated with the MVCT Neighborhood Improvement Program, and financial contributions were obtained from the departmental and municipal governments. The program collaborates closely with Red Unidos (representing the most vulnerable and needy households in the municipalities).

## Intervention Design

The initial goal of the program was to connect 90,000 families with water and/or sewerage. In 2012, national regulations established the criteria for program targets and for maximum subsidy values to households. The financial limit of the subsidy was 10 times the minimum monthly legal salary (SMMLV), an amount of approximately US$2,700. In the departments with the highest costs of living (Amazonas, Chocó, Guainía, Guaviare, Providencia, Putumayo, San Andrés, Santa Catalina, Vaupés, and Vichada), the subsidy limit was set at 13.6 times the SMMLV. The value of the subsidy underwent periodic revisions and modifications, based on results obtained and the economic situation of the country.

Annually, participating municipalities were prioritized according to several factors, including the following:

- The number of people belonging to strata 1 and 2
- Participation in the united network of the presidency of the republic
- The Multidimensional Poverty Index in each urban area
- The management capacity of water companies, in accordance with the Single Information System administered by the superintendent of public utilities (SSPD).

After identification of municipalities, participating neighborhoods were selected, using criteria established jointly by the MVCT, the municipality, the local utility company, and a representative of Red Unidos. Priority went to neighborhoods with the highest percentage of people identified as stratum 1, or the most marginalized population.

After identification of municipalities and neighborhoods, the program developed in two phases: diagnosis and execution. The two stages typically required a year in total, or six months per stage. Diagnosis is the verification and approval by an inspector of preliminary data on household needs prepared by local governments or water companies. Once approved, preparation began for the bidding documents for execution of projects. At this stage, the households selected four of the following five program intervention works: (a) hand basin and drain; (b) sanitary appliance, including facilities and faucets; (c) shower with siphon drain, and floor grate; (d) sink for washing up/laundry, faucet, and drain; and (e) sink with drain and drain valve. Since 2012, the program has allowed the installation of the five works, provided the maximum value of the subsidy is not exceeded.

The second phase (execution) took another six months and included the following steps:

- Socialization of the project, using contracted social communicators and local government staff (two months)
- Technical diagnosis of construction per household (this could be time-consuming depending on the existing situation)
- Physical execution of the works and their final approval (about two months)
- Social Management Plan (PGS) under the lines of: Communication, Training, and Community Participation, which were implemented in a transversal manner throughout the execution phase

Potential participants must have submitted their deeds of ownership and signed a participation commitment to authorize access to the property during construction. Tenants were cosignatories with the owners. Contractors were responsible for the complete process of connection, including social intervention, design, and execution of works. During execution of the project, regular meetings of local committees occurred; a representative of MVCT sometimes attended, if necessary. Social interventions focused on home visits to promote the project, and close coordination with neighborhood organizations identified all potential participants.

After the completion of projects, the contractor tested the water pressure and sewage flow in the presence of an inspector. The program required that the installations were in accordance with established regulations for the installation of water-saving equipment and appliances.

### Program Implementation

The first phase of the program spanned 2012–14; the second phase, 2015–18. During implementation, several successes and challenges became evident. The first phase (selection of municipalities/neighborhoods) faced multiple delays because of the large number of participants in the process. It experienced additional complications because of the inclusion of other donors or funders.

Difficulties during execution included problems with neighborhood stratification, which occurred upon household selection, and deficiencies in the quality and types of existing water and sewerage services, a situation that affected new construction. Contractors faced significant logistical challenges because of the large number of simultaneous projects. In addition, contractors tried to complete the work as quickly as possible due to losses of stored construction materials. The program experimented with hiring local labor without great success because some workers did not receive adequate technical training.

As a result of the high subsidy allowance, almost all identified beneficiaries participated in the program. This was a major success of the program. In some cases, the program indirectly motivated homeowners or renters to invest their own funds in their in-home facilities. However, it took time to build trust with the population, and many people were only convinced when the construction work began.

## Monitoring and Evaluation

During the pilot phase of the program, inadequate scheduling led to fewer-than-expected connections, and costs exceeded proposed prices. It was noted that the program made important adjustments (during implementation) to improve performance in terms of quality and cost, including:

- Reducing execution times
- Improving estimates for the specific amount of work
- Strengthening the quality of audits and inspections
- Employing local labor when possible
- Adapting designs to local conditions

It is important to mention that the central government cut financial support by about 50 percent due to the country's deteriorating economy. However, thanks to the "Impact and Design Evaluation of the MVCT connections program" study carried out by the National Planning Department in 2014, identified the following impacts and effects of the program in the beneficiary municipalities and households:

- The ease of access to water services increased the opportunities for, and the effectiveness of, the beneficiaries' ease to access the sanitation services.
- The program generated positive impacts on hygiene. Beneficiaries washed clothes more thoroughly and washed their hands more frequently before preparing food or after leaving the bathroom.
- For children under 5 years of age, a 33 percent decrease in the probability of suffering from diarrhea was found. Additionally, in young people between 12 and 17 years old, the probability of suffering from diarrhea reduced by 1.5 percent.
- The program positively reduced the transmission of acute diarrheal diseases through improved management of domestic wastewater and the reduction in the requirement for household water storage.
- Beneficiaries reported that they bathe with more ease (which frees up time for other things and improves self-esteem) and with privacy which reduces the probability of being victims of verbal harassment or any other type of harassment.

Key efforts for the successful implementation of the connection program were to:

- Regulate the program through a national standard.
- Establish a very clear scope for both design and implementation stages.
- Design a social strategy that is linked to each of the program's execution stages.
- Define the actors and roles and responsibilities of each in the implementation of the program.
- Ensure consistent knowledge sharing to each of the participating entities, thus avoiding setbacks in processes and loss of information.
- Provide continuous feedback and improvement to overcome obstacles that may arise.

It should be noted that the program, now in its third phase, is still ongoing and has been consolidated as a State Strategy in the country.

## Lessons Learned

The following are lessons learned from the project:

- A national program depends on (and takes advantage of) preexisting programs and requires effective government administrative systems.
- Program regulations included preestablished limits for subsidies and administrative procedures necessary to meet legal requirements.
- The Colombia program established a pro-poor approach and introduced concrete criteria to ensure that subsidies reach the neediest people.
- It is important to focus on internal plumbing fixtures because benefits to health, privacy, and general well-being depend less on the connection and more on internal facilities.
- The average subsidy for residential facilities was very high (close to US$2,000 for each household), which limited the number of program beneficiaries. With the financial cut in the second phase, the number of beneficiaries fell sharply.
- Specifications and installation of water-saving equipment reflected a concern for the long-term integrity of the systems.
- Integrating social and technical interventions into a single implementation contract facilitated coordination between the two components.
- Working in individual homes has technical and social complications. Each home and each client is different, and require individualized responses. At the beginning of the Colombia program, some facets of planning, logistics, coordination, hiring of laborers, and other components resulted in high costs and arrears at every step. Over time the performance of contractors and administrators improved.

# GUAYAQUIL, ECUADOR

## Improving the city's connection rate from 45 percent to 85 percent

**TYPE**
Subsidized, supply-driven sewerage connection program benefiting 10,000 households

**IMPLEMENTING ENTITY**
Private operator Interagua and the public municipal enterprise la Empresa Municipal de Agua Potable y Alcantarillado de Guayaquil (EMAPAG-EP)

**TOTAL COST**
US$146.5 million

**FINANCING**
Combination of investments by Interagua and the Central Bank of Ecuador and revenue from a special user tax, named the special enhancement contribution (contribución especial de mejoramiento (CEM)).

**DURATION**
2013–15

**GEOGRAPHIC SCOPE**
Economically disadvantaged districts of Guayaquil

**OVERVIEW**
The connection program in Guayaquil increased access to improved sanitation services and reduced wastewater pollution in select areas of the city. The program focused on community participation, provided financial incentives, targeted low-income households, and applied legal mechanisms requiring households to connect to the sewerage network. The program's success led to a US$461 million follow-up program starting in 2015.

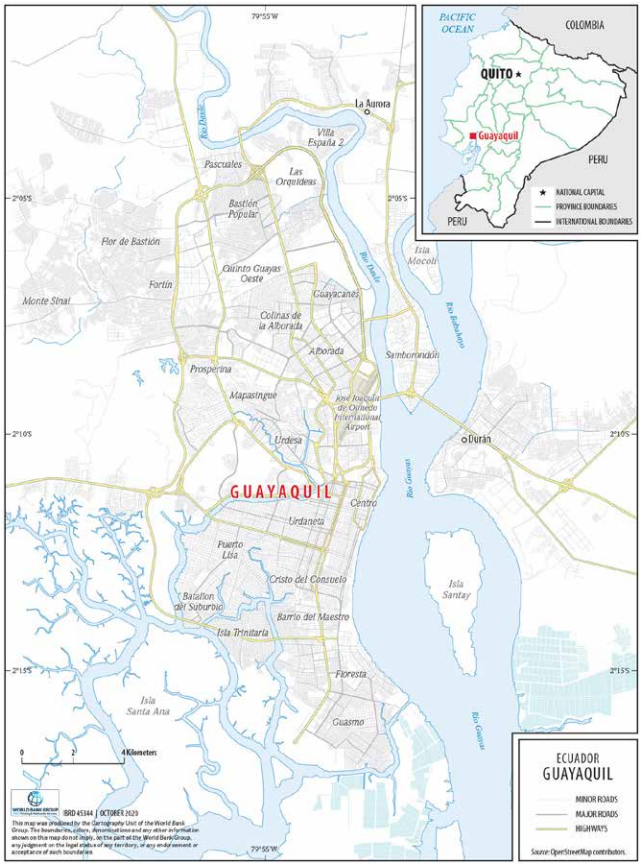
**SOCIAL**
- Over 50 percent of the inhabitants in low-income neighborhoods of the city lived below the national poverty line.
- The program promoted the concept of "social co-responsibility" through "connection certificates." The program encouraged user responsibility toward system management and payment of the tariff.

**FINANCIAL**
- About 31 percent of homeowners did not connect because of financial constraints, a situation that motivated the development of conditional cash transfers.
- The standard costs are US$500-600 (household connection only) and US$1,750-2,000 (household connection and network rehabilitation).

**INSTITUTIONAL**
- EMAPAG-EP was motivated to develop the connection program to support the city's Poverty Eradication Strategy and National Development Plan 2013–2017.
- The program was developed and implemented by a public-private partnership (PPP) between the private vendor Interagua and the public municipal enterprise EMAPAG-EP.
- The program involved the National Water Secretariat of Ecuador (la Secretaría Nacional del Agua-SENAGUA).
- The program involved the municipal governments, which are responsible for water supply and sanitation service delivery within their areas of jurisdiction either directly or through delegation to a public company or community-based organizations.

**LEGAL**
- Land tenure issues associated with the city's massive and uncontrolled expansion over the past 40 years (since the 1970s) resulted in the adoption of appropriate administrative laws.
- A critical executive decision by municipalities to buy land from original owners/occupants and sell it in installments at a regulated price made it possible to address the land legalization issue.
- The creation of a municipal ordinance allowed public investment in private property. The recovery of investment was subsidized at more than 85% and paid back to users over 15 years. This was recovered through the CEM.

**TECHNICAL**
Technical impediments, such as houses being located at a lower level than the network, resulted in municipal ordinances imposing easements for all branches of the sewers.




*Map C.4* / **Guayaquil, Ecuador**

## Overview

The connection program in Guayaquil, Ecuador (map C.4), increased access to improved sanitation services and reduced wastewater pollution in select areas. Initiated in 2013, the program benefitted approximately 10,000 households in economically disadvantaged districts of Guayaquil. The beneficiaries comprised 95 percent of the initially surveyed and targeted population. Private operator Interagua and the public municipal enterprise Empresa Municipal de Agua Potable y Alcantarillado de Guayaquil (EMAPAG-EP) developed and implemented the program, financed through investments by Interagua and the Government of Ecuador (GoE).

The program focused on community participation, providing financial incentives, targeting poor households, and applying legal mechanisms requiring households to connect to the network. The program was successful, and it led to a follow-up project in 2015 financed by the GoE, the World Bank, and the European Investment Bank (EIB) with investments totaling totaling US$461 million. The success of the program allowed EMAPAG to institutionalize the importance of the household sewerage connections, and the current World Bank portfolio is supporting its scaling up, as are those of other donors such as EIB and AFD with approximately 40, 000 new connections to be completed.

## Background and Motivation

Since the late 2000s, the GoE has invested heavily in infrastructure and social sectors to stimulate growth, reduce inequality, and promote inclusion in urban centers. In line with such efforts, the GoE has prioritized improving water supply and sanitation (WSS) services as the foundation of its Poverty Eradication Strategy and its National Development Plan 2013-17.

Environmental and community well-being benefits were also key motivators for the program described here and the current program. Connections to the sewerage network triggered a domino effect: removing pollution along the shores and riverbanks led to opportunities and projects for the requalification of public spaces, which in turn improved community health as the exposure to excreta- and water-related diseases decreased. The latter two improvements encouraged the communities to start using/occupying the safe riverbank public spaces. The contrast between one part of the city, where people on a riverbank were connected to the sewers, and the other river bank, where they were not connected, was considerable.

At the time the program ended, Guayaquil was the most populated city in Ecuador (approximately 2.3 million inhabitants and accounted for about 18 percent of Ecuador's gross domestic product (GDP).[8] Compared to other cities in Ecuador, Guayaquil has very high poverty levels, with more than 50 percent of the residents of poor neighborhoods living below the national poverty line.[9] Between 2007-17, national and municipal efforts expanded to extend sewerage to Guayaquil's slums to improve sanitary conditions and to reduce contamination of the Guayas River and surrounding areas.

Before implementation of the program, the connection rate to the sewerage network in Guayaquil's impoverished areas was barely 45 percent. In 2008, EMAPAG-EP adopted regulatory and community outreach measures to increase the rate of connection in these areas. After implementation, the city's sewerage coverage reached approximately 80 percent, and its household connection rate approached 85 percent.

## Responsibilities and Institutional Framework

The Ecuadorian National Secretariat for Water (SENAGUA) is responsible for developing and applying policies, standards, norms, and regulations for water resources and water supply and sanitation. Municipal governments are responsible for WSS service delivery within their areas of jurisdiction, either directly or through delegation to a public company or community-based organizations.[10]

In Guayaquil, the water supply and sanitation services are provided through a concession contract signed between EMAPAG-EP, a controlled and regulated company, and the private company Interagua, an integral concession for a period of 30 years that began in 2001. This arrangement applies to the entire city, all services (drinking water, sanitary sewerage, and storm drainage), and all areas (investment, operation, maintenance, and marketing of services).

## Intervention Design

The program's target population lived in the poorest neighborhoods, where the percentage of people below the poverty line ranged from 55 to 70 percent and where 18 to 32 percent of households lived in extreme poverty. Designers based the connection program on the results of a baseline survey, carried out by EMAPAG-EP, which revealed high demand for and interest in connections to sewerage networks. Forty percent of the households interviewed considered connecting immediately, and 3 percent were undecided. The survey also revealed that 31 percent of homeowners did not connect because of financial constraints and 17 percent because they had no knowledge of the procedures to connect. Additional constraints preventing households from connecting to the sewerage network included technical impediments, such as being located at a lower level than the network, and land tenure issues following the city's massive and uncontrolled expansion since the 1970s.

The total cost of connection was estimated at US$500 per household (EMAPAG in reality uses a cost range of US$ 500-600), a figure that included directing all the drains away from the property to the sewer, building the inspection chambers, making the physical connection to the network, cosigning, and sanitarily sealing the preexisting sanitation solution (latrine, septic tank, or direct outlet to the environment, and repair of broken floors). If sewerage network rehabilitation is included, then the cost per connection was between US$1,750-2,000. Accounting for the results of the baseline survey, the connection program comprised two major components focusing on intensive promotion of the program to potential users and on establishment of conditional cash transfers to households.

Consequently, the program design incorporated financial and social elements that reflected results of the baseline survey and encompassed complementary technical and legal elements to achieve the program's strategic objective of expanding connections (figure C.5).

8 The World Bank Group (2015, February 27). Project Information Document (PID), Report No.: PIDA21815, EC Guayaquil Wastewater Management Project (P151439), from http://documents.worldbank.org/curated/en/645951468022137522/pdf/PID-Appraisal-Print-P151439-02-27-2015-1425062978530.pdf.

9 The World Bank. Connecting Latin America to Sanitary Sewerage (Rep.). (2017). Washington, DC.

10 The World Bank Group (2015, February 27). Project Information Document (PID), Report No.: PIDA21815, EC Guayaquil Wastewater Management Project (P151439), from http://documents.worldbank.org/curated/en/645951468022137522/pdf/PID-Appraisal-Print-P151439-02-27-2015-1425062978530.pdf.

*Figure C.5* / Elements of the Connection Expansion Program, Guayaquil, Ecuador

The cost of household connections was financed by the Interagua concessionaire (US$107.5 million), an annual transfer to the city municipality from the Central Bank of Ecuador (US$35 million), and a user tax, called special improvement contributions (contribucion especial de mejoramiento (CEM); about US$4 million).

To effectively promote the program, cultivate accountability in citizens and customers, and nurture informed and active participation by citizens, the program incorporated the following activities:

- **Community outreach.** EMAPAG-EP and Interagua established dedicated internal units to conduct community development and social communication activities, including trainings, house visits, and educational events.
- **Citizens engagement.** Contractors and inhabitants signed agreements outlining scope of work, allowing inhabitants to authorize the proposed project, assess the quality of delivered outputs, and accept or reject the final product in writing.
- **Focus on end users.** Contractors were obligated to establish customer service centers to handle complaints and to provide the public with information and news about the program and work in progress.
- **Local capacity building.** EMAPAG-EP and Interagua promoted training courses for community leaders to strengthen local capacity for self-management.
- **Local workforce solicitation.** The contractors gave priority to local skilled and unskilled laborers from the targeted areas and sought local service providers to provide domestic economic opportunities.

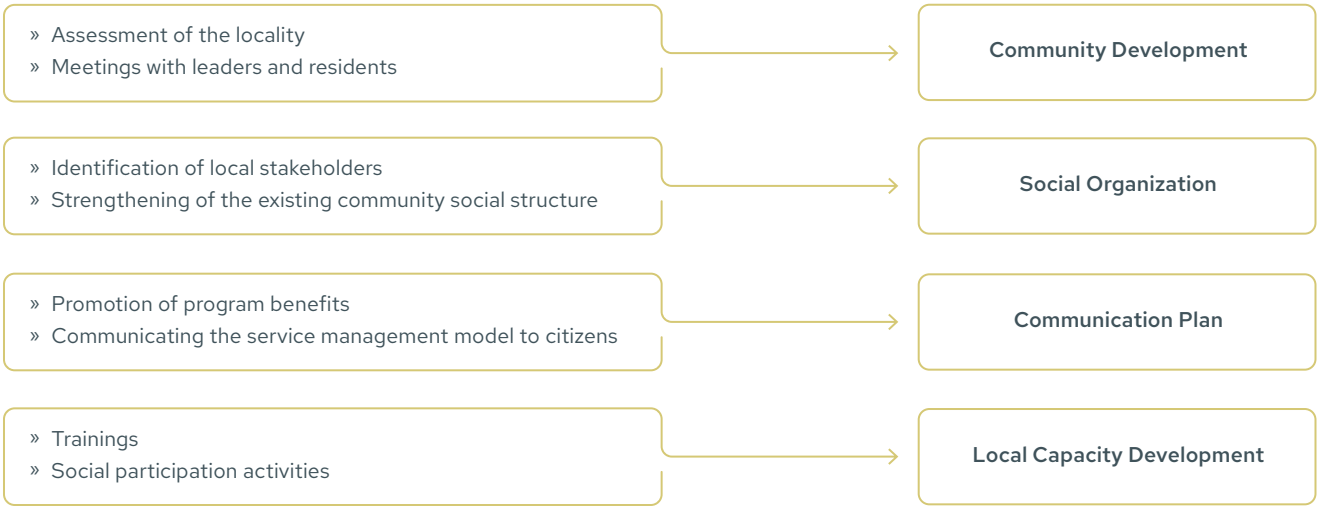
On the legal front, the municipal government addressed issues of land regulation and legalization of land in illegal settlements by adopting appropriate administrative laws. First, these laws made it possible to execute program activities in private properties with state funds. Second, executive decisions by municipalities to buy land from the original owners or occupants and sell it in installments at a regulated price made it possible to address the land legalization issue. Last, municipal ordinances imposed easements for all branches of condominial sewerage network, thereby minimizing social conflicts during the implementation of the piloted condominial sewerage project in certain neighborhoods.

## Program Implementation

Social intervention activities represented the largest and most important aspect of the program's strategic approach in promoting household connections. The social intervention model applied in the program had several main components (see figure C.6).

Private construction companies executed the work through public tenders issued by Interagua and EMAPAG-EP. The winners of public tenders received initial census forms prepared by social facilitators from the communities. Once the construction contractors confirmed addresses and work to be done and once owners signed authorization acts, the involved parties agreed on installation dates. After completion of projects, owners needed to sign acceptance forms and third-party inspectors needed to review work completed before contractors received payment. Community development

*Figure C.6* / **Social Intervention Model in Guayaquil, Ecuador**



agents coordinated activities and handled advocacy, training, and conflict resolution through separate contracts. This separation of construction contracts and the work of community development agents ensured equitable participation by residents, socially audited the program, and served as a monitoring mechanism. The practice of hiring local labor provided an added benefit by boosting economic growth in the community.

## Monitoring and Evaluation

The program applied post-construction monitoring called "social co-responsibility." Once the connection rate reached more than 90 percent of the targeted community, each connected household was asked to sign a "connection certificate" outlining responsibilities of the household toward the management of the system and tariff payment. The details of the certificate helped ensure that the community benefited from better environmental and health conditions in addition to enjoying improved quality of life. This approach placed responsibility for monitoring and evaluation (M&E) on the community rather than on the utility. The post-construction M&E framework strengthened the local capacities of poorer communities and aimed to create responsible consumer markets. The framework endeavored to help residents of lower-income communities learn to exercise their rights and improve their decision-making skills, and it encouraged their active participation in the sustainability of services through voluntary compliance with ongoing operation and maintenance responsibilities.

## Lessons Learned

The connection program in Guayaquil, Ecuador, offers the following lessons:

- Implementation of social communication and community development activities can contribute to program success by attaining stakeholder cooperation and participation in addition to enhancing local self-management capacities.
- Creation of social management and communication units increases the importance and visibility of social interventions within institutions historically led by technical personnel.
- Both public and private entities can successfully execute connection programs in various areas, including poor neighborhoods and slums.
- A connection initiative can encourage homeowners and renters to invest their own resources in improving their sanitation facilities and to take advantage of free installations as part of a program.
- Efforts to monitor the performance and results of the connection program are pending; results of the monitoring may suggest modifications that would improve the program's efficiency and effectiveness.
- The success of this program led to a follow-up project in 2015 with investments totaling US$480 million primarily from the government of Ecuador, the World Bank, and the European Investment Bank. The success of the program allowed EMAPAG to institutionalize the importance of the intradomiciliary sewerage connection program, with investors supporting its scaling up, with approximately 40,000 new connections to be completed.

5

# TAMIL NADU, INDIA

Connecting 1,551,995
households statewide

**TYPE**
Statewide sewerage development with connection component supported by World Bank-financed Third Tamil Nadu Urban Development Project.

**IMPLEMENTING ENTITY:**
Tamil Nadu's Municipal Administration and Water Supply Department

**TOTAL COST**
US$1.5 billion committed for implementation of sewerage projects in the state. National and state government (centrally sponsored schemes) contributed US$734 million, World Bank US$187 million, KfW US$82 million, and ADB US$500 million.

**FINANCING**
Blend of loans, grants from national and state government, urban local bodies funds, and public deposits

**DURATION**
Ongoing since 1997. World Bank project 2005–14.

**GEOGRAPHIC SCOPE**
Tamil Nadu, a southeastern state of India. The city of Chennai's population exceeds 5 million.

**OVERVIEW**
In 1997, the government of Tamil Nadu (GoTN) committed to safely managing sanitation in dense areas of the state. It began implementing sewerage schemes in seven cities through internal and external funding. In 2005, the Third Tamil Nadu Urban Development Project (TNUDP III) funded by the World Bank (US$187 million) began working on sewerage systems in 25 towns, which served as district headquarters. The principles and approaches for service connections and user charges developed under this project established the framework for sewerage interventions in the state.

**SOCIAL**
» Program championed and driven by the state government with effective participation and support of elected officials.
» Extensive outreach and public engagement campaign.

**FINANCIAL**
» Households within 100 meters of sewerage required to pay for all sewerage schemes in the form of a one-time non-refundable deposit, which helped meet a portion of the capital cost (20 percent to 30 percent).
» Users required to pay a charge to cover the costs of operation and maintenance.
» In Chennai, projects also included energy recovery and sale of treated wastewater to industries.
» Connection and user charges related to the size of
» the property to address issues of equity with larger plots paying a greater charge than smaller plots.
» Even after public deposit contribution, if a city is not able to meet its project cost, the gap is met by either contribution from the urban local bodies or additional grants from the state.

**INSTITUTIONAL**
» Multiple national, municipal, and local entities with clear roles and responsibilities for policies, financing, and development of urban water supply and sanitation programs.
» State Pollution Control Board is responsible for standard setting and monitoring.

**LEGAL**
» Regulatory provisions in Tamil Nadu (TN) mandate that a house service connection be made when a sewerage line is laid and available within 100 meters from a household.
» This provides the legal framework for urban local bodies to push households to connect to sewers.

**TECHNICAL**
» Flexibility and allowing contractors to adapt to ground realities are key.


*Map C.5* / **Tamil Nadu, India**

## Overview

I n 1997, the government of Tamil Nadu (GoTN) formally proclaimed its commitment to providing safe sanitation in seven urban areas adjacent to Chennai (shown in map C.5). Subsequent policy announcements and five-year plans have reinforced the commitment to safe sanitation in more densely populated areas of the state, funded by a range of internal and external funding. In 2005, 24 urban local bodies (ULBs) serving as district headquarters began the implementation process under the Third Tamil Nadu Urban Development Project (TNUDP III) funded by the World Bank (US$209.7 million). The principles and approaches for house service connections and user charges developed under this project provided the framework for sewerage interventions in the state. The project required a public deposit from households within 100 meters of the sewerage network (and allowed payments in installments) to meet the capital cost of the schemes. Households were also required to pay a user charge to cover the costs of operation and maintenance of the sewerage network and sewerage treatment. This contribution from the users, who had been adequately informed about the project, signalled their willingness to participate in the equity of the project and to connect to sewers as construction progressed. The GoTN has adopted this approach as the norm for all sewerage projects in the state. Considerable efforts to make people aware of the need for such schemes and to show them that their deposits ensure sustainability of the project proved to be critical to the program's success. Flexibility and allowing contractors to adapt to contextual realities also contributed to the project's success.

## Background and Motivation

Tamil Nadu is the most urbanized major Indian state. About 48 percent of its population (35 million people) resides in urban areas, compared with the national average of 31 percent. By the late 1990s, when 75 percent of Tamil Nadu's urban population had access to an onsite system (septic tank or pit latrine), the state capital, Chennai, had a partial sewerage network serving about one-fifth of its population.

In 1997, the GoTN identified seven areas adjacent to Chennai for further investigation related to sewerage schemes. The overall objective of the sewerage interventions was to safely manage human excreta and wastewater through a sewerage network, and sewage treatment in phases in cities and towns. Rapid urbanization, demand for urban services, pollution of waterways, and elected officials who saw merit in supporting sewerage services were all motivation factors for sewerage interventions in major cities. The approach had three phases:

- **Densely populated suburban towns adjacent to Chennai (1997–2003).** Two sewerage projects out of seven became reality in this phase. One of these sewerage projects was in Alandur, which set the precedent for public-private partnerships (PPPs) in the sanitation sector and for collecting public deposits toward meeting the capital expenditure for the sewerage system.
- **Cities and towns along rivers (2002–06).** Building on the successful implementation of these first city-level projects, sewerage schemes became a reality in seven river cities, with financing from the National River Conservation Plan (NRCP) of the government of India (GoI) with participatory funding from GoTN and ULBs.
- **District headquarters, cities with more than 100,000 people, and heritage and towns of religious importance (2005–14).** Sewerage projects were implemented in 24 ULBs identified as district headquarters or growth hubs, under TNUDP III.

In addition are GoI's centrally sponsored schemes—the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and the Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) from 2005–14 and the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) from 2015–19 financed sewerage infrastructure. JNNURM and UIDSSMT financed sewerage projects in cities or towns, and AMRUT financed sewerage projects in 10 ULBs. Since 2015, the World Bank is supporting sewerage projects in two towns, KfW is supporting interventions in five towns and ADB in eight towns.

The urban sanitation policy landscape in India has evolved since 2008, and it has been complemented by national flagship programs. The National Urban Sanitation Policy (2008) brought to the fore the need to safely manage human excreta and to look at the full cycle of sanitation. In 2017, the National Urban Fecal Sludge and Septage Management Policy (2017) provided necessary guidance for cities dependent on onsite sanitation. Sanitation received national priority with the launch of the Swachh Bharat (Clean India) Mission (SBM) in 2014 for rural and urban areas. The SBM Urban (SBMU) provides funding for household, community, and public toilets to eliminate open defecation in urban India. Annual surveys and ranking of urban areas have added momentum to states' and cities' efforts to better manage their wastes and to have cities that are clean, green, and free from open defecation. In 2015, the launch of the AMRUT provided dedicated funding to urban infrastructure and services delivery in India's larger cities, including funding for sewerage. The Smart Cities Program also potentially provides for resources to be invested in waste management systems. Investments under the National Mission for Clean Ganga (NMCG) provide infrastructure support to cities in the Ganges River basin to manage their liquid wastes and to prevent pollution of the river. Priority goes to cities that have sewerage networks at risk of being ineffective due to households not being connected.

In 2005, the World Bank financed TNUDP III (US$187 million). The project provided a fillip to sewerage systems in the state by financing 1,800 kilometers of sewers and 270 million liters per day of sewage treatment plants in 24 ULBs. The principles and approaches for household service connections and user charges developed under this project laid the framework for sewerage interventions in the state. Many teams from several states regularly visit Tamil Nadu to learn and replicate their efforts.

### Institutional Arrangements

The Municipal Administration and Water Supply Department is responsible for policy, financing, and development of statewide urban water supply and sanitation programs. The Corporation of Chennai, the Commissionerate of Municipal Administration, and the Directorate of Town Panchayats are integral parts of this department. The Commissionerate of Municipal Administration is responsible for implementing water supply and sanitation programs in 135 cities (15 corporations and 121 municipalities), and the Directorate of Town Panchayats is responsible for water supply and sanitation programs in 528 small towns. The Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) and the Tamil Nadu Water Supply and Drainage Board (TWAD Board) are parastatals responsible for the provision of water supply and sanitation systems. The Tamil Nadu Urban Development Fund (TNUDF) and the Tamil Nadu Urban Finance and Infrastructure Development Corporation Limited (TUFIDCO) are financial intermediary pioneers in the field of urban infrastructure financing. These financial intermediaries guide ULBs to develop urban infrastructure projects, assess their financial viability, and coordinate in channeling funds from different sources to implement them. The State Pollution Control Board is responsible for standard setting and monitoring. The ULBs are responsible for the sewerage connection programs. The state's administration arrangements for urban areas of Tamil Nadu appear in figure C.7.

Municipal bylaws in ULBs mandate that all households within 100 meters of a sewerage network to connect to sewers. This provides the legal framework for urban local bodies to push households to connect to sewers. Close monitoring by Commissionerate of Municipal Administration ensures that projects achieve/maximize house service connections.

## Design

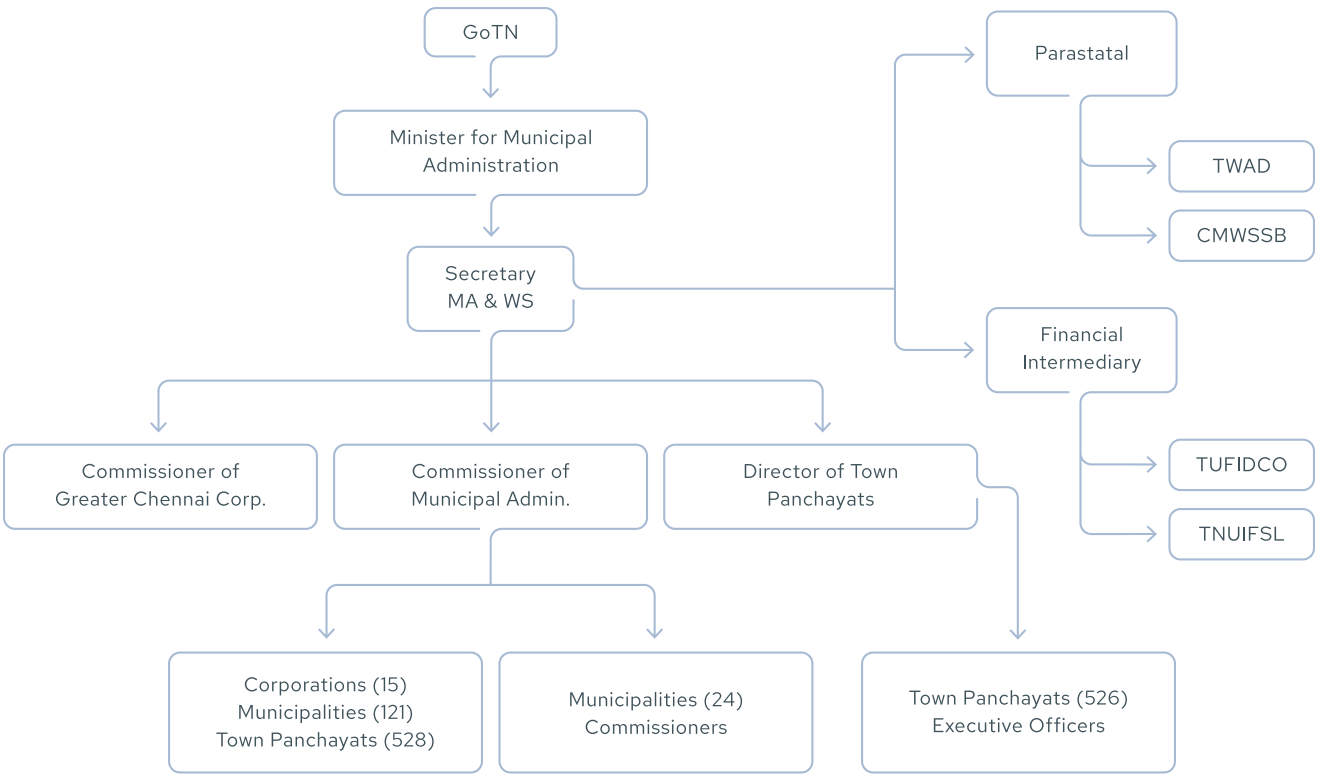
Residents requiring a conventional household sewerage connection must pay a service connection fee or deposit and do the necessary internal plumbing to connect to the sewerage network. All households (households paying property taxes and those on the ULB database) in the project area are targeted for household sewerage connections. Only households where sewers are proposed pay a connection deposit. However no city in the state except for Chennai is fully sewered. Regulatory provisions in Tamil Nadu mandate that a household sewerage connection (HSC) is compulsory when a sewerage line is laid and available within 100 meters from a household. Although similar provisions exist in many other urban areas of India, achieving high levels of HSC to sewerage networks has proven to be a challenge. Typical deposits and plumbing costs appear in table C.1.

Under this project, a sewerage connection meant that the pipe was brought up to the compound wall of the house and that the user was responsible for internal plumbing to connect to the sewer. This led to delays in HSC; hence, based on learnings from this project, the GoTN has modified its approach to include internal plumbing as part of the sewerage contract, so the cost is included as part of household charges for obtaining a sewerage connection.

Connection charges based on property size help address issues of equity, with households on larger plots paying a higher charge than smaller ones. Public deposits not only contribute toward the total project cost, but they also ensure sustainability of the investment. Households are also required to pay a user charge to cover the costs of operation and maintenance of the sewerage network and



*Figure C.7* / State Administration Arrangements for Urban Areas in Tamil Nadu




**Source:** Municipal Administration and Water Supply Department, Govt. of Tamil Nadu
**Note:** CMWSSB = Chennai Metropolitan Water Supply and Sewerage Board; GoTN = Government of Tamil Nadu; MA & WS = Municipal Administration and Water Supply Department; TNUIFSL = Tamil Nadu Urban Infrastructure Financial Services Limited; TUFIDCO = Tamil Nadu Urban Finance and Infrastructure Development Corporation Limited; TWAD = Tamil Nadu Water Supply and Drainage.

sewage treatment. The user charge was approved by the municipal council and communicated to households through elected officials (ward councilors) and display boards at the city or town office. User fees ranged from Rs. 120 to 150 (equivalent US$1.6–2)[11] per household per month. In Chennai, projects also included an energy recovery component, which has helped meet 60 percent to 80 percent of plant energy needs and the sale of treated wastewater to industries, which helped defray operation and maintenance costs. All projects prepare a detailed project report, which includes design information, extent of sewerage network, number of HSCs, sewage treatment plants, capital, operating costs, and options to meet operations costs.

The GoTN collects a public deposit: a one-time nonrefundable fee from the household that goes toward meeting the capital cost of the underground drainage system (UGDS). Payments signify that users have received adequate information, are willing to participate in the equity of the project, and will connect to the sewerage as construction progresses. The total project cost comes from a composite of loans and grants from national and state government, ULB funds, and public deposits. The approach for determining the share of sources has three parts:

- Determine the number of HSCs.
- Determine the borrowing capacity of the city to estimate the amount of loan that can be taken.
- Determine the gap to meet the total capital cost of UGDS.
- This gap is then divided by the total number of HSCs to determine the public deposit contribution of each household. A grant component for each scheme is also factored into the calculation, reducing the overall costs for the household.

Even after the public deposit contribution, if a city is not able to meet its project cost, the gap is met either by contributions from the ULB or by additional grant money from the state government available as gap funding. The ULB makes considerable efforts to educate people on the need for the UGDS schemes. These efforts include awareness campaigns; meetings at ward level with active involvement of elected representatives, ULB staff, and other influencers; issuing pamphlets; engaging nongovernment organizations for facilitation; and so on.



*Table C.1* / Typical Sewerage Connection Fees and Plumbing Costs for Tamil Nadu, India

| PLOT SIZES (Sq. ft.) | RESIDENTIAL CONNECTION FEE (Indian Rupees) | COMMERCIAL CONNECTION FEE (Indian Rupees) |
|---|---|---|
| < 500 | 3000 | 6000 |
| 500-1200 | 5000 | 15000 |
| 1200-2400 | 7000 | 21000 |
| > 2400 | 9000 | 45000 |

| DISTANCE FROM PROPERTY TO SEWERAGE NETWORK | MATERIAL, LABOR, AND SUPERVISION (Indian Rupees) |
|---|---|
| 0-3m | 1949 |
| 3-6m | 2543 |
| 6-9m | 3127 |
| 9-12m | 3711 |
| 12-15m | 4305 |

**Source:** Commissionerate of Municipal Administration, Govt. of Tamil Nadu.
**Note:** Indian Currency – I Rs = 0.014 US $ (Currency exchange as on Oct 16, 2020).

11 Indian Currency – I Rs = 0.014 US$ (Currency exchange as on Oct 16, 2020)

## Program Implementation

During implementation there were several technical challenges to overcome. These included laying sewers in narrow lanes and the need for extra effort to lay sewerage networks when dealing with hard rock, high water table, or loose earth. For example, baling was required to pump groundwater and shoring needed to prevent collapse of trenches. The presence of other utility lines required precautions to avoid damaging those while laying the sewers. In many cases, this meant going below the existing utility lines while not unduly affecting the gradient. The complex construction led to some delays.

Residents and city officials closely monitored the progress, which kept pressure on contractors to complete the work. Other factors also contribute to the project's success. Getting the council on board and getting its approval or endorsement were crucial. Ward-level meetings with residents and elected and city officials were helpful for explaining the project, timelines, and expectations and for clearing up any misgivings.

The projects were financed by the national government (centrally sponsored schemes such as NRCP, JNNURM, UIDSSMT, and AMRUT) and state government and by loans from multilateral development banks (World Bank, Asian Development Bank, and KfW). Of the US$1512 million committed for implementation of sewerage projects in the state, national and state government (centrally sponsored schemes) contributed US$734 million, World Bank US$187 million, KfW US$82 million, and ADB US$500 million.

Of 121 cities under the Commissionerate of Municipal Administration (CMA), sewerage projects have become reality in 35 cities, work is progressing in 20 cities, and projects are in the preparation stage in five cities. Of the 2,613,189 properties (households assessed and paying property taxes) in these 35 cities, 1,691,869—or 65 percent of the households—have paid the HSC fees, and about 40 percent of these households are connected to the sewerage network (completed internal plumbing and connected to the sewerage network) with 639,104 HSCs as of December 2018. Between 1 percent and 2 percent of the project cost goes toward information, education, and communication activities in all sewerage projects implemented (World Bank–funded projects, government-funded projects, or both).

## Monitoring and Evaluation

ULBs and CMA regularly monitor and track progress of house service connections. This information is collated and reported monthly to the government. A review of UGDS systems implemented with financial support from NRCP and TNUSDP III determined relative success in ensuring household connections. An analysis of completed HSC schemes showed that on average, HSC schemes' effectiveness ranged from 50 percent to 90 percent in getting households to connect to the sewerage network.

## Lessons Learned

The following key lessons became apparent during development of this program.

- Having the program championed and driven by the state government with participation and support from elected officials made it successful.
- The development of a concept, its testing and refining, and mainstreaming the approach. allowed it to be successful at scale.
- Challenges of ground realities created the need to innovate to overcome issues encountered during implementation. For example, in narrow lanes, because of space constraints, contractors connected gray and black wastewaters from households directly to manholes or improvised inspection chambers to suit the available spaces by connecting more than one household to inspection chambers. By giving freedom to contractors to innovate, this helped overcome challenges and complete projects on time. Connection fees based on property size and allowing applicants to pay in installments helped low-income households connect.
- Because of delays in households charged with modifying or doing the internal plumbing to connect to the sewerage network, sewerage contractors were made responsible for HSCs, including the internal plumbing, which speeded up project implementation.
- Households' ability to pay the connection charges was also perceived as a bottleneck to increasing connectivity. GoTN now gives households the option of paying for the HSC in 10 installments, further helping low-income households. This approach, which is unique in India to Tamil Nadu, has the added advantage of reducing the cost of debt to the ULB.

# NAIROBI, KENYA

## Output-based aid program connecting 137,243 people

**TYPE**
Demand-driven output-based aid (OBA) program subsidizing costs of connecting low income households to existing sewers

**IMPLEMENTING ENTITY**
Nairobi City Water and Sewerage Company (NCWSC)

**TOTAL COST**
US$10.55 million

**FINANCING**
Global Partnership for Results-Based Approaches (GPRBA, formerly GPOBA), the World Bank, NCWSC through a commercial loan from the Co-operative Bank of Kenya, and households

**DURATION**
2012–18

**GEOGRAPHIC SCOPE**
Six informal settlements in Nairobi

**OVERVIEW**
Nairobi's Sanitation Output-Based Aid (OBA) Program (2012–18), administered by the Nairobi City Water and Sewerage Company (NCWSC), developed an OBA connection program using commercial finance combined with a grant from the Global Partnership for Results-Based Approaches (GPRBA). From 2012–18, the program invested US$4.92 million to subsidize the cost of water and sewerage connections for low-income households and provide a catalyst for NCWSC to secure commercial financing that could amortize the remaining costs of these connections through on-lending to customers. The targeted program areas were able to achieve high connection rates, and the program reached 137, 243 people, through the provision of 9,843 household sewerage connections and 7,683 water connections.

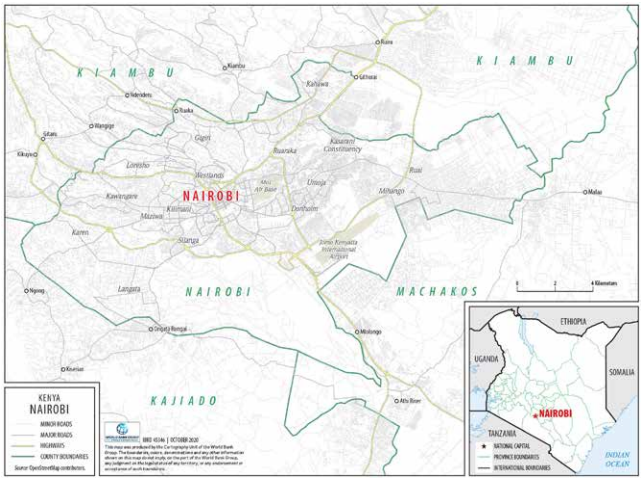
**SOCIAL**
» NCWSC's sociologists mobilized community leaders and health workers to support implementation.
» Engaged the county public health department to support a communication campaign to build awareness about subsidies, new services, loans, and the use of new technologies.

**FINANCIAL**
» GPRBA provided co-financing (partial output-based subsidy) to NCWSC, conditional on: (i) NCWSC securing commercial financing; (ii) connecting target households; and (iii) providing sustainable service.
» The GPRBA subsidy to NCWSC reduced the cost of a sewer connection for customers by 65% to US$270; NCWSC obtained the Ksh equivalent of US$6 million commercial credit, allowing the utility to offer on-lending to customers with the option to repay this US$270 through monthly repayments of US$4.50 per month for 60 months.
» Issues with the billing system, loan repayments, and their enforcement meant that customer repayment rates were lower than expected, adding financial risk to the utility.

**INSTITUTIONAL**
» NCWSC established a robust billing system and provided extensive community sensitization on all aspects of the program, which ultimately resulted in improved customer payments.

**LEGAL**
» A balanced more lenient approach to nonrepayment of the loan required working with customers and community leaders to address repayment problems and to develop repayment plans.

**TECHNICAL**
» The program provided a comprehensive water and sanitation package to each multi-household compound which included: (i) a piped household water supply; and (ii) latrine upgrading or construction of two pour-flush toilets connected to the sewerage system, a handwashing basin and a 400 litre water tank to help manage water supply rationing.




*Map C.6 /* **Nairobi, Kenya**

## Overview

With support of World Bank financing, significant investments had been made in trunk infrastructure for Nairobi's low-income settlements, but high last mile connection costs inhibited demand for sewerage connections. In 2012, a US$4.92 million output-based aid (OBA) program allowed the utility—the Nairobi City Water and Sewerage Company (NCWSC)—to expand water and sanitation services for low-income households in Nairobi (map C.6) through two channels: First, the funds helped directly subsidize the cost of last mile connections for low-income households; and second, the program helped the utility secure a commercial loan to provide on-lending to customers, tapping into latent demand by releasing credit constraints. The project reached 137,243 people through the provision of 9,843 household sewerage connections and 7,683 water connections. The project worked across six informal settlements located in Nairobi's low-income areas.

The program intervention areas experienced high connection rates, indicating that it had successfully addressed the upfront cost constraints to increasing service coverage. The sustainability and scalability of this approach depended on households continuing to make loan repayments to allow NCWSC to meet its commercial loan obligations from project revenues.

## Background and Motivation

From 2007–19, the US$427 million World Bank Water and Sanitation Services Improvement Project (WaSSIP) invested in bulk infrastructure with the aim to increase access to reliable, affordable, and sustainable water supply and sanitation services, including services within informal settlements. This project did not finance the cost of the final length of the sewerage connection to households. In Nairobi's informal settlements—in which the majority of Kenya's urban poor live— this final length of sewerage connection cost as much as US$1,170 per connection (including decommissions/adapting existing pit latrines), which was significantly higher than the assessed willingness to pay. A complementary program financed through the Global Partnership for Results-Based Approaches (GPRBA)[12] was developed to help tackle the high connection costs that households were expected to pay. The project enabled low-income households to connect to main infrastructure, increasing utilization and supporting the government's poverty alleviation goals.

## Intervention Design

The program provided financing to the NCWSC conditional on achieving connection targets as a way to incentivize expansion of sewerage services in informal settlements, which were seen as high-risk, low-return investments for the utility. The main elements of the program included the following:

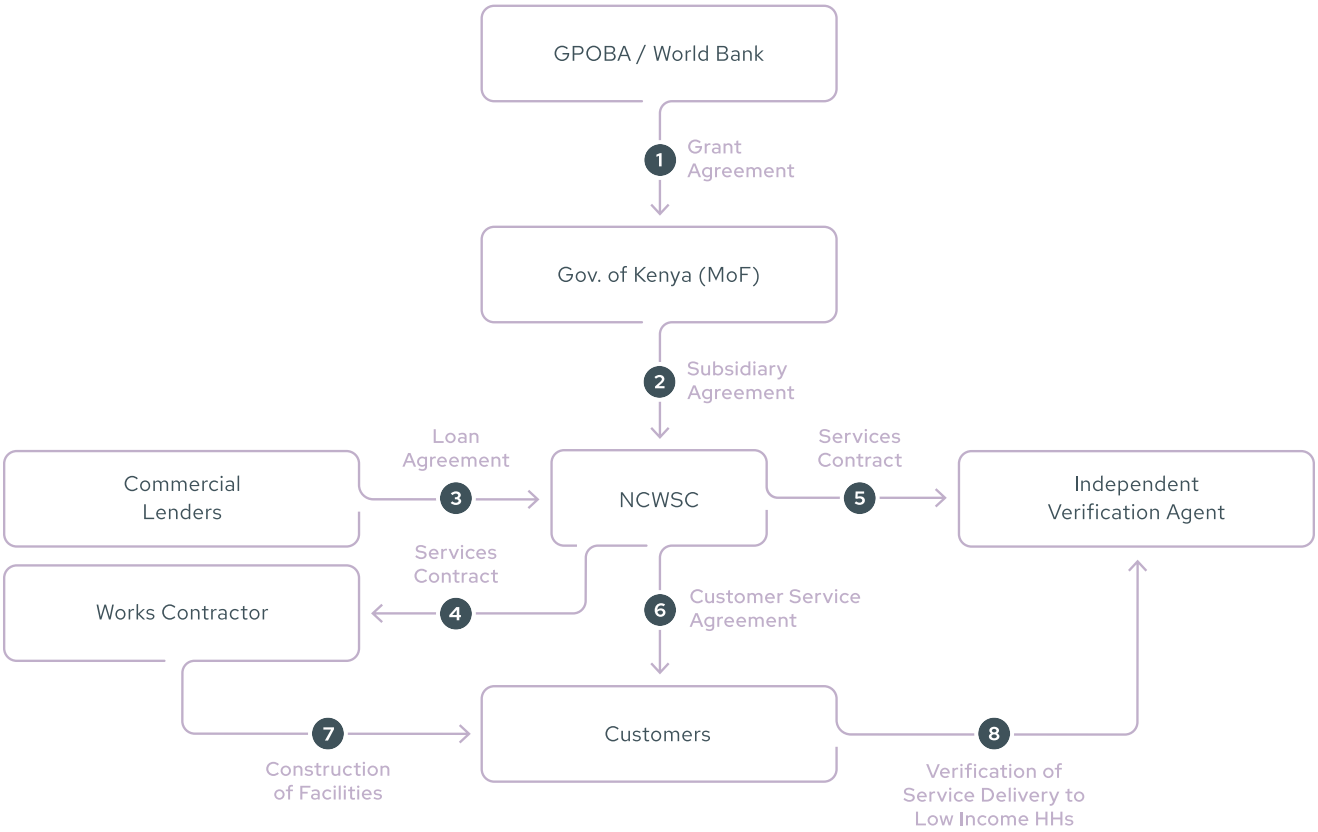
» NCWSC received a grant of US$670 per verified sewerage connection to cover 50% of the cost of connecting a household. As securing commercial loan finance was a key output of the project, an initial sum equivalent to 10 percent of the total grant was paid to NCWSC for securing a commercial loan of US$6million to finance the project. The second subsidy installment (65 percent) was paid on actual connections verified by the independent verification agent (IVA). The final subsidy installment (25 percent) was paid against evidence that consumers had received services for at least three months per billing records.

12 The GPRBA grant was funded through a contribution from the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS)

- The typical residential property in the targeted settlements consisted of several families, each with its own single room, living together in a larger compound that had shared toilet facilities. The compounds were mostly owned by a landlord who was also the NCWSC customer account holder and who typically rented out rooms. For billing purposes, there was only one NCWSC account per compound, and a connection subsidy was applied at the compound level.
- Existing toilets were characterized as either "Type A" or "Type B." Type A facilities were pour-flush systems, typically discharging into a septic tank, while Type B facilities were pit latrines. There was a significant cost difference between upgrading and connecting Type A facilities to the sewerage system (US$388 per facility/connection) compared with Type B (US$1,170 per facility/connection), but it was decided that all compounds would have the same connection fee and loan repayment conditions regardless of the original toilet types.
- A sanitation intervention in a compound under the project included the following: the upgrading of any existing latrines to connection-ready status, a process that included filling pit latrines and building superstructures where needed; the installation of a hand-wash basin; the installation of a 400-liter water tank to store graywater for when piped water for flushing the toilet was temporarily unavailable; and the physical connection of the new latrine to the newly built sewerage network. The landlords were the customers and they were required to invest in a subsidized water connection as a precondition for getting the sanitation upgrade if they had not yet done so.

» Technical support was provided by the World Bank to NCWSC in securing a commercial loan at market rates to pre-finance the cost of infrastructure. Repayment for this loan was the responsibility of the utility, with a loan tenor of 10 years.

*Figure C.8* / **Project Funds Flow (Nairobi, Kenya)**




**Source:** World Bank (2019b)
**Note:** GPRBA (formerly GPOBA) = Global Partnership for Results-Based Approaches, MoF = Ministry of Finance, HHs = households.

- Repayment of the commercial loan occurred through revenue from newly connected customers, who were charged US$286 (US$16 upfront and US$270 in loan repayments) for sewerage connections. While the landlords were the customers and were obligated to repay the loans, the renters benefited from the services and in most cases, the room rent included an additional amount to cover the combined water and sewer bill.
- By obtaining commercial credit, the utility could offer new customers the option to repay their US$270[13] loans through monthly repayments of US$4.50 per month for 60 months, together with an upfront application fee of US$16. Through a blended finance model, the project was able to effectively reduce the upfront charges that a customer would need to pay by US$940, or 98 percent.

By providing the output-based subsidy, the program aimed to lower the effective cost per connection while also reducing the financial risk and improving the terms on which a commercial bank would provide financing to NCWSC (see figure C.8).

### Program Implementation

Program implementation occurred between May 2014 and June 2018. The total cost of the project was US$10.55 million, of which US$4.92 million was covered by the OBA grant, US$5.35 million by NCWSC, and US$0.28 million by households. The project experienced delays for multiple reasons. One reason for delay was the time needed to sensitize residents and secure buy-in from the communities—although this took time, it ultimately helped the project respond directly to the needs of residents e.g. designing a system to respond to the reality of water supply rationing, and securing buy-in from large numbers of targeted households. The program eventually had so much demand that NCWSC continued it beyond the life of the OBA grant using its own resources.

The project also supported various activities, such as community engagement, customer awareness building, assistance for NCWSC to access a commercial loan, and support for commercial processes and for the implementation of social marketing and hygiene promotion activities. The focus group discussions with potential customers which were carried out before the contractor entered the areas of intervention helped to increase community ownership and engagement with the project and to identify and address any potential conflicts that might arise within the settlements.

### Monitoring and Evaluation

The IVA, with some technical support from the World Bank team, established a baseline, which was the basis of the project's M&E system. The data collected during implementation helped with course correction and project adaptation.

For example, the socio-economic data from tenants and landlords helped understand the ex-ante living conditions and helped assess the ability of landlords and tenants to pay for services, either directly or as part of the rent. This data informed project restructuring and ensured that the revised project elements correlated with a comprehensive understanding of the settlement, the landlord, and the compound characteristics.

The constant monitoring of connection and repayment data took place because the IVA was commissioned to collect detailed records of each connection and because NCWSC allowed a research team to use the utility billing data to assess repayment patterns. Since connection and repayment rates were the main elements needed to calculate the OBA subsidies, this detailed information helped NCWSC keep track of project goals while also generating lessons for future implementation.

13 The US$270 included interest of 19 percent per year. In effect, by charging US$4.50 per month, it was implicitly assumed that customers would pay instalments regularly since there was no additional interest applied if payments were delayed.

By project close, the IVA determined that only 43 percent of customers (landlords) had made their payments against three months of billing; hence, NCWSC received only part of the final subsidy payment, related to those customers who had been provided with services for the agreed post-connection period. Up until September 2018, NCWSC experienced difficulties in billing clients due to teething problems with its jisomee mita self-reading billing system, including failure to include household sewerage connection loans. While this resulted in a lower subsidy payment to NCWSC due to the strict disbursement criteria, NCWSC did eventually fix its billing issues and this, coupled with extensive sensitization, resulted in improved customer payments.

Although NCWSC received additional technical support from the World Bank on M&E, the company also put in place its own quality control and monitoring system to ensure the sustainable use of the monitoring tools. The NWSC system includes oversight of the construction of project infrastructure by locally-based NCWSC staff and the inspection of finalized infrastructure by an independent engineer (the IVA) hired by NCWSC, which underpinned subsidy payments. The IVA also confirmed the eligibility of payments to the contractors through interim payment certificates, which are also used to draw down tranches of the commercial loan. NCWSC's customer billing data were used to review and monitor the number of customers who had made a connection fee payment against their combined water and sewer bills over a three-month period.

Through the implementation of this project, NCWSC has significantly increased the knowledge and developed the skills required to implement sustainable water and sanitation solutions in informal settlements. This experience can inform the implementation of Kenya's Social Connection Policy more widely and guide the design and implementation of future projects in challenging urban areas.

## Lessons Learned

The project has shown that by using a blended finance model to provide a combination of subsidies and credit to customers, challenges to provision of household infrastructure could be significantly mitigated. The use of commercial credit is particularly important as a potential tool for expanding sanitation access given that it does not rely on stretched government budgets. However, the focus on increasing household sewerage connections by overcoming the barrier of upfront fixed costs solved one problem but presented a new challenge. The utility's commercial loan was intended to be repaid through customer contributions over time, but low repayment rates increased the financial risk to the utility. The success of the connection program depended on achieving a balance between expanding services through reducing upfront connection costs and ensuring that revenue collection efforts were robust enough to support the financial sustainability of the expansion after the connections were made.

7

# MANILA, THE PHILIPPINES

## Connecting 4,800 properties

**TYPE**
Pilot and scaled up demand-driven, subsidized sewerage connection program

**IMPLEMENTING ENTITY**
Pasig River Rehabilitation Commission (PRRC)

**TOTAL COST**
Estimated budget was US$115 million

**FINANCING**
Government funding with several private companies that participated and provided additional funds for the project. Maynilad Water Services Inc., alone, invested about US$2.1 million for the construction of interceptor pipes and a small sewerage treatment plant (STP).

**DURATION**
2009–13

**GEOGRAPHIC SCOPE**
Estero de Paco, a river in Manila with an area of 2.3 square kilometers

**OVERVIEW**
Estero de Paco in the capital city of Manila was crowded with informal settlements that occupied land near the main estuary, blocking the natural flow of the water. Solid waste and wastewater from these settlements were directly discharged to the estuary. Several government agencies, notably the local government of Manila, embarked on piloting a program to prove that rehabilitation of a receiving body of water could occur. To gain community buy-in, the Pasig River Rehabilitation Commission (PRRC) began several community consultations to explain the project and its importance to the residents while encouraging and supporting the community's role in the clean-up effort.

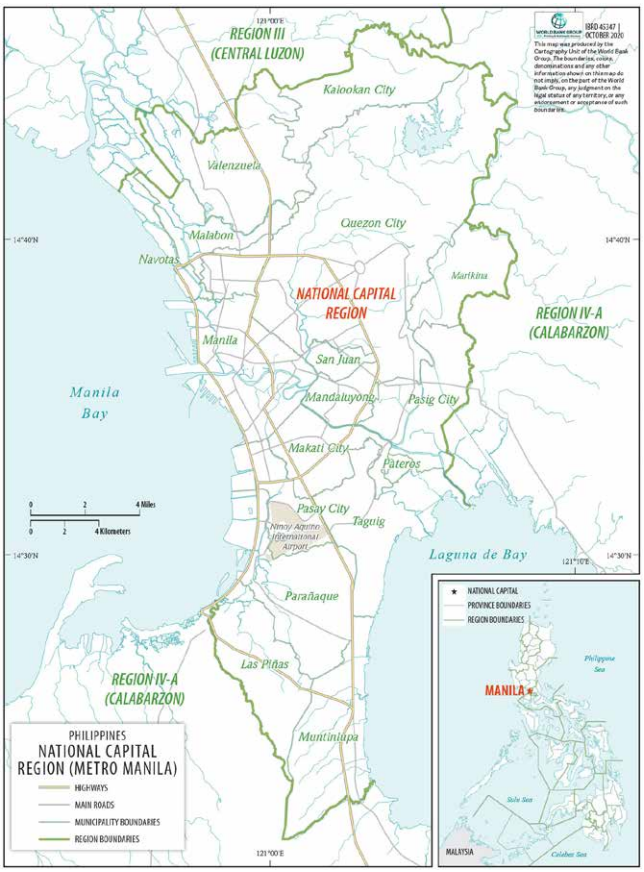
**FINANCIAL**
- The community maintains the stormwater drainage network.
- Maynilad operates and maintains all sewerage facilities.

**SOCIAL**
- Individually connecting households within the vicinity of the river to the sewerage network.
- Training residents to be part of the "River Warriors" to ensure sustainability of the clean-up and beautification efforts.
- Resettling affected families and providing livelihood programs.
- Providing an STP for the public market near the river.

**INSTITUTIONAL**
- The Metropolitan Waterworks and Sewerage System (MWSS) was mandated primarily by Republic Act 6234.
- The MWSS area of responsibility was divided into two, the west and the east zones of Metro Manila, after MWSS entered into public-private partnerships in 1997.
- A specially created regulatory office monitors performance of the two concessionaires.
- Maynilad is the concessionaire responsible for operations, maintenance, and expansion of water and sewerage coverage in the West Zone, which includes the city of Manila. The other concessionaire is Manila Water.
- The mandate of the local government unit (LGU) includes the implementation of existing laws that pertain to sanitation.
- PRRC coordinates all activities with all concerned government agencies and the private sector.

**LEGAL**
- Reclamation or clearing of the easements of Estero de Paco.

**TECHNICAL**
- Dredging of Estero de Paco.
- Installation of interceptor pipes to collect wastewater and divert it to the nearest sewerage network.
- Construction of linear park and beautification of the cleared easement.
- Construction of a STP to intercept and treat wastewater from communities that cannot access the existing sewerage network.




*Map C.7 /* Metro Manila, Philippines

## Overview

Estero de Paco in the capital city of Manila (map C.7) was crowded with informal settlements that occupied land near the main estuary, blocking the natural flow of the water. Solid waste and wastewater from the settlements were directly discharged to the estuary. Several government agencies, notably the local government of Manila, piloted a program to prove that rehabilitation of a receiving body of water can be successful. To gain community buy-in, the Pasig River Rehabilitation Commission (PRRC) began several community consultations to explain the project and its importance to the residents while encouraging and supporting the community's role in the clean-up effort. "Although the total investment in the program is not known (estimated to be US$115 million), for Maynilad alone[14] the connection project totaled ₱110M (about US$2 million) for collection, individual household sewerage connections, and STPs.

## Background and Motivation

Between 1902 and 1907, the US government built a separate sewerage system in the city of Manila. With increased urbanization in the city of Manila, informal settlements developed near the estuary, resulting in households directly discharging their wastewater into the waterbody. To ensure that the city's waterway (Pasig River system) maintained its historically pristine condition conducive to fish and other aquatic resources and to continue to be used for transport, recreation, and tourism, the Pasig River Rehabilitation Commission (PRRC) was created, thanks to Executive Order (EO) No. 54 (series of 1999).[15] The order provided PRRC with the authority to approve, plan, supervise, monitor, coordinate, and implement programs, projects, and activities toward the rehabilitation of the Pasig River system.

Prompted by the Supreme Court's continuing mandamus decision to expedite cleanup of Manila Bay, Maynilad executed a memorandum of understanding with PRRC to align the company's sewerage projects with the Estero Improvement Program. Maynilad has the responsibility of providing water and sewerage services, and the local government has the responsibility of maintaining the health and sanitation of the community. The Pasig River is one of the primary rivers discharging into Manila Bay. The continuing deterioration of environmental conditions affecting the health and sanitation of the community catalyzed the creation and launch of the sewer connection project. Another major motivating factor was an overarching desire to improve the condition of the receiving body of water.

## Intervention Design

The concept of a combined sewage-drainage system was used in almost all cases in the project area. The objective of the intervention was to target both the informal settlements and residents near Estero de Paco, occupying approximately 2.3 square kilometers. The objectives were the following:

- **Objective 1.** Relocate families occupying the easement of the estero and blocking the flow of water into the estero with special attention to extremely low-income households.
- **Objective 2.** Improve health and sanitation conditions in the area by cleaning or dredging the estero and by constructing a linear park along the easement.

14 Maynilad Water Services, Inc. is the concessionaire responsible for operations, maintenance, and expansion of water and sewerage coverage in the West Zone of the city of Manila.

15 As amended by EO No.65 (series of 1999)

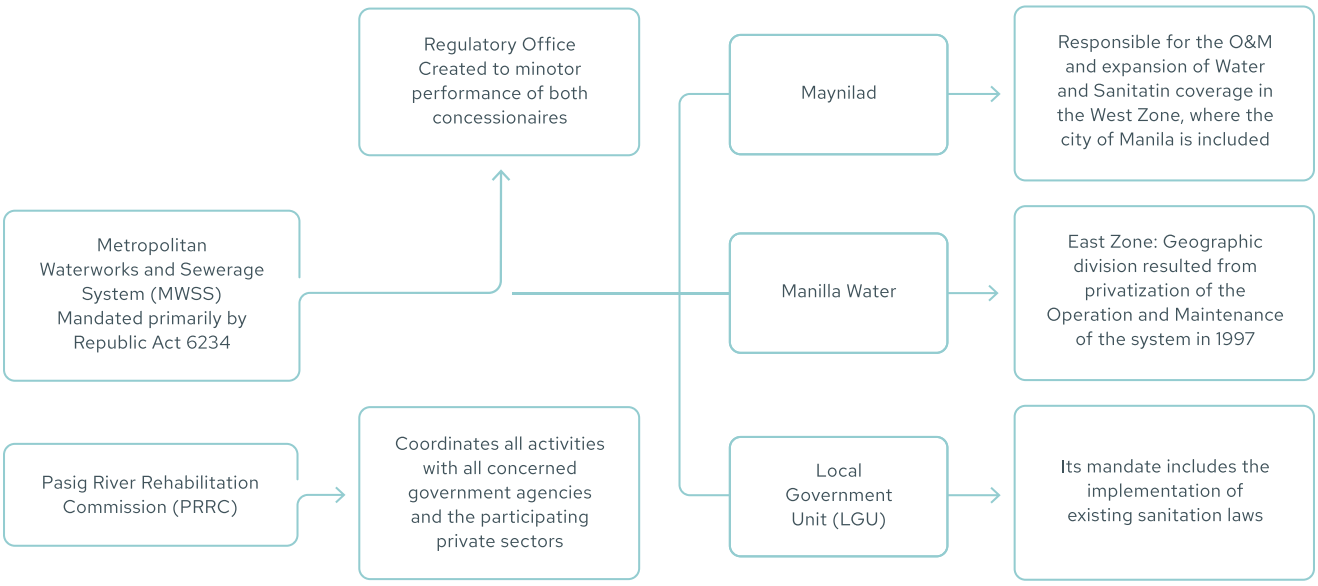
Although a sewerage network existed near the program area—except for an area near the Pasig River—Maynilad designed a network of collector pipes and an STP to serve the area. To assess the situation, Maynilad conducted a census of individual families to determine the wastewater generated in the project area, which served as the basis for the design of interceptor pipes, lift stations, and STP. For customers found within the vicinity near the existing sewerage line, Maynilad planned and ultimately provided individual household connections. By the end of the project, all of the identified families were connected individually, or they had connections through the interceptor pipes.

In the area farthest from the existing system, Maynilad constructed an STP and sewerage network to collect from the pipes intercepting the existing drainage system Maynilad found that it was not technically feasible to make individual connections due to the extremely small and narrow alleys. For households that were not relocated and opted to remain in the area, all wastewater flows were intercepted using interceptor pipes to divert flow to the nearest sewerage line in the area.

### Responsibilities and Institutional Framework [16]

The connection project clearly delineated roles and responsibilities from the outset (see figure C.9). Maynilad was responsible for the household connection project; it closely coordinated with government offices and the LGU on necessary permits. As the project proponent, PRRC ensured the collaboration of all government agencies and the private sector to make the project successful. It obtained individual agency commitments, consolidated them, and monitored implementation. PRRC, in collaboration with the LGU of Manila, conducted several public forums to discuss the importance of the project and to solicit cooperation regarding project implementation. This improved community engagement in the project. During the project implementation, PRRC acted as an arm of the national department overseeing the over-all aspects of the project.

*Figure C.9* / **Institutional Set Up for Sewerage in Manila, Philippines**




16 The Republic Act states the basic goals of the system. Its major policy is the proper operation and maintenance of the waterworks system to ensure an uninterrupted and adequate supply and distribution of potable water for domestic and other purposes. This includes the proper operation and maintenance of sewerage systems in its service area, specifically the entire Metro Manila area, and parts of Cavite and Rizal.

For general urban sanitation services, Maynilad plays a critical role. Maynilad is responsible for providing continuous potable water, as well as for the operations, maintenance, and expansion of sewerage and sanitation facilities. Maynilad provides individual connections to customers in areas with separate sewerage systems, constructs and maintains combined sewerage systems, and desludges individual septic tanks.

From a legal perspective, if a customer is within a sewerage area, households and commercial establishments should connect to the system, as mandated in the existing Sanitation and Plumbing codes of the Philippines. The Department of Health, the Department of Environment and Natural Resources (DENR), and LGUSs are the implementing agencies for the legal framework. The DENR and local governments ensure compliance with the connection mandates.

## Program Implementation

Program implementation provided an opportunity to capture valuable lessons to later replicate the project as part of the ongoing activities of PRRC. The project faced several challenges, including nonuniform elevation of discharge points or drainage systems, soft condition of the soil (mixed with garbage), limited excavation space, delays in relocating families occupying the easement, and a delay in demolition of structures occupying the easement. Nevertheless, the approaches and tools employed by Maynilad helped to maintain the program's momentum and reach completion. The political leadership of the PRRC Chairman was instrumental in completing the project, coupled with the effective community collaboration and participation of the private sector. Maynilad used its existing technical personnel to directly address the challenges as they arose, making adjustments in terms of project prioritization to align with the requirements of the program. Overall, underscoring the program's approach was the effective communication, education, and awareness tools used. Distribution of operation and maintenance responsibilities also contributed to the success of the program. For example, the community maintains the stormwater drainage lines, while Maynilad operates and maintains all sewerage facilities. See below for before and after construction photos.

## Monitoring and Evaluation

After the project, 4,800 households were either directly connected or had their wastewater discharges diverted to an interceptor pipe connected to the existing sewerage system.

As part of its preventive network maintenance program, Maynilad regularly cleans and checks the system. Maynilad also has dedicated teams that respond to sewerage-related complaints from the community. Because of the success of the Maynilad program, PRRC is replicating the approach in all the esteros targeted for cleaning and rehabilitation. Moving forward, Maynilad and PRRC have a memorandum of understanding to ensure that Maynilad will align its sewerage connection efforts in the city of Manila with PRRC projects.

Furthermore, DENR launched an Adapt-an-Estero Program that uses the same concept. This program encourages participation by other private sector entities in the drive to clean up receiving bodies of water in collaboration with all concerned government agencies. Not only do the private sector entities share in the funding of the project, but they also have shared their technical expertise and innovative ideas to help in cleanup and rehabilitation activities and to ensure sustainability of the benefits derived from the program.

## Lessons Learned

The Estero de Paco program provides the following lessons:

- Political will of the head of implementing agency is critical to success.
- The most critical and challenging issue to address is the social aspect of the problem.
- Public-private partnerships can work for sewerage connection programs.
- Empowerment of community leaders is also critical for program success.
- Training of River Warriors and community members ensured effective project implementation and sustainability of benefits after project completion.
- The pilot tested the concept, and lessons were learned during its implementation such that the program was further enhanced before large-scale implementation.
- Mobilization activities, including an annual fun run during project implementation, increased public awareness of the importance of the project and raised additional funds.

## Before and After Construction of the Maynilad Sewerage Facility

During construction of sewerage network

Maynilad awareness campaign

Source: Maynilad water

The estuary after the program

# SALVADOR, BRAZIL

## Connection to condominial sewerage for 2.5 million people

**TYPE**
Large scale condominial sewerage program benefiting 2.5 million people with a focus on low-income households.

**IMPLEMENTING ENTITY**
Empresa Baiana de Águas e Saneamento S.A. (Embasa), the Bahia State Water and Sewerage Utility.

**TOTAL COST**
US$450 million went toward sewerage.

**FINANCING**
Channeled through three different projects under the "Bahia Azul" (Blue Bahia) umbrella program and financed by loans from a mixture of international and national sources and matching funds from the state government.

**DURATION**
1995–2004

**GEOGRAPHIC SCOPE**
Salvador Metropolitan Region, Bahia state, northeast Brazil

**OVERVIEW**
The Bahia Azul program was implemented by Embasa, the public water and sanitation company of the state of Bahia. The program included the state's capital city of Salvador and 11 other cities near the "Baía de Todos los Santos" (Bay of All Saints). The main goal of the program was to depollute the bay and improve the quality of life of people. The program was designed to improve not only sewerage but also water and solid waste solutions, and it targeted the entire urban population, with specific solutions provided for those living in low-income informal settlements where conventional sanitation solutions could not be applied.

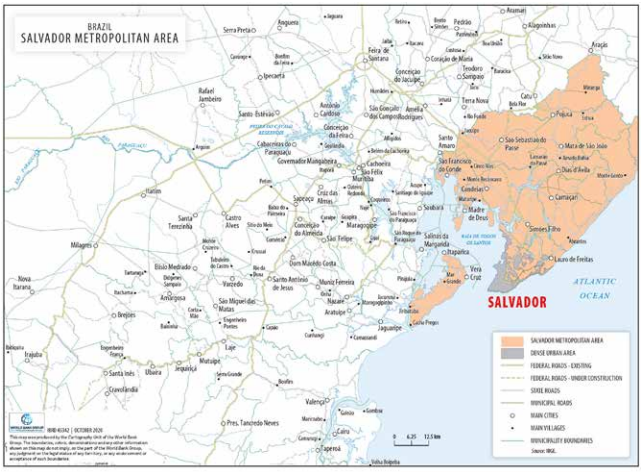
**SOCIAL**
- Embasa created a social mobilization unit responsible for planning and managing work with the communities alongside the construction work.
- The utility required contractors to make community hires.
- Mobilization activities to secure community buy-in to the condominial approach usually began before construction.
- More than 10,000 community meetings occurred during implementation.
- Household sign-up forms served as contracts between households and Embasa; a sign-up contract rate of 80 percent was set for each community.

**FINANCIAL**
- Households paid no connection charges; a sewerage maintenance fee was charged, equal to 45 percent of the water bill when households performed the maintenance and 80 percent when Embasa did it.

**INSTITUTIONAL**
- Embasa created an internal management unit to oversee the program's technical projects and financial resources.
- The government unified management within the relative departments: Secretariats of Water Resources, Sanitation, and Housing.

**LEGAL**
- State law 7,307 of January 23, 1998, followed by State Decree 7765 of May 8, 2000 obliges households to connect to a network within 90 days of its completion. After this period, the company charged the sewerage tariff regardless of whether the property had connected.

**TECHNICAL**
- The Embasa Sewerage Master Plan for Salvador and Metropolitan Area served as a starting point.
- None of the residences covered by Bahia Azul had sewerage systems. The utility's georeferenced system identified users of the water distribution system that could be targeted for sewerage connections.
- Initial piloting and rolling out of the successful condominial sewerage program overcame physical, topographical, and social constraints of low-income areas while achieving a high level of service.
- The first phase concentrated on neighborhoods and communities where it was technically easier to extend sewerage coverage. This work provided experience for more technically complex areas.
- Operation and maintenance requirements existed for households with this technical approach.




*Map C.8* / **Salvador, Brazil**

## Overview

Salvador is the capital city of Bahia state, located in northeast Brazil, and it has a population of more than 2.9 million (map C.8). The city sits on a bay seen as a strategic tourism asset. Salvador's sociopolitical context is broadly representative of the region, characterized by high levels of poverty and inequality (average per capita income of the city in 2003 was R$4,624 [US$1,500]). The low-income population lives primarily in high-density informal settlements on steep hillsides and along waterbodies.

The Bahia state utility Empresa Baiana de Águas e Saneamento S.A. (Embasa) implemented the Bahia Azul program between 1995 and 2004 in the Salvador Metropolitan Region. To manage the technical projects and financial resources of the Bahia Azul program, the company formed an internal management unit. The program came to fruition in the urban area of Salvador and in 11 other cities near the other cities in the watershed of the "Baía de Todos los Santos" (Bay of All Saints). The program's stated aim was to depollute the bay and improve the quality of life of people living in urban centers surrounding the bay. The program was designed to improve not only sewerage services but also water supply services and solid waste disposal. The final design of the program had seven components: sewerage, water supply, solid waste, repaving, environmental protection, health, and environmental education and institutional strengthening.

The sewerage intervention targeted low-income neighborhoods in Salvador and relied on the condominial sewerage approach. By 2008, the program had 252,416 household sewerage connections across all 12 cities that surround the Bay of all Saints. The most salient features of the program included the use of condominial sewerage to overcome challenges of providing sanitation in irregular, difficult to reach low-income areas, while ensuring the same level of service to these communities as was provided to the formal areas of the city; creation of a utility-embedded social mobilization unit and extensive community mobilization efforts; technical assistance from Embasa and even financing (paid back up to 36 months) for household connections; establishment of sewerage charge options; and interlinked maintenance requirements.

## Background and Motivations

In the 1970s, Salvador had a metropolitan population of about 1 million people, with a sewerage system that covered only 26% of households. During the following decades, Salvador underwent intensive urbanization. This resulted in chaotic and unplanned occupation of its urban spaces. The existing sewerage system, which was already very limited, could not keep up with this growth, a situation that increased environmental degradation, characterized by pollution of beaches and the bay, and the resultant negative public health effects.

During the 1980s, various municipalities in Brazil were beginning to establish sanitation programs that enhanced their reputation as tourist destinations. In 1991, the governor of Bahia made a decision (that was supported by the people) to prioritize and invest in sanitation, given the importance attached to the beaches on both sides of the city, which lies between the Atlantic Ocean and the celebrated Bay of All Saints. Negotiations with international funding institutions began, leading to financing of the Bahia Azul program.

### Above-Ground Condominial Sewerage Pipes

Source: Ivan Paiva.

## Intervention Design

The program was conceived initially by the State Secretariat for Urban Development (SEDUR), but soon a program management unit came into being. Called Unidade Executora do Programa (UEP), it was the management nucleus responsible for both relating to donors and for coordinating implementation of the program. The UEP consisted of representatives of state government, SEDUR, Embasa, the environmental regulatory agency (CRA), CONDER (the state urban development company), and the governments of the municipalities included in the program. The program management unit was established within Embasa. This institutional strengthening component trained Embasa's professionals, purchased equipment for operation and maintenance, and developed its overall management efficiency. It's important to note that throughout the 10 years of program implementation, the program enjoyed significant political and administrative continuity, both in the state government and in Embasa.

To define the scope of the program, many studies and projects occurred. The Embasa Sewerage Master Plan for Salvador and Metropolitan Area was revised, and it served as a starting point to define and format the program. The sanitation investment program that was to become Bahia Azul was initially designed to use conventional sewerage. It initially made no allowance for adopting specific pro-poor approaches or technical solutions appropriate for the high-density informal settlements located on steep hillsides and along watercourses. The results of the first tranche of sewerage network expansion works contracted by Embasa were unsatisfactory, with complaints focusing both on the reportedly poor quality of the work and on the unsuitability of conventional sewerage systems for the poorer communities, which contained the bulk of the unmet demand for sanitation services in Salvador. These communities were usually built on illegally occupied land, often in areas designated for environmental protection, having sprung up in a process of unplanned urbanization. Connecting them to the main sewerage system was a physical and topographical challenge—and a social one—since conventional sewerage pipes would have had to pass

under people's houses. In 1994, Embasa received support to design and implement a condominial sewerage system project for some of the areas covered by Bahia Azul to address these technical constraints (see above photo). Program financing amounted to US$600 million, channeled through three projects under the "Bahia Azul" umbrella and financed by loans from international and national sources and by matching funds from state government. The international sources included the Inter-American Development Bank (IDB), the Japan Bank for International Cooperation (JBIC), and the World Bank. In Brazil, loans came from Caixa Economica Federal (CAIXA) and the National Bank for Economic and Social Development (BNDES). In total, US$450 million of the total loan amount went toward sewerage systems. All resources were concentrated in the program's common fund, and they were used both for the urban upgrading of low-income areas and the condominial sewerage systems; therefore, no specific amount that was allocated to condominial sewers can be ascertained.

### Program Implementation

Bahia Azul came to fruition in phases. The city was divided into catchment basins and microbasins, and each phase included tranches of contracted construction work that focused on linking communities to the main sewers. The first phase of the program concentrated on neighborhoods and communities where it was technically easier to extend sewerage system coverage. As Embasa and contracted construction companies gained experience putting in condominial sewerage systems, they gradually incorporated more technically complex areas.

A key characteristic of condominial sewerage systems (unlike conventional sewerage systems) is the need to mobilize communities to both negotiate the use of private spaces for physical construction of the network and agree on responsibilities for its maintenance. Moreover, involving the community is seen as a necessary part of overcoming reluctance to connect to the sewerage system because connection requires residents to pay an additional monthly cost (via a sanitation surcharge on their water bills). Some resistance occurred because some residents had existing sanitation solutions and were reluctant to use a new system. Once residents saw the positive effects of the program in the first areas of implementation, reluctance decreased over time.

As part of the implementation process, Embasa created a social mobilization unit that was responsible for planning and managing work with the communities alongside the construction work. In addition to establishing its own team of community workers (most of whom had formal training in social work), Embasa also required all the construction firms involved in the program to hire community workers to accompany their projects.

Social mobilization activities usually began before construction started to secure community buy-in. These activities focused on reaching agreement among residents about organization of the condominiums (groups of households that shared a condominial sewerage branch connection) and choosing the condominium representatives who would take responsibility for the maintenance of the sewerage network and represent their neighbours in negotiations with Embasa. The mobilization program also included explaining the workings of the condominial sewerage system and the different tariff rates that the condominiums could choose (a lower sanitation tariff for community-managed branch connections and a higher tariff if Embasa managed the branch). Mobilization work focused on securing consent and then managing relations between communities and construction companies as installation of sewerage systems occurred with comparatively less attention paid to follow-up for operation and maintenance. It should be noted that 10,000 community meetings were held during implementation of the condominial program and 2.5 million people took part in the educational sanitation and environmental programs. There was a household sign-up form, and both parties signed contracts (the household and Embasa); however, these were not legally binding and not witnessed by a notary, but they became established as a precondition for system installation to proceed.

Embasa set a target 80 percent sign-up rate for community involvement. Another important aspect of the program was environmental education, involving public organizations, schools, and communities, to get the wider public and inhabitants of the city participating and committed to the goals of the program.

The Bahia state law 7307 of January 23, 1998 (followed by State Decree 7765 of May 8, 2000), which obliges households to connect to the sewerage system, only became a reality three years after the beginning of the program. At that time the law only applied to higher-income populations. The law was necessary for these areas because the argument for improving health and quality of life had limited effect on these customers, who already had sanitation infrastructure available. Low-income populations learned about the law, but the program focused on raising awareness about the advantages for public health, using as an example the significant improvement in the quality of life of the neighborhoods already benefiting from the program (the disappearance of sewerage in the streets). In 2007 a national law was passed (obliging connection to sewerage), but the state of Bahia already had its own law.

The engineering design process for the sewers was the responsibility of Embasa with preliminary designs prepared by outside companies under contract to Embasa. In the case of the preliminary designs, no options were given for the location of the condominial sewerage branch because these branches are sited wherever they fit, given the land occupation and use patterns in target areas. However, the subsequent detailed engineering designs for the condominial branches were undertaken in the communities themselves as part of the mobilization process. Implementation was carried out by construction companies, with oversight from contracted works supervision firms, both under contract to Embasa. There was no option for direct community construction with Embasa having the sole responsibility for carrying out work via contracted construction firms.

The condominial sewerage approach allows for flexibility in the location of the sewerage branches and for location of inspection boxes as close as possible to the internal facilities of residences. The social process of community mobilization ensured that these branches were able to be placed in private areas without the need for any kind of compensation. The proximity between the connection site (the so-called box of the condominial branch) and the internal facilities significantly reduced the cost of interconnecting internal facilities to the condominium branches.

Embasa provided technical assistance for the connection of the internal plumbing facilities to the condominium branches, and if the resident did not have financial resources, Embasa carried out the interconnection work including internal household plumbing. The household was then charged up to 36 monthly installments on the water bill to cover the costs of the internal plumbing. To simplify the budget, the charge for interconnection work was worked out on an amount per meter between the toilet tubing and the condominium branch, although there were works to connect other equipment (kitchen sinks, laundry sinks, shower drains, and so on). There was no connection charge for the households; however, there was a specific sewerage system maintenance charge, set at 45 percent of the water bill if maintenance was carried out by the household and 80 percent if maintenance was carried out by Embasa.

## Results

When Bahia Azul started in 1995, only 26 percent of the population of Salvador had access to sewerage systems. By the time the program officially ended in 2004, coverage had increased to 60 percent, and it has since risen to almost 85 percent in the city itself (though it remains significantly lower in other municipalities of the metropolitan region). Over the same period the main sewerage network was extended from about 530 kilometers to 2,667 kilometers. The program directly benefited a population of 2.5 million people, mainly low-income informal households, providing sewerage connections for 252,416 households. At the beginning of the program, the condominial sewerage approach was only used for low-income informal areas; however, with its success the model was adopted for all areas of the city. Today, Embasa does not differentiate between conventional or condominial sewerage technology, but it is presented as the sewerage system.

The program's positive environmental impact in Salvador is evident. Twenty-three out of 25 of the city's most popular beaches were classified as unsafe for bathing in 1995, but by 2005 only two were still regularly classified as unsafe. Monitoring of the water quality of the beaches occurred as a result of the program, and results became part of a georeferenced information system for the whole bay. This information system serves to monitor environmental pollution and its effects on the health of the bay.

Positive health effects attributable to Bahia Azul's investment in sewerage services have also been demonstrated by a high-quality epidemiological monitoring study conducted by the Instituto de Saúde Coletiva (Institute of Collective Health [ISC]) of the Federal University of Bahia, together with the London School of Hygiene and Tropical Medicine. The ISC study revealed a significant reduction in incidence of excreta-related diseases in areas that lacked sanitation services before the program's investments. The publication of the ISC findings in respected Brazilian and international journals has significantly enhanced the credibility of the claims for positive health effects made by the Bahia state government.

At the beginning of the program, no law stipulated that households must connect to sewerage, but a political buy-in was created that such a program should commence and the need for a law was identified. Three years after the program began, the state government created law 7307 of 1998 to mandate households to connect to sewerage even before the federal government made this decision. That is, the state of Bahia already had its own law.

The program's implementation model has largely remained in place. In particular, the mainstreaming of condominial sewerage systems (for both informal settlement and areas with regular land occupation patterns) and the associated use of community workers for negotiation and mobilization activities that was pioneered by the program have continued in the latest phase of sewerage investments in Salvador. Embasa continues to maintain a social mobilization unit, and its overall implementation approach remains largely unchanged, even though "Bahia Azul" has been officially replaced by other sources of investment for sewerage programs in Salvador. The technical approach to condominial sewerage has also expanded to include hundreds of other cities in the state. With the success of the program, Embasa commonly receives national and international delegations to visit and learn more about the approach.

The main challenges that were overcome to make the program a success included the following:

- Getting buy-in from the water company that sanitation should be provided to low-income areas, which until the program began had been excluded.
- Breaking down barriers and opposition of engineers who were not willing to design unconventional solutions and change their working methods (including ensuring the involvement of populations in defining the solutions).
- Training technical teams (internal for utility and construction companies) on the condominial sewerage approach, social mobilization requirements, and execution of works in extreme environments.
- Convincing contractors (often large-scale contractors) to construct condominial branches, which have characteristics close to artisan works with more intensive use of labor and less equipment.
- Training operation and maintenance teams to use appropriate techniques for services within these urban blocks. The training covered social aspects and learning to relate to residents.

**Before and After Pictures of the Bay in Salvador, Brazil**

Before program implementation

After program implementation

**Source:** Embasa

## Monitoring and Evaluation

Embasa created a computerized system to record and follow up on problems that occurred in the condominium sewerage program. Problems fell into categories, for example, community grievance, construction issue, or external factors (such as absence of a rainwater drainage system). Embasa uses a mobile phone application that allows users to request a service or to lodge a complaint. The information is registered in Google Maps, and the user can send photos of the problem.

The mobilization team had less contact with communities after construction; this led to ramifications for operations and maintenance (which were envisioned as mainly being the responsibilities of condominium members themselves). With Embasa's responding to callout requests without charging, calling the utility rather than mobilizing neighbors often became the default response to a problem in the condominial sewerage branch. This led to unforeseen costs for Embasa and also weakened the sense of ownership of the system, which is important in ensuring that it is kept in good order and protected from misuse post-construction. As a result, Embasa has reviewed its tariff policy, and although it still installs condominial-type sewerage systems, they do not bear the formal label of "condominial" and the utility no longer offers the option of choosing to take responsibility for maintenance in exchange for lower tariffs. Embasa still acknowledges the need to reinforce social and educational work in the areas that present the greatest operation and maintenance problems.

## Lessons Learned

The Salvador program offered many lessons:

- Embasa's adoption of the condominial approach for Bahia Azul sewerage investments in low-income communities in Salvador secured some impressive results and stimulated institutional innovation within the utility.
- Embasa initially faced a high level of reluctance to engage with the program on the part of the low-income population. Credibility of public services was not high, and low-income communities either did not want to connect or thought that the service should be provided free of charge. Many people living in these communities were suspicious of the state, and they were reluctant to have outsiders doing construction work not only inside their communities but actually inside their homes and on their property.
- The dedication of community mobilizers in organizing neighborhood meetings and in pursuing individual households to ensure their adherence succeeded in creating the condominiums and paving the way for construction. Embasa's community organizers developed a level of trust with communities that allowed them to act effectively as conflict mediators. This was reinforced by the voluntary work that many of them did over and above their formal roles mobilizing residents to adhere to the condominial sewerage systems. The community mobilizers used their positions to help community leaders gain access to other branches of the state and municipal governments to pursue their demands for support to upgrade neighborhoods.

- The utility's mainstreaming and formal establishment of a relatively well-resourced social mobilization department proved essential to the program's success. The mobilization department has continued to operate even after the formal conclusion of the Bahia Azul program. During the program, the utility also required all construction companies that won program tenders to hire their own social mobilization and community relations staff.
- Flexibility in locating condominial branches allowed the inspection boxes to be located as close as possible to the internal facilities of the residences. The social process of community mobilization ensured that these branches were executed in private areas without the need for any kind of compensation for the use of private areas to implement the networks. The proximity between the connection site (the box of the condominial branch) and the internal facilities significantly reduced the cost of the interconnection work from the internal facilities to the condominium branches.
- The communities that received Bahia Azul investments said the program triggered greater accessibility to other service providers, not only of water supply and sanitation (Embasa) but also electricity and garbage collection. This was indicative of a broader process of urban upgrading. More than simple access to services, this process related to collective self-esteem and the development of a sense of citizenship among people with a long history of social exclusion. There was also acknowledgment that sewerage services could improve a neighborhood's perceived status.
- The lack of time and resources for follow-up of community mobilizers meant that little ongoing contact occurred with community or individual condominium members. This had implications for operation and maintenance because the absence of engagement once construction was complete reduced the incentives to comply with the agreements whereby condominium members themselves maintained the system in exchange for tariff reductions. Because Embasa (whose own procedures had not been fully adapted to allow for the condominial system) responded to callout requests without charging, calling the utility rather than mobilizing neighbors often became the default response to a problem in the condominial branch. (It is important to note that delays in responses to callout requests resulted in many residents continuing to carry out low-complexity maintenance themselves.) Answering so many requests for service not only led to unforeseen costs for Embasa, but it also weakened the community's sense of ownership of the system, which is important in ensuring that it is kept in good order and protected from misuse. As a result, Embasa has reviewed its tariff policy, and although it still puts in condominial-type sewerage systems, these are not given the formal label of "condominial," and the utility no longer offers the possibility of choosing to take responsibility for maintenance in exchange for a lower tariff.

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