World Health Organization

A roadmap for advancing sanitation regulation

unicef for every child

ESAWAS REGULATORS ASSOCIATION

WSUP | Water & Sanitation for Urban Populations

World Health Organization

A roadmap for advancing sanitation regulation

unicef
for every child

ESAWAS
REGULATORS ASSOCIATION

WSUP | Water & Sanitation for Urban Populations

A roadmap for advancing sanitation regulation

ISBN 978-92-4-010748-9 (electronic version)
ISBN 978-92-4-010749-6 (print version)

Suggested citation. A roadmap for advancing sanitation regulation. Geneva: World Health Organization; 2025. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at https://iris.who.int/.

Contents

List of figures

List of tables

List of boxes

Acknowledgements

The World Health Organization (WHO) wishes to express its appreciation to all whose efforts made this publication possible by contributing their time and expertise.

This document was prepared in collaboration with Water & Sanitation for Urban Populations; Eastern and Southern African Water and Sanitation (ESAWAS) Regulators Association and the United Nations Children's Fund. Sam Drabble (Water & Sanitation for Urban Populations) led the drafting of the text. The development, technical editing and production of the Roadmap was coordinated and managed by Batsirai Majuru, with support from Kate Medlicott and Sophie Boisson (Department of Environment, Climate Change and Health, WHO, Switzerland). Strategic direction was provided by Bruce Gordon (Department of Environment, Climate Change and Health, WHO, Switzerland).

The development of this Roadmap benefited from the following individuals who provided key informant insights, case example inputs, peer review, text or insights, and/or participated in meetings:

- Adefemi Afolabi (Lagos State Wastewater Management Office, Nigeria)
- Ahmad Alazzam (Utilities Performance Monitoring Unit, Ministry of Water and Irrigation, Jordan)
- David Alves (Water and Waste Services Regulation Authority, Portugal)
- Rita Amaral (Lisbon International Centre for Water [LIS-Water], Portugal)
- Narayan Prasad Acharya (Ministry of Water Supply, Nepal)
- Jaime Baptista (Lisbon International Centre for Water [LIS-Water], Portugal)
- Daniela Bemfica (International Water Association [IWA], United Kingdom of Great Britain and Northern Ireland)
- Dhruv Bhavsar (CEPT University, India)
- Robert Bos (International Water Association [IWA], Switzerland)
- Claire Chase (World Bank, United States of America)
- Richard Cheruiyot (Water Services Regulatory Board, Kenya)
- Arnold Cole (UNICEF Eastern and Southern Africa Regional Office, Kenya)
- Helena Costa (Water and Waste Services Regulation Authority, Portugal)
- Awa Diagne (World Bank, United States of America)
- Amadou Diallo (Ministry of Water and Sanitation, Senegal)
- Masra Arsène Douguengart (Ministry of Water and Sanitation, Chad)
- Kathy Eales (Independent Consultant, South Africa)
- Isabela Espindola (International Water Association [IWA], the United Kingdom)
- Rodrigo Farías (Superintendence of Water and Sanitation Services, Chile)
- Exaudi Fatael (Energy and Water Utilities Regulatory Authority, United Republic of Tanzania)
- Mai Flor (WaterLinks, Philippines)
- Richard Franceys (Independent Consultant, the United Kingdom)
- Mary Galvin (Water Integrity Network, Germany)
- Claire Grisaffi (Cranfield University and Water & Sanitation for Urban Populations, the United Kingdom)
- Mohammad Al Hmaidi (Water Sector Regulatory Council, occupied Palestinian territory, including east Jerusalem)
- Sandro Huamani (National Superintendence of Sanitation Services, Peru)
- Alejandro Jiménez (Stockholm International Water Institute, Sweden)
- Dragana Jovanovic (Ministry of Environmental Protection, Serbia)
- Yvonne Magawa (ESAWAS, Zambia)
- Mohd Roslee Bin Mahyudin (National Water Services Commission, Malaysia)
- Alejo Molinari (Regulatory Agency for Water and Sanitation, Argentina)
- Margarida Monte (Water and Waste Services Regulation Authority, Portugal)
- Anselmo Munhequete (Water Regulatory Authority, Mozambique)
- Peter Mutale (National Water Supply and Sanitation Council, Zambia)

- Andy Narracott (UNICEF, United States of America)
- Jacques Nzitonda (Utilities Regulatory Authority, Rwanda)
- George Ochieng (Water & Sanitation for Urban Populations, Kenya)
- Emanuel Owako (Water & Sanitation for Urban Populations, Kenya)
- Mafalda Pinto (Independent; formerly Asian Development Bank, Philippines)
- Manuel Fernando Muñoz Quiroz (National Superintendence of Sanitation Services, Peru)
- Ion Salaru (National Center for Public Health, Republic of Moldova)
- Alyse Schrecongost (Bill & Melinda Gates Foundation, United States of America)
- Wendy Seone (Ministry of Land Management, Water and Sanitation Services, Botswana)
- Jitendra Singh (Asian Development Bank, Philippines)
- Massa Antoine Traore (National Department of Sanitation and Pollution Control, Mali)
- Recca Tharmarajah (National Water Services Commission, Malaysia)
- Patrick Ty (Metropolitan Waterworks and Sewerage System Regulatory Office, Philippines)
- Laura Vargas (Stockholm International Water Institute, Sweden)
- Miguel Vargas-Ramirez (World Bank, United States of America)
- Ivan Zupan (Water Integrity Network, Germany)

All technical and funding inputs from institutions and individuals from the United States of America preceded 20 January 2025.

This document also benefited from insights provided by many experts and members of the WHO International Network of Drinking-water and Sanitation Regulators, as well as participants at numerous international meetings and conferences.

WHO also gratefully acknowledges the financial support provided by the Bill & Melinda Gates Foundation and the Directorate-General for International Cooperation of the Kingdom of the Netherlands.

Acronyms and abbreviations

AURA	Autoridade Reguladora de Águas (Mozambique)
CAPEX	capital expenditure
CRSC	Climate Resilient Sanitation Coalition
CSO	civil society organizations
CWIS	citywide inclusive sanitation
ERAS	Ente Regulador De Agua Y Saneamiento (Argentina)
ERSAR	Water and Wastes Regulatory Authority (Portugal)
ESAWAS	Eastern and Southern African Water and Sanitation
EWURA	Energy and Water Utilities Regulatory Authority (Tanzania)
GLAAS	UN-Water/WHO global analysis and assessment of sanitation and drinking-water
GNI	Gross National Income
HRWS	human rights to water and sanitation
IWA	International Water Association
JMP	WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene
KPI(s)	key performance indicator(s)
LGA(s)	local government authority(ies)
MWSS RO	Metropolitan Waterworks and Sewerage System Regulatory Office (Philippines)
NGO(s)	nongovernmental organization(s)
NWASCO	National Water Supply and Sanitation Council
ODF	open-defecation-free
oPt	occupied Palestinian territory, including east Jerusalem
OPEX	operational expenses
PAS	Performance Assessment System
RegNet	WHO International Network of Drinking-water and Sanitation Regulators
RURA	Rwanda Utilities Regulatory Authority (Rwanda)
SDG	Sustainable Development Goal
SLB	Service Level Benchmark
SISS	Superintendence of Water and Sanitation Services (Chile)
SPAN	Suruhanjaya Perkhidmatan Air Negara (Malaysia)
SSP	sanitation safety planning
SOP(s)	standard operating procedure(s)
SUNASS	Superintendencia Nacional de Servicios de Saneamiento (Peru)
UN	United Nations

UNICEF	United Nations Children's Fund
WASAC	Water and Sanitation Corporation (Rwanda)
WASH	water, sanitation and hygiene
WASREB	Water Services Regulatory Board (Kenya)
WHO	World Health Organization
WIN	Water Integrity Network
WSA(s)	water services authority(ies)
WSRC	Water Sector Regulatory Council
WSS	water supply and sanitation
WSSA(s)	water supply and sanitation authority(ies)
WSUP	Water & Sanitation for Urban Populations

Glossary

Benchmarking	In this document, refers to the process of comparing the performance of different entities through standardized KPIs.
Bylaw	A regulation made by a local authority or corporation; a rule made by a company or society to control the actions of its members.
Container-based sanitation	A sanitation service in which excreta is captured in sealable containers that are then transported to treatment facilities.
Containment	Containment describes the ways of collecting, storing and sometimes treating the products generated at the toilet (or user interface). The treatment provided by these technologies is often a function of storage and is usually passive (e.g. requiring no energy input). Thus, products that are "treated" by these technologies often require subsequent treatment before use and/or disposal.
Conveyance	Conveyance describes the transport of products from either the toilet or containment step to the treatment step of the sanitation service chain. For example, where sewer-based technologies transport wastewater from toilets to wastewater treatment plants.
Economic regulation	In the context of sanitation, economic regulation generally includes (but may not be limited to): defining the tariff model and approving tariffs; development and compliance monitoring of service quality standards; data management relating to service access and service quality; consumer protection and complaint resolution; and regulation of competition.
Environmental regulation	In the context of sanitation, environmental regulation includes (but may not be limited to): water resource protection; the creation and enforcement of wastewater and faecal treatment standards; and issuance of licenses and discharge permits relating to wastewater and faecal sludge treatment. These functions may be performed by environmental authorities, ministries or local governments. Environmental regulation is particularly critical to achieving SDG 6.3, which seeks to halve the proportion of untreated wastewater and substantially increase recycling and safe reuse globally.
Faecal sludge	Solid and liquid wastes removed from on-site storage containers, also called septage when removed from septic tanks.
Improved sanitation facilities	Facilities designed to keep excreta away from human contact.
KPI	A quantifiable measure used to evaluate the performance of an organization.
Legislation	Laws, considered collectively, as well as the process of making or enacting laws.
Low-income country	Low-income economies are defined as those with a Gross National Income (GNI) per capita, calculated using the World Bank Atlas method, of US$ 1135 or less in 2024.
Mandated service authority	In this document, refers to the institution with legal responsibility for ensuring services are provided.
Manual emptying	In this document, refers to the emptying of faecal sludge from on-site sanitation technologies, where humans are required to manually lift the sludge. Manual emptying can be used with either manual or motorized transport.
Middle-income country	Lower middle-income economies are those with a GNI per capita between US$ 1136 and US$ 4465; upper middle-income economies are those with a GNI per capita between US$ 4466 and US$ 13 845, calculated using the World Bank Atlas.

Off-site sanitation	A sanitation system in which excreta and wastewater are collected and conveyed away from the plot where they are generated, this relies on a sewer technology for conveyance.
On-site sanitation	A sanitation system in which excreta and wastewater are collected and stored, or treated where they are generated.
Open defecation	The disposal of human faeces in fields, forests, bushes, open bodies of water, beaches or other open spaces, or with solid waste.
Policy	A course or principle of action adopted or proposed by an organization or individual; a plan or course of action adopted or proposed by a government, political party, or business, intended to influence and determine decisions, actions and other matters.
Public health regulation	In the context of sanitation, public health regulation includes (but may not be limited to): drinking-water quality protection; sanitation worker health and safety; and community-level environmental surveillance, including standards for containment and transportation of faecal waste. These functions may be overseen by ministries of health and/or local government public health departments.
Regulation	The action or process of regulating or being regulated.
Regulations	Rules or directives made and maintained by an authority.
Risk	The likelihood and consequences of something with a negative impact occurring.
Safely managed and treated sanitation	Facilities that are not shared with other households and where excreta are safely disposed of in situ or transported and treated off-site.
Sanitary inspection	A sanitary inspection is an on-site inspection and evaluation, by qualified individuals, of all conditions, devices and practices in the sanitation system that pose an actual or potential danger to the health and well-being of the various exposure groups. It is a fact-finding activity that should identify system deficiencies; not only potential sources of hazardous events, but also inadequacies and lack of integrity in the system that could lead to hazardous events.
Sanitation	Basic sanitation is defined as having equitable access to effective waste disposal or sewerage facilities that safely separate human waste from human contact.
Sanitation service chain	All components and processes comprising a sanitation system, from toilet capture and containment to emptying, transport, treatment (in situ or off-site) and final disposal or end use.
Sanitation technologies	The specific infrastructure, methods or services designed to support the process of managing faecal sludge and/or wastewater through the stages of containment, emptying, transport, treatment and end use/disposal.
Sanitation users	In this document, refers to all people who use a toilet.
Sanitation workers	In this document, refers to all people (employed or otherwise) responsible for cleaning, maintaining, operating or emptying a sanitation technology at any step of the sanitation chain.
Service provider	In this document, refers to any organization that provides services. This could be the mandated service authority, a private sector company, a social enterprise, etc.
Sewer	An underground pipe that transports black water, grey water and, in some cases, storm water (combined sewer) from individual households and other users to treatment plants, using gravity or pumps when necessary.
Sewerage	The physical sewer infrastructure for conveyance and treatment of sewage.
Standard	A required or agreed level of quality or attainment.

Storm water	The general term for the rainfall run-off collected from roofs, roads and other surfaces before flowing towards low-lying land. It is the portion of rainfall that does not infiltrate into the soil.
Tariff	The fee charged to consumers for the use of services.
Toilet	The user interface with the sanitation system, where excreta is captured; can incorporate any type of toilet seat or latrine slab, pedestal, pan or urinal. There are several types of toilet, for example, pour- and cistern-flush toilets, dry toilets and urine-diverting toilets.
Treatment	Process(es) that changes the physical, chemical and biological characteristic or composition of faecal sludge or wastewater so that it is converted into a product that is safe for end use or disposal.
Wastewater	Used water from any combination of domestic (households and services) industrial or storm water, and any sewer inflow/infiltration.
WHO guidelines	A WHO guideline is any document containing recommendations about health interventions, whether these are clinical, public health or policy recommendations.

Introduction

Background and rationale: the need to strengthen sanitation regulation

Safe water and sanitation are essential for human health and well-being, and are recognized as human rights *(1)*. Effective regulation of drinking-water and sanitation services plays an important role in ensuring the delivery of safe, inclusive and sustainable services that are protective of public health. However, regulatory frameworks for drinking-water and sanitation services are at varying stages of maturity globally, and significant challenges exist *(2)*.

The need to strengthen sanitation regulation is particularly urgent, as shown in the UN-Water *Global analysis and assessment of sanitation and drinking-water (GLAAS) 2022 report* (the 2022 GLAAS report) *(3)*. Survey findings from the GLAAS report, which compiles data from 121 countries and territories as well as 23 external support agencies, show that regulation for sanitation is weaker overall than for drinking water. Less than one third of countries reported that most "key regulatory functions" for sanitation – i.e. collecting data, publishing reports, recommending planning and actions, and enforcing the implementation of recommendations – are fully performed in rural and urban areas (see Box 1).

The causes of the regulatory deficit for sanitation will vary by country (for example, lack of maturity of sanitation regulation may reflect gaps in policies and mandates, or lack of political and societal expectations for the public provision of sanitation services). Regardless of the cause, the deficit can be expected to have huge negative impacts on: sanitation service access; service quality and financing; the environment; and public health. Without effective regulation, mandated authorities cannot be held accountable for the sanitation services they provide; and citizens and ecosystems lack protection from public health and environmental risks posed by inadequate treatment *(4)*.

Document purpose

This Roadmap responds to the urgent need to strengthen sanitation regulation demonstrated by the GLAAS findings. Although various sector documents that explore sanitation regulation exist, there is a need for step-by-step guidance, duly caveated, to support countries in identifying priority actions. The Roadmap aims to bridge this knowledge gap, providing countries with guidance on the key actions required as they chart their own way forward.

The Roadmap also aims to inspire replication of best-fit practice, deriving shared principles from the growing number of countries globally that are driving meaningful regulatory reforms. The Roadmap concept draws inspiration from the work of member countries of the Eastern and Southern African Water and Sanitation (ESAWAS) Regulators Association in particular, who have made significant progress towards advancing regulation in low-income contexts; but the Roadmap is global in scope. Each step in the Roadmap is supported by country-level case studies from across income categories (low-, middle- and high-income countries) and across regions. The case studies are included to ground the guidance in practical examples; and to showcase the wide range of inspiring regulatory initiatives now being driven by countries around the world.

Linkages to other WHO publications and key sector documents

Sanitation regulation is a complex and wide-ranging topic. The Roadmap aims to provide strategic guidance on the key activities and principles involved in regulating sanitation effectively. It is outside the scope of this document to provide exhaustive technical guidance relating to (for example) the setting of specific standards and regulations. Rather, the Roadmap has been conceived to complement existing resources by the World Health Organization (WHO) and other external support agencies. These resources are referenced throughout the text and readers are encouraged to use them in conjunction with the Roadmap. They include:

- *WHO Guidelines on sanitation and health (5)*
- *WHO Sanitation safety planning manual (6)*
- *WHO guidelines for the safe use of wastewater, excreta and greywater – published with FAO and UNEP (7)*
- *Developing wastewater and sludge treatment regulations and standards: general guidance with a special focus on countries with limited resources* (forthcoming) *(8)*

- Citywide inclusive sanitation regulatory journeys *(9)*
- International Water Association (IWA) Inclusive Urban Sanitation Stories *(10)*
- WASHREG *(11)*
- The Lisbon Charter *(12)*
- *Health, safety and dignity of sanitation workers (13)*

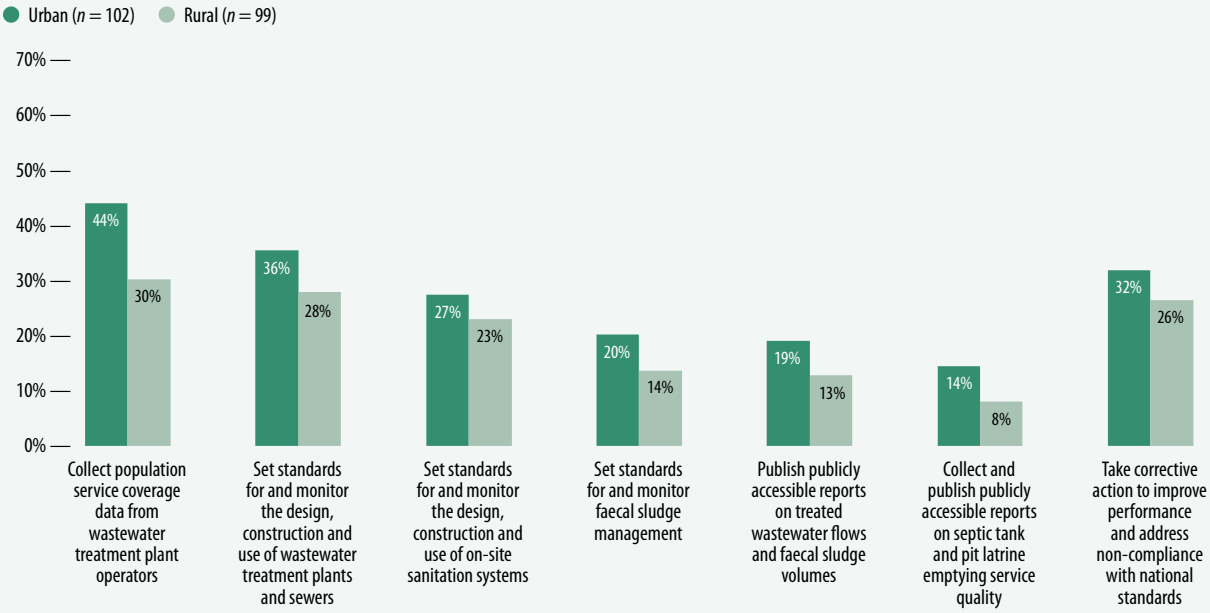
Box 1

Insights on sanitation regulation from the 2022 GLAAS report

The 2022 GLAAS report includes wide-ranging analyses on drinking water, sanitation and hygiene. A key message of the report is that sanitation regulation is relatively underdeveloped; and within this, on-site sanitation requires urgent attention. GLAAS findings relating to sanitation regulation include:

- Nearly a third of countries lack a regulatory authority responsible for setting sanitation service tariffs in urban areas, and nearly half in rural areas.
- In both urban and rural areas, more than 80% of countries lack regulatory authorities that publish accessible reports on treated wastewater flows and faecal sludge volumes.
- Regulations, standards or guidelines that address faecal sludge management are less common than those for sewered sanitation, even though faecal sludge management has been shown to be one of the greatest obstacles in achieving safely managed sanitation (see Fig. 1). Less than 20% of countries set standards for and monitor faecal sludge management.
- Perhaps reflecting these deficits, supporting capacity development for sanitation was identified as a high or very high priority by a large number of external support agencies surveyed for GLAAS.

Fig. 1. Percentage of countries with sanitation/wastewater regulators that fully perform key functions



Source: GLAAS 2021/2022 country survey.

Document scope: defining sanitation regulation

A starting principle of the Roadmap is that water and sanitation are essential public services, which need to be regulated from an economic, environmental and public health perspective. The Roadmap explores what is required to regulate for **safely managed sanitation**, which includes all aspects of the sanitation service chain, including containment,

emptying, treatment and safe reuse. Within this, the Roadmap emphasizes the importance of active regulating – autonomous regulatory authorities deploying a wide range of tools to drive sector improvements – over passive regulatory compliance (see Box 4).

There are competing definitions and typologies of sanitation regulation in the literature, with lack of consensus on terminology. A useful starting point in defining what needs to be regulated is the WASHREG approach *(11)*, which sets out six main regulatory areas: tariff setting/price regulation; service quality; competition; consumer protection; environment; and public health.

As outlined in the WASHREG approach, the first four of these areas are also considered the areas that constitute "economic regulation" – see also *(14)* and *(15)*. For simplicity and consistency throughout the document, the Roadmap refers to three main areas of sanitation regulation throughout. The areas are introduced below and unpacked further in Chapter 3.

- **Economic regulation:** In this document, economic regulation includes (but may not be limited to): establishing costs of provision, costs of capital and levels of return on capital; defining the tariff model (including subsidy policy) and approving tariffs; development and compliance monitoring of service quality standards (sometimes referred to as "technical regulation" in the literature); data management relating to service access and service quality; consumer protection and complaint resolution; and regulation of competition. As outlined by the regulatory authority in Zambia, the National Water Supply and Sanitation Council (NWASCO), for example, tariff setting and service quality are closely interlinked, with service quality required to assure value for money.[1]

  In the context of sanitation, this area speaks to the overall performance regulation of the publicly mandated service authority (the utility or municipality). Economic regulation is often performed by autonomous regulatory entities where they exist, but might equally be performed by ministries or local governments (see Box 2).

- **Environmental regulation:** Includes (but may not be limited to): water resource protection; the creation and enforcement of wastewater and faecal sludge treatment standards; and issuance of licenses and discharge permits relating to wastewater and faecal sludge treatment. These functions may be performed by environmental authorities, ministries or local governments. Environmental regulation is particularly critical to achieving Sustainable Development Goal (SDG) 6.3, which seeks to halve the proportion of untreated wastewater as well as substantially increase recycling and safe reuse globally.

- **Public health regulation:** Includes (but may not be limited to): drinking-water quality protection; community-level environmental surveillance, including standards for containment and transportation of faecal waste; and sanitation worker health and safety. These functions may be overseen by health ministries and/or local government public health departments. Labour ministries may have a central role in regulatory issues relating to the sanitation workforce.

Reflecting its mandate, WHO has a particular focus on the public health aspects of sanitation regulation, as outlined in Box 3. However, the Roadmap recognizes that each of these areas – economic regulation, environmental regulation and public health regulation – are closely connected. Each area must be addressed in full if regulatory frameworks are to be comprehensive and public health goals adequately addressed.

Target audience

In line with the document scope, the Roadmap is written primarily for staff in country-level agencies involved in sanitation regulation. These agencies vary from country to country, but may include economic regulators, national environmental authorities and several ministries, which are likely to include ministries of water and sanitation, health, environment, infrastructure and local government. The latter is most often a country's responsible authority for sanitation service provision and/or regulation *(17).* The guidance and experience outlined in the document is also of use for: local governments (municipalities, councils, counties, states) as well as water and sanitation utilities at the country level; and regional water and sanitation associations, international financing institutions, United Nations (UN) agencies, researchers and wider development partners. The document has been developed primarily for countries with limited resources, but the guidance is also relevant to middle- and high-income countries.

[1] Peter Mutale (NWASCO). Peer review input.

Box 2

Regulatory models

ESAWAS *(16)* outlines that four main models through which economic regulation can be delivered have been observed:

i) Regulation by agency, in which a regulatory body (semi-)autonomous from the government has discretionary powers to regulate water and sanitation services.

ii) Regulation by contract, where a public entity other than a (semi-)autonomous regulatory agency and a service provider agree on contractual clauses determining how key aspects of sanitation service provision are defined and controlled, such as tariffs and service standards.

iii) Ministerial regulation, where a ministry performs some or all regulatory responsibilities for water and sanitation, and does not use contracts as a core regulatory tool for water and sanitation service provision.

iv) Self-regulation, where the same entity is responsible for both service provision and regulation of those services. This model is more prevalent in contexts where municipalities are the mandated service provider, rather than utilities.

The optimal regulatory model for any given country will be influenced by a wide range of factors including: prevailing legal framework, current institutional and regulatory frameworks at national and/or regional levels; the extent to which current structures are fit for purpose, which can be informed by data on sector performance; and the political acceptability of structural reform. There is considerable variation in prevailing regulatory models among countries and regions; some countries evade neat categorization, and many hybrid models can also be observed. For an overview of regulatory models for water and sanitation, including hybrid models, see *(14, 15, 4)*. These issues and connected principles are discussed in Chapter 2.

The Roadmap concept draws inspiration from countries that have implemented regulatory reforms under the leadership of an autonomous economic regulator (such as NWASCO in Zambia, the Energy and Water Utilities Regulatory Authority [EWURA] in the United Republic of Tanzania (an example of a multisectoral regulator) and the Water and Wastes Regulatory Authority [ERSAR] in Portugal). However, it is emphasized that the steps, actions and principles within the Roadmap are potentially relevant to all countries, irrespective of the regulatory model adopted.

Box 3

WHO, sanitation regulation and public health

Within the context of drinking-water and sanitation services, and in line with its mandate, WHO has a particular focus on the protection of public health. This includes proactive assessment and management of safety risks through SSP. This also includes effective regulation of public health and interrelated service quality aspects of all steps of the sanitation service chain, from safe toilets in all settings and containment through conveyance, treatment, and final disposal or end use. Health and service quality aspects pertain to risks for users, workers and communities from exposure caused by unsafe management of faecal waste at all steps of the sanitation service chain *(6)*.

WHO promotes effective regulation in this area through the WHO International Network of Drinking-water and Sanitation Regulators (RegNet) – an international forum established to promote and share good practice in regulation of drinking-water and sanitation services (including sewered and on-site sanitation systems), for the protection of public health. The scope of RegNet activities also encompasses the implementation of regulations, including addressing the structure and function of governments and institutions to enhance the effectiveness of regulatory systems.

Methodology

The Roadmap foregrounds the experience and expertise of the regulators who are leading water and sanitation regulatory initiatives globally. It is based centrally on consultations with over 20 regulatory authorities across the Regions of Africa, the Americas, the Eastern Mediterranean, Europe, South-East Asia and the Western Pacific. Key informant interviews with these regulators are supplemented by wider consultations in sector forums, notably the annual meeting of the WHO RegNet in Kigali, Rwanda in December 2023. The Roadmap is underpinned by a review of grey and published literature as well as supplementary interviews with global-level experts. Relevant country-level experience is highlighted throughout the document. Informants are listed in the Acknowledgements.

Box 4

The difference between regulations and regulating

An important distinction to keep in mind when interpreting the Roadmap is between regulations and regulating. In many countries currently, sanitation regulations and standards do exist and may be encapsulated in national laws and municipal bylaws; but the translation of agreed regulations and standards into improved outcomes, delivering public health benefits to all, has proven difficult. The sanitation subsector has a rich tradition of developing frameworks, plans, standards and regulations that are never implemented or enforced.

This persistent failure underscores the importance of regulating – the ongoing process of managing the delivery of regulations *(18)*. The Roadmap is designed to address both these functions. Regulations, codes and standards are foundational, and must be developed across the sanitation service chain; but regulating involves much more than the development of regulatory frameworks. To advance sanitation regulation in a meaningful way, frameworks must be implemented and the performance of service providers actively managed through regulatory activities such as licensing, monitoring, ensuring compliance and performance benchmarking.

Through the guidance and case studies provided, the Roadmap highlights examples of regulatory authorities deploying a wide range of tools to drive sector improvements. These regulators are demonstrating what active regulating looks like in the context of sanitation.

Document structure: Introducing the roadmap

The document structure follows the structure of the Roadmap. Each chapter presents one of six core steps that can be taken to achieve high-performing sanitation regulation. Each step is unpacked to present a) actions for implementation; and b) key underlying principles.

The Roadmap is presented in Fig. 2. This graphic is reintroduced at the beginning of Chapters 1–6, each time highlighting the Roadmap area to which the chapter relates. Connected underlying principles are also summarized in a table at the beginning of each chapter.

Interpreting the roadmap

In interpreting the Roadmap and supporting guidance, the following is emphasized:

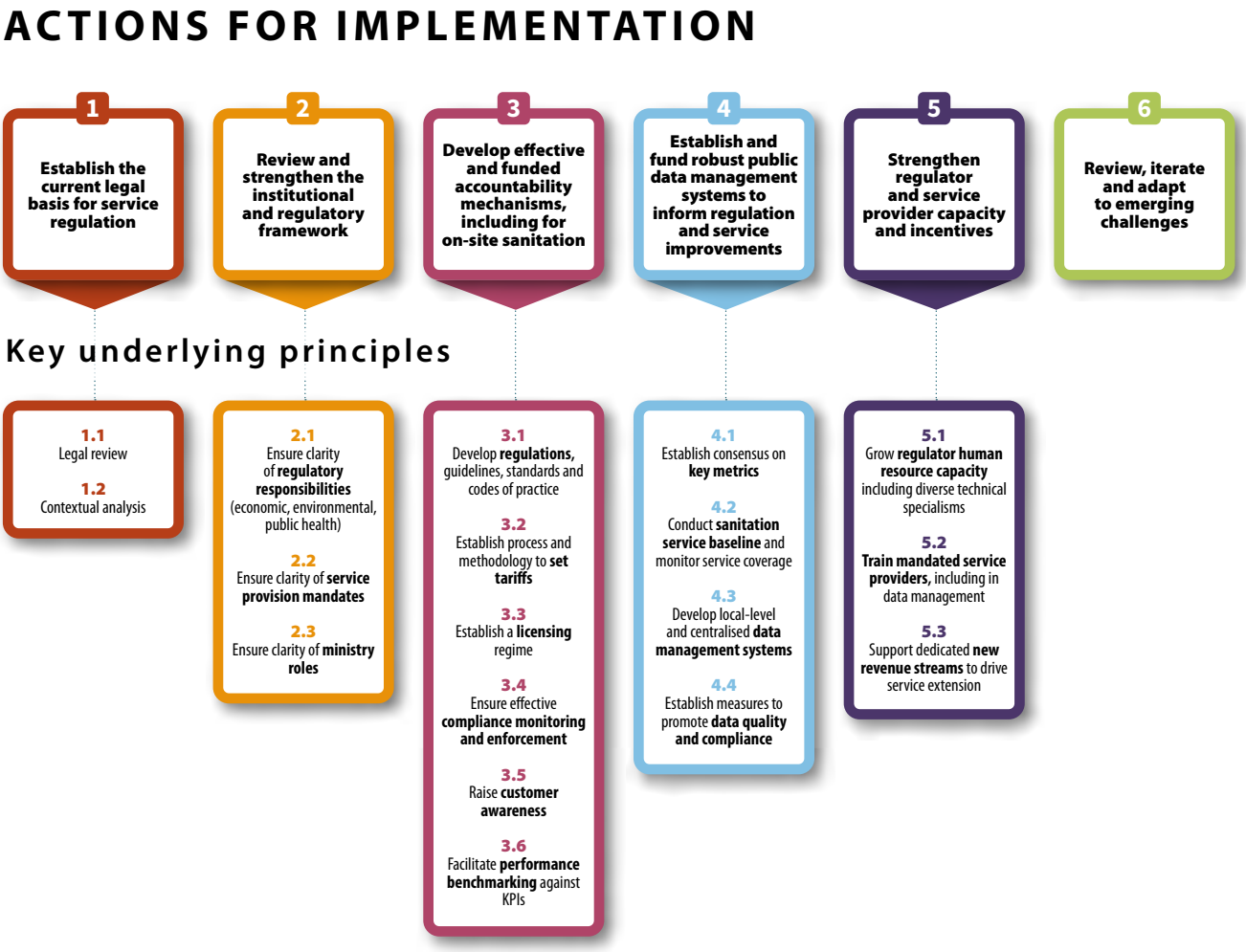
- **Principles are based on country- and sector-level consultation with regulators and regulatory experts. The principles are for guidance only.** Each country operates within its own unique set of limitations, resources and incentives. This highlights the importance of undertaking contextual analysis (section 1.2) prior to adopting any guidance in the Roadmap.

- **No country addresses sanitation regulation in isolation from wider political, economic and social factors.** Variables such as political commitment and financial resource availability influence the path and pace of advancement that is possible. These factors are discussed in Chapter 8.

- **Roadmap steps are not necessarily to be implemented in a linear sequence from Steps 1 to 6.** Particularly for countries at an early stage in advancing sanitation regulation, a legal review is suggested as a practical first step. The sequencing of Steps 2 to 5 is intended to be fluid. These actions may be implemented in parallel, in a different order, or some actions may not be needed or helpful, depending on the country's starting point.

- **Adoption of the guidance in this Roadmap is iterative and part of any country's long-term systems strengthening work.** Experience has shown that it can take 20 years or more for regulatory reforms to translate into improved service outcomes. This underlines the need for long-term political commitment. The document includes two examples of countries at contrasting stages in their journey towards whole Roadmap implementation (Chapter 7): the United Republic of Tanzania, a low-income country in the early stages of implementation; and Portugal, a high-income country where reforms have reached maturity and the regulator is now engaged in review, iteration and adaptation to emerging challenges. These include climate change, a threat that has urgent and significant implications for sanitation regulation, as explored in Chapter 6.

Fig. 2. Roadmap for advancing sanitation regulation

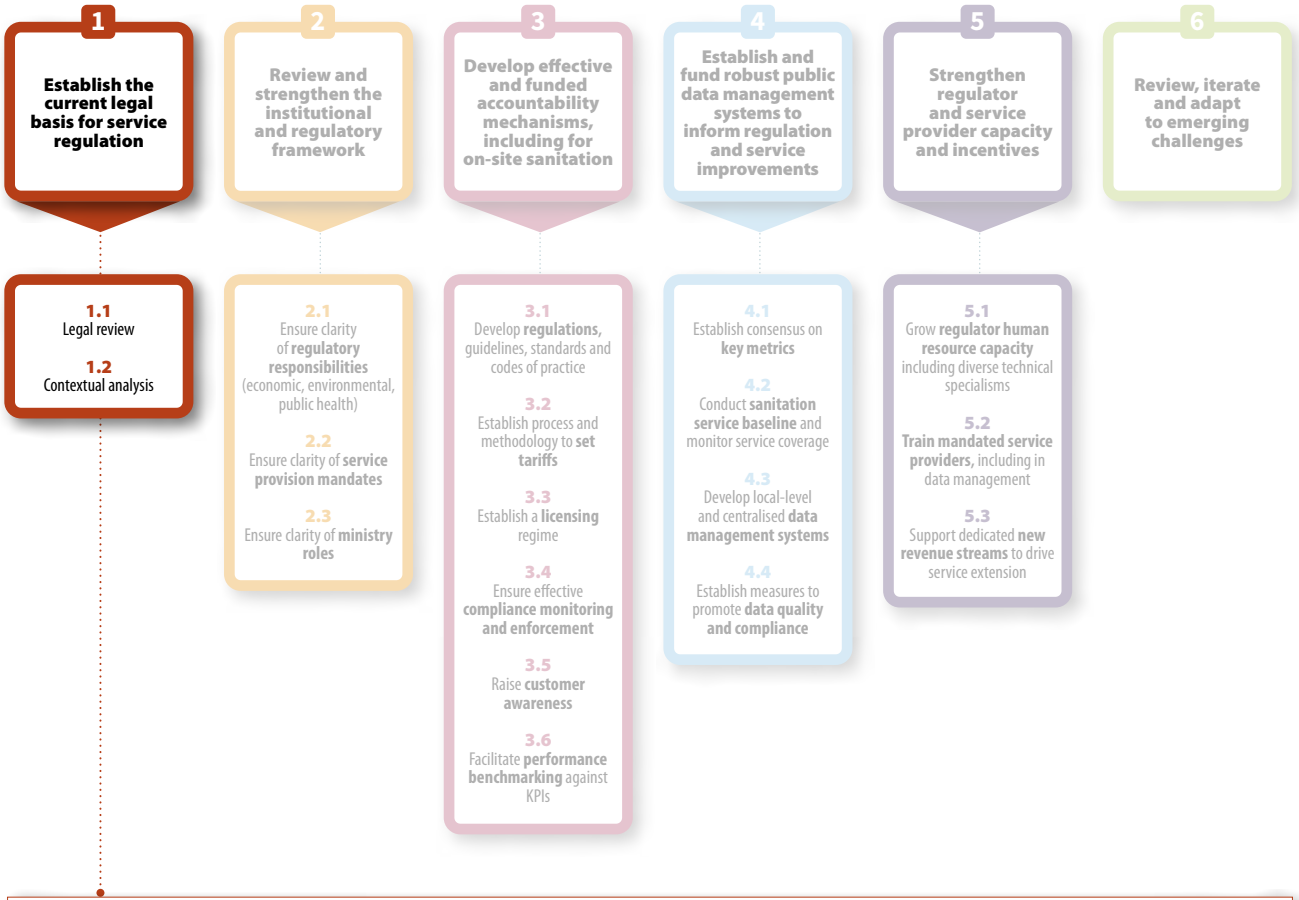


Measuring progress against the Roadmap

In Chapter 4 (data management systems), it is emphasized that local-level and national sanitation indicator definitions and monitoring elements should align with national targets on sanitation; and that local-level indicators can then be developed according to contextual requirements. In line with these principles, this document does not suggest a standardized framework against which progress should be assessed. The key is to ensure that deployment of any Roadmap efforts is guided by the country's overall sector goals and targets. Progress against those targets is then systematically tracked at local and national levels.

1. Establish the current legal basis for sanitation regulation

Fig. 3. Roadmap for advancing sanitation regulation



Chapter in brief: A first step for countries looking to strengthen sanitation regulation is to conduct a detailed legal review. The purpose of the review is to clarify what agencies are responsible for which aspects of sanitation services, including policy formulation, regulation and service provision; and to reveal any gaps or overlaps in mandates. The review can be accompanied by a contextual analysis of the country's sanitation sector, to inform potential revisions to the institutional and regulatory framework.

1.1 Conduct legal review

In many countries, lack of progress in sanitation service coverage can be traced to lack of clarity or lack of agreement on the roles and responsibilities of different actors across the sanitation service chain. A useful first step for countries looking to strengthen sanitation regulation is to conduct a detailed legal review, to clarify what agencies are responsible for which aspects of sanitation services and reveal any gaps or overlaps in mandates along the components of the sanitation service chain. Only when the current legal status is known and accepted can there be a basis to move forward.

To provide a sound basis for advancing sanitation, the review should not be limited to regulatory responsibilities, but should be broader in scope. Even where the review is being led by a regulatory authority, it is necessary to understand legal responsibilities in policy, regulation and service provision, and how these interconnect, in order to provide a basis for moving forward. The review should include:

- legal responsibility for formulating sanitation-related government policy;
- legal responsibility for sanitation service provision, including both sewered and on-site sanitation, in both urban and rural areas;
- legal responsibilities for regulating sanitation, including economic, environmental, public health and labour regulation, for both sewered and on-site sanitation;
- legal responsibilities for setting standards, norms and good practice rules, across the sanitation service chain;
- legal responsibilities for regulating sanitation investment and finance;
- legal roles and responsibilities of other actors within the sanitation sector, including those legally covering treatment and safe reuse;
- current levels of decentralization across service provision and regulatory functions;
- review of the extent to which policy, legislation, and institutional and regulatory frameworks promote equity and mandate the provision of services to unserved populations and informal settlements;
- review of the extent to which labour policies, legislation and regulations acknowledge and support the professionalization of the sanitation workforce along the sanitation service chain; and
- review of whether the human-right principles and criteria for water and sanitation are effectively inserted in the national legislation (see Box 5).

The rationale for undertaking a legal review, and the impact this can have in providing a foundation for advancement, is presented in the Zambia case study.

Case study: Legal review leading to development of new institutional and regulatory framework for on-site sanitation and faecal sludge management in Zambia

Until recently, the sanitation subsector in Zambia was characterized by inadequate coordination and lack of consensus on roles and responsibilities of the institutions involved. As a first step in advancing the subsector, the regulator, NWASCO, commissioned a legal review to establish the current situation, supported by external funding from the German development agency Deutsche Gesellschaft für Internationale Zusammenarbeit. The review identified a number of gaps and overlaps in legislation that needed to be addressed if the regulation of on-site sanitation and sanitation service coverage were to advance *(19)*. Building on this foundation, and with gaps and overlaps made clear, NWASCO adopted a leadership role in coordinating the development of a comprehensive institutional and regulatory framework for on-site sanitation and faecal sludge management. The processes and principles involved in strengthening institutional and regulatory frameworks are explored in Chapter 2.

NWASCO are clear that undertaking a legal review is a necessary first step for countries at an early stage in sanitation regulation, recommending that other countries adopt the same measure. As articulated by Peter Mutale, Chief Inspector of NWASCO, "For anyone looking to develop sanitation regulation, this legal review is the process you need to go through. If the law allows certain institutions to do certain activities the review helps to make that clear. It makes clear who is supposed to provide the service."

Box 5

The human rights to water and sanitation (HRWS)

Under the UN General Assembly Resolution A/Res/64/292 of 28 July 2010 *(1)*, signatory States are obliged to provide maximum resources for the progressive realization of the HRWS. This obligation must be expressed in the legislative system of each country through its Constitution, policy framework, laws and/or jurisprudence. As outlined by the Inter-American Development Bank and IWA *(18)*, inclusion in the national Constitution represents a country's strongest possible commitment to implementing HRWS and facilitates the incorporation of the rights into legislation at lower levels – nationally, regionally (provinces, counties or federated States) and locally (municipalities) – and finally in the regulation of services. Incorporation of HRWS into the legislation generates obligations for the parties involved and opens a space for the design of policies that establish objectives and means of implementation of the rights *(18)*.

Despite being seen to have a positive impact on inclusion, many countries do not yet have HRWS reflected in the Constitution, but others are leading by example. In the Region of the Americas, the Plurinational State of Bolivia, Ecuador, Honduras, Mexico, Nicaragua and Uruguay have explicitly incorporated HRWS into the Constitution *(18)*. Burkina Faso and Kenya and are two examples of African countries that have taken this step. The criteria to support application of HRWS in regulatory frameworks are explored in Chapter 3.

1.2 Conduct contextual analysis

To supplement the legal review, a contextual analysis is required to understand features of the sanitation subsector that will inform the feasibility, desirability, and specific nature of potential revisions and reforms.
This analysis will potentially be wide-ranging and may include:

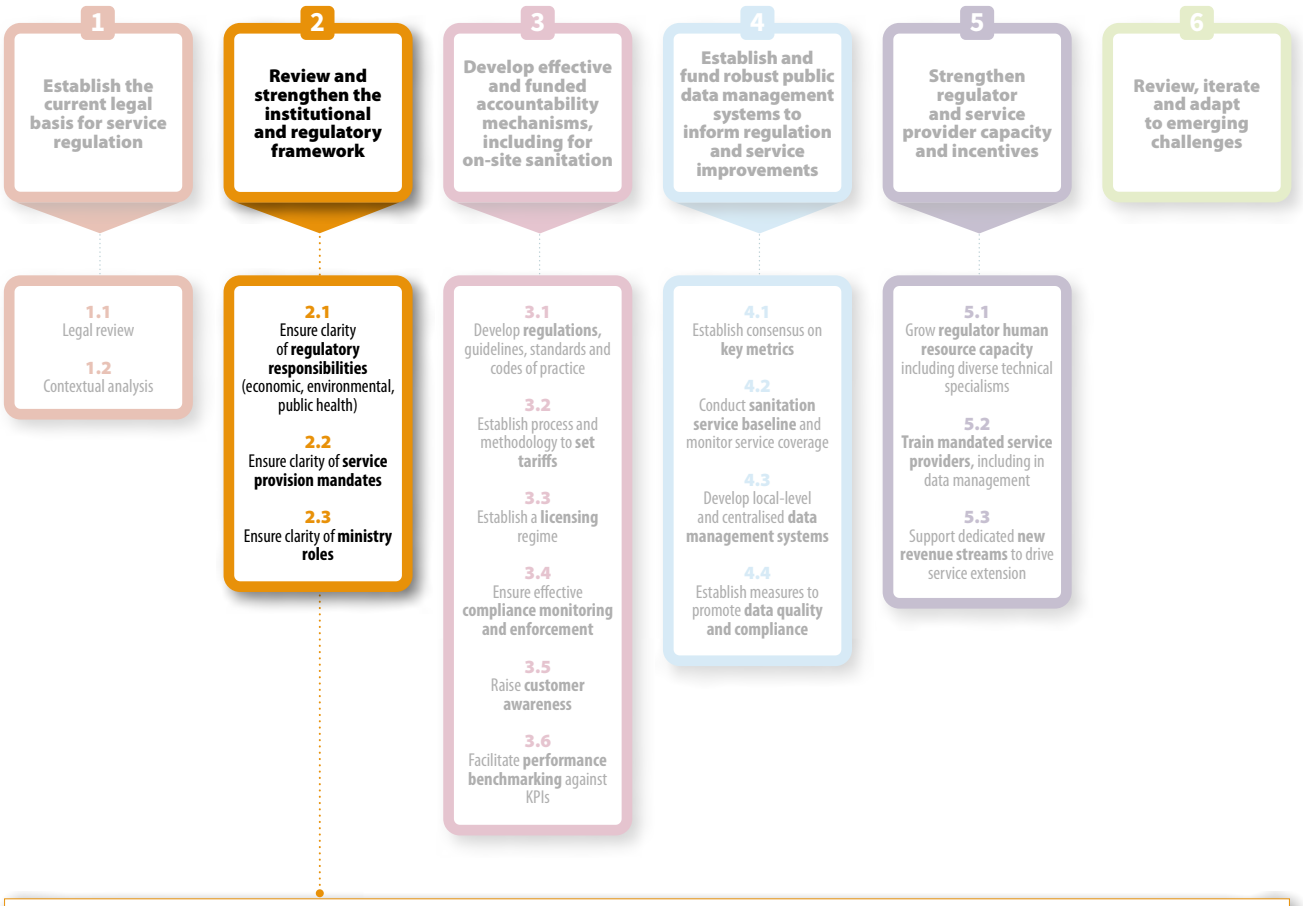
- current sector performance, including current levels of service access in both urban and rural areas (to the extent data are available);
- current gross domestic product per capita;
- current sector financial and human-resource capacity at the level of regulation and service provision;
- current and planned levels of investment in sanitation, including government allocations and ongoing sources of concessional finance;
- current level of priority assigned to sanitation by the Executive;
- mix of sanitation services currently provided (sewered and on-site);
- existing technological options along the service chain;
- climatic conditions and the level of water resources available, which could impact the mix of services that is desirable and feasible; and
- wider features of the political economy that could impact potential or planned revisions and reforms (defined as the social, political and economic processes and actors that determine the extent and nature of sanitation investment and service provision).

In certain settings, the scope of the contextual analysis may be expanded across national boundaries. This will allow for legal harmonization on issues of regulation (for example, relating to downstream impacts of specific practices) and facilitate learning from legal frameworks in similar settings of neighbouring countries.

Together, the legal review and contextual analysis provide a platform to assess what (if any) revisions are: a) required to address gaps and overlapping mandates; b) politically feasible; and c) fit for purpose in the country's specific context. In some cases, this may lead to revisions in the institutional and regulatory framework, as explored in Chapter 2.

2. Review and strengthen the institutional and regulatory framework

Fig. 4. Roadmap for advancing sanitation regulation



Chapter in brief: Following from the legal review, revisions to the overarching institutional framework may be required, including the design of a regulatory model and potential changes to the regulator's mission and mandate. The regulatory function must be viewed within the context of the overall institutional framework for sanitation and the interconnections between ministries, regulators and service providers. Such a review may also lead to changes to the definition of ministry roles and/or changes in the framework for sanitation service provision. This chapter sets out key principles to guide the review of institutional and regulatory frameworks for sanitation, supported by examples of countries that have recently undertaken or are now undertaking processes of sector reform.

Guiding principles for Step 2

1. Clarify responsibilities for economic, service quality, environmental and public health regulation at every stage of the sanitation service chain.
2. In the area of economic regulation, the creation of autonomous regulatory entities should be considered, with technical, managerial and financial independence from the responsible line ministry.
3. Irrespective of the model a country adopts, policy should provide the regulatory office or entity with decision-making autonomy and insulation from political interference.
4. Policy and service provider mandates should promote equity by including informal settlements.
5. Regulatory and service provision mandates should align and integrate water, sewered and on-site sanitation.
6. Reporting to a single ministry, rather than multiple ministries, can assist the role of the regulator.
7. Government must understand and plan for the long-term nature of sector reform processes.

2.1 Ensure clarity of regulatory responsibilities

Principle 1: Clarify responsibilities for economic, service quality, environmental and public health regulation, at every stage of the sanitation service chain.

In designing institutional and regulatory frameworks for sanitation, three core spheres of regulation must be considered: i) economic regulation (incorporating service quality); ii) environmental regulation; and iii) public health regulation. Key aspects to be regulated under each function are summarized in Table 1. More information on the regulatory tools required to support implementation of these functions is presented in Chapter 3.

These responsibilities can be combined within a single institution, although they are more commonly divided between multiple ministries and agencies (for example, between economic regulators, environmental authorities and health ministries). Because of the overlapping nature of some of these functions, institutional mechanisms to support coordination between regulators are critical.

Table 1. Overview of regulatory responsibilities for sanitation that need to be addressed in the regulatory framework

Sphere of regulation	Key functions to be executed	Potential agencies involved
Economic regulation	• Issuance of licences for service provision • Defining the tariff model and approving tariffs • Development and compliance monitoring, and enforcement of service quality standards • Data management relating to service access and service quality • Consumer protection and complaint resolution • Regulation of competition	These functions are often performed by autonomous regulatory entities where they exist, but might equally be performed by ministries or local governments. In the context of sanitation, this area speaks to the overall performance regulation of the publicly mandated service authority.
Environmental regulation	• Water resource protection • Creation and enforcement of wastewater and faecal sludge treatment standards • Issuance of licences and discharge permits relating to wastewater and faecal sludge treatment	Functions may be performed by environmental authorities, ministries or local governments. Global assessments have shown that environmental regulations and standards are commonly developed at the ministry level, with enforcement devolved to municipalities *(4)*.
Public health regulation	• Drinking-water quality protection inclusive of source water protection • Sanitation worker health and safety • Community-level environmental surveillance, including of standards for containment of faecal waste • Safe use of wastewater and sludge in agriculture and aquaculture	These functions may be overseen by health ministries, labour ministries and local government ministries; and/or by local government public health departments.

Principle 2: In the area of economic regulation, the creation of autonomous regulatory entities should be considered, with technical, managerial and financial independence from the responsible line ministry.

As introduced in Box 2, four main models have been outlined by which regulation can be instituted: i) **regulation by agency**, in which a regulatory body (semi-)autonomous from the government has discretionary powers to regulate water and sanitation services. ; ii) **regulation by contract**, where a public entity other than a (semi-)autonomous regulatory agency and a service provider agree on contractual clauses determining how key aspects of sanitation service provision are defined and controlled, such as tariffs and service standards; iii) **ministerial regulation**; and iv) **self-regulation**.

The optimal regulatory model for any given country will be influenced by a wide range of factors, including: the existing policy and legal framework; current institutional and regulatory frameworks at national and regional levels; the extent to which current structures are fit for purpose, which can be informed by data on sector performance; and the political acceptability of structural reform.

Notwithstanding these important caveats, there is emerging evidence, most notably in the African context, that autonomous regulatory entities should be considered with responsibility for economic regulation. This model is viewed as conducive to maintaining decision-making and financial autonomy for the regulator, enabling them to fully enforce accountability of sector actors for their mandates and to drive improvements in service delivery. Among member countries of ESAWAS in the African Region, autonomous regulators are already taking a leading role in sector reform with positive impacts (Chapter 5). A continent-wide assessment of the water supply and sanitation (WSS) regulatory landscape in Africa found autonomous regulators to be associated with: more active deployment of a wider range of regulatory mechanisms; having stronger legal backing for WSS regulation; and greater progress made in regulating smaller, decentralized service providers and service delivery *(16)*.

IWA has outlined how this model is also increasingly favoured in the Americas, where there has been a general trend over the past two decades towards the establishment of public regulatory entities that are expected to be independent from providers, governments and the direct administration of the State. The need for autonomous regulatory bodies has been reinforced by the belief that policy, regulation and provision of services should preferably be separated to ensure maximum benefit from the expertise required and to provide transparency *(19)*.

In consultations with regulators undertaken for this study, the value of autonomous regulatory entities was frequently emphasized: "The first and most important advice is to establish a regulatory office. Many countries don't have this."[2]

Case study: Mali – Development of new sanitation policy and redefinition of institutional roles

In west Africa, potentially significant change is under way in Mali, where a new sanitation policy is being formulated, substantially revising the country's first national sanitation policy developed in 2009. At present, key institutions involved in sanitation in Mali are the National Directorate for Sanitation, Pollution and Nuisance Control and the National Agency for the Management of Wastewater Treatment Plants. No agency is responsible for the economic regulation of either sewered or on-site sanitation.

The new policy aims to address these regulatory gaps and to provide the basis for a fundamental restructuring of institutional roles. Reforms under consideration include:

- The creation of an **independent regulatory agency for sanitation**, responsible for: regulation of standards; regulation of tariffs; conflict arbitration; monitoring and evaluation of services; and rewards for high-performing service providers. The regulator is expected to adopt oversight of wastewater treatment as well as faecal sludge emptying services. The integration of solid waste management within the regulatory mandate is also under consideration.
- The creation of a new **financing agency**, responsible for: mobilizing finances; investment planning; asset management; and commissioning of works.
- Clarification of the roles and responsibilities of the National Agency for the Management of Wastewater Treatment Plants as the **management entity** responsible for operations and maintenance of wastewater and faecal sludge treatment plants, service provision and cost recovery.

Importantly, roles and responsibilities at the ministry level will also be addressed, and are expected to include the development of policies and strategies as well as wider technical assistance and capacity development.

The reforms under discussion in Mali represent a higher-level political decision, and given the scale of reforms proposed, the plans will take time to enact. But the nature of the reforms under consideration are indicative of shifts observable in a number of countries across Africa and Asia. Increasingly, countries are recognizing the value of independent regulatory agencies and taking steps to establish such entities. As outlined by the National Directorate for Sanitation, Pollution and Nuisance Control in articulating the rationale for the proposed reforms: "The first principle is to separate functions and to have an independent regulatory agency."[a]

[a] Massa Antoine Traore. Key informant interview. 29 July 2022.

[2] Patrick Ty. Key informant interview.

An increasing number of countries are taking steps towards the creation of such entities, including in Europe (Serbia) and the Region of the Eastern Mediterranean (Jordan); as well as regions where regulation by contract or ministerial regulation have historically been more prevalent, such as the western parts of Africa (Senegal; see Mali case study) and south Asia (Odisha, India; see Nepal case study).

Self-regulation provides a further alternative, whereby municipalities act as both service provider and the enforcer of regulations. However, this model is not recommended: self-regulation has resulted in widespread ineffectiveness due to these dual roles often leading to conflict of interest, and the model has been cited in the literature and by informants as a barrier to progress *(18)*.

For more guidance on the advantages and disadvantages of potential regulatory models, see (for example) the African Sanitation Policy Guidelines *(20)*.

Principle 3: Irrespective of the model a country adopts, policy should provide the regulatory office or entity with decision-making autonomy and insulation from political interference.

In interpreting the role of the regulator, it should be recognized that regulators are necessarily part of a political system and must themselves be held accountable. Nonetheless, consultations for this study have underlined that to perform their role effectively, irrespective of the regulatory model adopted, it is important that the regulatory office or entity maintains the autonomy to make decisions without undue political interference. This question of autonomy and how it is to be defined is discussed in Box 6. In the view of informants, while any regulatory model (except for self-regulation) can theoretically provide the basis for freedom of decision-making, this is likely to be facilitated by the creation of a stand-alone autonomous regulator. By contrast, regulatory offices within ministries may be more vulnerable to political interference.

Box 6

Defining autonomy

All regulators must be accountable to the government and the scope of regulatory activity is often impacted by political decisions. However, to be effective, regulatory entities must have significant autonomy – defined as the freedom to make decisions relating to the regulator's remit without political interference.

As outlined by IWA, the conditions for effective regulation include: ensuring regulatory bodies have an adequate level of institutional, functional and financial independence; and guaranteeing the stability and autonomy of these bodies, including the freedom of decision-making within their legal frameworks, subject to judicial review *(11, 18)*.

Credible regulators acting with autonomy and independence are needed to balance sometimes competing stakeholder interests. Undue influence from the regulated industry, government, politicians or outside interest groups can prevent regulatory authorities from ensuring safe services are delivered for all by balancing competing interests. Perceived autonomy is also critical in building credibility and trust in an agency *(21)*.

In consultations for this study, three aspects emerge as key to regulatory autonomy:

- **Freedom to determine how regulator funds are spent:** Regulators must have the autonomy to determine how their own budgets are executed. EWURA in the United Republic of Tanzania provides a model of note: EWURA's funding comprises a fixed percentage of revenues from water tariffs, meaning there is no dependence on the government for transfer of funds. This model is also adopted by the water and sanitation regulatory body in Malaysia, SPAN, which has full financial independence. The model is also planned for adoption in the occupied Palestinian territory, including east Jerusalem (hereinafter referred to as 'oPt'), where the Water Sector Regulatory Council (WSRC) revenues are to be funded solely through license fees. EWURA's autonomy to determine how its revenues are spent is protected under the EWURA Act of 2006 (see the United Republic of Tanzania case study). In the Americas, over 50% of the 23 regulators who responded to a survey stated that they follow a model where funds are entirely self-generated *(18)*.

- **Freedom to determine tariffs:** Setting tariffs is fundamental to the role of economic regulators, but in many countries, the role of these regulators is limited to an advisory function and tariff setting remains a political decision. This has been seen to undermine the sustainability of services. This is explored further in section 3.2.
- **Freedom to make decisions:** Regulators must maintain the authority to make final decisions without having to obtain approval from any other agency of government. In the law, there should be an explicit means for the regulators to enforce their decisions, and authority to set such rules and mechanisms as may be needed to carry out regulatory responsibilities.

A further prerequisite for the independence of the regulator is the nature of the legal instrument by which the regulatory agency has been created. A law, such as the EWURA Act of 2006, confers greater stability than a decree, because it requires parliamentary consensus to be modified. A decree, on the other hand, can easily be replaced by another decree if the authority of the Executive changes. This practice has largely been followed in the Americas, where the IWA survey found that of the 23 regulators who responded, 16 were established by law, five by decree and two are self-regulated providers *(19)*.

As outlined in section 2.2, many countries are now in the process of establishing stand-alone regulatory entities. In these processes, the end goal must be to ensure genuine autonomy of the regulatory entity. The creation of a stand-alone entity is not essential for achieving this goal – it is theoretically possible to maintain autonomy as a regulatory unit within a ministry. However, it may be advantageous, for the purposes of autonomy, to ensure separation between the regulator and the responsible line ministry.

2.2 Ensure clarity of service provision mandates

Principle 4: Policy and service provider mandates should promote equity by including informal settlements.

In urban contexts, a major barrier to the equitable provision of services is the exclusion of informal settlements from formal mandates. In some cases, this is a deliberate matter of government policy; in others, exclusion arises because mandates are limited to older city administrative boundaries and have not been updated, missing new peri-urban settlements.

Several reasons are commonly given for the exclusion of informal settlements, which tend to have a high prevalence of on-site sanitation, from policy and service provider mandates. For example, that on-site sanitation is a household responsibility and utilities should not be providing on-site sanitation services to these areas. However, from a CWIS perspective, services should be provided to everyone in the city, including the residents of informal settlements. Connected public health and environmental goals cannot be met without directly addressing these barriers and perceived barriers to active public planning, investment and service coordination in informal settlements, the residents of which are at the greatest health risk from inadequate sanitation.

As outlined by ESAWAS, there are multiple examples to follow where informal settlements are encompassed in institutional responsibilities for urban sanitation. This may be explicit in national-level policy, for example in Kenya, where the Constitution details the universal right to water and sanitation; or it may be implicit, with institutions mandated to serve everyone within their jurisdiction – the implication being this includes informal settlements within the city boundaries *(17)*. The shift towards expanding utility mandates to include on-site sanitation in countries across eastern and southern Africa also represents a positive step forward (see Principle 5).

To further support inclusion, it is recommended the policy mandate or license of utilities should include equity as a goal, making technical performance an issue of equity. It must also be kept in mind that the residents of informal settlements typically rely on informal private service providers for latrine and septic tank emptying. A key regulatory function for ensuring equity is supporting the progressive formalization of these services (see section 3.1).

Principle 5: Regulatory and service provision mandates should be aligned and integrate water supply, sewered and on-site sanitation.

A common issue in the development of institutional and regulatory frameworks is lack of alignment and shared understanding between the national and subnational levels of governance. To support this, regulatory and service provision responsibilities should ideally be aligned, and promote integration of water supply, sewerage and on-site sanitation (including treatment and safe reuse), with consideration given to the integration of stormwater management where feasible. Integration and coordination of these responsibilities supports more effective regulation, more sustainable service provision at greater scale, and better connectivity between regulators and service providers.

At the level of service provision, in both urban and rural contexts, single-point responsibility for WSS can help ensure appropriate service delivery within a given geographical area. This does not necessarily mean one entity provides those services; but that one entity plans, organizes and has responsibility for ensuring services are delivered, by themselves or others *(21)*. The interconnections between water supply, sewered sanitation (where this is being provided) and on-site sanitation, alongside stormwater management in urban contexts, mean that unless services are planned together, the risk of service failure is magnified. Consideration of this integrated approach is recommended in the *African sanitation policy guidelines*, where feasible, and in the ESAWAS *Regulation strategy and framework for inclusive urban sanitation service provision (20, 22)*.

This shift is one of the pre-eminent trends in the African sanitation subsector, and is now under way, at varying stages of maturity, in Burundi, Kenya, Malawi, Rwanda and Zambia. The basis for consolidating and assigning responsibility for service outcomes to a single authority is presented by ESAWAS, who outline that in utility-led contexts, integration of responsibilities for sewered and on-site sanitation can assist the formation of effective regulatory structures – regulators generally have more leverage over semi-commercialized utilities than over municipalities. Integration and coordination can also help to facilitate the introduction of cross-subsidies from sewered to on-site sanitation services, promoting equity and helping to address challenges of affordability of on-site sanitation services in low-income areas *(16)*.

Box 7

Addressing sanitation as part of locally delivered services including solid waste management

Sanitation has many interdependencies with other basic services, including (for example) water supply, stormwater management, solid waste management, transport and road access, electricity and land tenure. While it is beyond the scope of this document to address the regulation of each of these services, it is emphasized that sanitation should be provided and managed as part of a package of locally delivered services to increase efficiency and health impact.

Guidance in this area is provided in the WHO *Guidelines on sanitation and health (5)*. Recommendation 3 of the guidelines states that sanitation services should be included in local planning processes (for land use, water supply and drainage, transport and communications, and solid waste management) to avert the higher cost and complexity of retrofitting sanitation services and infrastructure where there is insufficient space, and where sanitation clashes with other local services and infrastructure. From a public health perspective, the link between sanitation and solid waste is critical. For example, special consideration is needed when solid waste and excreta are co-disposed at the toilet step (e.g. solid waste disposal in dry toilets, child or adult faeces disposed in solid waste), or mixed at the end use and disposal steps (e.g. sludge disposal in landfill, co-composting of sludge and organic solid waste).

At the level of regulatory responsibilities, integration of WSS is highly recommended. Key to this is the stability of financial flows, to both the regulator and the service providers they regulate. Water tariffs provide a reliable source of financing, which may: directly fund regulatory functions (by directing a percentage of tariff revenues to the regulator); create potential for cross-subsidy mechanisms (from high- to low-income consumers, and from water to sanitation); and provide the basis for service provider investments in wastewater treatment and potentially wider sanitation services. Denied recourse to the water tariff, the role of a regulator focused only on sanitation will be harder. This is articulated by IWA *(23)* in reference to the Malaysian water and sanitation sector, where sewerage is currently provided by a separate provider to water, but the long-term aim is "to ensure effective and efficient services are provided to consumers with a single operator for both water and sewerage. Under one umbrella, the industry should be more straightforward to regulate, where uniformity, sustainability and transparency can develop."

Case study: Peru – expansion of regulator scope to include small towns and rural areas

In Peru, the National Superintendence of Sanitation Services (SUNASS) is responsible for technical and economic regulation of water and wastewater services. Key responsibilities of SUNASS include: overseeing quality of service standards; providing advisory proposals on tariffs; and settling customer complaints. The regulator has 730 staff, 400 of which are based in the capital city Lima, and offices in every region (administrative subdivision) of Peru. In 2016, Law 1280 was passed by presidential decree, extending the regulator's scope beyond urban areas to include small towns and rural areas. The reforms massively increased the number of local service providers under the purview of SUNASS, from 50 local service providers operating only in urban areas to 28 000 local service providers, including community-level providers of on-site sanitation services.

The delivery of these reforms involves three forms of regulation acting in a concerted manner: self-regulation of community boards; supervision by the municipality; and central regulation by SUNASS. The reform process started with the characterization of services, and the monitoring of water quality and service quality in approximately 750 service providers, to understand how to gradually scale up the task and how to take advantage of the different dynamics that occur in rural Peru, with a view to identifying those spaces where public investment can have a greater impact *(10)*. Wastewater treatment is key to the regulatory challenge: medium-sized cities in the Peruvian valleys receive the worst quality of water, due to contamination with coliforms originating from other populations upstream. It is perceived that this public health issue must be addressed with a territorial analysis strategy and aggregation process *(10)*.

SUNASS acknowledges these reforms have posed a huge regulatory challenge. The logic behind the reforms was for larger existing service providers to extend the geographical scope of their services to small towns and rural areas, and to invest in infrastructure to reach these areas. As outlined by IWA, in the context of small cities and rural populations, it is clear that there must be either a merger of the larger service providers or some form of aggregation of their processes *(10)*. However, this is not yet happening in practice. Seven years on from the Decree, the regulator is currently reviewing options to strengthen the scope of their jurisdiction in these areas: "we need to be creative in reaching these areas."[a]

The experience in Peru illustrates the interdependencies between ministry roles, regulatory responsibilities and service provision mandates. In Zambia, for example, expanded regulatory responsibilities for NWASCO have been accompanied by expansion of utility mandates to include on-site as well as sewered sanitation and rural WSS, in reforms backed at the ministry level. In Peru, the regulator's remit has been expanded; but without parallel reforms to ensure clear responsibility for service provision to these areas, the regulator has not yet been able to fully execute this mandate.

[a] SUNASS. Key informant interview.

2.3 Ensure clarity of ministry roles

Principle 6: Reporting to a single ministry, rather than multiple ministries, can assist the role of the regulator.

Where regulators exist as autonomous entities, the nature of their relationship with the line ministry(ies) responsible for water and sanitation is critical to their effectiveness. When reporting to multiple line ministries, the regulator's role may become more politicized and more complex. For example, a requirement to report to different line ministries for sewered sanitation, on-site sanitation, and/or urban drainage and stormwater management will make the functioning of the regulator very challenging. Dividing sanitation across ministries may also result in trade-offs, which negatively affect service outcomes.

Although not always feasible politically, the regulator's role will be simplified by reporting to one ministry. "Reporting" in this context may mean working under the administrative oversight of a ministry, rather than technical oversight: the autonomy of the regulator is likely to be strengthened by reporting directly to the Prime Minister's Office (see Box 6).

Experience from countries such as Ghana, which launched the combined Ministry of Sanitation and Water Resources in 2017, suggests that integration of WSS within the same ministry (potentially also including water resource management and environmental protection) may bring positive impacts on coordination. Other examples of this integrated arrangement include: Zambia, where the regulator NWASCO reports to the Ministry of Water Development and Sanitation; and Kenya, where the Water Services Regulatory Board (WASREB) reports to the Ministry of Water, Sanitation and Irrigation. However, there are also risks associated with this approach, which need to be mitigated (see Box 8).

Institutional arrangements for intersectoral action between ministries or institutional arrangements within ministries (intrasectoral collaboration) should ideally be based on binding memoranda of understanding. As well as promoting horizontal coordination between and within ministries, vertical coordination and alignment should be promoted between national and local government institutions.

Box 8

Mitigating the risks involved in institutional and regulatory reform

Institutional and regulatory reforms do not always go to plan, and course correction or adaptations may be required. In Zambia for example, commercial utilities, the mandated service providers for sewered and on-site sanitation, report to the same ministry as the regulator, NWASCO. Although this arrangement has advantages in terms of coordination, it has also contributed to a deadlock in tariff adjustments, with the ministry prohibiting commercial utilities from implementing the tariff adjustments approved by NWASCO.

A corrective measure for scenarios of this type is to ensure that boundaries of ministry and minister roles, and reporting lines for both regulators and service providers, are properly delineated in law (as is the case in Kenya, for example). This delineation is important under all arrangements, but is particularly critical where regulators and service providers are reporting to the same ministry. In cases where WSS are integrated within a single ministry, it is also vital to ensure that sanitation is not deprioritized relative to water.

Principle 7: The long-term nature of sector reform processes must be understood and planned for.

For countries considering structural reforms to the institutional and regulatory framework, it is important to understand and plan for the long-term nature of sector reform processes. An incremental approach to reform may lead to better outcomes, allowing flexibility for course correction where required. For example, in contexts where clarity of regulatory roles is currently lacking, it may be practical to first introduce a regulatory unit within the responsible line ministry, before undertaking more extensive reforms such as the introduction of a regulatory entity. This is the approach now being adopted in Jordan, where the Utilities Performance Monitoring Unit, housed within the Ministry of Water and Irrigation, is in the process of transitioning to become an autonomous regulator. This approach is also now being adopted in Nepal, where the planned creation of a new regulatory and monitoring unit within the Ministry of Water Supply (MoWS) is conceived as an interim step towards the establishment of an autonomous regulatory entity. The function and capacity of a regulatory unit may also evolve while remaining in the ministry, as seen in Uganda, where the unit responsible for water and sanitation regulation has been elevated to departmental level, to better undertake its monitoring function (the department remains dependent on budget provision from the ministry and so lacks financial autonomy).

Case study: Nepal – phased reforms involving the creation of a new ministry-level regulatory and monitoring unit

In Nepal, major sector reforms are planned, underpinned by the Water Supply and Sanitation Act of 2022 and the Water, Sanitation and Hygiene (WASH) Act of 2023, which provide the basis for a new regulatory framework. The reforms, which are being driven by MoWS, the agency responsible for formulating federal-level policies in WSS, are expected to involve the following:

- The creation of a new **regulation and monitoring unit within MoWS** with responsibility for planning, coordination, regulation of service quality and arbitration of complaints. The unit will host the newly created role of Water and Sanitation Inspector.
- The creation of a dedicated **commission responsible for regulating tariffs**.
- Clarity on the **licensing framework** for water and sanitation utilities and wider service providers. Licensing will be the responsibility of the Department of Water Supply and Sewerage Management within MoWS.
- The introduction of a performance management framework with **key performance indicators (KPIs)**, defined by MoWS, against which service providers will be regulated.

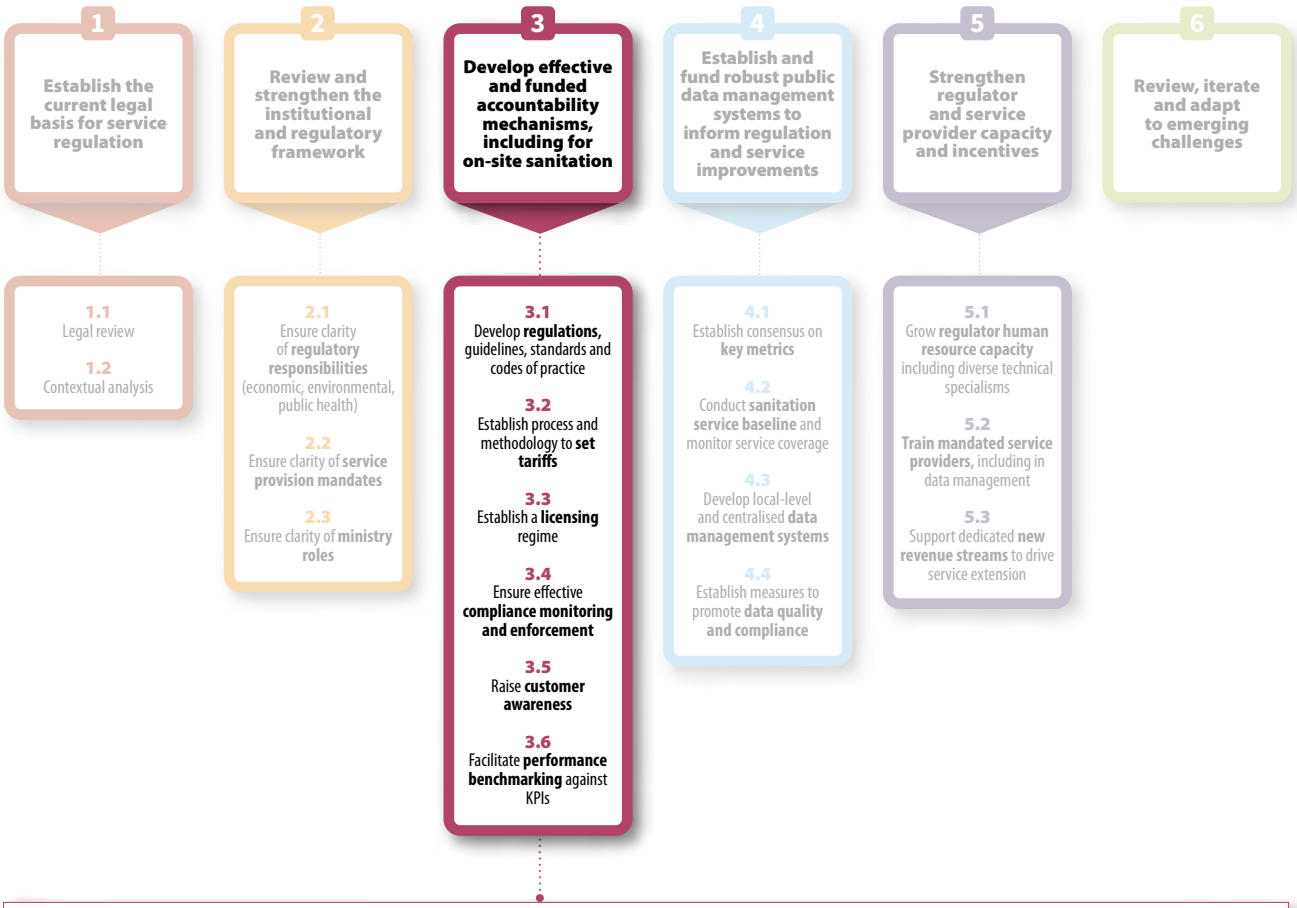
These revisions to the regulatory framework have been supported by the development of previously absent or underdeveloped regulations and standards, notably the domestic Wastewater Effluent Standards 2023 (prior to this, no standards existed for wastewater or faecal sludge treatment).

Although substantial, the reforms in Nepal represent an incremental approach, in which the creation of a dedicated regulation and monitoring unit is conceived as a first step towards the creation of a dedicated regulatory authority. The creation of this stand-alone entity is foreseen in the WASH Act, but no timeline has been set for this (MoWS estimates five to seven years). An intermediate step will be a detailed assessment to identify the optimal structure for the new regulatory entity.[a]

[a] Key informant interview. Nepal.

3. Develop effective and funded accountability mechanisms, including for on-site sanitation

Fig. 5. Roadmap for advancing sanitation regulation



Chapter in brief: Regulatory authorities need politically and financially viable tools to hold service providers accountable for delivering service mandates. This chapter sets out the key tools that regulators should draw upon to fulfil their function. These include: the development of regulations, guidelines, standards and codes of practice; tariff adjustments and wider economic regulation; licensing; performance contracts; compliance monitoring and enforcement; and public performance benchmarking. Key principles and country-level case studies are provided to inform the adoption of these tools.

Guiding principles for Step 3

1. Regulatory frameworks must be comprehensive and coherent. This involves the development of regulations, guidelines, standards and codes of practice, as well as promoting SSP as a risk-based approach to managing every step of the sanitation service chain, for both sewered and on-site sanitation.
2. Regulatory mechanisms should be developed to support the formalization of sanitation workers. This includes the development of operational guidelines to assess and mitigate the occupational risks of all types of sanitation work.
3. Economic regulators need sufficient autonomy to determine tariffs to incentivize efficiency, equity and high performance.
4. Tariffs should be set to a level that ensures recovery of operational costs as well as safeguards sustainability and equity of services.
5. Licensing and performance contracts offer useful tools for ensuring accountability of private sector service providers.
6. A responsive regulation approach should be adopted, which responds to social, economic and normative motives for compliance.
7. Sanitary inspections should be conducted regularly to ensure systems are being managed to meet health objectives, in line with the SSP approach.
8. Regulators and surrogate regulators should raise awareness of consumer rights to strengthen accountability.
9. Comparative data on service provider performance should be published wherever possible.

3.1 Develop regulations, guidelines, standards and codes of practice

Principle 1: Regulatory frameworks must be comprehensive and coherent. This involves the development of regulations, guidelines, standards and codes of practice, as well as promoting SSP as a risk-based approach to managing every step of the sanitation service chain, for both sewered and on-site sanitation.

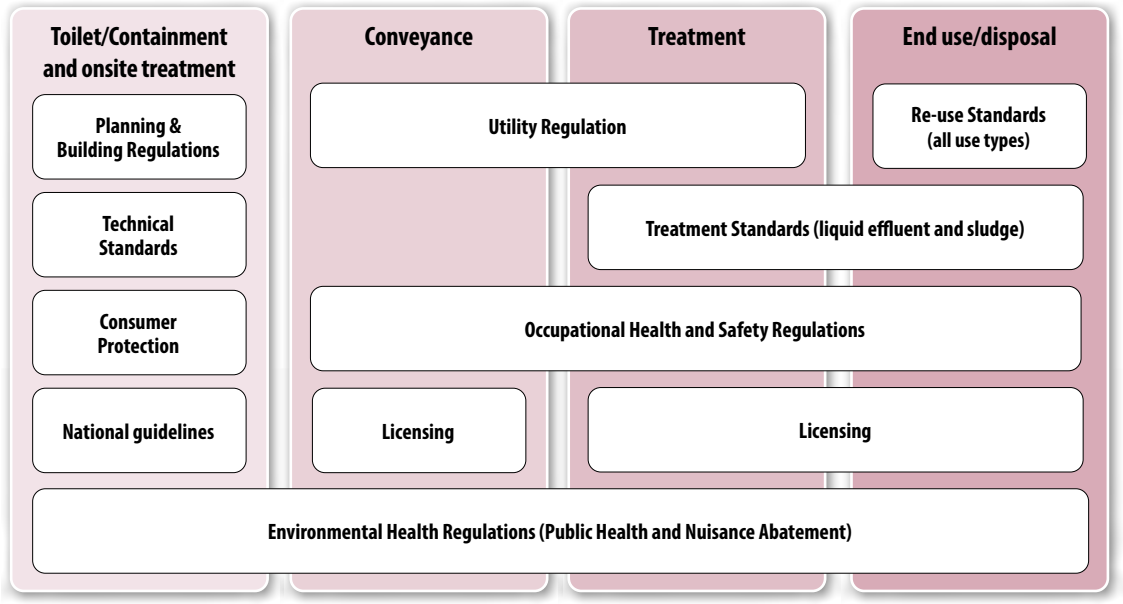
Regulations, guidelines, standards and codes of practice provide the foundation for effective regulation. Following clarification of regulatory responsibilities, these tools must be developed across the three spheres of regulation discussed in Chapter 2 (economic, environmental and public health) and address every step of the sanitation service chain, for both sewered and on-site sanitation. In addition, regulatory frameworks should promote implementation of sanitation safety plans as a risk-based approach to managing sanitation services (see Box 9).

As outlined in section 2.1, the development of these tools typically extends beyond economic regulators (where these exist): ministries of water, health, agriculture, environment, local government and urban development; labour and environmental authorities (for wastewater and faecal sludge treatment standards); and local authorities (in developing bylaws and tailoring regulations and standards to the local context) may all have important roles to play.

The WHO *Guidelines on sanitation and health (5)* provide an overview and supplementary guidance on the key mechanisms required to regulate effectively across the sanitation service chain (Figure 6). These include: planning and building regulations and technical standards at the containment stage; occupational health and safety regulations to protect sanitation workers involved in faecal sludge emptying, conveyance and treatment; treatment standards for liquid effluent and sludge; and safe reuse standards.

To inform the regulatory tools to be developed, it may be necessary to first collect and analyse data on the prevalence of different types of sanitation system (see also section 1.2; Chapter 4). At the local level, context-specific bylaws and standards may be required, which: mitigate the greatest risks to human health and the environment; incorporate local innovations and norms; and respond to community-driven pressures and incentives. This community-centred approach is likely to be particularly relevant in rural areas.

Fig. 6. Sanitation service chain regulatory mechanism options



Source: WHO *Guidelines on Sanitation and Health, 2018 (5)*.

Box 9

Guidance for integrating health-based risk assessment in regulatory frameworks *(11)*

To ensure sanitation delivers public health outcomes, health-based risk assessment and management approaches should be addressed in national policies, legislation, regulations and standards. The WHO ***Sanitation safety planning manual*** *(6)* provides detailed guidance on how this can be achieved. The SSP manual recommends that local-level health-based risk assessment should be compulsory along the entire sanitation service chain; and that sanitation service providers should implement measures to mitigate health risks, and follow performance criteria and standards to protect public health.[a]

The SSP manual is aimed primarily at local authorities as a tool to coordinate, plan improvements to and monitor services in an administrative area, but can also be used by public health regulators as an oversight tool to identify and verify effectiveness of risk-based regulatory measures applied to local authorities and service providers. It provides a step-by-step risk-based approach to assist in the implementation of local-level risk assessment and management for the sanitation service chain. See also section 3.4.

[a] The 2006 WHO *Guidelines for safe use of wastewater, excreta and greywater in agriculture and aquaculture (7)* is another useful resource with guidance on following a health-based risk assessment and management approach.

In many low-income countries, the development of regulations for faecal sludge management will be of critical importance. Recent global analyses have demonstrated that although most residents of low-income countries use on-site sanitation, many countries currently lack regulations, guidelines and standards for faecal sludge management. The 2022 GLAAS report outlines that only 27% of countries set standards for and monitor the design, construction and use of on-site sanitation systems in urban areas, and only 23% in rural areas. A still lower proportion of countries set standards for and monitor faecal sludge management (20% in urban areas, 14% in rural areas) *(3)*.

However, there is now a growing number of regulatory authorities, operating in low-income countries, who are proactively addressing this gap. Among ESAWAS member countries in the African Region, Rwanda, the United Republic of Tanzania, and the city of Kampala (Uganda) have all recently developed faecal sludge management guidelines. A leading example of enacting this process is provided by the regulator in Zambia, NWASCO, who developed a comprehensive framework for urban on-site sanitation and faecal sludge management service provision and regulation, supported by a code of practice for faecal sludge management, including technological and operational standards *(24)*. The code of practice involved extensive consultation with local authorities, who are tasked with enforcing containment standards, and was developed with the Zambia Bureau of Standards.

To support access to safely managed sanitation across contexts, planning, building codes and technical standards must be developed, which tailor to different geographical contexts, including urban areas, peri-urban areas, small towns and rural areas.

Box 10

Reflecting criteria for realizing the HRWS in regulatory frameworks

Chapter 1 details that under the *UN General Assembly Resolution A/Res/64/292 of 28 July 2010 (1)*, signatory States are obliged to provide maximum resources for the progressive realization of HRWS. As outlined by the Inter-American Development Bank and IWA, five criteria have been developed to guide the realization of HRWS, and regulatory frameworks should ideally establish the standards for the provision of services specifically linked to these HRWS criteria. This means that regulatory frameworks should require sanitation services to be: i) accessible; ii) available; iii) safe and meeting quality standards; iv) acceptable, including from the perspective of privacy and dignity; and v) affordable for everyone. In addition, they must include the general principles that cut across all human rights: equality and non-discrimination; economic, social and environmental sustainability; public participation; access to information and transparency; and adequate accountability *(18)*.

Alongside faecal sludge management, standards and guidelines must be developed for wastewater treatment and reuse *(7, 22)*. Here, the safe reuse component is growing in importance because of water scarcity and the threats posed by climate change (see Chapter 6). Countries and territories such as Jordan, Morocco, and the oPt have taken steps to provide for wastewater reuse within core regulations and performance indicators.

It is recognized that the process of developing regulations, standards, norms and codes of process takes time and resources, and interim guidance may be required. In these cases, the standards and codes of practice recommended by international organizations such as WHO and IWA can be adopted as a temporary solution while the country in question is developing its own regulatory framework. A useful resource relating to wastewater treatment and reuse is the *WHO guidelines for the safe use of wastewater, excreta and greywater (7)* and *Developing wastewater and sludge treatment regulations and standards: General guidance with a special focus on countries with limited resources (forthcoming) (8)*.

An area of concern is the public health risk posed by antimicrobial resistance. Antimicrobial compounds and resistance microorganism are carried in wastewater from communities, health facilities, animal raising and slaughtering facilities and antimicrobial manufacturing sites. Agencies responsible for the regulation of industrial wastewater at source and municipal wastewater, sludge and solid waste treatment have a critical role in mitigating this threat, in conjunction with agencies responsible for regulation of pharmaceutical production and use. For specific guidance on manufacturing sites see *Guidance on wastewater and solid waste management for manufacturing of antibiotics (25)*.

Principle 2: Regulatory mechanisms should be developed to support the formalization of sanitation workers. This includes the development of operational guidelines to assess and mitigate the occupational risks of all types of sanitation work.

Sanitation work is an essential public service, but often sanitation workers are employed in the informal sector and are some of the most vulnerable workers. Survey data from the 2022 GLAAS report highlights that one third of countries lack national laws or regulations in place to ensure the health and safety of: toilet cleaners; faecal sludge emptying, transport and treatment workers; and sewage and wastewater treatment plant workers. Those laws and regulations that do exist are applicable to the formal sector and likely mask the informal workforce working outside any legal and regulatory protections *(3)*.

Regulating for equity involves the gradual formalization of the sanitation workforce. Guidance in this area is provided in the report *Health, safety and dignity of sanitation workers (13)*. The report highlights the need to articulate protection mechanisms, including legislation and standard operating procedures (SOPs), covering measures such as personal protective equipment, training, regular health checks, insurance and treatment for workers to mitigate their occupational risks across the sanitation service chain. In the more immediate term, steps could be taken to enforce existing national and international labour laws and regulations (national, subnational and municipal/city authorities) and strengthen the role of labour inspectorates regarding sanitation work.

The development of national- and local-level SOPs is likely to involve cross-sectoral coordination and may be led by labour ministries, health ministries and/or by local government public health departments. For an example of supporting the formalization of informal emptiers through local-level SOPs, see the Kisumu case study. Further specific measures in this area are outlined in Box 11.

Box 11

Ensuring the health, safety and dignity of sanitation workers

Sanitation workers face a wide range of challenges, which need to be addressed through policy, legislative and regulatory measures. Progress in this area remains nascent in many countries. In addition to the development and enforcement of SOPs, specific measures to be considered to ensure the health, safety and dignity of sanitation workers include:

- ensuring sanitation workers receive comprehensive training on handling hazardous environments and protective equipment to minimize exposure to toxic gases;
- regulations that mandate safety protocols, including gas monitoring, ventilation, and protective equipment;
- regulations that encourage formal employment contracts for sanitation workers, including fair wages and social security benefits;
- enforcement of minimum wage laws to ensure fair compensation;
- provision of access to health insurance and other employment benefits;
- establishment of labour laws to protect sanitation workers' rights, antidiscrimination laws to prohibit discrimination based on occupation or social status, and whistle-blower protection for workers who report violations; and
- regulations that mandate public awareness campaigns to highlight the importance of sanitation work, challenge stigma and change negative societal perceptions.

Case study: Kisumu, Kenya – county-level development of SOPs for pit-emptying services

In Kisumu, Kenya, SOPs have been developed and adopted, which aim to minimize the health risks of pit emptying to both operators and the general public. As an initial requirement, the SOPs require that enterprises working in faecal sludge management in Kisumu have three licenses: one to operate a business; a license to transport waste issued by the National Environment Management Authority; and a hygiene and operational license from the County Public Health Office. In addition, all employees must: be immunized against typhoid, hepatitis B and cholera; have health insurance; and receive training from the County Public Health Office. The SOPs also specify personal safety and emptying equipment, best practice for transporting and disposing of waste in the Nyalenda wastewater treatment plant, and guidelines relating to customer relations and acquisition.

If effectively enforced, the code will significantly raise the professional standards of pit emptying in Kisumu, ensure a level playing ground for all faecal sludge management businesses to compete fairly as well as reduce the health risks of emptying for operators. Training has been provided to the County Public Health Office to enable public health officers to effectively enforce the new standards. To support implementation, two checklists have been developed, which align with the standards and enable: (i) County Public Health Office staff to visit a pit latrine emptying exercise and examine whether the practices being undertaken meet these minimum operating procedures; and (ii) site supervisors to ensure their own operations comply with required standards.

The SOPs are an example of meaningful regulatory reforms that have been adopted at the city level. In a highly decentralized country such as Kenya, there is now a need to develop similar codes of practice in other urban centres, with similar activities under way or planned in Nakuru and Malindi. Significantly, the knowledge and experience gained in enforcing the SOP in the city of Kisumu is feeding into a Kisumu County Sanitation Policy being drafted by the county government, which will potentially influence other counties facing similar faecal sludge management challenges in Kenya *(26)*.

3.2 Establish process and methodology to set and review tariffs

A key function of sanitation regulators is to support the balance between: a) the financial viability of the service provider; b) affordability, including for low-income consumers; and c) quality of service provision. The regulator's role in setting tariffs is critical to achieving this goal.

It should be kept in mind that water and sanitation tariffs make up a relatively small proportion of overall financing streams of service providers. Low-resource countries will almost certainly have a financing gap for sanitation, and multiple funding mechanisms will be needed to cover this gap, targeting both capital investment and long-term operating costs, as explored in Chapter 8. But tariffs provide a dependable revenue source and are crucial to long-term service sustainability.

Although water and sanitation are essential public services, it must be acknowledged when setting tariffs that regulators operate in a space that involves market dynamics. Regulating that market first requires a nuanced understanding of the full costs of sanitation services.[3]

As outlined by ESAWAS and Water & Sanitation for Urban Populations (WSUP) *(17)*, every regulatory tariff setting is a best-available approximation. Fundamentally subjective judgments the regulator must make include: the figure for inflation to use in any indexation of fixed assets; over what period should fixed assets be depreciated in order to fund capital maintenance; and the costs of future investments to put into any tariff adjustments. In the specific case of sanitation, the accuracy of cost predictions will be influenced by a wide range of factors including the eventual take-up of the services, whether toilet building takes place or pit emptying is actually paid for. Within these parameters, it is incumbent on the regulator to harness the best-available data, however imperfect they may be (see Chapter 4).

For guidelines on sanitation services tariff setting in low- and middle-income contexts, see ESAWAS *Guidelines for sanitation services tariff setting and inputs for tariff models (27)*. The ESAWAS guidelines set out six core principles to guide tariff setting, outlined in Box 12, supplemented by detailed guidance on methodologies to be adopted.

Box 12

Principles to guide tariff setting for sanitation services *(27)*

1. **Economic efficiency:** Water and sanitation services are provided in the most efficient manner, i.e. supply costs (financial, resource and environmental perspectives) should be minimum.
2. **Cost recovery:** Tariffs produce revenue sufficient to meet the financial needs of the service provider, including operations, maintenance and administration of the company.
3. **Fairness:** Tariffs should treat all consumers equally. The system of subsidies should not interfere with economic incentives. Cross-subsidy needs to be limited to a last resource tool.
4. **Resource conservation:** Tariffs should encourage resource conservation by the service provider itself and consumers.
5. **Social inclusivity**: Guaranteed provision of water and sanitation services to all consumers regardless of income.
6. **Simplicity and understandability:** Tariffs have to avoid unnecessary complexity and be clear to service providers, water users and decision-makers.

[3] ESAWAS. Key informant interview.

Principle 3: Economic regulators need sufficient autonomy to determine tariffs to incentivize efficiency, equity and high performance.

To ensure tariff systems are designed in a way that reflects core principles, regulators require sufficient autonomy. In many countries, the final determination on tariffs is made at the ministry level; politicians commonly run for election promising reduced tariffs. This undermines the regulator's ability to support cost recovery and impacts the long-term sustainability of service provision. This is evidenced in the case of Malaysia (see Malaysia case study), as articulated by the regulator SPAN: "One of the challenges is unsustainable tariffs. We were unable to obtain approval to increase tariffs from 1994 until last year. However, the current tariff does not equate to operating costs as we need a few hikes to reach the break-even point. Excessive tariff increases will burden the consumers. SPAN is not a 100% autonomous entity and tariff review requires the approval of the Minister and Cabinet. We know the sector needs sustainable tariffs in order to break even on costs, but politicians' focus is mainly on what the impact will be on consumers."[4]

Principle 4: Tariffs should be set to a level that ensures recovery of operational costs as well as safeguards sustainability and equity of services.

Used effectively, tariff setting provides a key tool for economic regulators, both for holding service providers accountable for investment commitments and for incentivizing efficiencies. In the Americas, countries such as Chile and Peru are utilizing tariffs to promote efficient service provider business models. The regulatory authority in Peru, SUNASS requires service providers to develop optimized master plans setting out their investment plans and proposed tariff changes on an annual basis. SUNASS conducts additional field studies to inform their technical review and maintains the capability to adjust the proposal, which is also informed by a public consultation process. For SUNASS, the key principle is to ensure tariffs are set to a level that ensures recovery of operational and maintenance costs as well as safeguards sustainability of services: "financial solvency is a regulatory target for us. Our first tool will be tariffs."[5] Following finalization of tariffs, service providers are monitored by SUNASS on a year-by-year basis to ensure consistency of investments with the approved tariff studies. The SUNASS approach is consistent with that of ESAWAS member countries in the African Region, such as EWURA (the United Republic of Tanzania), who emphasize the importance of utility business plans and the regulator's role in ensuring plans are bankable.

Although SUNASS nominally has the autonomy to set tariffs, in practice, the proposals it develops are advisory, since they may be overruled by the responsible ministry (see also Portugal case study). Manila, the Philippines provides a contrasting example where the Metropolitan Waterworks and Sewerage System Regulatory Office (MWSS RO) has full autonomy to determine tariffs. MWSS RO has leveraged this instrument effectively to incentivize improved sanitation service delivery and reinvestment from the private sector concessionaires it regulates (see Manila case study).

Chile provides a further example where the tariff instrument has been utilized to drive huge performance improvements, in this case for wastewater treatment. The regulator Superintendence of Water and Sanitation Services (SISS) recognizes the need to enable incentives for innovation in tariff processes to improve service efficiency and environmental sustainability. SISS allows operators to charge operational expenses (OPEX), capital expenditure (CAPEX), self-financing and a profitability (7% as the minimum capital cost rate) in the tariff. This model has been cited as a key driver of improvements in wastewater treatment from 8% in 1989 to 99.8% in 2012 (see Chile case study).

As emphasized by Water Integrity Network (WIN) *(28)*, a significant integrity risk can arise from lack of regulation of private service providers' tariffs. This loophole facilitates the potential for overcharging, particularly in areas where alternative service providers are scarce. Since private service providers often operate in informal settlements inhabited by marginalized communities, this exacerbates the disparity, resulting in economically disadvantaged individuals paying

[4] SPAN. Key informant interview.
[5] SUNASS. Key informant interview.

disproportionately higher fees for unregulated services. This issue mirrors the disparities seen in the WSS sector, where impoverished communities bear a heavier financial burden for access to drinking water compared with their wealthier counterparts with established household connections. Addressing this imbalance necessitates the comprehensive regulation of all service providers, whether formal or informal, to ensure fair and equitable access for all *(28)*.

Case study: Manila, the Philippines – leveraging tariff adjustments to incentivize performance

Manila underwent significant reforms in 1997, privatizing its water and sewerage system and awarding 25-year contracts to two concessionaires, who adopted responsibility for delivering water supply, sewerage and desludging services – Maynilad Water Services, Inc. in the West Zone and Manila Water Company, Inc. in the East Zone. The former utility, the Metropolitan Waterworks and Sewerage System (MWSS), changed its role to that of concession manager, and a regulatory office (MWSS RO) was set up as an adjunct to it *(22)*. MWSS RO currently has 91 staff, including 7 staff directly involved in wastewater services. However, a parliamentary bill is now under review, which would lead to a significant expansion of the regulator's jurisdiction, incorporating wider districts and potentially doubling the number of staff.

Tariff adjustments are the regulator's main accountability mechanism. The primary task of MWSS RO is to determine a reasonable tariff and monitor the compliance of the concessionaires with the revised concession agreements. The tariff rate is rebased every five years, with performance targets agreed as part of the negotiations around this *(23)*, including targets on sewer, sanitation and effluent quality. Within this framework, the concessionaires are set clear annual milestones and capital investment requirements, providing quarterly and annual reports to MWSS RO against defined KPIs.

The approach to regulating wastewater and desludging services in Manila has evolved significantly over time. As outlined by Patrick Ty, Chief Regulator of MWSS RO, the concessionaires were initially focused on water supply. Performance in wastewater management had no significant impact on water tariffs, meaning the concessionaires lacked any real incentive to invest in wastewater. A link has now been established between the level of sewered coverage and the environmental charge concessionaires are eligible to include in the water bill: the concessionaires will be allowed to increase the environmental charge from 20% to 25%–30% during the tariff adjustments in the next five years, subject to meeting the agreed targeted service coverage for sewerage services. This increase in the environmental charge will materialize as revenue, strengthening the investment case for sewerage infrastructure and services, and ultimately resulting in expansion of wastewater coverage in Manila. Sewer connection fees can also be recovered through the water tariff *(9)*.

At present, 75% of Metro Manila's population uses septic tanks, with a target to increase sewered coverage from 25% to 45% in the next rate rebasing exercise in 2027 and to around 80% in the long term.[a] An increasing block tariff structure is deployed, with households consuming less than 10 cubic metres of water charged lower rates subsidized by wealthier consumers. Wastewater services are also heavily subsidized for this lower-consumption group. Desludging services are integrated into the water bill. Despite having already paid for the service through the bill, uptake of the desludging service is only 30% in the West Zone of Metro Manila, presenting a public health risk through discharge into the local environment without pretreatment. This is a challenge to both Maynilad and MWSS RO, who have a role in ensuring compliance with effluent discharge standards set by the Department of Environment and Natural Resources. To address this, MWSS RO: embarked on an information campaign via social media, raising awareness of the need to desludge septic tanks every five years *(10)*; and engaged with local government units, encouraging them to adopt a proactive role mobilizing households to avail of the desludging service.

In 2021 the MWSS RO was granted its own charter, as part of Executive Order No. 149 that granted the office greater independence from the Board of Trustees. With this independence came the ability to impose fines and penalties on the concessionaires, positioning the regulator to apply both carrots and sticks. This has had a positive impact on levels of investment: "Both concessionaires are now spending money to ensure they are meeting all their targets; for non-revenue water but also for sewerage."[b]

Although the MWSS RO continues to evolve its approach to regulating sanitation, the Manila experience is already cited as one of the most successful examples of water privatization *(10)*, highlighting the role of the regulator in creating positive incentives that can drive service improvements. The proportion of the city population with access to safely managed water supply has increased from 48% in 1997 to 91.5% in 2023, and from 10% to 82% access to safely managed sanitation. In the view of Patrick Ty, regulation has been central to this success: Manila is "still considered the best privatization in the world, and the real reason it worked is because it's properly regulated; because we made sure utilities met certain conditions … (regulators) need to allow the water utility to recover their expenses, but with related targets and requirements … require them to spend before they get tariff increases. There needs to be a carrot for them to perform, especially for the private sector."[c]

[a] Patrick Ty. Key informant interview.
[b] Ibid.
[c] Patrick Ty. Key informant interview.

3.3 Establish a licensing regime

Principle 5: Licensing and performance contracts offer useful tools for ensuring accountability of private sector service providers.

Licensing arrangements provide a robust accountability mechanism – particularly where the private sector provides services independently, dealing directly with customers – and are deployed by regulatory authorities across the sanitation service chain. Among ESAWAS member countries in the African Region, the tool has notably been deployed to drive through expansion of service authority responsibilities. As outlined by the Kenyan regulator WASREB, licensing can serve as "the entry point for enforcing regulations". Through their jurisdiction to grant or withdraw licenses to water service providers, WASREB has been able to push these utilities to incorporate on-site sanitation within their mandate.[6] In Malaysia, the regulator SPAN leverages the license to carefully define the scope of operations for the licensee and to promote long-term business planning. License renewal for public water and sewerage operators is subject to the development of five-year business plans (see Malaysia case study). Licensing also represents an additional revenue stream for many resource-constrained local authorities.

Building on WASREB's perspective, it should be emphasized that in some contexts, establishing the licensing regime may be the logical first step in developing detailed regulatory frameworks and accountability mechanisms. Who the service provider is will be critical for determining the appropriate instruments for regulation. Whether by license or contract, the authority to provide services is first granted by the regulator, who then enshrines the conditions for operating.

Licensing is an equally fundamental tool in the area of wastewater and faecal sludge treatment. Portugal adopts an approach reflected by countries across regions, whereby the Portuguese Environment Agency issues discharge permits for wastewater treatment plants and applies penalties in cases of non-compliance (principally failure to meet treatment standards for effluent discharge). In the view of the informant from the Republic of Moldova, licensing is the single most powerful tool available to regulatory authorities.[7] The licensing function becomes even more critical where the regulator's autonomy to determine tariffs is compromised (see section 3.2).

Licensing regimes for all aspects of sanitation service provision should include possible sanctions such as license suspension/removal/transfer and contract termination, to protect integrity and penalize non-compliance *(29)*. However, the ideal is to promote voluntary compliance (see section 3.4).

Principles for structuring licensing arrangements with private sector service providers are summarized in Box 13.

Box 13

Principles for structuring licensing arrangements with private sector service providers *(5)*

The WHO Guidelines on sanitation and health *(5)* provide guidance on the structuring of licensing arrangements with the private sector, stipulating:

- Licensing arrangements should specify service standards, annual targets, an inspection regime and remedies for failure to meet the conditions.
- The arrangement may also (but not necessarily) specify maximum fees, or an equitable tariff structure covering one-time (e.g. connection fees) and regular services.
- Separate licensing arrangements may also be a good option for private sector operators selling processed sludge products (solid or liquid) to ensure that adequate pathogen control measures are in place.

[6] Richard Cheruiyot. Key informant interview. 2022.
[7] Ion Salaru. Key informant interview. 2022.

Performance contracts have also emerged as a useful tool for ensuring accountability of private sector service providers. In Kenya for example, water service providers have the exclusive mandate for service provision, but are able to engage private sector operators through performance contracts, through which issues in the level of service offered by the private sector partner can be addressed. In Zambia, commercial utilities can enter into service agreements/permits with the private sector, but must first gain consent from NWASCO; private sector third parties are then answerable only to the utility, in a form of delegated regulation.

The conditionality of public sector support represented by licensing arrangements and performance contracts can also be used to **incentivize the private sector to serve low-income urban residents** (provided the tariff structure allows for profit). For example, utilities or local governments aiming to engage the private sector in pit-emptying services can make licenses conditional on maintaining a minimum percentage of the customer base from low-income areas *(30)*.

3.4 Ensure effective compliance monitoring and enforcement

Principle 6: A responsive regulation approach that responds to social, economic and normative motives for compliance should be adopted.

A key aspect of the regulatory challenge is ensuring compliance with approved standards, regulations and guidelines. Enforcement poses different challenges for regulatory authorities operating at different stages of the sanitation chain – from compliance with standards for containment structures, to SOPs for pit-emptying services, to wastewater effluent discharge standards.

Although regulators must be able to draw on hard sanctions as a last resort, the ideal is to facilitate, and create the incentives for, voluntary compliance. Voluntary compliance requires alignment with social, economic and normative motivations, the capacity to comply and a supporting enabling environment *(31)*. Responsive regulation is a flexible approach combining support and sanctions, where initial strategies are less coercive, less interventionist and cheaper, before moving to harder sanctions *(32)*. This means the creation of mechanisms to incentivize and enable service providers to improve, rather than assuming top-down enforcement. The latter must be retained as an option; but within a wider regulatory toolkit which also includes (for example) industry collaboration for learning and capacity-building (Chapter 5), consumer and civil society engagement (section 3.5) and performance recognition through (for example) industry awards (section 3.6).

Responsive regulation reflects learning from other sectors such as energy and telecommunications, whereby regulators work closely with other actors in a form of regulatory pluralism. The principle reflects a global shift in how regulators in different sectors are evolving from resource-intensive "command and control" approaches towards responsive, flexible and innovative regulation *(20)*.

Responsive regulation can support social alignment, as outlined in Box 14, and build voluntary compliance.

Box 14

Principles for a socially aligned approach to regulation

Voluntary compliance requires social alignment between the regulator and the service authorities it regulates. Three principles that can support social alignment and responsive regulation are as follows:

- **Having credible sanctions that are highly targeted and highly visible but used only in extremis.** This means regulatory authorities only punish wilful non-compliance (persistent offenders) rather than incompetence or lack of capacity.
- **Leading with social norms and engaging with trust**, rather than relying on threats of sanctions.
- **Visibly rewarding and building status, so that compliance is valued.** The awarding of prizes for high performance in benchmarking exercises (see section 3.6) is an example of this approach *(32)*.

Several regulators consulted for this study have implicitly adopted a responsive regulation approach — leading with incentives, providing scope for improvement and rewarding incremental change, but with the capability and autonomy to implement harder sanctions where required. This can be seen in approaches to **licensing** (section 3.5) and **tariff setting** (section 3.2). In Zambia for example, NWASCO has developed guidelines on licensing requirements for commercial utilities. If the utility fails to comply with regulations, they are placed under special regulatory supervision, an intrusive form of regulation with closer monitoring of the utility's operations; if there is no sign of improvement, the license be suspended. NWASCO has demonstrated its willingness to take this measure where required, having suspended two commercial utilities' licenses in 2022 *(33)*. In Manila, MWSS RO have focused on creating economic incentives for sanitation service extension; but the recent acquisition of powers to back this up with fines and sanctions where needed has had a positive impact on levels of investment (see Manila case study).

Principle 7: Sanitary inspections should be conducted regularly to ensure systems are being managed to meet health objectives, in line with the SSP approach.

The provision and emptying of small-scale on-site sanitation systems has been seen to pose a particular challenge for compliance monitoring and enforcement. Many municipal authorities lack the capacity to monitor standards for the construction of pit latrines or septic tanks, which in most countries is viewed as a household responsibility; or to adequately enforce the emptying of these facilities. In the oPt for example, on paper, municipalities have a responsibility to enforce regulations around on-site sanitation systems. However, according to a WSRC key informant, the responsible authority may be a village council with no full-time staff and very limited human-resource capacity. Lack of active regulation of on-site sanitation systems has also been observed in the Americas, in countries such as Argentina, and across the WHO European Region in countries such as Azerbaijan, Romania and Serbia *(33)*.

For countries in the early stage of developing levels of compliance monitoring and enforcement in this area, the adoption of sanitary inspections, concomitant to available levels of financial and human resources, can be a first step. Detailed guidance and tools to support sanitary inspections is provided in the *WHO Sanitation safety planning manual (6)*. The SSP manual is aimed primarily at local authorities, as a tool to coordinate, plan improvements to and monitor services in an administrative area. Within this monitoring component, public health and environmental health officers will often play a key role in conducting inspections, as well as in collecting information on sanitation facilities and how they are used; the effectiveness and safety of in situ treatment or the emptying and transport of faecal sludge; and the effectiveness of faecal sludge and sewage treatment against national standards or permits *(5)*.

As outlined in Chapter 2, it is critically important to have a clear delineation of responsibilities, and feedback mechanisms, between public health offices (who will often lead compliance monitoring on the ground, particularly at the containment stage), economic regulators (where these exist) and environmental authorities. The Kisumu case study below provides an example of the role of county-level public health offices in developing and enforcing SOPs for faecal sludge emptying services in the highly devolved context of Kenya.

In high-income contexts, Ireland provides an outstanding example of implementing a rigorous national programme for the inspection of domestic wastewater treatment systems. The Ireland case study exhibits the principles of responsive regulation, through clear communication to households; the provision of financial support to fixed failed systems; and recourse to effective enforcement mechanisms, used only as a last resort. Portugal provides another notable example of integrating small-scale on-site sanitation systems into the regulatory and benchmarking framework (see Portugal case study).

Key monitoring activities that must be performed for sanitation services are summarized in Box 15.

Box 15

Monitoring sanitation services

Responsibilities for effective monitoring typically extend beyond regulatory offices to include local governments, environmental authorities and responsible line ministries. The WHO Guidelines on Sanitation and Health *(5)* provide a summary of the key monitoring activities at each level:

- **Individual facility level:** Checking that sanitation standards are being met and good hygiene behaviours practiced (this function will frequently be performed by environmental health officers).
- **Community level:** Environmental health inspections to check standards and practices are met in all settings across the entire community.

- **Utility or service provider level:** Ensuring sanitation safety plans are present and implemented, and that standards are met along the sanitation service chain.
- **Subnational level:** Ensuring bylaws and regulations are set and monitored; measuring sanitation indicators and quantifying progress (generally the responsibility the regulatory office and/or local governments. For more information on defining sanitation indicators, see Chapter 4).
- **National level:** Aggregating the local statistics to the national level to track progress towards national and global targets.
- **International level:** Monitoring progress towards the SDGs (see Chapter 4)

Case study: Ireland – a national plan for inspection of domestic wastewater treatment systems *(34)*

In Ireland, the Environmental Protection Agency (EPA) oversees the implementation of the *National Inspection Plan for Domestic Waste Water Treatment Systems 2022–2026*. The plan was founded on the Water Services (Amendment) Act 2012, which provides for inspection responsibilities for domestic wastewater treatment; and the *Domestic Waste Water Treatment Systems Regulations 2012*, which pertain to the operation and maintenance of these systems and the requirements of desludging.

The plan provides a strong example of a rigorous yet transparent inspections regime, with homeowners supported at every stage. Notable features of the plan include:

- **Clarity of responsibilities at the household, local and national levels:** Under the Water Services (Amendment) Act 2012, homeowners are required to register systems; and assigned clear responsibility for ensuring that system does not present a risk to human health or the environment. Homeowners must comply with inspections, which are carried out by inspectors from the water services authority (WSA) (of the local council), which also takes and maintains registrations. The EPA appoints inspectors to issue the national inspection plan and supervise the WSA's work in this area.
- **Clear inspection criteria, communicated to homeowners:** domestic wastewater treatment systems are inspected according to transparent criteria: the system should not leak, and should not allow roof water or surface water to enter the system; all parts of the system should be fit for purpose; and the system should be desludged at appropriate intervals by an authorized contractor (homeowners need to keep receipts of desludging to evidence this). The EPA provides guidance on its website to help homeowners establish an appropriate interval for their system, and publishes information on what to expect from an inspection, as well as the findings of inspection reports.
- **Inspection targets and guidance for site selection:** WSAs are required to complete a minimum of 1200 inspections nationally per annum under the plan. Inspections are prioritized into highest relative risk areas – close to rivers and in areas with shallow soils and drinking water wells – and WSAs provided with guidance on the number of inspections to be completed in each risk zone. WSA inspectors (of whom there are over 100 nationally) attend a training course.
- **Effective enforcement measures where required:** The rigour of inspections is evidenced by a failure rate that can exceed 50% (the main issue leading to failure is homeowners failing to desludge and maintain their tanks). In such cases, the WSA issues an advisory notice to the homeowner. Data from 2013–2023 shows that 80% of systems that failed have been fixed. Where homeowners fail to comply, legal actions can be initiated; as of 2023, 62 legal actions have been initiated by seven WSAs nationally *(35)*.
- **Availability of grant schemes to fix systems that fail inspection:** Three regulations were introduced in 2020 to ensure availability of grants to help homeowners fix systems that fail inspection. Planning exemptions are issued where structural remediation works are required; and homeowners are provided with information on where they can find assistance to help them fix their systems.

3.5 Raise consumer awareness

Principle 8: Regulators and surrogate regulators should raise awareness of consumer rights to strengthen accountability.

In supporting equitable access to sanitation services, behavioural and social aspects must be addressed. This involves engaging communities at different steps of sanitation projects and service delivery and confronting the stigma related to sanitation. Community-led initiatives must be supported through awareness campaigns and participatory planning.

To achieve improved public health outcomes related to sanitation, community-level behaviour change activities may be required across areas such as demand creation, toilet maintenance, pit-emptying practices and handwashing. Large-scale behaviour change campaigns of this type will often be led by health ministries and/or local governments. However, regulators and surrogate regulators may also have supporting roles. For example, behaviour change should be encouraged through regulations that emphasize hygiene education and community involvement. Detailed guidance on creating sanitation behaviour change interventions is provided in the *WHO Guidelines on sanitation and health (5)*.

The role of the regulator in this area will vary according to their specific mandate, and it is important to avoid duplication with other sector actors. Several regulators consulted for this study viewed raising consumer awareness as an important part of their regulatory remit. Central to this objective is raising awareness of consumer rights, and the services customers are entitled to expect, through targeted public information campaigns. For example, ERSAR has produced educational videos, aimed at the public, on topics such as drinking-water quality (see Portugal case study). The aim of these activities is to raise awareness of health risks, but also to strengthen consumer complaint mechanisms, viewed as part of the regulator's "soft power" in holding service providers accountable. According to a key informant from ERSAR, "We see cases where consumers are complaining, but not as they should be. We are seeing [consumer] complaints are a way of changing the utility's procedures". WSRC, the water and sanitation regulator in the oPt, also expressed commitment to raising consumer awareness to strengthen accountability, providing regular radio broadcasts where they update on service provider performance.

Consultation processes to inform and consult the public – as practiced by WASREB (Kenya) and NWASCO (Zambia) among others – are a vital step in introducing planned regulatory reforms. The regulator may also have a role in reinforcing messages that are less readily accepted by the public: for example, countering misconceptions (where they exist) that the HRWS implies these services should be free, when this would undermine financial viability and the long-term sustainability of services.

Consumer engagement features prominently in the 2030 strategy of SISS, the economic regulator in Chile. The strategy emphasizes that "people are the ultimate goal of water and sanitation services" and must be at the centre of decisions and actions, with "information, dialogue and a better understanding of public expectations" required. SISS sets out its commitment that "a certified standard of relationship between companies and their community will be defined and established in a participative manner, which allows the dialogue of each water utility company with its users, so that its management focuses on people" *(36)* (see also Chile case study).

Box 16

Engaging third parties as surrogate regulators

Surrogate regulators are third parties that are not the primary regulator or target of regulation, but contribute to the delivery of regulatory functions *(37)*. In some contexts, working through surrogate regulators can reduce the costs of regulation and increase its effectiveness. Surrogate regulators are typically used to deliver functions such as standard setting, monitoring, or support and guidance to regulated entities. They can be formal or informal actors, commercial or non-commercial and include businesses, associations, industry bodies, community-based organizations or nongovernmental organizations (NGOs).

Several regulators interviewed for this study are already engaging, or even establishing, surrogate regulators – for example, by engaging community-based organizations to raise consumer awareness, engaging pit-emptying associations or NGOs to provide training, and establishing new community-level structures, such as Water Watch Groups created in Zambia by NWASCO. The effectiveness and impact of surrogate regulators is significantly increased if they are engaged intentionally, carefully selected and resourced, and allocated clear roles, in coordination with other surrogate regulators.

3.6 Facilitate performance benchmarking against KPIs

Principle 9: Comparative data on service provider performance should be published wherever possible.

In sanitation, as in other sectors, public benchmarking of service provider performance against defined KPIs is a core regulatory tool. For countries seeking to replicate this approach, there is a growing number of examples across regions to learn from:

- Among low-income countries, ESAWAS members in the African Region are at the forefront in deploying public benchmarking to incentivize service provider performance. WASREB (Kenya) publishes a detailed "Impact" report annually, aiming for full public transparency around service provision by different utilities *(37)*. Similarly, in Zambia, NWASCO produces detailed annual sector reports with comparative performance ranking of the country's commercial utilities *(38)*.

- In the oPt, the economic regulator WSRC publishes annual performance reports, comparative data and district-level performance reports.

- Public benchmarking is also a prominent accountability tool in the Americas. In Buenos Aires, the regulator Ente Regulador de Agua y Saneamiento (ERAS) implemented a benchmarking system since the late 1990s, inspired by the Ofwat system in the United Kingdom. This approach has now been diffused through the regional association of water and sanitation regulators in the Americas, *Asociación de Entes Reguladores de Agua y Saneamiento de las Américas*, with World Bank support. ERAS are strong proponents of this approach, stating "the most effective tool is publishing the information" *(33)*.[8]

- In Portugal, ERSAR publishes data annually on service provider performance against 21 KPIs encompassing wastewater, 17 water KPIs and 23 waste management KPIs (see Portugal case study);[9] while in the Netherlands, data are publicly available on Water Board performance in areas including wastewater treatment.[10]

A number of regulators consulted for this study emphasized the importance of benchmarking systems for creating positive incentives, and the need to **connect these systems to industry awards, prizes and wider incentives**. In the oPt, for example, the regulator WSRC has developed a comprehensive performance monitoring framework including indicators covering operations, financial sustainability, community engagement and gender mainstreaming, among others. WSRC publishes these data in reports documenting good and bad practice, described by the WSRC informant as "a shaming *and* appreciation list … it's about public recognition". NWASCO similarly emphasizes the importance of trophies, cash prizes and corporate recognition that accompany high performance in the benchmarking process *(33)*.[11]

Incentive-based regulation is used by the South African Green Drop certification programme, designed to catalyse change towards more proactive management of wastewater services. The potential for regulators and surrogates to jointly incentivize change through public benchmarking and rewards is also evidenced the Brazilian National System for Water and Sanitation Data database, and the awards for high performers provided by the Brazilian Association of Sanitation and Environmental Engineering *(21)*. The principle is articulated well by SUNASS, the Peru regulator. According to a key informant from SUNASS, "The approach has to be more about incentives than punishment. The purpose (of public benchmarking) is to increase the relevance that reputation will have for the regulator. Reputation is the incentive – to be first or second in the benchmarking; to be a company that executes investments in a responsible way".

[8] Key informant interview: Molinari, in WHO (2022).
[9] See https://www.ersar.pt/pt/site-publicacoes/Paginas/edicoes-anuais-do-RASARP.aspx.
[10] See https://waves.databank.nl/.
[11] Key informant interview: NWASCO, in WHO (2022).

Designed appropriately, **performance benchmarking can also be a powerful tool for incentivizing equitable service provision**. An inspiring example that could be replicated by other regulatory offices is provided by WASREB, the Kenyan regulator, who introduced a pro-poor KPI mandating utilities to report levels of service to low-income urban communities. The pro-poor KPI has already resulted in a significant increase in service coverage to these areas (see Kenya case study). WASREB is now adapting their monitoring framework further to include a dedicated KPI for on-site sanitation services. Box 17 summarizes wider measures to promote equity within regulatory frameworks.

Box 17

Incorporating Gender Equity, Disability and Social Inclusion (GEDSI) considerations into regulatory frameworks

Disadvantaged and vulnerable groups must be explicitly considered if disparities in access to safely managed sanitation are to be understood and addressed. This includes consideration of diversity within target populations in terms of service level, wealth, age, health, sex and gender. Assuming that all users of sanitation services are a single homogeneous group may overlook important vulnerabilities that affect marginalized users *(3)*.

To ensure inclusion, GEDSI considerations should be mainstreamed in the development of regulatory frameworks relating to sanitation service delivery. This involves systematically reviewing potential vulnerabilities and points of exclusion, as part of the development process for all regulations, guidelines and standards; and ensuring that identified barriers are addressed.

For example, relevant regulations, guidelines and standards should stipulate that shared or public toilets be gender-sensitive (e.g. with cubicles separated by gender, and constructed in a way that ensures privacy, with the provision of facilities for menstrual hygiene management and for disposal of menstrual materials); that sanitation facilities are accessible for people with disabilities; and that the health and safety of sanitation workers is protected (see also section 3.2). At the community level, the participation of disadvantaged groups must be promoted in the planning, design, siting and management of sanitation facilities.[a]

In processes such as SSP (see section 3.1), ensuring equity may include:

- Explicitly considering users in informal settlements when assessing risks;
- Recognizing the need to compensate stakeholders adversely affected by improvement measures;
- Considering all users in monitoring programmes; and
- Developing emergency response plans that consider the needs of different groups (e.g. those with limited access to communication systems).[b]

In parallel, regulatory agencies must establish systems to monitor and evaluate the effectiveness of GEDSI integration in sanitation services. This includes incentivizing equity through the incorporation of specific KPIs in benchmarking and reporting systems. A leading example in this area is the initiative of WASREB, the Kenyan regulator, to mandate utilities to report levels of service in low-income urban communities, including informal settlements (see Kenya case study).

[a] For specific guidance on female-friendly communal and public toilets, see "Female-friendly public and community toilets: a guide for planners and decision makers" *(41)*.
[b] Adapted from WHO (2023).

In addition to providing a case study of regulating to achieve equity, the KPI under development by WASREB is a leading example of applying proven benchmarking approaches to on-site sanitation more broadly. As outlined by USAID, although benchmarking has been widely applied to water and wastewater services, the practice has only just begun expanding to faecal sludge management. Nonetheless, faecal sludge management benchmarking has considerable untapped potential as a versatile regulatory tool that can improve transparency, foster competition, and inform advocacy and financial and management decisions. For guidance on potential indicators to include within faecal sludge management benchmarking systems, see *Lessons and Good Practices for Benchmarking Fecal Sludge Management (39)*.

For further guidance on indicators to include in performance benchmarking frameworks, see Chapter 4.

Case study: Kenya – introducing a pro-poor KPI to drive service improvements to low-income urban areas

WASREB, established in 2003, is responsible for economic regulation of water and sanitation services in Kenya. WASREB now directly regulates more than 90 licensed water service providers and has overseen an impressive increase in coverage of water services over this period with access increasing from 39% to 65%. However, access to these basic services in low-income areas has effectively decreased over this same period, due to rapid urbanization.

WASREB is a regional leader in developing and applying a comparatively advanced set of regulatory mechanisms, including using public disclosure of data to drive change. WASREB annual reporting aims for full public transparency around service provision by ranking utilities against KPIs. Prior to 2018, the reporting process did not explicitly require utilities to focus on low-income areas. Indeed, prioritizing higher-income areas would help utilities to score highly on WASREB's established indicators, such as cost recovery and revenue collection *(40)*.

In 2018, WASREB introduced a tenth KPI which specifically targets services in low-income areas. This indicator assesses progress made by utilities towards improving services in low-income areas against four dimensions of governance, planning, financing and impact. Being structured in this way enables WASREB to both guide and hold utilities accountable for laying the foundation for pro-poor service expansion. Utilities are incentivized to establish pro-poor policies, dedicated low-income consumer units and ensure Board representation; and supported to map low-income areas, plan for service provision and develop appropriate business plans. The budget and resources allocated to low-income areas are monitored. Finally, impact in terms of actual growth of services in low-income areas is reported.

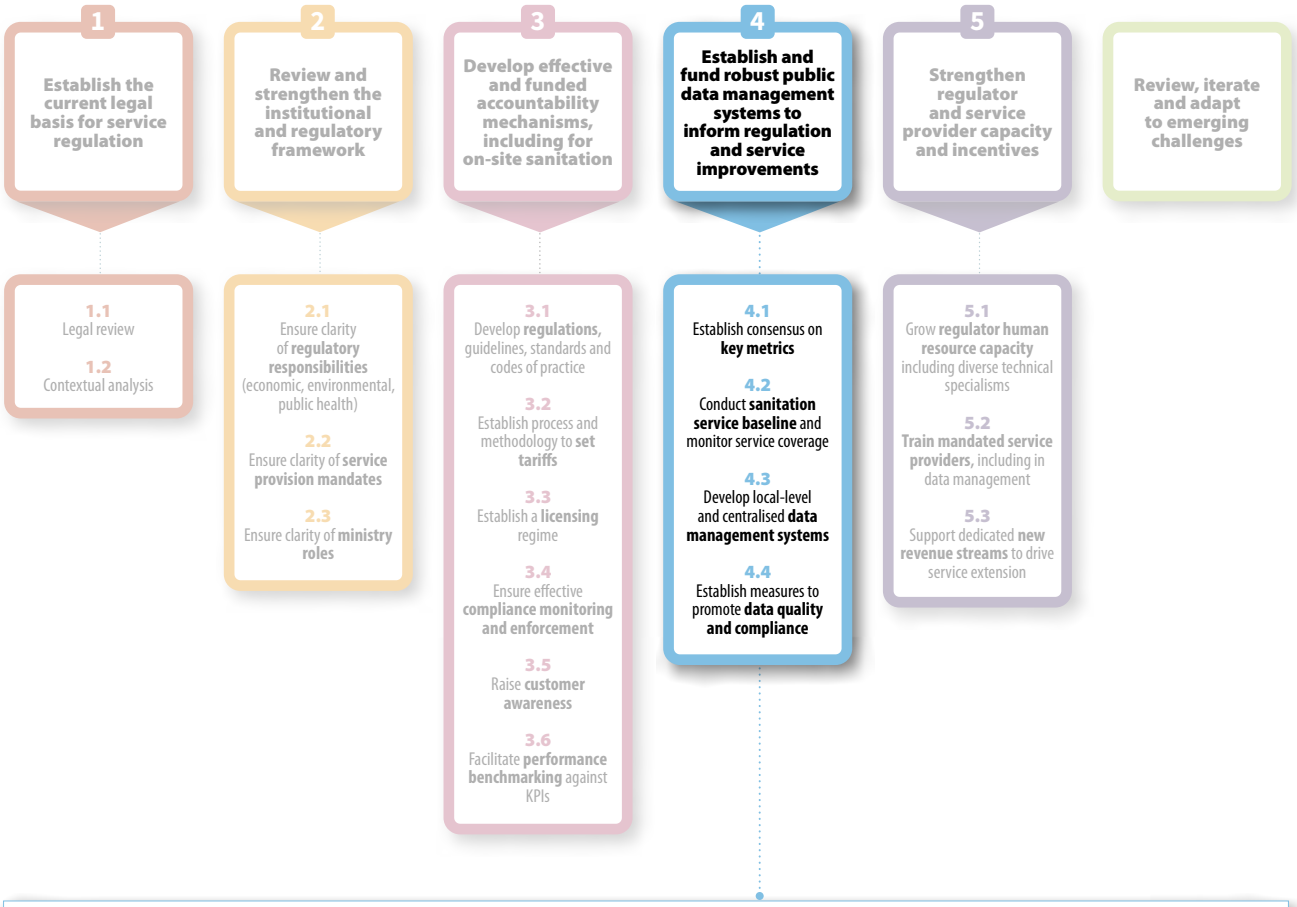
The sophistication of this accountability mechanism lies in creating a roadmap for expansion of services in low-income areas and making progress at each visible step. It incentivizes incremental and sustainable change.

The pro-poor KPI 10 is not yet used to inform the overall ranking of utilities. However, in the annual WASREB Impact Report, the highest and lowest performing utilities are highlighted. The number of utilities assessed on their efforts towards improving services in low-income areas is gradually increasing. In 2020–2021, 58 utilities were assessed, an increase of 7% from the previous year. The scores across each of the four dimensions for all 58 utilities is shared publicly *(42)*.

As outlined by ESAWAS and WSUP *(18)*, regulatory reforms such as KPI 10 can usefully be viewed as systems interventions – the introduction of these reforms requires an incremental, iterative process of testing, monitoring and adaptation in response to system feedback. This is why regulatory reform must be an incremental process, underpinned by extensive stakeholder management and consultation; to rush these processes risks being counterproductive and distorting the system in unhelpful ways.

4. Establish and fund robust public data management systems to inform regulation and service improvements

Fig. 7. Roadmap for advancing sanitation regulation



Chapter in brief: Regulators, service providers and citizens need data-backed information to plan, perform and improve services. This chapter sets out the steps involved, and the role of the regulator, in developing robust public data management systems. Key principles are outlined and supported by examples of regulators adopting information-based strategies.

Guiding principles for Step 4

1. Regulators should build consensus on key indicators to be measured. Local-level and national indicator definitions and monitoring elements should align with national targets on sanitation, and wherever possible, with relevant elements of regional and global norms. Additional local-level indicators can then be developed according to contextual requirements.
2. On-site sanitation must be included within monitoring frameworks and assessed as part of sanitation service baselines.
3. Centralized data management systems should be established to facilitate internal coordination, enable sector reporting and minimize requests for data on service providers.

4.1 Establish consensus on key metrics

Principle 1: Regulators should build consensus on key indicators to be measured. As a priority, local-level and national definitions and monitoring elements should align with national targets on sanitation, and wherever possible, with relevant elements of regional and global norms. Additional local-level indicators can then be developed according to contextual requirements.

Establishing and funding robust public data management systems is imperative for advancing decision-making processes within the sanitation subsector. By ensuring availability of comprehensive and accurate data related to sanitation service provision, these systems empower regulators and policy-makers to make evidence-based decisions, foster stakeholder engagement and accountability, and encourage collaboration among diverse actors. Through effective data management, regulators can monitor performance, evaluate regulatory interventions and identify areas for improvement, ultimately driving progress towards sustainable and equitable service delivery.

A first step in developing data management systems is defining the key indicators against which service levels are to be assessed. Reflecting the principle that "what you measure is what you manage", indicator definitions and standards must be carefully developed. While it will often be appropriate for regulatory authorities to lead this process, wider stakeholders, including service providers, should be consulted. Drawing on these consultations, it is important to include key information that service providers need to manage their services effectively and efficiently. This will assist (and help motivate) service providers to obtain usable information that can be easily passed on to the regulatory process.

The monitoring indicators selected should reflect the mix and classification of sanitation options within the reporting area. As a priority, both local-level and national definitions and monitoring elements should align with national targets on sanitation. Wherever possible, indicators should also align with relevant elements of regional and global norms.

A base level of alignment between local and national-level data systems should be promoted wherever feasible, after which additional local-level indicators should be developed as required, to ensure alignment with relevant regulations, standards and bylaws, and to monitor critical control points highlighted through local-level risk assessments *(5)*. In highly decentralized governance systems, it will be especially important to establish a feedback loop to more generic systems and indicators at the national level.

In addition to service access and service quality, frameworks must be developed to support compliance monitoring for faecal sludge and wastewater treatment (this will often be implemented by environmental authorities rather than economic regulators). For detailed guidance in this area, see *Developing wastewater and sludge treatment regulations and standards: general guidance with a special focus on countries with limited resources (8)*.

4.2 Establish sanitation service baseline and continue to monitor service coverage

Principle 2: On-site sanitation must be included within monitoring frameworks and assessed as part of sanitation service baselines.

In parallel with the definition of key metrics, and depending on the level of data available, large-scale surveys may be required to establish a robust baseline for current levels of sanitation service provision. In many countries, these data may be completely absent, particularly in peri-urban and rural areas. Establishing current service levels can be a significant task requiring time and dedicated financial and human resources, including the training of enumerators.

It is critically important that on-site sanitation is included within monitoring frameworks and that small-scale on-site sanitation systems are assessed as part of baseline surveys. In addition to information on household-level service access, it may be necessary to include information on sanitation infrastructure, including shared, communal and pay-per-use public toilets in urban contexts; transport infrastructure (such as road access for vacuum truck operators) and treatment infrastructure. The importance of this mapping exercise in providing the foundation for service improvements is articulated by the Rwanda Utilities Regulatory Authority (RURA): "For a well-integrated management of non-sewered sanitation, data collection is key. It is impossible to proceed without information. By mapping infrastructure, sanitation technologies and transport infrastructure, it becomes easier to see whether other types of desludging equipment can be used so that at least it will be possible to serve each citizen" *(43)* (see Rwanda case study). For an example of the large-scale mapping of on-site sanitation systems, see the oPt case study.

Provision for sanitary inspections should be included within monitoring frameworks (see section 3.4), to provide useful data for public health surveillance and monitoring.

Case study: oPt: mapping small-scale on-site sanitation systems in peri-urban and rural areas

In the oPt, WSRC was established in 2014 as part of ongoing sector reforms, and is responsible for the economic regulation of water and wastewater services. In 2023, WSRC completed a comprehensive mapping exercise to improve data management for on-site sanitation systems. Data were collected from 287 small-scale service providers across 450 communities. As outlined by WSRC, this was partly a response to the widespread issue of unregulated small-scale sanitation systems, often set up or supported by NGOs, where waste is typically discharged untreated into the local environment. According to a key informant from WSRC, "As a regulator we have started collecting data on all of these facilities; our intention is to begin enforcing with the Ministry of Environment to improve the performance of small-scale systems".

WSRC aims to ensure that all actors and communities are represented in the mapping, data for which is now collected on a quarterly basis and stored in a centralized data management system. Performance data for the service providers, which provides the basis for WSRC's performance benchmarking function (see section 3.6) is stored in the same database, which is open access for the United Nations Children's fund (UNICEF) (which funded the mapping exercise) and and other humanitarian donors in the oPt.

A key challenge is data validation, and the regulator has invested substantially in this process. According to a WSRC key informant, "If you want to have data, you have to spend a lot on data validation and data quality. Otherwise (the regulator) collects a huge amount of data which is useless. This is why we brief our customers on the importance of accurate data. Having fieldworkers who can engage service providers can support this. This is costly, but it needs to be done".

As part of its capacity-development activities (section 5.2), WSRC convenes three workshops per year involving all service providers. The workshops provide a space for service providers to set out their needs and concerns and to submit requests for technical assistance to the regulator. The first of these workshops is dedicated to training service providers on quality assurance and improving the data they provide, as part of the preparatory phase prior to roll-out of survey data collection. In the final workshop, WSRC presents the provisional version of the data analysis they intend to publish.

For the purposes of data analysis and technical assistance, service providers are divided by WSRC into three clusters according to the size of their customer base: small (less than 2 000 people), medium (up to 10 000 people) and large (more than 10 000 people). Recognizing the interdependencies between the quality of data provided and wider operations, WSRC advises on wider measures to build service provider capacity, for example by encouraging each larger service provider to recruit their own inspector.

4.3 Develop centralized data management systems

Principle 3: Centralized data management systems should be established to facilitate internal coordination, enable sector reporting and minimize requests for data on service providers.

The development of centralized data management systems was emphasized by many of the regulators consulted for this study. The complexity of these systems will be influenced by the available financial resources. At a minimum, such systems should include data relating to service access, service quality and all other KPIs included within regulatory performance reports. The systems may additionally include data on asset management and geographic information system mapping, subject to availability of resources to maintain and update these systems. Consultant support may be enlisted to support the development of digital platforms, which are critical in supporting data analysis and access to data (see India case study). Sanitation data may be integrated within existing data platforms for water supply services, as is currently planned in Nepal, where the MoWS is leading the development of a unified management information system, including water supply and all sanitation outcomes.

An important principle is to minimize the data burden on service providers as far as possible, to avoid duplicative requests. The rationale for developing centralized data management systems is articulated by the Malaysian regulator SPAN (see also Malaysia case study), relating to their Water Industry Business Intelligence System. SPAN outlines that from 2008 to 2016, the regulator manually gathered essential data from operators. Eventually, SPAN noticed that operators were more advanced than the regulator itself, especially Indah Water Konsortium (IWK) (the service licensee), which had its own system for asset management data and geographic information system. This informed SPAN's decision to develop a centralized system to process data and provide benchmarking for the industry. A second reason why SPAN developed the Water Industry Business Intelligence System was to have one focal point handling data collection. This addressed complaints from operators that too many people were calling them asking for the same data; according to a key informant from SPAN, the Water Industry Business Intelligence System helps all internal divisions to be on the same platform. At the time of writing, SPAN is developing a dashboard system that integrates data from the operators and other agencies.

As part of their leadership role, regulators have also supported the development of data management systems aimed principally at service authorities. One example is WASREB in Kenya, which has been central to the ongoing piloting of EquiServe,[12] a digital platform developed to support service authorities with sanitation investment planning.

[12] See https://www.equiserve.io/.

Case study: India – Development of state-level data systems to assess sanitation service performance

In the federal system of India, the **Performance Assessment System (PAS) for urban water and sanitation project** has facilitated a gradual and sustained shift in the practice of city and state governments, helping to build a culture of data collection and reporting to the national Government. The project started in 2009 and aimed to create a data-driven system focusing on measurement, monitoring and improvement of water and sanitation services. Importantly, the project was designed to include all cities in its pilot states of Gujarat and Maharashtra; it has since expanded to include more than 1000 cities across five States.

Prior to inception of the project, there was a widespread lack of reliable and updated information on sanitation service levels in the focus cities. The available data were in paper-based formats and were not collated or analysed for decision-making. Led by technical partner CEPT University, a thorough analysis was conducted of national and international benchmarking initiatives. The resulting performance assessment framework also drew on the Service Level Benchmarks (SLBs) for urban WSS of the Ministry of Urban Development in India. In addition to SLB indicators, the framework captures the performance of on-site sanitation through the SAN-Benchmarks framework.[a] The core data and monitoring framework comprises five aspects of water and sanitation services by urban local governments:

- access and coverage
- service levels and quality
- equity in access to service levels (based on assessments of service levels in slum areas)
- financial sustainability
- efficiency in service operations.

The project would not have been possible without the creation of a digital platform, delivered through an industry-academic partnership. A data entry module was developed to support data collection, validation and analysis; and **capacity-building sessions were provided for municipal officers** on utilizing the platform. The data management systems created through the project have had several important applications:

- **Regulation:** Multisectoral regulators, such as the Comptroller and Auditor General of India, have used PAS information to conduct performance audits of urban local bodies for selected cities in Maharashtra. The Comptroller and Auditor General of India in Gujarat, Chhattisgarh, Jharkhand and Telangana assess their regulatory compliance using PAS data.
- **Investment planning:** Through alignment with city and state-level reporting requirements, the PAS project has provided the basis for data-led sanitation investment planning in the focus States. Data is synthesized and presented to the Directorate of Municipal Administration Head Office at the city level, which provides information to state governments to inform investment decisions. Data entry completed in the PAS portal is gazetted annually at the state level.
- **Facilitating cash transfers from national to state governments:** Recognizing the importance of transparency, the Finance Commission, a statutory body appointed by the Government of India, has introduced grant conditionality requiring state governments to publish data and achieve targets on SLBs.
- **Provision of baseline data to inform the Swachh Bharat Mission:** The open-defecation-free (ODF) and ODF++ framework rolled out under the Swachh Bharat Mission is derived from information from the PAS pilot project in Maharashtra (see Chapter 8).

[a] See https://cwas.org.in/theme/monitoring/frameworks-and-toolkits.

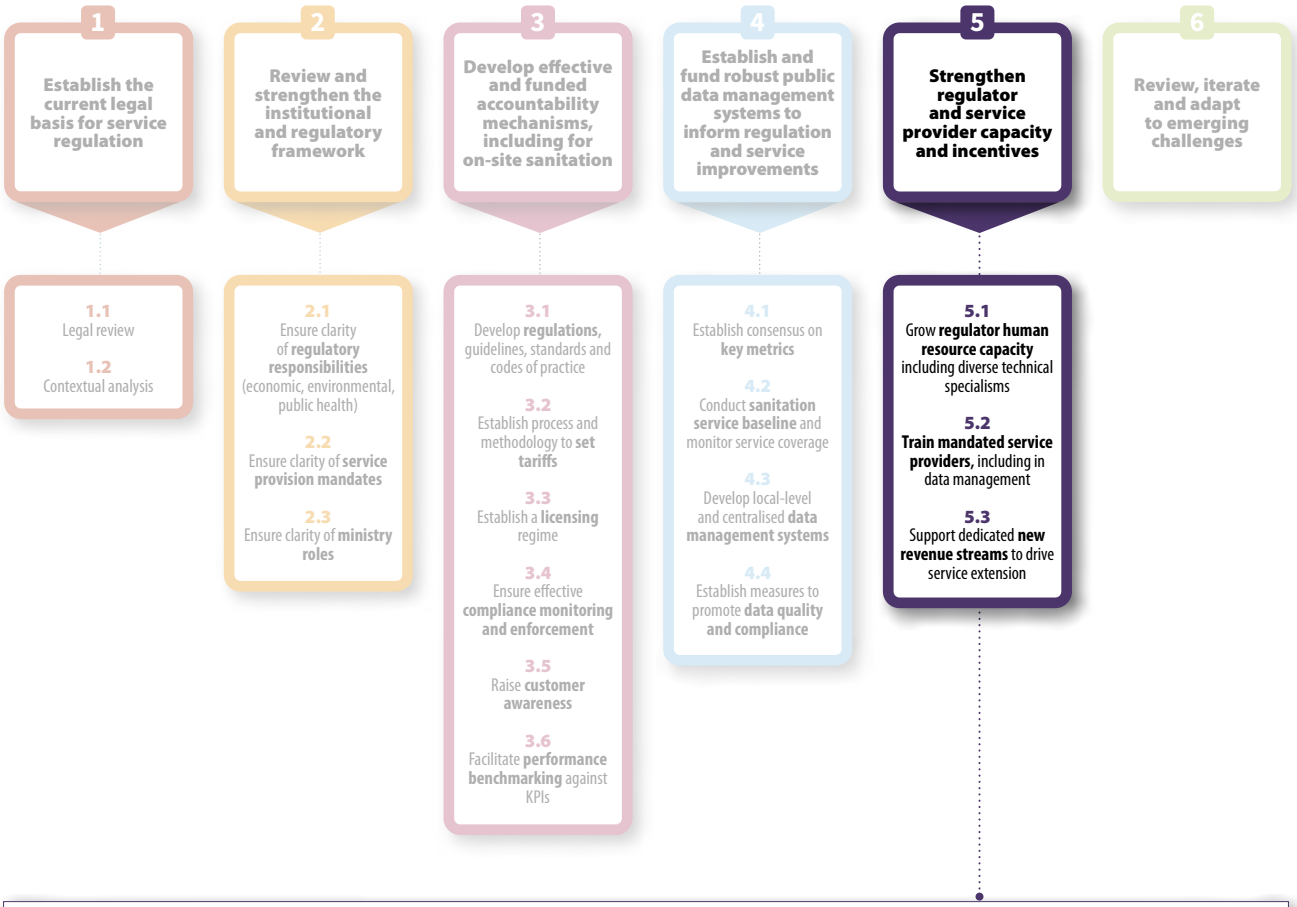
4.4 Establish measures to promote data quality and compliance

To use data to inform decision-making, regulators must establish rigorous processes for data validation and data auditing. Regulators consulted for the Roadmap cited data auditing as a capacity gap. This issue was effectively summarized by a key information from SUNASS: “All of Latin America has this issue of data auditing mechanisms. We collect so much information, we have a lot of data on the providers, but we still need to consolidate it and audit to guarantee that information we receive is accurate”. To support these ongoing efforts and address this capacity gap, the national water information analysis and monitoring centre (Cami Yaku) was created in Peru to conduct real-time analysis of information on the status of potable water and sewerage services provided by its 24 decentralized offices nationwide.

Many regulators will be handling vast quantities of data, and measures to ensure data quality and compliance must be realistic and concomitant with the resources available. Data quality assurance measures that can be adopted include establishing integrated, thorough and systematic processes for data collection and submission by service providers, with clear minimum requirements (see section 4.3); reviewing submissions to identify missing data, and inconsistencies with previous submissions and/or with external data sources; and conducting detailed inspections and spot checks (for example, visits to service provider offices and/or to the field) to observe data collection processes and validate data reporting.

5. Strengthen regulator, service authority and service provider capacity and incentives

Fig. 8. Roadmap for advancing sanitation regulation



Chapter in brief: As trusted technical and social actors, regulators have a leadership role to play in sector coordination and driving processes of sector reform. This chapter explores the regulator's role in building capacity – internally within the regulatory body, and of service authorities – and in addressing sector constraints. As countries advance implementation of the Roadmap and build a base level of regulatory capacity, regulators will increasingly be positioned to engage with the challenges of scaling services, including financing, and to propose innovative solutions.

Guiding principles for Step 5

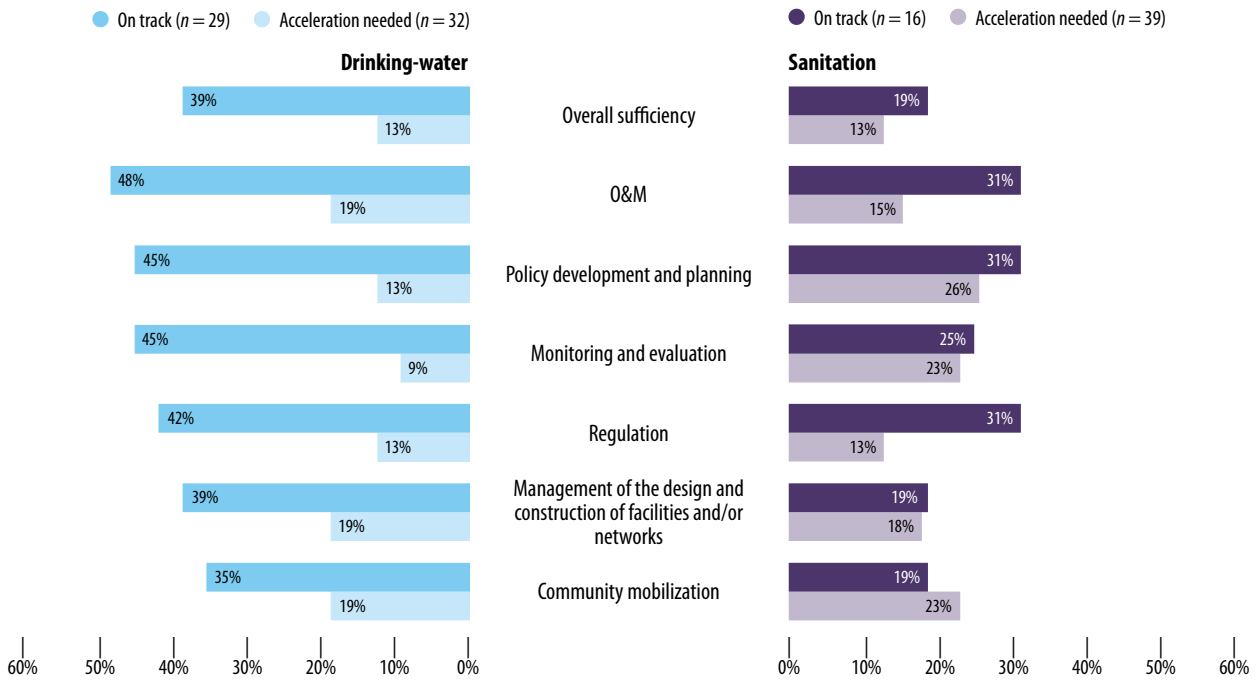
1. Regulator staffing levels and skill sets must follow from the specific regulatory functions to be performed.
2. Regulators have a leadership role to play, as trusted technical and social actors, in sector coordination and driving processes of sector reform.
3. To be effective, regulators must build the capacity of service authorities, influence policy-makers, and help consumers to understand their rights and responsibilities.
4. Regulators can support the scaling of services by helping to address the financing gap for sanitation.

5.1 Grow regulator human-resource capacity, including diverse technical specialisms

Principle 1: Regulator staffing levels and skill sets must follow from the specific regulatory functions to be performed.

To fulfil their functions effectively, regulators must be supported in building their staffing levels, skills and knowledge. As outlined in the 2022 GLAAS report, sanitation is impacted by a lack of human resources for all functions, even in countries that are on track to meet SDG targets. Only 13% of countries where acceleration is needed reported having 75% of the human resources required for sanitation regulation; 31% of countries on track to meet SDG targets meet the same benchmark (Figure 9).

Fig. 9. Percentage of countries that reported having 75% or more of the human resources needed for drinking water and sanitation



Source: GLAAS 2021/2022 country survey.

The capability of a regulator to expand its human-resource capacity will be impacted by a range of factors. The first of these is financial independence, which regulators such as SPAN in Malaysia and NWASCO in Zambia have used to invest in staff learning and development. The size and predictability of regulator revenue streams will clearly be significant, as will the availability of catalytic external financing in some low-income contexts. Several regulators consulted for this study are currently increasing their staffing levels in line with expanded regulatory responsibilities. These included the Sanitation Management Division within the Ministry of Land Management, Water and Sanitation Services in Botswana, and the MWSS RO in Manila (see Manila case study).

The staff skill sets that a regulator adopts must follow from their specific regulatory function. Most regulatory offices will have a combination of technical and administrative staff. The technical staff may work across water and sanitation regulation, or in specific technical areas, such as tariff modelling or performance monitoring. However, there is no established standard for staffing profiles beyond this. Regulators are encouraged to regularly review and track their human, financial and material capacity, and the extent to which they are performing required functions; and to ensure sustained focus on staff learning and development. Where required, capacity-development plans should be developed,

and funding should be sourced internally, from governments or development partners, to enable the requisite capacity to be built *(44)*.

Measures to support staff learning and development include incorporating training into staff KPIs; supporting exposure visits, which enable senior management and wider staff to see first-hand the work of other regulators facing a shared set of challenges; and supporting staff participation in peer-to-peer learning networks (see Box 18). Regulators are encouraged to allocate financial resources to these activities wherever feasible. A review of regulators in the Americas found that additional funding to support these activities has variously been derived from national budgets, national and regional-level regulator associations, and multilateral organizations *(18)*.

Notwithstanding the importance of these activities, it should also be noted that customers are paying for regulatory costs on top of the services they wish to access. Regulators must balance internal investment requirements with their duty to ensure that their own cost base is as efficient as they desire their service providers to be. It is also vital to conduct recruitment processes with integrity and ensure the most qualified candidates are selected *(44)*.

Box 18

Peer-to-peer learning networks and international training centres to support the development of regulator human-resource capacity

Regulators consulted for this study emphasized the value of peer-to-peer learning, exposure visits and professional training in building staff capacity. A growing number of peer-to-peer networks, training centres and online courses exist to support regulators in building staff knowledge and skill sets. Examples cited by regulators consulted for this study include:

- **RegNet:** as outlined in Box 3, RegNet is an international forum established to promote and share good practice in regulation of sewered and on-site sanitation services, for the protection of public health.
- The **ESAWAS Training Centre for WSS service provision**, launched in March 2024. The ESAWAS Training Centre aims to equip participants with knowledge and skills on WSS regulation globally, with focus on good regulatory practices to inform decisions about what, whom and how to regulate within the local context.
- The **Public Utility Research Center** in Florida, United States, which provides training in utility regulation and strategy.
- The IWA **International Water Regulators Forum**, an annual event that brings together global regulators to exchange knowledge, experience and best practice related to policy development and regulatory frameworks.
- The Sanitation and Water for All **Utilities & Regulators Constituency**.

5.2 Train mandated service providers, including in data management

Principle 2: Regulators have a leadership role to play, as trusted technical and social actors, in sector coordination and driving processes of sector reform.

Led by the impact of autonomous regulators among ESAWAS member countries in the African Region, there is increasing recognition that regulators have a key leadership role to play in becoming trusted social and technical actors, fostering dialogue, strengthening information flows and building sector capacity *(17)*. Although responsibility for sectoral management generally lies with ministries or ministerial departments, the vital intermediary role that economic regulators are asked to perform may lead to ministerial delegation of these coordination functions. Where there is no autonomous regulator, ministerial units and departments can embrace this convening and wider leadership role. The regulators' enabling and coordinating role must be explicit and visible, engaging both service providers and customers to build trust and credibility *(21)*.

For example, recognizing that formalized on-site sanitation is new, national regulators, together with the regional regulatory association, ESAWAS, have led technical support for on-site sanitation, developing technical, operational and commercial guidance for utilities and front-line service providers (see Rwanda case study; United Republic of Tanzania case study). This approach is further exemplified by NWASCO in Zambia, who led a long-term process of sector reform, described in section 1.1; and *Autoridade Reguladora de Águas* (AURA) in Mozambique, who have taken a leading role in stakeholder coordination to drive sanitation sector reform through a revised regulatory framework, developed in consultation with key institutional stakeholders at the national and municipal levels (see Mozambique case study).

By regulating a highly heterogeneous range of mandated and front-line service providers, from established utilities to community-based organizations, regulators also have a key role to play in the coordination and harmonization of service standards and consumer prices *(21)*. National regulators do not need to regulate all these actors directly; they can provide the framework and build capacity for subnational-level organizations to provide regulation in their jurisdiction. In turn, they can then delegate further, for example to utilities who can regulate the performance of supplementary service providers (see section 3.3).

Principle 3: To be effective, regulators must build the capacity of service authorities, influence policy-makers, and help consumers to understand their rights and responsibilities.

In addition to leading wider processes of sector reform, the regulators consulted for this study emphasize the importance of providing specific training to service providers, particularly (but not only) where new regulatory initiatives are being introduced. Experience from the Region of Latin America and the Caribbean and the African Region suggests the capacity-building role of the regulator should include:

- building **service provider knowledge of regulations**, guidelines and standards;
- building service provider **capacity to comply** with regulations, guidelines and standards;
- support to service providers in developing **compliant business models** (where compliance become highly relevant to the success of the business model);
- development of business plans, cost recovery and wider financial management;
- building service provider capacity to **collect and interrogate data**; and
- provision of training in **operational inspections**.

Through direct capacity-building exercises and other mechanisms, regulators should aim to build trusted relationships with the service providers they regulate. Trust can be enhanced through a two-way exchange, in which the regulator

consistently demonstrates willingness to engage with and learn from service providers, evolving their own understanding of service provider needs and how regulations are perceived by the service provider.

An example of the regulator's role in strengthening service provider capacity is provided in the Rwanda case study below. Informants further emphasized that the regulator's leadership remit involves influencing ministries to ensure best-fit practice is reflected in policy. In this function, regulators act as a critical pivot between policy-makers and service providers; both influencing the substance of policies, and helping to translate these policies into action, through ongoing regulatory support to service providers.

The regulator's role in helping consumers understand their rights and responsibilities, and in ensuring transparency and integrity, is also emphasized. As outlined in Chapter 3, civil society organizations (CSOs) and consumers can play a crucial role in helping to regulate the sanitation subsector. Accordingly, regulatory actors should develop and expand existing mechanisms to cover sanitation, ensure CSO involvement in applying regulatory mechanisms and increase accountability. At the same time, governments must strengthen right to information laws to ensure they can be applied in practice. The laws must provide a basis for the public sharing of reports on service providers' performance and on identified instances of corruption and other integrity failures.

One such is example is Transparency International's Bribery Index in Rwanda, which is widely used by the Government, including the Ombudsman's office and the Rwanda National Police, as a tool to better plan to prevent and mitigate corruption. Transparency International uses the index to assesses the impact of bribery on service delivery, and gathers concrete information on the size and share of bribes paid by Rwandan citizens when seeking access to specific services. Some actors involved in the urban sanitation subsector, such as the Water and Sanitation Corporation (WASAC), RURA and local governments, are included as part of the bribery assessment *(43)*. The regulator's role in monitoring corruption is discussed in Box 19.

Case study: Rwanda – the regulator's role in strengthening service provider capacity

RURA is one of several regulators in the African Region that has adopted a proactive role in building the capacity of the service authorities and service providers it regulates. Core to this has been the provision of **training to sanitation service providers** on the preparation of business plans, financial management and key aspects of service quality. RURA cites a wider set of activities driven by the regulator, which together aim to strengthen incentives and facilitate ease of service provision, including:

- Coordination of sanitation stakeholders and **mapping of roles and responsibilities**.
- The introduction of a **regulatory framework for faecal sludge management**, underpinned by a common framework for monitoring and evaluation.
- Adopting **cost-reflective tariffs** as a core principle, supported by research and surveys to inform a nuanced understanding of affordability and willingness to pay.
- Development of a web-based **customer management system** for data acquisition, and reporting of technical, commercial and financial information, as well as all information related to sector financing and financial management. The system supports service providers in metering, billing and record-keeping.
- **Global positioning system mapping** of sanitation facilities to support service providers in locating customers for emptying.

Like other autonomous regulators in the region, RURA is adopting a leadership role in driving ambitious reforms with the potential to address key sector constraints. These include the planned **introduction of a sanitation tariff**, similar to that now being implemented by AURA (see Mozambique case study). The fee will be integrated into the water bill in urban areas within the jurisdiction of WASAC, the utility mandated to provide sewered and on-site sanitation services in urban areas, including Kigali, the capital city. These upfront contributions through the water bill will then provide the basis for the provision of **scheduled desludging** services. WASAC will implement a tariff approved by RURA and may provide the connected services directly or through contracted private sector partners *(45)*.

5.3 Support dedicated new revenue streams to drive service extension

Principle 4: Regulators can support the scaling of services by helping to address the financing gap for sanitation.

In low-income countries seeking to implement the Roadmap, there is likely to be a significant financing gap for sanitation. Recent studies have estimated that low-income urban residents, for example, are only willing and able to pay a fraction of the true costs for high-quality sanitation solutions *(46)*. This means a diverse range of financing streams must be leveraged to bridge the financing gap, including concessional, public and private investment *(47)*.

While it is beyond the scope of the Roadmap to explore financing modalities for sanitation in depth, it is emphasized that regulators can have a positive influence, as part of their leadership and sector coordination role, in supporting the adoption of best-cost sanitation solutions, and driving forward innovative public finance mechanisms to help bridge the financing gap. When faced with funding constraints, governments have tended to underprioritize sanitation as a public investment area. In the African Region in particular, regulators are proactively working to address this issue and find new solutions. They are doing this while also continuing the more well-known tasks of an economic regulator, such as moving tariffs towards appropriate cost reflectivity.

One mechanism that high-performing regulators may be well positioned to support – if their regulatory remit includes water supply, and sewered and on-site sanitation (see Chapter 2) is the introduction of sanitation surcharges on water bills. In Kenya, the water and sanitation regulator WASREB is driving the introduction of such a surcharge, to mobilize funds for sanitation investments in low-income urban areas. This is supported by research indicating that middle and high-income utility customers recognize the collective benefits of good sanitation and are willing to pay the surcharge, which could generate an estimated US$ 15 million if rolled out across all utilities in Kenya *(48)*. A sanitation surcharge of this type has already been introduced in Zambia and is now being explored in Rwanda and the United Republic of

Box 19

The regulator's role in monitoring corruption in the sanitation subsector

To safeguard integrity in the sanitation subsector, WIN recommends that regulators should monitor the prevalence of different forms of corruption and update the set of more specific regulatory mechanisms to tackle identified weaknesses. Regulatory actors should collaborate with CSOs to produce and widely disseminate annual reports detailing the prevalence of different forms of corruption, such as corruption at the citizen-institution interface, corruption in public financial management, and wider integrity failures in different sectors and for various organizations. Specific regulatory mechanisms should be developed and updated based on observed trends to tackle identified weaknesses.

Examples of best practice in this area that could be upscaled are provided in the WIN report *Regulating the urban sanitation sector to prevent integrity failures (44)*. They include adapting the proven Water Watch Group model for sanitation (Zambia), project and procurement management systems (Bangladesh), truck route tracking (United Republic of Tanzania), operational health and safety guidelines for sanitation workers (United Republic of Tanzania and Zambia) and bribery reports (Rwanda, see section 5.2).

It is emphasized that the introduction of new finance mechanisms (section 5.3) can be supported by strong public financial management systems that reduce room for corruption, mismanagement and misuse of scarce funds. An example highlighted by WIN is the initiative of RURA, the Rwandan regulator, to establish a performance security payment before construction work begins for wastewater treatment plant installers, to avoid unfinished or nonfunctional wastewater treatment plants being built. Under this model, to minimize construction risks, the system installer provides the client with performance security equivalent to 10% of the total cost of the system installation before starting the work, and also provides the owner of the infrastructure with a one-year guarantee. The performance bond covers any cost related to rectifications that remain unattended by the installer. When handing over the infrastructure, the installer must provide the results of laboratory analyses of effluent as proof of the treatment system's performance, and if the parties are satisfied, the performance security is returned to the installer *(43)*.

Tanzania. In Mozambique, the regulator AURA has again taken a leadership role in driving the recent introduction of a pro-poor sanitation tariff (see Mozambique case study).

Public finance mechanisms such as sanitation surcharges may not be viable in all contexts, and they will only partially address the financing challenge for sanitation, which is significant. However, as countries advance implementation of the Roadmap and build a base level of regulatory capacity, regulators will increasingly be positioned to engage with sector constraints and the challenges of scaling services, including financing. This could also involve providing advisory inputs on the viability and policy alignment of finance packages.

Case study: Mozambique – the sanitation tariff demonstrating the regulator's leadership role and introducing a new public finance mechanism to help bridge the financing gap

The water regulatory authority public institute AURA is responsible for overseeing and regulating all public and private entities that provide water and sanitation services in Mozambique.

AURA began work in 2013, with a wide group of stakeholders, to introduce a sanitation tariff in the form of a surcharge on water bills. This work recognized the significant financing gap for sanitation and the lack of a sustainable financing mechanism. The water and sanitation subsector in Mozambique is dependent on external funding, and the funds allocated to sanitation are significantly less than those allocated to the water sector.

The development of the sanitation tariff, and agreement on the structure and operating modality, took many years to finalize. The role of AURA as a champion for the sanitation tariff was critical throughout this period, both in bringing together local and global partners, and keeping the introduction of the tariff a current issue. AURA established the Maputo Sanitation Platform led by the local municipality, and comprising key institutional partners, where the potential introduction of the tariff was discussed.

The financing mechanism introduced needed to balance the substantial financing needs with the requirement to safeguard low-income groups. A progressive tariff structure was therefore introduced that is applied as a percentage to the bills of water utility customers. This tariff is not applied to social tariff customers (customers with water consumption equal to or less than 5 m^3/month) or to customers served by standpipes.

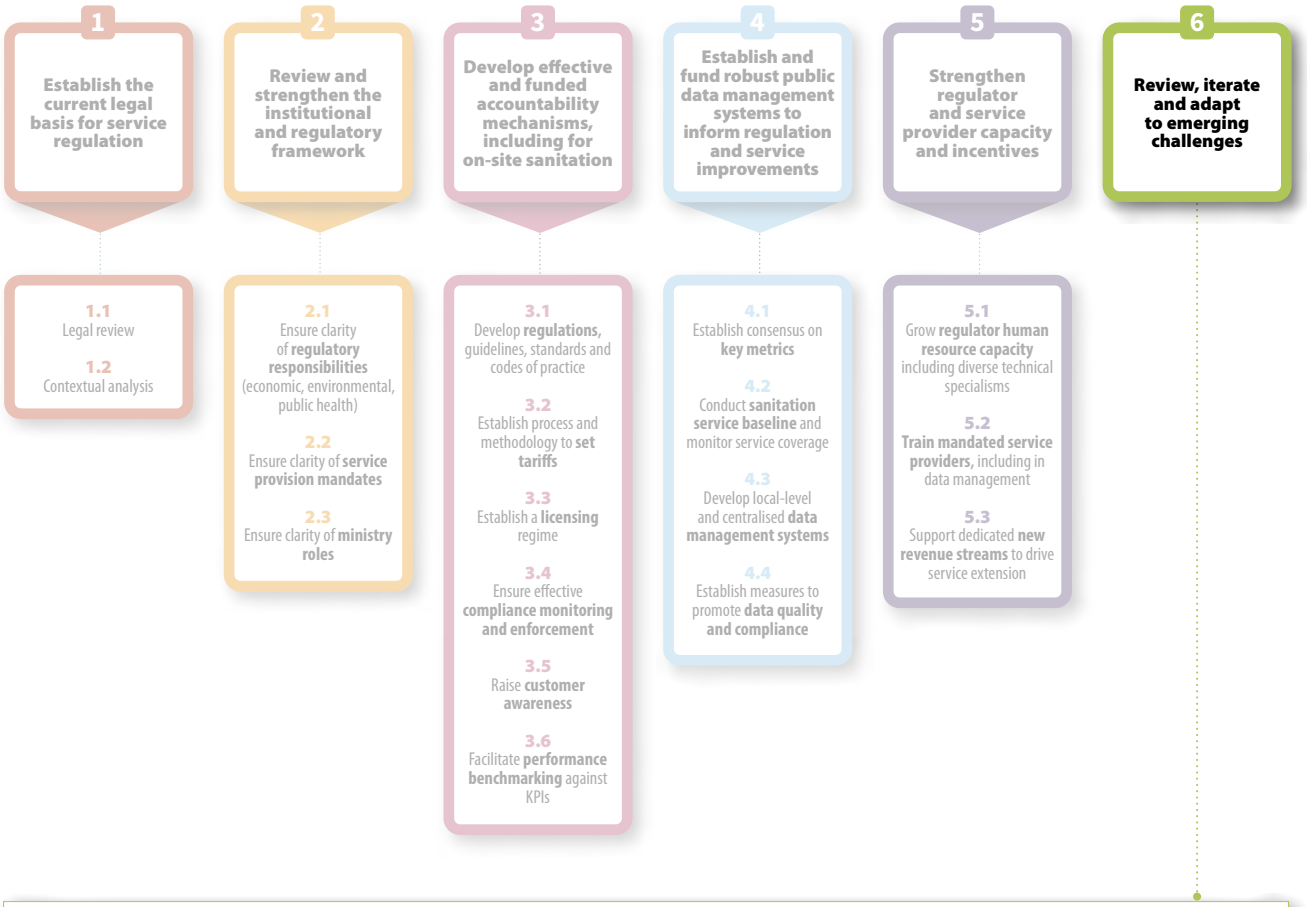
The use of the funds from the sanitation tariff is more flexible than similar schemes elsewhere. It allows for cross-subsidization of both capital investments and recurring investments in low-income areas. This structure recognizes the need to target funds to areas where coverage is lowest. The structure also recognizes that operational costs can be more challenging to finance through grant funding, and are often higher in low-income areas due to an increased need for manual emptying and difficult access.

The application of the sanitation tariff responds to local realities with percentages of the water bill for each customer group, domestic to industrial, being fixed by the local Municipal Assembly and coordinated by AURA. Following this process, the sanitation tariff has been applied in seven municipalities since 2020, following criteria defined in the regulatory frameworks with each area. AURA is planning how these funds can provide direct support to the financial sustainability of services, but also how this mechanism can leverage external funds for capital projects and infrastructure rehabilitation.

The successful and sustained use of cross-subsidy mechanisms in Mozambique will require AURA to demonstrate leadership with city, national and global stakeholders; and for both the regulator and the mandated service authorities to build credibility and trust with the customer base. Credibility and trust have been identified as essential components of building willingness to pay for cross-subsidies *(49)*.

6. Review, iterate and adapt to emerging challenges

Fig. 10. Roadmap for advancing sanitation regulation



Chapter in brief: Regulators are consistently faced with new challenges. Any roadmap for regulating sanitation has no fixed end point, only continual adaptation and iteration of the regulatory approach. Drawing on case studies from Chile and Malaysia, this chapter explores how established regulators, operating in mature sectors with high levels of service coverage, are evolving their approach and expanding their scope in the context of new threats such as climate change.

Guiding principles for Step 6

1. Climate resilience should be mainstreamed into guidelines, standards and codes of practice at every step of the sanitation service chain, for sewered and on-site sanitation.
2. Tariff models should be adapted to support the costs of climate-resilient sanitation while balancing financial viability and affordability.
3. Regulators should support service providers in adopting climate-resilient approaches and adapting to droughts and extreme weather events.

6.1 The role of regulation in supporting climate-resilient sanitation

Countries seeking to adopt this Roadmap are likely to be acting in a context of climate vulnerabilities. There is increasing evidence of the challenges being posed by climate change to sanitation service provision worldwide. Five key climate-related hazards posing the greatest threat to sanitation services have been identified: floods, droughts, windstorms, storm surges and sea level rises *(50)*. On-site sanitation facilities are particularly vulnerable to flooding, with a risk of contamination of groundwater sources of drinking-water due to flood events; increased wet weather also negatively impacts wastewater infrastructure in the form of sewer flooding, which causes sewer backups and combined sewer overflow discharges, which result in pollution. Water scarcity can be equally problematic, limiting the ability to operate and manage water-intensive sanitation systems *(4)*.

Emerging research also suggests that on-site containment of faecal waste may contribute significantly to greenhouse gas emissions in cities *(51)*. This suggests the need for transport and treatment improvements, active management approaches such as scheduled desludging, and more adapted faecal sludge containment storage.

In the remainder of section 6.1, we outline key principles relating to the regulation of climate-resilient sanitation. The evidence base in this area continues to evolve, and more information is available from the Climate Resilient Sanitation Coalition (CRSC) (see Box 20).

Box 20

Climate resilient sanitation coalition

Further guidance on the requirements of climate-resilient sanitation is forthcoming from CRSC. Formed in 2022, CRSC is a growing coalition of international organizations, global research organizations, and practitioners in the fields of water and sanitation. The coalition launched a Sanitation Call to Action at COP27, calling on all stakeholders to work collectively to ensure the resilience of sanitation systems to maximize the public health outcome and explore opportunities to reduce emissions along the sanitation service chain. Its members include UNICEF, the World Bank, WHO, the Bill and Melinda Gates Foundation, WaterAid, the Asian Development Bank, the African Development Bank, and many other research institutions and funds.

Principle 1: Climate resilience should be mainstreamed into guidelines, standards and codes of practice at every step of the sanitation service chain, for sewered and on-site sanitation.

In many countries, the urgent need for climate-resilient sanitation may necessitate a review of existing regulatory frameworks and connected regulations, guidelines and standards. Overall guidance for the review and adaptation of regulatory frameworks for sanitation is provided in Chapter 2 and Chapter 3. Within these processes, regulatory frameworks must be assessed to ensure that climate resilience is integrated across all levels of guidance for sanitation service providers.

The appropriate regulatory measures to be adopted will vary across (and potentially within) countries. However, several regulatory measures that are likely to be broadly applicable can be outlined. For many countries, **development or adaptation of regulations and standards is likely to be required to** *(52)*:

- protect serviceability of on-site sanitation systems in flood-prone and/or water-scarce areas;
- reduce contamination risk from on-site systems to groundwater or surface water in flood-prone areas, or with raised groundwater levels;
- ensure continued safe faecal sludge transportation, through extreme temperatures and high precipitation;
- incentivize the connection of unconnected households to existing or planned sewer networks;
- protect serviceability of networked systems in flood-prone and/or water-scarce areas;

- support safe wastewater and faecal sludge reuse, as part of circular economy approaches that can help mitigate the effects of water scarcity and wider climate impacts *(4)*;
- protect collection and treatment infrastructure;
- support the development of service models such as scheduled desludging to promote active management of faecal waste; and
- ensure sufficient financial allocations for equitable provision of climate-resilient sanitation infrastructure and/or service delivery models.

As part of the ongoing review of regulatory frameworks, regulatory obstacles to innovative technology and service approaches should be systematically identified and addressed. Within these key areas outlined above, the following is emphasized:

At the household level, for on-site sanitation systems, the initial focus of regulatory authorities should be on the development of minimum standards for infrastructural improvements for containment structures and their superstructures.

For example, standards can be developed to promote elevated sanitation facilities (e.g. pit latrines) where appropriate, or the use of smaller and shallower pits, to improve their ability to withstand flood events and reduce contamination in the case of collapse. Regulators should take the lead in reviewing design standards for sanitation infrastructure in the face of enhanced flood and drought risks and ensure that sanitation infrastructure is not installed in vulnerable sites, especially in the case of flooding. Regulatory changes could also promote the use of water-smart or safe reuse-oriented sanitation systems (such as container-based sanitation or composting toilets) which have demonstrated their ability to provide continued serviceability in water-scarce areas *(53)*. Regulating for service models such as scheduled desludging (see also Box 21), to proactively manage faecal sludge, can also reduce contamination risk by reducing infiltration in the event of raised groundwater levels, providing a buffer period in the event of reduced access by the emptiers, and reducing impact in the event of flooding *(54)*.

Design guidelines and construction standards should be developed and implemented with participation of users and local stakeholders wherever feasible *(55)*. Household on-site sanitation infrastructure continues to be financed primarily through households' own investments. Enforcement of construction standards must, therefore, be accompanied by suitable funding mechanisms, to promote equity and ensure that low-income residents are not punished for their inability to pay. Landlords, contractors and service providers must be held accountable for upholding good practices, including in acceptable design standards and in preventive maintenance measures *(55)*. Regulatory frameworks should also promote implementation of **sanitation safety plans** by utilities and wider service providers, including climate considerations, as part of a risk-based approach to managing sanitation services (see also Chapter 3).

Regulatory frameworks to ensure continued transportation of faecal sludge require an integrated planning approach to maintain accessibility of road networks. In addition to the immediate access barriers from extreme weather events, such as high winds and flooding, extreme temperatures can also rapidly accelerate road deterioration *(56)*.

Regulatory frameworks to protect the serviceability of networked systems require integrated planning to protect electricity networks, protect against subsidence and mitigate surface run-off. Regulatory frameworks could require separation of stormwater from wastewater, to reduce risks related to overflows or damage to collection and treatment infrastructure *(5)*; support and incentivize connection to sewer networks, to plan and implement sewerage in a participatory way, and to provide CAPEX and OPEX subsidies, as appropriate, to households that cannot otherwise afford to connect; and promote decentralized wastewater and faecal sludge treatment that is more resilient to climate change impacts.

KPIs against which service providers will be assessed should link to environmental and climate change considerations. Notable examples of this approach include the Green Drop regulation programme in South Africa, which identifies and audits key competencies for wastewater management (the Green Drop Audit compares the results

of service providers' performance, and rewards or penalizes the organization based on evidence of performance against defined standards *[57]*); and the United Kingdom, where the economic regulator Ofwat links service commitments to climate change: companies that demonstrate activities to meet these commitments, such as facilitating longer-term strategic approaches to wastewater and drainage planning, working with customers to engage in wastewater resilience and investing in large adaptation projects, receive incentives as well as access to funding earmarked for innovation or climate change *(58)*.

Box 21

Climate-resilient sanitation within the CWIS framework

Regulatory activities to enable climate-resilient sanitation should be conceived as part of, and not a substitute for, overall activities to enable inclusive sanitation service provision. To address the devastating impacts of climate change on on-site sanitation in urban areas, it is key to maintain focus on equity, including (for example) supporting the frequent provision of safe pit and tank emptying services to the most vulnerable urban residents. As foundational steps, this will involve expanding service authority mandates to include on-site sanitation, and connecting the private sector to the service authority through the progressive formalization of pit and tank emptying services. Accountability mechanisms to support this are explored in Chapter 3 and include the development of licensing regimes and performance contracts; and an increased understanding of business models such as scheduled desludging.

Principle 2: Tariff models should be adapted to support the costs of climate-resilient sanitation while balancing financial viability and affordability.

In many countries, clarity on the financing costs for climate-resilient sanitation is needed to inform adjustments to tariff models. However, it has been inferred that climate change impacts and adaptive management will increase the operation and maintenance costs of sanitation assets *(56)*. Service providers are likely to encounter increasing costs for preventive maintenance, repairs and replacements to adapt and cope with climate-related hazards to sanitation infrastructure and services. Inaction will also lead to costs in the longer term to service quality and deferred tariffs.

Within this context, economic regulators are crucial in holding service providers accountable for investment commitments and incentivizing their efficiency. As outlined in Chapter 3, economic regulators are already using tariffs to promote efficient service provider business models, and requiring sanitation service providers to develop optimized master plans setting out their investment plans and proposed tariff changes. To support climate-resilient sanitation, tariff models will need to be adapted; however, this must be done in a way that balances the financial sustainability of the service provider with affordability of services for low-income customers *(52)*.

The question of the extent to which, and in what ways, tariff structures can be adapted to support climate-resilient sanitation is critical, but also politicized and highly complex. The evidence base to support resilience-related expenses being factored into tariffs is a developing area, which regulators can support. As outlined in Chapter 3, a first principle is that tariffs should be set to a level that recovers operations and maintenance costs. While this can provide a departure point, localized data on the true costs of climate-resilient sanitation will first be required, to assess the feasibility of this principle in specific contexts. Predictions on expected performance in different climate scenarios will also be required, to facilitate the inclusion of maintenance and repair costs for adaptation and response in cost analysis (56). Chile provides a notable case study in this area, where a law has been introduced enabling investments that support climate change adaptation to be incorporated in the tariff (see Chile case study).

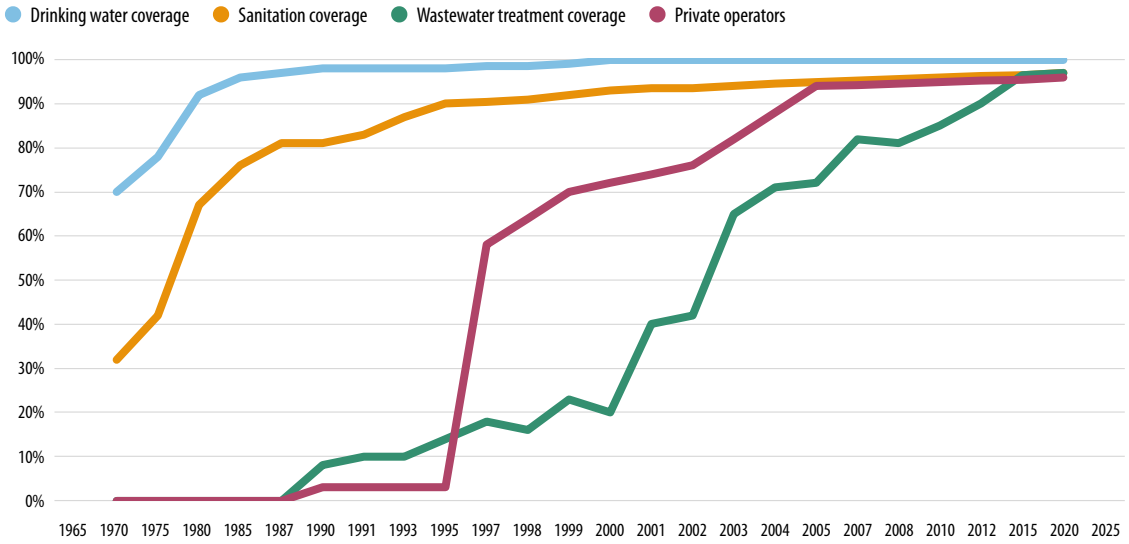
To safeguard continuity of service for vulnerable households, it is critical that service tariffs are closely monitored and regulated during periods of high demand; for example, during heavy rainfall or periods of raised groundwater levels, when demand for pit-emptying services may increase.

Case study: Chile – regulator-led development of Strategic Agenda 2030 to address challenges posed by climate change

The Chilean water and sanitation sector has been recognized as a model to follow for middle- and high-income countries, achieving sustained high levels of service quality and coverage. The sector is urban, reflecting that 88% of Chile's population reside in urban areas. In 1988, the sector began a period of phased liberalization, opening the option to incorporate private operators.[a] These reforms brought significant change in several respects, notably a rapid increase in levels of wastewater treatment, enabled by large-scale private investment and the construction of hundreds of wastewater treatment plants within only a few years.

Figure 11 charts the evolution of drinking water, sewerage, wastewater treatment coverage and the percentage of private operators from 1970 to 2021. It shows that WSS achieved high levels under public provision of these services prior to the 1990 reforms; 98% for water supply and 81% for sewered sanitation in 1990, which were increased to 99.9% and 97.4% in 2021, respectively. In parallel, the introduction of private operators led to a dramatic increase in levels of wastewater treatment for sewered sanitation, from 8% in 1989 to 100% coverage[b] by 2012.

Fig. 11. Evolution of drinking water, sewered sanitation, wastewater treatment coverage, and percentage of private operators in Chile, 1970–2021



Source: Adapted from Superintendence of Sanitary Services, 2019 *(36)*.

The role of the regulator SISS

Regulatory reforms have been key in enabling private sector participation in Chile. This has been achieved due to changes in the tariff structure, to increase user contributions and enable self-financing and profit generation for the companies in the sector. The tariff model allows operators to include in the tariff OPEX, CAPEX, self-financing and a profit margin (7% as the minimum capital cost rate). Article 12A of the Tariff Law of Water and Sanitation Services, which allows for changes in assumptions, enables investments that support climate change adaptation to be incorporated into the tariff.

This work was overseen by **SISS**, an organization of over 200 staff with an operating budget of US$ 14.75 million (as of 2022). The core responsibilities of SISS include setting tariffs for drinking water, sewerage and wastewater treatment services provided by utilities; granting sanitation service concessions; supervising the quality of services provided (including annual surveys of user perceptions of service quality); and supervising the management and discharge of industrial wastewater into the sewerage of operators in urban areas. SISS also has a leading role in the creation of regulations and standards across these areas, and in the public benchmarking of services through quality indicators and users' perception.

In addition to the enabling of private sector participation, several other factors were cited by SISS key informants as significant in the success of the Chilean sector. These include the introduction of a "Transparency Law" that allows citizens to request any kind of information from public institutions, which must respond within 20 working days; and the public appointment of leaders within regulators and other public authorities (for example, the Superintendent of SISS is elected for three years by the *Servicio Civil*, a public institution, and can be ratified twice, leading to a maximum term of nine years).

In 2020, a new law was introduced relating to Rural Water and Sanitation Sector Regulation[c] (**Law 20998**), which added two additional SISS responsibilities in rural areas: setting the tariffs, and the development and monitoring of service quality indicators. The new law has been introduced to close the gap between urban and rural areas in the water and sanitation sector, especially in wastewater treatment.

Development of the 2030 *Water and Sanitation Strategic Agenda* to sustain service improvements and mitigate the threats posed by climate change

The 2020 reforms are representative of Chile's continued commitment to evolution of the institutional and regulatory framework to sustain the improvements made in service coverage and proactively engage with emerging challenges. First among these is climate change and water scarcity. Chile is currently experiencing its longest-lasting drought since records began; for example, since 2010, the area between the regions of Coquimbo and Araucanía has experienced a rainfall deficit of around 30%. At the governmental level, the *Government Program 2018–2022* acknowledged the threat posed to water resources and sanitation, including as one of its goals the continued provision of sanitation services in times of climate emergency.

Within the same context, the regulator SISS provides a strong example of proactive strategic planning to mitigate the threats posed by climate change. The regulator's ***2030 Water and Sanitation Strategic Agenda*** acknowledges that despite the progress made in water and sanitation service coverage in Chile, "the current economic, social and environmental scenario is very different from that of years ago, especially considering the water stress and climate change situation, making it necessary to consider a new vision for the sector in the medium and long term" (SISS, 2019). To develop the strategy, SISS began a broad participatory process in 2017, involving more than 700 participants throughout the country, representing civil society, business, academia, and the public and private sectors, all of them with connection to water and sanitation.

A three-year process of strategy formulation followed, culminating in the published document. The process included stakeholder-led definition of challenges faced by the sanitation strategy to 2030; a 2030 Roadmap, to define how these challenges would be addressed; and the definition of 12 projects to support strategy implementation, presented in Figure 12. The projects are wide-ranging, capturing key aspects relating to water resource management, environmental protection and sustainable urban development. The strategy also includes strong emphasis on community and user engagement.

Three projects are particularly notable as a response to the challenges of regulating sanitation services at scale in the context of climate change:

- **Risk plans:** The strategy recognizes the importance of risk-based management for prioritizing the most efficient investments and actions to achieve resilience, including climate resilience. In this area, SISS commits to supporting a diagnosis of each water and sanitation facility, to identify vulnerabilities, management and investment gaps; joint work with stakeholders to define minimum standards for the incorporation of risk management in evaluating investment and management plans of concessionaires, as well as in disaster response plans; and the development of an early warning system, in collaboration with local public and private stakeholders, to inform the public and support effective and timely responses to events that may affect supply.
- **Sustainable sewage and storm water management:** Under the strategy, SISS commits to the development of new standards to improve wastewater infrastructure, including the improvement and/or replacement of collectors and lifting plants, plans to disconnect rain discharges into the sewage system, and planning new works where required. In addition, actions will be proposed to the Ministry of Public Works to cover the infrastructure gap for stormwater management, reduce waterproofing, increase the recharge of aquifers, and reduce or regulate run-off through solutions such as green or blue infrastructure.
- **Quality standards in rural sanitation systems:** Recognizing sanitation in rural areas to be a key challenge, the strategy sets out the regulator's commitment to define standards for service quality; support activities to strengthen the capacity of cooperatives and rural services committees; and collaborate with the Ministry of Planning and the Rural Sanitation Services Sub-Directorate, for the implementation of Law 20998 and its dissemination *(36)*.

Fig. 12. Main elements of the 2030 Water and Sanitation Sector Agenda

Strategic axis	Challenge	Siss project
	Resilient cities	Risk plans
	Innovation and efficient use of water	Water recycling and reduction of water losses
		Multi-purpose infrastructure
		Environmental footprint
	Storm water management	Sustainable sewage and storm water management
	Territorial planning	Harmonic city growth
	Integrated basin management	Siss open data
	Rural sanitation services	Quality standards in rural systems
	Bringing businesses closer to people	Public account of water utility companies
		Quality drinking water
	Water culture	Water culture
		Blue seal

Source: Adapted from Superintendence of Sanitary Services, 2019 *(36)*.

Implementation of the strategy has been led by project teams created for every agenda project, overseen by an Advisory Board with representatives from the public and private sectors, academia and citizens. In the area of sustainable sewage and stormwater management, strategy implementation will involve continued dialogue between SISS and the private operators: in the Los Lagos and Los Ríos regions, for example, a technical study is under way by an operator, which SISS will review. The study aims to measure key variables, understand cost implications and responsibilities for increased stormwater management requirements, and develop evidence-based consensus in this area, in order to facilitate future tariff revisions.

[a] As of 2024, 73% of water and sanitation providers in Chile are private operators who bought public companies; 23% are private operators that hold 30-year concession contracts; and 4% are public companies (a municipality and several cooperatives).
[b] In 2012, wastewater treatment coverage, calculated as wastewater collected through sewered systems, was 99.8%.
[c] The Ministry of Public Works is responsible for making investments (CAPEX) for water and sanitation sector in rural areas, while OPEX are paid by the users, who are grouped in cooperatives.

Principle 3: Regulators should support service providers in adopting climate-resilient approaches and adapting to droughts and extreme weather events.

Because climate change is introducing uncertainty, sanitation service providers need the freedom to adapt to emerging or unexpected conditions. This means that flexibility must be built into the planning of services *(56)*; and that regulation gives service providers the flexibility to adjust standards to ensure continuity of services in droughts and following extreme weather events. Regulators may also have an important role to play in providing guidance and capacity-development support in climate risk screening and infrastructure adaptation; and in raising public awareness and promoting behavioural responses.

A notable example of this proactive approach is NWASCO, the regulator in Zambia. NWASCO has developed a Climate Risk Screening Guideline for the WSS sector, providing water and sanitation utilities with systematic steps to identify climate risks and hazards for new projects; and to improve the resilience of existing projects and infrastructure. ESAWAS is also developing a new tool to support utilities in preparing for climate emergencies. The tool will incorporate guidance on vulnerability assessments; and on technology, infrastructure, consumer engagement and operational aspects of emergency response *(52)*.

A final area where regulators can support is in the adoption of circular economy approaches (see also section 3.1). To unlock the full potential of climate-resilient sanitation, the linkages should be emphasized between safe wastewater and faecal sludge reuse, and wider climate resilience, particularly in water-scarce contexts. The use of treated wastewater and faecal sludge can reduce water shortages, create value from by-products for use in agriculture and industry, and have a climate mitigation impact. Service providers must now be supported in preparing for a future where sales of by-products for uses in water supply, energy and agriculture are a crucial part of their revenue streams *(21)*.

Within this paradigm shift, it is critical that regulatory authorities continue to emphasize *safely managed reuse* and the development, monitoring and enforcement of standards for safe wastewater and faecal sludge reuse. SPAN, the regulator in Malaysia, provides an example of a regulator now focusing its attention on water resource management and circular economy approaches while working to sustain near-universal sanitation coverage (see Malaysia case study).

Case study: Malaysia – continued evolution of the institutional and regulatory model in the context of near-universal sanitation coverage

Malaysia has achieved near-universal coverage of water and sanitation services: 96% of urban residents have access to safely managed sanitation, 80% of whom are connected to a sewer line across 13 major districts, with the remaining using 1.13 million septic tanks both in urban and rural areas. As outlined by IWA *(23)*, Malaysia's approach to sanitation service provision is "unique and not easily replicated". The private company IWK, owned by the Federal Government, provides sewerage services across most of peninsular Malaysia. In Malaysia, "sewerage services" include desludging of septic tanks.

The Malaysian sanitation subsector has been through multiple stages of reform. Before the 1990s, water services were provided by state (subnational) authorities, and sewerage services were the responsibility of local authorities. The 1994 Sewerage Services Act formally transferred responsibility for sewerage services to the Federal Government and paved the way for privatization. IWK was then awarded a 28-year concession. At this time, new legislation empowered the Federal Government to regulate the sewerage industry, through a Sewerage Services Department under the Ministry of Housing and Local Government.

Although the Sewerage Services Department was initially formed to function as a regulator, in practice, its role focused primarily on implementing capital works projects. This had "inhibited regulatory maturity in building a robust regulatory model" *(23)*. The terms of the concession also proved unworkable for IWK, especially due to the low sewerage tariff, which failed to cover OPEX, and in 2000, ownership of IWK was taken over by the Ministry of Finance. IWK continued operating as a private company, but IWK's main role focused on operations and maintenance, and not CAPEX.

Influenced by these developments, in 2006, the sanitation subsector experienced its second major transition, with the creation of the National Water Services Commission, SPAN, underpinned by the Water Services Industry Act (Act 654) and the SPAN Act (Act 655) in Parliament. SPAN was assigned regulatory oversight of water supply and sewerage services. As outlined by IWA *(23)*, a key driver of this reform was the need to balance affordability for the consumer with the financial viability of service providers, who at this point were operating at a loss. The reforms aimed to support a transition to an asset-light model separating service providers (known as "service licensees") from asset owners (known as "facility licensees"), whose responsibility was to construct and maintain public sewerage systems and all related assets.

In the view of SPAN, responsibilities for sanitation regulation and service provision are largely clear under the revised framework. Two licenses are granted by SPAN: one for the construction of sewerage systems, and one for service provision and operation and maintenance of new and existing infrastructure (since 2022, IWK has been the designated service licensee and is responsible for maintaining sewerage assets, providing sewerage services to a network involving over 7000 public sewage treatment plants). However, an important gap has persisted in responsibilities for capital investments: the facility licensee for the sewerage subsector has never been appointed, with these roles still undertaken by the Federal Government, public operators and private developers.

Notwithstanding the high levels of service that have been achieved in Malaysia, there is recognition from SPAN and other institutional stakeholders that the institutional and regulatory framework for sanitation remains a work in progress. According to a SPAN key informant, the Government is currently conducting a study to understand deficiencies in the model that have prevented the appointment of a facility licensee. Desludging regulations were introduced in 2021, to re-stimulate the market for scheduled desludging services, which have been mandated by the Federal Government since 1994 but have stagnated since liberalizations to the model were made in 2008. Several issues that need to be addressed have been identified, including unsustainable tariffs (SPAN lacks the autonomy to approve tariff increases; tariffs have not increased since 1994 and are below the level to cover operational costs [see SPAN quote in section 3.2]); lack of competition, with IWK the only provider receiving government operating subsidies; and the excessively "developer-driven" nature of the sewerage subsector, with most new infrastructure funded by the private sector in the context of new housing and property developments, in the absence of a facility licensee to provide sector-wide coordination and oversight.

In light of these challenges, further reforms to the institutional and regulatory framework cannot be ruled out. For instance, the Malaysian water and sanitation sector is unusual in its separation of responsibilities for water supply and sewerage services. As stipulated in the National Policy, the first objective of the 2006 reforms is to integrate water and sewerage services with a single operator. Under one umbrella, the industry "should be more straightforward to regulate, where uniformity, sustainability, and transparency can develop" *(23)*.

As outlined by SPAN, the key goals of safe, equitable, and sustainable WSS, and protecting public health, water resources and the environment, are and will remain its key motivation. Looking to the future (and underpinned by the high levels of service coverage already achieved) Malaysia's focus is progressively shifting from protecting public health to protecting water resources and the environment. This includes specific focus on resource recovery and the circular economy. Malaysia has a national sewerage planning policy that incorporates climate change considerations, and the Ministry of Natural Resources and Environmental Sustainability has introduced a policy mandating that 50% of sewage and 30% of faecal sludge must be safely reused; in addition, every city must collect 50% of rainwater. However, the policy has not been accompanied by sufficient awareness-raising activities, and more work is required to increase uptake *(52)*.

Box 22

Regulating in crises

Alongside the threat of climate change, regulatory authorities in fragile contexts may find themselves having to adapt to a wide range of shocks and stresses, from short-term political unrest to escalating long-term conflicts. In such contexts, basic considerations such as the protection of water and sanitation infrastructure are likely to take primacy. The following challenges have been raised by informants as particularly relevant to the regulator's role during crisis:

- loss and damage of data systems and assets, limiting availability and continuity of data;
- loss of technical knowledge and reduced staff retention due to forced migration;
- currency devaluation, which impacts both customer ability and willingness to pay and workforce motivation; and
- limited law enforcement, undermining punitive action against practices such as illegal connections or illegal use of non-treated or partially treated wastewater.

While it is beyond the scope of this Roadmap to address regulating sanitation in crises (due to particular contextual challenges), this is highlighted as a priority evidence gap where further nuanced guidance is required. Nonetheless, there are examples of autonomous regulators who are already providing support in this area, such as WASREB, who have developed disaster preparedness and mitigation guidelines for water and sanitation utilities in Kenya *(59)*.

7. Roadmap implementation: in-depth case studies

7.1 Whole Roadmap implementation: Early stage – United Republic of Tanzania

The United Republic of Tanzania is one of several low-income countries in the African Region that has made significant progress across the areas outlined in the Roadmap. The regulator EWURA has developed a suite of accountability mechanisms and regulatory tools; data management systems incorporating on-site sanitation are now being developed; and the regulator is embracing its role in developing sector capacity. Although EWURA's current responsibilities are grounded in policy reforms that took place in 2009, most of these activities have taken place over the past five years, and EWURA is still at an early stage of Roadmap implementation. Key steps in its regulatory journey are described below.

Fig. 13. Whole Roadmap implementation: early stage – United Republic of Tanzania

Step 2: Review and strengthen the institutional and regulatory framework

The institutional and regulatory framework for sanitation in the United Republic of Tanzania has its origins in the Water Supply and Sanitation Act 2009 *(60)*. The act provided for significant reforms to service provision mandates (section 3.2), establishing WSS authorities as commercial utilities. These entities adopted defined responsibilities for sanitation, initially focused on treatment facilities and sewage systems. The 2009 Act was superseded by the Water Supply and Sanitation Act 2019 *(61)*. Among other provisions, the act established the Rural Water Supply and Sanitation Agency and the National Water Fund; confirms responsibility for the provision of WSS services as assigned to licensed water supply and sanitation authorities (WSSAs); and clearly provides for the delegation of services from these authorities to lower-level service providers, creating the formal basis for private sector engagement in pit-emptying services.

The technical and economic regulation of WSS services is provided by EWURA. The scope of EWURA's mandate is founded in the Energy and Water Utilities Regulatory Authority Act 2001 and its amendments *(62)* — which provides the basis for EWURA's status as an autonomous regulatory entity — and is further clarified in the Water and Sanitation Act of 2019. Importantly, the act provides for the involvement of WSSAs and EWURA in adopting service provision and regulation roles for faecal sludge management, in cooperation with local government authorities (LGAs).

Step 3: Develop effective and funded accountability mechanisms

Regulatory functions assigned to EWURA under the 2019 Water Supply and Sanitation Act include licensing of WSSAs; establishing guidelines and approving tariffs chargeable for WSS services; and monitoring water quality and wider standards of service *(61)*. Since 2019, the sanitation subsector in the United Republic of Tanzania has rapidly evolved, with EWURA adopting a central role as it enacts these responsibilities. Key to this has been the development of a suite of regulatory tools, approved by the EWURA Board of Directors, which has provided the basis for greater WSSA involvement in on-site sanitation. First among these is the 2020 *Guidelines for onsite sanitation and faecal sludge management for water and sanitation authorities*, which provide related guidance to WSSAs, LGAs and EWURA on both service provision and regulation. Other important tools include the 2020 *Water and wastewater quality monitoring guidelines*; and the 2022 *Guidelines for preparing a business plan for regulated water utilities*.

Licenses for WSSAs have also been amended to ensure accountability for the provision of faecal sludge and wastewater treatment, with WSSAs required to acquire land for treatment facilities and to build such infrastructure within 10 years of license tenure.

Step 4: Establish and fund robust public data management systems to inform regulation and service improvements

The 2019 Water Supply and Sanitation Act makes explicit EWURA's mandate to "collect and compile data on licensees as it considers necessary for the performance of its functions under this Act". Since 2019, the development of robust performance indicators, reporting and data verification mechanisms have been a central focus of the regulator. KPIs have been developed, including the proportion of the population receiving WSSA sanitation services (KPI 11) section 3.6. Data on on-site sanitation services were first published in the Water Utilities Report 2020/21 , which includes basic information on containment structures, emptying services and faecal sludge treatment facilities *(63)*.

However, this work is still in its early stages: EWURA has identified improved data accuracy, to establish a reliable baseline, and ensuring the utilities and private sector accurately report sanitation data as a key priority *(9)*. Supporting activities in this area include upgrading of the national-level Water Utilities Information System, to include more data on sanitation; and development of the Unified Water Information System, under the leadership of the Ministry of Water (section 4.3).

Step 5: Strengthen regulator, service authority and service provider capacity and incentives

EWURA has invested in the development of its own staff (section 5.1), through the provision of training, and participation in peer-to-peer knowledge exchange. Peer review visits between EWURA and regulatory authorities in Uganda, Angola and South Africa have been cited as particularly constructive by EWURA key informants. EWURA also consider wider capacity development as core to their regulatory remit (section 5.2), regularly conducting training with WSSAs to support the roll-out of guidelines, such as training delivered in 2023 on the on-site sanitation/faecal sludge management guidelines.

In line with other regulators in the ESAWAS region, such as NWASCO (Zambia), AURA (Mozambique) and WASREB (Kenya), EWURA are adopting an increasingly proactive role in working to address wider sector constraints (section 5.3). Examples include incentivizing WSSAs to coordinate with wider stakeholders in the development of CWIS plans, identifying technological options along the sanitation service chain, by stipulating this as a requirement in the EWURA business planning guidelines; and the planned introduction of a sanitation surcharge or tax to ensure dedicated funding for sanitation, although this initiative is still at an early stage.

Step 6: Review, iterate and adapt to emerging challenges

Notwithstanding the huge progress made since 2019, EWURA and wider stakeholders in Tanzania are continuing to critically review responsibilities and assess how these can be improved. The regulator has identified two issues related to responsibilities for regulation and service provision that need to be addressed in the near term to further strengthen sanitation regulation in the United Republic of Tanzania:

- EWURA's current mandate focuses on urban areas, including townships and district towns. Regulatory models for rural sanitation regulation from other countries (e.g. Zambia) need to be explored.

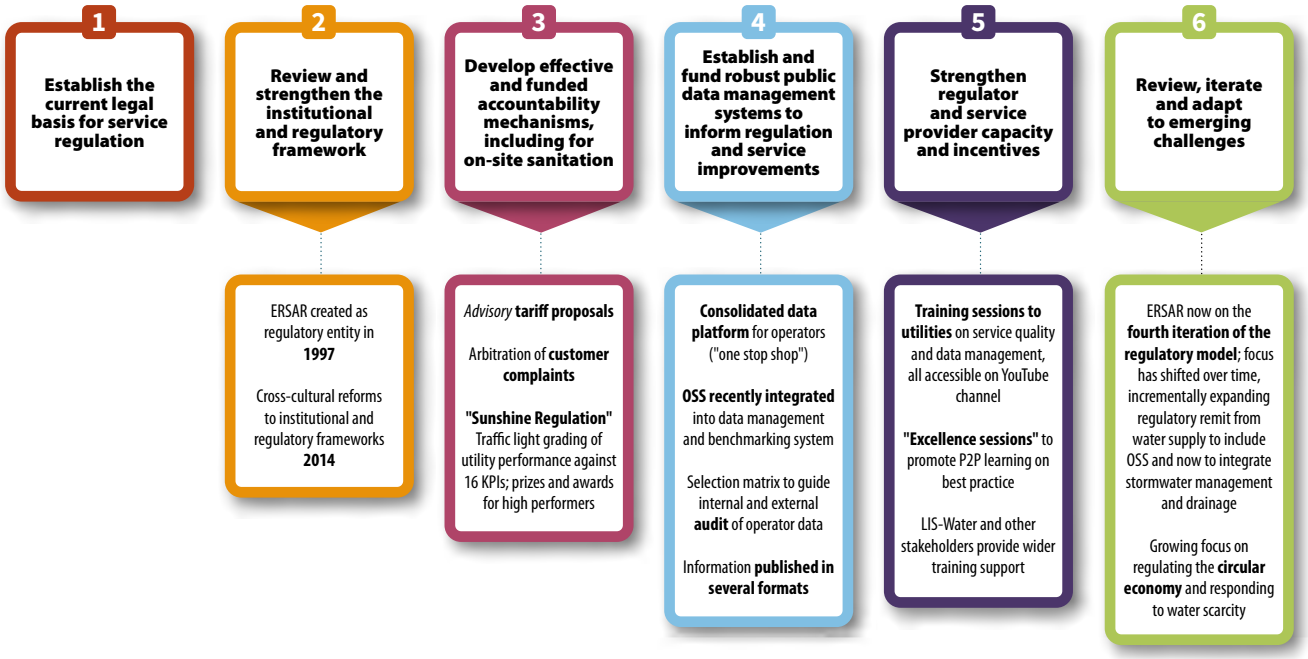
- Overlapping responsibilities in service provision and regulation remain (for example, emptying and transport of faecal sludge is provided by LGAs, WSSAs and private operators, and regulated by both EWURA and LGAs). There is a corresponding lack of interconnectivity of service provision and regulation along the chain.

In response to these challenges, a memorandum of understanding is planned between WSSAs, LGAs and EWURA, which will further clarify duties and responsibilities, especially those relating to capture and containment, and emptying and transport. It is anticipated that the Ministry of Water will then review the Sanitation Regulation 2019 to ensure alignment with the proposed responsibilities under the memorandum of understanding.

7.2 Whole Roadmap implementation: Mature stage – Portugal

In Portugal, stability of public policy and long-term strategic planning have provided the foundation for the advancement of sanitation services, with access to safely managed sanitation now at 93% *(64)*. The regulator ERSAR has been central to the evolution of the sector through its focus on service-level benchmarking and data management. More than 25 years since its inception, ERSAR continues to evolve its focus and its leadership role as a highly credible autonomous regulator: ERSAR is now driving reforms to support the integration of on-site sanitation into formal utility services, and looking ahead to the challenges posed by climate change. Key steps in its regulatory journey are described below.

Fig. 14. Whole Roadmap implementation: mature stage – Portugal



Step 2: Review and strengthen the institutional and regulatory framework

The national regulatory agency ERSAR was created in 1997 and assigned responsibility for the economic regulation of water supply, wastewater and solid waste management. ERSAR's responsibilities have evolved over time. The following revisions are noted by ERSAR as significant in the progression of the water and waste sector in Portugal:

- **2000–2003:** The jurisdiction of the regulator, then known as IRAR, was limited to concession contracts. At the end of 2003, there were about 50 regulated operators.
- **2004–2009:** IRAR assumed responsibility for regulating drinking-water quality, and direct regulatory oversight of municipalities. The number of service providers regulated by ERSAR increased from 50 to 400. In 2009, ERSAR replaced IRAR and is now the regulation authority for the entire water and waste sector, with over 500 regulated operators.
- **2014:** Cross-sectoral reforms were introduced, including a new statute for ERSAR, which became an independent body with greater autonomy. At this time, ERSAR was assigned legal responsibility for defining tariffs; however, in practice, this never amounted to full independence over tariff setting, which remained a political decision (see section 3.2).
- **2021:** An amendment was passed formally revoking the 2014 reforms and with this ERSAR's legal responsibility for defining tariffs; however, ERSAR has retained expanded responsibilities for the monitoring of services, according to ERSAR key informants.

ERSAR is complemented by the Portuguese Environment Agency (*Agência Portuguesa do Ambiente*), which is responsible for environmental regulation of sanitation, including policy development, the issuance of discharge permits for wastewater treatment plants, and the application of penalties in cases of non-compliance with wastewater treatment standards.

Step 3: Develop effective and funded accountability mechanisms, including for on-site sanitation

ERSAR's core competency is **economic regulation and the provision of advisory tariff proposals** (section 3.2). ERSAR conducts costings analysis and issues opinions to the Government on the tariffs required to ensure cost recovery and incentivize efficiencies for service providers. ERSAR advisory proposals are generally adopted; however, for state-owned utilities, the Government retains the power to accept or overrule ERSAR recommendations and may choose to set tariffs below the levels required to enable cost recovery for political reasons. Where the ERSAR recommendation is not accepted, the Government must justify this decision to the municipal assemblies. Efficiency metrics related to OPEX costs provide an extra accountability mechanism for these bulk utilities: ERSAR sets efficiency metrics and can adjust the utility's accounting if these targets are not met and a reasonable justification is not provided (meaning that deficits are paid by shareholders, not covered by the tariff). For municipally owned utilities, the municipality determines tariffs and is required to provide a justification to ERSAR for any deviation from ERSAR recommendations.

A second key function of ERSAR is the performance of **comparative benchmarking of service providers** (section 3.6). ERSAR publishes data annually on service provider performance against 16 KPIs encompassing wastewater, water and waste management (see Figure 15).[13] Utilities are clustered to ensure that each utility is only being benchmarked against others with comparable service areas. ERSAR informants frame their comparative benchmarking approach as an example of sunshine regulation; the aim of the traffic light system is to reward good performance (not only to name and shame), with the strongest performers receiving prizes. ERSAR awards annual

Fig. 15. ERSAR urban wastewater management service quality indicators

Urban wastewater management service quality indicators	Bulk	Retail
Protection of user interest		
Accessibility of the service to users		
AR01 - Service coverage (%)	*	*
AR02 - Affordability of service (%)	*	*
Quality of the service provided		
AR03 - Flooding occurrences		
[No./100km of sewer * year]	*	n.a
[No./1000 service connections * year]	n.a	*
AR04 - Responses to complaints and suggestions (%)	*	*
Operator sustainability		
Economic sustainability		
AR05 - Cost recovery ratio (%)	*	*
AR06 - Connection to the service (%)	*	*
Infrastructure sustainability		
AR07 - Adequacy of treatment capacity (%)	*	*
AR08 - Sewer rehabilitation (% / year)	*	*
AR09 - Sewer collapses [No. /(100km * year)]	*	*
Physical productivity of human resources		
AR10 - Adequacy of human resources		
[No./10^6 m3 * year]	*	n.a
[No./100 km * year]	n.a	*
Environmental sustainability		
Efficiency in the use of environmental resources		
AR11 - Standardized energy consumption [kWh/m3 8 100m)]	*	*
Efficiency in the prevention of pollution		
AR12 - Proper treatment of collected wastewater (%)	*	*
AR13 - Emergency discharge control (%)	*	*
AR14 - Wastewater analysis carried out (%)	*	*
AR15 - Compliance with discharge parameters (%)	*	*
AR16 - Sludge disposal (%)	*	*

n.a - not applicable

Source: Portugal Water and Waste Services Regulation Authority, 2017 *(65)*.

[13] See https://www.ersar.pt/pt/site-publicacoes/Paginas/edicoes-anuais-do-RASARP.aspx.

"quality stamps" across key areas, according to transparent criteria and based on KPI performance. An ERSAR key informant stated, "The rules are clear to everyone; (the stamps) are the result of the quality of service provided that year". Drinking-water quality is the only area where ERSAR can directly intervene and issue penalties; in economic regulation, it can only issue recommendations, but these are non-mandatory.

ERSAR is also active in **handling consumer complaints** (section 3.5). It does not have a role in licensing of service providers (utilities must obtain licenses for water extraction; and for discharge of treated effluent into environmental bodies from the Portuguese Environment Agency (APA). Although **raising customer awareness** is not a core activity, the regulator conducts periodic campaigns and develops educational videos, aimed at both consumers and operators, most notably in the area of drinking-water quality. ERSAR recognizes the role of the regulator in mobilizing consumers to campaign for their rights. A key informant from stated: "We are seeing cases where consumers are complaining, but not to the level they should be. We are seeing complaints are a way of changing the utility's procedures, and the soft power of the regulator to influence this."

Step 4: Establish and fund robust public data management systems to inform regulation and service improvements

To minimize the reporting burden for the service operators under its jurisdiction, ERSAR has created **a 'one-stop shop' centralized data management system** (section 4.3). Service providers use the portal to provide the required data relating water quality, service quality and economic regulation. An ERSAR key informant said this was "for every interaction they have with us". ERSAR aims to make these data fully accessible by publishing in multiple formats, including via mobile app and in full Excel files downloadable from the ERSAR website.

In the past five years, ERSAR has moved to a validation system based on a selection matrix, through which a sample of utilities is selected for a **data audit** each year (see section 4.4). Since the system's inception, all service providers under ERSAR's jurisdiction have been audited at least once. External auditors are engaged to support the validation process.

Box 23

Integrating on-site sanitation into formal service delivery and regulatory systems

Although 86% of the Portuguese population has access to sewered sanitation, on-site sanitation is nonetheless viewed as part of the formal system in Portugal, with clear responsibilities for both service delivery and regulation. In 2007, ERSAR published a recommendation addressed to water utilities and users, and in 2009, legislation was introduced mandating utilities to provide septic tank emptying services, which may be provided directly or through a private sector partner.

ERSAR regulates this service and has recently adapted benchmarking criteria (see section 3.6) to include utility performance in on-site sanitation. The fourth iteration of ERSAR's data management system includes information about formal on-site sanitation services provided by the utilities. This new indicator reflects a new national strategic plan for the sector; as outlined by ERSAR informants: "It's the new vision – that sanitation services can be provided by (either) sewer networks or well-controlled on-site sanitation systems. The aim is to align the economic incentives, formalize the sector and know where the waste goes regardless of the infrastructure in place."

Improvements are still required in this area: for example, there is no registration system, meaning utilities have weak data on the number of small-scale sanitation systems that exist. Septic tanks are rarely inspected ("no one knows how they are in structural terms"); and asset management for on-site sanitation systems is "not there currently in Portugal".[a]

The regulator's approach to this challenge is to focus on enabling the economic incentives for utilities to engage on-site sanitation: "The economics part is relevant – we need to provide the right incentives for these systems to be managed as an actual service".[b] Under the new system, ERSAR recommends that costs for the emptying service are integrated into the water bill, enabling households to absorb the cost through payments made "little and often". Under the recommended model, households with an existing water connection and a septic tank pay an additional tariff for wastewater, for which they can request that the utility provides a septic tank emptying service up to twice a year. However, many utilities are not yet following this model, and the ERSAR recommendations for on-site sanitation systems are now being revised.

[a] ERSAR. Key informant interview.
[b] ERSAR. Key informant interview.

Step 5: Strengthen regulator, service authority and service provider capacity and incentives

ERSAR have adopted a proactive role in building the capacity of the utilities that they regulate, providing training on diverse aspects of service quality, economic regulation and data reporting. These trainings generate significant interest: ERSAR informants cite the example of a 2023 training session on transposing the European Drinking Water Directive that attracted over 2000 participants. All such sessions are recorded and posted on the ERSAR YouTube channel.[14] As part of their remit to highlight the best-performing operators, ERSAR convene "excellence sessions" where operators engage in peer-to-peer learning and exchange experience on key topics: "It is important for these operators to learn about each other".[15] ERSAR are also proactive in the development of technical guidelines, books and wider resources that they perceive to be lacking in the sector.

Relating to internal capacity (section 5.1), the regulator runs a secondment programme to build the capacity of its own staff: the regulator has 90 full-time staff, of whom around 10% are seconded to other authorities at any given time. LIS-Water, the ERSAR Academy, universities and other research institutions in Portugal are also active in the sector and provide training on wider topics.

Step 6: Review, iterate and adapt to emerging challenges

In addition to integrating on-site sanitation into benchmarking criteria, ERSAR is increasingly turning its attention to stormwater management, recognizing the interdependencies between drainage and wider aspects of sanitation: "We have another aspect – stormwater. For the first time, we will be bringing this into the fold. We felt this was left behind. First, we were concerned with drinking water; then sanitation; then stormwater management."[16]

The Portuguese Government has developed a new strategic plan (PENSAARP 2030), which highlights stormwater management as a third service to be managed. Currently, this is sometimes placed with utilities and sometimes with municipal authorities. However, ERSAR sees the potential to transfer the responsibility fully to utilities as part of an integrated approach to urban water resilience: "We are preparing ourselves to regulate this. There are synergies with sanitation. We feel there is a lot to do in this field". Current legislation will first need to be revised in order to assign ERSAR as the regulator of stormwater management services.

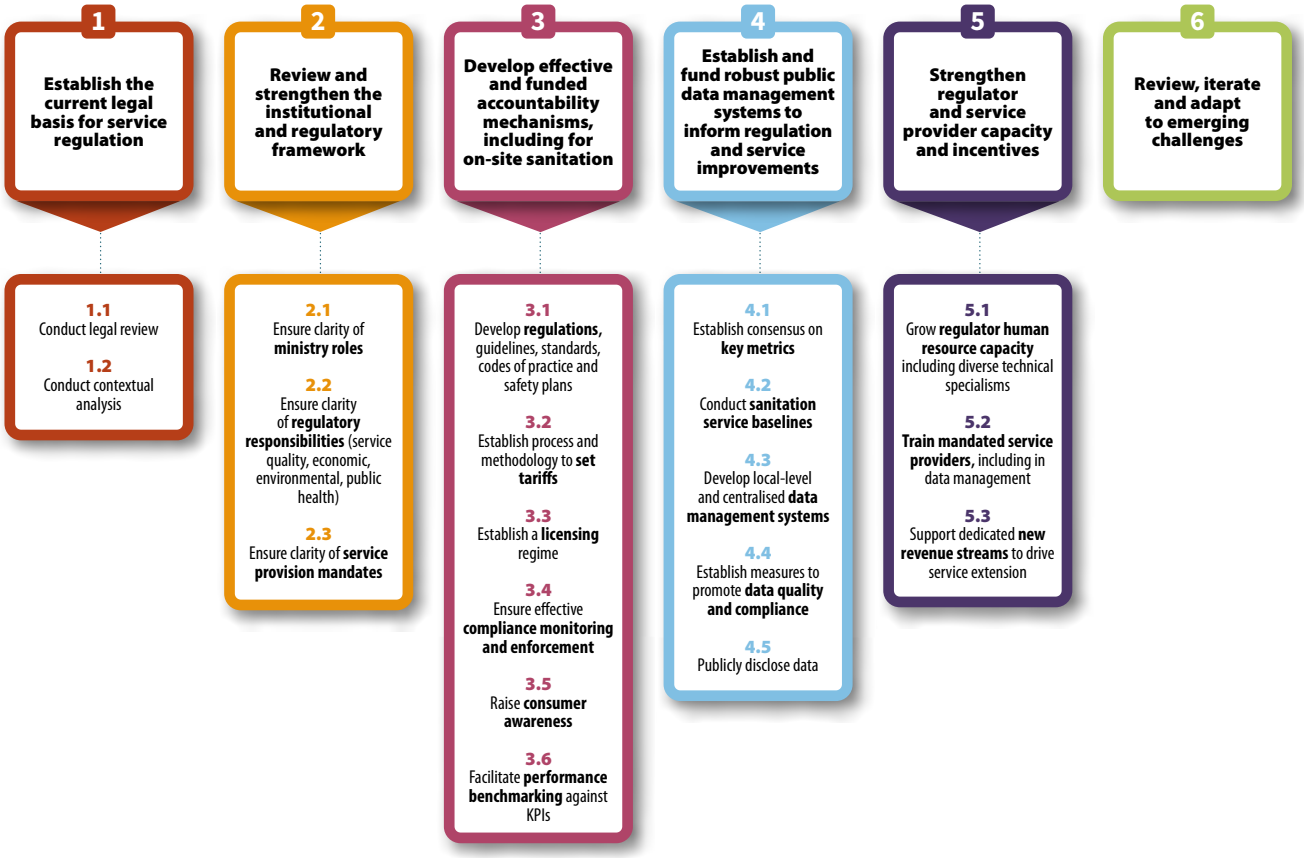
The focus on stormwater management is part of ERSAR's wider view that climate resilience represents the key regulatory challenge for the near future. Portugal is facing water scarcity and expects to have its first desalination plant within the next three years as part of mitigation strategies in this area. According to ERSAR, within this context, "the price of water will be a key challenge". Greater focus will be needed on regulation that can enable the circular economy and resource recovery. This is all viewed as part of the continual evolution in the regulator's role and focus. As an ERSAR key informant put it, "The knowledge transfer never ends".

[14] See: https://www.youtube.com/channel/UCEewVWFRU3SvQbYrfNCMsuQ.
[15] ERSAR. Key informant interview.
[16] ERSAR. Key informant interview.

8. Prior enablers for successful implementation of the roadmap

Fig. 16. Adapted Roadmap

Prior enablers: high-level political commitment; financial resource allocation



Chapter in brief: No country will be addressing sanitation regulation in isolation from wider political, economic and social factors. Variables such as the level of high-level political commitment, and the level of financial resources available, will influence the desired steps and the pace of advancement that is possible. This chapter introduces some of the key enablers that are likely to be required to deliver the Roadmap, supported by country-level examples. The following principles are noted:

- National-level campaigns can be powerful drivers of sanitation improvements.
- A first step towards increasing commitment to sanitation at all levels is to enshrine the HRWS in the Constitution.
- In low-income contexts, the financing gap for sanitation must first be assessed and acknowledged, providing a platform to leverage diverse forms of investment.

As observed in the Portugal case study, where stability of public policy has been key to the progress made, wide-ranging factors will influence the extent to which any single country can advance sanitation regulation. In consultations to inform this document, two factors were emphasized by informants above all others: high-level political commitment to improving sanitation access; and connected to this, a step change in the level of targeted financial resource allocation to sanitation (in low-income countries, this is likely to involve government allocations, private investment and ongoing sources of concessional finance). These prior enablers are reflected in Figure 16.

It is beyond the scope of this document to provide in-depth analysis of the social, political and economic factors that influence the extent of political commitment and levels of investment in sanitation in a given country. Chapter 1 outlines some of the factors that should be assessed as part of a contextual analysis, to understand features of the sanitation subsector that will inform the feasibility, desirability and specific nature of potential regulatory reforms. Nonetheless, it is useful to provide an overview of the enablers outlined by informants, and examples of countries where these can be observed:

National-level campaigns can be powerful drivers of sanitation improvements.

Arguably the leading example of high-level political commitment to large-scale sanitation improvements over the past 10 years is the **Swachh Bharat Mission**, initiated by the Government of India in 2014, and directly championed by the Prime Minister. Swachh Bharat aimed to achieve an ODF India over a 5-year first phase (2014-9), with the second phase now ongoing to improve management of solid and liquid waste. Swachh Bharat was underpinned by major investment from the Government of India, who allocated $5.8 billion in the first phase alone to support toilet construction across 700 000 villages nationwide *(21)*.

The Swachh Bharat Mission was supported by significant advancements in data collection and data management, to facilitate roll-out of the ODF and ODF ++ frameworks developed under the programme. Baseline data for the programme were derived from information from the PAS project in Maharashtra (see India case study).

In South-East Asia, Malaysia, Singapore, the Republic of Korea and Thailand have been cited as examples of high-level political leadership contributing to rapid advancements in sanitation coverage *(66)*. More recently in the WHO African Region, there have been examples of government campaigns to drive improvements in water and sanitation access. Perhaps most notably, in Ethiopia, Phase 1 of the **One WASH National Programme (2013–2017)** led to 18.7 million people gaining improved access to water supply and reduced open defecation from 44% to 29%. In Nigeria, where an estimated 50 million people still defecate in the open, the President declared a state of emergency in the WASH sector in 2018, launching a national campaign tagged **"Clean Nigeria: Use the Toilet"** to jump-start the country's journey towards becoming ODF by 2025. Parts of Nigeria have since made progress, such as the Cross River State, which became the first ODF local government area *(21)*.

A first step towards increasing commitment to sanitation at all levels is to enshrine the HRWS in the Constitution.

As outlined by IWA, inclusion in the national Constitution represents a country's strongest possible commitment to implementing the HRWS (see Chapter 1). A total of 122 Member States voted in favour of *UN General Assembly Resolution A/Res/64/292 of 28 July 2010 (1)*, recognizing HRWS. In the Americas, enshrining HRWS in the Constitution has been seen to facilitate the incorporation of the rights into legislation at lower levels – nationally, regionally (provinces, counties or federated States) and locally (municipalities) – and finally in the regulation of services *(10)*. Argentina (where international legally binding instruments are automatically incorporated into the Constitution), Bolivia, Ecuador, Honduras, Mexico, Nicaragua and Uruguay have taken this step in the Region of the Americas; in the African Region, Burkina Faso and Kenya are two examples of countries adopting the measure. As outlined by the World Bank, experience from Kenya

suggests this measure naturally cascades into high-level legislation and development strategies, into lower-level policies, strategies, frameworks and plans, and into the attitudes and language of decision-makers *(20)*.

In low-income contexts, the financing gap for sanitation must first be assessed and acknowledged, providing a platform to leverage diverse forms of investment.

As outlined in Chapter 5, low-income countries seeking to implement the Roadmap will almost certainly be confronting a significant financing gap for sanitation. Recent studies have estimated that low-income urban residents, for example, are only willing and able to pay a fraction of the true costs for high-quality sanitation solutions *(46)*. Historically, public funds have been instrumental in developing sanitation infrastructure in regions such as Europe and the United States of America *(4)*. However, in low-income countries with lower tax bases, where on-site sanitation currently predominates, a diverse range of financing streams must be leveraged to bridge the financing gap. This involves higher prioritization of sanitation as a public investment area, but also concessional loans and private investment *(47)*.

While it is beyond the scope of the Roadmap to explore financing modalities for sanitation in depth, progress will only be possible if the extent of the financing gap is assessed and acknowledged, providing a platform to explore potential solutions. Regardless of the source, hardware subsidies will likely be necessary to support large-scale increases in safely managed sanitation in low-income contexts, as seen in cases such as Zambia, where sector-level reforms, including regulatory reforms, have been accompanied by catalytic external financing to support toilet improvements and create conditions for improved pit-emptying services.

Within this challenge, it is emphasized that regulators can have a positive influence, as part of their leadership and sector coordination role, in driving forward innovative public finance mechanisms to help bridge the financing gap. In the African Region in particular, regulators are proactively working to address this issue and find new solutions (see Mozambique case study).

References

1. Resolution adopted by the General Assembly on 28 July 2010: 64/292 – The human right to water and sanitation. United Nations General Assembly; 2010 (A/RES/64/292; https://documents.un.org/doc/undoc/gen/n09/479/35/pdf/n0947935.pdf, accessed 26 September 2024).
2. World Health Organization. Terms of reference of the WHO International Network of Drinking-water and Sanitation Regulators (RegNet). Geneva: World Health Organization; 2010 (https://cdn.who.int/media/docs/default-source/wash-documents/regnet/regnet_tor_v1_dec2021.pdf?sfvrsn=aef71421_7&download=true, accessed 23 September 2024).
3. World Health Organization. Strong systems and sound investments: evidence on and key insights into accelerating progress on sanitation, drinking-water and hygiene – UN-Water global analysis and assessment of sanitation and drinking-water (GLAAS) 2022 report. Geneva: World Health Organization; 2023 (https://iris.who.int/bitstream/handle/10665/365297/9789240065031-eng.pdf?sequence=1, accessed 23 September 2024).
4. United Nations Human Settlements Programme. Global report on sanitation and wastewater management in cities and human settlements. Nairobi: United Nations Human Settlements Programme; 2023 (https://unhabitat.org/sites/default/files/2023/06/water_report_web.pdf, accessed 23 September 2024).
5. World Health Organization. Guidelines on sanitation and health. Geneva: World Health Organization; 2018 (https://iris.who.int/bitstream/handle/10665/274939/9789241514705-eng.pdf?sequence=25, accessed 23 September 2024).
6. World Health Organization. Sanitation safety planning: step-by-step risk management for safely managed sanitation systems. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364586, accessed 23 September 2024).
7. World Health Organization. Guidelines for the safe use of wastewater, excreta and greywater in agriculture and aquaculture. Geneva: World Health Organization Press; 2006 (https://apps.who.int/iris/handle/10665/78265, accessed 23 September 2021).
8. World Health Organization. Developing wastewater and sludge treatment regulations and standards: general guidance with a special focus on countries with limited resources. (Forthcoming).
9. Eastern and Southern Africa Water and Sanitation Regulators Association, United Nations Children's Fund. Citywide inclusive sanitation (CWIS) regulatory journeys in six countries: Eastern and Southern Africa. Lusaka: Eastern and Southern African Water and Sanitation Regulators Association; 2024 (https://www.esawas.org/wp-content/uploads/2024/05/6-CWIS-Regulatory-Journey-Technical-Report_Final_May.pdf, accessed 23 January 2025).
10. Ty PLN. Regulatory approaches towards CWIS in Metro Manila, Philippines. In: International Water Association [website]. London: International Water Association; 2023 (https://iwa-network.org/wp-content/uploads/2015/12/Regulatory-approach-towards-achieving-CWIS-in-Metro-Manila-Philippinesnitation-for-the-poorest-communities-in-Colombias-cities.pdf, accessed 3 April 2025).
11. Draganic I, Avello P, Jiménez A. The WASHREG approach: an overview. Stockholm and New York: Stockholm International Water Institute, United Nations Children's Fund, World Health Organization, Inter-American Development Bank; 2021 (https://www.unicef.org/media/106281/file/The%20WASHREG%20Approach.pdf, accessed 23 September 2024).
12. International Water Association. The Lisbon charter: guiding the public policy and regulation of drinking water supply, sanitation and wastewater management services. London: International Water Association; 2015 (https://iwa-network.org/wp-content/uploads/2015/12/1428790487-Lisbon_Regulators_Charter.pdf#:~:text=eptember%202014.%20They, accessed 23 September 2024).
13. World Bank, International Labour Organization, WaterAid, World Health Organization. Health, safety and dignity of sanitation workers: an initial assessment. Washington (DC): World Bank, 2019 (https://washmatters.wateraid.org/sites/g/files/jkxoof256/files/the-health-safety-and-dignity-of-sanitation-workers_0.pdf, accessed 23 January 2025).

14. Groom E, Halpern J, Ehrhardt D. Explanatory notes on key topics in the regulation of water and sanitation services. Washington (DC): World Bank; 2006 (Water Supply and Sanitation Sector Board Discussion Paper Series, No. 6, https://documents1.worldbank.org/curated/zh/832791468139205448/pdf/375290Explanatory0notes0WSS601PUBLIC1.pdf, accessed 23 January 2025).

15. Trémolet S, Binder D. The regulation of water and sanitation services in DCs. Paris: Agence Française de Développement; 2010 (https://www.yumpu.com/en/document/read/15764648/the-regulation-of-water-and-sanitation-services-in-dcs-afd, accessed 23 September 2024).

16. Eastern and Southern Africa Water and Sanitation Regulators Association. The water supply and sanitation regulatory landscape across Africa: continent-wide synthesis report. Lusaka: Eastern and Southern African Water and Sanitation Regulators Association; 2022 (https://www.esawas.org/wp-content/uploads/2024/04/Esawas_Report_2022.pdf, accessed 23 September 2024).

17. Eastern and Southern Africa Water and Sanitation Regulators Association. Citywide inclusive sanitation: accountability. Lusaka: Eastern and Southern African Water and Sanitation Regulators Association; 2021 (https://www.esawas.org/wp-content/uploads/2024/04/CWIS-ACCOUNTABILITY7-FINAL_en.pdf, accessed 23 September 2024).

18. Franceys R. Referee! Responsibilities, regulations and regulating for urban sanitation. Drabble S and Renouf R, editors. Lusaka: Eastern and Southern African Water and Sanitation Regulators Association and Water & Sanitation for the Urban Poor; 2020 (https://wsup.com/wp-content/uploads/2020/06/WSUP-ESAWAS-report_FINAL.pdf, accessed 23 September 2024).

19. Molinari A. Regulators and the application of the human rights to drinking water and sanitation in Latin America and the Caribbean. Inter-American Development Bank Water and Sanitation Division; 2023 (https://publications.iadb.org/en/regulators-and-application-human-rights-drinking-water-and-sanitation-latin-america-and-caribbean, accessed 23 September 2024).

20. African Ministers' Council on Water. African sanitation policy guidelines. Abuja: African Ministers' Council on Water; 2021 (https://knowledgehub.amcow-online.org/resource/african-sanitation-policy-guidelines-(aspg), accessed 23 September 2024).

21. World Bank. Principles and enablers for achieving universal access to water supply and sanitation: lessons from Africa. Forthcoming.

22. Eastern and Southern Africa Water and Sanitation Regulators Association. Regulation strategy and framework for inclusive urban sanitation service provision incorporating non-sewered sanitation services. Lusaka: Eastern and Southern Africa Water and Sanitation Regulators Association; 2019 (https://www.esawas.org/wp-content/uploads/2024/04/Sanitation-Regulation-Framework-and-Strategy.pdf, accessed 23 September 2024).

23. International Water Association. Lessons learnt: regulating for citywide inclusive sanitation. London: International Water Association; 2022 (https://iwa-network.org/wp-content/uploads/2022/02/R_CWIS_Lessons_Learned_WEB_central.pdf, accessed 23 September 2024).

24. National Water Supply and Sanitation Council. Urban onsite sanitation and faecal sludge management: framework for provision and regulation in Zambia. Lusaka: National Water Supply and Sanitation Council; 2018 (https://www.susana.org/_resources/documents/default/3-3327-7-1530187197.pdf, accessed 23 September 2024).

25. World Health Organization. Guidance on wastewater and solid waste management for manufacturing of antibiotics. Geneva: World Health Organization; 2024 (https://iris.who.int/bitstream/handle/10665/378471/9789240097254-eng.pdf?sequence=1, 23 September 2024).

26. Water & Sanitation for the Urban Poor. Regulatory reform: raising the raising the standard of pit-emptying services in Kisumu. London: Water & Sanitation for the Urban Poor; 2018 (Practice Note; https://wsup.com/wp-content/uploads/2018/03/PN034-ENGLISH-Regulation-in-Kisumu.pdf#:~:text=Effective%20regulation, accessed 4 September 2024).

27. Eastern and Southern Africa Water and Sanitation Regulators Association. Guidelines for sanitation services tariff setting and inputs for tariff models. Lusaka: Eastern and Southern African Water and Sanitation Regulators Association; 2020 (https://wesnetwork.org/wp-content/uploads/2020/08/Guidelines-for-Sanitation-Services-Tariff-Setting-Final-032020.pdf, accessed 23 September 2024).

28. Water Integrity Network, AquaConsult. Regulating urban sanitation to prevent integrity failures: Tanzania country report. Berlin: Water Integrity Network; 2024, (https://www.waterintegritynetwork.net/post/integrity-for-cwis-from-containment-to-disposal, accessed 23 January 2025).

29. Water Integrity Network, AquaConsult. Regulating urban sanitation to prevent integrity failures: Zambia country report. Berlin Water Integrity Network; 2024 (https://www.waterintegritynetwork.net/post/integrity-for-cwis-from-containment-to-disposal, accessed 23 January 2025.

30. Water & Sanitation for the Urban Poor. Incentivising the private sector to target low-income customers. London: Water & Sanitation for the Urban Poor, 2018 (https://wsup.com/wp-content/uploads/2018/03/02-2018-Incentivising-the-private-sector-to-target-low-income-customers.pdf, accessed 4 September 2024).

31. Parker C, Nielsen V. Compliance: 14 questions. In: Drahos P, editor. Regulatory theory: foundations and applications. Acton: ANU Press; 2017:217-32.

32. Braithwaite J. Responsive excellence. In: Coglianese C, editor. Achieving regulatory excellence. Washington (DC): Brookings Institution; 2016:23–35.

33. World Health Organization. Clarifying responsibilities and strengthening accountability to support the effective regulation of sanitation services. Background paper prepared for the WHO International Network of Drinking-water and Sanitation Regulators. 2022.

34. Environmental Protection Agency. National inspection plan for domestic waste water treatment systems 2022 - 2026. Wexford, Ireland: Environmental Protection Agency; 2021 (https://www.epa.ie/publications/compliance--enforcement/waste-water/2022-2026-NIP---Final.pdf, accessed 9 September 2024).

35. Environmental Protection Agency. Domestic waste water treatment system inspections 2023. Wexford, Ireland: Environmental Protection Agency; 2024 (https://www.epa.ie/publications/compliance--enforcement/waste-water/OEE---Domestic-Waste-Water-Report---2023---Final-Report.pdf, accessed 16 September 2024).

36. Superintendence of Sanitary Services (2019). 2030 Water and Sanitation Sector Agenda Strategic Plan, First Edition, Santiago, Chile. Government of Chile.

37. Water Services Regulatory Board. A performance report of Kenya's water services sector – 2021/22. Nairobi: Water and Services Regulatory Board; 2023 (https://wasreb.go.ke/wp-content/uploads/2023/08/WASREB_Impact_Report15.pdf, accessed 23 September 2024).

38. National Water Supply and Sanitation Council. NWASCO annual report 2022. Lusaka: National Water Supply and Sanitation Council; 2023 (https://www.nwasco.org.zm/index.php/media-center/publications/annual-reports?task=download.send&id=97&catid=6&m=0, accessed 23 September 2024).

39. United States Agency for International Development Urban Resilience by Building and Applying New Evidence in Water, Sanitation, and Hygiene. Lessons and good practices for benchmarking fecal sludge management. Washington (DC): United States Agency for International Development Urban Resilience by Building and Applying New Evidence in Water, Sanitation, and Hygiene; 2024.

40. Mati E, Mugo K. Institutionalising pro-poor services: a new key performance indicator for Kenyan utilities. Drabble S, series editor. London: Water & Sanitation for the Urban Poor; 2018 (https://wsup.com/wp-content/uploads/2018/07/PN036-ENGLISH-Institutionalising-pro-poor-service-delivery-KPI-10-Kenya.pdf, accessed 23 September 2024).

41. United Nations Children's Fund, WaterAid, Water & Sanitation for the Urban Poor. Female-friendly public and community toilets: a guide for planners and decision makers. London: WaterAid; 2018 (https://washmatters.wateraid.org/publications/female-friendly-public-and-community-toilets-a-guide-for-planners-and-decision-makers, accessed 23 September 2024).

42. Water Services Regulatory Board. A performance report of Kenya's Water Services Sector – 2020/21. Nairobi: Water Services Regulatory Board, 2022 (https://wasreb.go.ke/wp-content/uploads/2023/08/Wasreb_Impact_Report_14.pdf, accessed 23 January 2025).

43. Water Integrity Network, AquaConsult. Regulating urban sanitation to prevent integrity failures: Rwanda country report. Berlin: Water Integrity Network, 2024 (IMPACT, No. 14; https://www.waterintegritynetwork.net/post/integrity-for-cwis-from-containment-to-disposal, accessed 23 January 2025.

44. Water Integrity Network, AquaConsult. Regulating urban sanitation to prevent integrity failures: a synthesis of findings from Tanzania, Rwanda, Zambia and Bangladesh, Berlin: Water Integrity Network; 2024 (https://www.sanirepo.com/publication/regulating-urban-sanitation-to-prevent-integrity-failures-2, accessed 23 January 2025).

45. Nzitonda J. Towards improving faecal sludge management in Kigali, Rwanda. In: International Water Association [website]. London: International Water Association; 2022 (https://iwa-network.org/wp-content/uploads/2022/08/9-Towards-improving-faecal-sludge-management-in-Kigali-Rwanda.pdf, accessed 3 April 2025).

46. Delaire C, Peletz R, Haji S, Kones J, Samuel E, Easthope-Frazer A et al. How much will safe sanitation for all cost? Evidence from five cities. Environ Sci Technol. 2020;55(1):767–777. doi:10.1021/acs.est.0c06348.

47. Mansour G, Tidwell B. Mind the gap: how can we address the shortfall in urban sanitation finance? Drabble S, series editor. London: Water & Sanitation for the Urban Poor; 2022 (https://wsup.com/wp-content/uploads/2022/02/Mind-the-Gap-How-can-we-address-the-shortfall-in-urban-sanitation-finance_final.pdf, accessed 23 September 2024).

48. Maina J, Norman G. Willingness of Kenyan water utility customers to pay a pro-poor sanitation surcharge. London: Water & Sanitation for the Urban Poor; 2018 (https://wsup.com/wp-content/uploads/2018/03/PBrief_Willingness-of-Kenyan-water-utility-customers-to-pay-a-pro-poor-sanitation-surcharge_Kenya.pdf, accessed 23 September 2024).

49. Acey C et al. Cross-subsidies for improved sanitation in low income settlements: assessing the willingness to pay of water utility customers in Kenyan cities. World Dev. 2019;115;160–77. doi:10.1016/j.worlddev.2018.11.006.

50. Howard G, Calow R, Macdonald A, Bartram J. Climate change and water and sanitation: likely impacts and emerging trends for action. Annu Rev Environ Resour. 2016;41:253–276. doi:10.1146/annurev-environ-110615-085856.

51. Johnson J, Zakaria F, Nkurunziza AG, Way C, Camargo-Valero MA, Evans B. Whole-system analysis reveals high greenhouse-gas emissions from citywide sanitation in Kampala, Uganda. Commun Earth Environ. 2022;3(1):80. doi:10.1038/s43247-022-00413-w.

52. World Bank. Urban sanitation in times of climate change. Washington (DC): World Bank; 2024 (Background Paper).

53. Luh J, Royster S, Sebastian D, Ojomo E, Bartram J. Expert assessment of the resilience of drinking water and sanitation systems to climate-related hazards. Sci Total Environ. 2017;592:334–344. doi:10.1016/j.scitotenv.2017.03.084.

54. Jaiswal J, Mehta D, Mehta M. Impacts of scheduled desludging on quality of water and wastewater in Wai city, India. Environ Plan B Urban Anal City Sci. 2022;49(8):2216–2229. doi:10.1177/23998083221078596.

55. Mikhael G, Hyde-Smith L, Twyman B, Sánchez Trancón D, Jabagi E, Bamford E. Climate resilient urban sanitation: accelerating the convergence of sanitation and climate action. Bonn: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH; 2021 (https://resilientcitiesnetwork.org/downloadable_resources/UR/AC-GIZ-report-A4-stg2-digital-aw-72.pdf, accessed 23 September 2024).

56. Mills F, Kohlitz J, Carrard N, Willetts J. Considering climate change in urban sanitation: conceptual approaches and practical implications. USHHD Learning Brief. The Hague: SNV Netherlands Development Organisation; 2019 (https://www.uts.edu.au/sites/default/files/2019-08/201908-climatechange-learning-brief-lr.pdf, accessed 23 September 2024).

57. Department of Water and Sanitation of South Africa. Green drop 2022: government & private systems. Pretoria: Department of Water and Sanitation of South Africa; 2022 (https://ws.dws.gov.za/iris/releases/Report_Govt_Privates_Rev01_28Mar22_MN_web.pdf, accessed 23 September 2024).

58. Ofwat. Ofwat's 3rd climate change adaptation report. 2022; Birmingham: Ofwat. (https://www.ofwat.gov.uk/wp-content/uploads/2022/01/Ofwats-3rd-Climate-Change-Adaptation-Report.pdf, accessed 23 September 2024).

59. Water Services Regulatory Board. Disaster preparedness and mitigation guidelines. Nairobi: Water Services Regulatory Board; 2013 (https://wasreb.go.ke/wp-content/uploads/2023/08/Disaster-Management-Guidelines_Final.pdf, accessed 23 January 2025).

60. United Republic of Tanzania. The water supply and sanitation act, 2009. Dar es Salaam: United Republic of Tanzania; 2009 (https://faolex.fao.org/docs/pdf/tan142669.pdf, accessed 23 January 2025).

61. United Republic of Tanzania. The water supply and sanitation act, 2019. Dar es Salaam: United Republic of Tanzania; 2019 (https://faolex.fao.org/docs/pdf/tan199085.pdf, accessed 3 April 2025).

62. United Republic of Tanzania. The energy and water utilities regulatory authority act. Dar es Salaam: United Republic of Tanzania; 2006 (https://faolex.fao.org/docs/pdf/tan34584.pdf, accessed 3 April 2025).

63. Energy and Water Utilities Regulatory Authority. Water utilities performance review report for FY 2020/21. Dar es Salaam: Energy and Water Utilities Regulatory Authority; 2022.

64. United Nations Children's Fund, World Health Organization. Progress on household drinking water, sanitation and hygiene 2000–2022: special focus on gender. New York: United Nations Children's Fund and World Health Organization; 2023 (https://washdata.org/reports/jmp-2023-wash-households, accessed 23 September 2024)

65. The Water and Waste Services Regulation Authority. Water and waste services quality assessment guide: 2nd generation of the assessment system. Lisbon: The Water and Waste Services Regulation Authority; 2017.

66. Northover H, Ryu SK, Brewer T. Achieving total sanitation and hygiene coverage within a generation: lessons from East Asia. London: WaterAid; 2016 (https://washmatters.wateraid.org/sites/g/files/jkxoof256/files/Achieving_total_sanitation_and_hygiene_coverage_within_a_generation__lessons_from_East_Asia_0.pdf, accessed 23 September 2024).

Effective regulation is essential to ensure safe, inclusive and sustainable sanitation services that protect public health and the environment.

A roadmap for advancing sanitation regulation responds to the urgent need to strengthen sanitation regulation. It provides step-by-step guidance to help countries identify and prioritize actions to improve regulatory frameworks, drawing on real-world experiences and emerging good practices from across income levels and regions.

Grounded in practical case studies and aligned with key WHO and sector resources, the roadmap outlines essential functions and principles for regulating the entire sanitation service chain—from containment and treatment to safe reuse. It emphasizes the integration of economic, environmental and public health regulation and supports national and local authorities as they work to enhance accountability, service quality and health outcomes.

This publication is intended for staff in national and local agencies responsible for sanitation regulation, including ministries, regulators, utilities and development partners. It aims to equip them with the tools and inspiration needed to drive meaningful, context-appropriate reform.

Contact

World Health Organization
20 avenue Appia
CH-1211 Geneva 27
Switzerland
www.who.int