Progress on Wastewater Treatment

GLOBAL STATUS AND ACCELERATION NEEDS FOR SDG INDICATOR 6.3.1

2021

United Nations | UN WATER   UN-HABITAT   World Health Organization

Lead authors

Graham Alabaster (United Nations Human Settlements Programme - UN-Habitat), Richard Johnston (World Health Organization - WHO), Florian Thevenon and Andrew Shantz.

Acknowledgments

The authors are very grateful to their colleagues from the United Nations Statistics Division, Department of Economic and Social Affairs (Reena Shah, Marcus Newbury, Xuan Che, Robin Carrington), from Eurostat (Jürgen Förster), and from the Organisation for Economic Co-operation and Development (OECD) (Mauro Migotto), for many technical discussions on wastewater statistics, and for providing critical reviews and helpful comments on the manuscript. The authors are also grateful to colleagues at WHO (Kate Medlicott, Francesco Mitis), to the UN-Water Members and Partners, and to the Strategic Advisory Group for the Integrated Monitoring Initiative for SDG 6, for their useful comments and suggestions on this report.

ISBN 978-92-1-132878-3

Suggested citation

UN Habitat and WHO, 2021. Progress on wastewater treatment – Global status and acceleration needs for SDG indicator 6.3.1. United Nations Human Settlements Programme (UN-Habitat) and World Health Organization (WHO), Geneva.

Cover photograph: Lisbon, Portugal by Helio Dilolwa

MINISTÈRE DE L'EUROPE ET DES AFFAIRES ÉTRANGÈRES
Liberté Égalité Fraternité

Ministry of Foreign Affairs of the Netherlands

SWEDEN

Ministry of Infrastructure and Water Management

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

BMZ Federal Ministry for Economic Cooperation and Development

Progress on wastewater treatment

Global status and acceleration needs for SDG indicator 6.3.1

2021

Presenting the UN-Water Integrated Monitoring Initiative for SDG 6

Through the UN-Water Integrated Monitoring Initiative for SDG 6 (IMI-SDG6), the United Nations seeks to support countries in monitoring water- and sanitation-related issues within the framework of the 2030 Agenda for Sustainable Development, and in compiling country data to report on global progress towards SDG 6.

IMI-SDG6 brings together the United Nations organizations that are formally mandated to compile country data on the SDG 6 global indicators, and builds on ongoing efforts such as the World Health Organization (WHO)/United Nations Children's Fund (UNICEF) Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP), the Global Environment Monitoring System for Freshwater (GEMS/Water), the Food and Agriculture Organization of the United Nations (FAO) Global Information System on Water and Agriculture (AQUASTAT) and the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS).

This joint effort enables synergies to be created across United Nations organizations and methodologies and requests for data to be harmonized, leading to more efficient outreach and a reduced reporting burden. At the national level, IMI-SDG6 also promotes intersectoral collaboration and consolidation of existing capacities and data across organizations.

The overarching goal of IMI-SDG6 is to accelerate the achievement of SDG 6 by increasing the availability of high-quality data for evidence-based policymaking, regulations, planning and investments at all levels. More specifically, IMI-SDG6 aims to support countries to collect, analyse and report SDG 6 data, and to support policymakers and decision makers at all levels to use these data.

> Learn more about SDG 6 monitoring and reporting and the support available: www.sdg6monitoring.org

> Read the latest SDG 6 progress reports, for the whole goal and by indicator: https://www.unwater.org/publication_categories/sdg6-progress-reports/

> Explore the latest SDG 6 data at the global, regional and national levels: www.sdg6data.org

UN WATER

INTEGRATED MONITORING INITIATIVE FOR SDG 6

United Nations | UN WATER

INDICATORS	CUSTODIANS
6.1.1 Proportion of population using safely managed drinking water services	WHO, UNICEF
6.2.1 Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water	WHO, UNICEF
6.3.1 Proportion of domestic and industrial wastewater flows safely treated	WHO, UN-Habitat, UNSD
6.3.2 Proportion of bodies of water with good ambient water quality	UNEP
6.4.1 Change in water-use efficiency over time	FAO
6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	FAO
6.5.1 Degree of integrated water resources management	UNEP
6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	UNECE, UNESCO
6.6.1 Change in the extent of water-related ecosystems over time	UNEP, Ramsar
6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan	WHO, OECD
6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management	WHO, OECD

UN WATER INTEGRATED MONITORING INITIATIVE FOR SDG 6

United Nations | UN WATER

Contents

List of figures

List of boxes

Foreword

The COVID-19 crisis has caused enormous disruption to sustainable development. However, even before the pandemic, the world was seriously off track to meet Sustainable Development Goal 6 (SDG 6) – to ensure water and sanitation for all by 2030.

No matter how significant the challenges we face, achieving SDG 6 is critical to the overarching aim of the 2030 Agenda, which is to eradicate extreme poverty and create a better and more sustainable world. Making sure that there is water and sanitation for all people, for all purposes, by 2030 will help protect global society against many and varied looming threats.

Our immediate, shared task is to establish safe water and sanitation services in all homes, schools, workplaces and health care facilities. We must increase investment in water use efficiency, wastewater treatment and reuse, while protecting water-related ecosystems. And we must integrate our approaches, with improved governance and coordination across sectors and geographical borders.

In short, we need to do much more, and do it much more quickly. In the SDG 6 Summary Progress Update 2021 that preceded this series of reports, UN-Water showed that the current rate of progress needs to double - and in some cases quadruple - to reach many of the targets under SDG 6.

At the March 2021 high-level meeting on the "Implementation of the Water-related Goals and Targets of the 2030 Agenda", UN Member States noted that to achieve SDG 6 by 2030 will require mobilizing an additional US$ 1.7 trillion, three times more than the current level of investment in water-related infrastructure. To make this happen, Member States are calling for new partnerships between governments and a diverse group of stakeholders, including the private sector and philanthropic organizations, as well as the wide dissemination of innovative technology and methods.

We know where we need to go, and data will help light the way. As we ramp up our efforts and target them at areas of greatest need, information and evidence will be of critical importance.

Published by the UN-Water Integrated Monitoring Initiative for SDG 6 (IMI-SDG6), this series of indicator reports is based on the latest available country data, compiled and verified by the custodian United Nations agencies, and sometimes complemented by data from other sources.

The data were collected in 2020, a year in which the pandemic forced country focal points and UN agencies to collaborate in new ways. Together we learned valuable lessons on how to build monitoring capacity and how to involve more people, in more countries, in these activities.

The output of IMI-SDG6 makes an important contribution to improving data and information, one of the five accelerators in the SDG 6 Global Acceleration Framework launched last year.

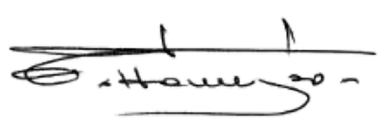
With these reports, our intention is to provide decision-makers with reliable and up-to-date evidence on where acceleration is most needed, so as to ensure the greatest possible gains. This evidence is also vital to ensure accountability and build public, political and private sector support for investment.

Thank you for reading this document and for joining this critical effort. Everyone has a role to play. When governments, civil society, business, academia and development aid agencies pull together dramatic gains are possible in water and sanitation. To deliver them, it will be essential to scale up this cooperation across countries and regions.

The COVID-19 pandemic reminds us of our shared vulnerability and common destiny. Let us “build back better” by ensuring water and sanitation for all by 2030.

Gilbert F. Houngbo

UN-Water Chair and President of the International Fund for Agricultural Development



Executive summary

Sustainable Development Goal (SDG) target 6.3 seeks to halve the proportion of untreated wastewater discharged into water bodies and includes two complementary indicators to monitor progress: the proportion of domestic and industrial wastewater flows safely treated (Indicator 6.3.1) and the proportion of bodies of water with good ambient water quality (Indicator 6.3.2). Indicator 6.3.1 aims to track the percentage of wastewater flows from different point sources (households, services, industries and agriculture) that are treated in compliance with national or local standards (UN-Water, 2017). The disaggregation and analysis of wastewater volumes and pollution loads by different sources can help identify heavy polluters, and consequently, apply the "polluter pays" principle to eliminate dumping, minimize the release of hazardous chemicals and improve treatment (UN-Water, 2018).

This report presents a summary of available data on total wastewater flows generated and treated in 2015, as well as disaggregated analyses on flows from industrial sources in 2015 and households in 2020. The monitoring of the total and industrial components of indicator 6.3.1 relies on the aggregation of standardized national-level statistics previously validated by governments. The corresponding flows of wastewater generated and treated have been extracted from two existing harmonized international frameworks (the United Nations Statistics Division (UNSD)/United Nations Environment Programme (UNEP) Questionnaire on Environment Statistics and the Organisation for Economic Co-Operation and Development (OECD)/Eurostat Joint Questionnaire on Inland Waters) and by contacting additional national institutions and ministries or statistical offices. Data for the year 2015 have been selected based on data availability for analysis of the 2021 update of the total and industrial components of the indicator.

In 2015, in the 42 countries (representative of 18 per cent of the global population) reporting both generation and treatment of total wastewater flows, 32 per cent received at least some treatment. The proportion of industrial wastewater flow treated was 30 per cent, and could only be calculated for 14 countries (representing 4 per cent of the global population). The limited data available on total and industrial wastewater flows therefore indicate that proportions of flows being safely treated are low, even among high-income countries, which were more likely to report data. Consequently, there are insufficient data to produce global and regional estimates.

The household component of the indicator has been reported separately from that of the total and industrial components due to its distinct methodological approach of producing estimates of flows generated and safely treated using a combination of nationally reported data, and in their absence, a set of assumptions. The household wastewater analysis draws on data from the UNSD/UNEP and OECD/Eurostat questionnaires, as well as data compiled directly from national statistical agencies, regulators, line ministries, utilities and the Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene (JMP). Overall estimates (global, regional, and national) of household wastewater flows generated and safely treated have been reported as being for 2020, although data for individual components in the calculation were derived from multiple (but most recently available) years in many cases. Globally, 56 per cent of household wastewater flows were safely treated in 2020 (extrapolated from data from 128 countries representing 80 per cent of the global population). Wide disparities among the regional proportions of household wastewater safely treated were discovered (ranging from 25 per cent to 80 per cent by SDG region), indicating that progress remains uneven across the globe.

Although this report reveals that data completeness remains a challenge, the reporting of this indicator remains important for the stimulation of progress on safe wastewater management and for advocating for improved national monitoring programmes that will address data deficiencies. For countries that lack national strategies and targets for the safe treatment of wastewater, improving the monitoring of indicator 6.3.1 may also attract greater attention towards the sector. Investments in both centralized and decentralized wastewater conveyance and treatment systems are needed in many countries and regions to minimize direct discharges to the environment while ensuring that collected flows are safely treated prior to discharge or reuse.

The monitoring of wastewater flows generated by different sources and economic activities is key to the enforcement of regulation (including discharge permits) in order to reduce pollutant discharges and protect water resources. The monitoring of wastewater flows treated will support the shift towards a circular economy in which wastewater is considered a valuable resource. Quality and up-to-date wastewater statistics contribute to the momentum towards achieving SDG 6, as they can be used to support sustainable water resources management and safe wastewater strategies that are both needed to ensure access to water and sanitation for all by 2030.

The Gambia by Dan Roizer on Unsplash

Key messages

- SDG indicator 6.3.1 tracks the percentage of wastewater flows that are safely treated before discharge or reuse. Wastewater flows are classified into three main categories: (i) total, (ii) industrial, and (iii) households, each of which have been reported on individually.

- Data on total and industrial wastewater generation and treatment rely on the existing standardized methodologies associated with the official statistics extracted from Eurostat, OECD and UNSD databases. Generally, there was a lack of accurate data reporting on wastewater volumes generated and treated, highlighting the challenges of complexity, cost and aggregation at national levels.

- The calculation of country estimates for the household component relies on a combination of official statistics and strategic assumptions to fill data gaps and fully characterize a "household wastewater management chain". This chain represents the proportion of flows generated, collected and safely treated for sewer and septic tank wastewater streams. While data are more broadly available and reported for the household component versus the total and industrial components, the same aforementioned issues about data quality and completeness apply.

- **Total wastewater treated:** In the 42 countries reporting standardized national-level data previously validated by governments for both generation and treatment of total wastewater flows, 32 per cent of all wastewater flows generated from point sources in 2015 received at least some treatment (although they were not necessarily safely treated), representing 18 per cent of the global population.

- **Industrial wastewater treated:** In the 14 countries reporting standardized national-level data previously validated by governments for both generation and treatment of industrial wastewater flows, 30 per cent of all wastewater flows from industrial sources in 2015 received at least some treatment, representing 4 per cent of the global population.

- **Household wastewater safely treated:** Globally, 56 per cent of all wastewater flows generated by households in 2020 were collected and safely treated (meaning they were treated by secondary or higher processes or that effluent discharges met relevant standards). This global estimate is based on individual estimates produced for 128 of 234 countries and territories representing 80 per cent of the global population. Approximately 57 per cent of all household wastewater flows that were generated in 2020 were delivered into sewers, while 24 per cent flowed into septic tanks, and the remaining 19 per cent were generated by households with all other types of sanitation, including those with no toilets at all. Of the household wastewater flows directed into sewers, approximately three-quarters (78 per cent) were safely treated at the point of discharge (either having been discharged according to standards or treated by at least secondary treatment processes). Of the flows directed into septic tanks, nearly half were collected and safely treated on- or off-site (48 per cent), while flows generated by households with all other types of sanitation (i.e. pit latrines and open defecation) were considered not safely treated.

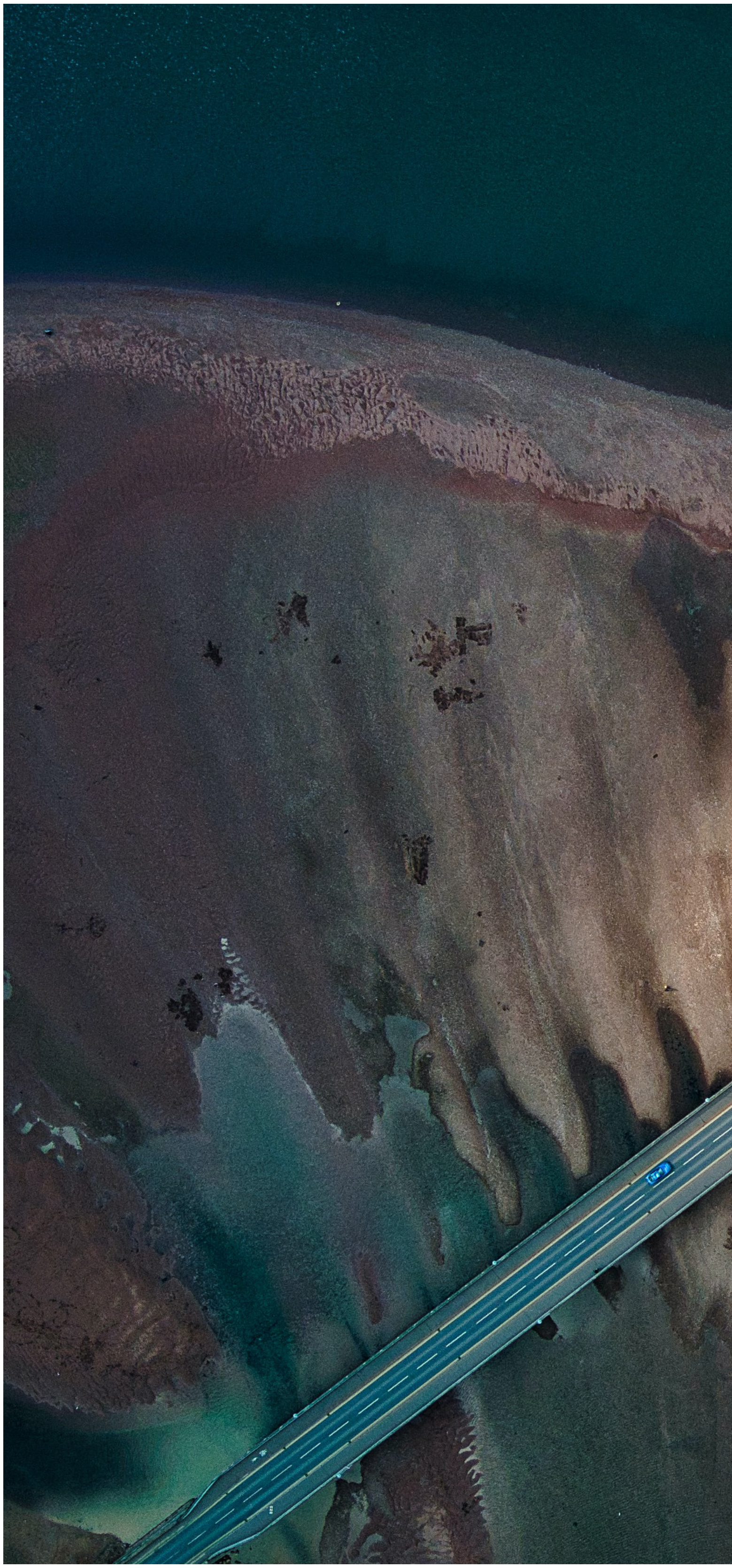
- Municipal wastewater utilities are an important source of consistent reported data, but there are currently extremely low levels of reporting of industrial wastewater statistics. Data scarcity, particularly for independent treatment systems and industrial discharges, reveals the low priority given to managing pollution from these sources. It is therefore necessary to strengthen regulatory mechanisms (for example, national standards and discharge permits) for all sources of wastewater and to carry out monitoring and enforcement of local service providers and industry to drive improvements to both treatment and monitoring. Data aggregation and national-level reporting by regulators in coordination with statistical offices is needed for the transparent assessment of national and global progress and for informing national strategies and plans.

- The disaggregation of wastewater volumes and pollution loads by sources according to households, services and industries can help identify heavy polluters, and consequently, apply the polluter pays principle to eliminate dumping, minimize the release of hazardous chemicals and better protect human health, aquatic ecosystems and biodiversity. Improving the monitoring and management of wastewater flows by economic sectors should be incorporated in national adaptation strategies and plans to increase society's resilience to climate change and implement equitable and sustainable integrated water resources management.

- For household wastewater in particular, it is urgently necessary to ensure that flows generated are discharged either into sewer lines or on-site storage and treatment systems, such as septic tanks with leach fields. In settings where septic tanks (or other forms of independent treatment) are common, national inspection programmes may support efforts to promote the correct operation, maintenance and functionality needed to not only meet monitoring requirements, but also to protect the surrounding environment and public health.

- Improving wastewater management is not only fundamental for protecting drinking water resources from faecal contamination and waterborne diseases (for example, cholera, typhoid fever or hepatitis) and protecting aquatic ecosystems from nutrient input (eutrophication) and chemical and plastic pollution; but also for mitigating and adapting to climate change. Developments in response to the COVID-19 pandemic have also demonstrated the utility of wastewater-based disease surveillance (for example, monitoring SARS-CoV-2 RNA).

- The promotion of the safe reuse of treated wastewater should be prioritized in policies and monitored in accordance with the ambition of SDG target 6.3. Safe reuse may also support the achievement of other goals by making beneficial use of water, nutrients and energy recoverable from wastewater, and adapting to growing urban population needs (SDG 2 and 11), transitioning to a circular economy (SDG 12) and adapting to water scarcity induced by climate change (SDG 13).
- In the future, some water quality parameters routinely monitored in wastewater treatment plant effluents could also be included as part of indicator 6.3.1, to estimate the organic load eliminated by wastewater treatment, and the resulting load discharged into the environment. Such enhancements to the monitoring of the indicator would serve to strengthen the relationship and interconnectedness between indicator 6.3.1 and indicator 6.3.2, which focuses on ambient water quality.



Teignmouth, UK by Red Zeppelin on Unsplash

1. Introduction

Ensuring the quality of our water resources depends on the monitoring and control of pollution sources and discharges. Contaminated water bodies pose risks to human health and the functioning of ecosystems. Uncontrolled discharges may result in contamination of drinking water sources, the overloading of water bodies with organic matter (causing eutrophication), and the accumulation of heavy metals and other pollutants.

Global water withdrawals have increased almost two times faster than the world's population over the last century (Food and Agriculture Organization [FAO], 2015). The World Economic Forum's Global Risks Report has listed water crises among the top five risks in terms of impact for eight consecutive years (World Economic Forum [WEF], 2019). Combined with a more erratic and uncertain supply, climate change will aggravate the situation of currently water-stressed regions and generate new water stresses in regions where water resources are currently abundant (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2020). Water stress already affects every continent and about two-thirds of the global population live under conditions of severe water scarcity for at least one month per year. Increasing water-use efficiencies will therefore be key to reducing the threat posed by water scarcity on biodiversity and human welfare (Mekonnen and Hoekstra, 2016).

The world is also turning its attention to the harm caused by emerging pollutants in aquatic environments, which include pharmaceuticals such as anti-inflammatory drugs, analgesics, antibiotics, hormones and microplastics (World Bank, 2019). From food to fashion, oil to chemicals, and mining to pharmaceuticals, businesses are failing to stem the flow of dirty water into our natural environments (CDP, 2019).

Improving wastewater monitoring and management should become recognized as part of the sustainable solution to the quantitative and qualitative aspects of the ongoing water crisis. To date, the willingness to pay for wastewater collection, treatment and monitoring is generally relatively low compared with drinking water services, especially in countries with low health and environmental standards. Furthermore, treated wastewater is generally not sufficiently recognized as a manageable and renewable resource which can be used in agriculture, industry and energy generation. An important paradigm shift regarding wastewater management is therefore necessary to not only better protect drinking water resources and aquatic ecosystems, but also contribute to sustainable development and climate change mitigation and adaptation. Safe wastewater management and reuse can mitigate climate change impacts, since sanitation and wastewater systems contribute to greenhouse-gas emissions, both directly through the breakdown of excreta discharged into the environment or during treatment processes, and indirectly through the energy required for treatment steps (Dickin and others, 2020). Treated wastewater should be also included as part of the river basin's water balance, to reduce the financial burden on wastewater treatment plants and to increase environmental benefits (World Bank, 2021).

It is generally considered that over 80 per cent of wastewater is released into the environment without adequate treatment (World Water Assessment Programme [WWAP], 2017). However, such statistics have been based on very incomplete data, and more recent and thorough analyses have suggested that just under 50 per cent of global wastewater production is released into the environment untreated (Jones and others, 2021). A recent study has also suggested that the global production of municipal wastewater is expected to increase by 24 per cent by 2030 and 51 per cent by 2050 over the current levels (Qadir and others, 2020). In fact, there is an overall lack of accurate knowledge about the current wastewater volumes generated and treated (see Sato and others, 2013, for examples) because monitoring is complex and costly, and data are not systematically aggregated to the national level and/or are not disclosed in many countries, especially in the industrial sector (World Business Council for Sustainable Development [WBCSD], 2020). A previous compilation of wastewater treatment statistics from various sources covering 183 countries pointed out that the lack of consistent definitions, reporting protocols and a central custodian for wastewater treatment data were the main reasons behind the challenges in constructing comparable performance measures (Malik and others, 2015). A global standardized monitoring effort through indicator 6.3.1 will stimulate considerable progress in wastewater management, and provide necessary and timely information to decision makers and stakeholders to make informed decisions.

The United Nations General Assembly in its seventy-first session in 2017 approved the global indicator monitoring framework developed by the Inter-Agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDG), and for the first time put wastewater on the global development agenda. Sustainable Development Goal (SDG) 6 is about ensuring the availability and sustainability of water and sanitation for all by 2030 and addresses the entire sanitation chain – from the safe management of household sanitation services (indicator 6.2.1a) to the safe treatment and discharge of domestic and industrial wastewater flows (indicator 6.3.1). Beyond the public health benefits associated with the safe treatment of wastewater, there are social, environmental and economic benefits. The SDG framework on sanitation differs from the previous target 7.C of the Millennium Development Goals (MDGs) in that it applies to high as well as low- and middle- income countries across which levels of service vary widely from basic household sanitation services through to safe management and safe treatment of wastewater from both domestic and industrial sources. Therefore, all countries are challenged to improve their service levels, as well as their capacities to measure and monitor these improvements.

Target 6.3 (Box 1) sets out to improve ambient water quality, which is essential to protecting both ecosystem and human health, by eliminating, minimizing and significantly reducing different streams of pollution into water bodies. The purpose of monitoring progress against SDG 6 indicator 6.3.1 is to ensure accountability among Member States while providing necessary and timely information to decision makers and stakeholders to make informed decisions towards reducing water pollution, minimizing release of hazardous chemicals, and increasing safe wastewater treatment and reuse to improve sustainable water management. To that end, SDG indicator 6.3.1 tracks the proportion of wastewater flows generated by households, services and industrial economic activities that are safely treated, either through centralized wastewater treatment plants or decentralized independent wastewater treatment systems, before being discharged into the environment. Safe treatment and disposal and productive reuse of wastewater are also called for in target 6.3 in order to respond to growing water demands, increasing water pollution loads and increasing climate change impacts on fresh water resources.

Quality and up-to-date wastewater statistics are crucial to provide information to decision makers and stakeholders. Only then may empowered decision makers effectively promote sustainable and safe wastewater management strategies and policies to benefit the global population's health and the environment. There is, however, currently an overall lack of precise accounting of the global volumes of wastewater generated and treated. Moreover, wastewater statistics are in an early stage of development in many countries and are not regularly produced and/or reported. Wastewater monitoring is relatively complex and costly, and data are not systematically aggregated to or available at the national level, especially industrial wastewater data, which are generally poorly monitored.

These gaps and deficiencies are commonly the result of an unclear institutional mandate for wastewater monitoring (for example, a policy of decentralization), insufficient resourcing or capacities, and poor coordination between regulatory or statistical agencies (who often work at the national level) and individual service providers (such as municipal utilities) who interact more with local government institutions. Despite the obvious effort and costs associated with compiling wastewater statistics, the benefit and value of measuring wastewater generation, treatment and related aspects cannot be underestimated. The 2030 Agenda for Sustainable Development provides an opportunity to explain why countries are advised to compile wastewater statistics and show them the benefits it will have on their citizens and the environment.

Currently, wastewater statistics are typically compiled by National Statistical Offices (NSOs) or in some cases national wastewater or utility regulators. Over the past decade, efforts have been made to introduce standardized methodologies and protocols to promote international compilation and comparison. The most prominent initiatives include the United Nations Statistics Division (UNSD) and United Nations Environment Programme (UNEP) data collection of environment statistics[1], the Organisation for Economic Co-Operation and Development (OECD) Environment Database[2], and Eurostat Environmental Statistics[3]. A clear definition of the terminology and methodology for wastewater statistics is essential to contribute to harmonizing international data-collection practices and SDG 6.3.1 reporting. The objective of indicator 6.3.1 is to cover safely treated wastewater flows representative of households and the entire economy, and to build

1 See https://unstats.un.org/unsd/envstats/datacollect.
2 See https://stats.oecd.org/OECDStat_Metadata/ShowMetadata.ashx?Dataset=WATER_TREAT&Lang=en.
3 See https://ec.europa.eu/eurostat/web/environment.

on the aforementioned international frameworks for monitoring wastewater generation and treatment at the national level. Such approaches reduce the monitoring burden that SDG reporting can impose on countries, and provide well-defined and internationally comparable variables for global data analysis and use by policymakers and urban/land planners.

This report presents wastewater statistics related to various sources covering economic activities and households, with separate methodologies and data for total, industrial and household wastewater flows. Statistics on total and industrial wastewater generation and treatment are based on data directly reported from national authorities, the compilation and analysis for which is led by UNSD and United Nations Human Settlements Programme (UN-Habitat), respectively. Employing a separate estimation-based methodology, the World Health Organization (WHO) leads on the collection, compilation and processing of data on domestic wastewater generation and treatment. The domestic methodology relies on data from UNSD and other international frameworks, as well as other data collected from national sources and a set of assumptions to fill in data gaps.

Box 1. Definitions of Sustainable Development Goal (SDG) 6, target 6.3 and related indicators

Goal 6: Ensure availability and sustainable management of water and sanitation for all.

Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

Indicator 6.3.1: Proportion of domestic and industrial wastewater flows safely treated. These statistics have been disaggregated, calculated and separately reported by the following components:

- Total wastewater: Proportion of reported total wastewater flows safely treated*. The composition of total wastewater flow is described separately in section 2.1.1.

- Industrial wastewater: Proportion of reported industrial wastewater flows safely treated*. The composition of industrial wastewater flow is described separately in section 2.1.1.

- Domestic wastewater: Proportion of reported wastewater flows from households safely treated*.

*Wastewater flows are defined as being safely treated if discharges comply with national or local standards. In the absence of such data, flows treated by secondary or higher technologies are also considered to be safely treated.

Indicator 6.3.2: Proportion of bodies of water with good ambient water quality.

2. Method and process

2.1. Methodology

Indicator 6.3.1 has been disaggregated into three components, namely the safely treated proportions of total, industrial and domestic wastewater flows. Distinct methodologies have been employed for the total and industrial components (which rely solely on official reported statistics from national authorities) and the domestic component (which relies on a combination of official reported statistics and assumptions where data are not available). The reporting on the total component includes a domestic contribution, but this is only inclusive of domestic figures that are officially reported, and is therefore not inclusive of the separately computed and presented domestic figures which utilize assumptions to fill some data gaps. Therefore, to avoid confusion, this report presents official data on total and industrial wastewater flows separately from estimates on domestic wastewater flows. The proportion of total wastewater flows safely treated is the main indicator for target 6.3.1, with statistics on industrial and domestic wastewater flows being presented as complementary data series.

Regional and global statistics for total and industrial wastewater flows have not been reported as the representativeness of the data sets among countries with official figures was insufficient (i.e. less than 50 per cent of the countries and global population). Instead, data on flows generated and safely treated are presented only for those countries that have officially reported such information (as per the methodology described in section 2.1.1). For domestic wastewater flows, global and regional estimates for wastewater flows generated and safely treated have been presented only when sufficiently representative.

2.1.1. Total and industrial wastewater statistics

Both total and industrial wastewater flows are monitored in terms of the volumes (in units of million m^3/year) of wastewater which are generated through different activities, and the volumes of wastewater which are treated before discharge into the environment. The proportion of the volume treated to the volume generated is taken as the “proportion of wastewater flow treated”. Such proportions can therefore only be calculated when both variables are reported by a given country or territory.

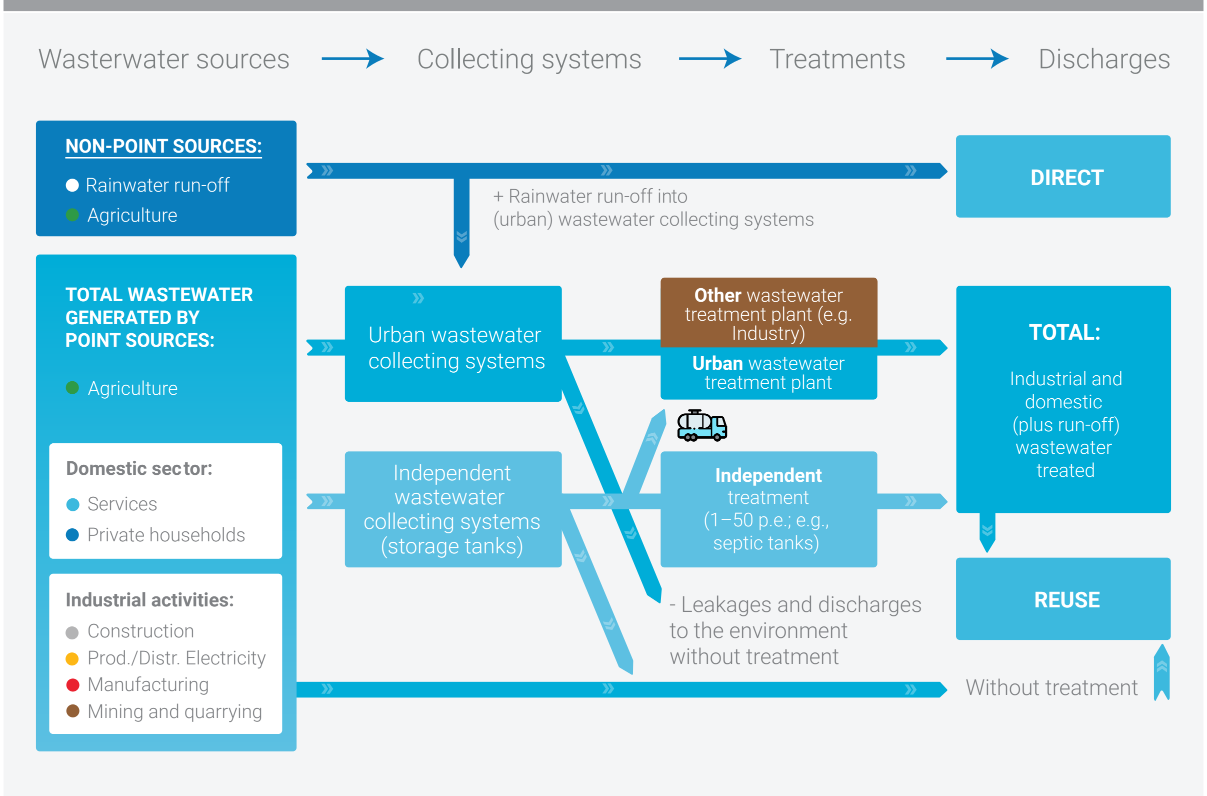
Wastewater generation

Total wastewater as considered in this report includes wastewater from industries, households, services and agriculture, i.e. point sources of one or more pollutant(s) that can be geographically located and represented as a point on a map. Although non-point sources such as run-off from urban and agricultural land can contribute significantly to wastewater flows and diffuse pollution, such flows cannot be monitored at source and are not considered in this report. Their impact on ambient water quality will be monitored under indicator 6.3.2 (Box 1).

Differentiating between the different wastewater streams is important as policy decisions need to be guided by the polluter pays principle.

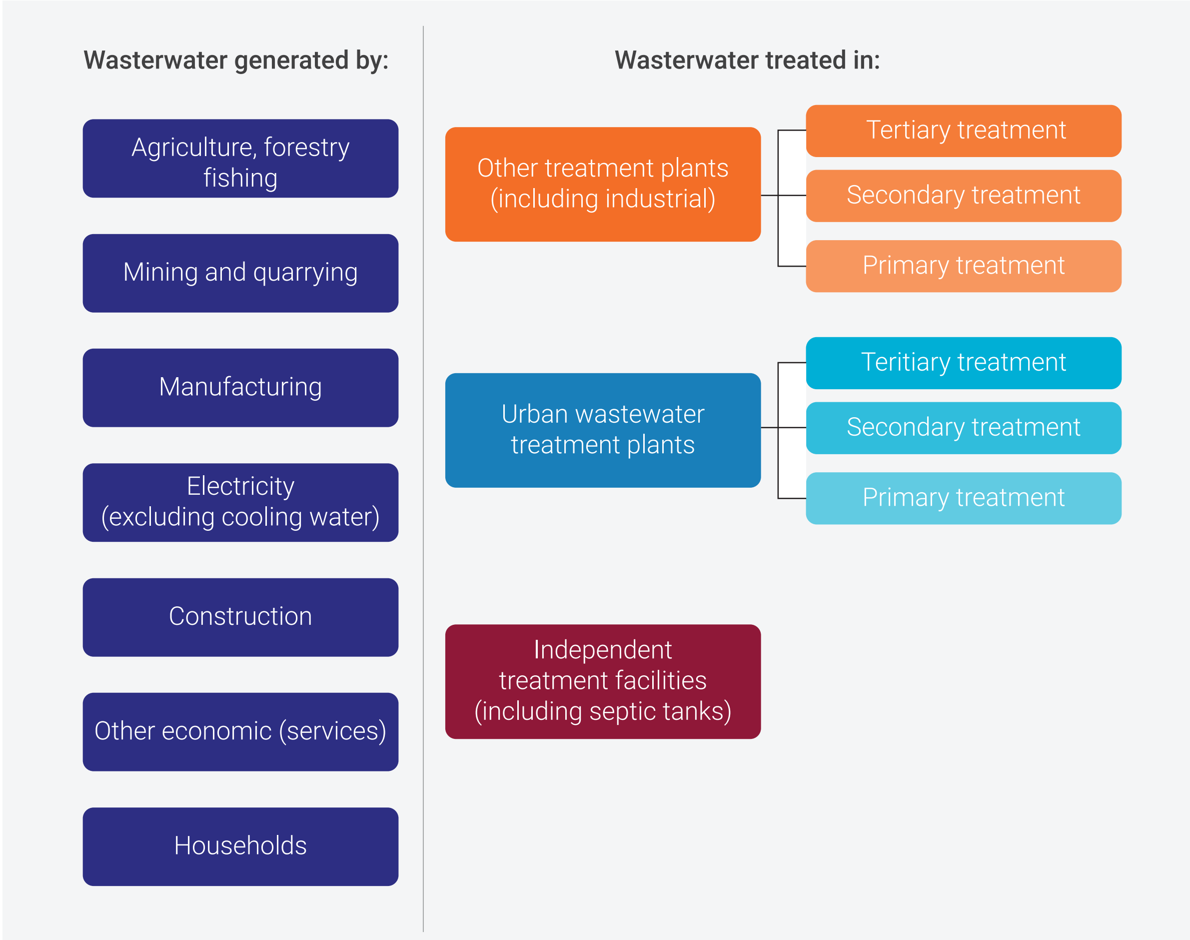
However, wastewater streams may combine both hazardous and non-hazardous substances discharged from different sources, as well as run-off and urban stormwater, which cannot be separately tracked and monitored (Figure 1). As a consequence, although the flow of total wastewater generated can be disaggregated by sources (households, services, industrial), the statistics on treated wastewater flows are rather disaggregated by type (for example, urban and industrial) and/or level of treatment (for example, secondary) (Figure 2).

Figure 1. Schematic representation of wastewater sources, collecting systems and treatment



Source: Adapted from OECD/Eurostat (2018).

Figure 2. Variables for the generation and treatment of wastewater used in OECD/Eurostat and/or UNSD/UNEP international databases (see definitions in Box 2 and Box 3)



The compilation of total and industrial wastewater statistics for reporting on indicator 6.3.1 relies explicitly on the existing international methodologies for the global or regional monitoring of wastewater flows generated and treated, namely:

i) UNSD/UNEP Questionnaire and Manual on the Basic Set of Environment Statistics of the FDES 2013 – Water Resources Statistics (UNSD, 2020)[4]

ii) OECD/Eurostat Joint Questionnaire on Inland Waters[5] for OECD and EU Member States (OECD/Eurostat, 2018).

These questionnaires use a comparable set of definitions and terminology to define, collect and analyse water statistics in a coherent way, with reported volumes of generated wastewater being disaggregated based on the International Standard Industrial Classification of All Economic Activities (ISIC) to attribute

4 See https://unstats.un.org/unsd/environment/FDES/MS%202.6%20Water%20Resources.pdf.
5 See https://ec.europa.eu/eurostat/documents/1798247/6664269/Data-Collection-Manual-for-OECD_Eurostat-Questionnaire-on-Inland-Waters.pdf/f5f60d49-e88c-4e3c-bc23-c1ec26a01b2a?t=1611245054001.

wastewater generation to economic activities (United Nations Department of Economic and Social Affairs, Statistics Division, 2008). Within indicator 6.3.1 monitoring, wastewater generation is disaggregated into the following categories (Box 2; Figure 2): Agriculture – point sources, i.e. excluding non-point agricultural activities such as run-off and irrigation – (ISIC codes 01–03), industrial (mining and quarrying: ISIC codes 05–09, manufacturing: ISIC codes 10–33, electricity production – excluding cooling water – ISIC code 35, construction: ISIC codes 41–43); services or other economic activities (ISIC codes 45-96); and wastewater produced by private households, which are not classified by ISIC as economic activities. While wastewater from agricultural activities (ISIC codes 01–03) that is discharged from point sources is included in 6.3.1 reporting, the predominant non-point sources are not (for example, run-off and irrigation from agricultural fields). Therefore, for the purposes of this report, "total wastewater" consists of agricultural, industrial and domestic flows, but excludes non-point agricultural activities and cooling water (ISIC class 3530).

In this report, "domestic wastewater" is the combination of wastewater produced by services and by households – which were paired due to the relative similarity of the composition of their wastewater (and the fact that they are likely to exclude major hazardous pollutants associated with industrial and agricultural processes). The separate methodology for the domestic component of indicator 6.3.1 is presented in section 2.1.2. Only officially reported figures for domestic wastewater flows generated and treated have been included in the composite of total wastewater flows.

Box 2. Wastewater generation by International Standard Industrial Classification of All Economic Activities (ISIC) codes

Agriculture, forestry and fishing (ISIC 01–03) includes crop and animal production, hunting and related service activities; forestry and logging; and fishing and aquaculture.

Mining and quarrying (ISIC 05–09) includes the extraction of minerals occurring naturally as solids (coal and ores), liquids (petroleum) or gases (natural gas).

Manufacturing (ISIC 10–33) includes the physical or chemical transformation of materials, substances, or components into new products.

Electricity, gas, steam and air conditioning supply (ISIC 35, excluding cooling water) includes the activity of providing electric power, natural gas, steam, hot water and the like through a permanent infrastructure (network) of lines, mains and pipes.

Construction (ISIC 41–43) includes general construction and specialized construction activities for buildings and civil engineering works.

Other economic activities (services) (ISIC 45–96) such as offices, hotels, schools, universities and services, where water is mainly used for similar purposes as in households (sanitation, washing, cleaning, cooking, etc.).

Note: Full definitions are available in United Nations Department of Economic and Social Affairs, Statistics Division (2008).

Box 3. Key definitions of wastewater treatment

Independent treatment: Facilities for preliminary treatment, treatment, infiltration or discharge of domestic wastewater from dwellings generally between 1 and 50 population equivalents, not connected to an urban wastewater collecting system (for example, septic tanks).

Other wastewater treatment: The treatment of wastewater in any non-public treatment plant, i.e. industrial wastewater treatment plants.

Primary wastewater treatment: The treatment of wastewater by a physical and/or chemical process involving settlement of suspended solids, or any other process in which the Biochemical Oxygen Demand (BOD) of the incoming wastewater is reduced by at least 20 per cent before discharge.

Secondary wastewater treatment: Post-primary treatment of wastewater by a process generally involving biological treatment with a secondary settlement or other process, resulting in a BOD removal of at least 70 per cent and a Chemical Oxygen Demand (COD) removal of at least 75 per cent. Natural biological treatment processes are also considered.

Tertiary wastewater treatment: The treatment of nitrogen and/or phosphorous and/or any other pollutant affecting the quality or a specific use of water (microbiological pollution, colour, etc.).

Urban wastewater treatment: All treatment of wastewater in urban wastewater treatment plants which are usually operated by public authorities or by private companies working on behalf of the public authorities.

Note: Full definitions are available in UNSD and UNEP (2020) and OECD and Eurostat (2018).

Wastewater treatment and discharge

The methodologies employed by UNSD/UNEP and OECD/Eurostat are largely aligned for the monitoring of the treatment of wastewater flows, but with some important differences. UNSD collects data on the volume of wastewater treated in independent treatment facilities, in other treatment plants and in urban wastewater treatment plants (WWTPs), whereas OECD/Eurostat collect data on volumes of industrial and urban wastewater discharges (see definitions in Box 3). OECD/Eurostat databases therefore disaggregate the flow of discharged wastewater by type (for example, urban and industrial discharges), whereas UNSD reports on the flow of wastewater by level of treatment (primary, secondary and tertiary). The breakdown of flows by level of treatment, as employed by UNSD, has been included in the latest 2020 version of the OECD/Eurostat Joint Questionnaire, ensuring that future rounds of data collection will have greater alignment with indicator 6.3.1 monitoring.

2.1.2. Domestic (household) wastewater statistics

The methodology for the domestic component of Indicator 6.3.1 was originally developed between 2016 and 2018 during WHO and Expert Group Meetings in 2016 and 2018 (see 2018 indicator report[6] for details), and since then, has been further refined. This section presents a brief summary of the methodology used for the 2021 update. Additional details can be found in a separate Methodological Note[7].

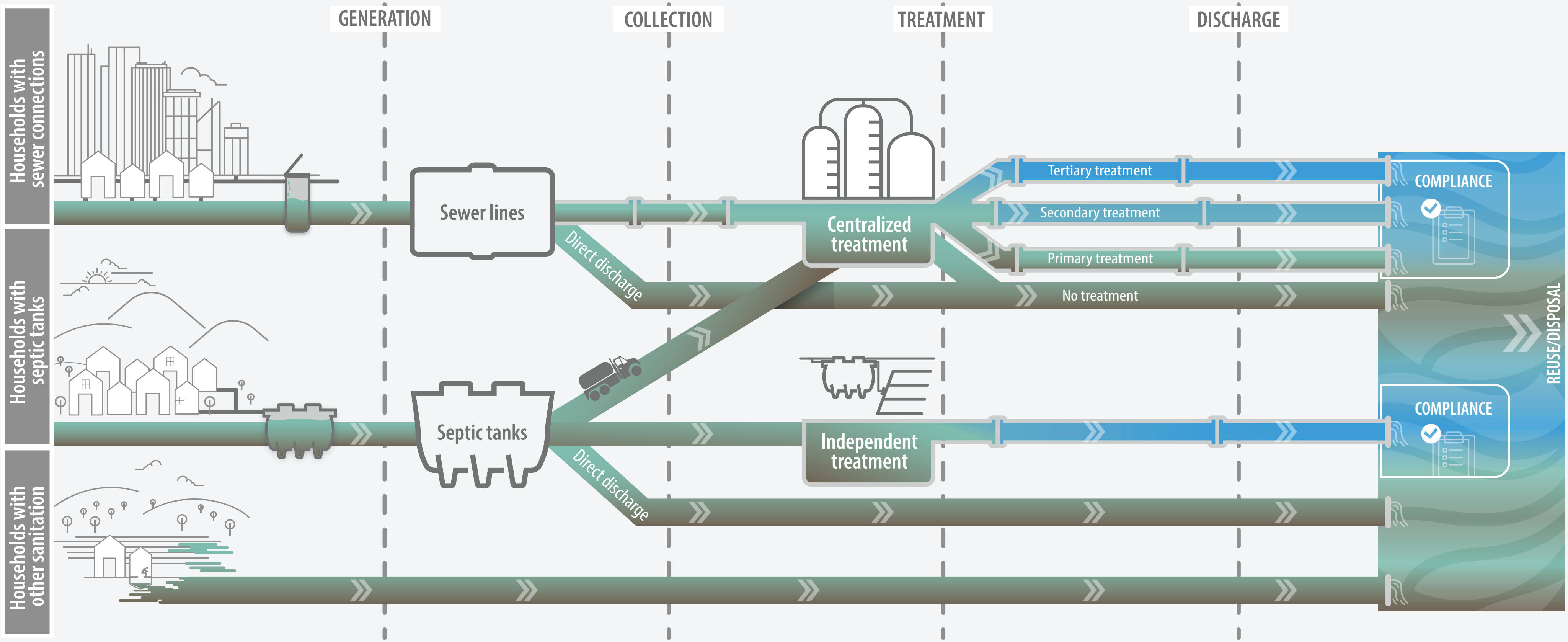
In principle, domestic wastewater includes wastewater generated by services (ISIC codes 45–96) and private households. However, at present, the statistics in this report on domestic wastewater generation and treatment cover only the wastewater produced by households. Flows from services, as well as from households, are included in estimates of total wastewater (as per section 2.1.1) where countries have officially reported them through the UNSD, Eurostat and/or OECD databases. Wastewater produced by services could in principle be systematically included in the domestic component in future database updates subject to data availability. To ensure clarity, the remainder of this report will refer explicitly to "household" instead of "domestic" wastewater.

Estimates for the household component of indicator 6.3.1 reflect the proportion of household wastewater safely treated, calculated as the total volume of safely treated household wastewater divided by the total volume of household wastewater generated (volumes reported in million m^3/year). Such estimates that are determined based on data from a given country are referred to in this publication as "country estimates". Household wastewater can be safely treated if it meets discharge standards from centralized treatment facilities or if it is stored, safely treated and disposed of on-premises (on-site) by the household. In the absence of information on effluent compliance with standards, and as done for total and industrial wastewater, treatment using secondary or higher processes is also used as a proxy for safe treatment.

The total annual volume of wastewater generated by households is directly reported by some countries (for example, through NSOs, or the UNSD or OECD/Eurostat questionnaires), but in most cases it has been calculated by WHO as a function of: total population[8]; proportion of households with on- and off-site water supply[9]; average domestic water consumption for households with on- and off-site water supply[10]; and ratio of domestic water consumed that is translated into wastewater generated[11]. For the 2021 update, estimates of the total volume of wastewater generated by households in 2020 were calculated or reported for all 234 countries and territories for which population data were available.

6 See http://www.unwater.org/app/uploads/2018/12/SDG6_Indicator_Report_631_Progress-on-Wastewater-Treatment_ENGLISH_2018.pdf.
7 To be found on the SDG6 website from September 2021
8 World Population Prospects (2019 revision). Available at https://population.un.org/wpp/.
9 Joint Monitoring Programme (JMP) per SDG indicator 6.1.1. See https://washdata.org/.
10 Using standard default values or reported figures from national sources if they are available.
11 Using an assumption or a reported figure from a national source if they are available.

Figure 3. Household wastewater management chain



Once calculated (or reported directly by countries), the total volume of wastewater generated by households was disaggregated into several categories of sanitation facilities: households with toilets connected to sewer lines, those connected to septic tanks, and all other types of household sanitation[12]. Note that the term "septic tanks" is used as a generic category for a range of decentralized wastewater treatment systems that receive blackwater (and in many cases greywater) generated by households. For the purposes of the household component of Indicator 6.3.1, only wastewater flows associated with sewers and septic tanks have the possibility of being safely treated, because these systems are typically designed and operated with the intention of treating wastewater prior to discharge into the environment. Well-designed and operated septic tanks substantially reduce the solid fraction of wastewater flows and can be considered equivalent to primary treatment. When the liquid fraction leaving the septic tank through an effluent line connects an infiltration system (for example, a soakaway or leach field), much of the remaining suspended solids, as well as dissolved organic carbon, is removed through adsorption and biodegradation and this can be considered equivalent to secondary treatment. Wastewater flows associated with all other types of sanitation facilities are not considered eligible to contribute to calculations of safely treated wastewater.

The calculation of the proportion of wastewater flows from households which are considered "safely treated" relied on a range of data covering the components described in the wastewater management chain (Figure 3). Broadly, these components include volumes generated, proportions collected, proportions treated (by level of treatment technology), and proportions discharged in accordance with national or local standards. Treatment and discharge may occur on-site (in independent treatment systems) or off-site in centralized facilities such as urban wastewater treatment plants (WWTPs). Independent treatment systems typically comprise septic tanks with leach fields but may also include small-scale and local wastewater collection and treatment systems for up to 50 people. Data for the different steps along the wastewater management chain have been taken from different national data sources, using the most recent year when data from multiple years are available[13]. Where data are lacking, assumptions have been applied based on empirical data from countries or studies where real data exist. A country estimate has not been produced in cases where its calculation is overly reliant on assumptions for key variables in the wastewater management chain[14].

Data on the proportion of the population with access to sewer connections and to septic tanks were taken from 2020 estimates produced by the JMP[15]. Accordingly, the overall estimates for safely treated household wastewater are presented for the year 2020.

12 Namely pit latrines, flush toilets that discharge directly to the environment, and open defecation.
13 This can result in a country estimate that is produced using data points for different variables originating from different years. This and other limitations are explained further in the Methodological Note.
14 Country estimates for proportion of safely treated domestic wastewater are only presented if one of the following two conditions are true: i) the proportion of the population connected to sewers is greater than or equal to that connected to septic tanks, and there is reported data on the proportion of sewer wastewater collected at WWTPs that is safely treated; ii) the proportion of the population connected to sewers is less than that connected to septic tanks, and there is reported data on emptying and management of septic tank wastewater.
15 JMP Methodological Note. See https://washdata.org/monitoring/methods.

The proportion of wastewater in sewers that is safely treated is a function of the proportions collected at WWTPs and undergoing safe treatment (compliance with effluent standards, or secondary or higher processes) prior to discharge or reuse (a case study on wastewater reuse is presented in Box 4). Data for these components are most often derived from NSOs, wastewater regulators, or utilities, and for some countries were compiled through regional or global databases (such as those administered by Eurostat, OECD and UNSD).

The proportion of household wastewater collected in septic tanks that is safely treated (via a septic tank and leach field system) is calculated separately for wastewater for which the faecal sludge is treated on-premises (buried on-site or remaining unemptied in the septic tank) and off-premises (faecal sludge emptied and delivered to a WWTP for treatment). For the on-site fraction, the proportion that is safely treated is a function of the proportion contained in a well-functioning tank system, the proportion of tanks for which faecal sludge is emptied and buried on-site (assumed to be safely treated through natural biodegradation[16]), and the proportion of tanks for which faecal sludge remains unemptied inside the tank. For households where septic tank faecal sludge has been transported off-premises, the proportion that is safely treated is a function of the proportion contained in a well-functioning tank system, the proportion collected at centralized treatment facilities (for example, WWTPs or other centralized treatment facilities specific to the treatment of faecal sludge), and the proportion subsequently safely treated prior to discharge or reuse. Data for the components related to septic tank wastewater flows are most often derived from septic tank inspection programmes (a case study for which is presented in Box 5) and/or routine household surveys (for example, Multiple Indicator Cluster Surveys).

Ivan Bandura on Unsplash

16 An acknowledged overestimation, as not all faecal sludge buried on-site will have been safely treated, particularly those fractions that are not buried to sufficient depth and/or with inadequate soil cover, or those buried in proximity to human activities and/or water sources.

Box 4. In Jordan, wastewater reuse has been prioritized in a water-scarce setting

The Food and Agriculture Organization of the United Nations (FAO) estimates that 1.2 billion people live in agricultural areas that are severely water-constrained, potentially threatening food security and nutrition. This vulnerability is expected to continue to worsen due to the impacts of climate change. Under Sustainable Development Goal (SDG) indicator 6.4.2, FAO has reported that many countries in the Central and Southern Asia and Northern Africa and Western Asia regions are experiencing critical levels of water stress (as defined by levels of freshwater withdrawal as a proportion of available freshwater resources). Over the past two decades, the per-capita availability of freshwater has declined by more than 30 per cent in the Northern Africa and Western Asia region. Water scarcity is therefore an urgent issue in many arid and semi-arid countries. Wastewater reuse can be an important tool to meet demands for water in such contexts, particularly in the countries with prominent agricultural sectors.

Approximately 51 per cent of the total water demand in Jordan originates from its agriculture sector. Wastewater effluents from wastewater treatment plants in the country totalled 178.2 million m^3 in 2019 and approximately 90 per cent of its treated wastewater was reused in agricultural activities. While all of Jordan's treated wastewater undergoes at least secondary levels of treatment (mostly activated sludge and disinfection with chlorine), to protect both the environment and human health, reused wastewater must meet additional discharge quality standards. Jordan has some of the most advanced safety measures and controls for wastewater reuse in the region. Its first standard for wastewater reuse was published in 1991 (developed based on World Health Organization guidelines). The standards, most recently revised in 2006 (839/2006), establish effluent quality requirements for three classifications of reuse applications based on 12 parameters (including Biochemical Oxygen Demand, Chemical Oxygen Demand and *Escherichia coli*):

A. cooked vegetables, parks, playgrounds

B. fruit trees, open land

C. field crops, industrial crops, and forest trees.

The Water Authority of Jordan is responsible for the wastewater treatment sector and coordination of individual utilities. For wastewater reuse, agreements are established between farmers, utilities and the Ministry of Water and Irrigation. Farmers must also obtain a licence from the Ministry of Agriculture detailing the types of crops used and irrigation techniques employed. The Ministry of Health and Jordan Food and Drug Administration are responsible for monitoring the quality of produce sold on the market. Despite the successes of Jordan's wastewater reuse initiative, further institutional development is needed to clarify and strengthen roles and responsibilities, better enforce standards and legalities, and monitor safety and processes.

Box 5. In Ireland, a national surveillance programme has been implemented since 2013 to monitor the safety and performance of septic tanks

Ireland's Environmental Protection Agency (EPA) and local authorities have implemented National Inspection Plans for the monitoring of domestic wastewater treatment systems (mostly septic tanks). In total, there are approximately 500,000 such systems in Ireland, and legally as of 2013, all must be registered with the local authorities (Republic of Ireland, Environmental Protection Agency, 2020a; 2020b). Any newly constructed system must be registered within 90 days. The objective of the National Inspection Plan prepared by the EPA is to protect human health and water quality from the risks posed by domestic wastewater systems. Many households that have a domestic wastewater treatment system also have their own private well. If the treatment systems do not function as intended, private well water may become contaminated. Additionally, many domestic wastewater treatment systems are in the vicinity of water bodies.

Each year, and according to Ireland's Water Services Act (2007, as amended), at least 1,000 domestic wastewater treatment systems are inspected (approximately 0.2 per cent of all existing systems in the country). Systems are selected using a risk-based methodology with prioritization given to areas where the environment or human health may be at greater risk. Inspections themselves are the responsibility of local authorities who visit the household to confirm:

- whether the wastewater treatment system is registered
- if the system is leaking or if there is ponding of wastewater on the surface
- if all the components of the system are in correct working order, and that effluent from the system is being properly treated and discharged into the ground
- whether the system is being properly operated and maintained, including regular desludging
- if there are any illegal discharges to surface water bodies.

If a system fails the inspection for any reason, an advisory notice is issued, requiring corrective action which the household must take. A grant scheme also exists to support remediation works among qualifying households.

The key finding of the programme is that approximately 50 per cent of domestic wastewater treatment systems are found to be non-compliant each year. Most of the failed systems have not been properly maintained, have not been desludged, or were discharging some wastewater illegally (Figure 4a).

Figure 4a. Problems identified during on-site inspections

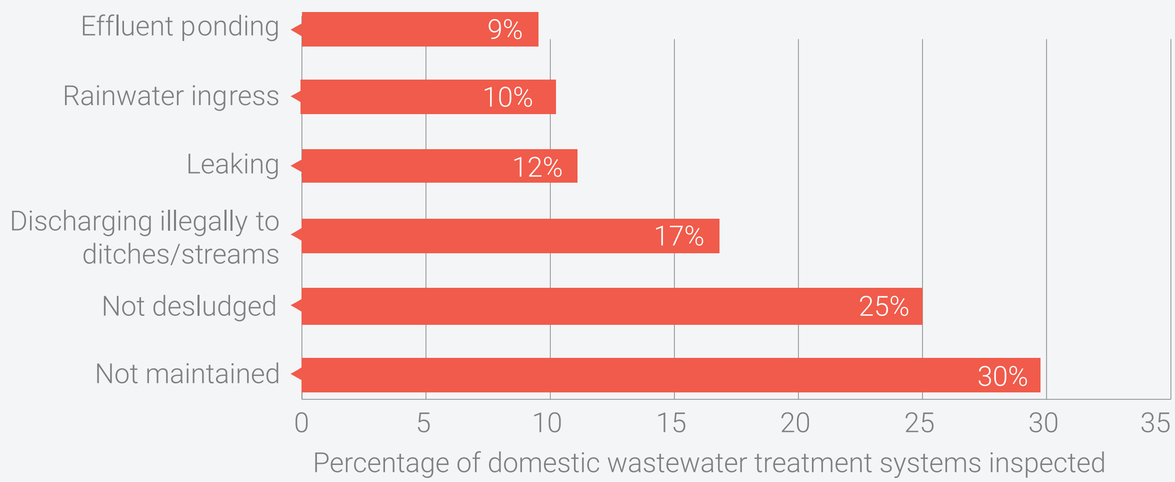
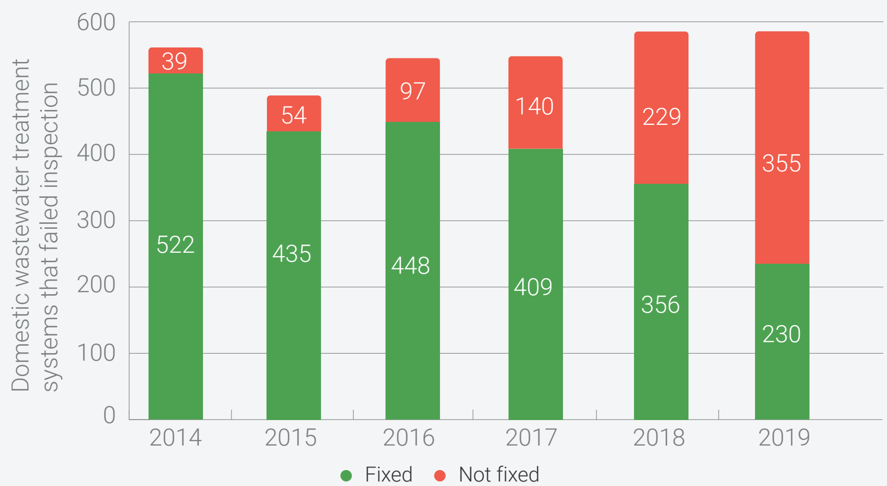


Figure 4b. Follow-up on systems which previously failed inspections



Source: Adapted from Republic of Ireland, Environmental Protection Agency (2020a; 2020b).

From 2013 to 2019, approximately 73 per cent of systems that failed the inspection were successfully remediated (Figure 4b). Significant differences in the compliance rates have been observed between local authority areas.

Beyond the inspections themselves, the EPA also implements an engagement strategy with the aim of ensuring that all home owners with domestic wastewater treatment systems are aware of their responsibilities and of how to correctly operate and maintain their systems while recognizing the potential risks these systems pose to health and water quality. The materials and videos associated with the EPA's engagement strategy can be found at https://www.epa.ie/water/wastewater/info/.

While rare, national septic tank monitoring programmes do exist in several countries and can be implemented effectively and sustainably to identify and mitigate deficient on-site systems. Such programmes can also be used as a vehicle to promote safe operation and maintenance of on-site systems to reduce environmental and health risks.

For wastewater flows managed either off or on-site, safely treated wastewater is defined as water treated in compliance with national or local discharge standards and safe management practices[17]. However, for off-site treatment, few countries report nationally representative data on wastewater discharge compliance from WWTPs. Therefore, proportions of wastewater treated by secondary or higher technologies (Box 3) are also used as a proxy measure for safely treated wastewater. Additionally, for on-site treatment, wastewater collected in septic tanks that is either not emptied or emptied and buried on-site is counted as safely treated. For septic tank wastewater flows transported off-site, data on the proportion of collected wastewater safely treated may be taken from sewer wastewater streams and applied to that for off-site septic tank flows collected at centralized facilities (see Methodological Note for further details).

For this 2021 update, the estimated volumes of household wastewater safely treated in 2020 were calculated for 128 countries and territories and were subsequently divided by the total volume of household wastewater generated in each country to calculate the proportion safely treated (the country estimate). Country estimates and their respective data, assumptions, sources and calculations are fully presented in publicly available country files (Excel spreadsheets) and summarized in this publication (chapter 3.2).

Global and regional estimates have also been calculated by taking the proportion of total treated to total generated wastewater at regional or global aggregations. For the derivation of aggregated estimates, regional averages of the proportion of wastewater safely treated (weighted by volume of wastewater generated) were applied to those countries without country estimates. Regional estimates were only produced if country estimates of wastewater

17 For centralized treatment, the composition of discharged wastewater quality may differ from country to country as compliance norms are defined nationally (or in some cases locally) and are not internationally standardized. Safely treated discharges are defined based on whether they meet national or local discharge standards, and as such, are comparable based on whether they comply but are not comparable in terms of specific wastewater quality parameters.

treatment were available for countries producing at least 50 per cent of the total volume of household wastewater generated in the region[18].

2.2. Stakeholders and sources of data

NSOs are the primary authorities responsible for providing data to be used for global statistics. NSOs may draw on data collected or compiled by relevant national or other authorities, such as ministries, municipalities or regulatory authorities. A common challenge is that there is often a need for the NSO to be in communication with not only national-level stakeholders (such as ministries) but also with city- or municipal-level stakeholders (such as city- or municipal-level water treatment plants). To address this challenge, one approach is for there to be an established multi-stakeholder forum within a country that includes participation of NSOs and other relevant stakeholders at the national, provincial/state and local/municipal level of government, as relevant. The convening of such a forum is known to require investment in human and financial resources.

2.2.1. Total and industrial wastewater statistics

UNSD leads on collecting, compiling and processing of data submitted by NSOs and/or Ministries of Environment through the UNSD/UNEP Questionnaire on Environment Statistics for the non-OECD/Eurostat Member States (requested from approximately 165 UN Member States in the 2020 collection cycle). UNSD carries out extensive data-validation procedures that include built-in automated procedures, manual checks and cross-references to national sources of data. Communication is carried out with countries for clarification and validation of data. UNSD does not make any estimation or imputation for missing values so the number of data points provided are actual country data. Only data that are considered accurate or those confirmed by countries during the validation process are included in UNSD's Environment Statistics database and disseminated on UNSD's website. In the same way, data treatment and validation are carried out jointly by Eurostat and OECD for their Member States according to an agreed process and timeline.

UN-Habitat uses the resulting data as directly reported by NSOs into the questionnaires without modification. UN-Habitat also leads on collection of additional data on total and industrial wastewater generation and treatment from non-reporting countries.

It is anticipated that future rounds of data collection could potentially include more information on pollutant loadings that could be eventually featured in SDG target 6.3 reporting (see chapter 2.3.1). Indeed, different types of wastewater have different degrees of contamination and pose different levels of threat to the environment and public health. Although some routine data produced by WWTPs exist on the organic pollutant load discharged into the environment (Box 6), these are not as widely available as data on volumes and have not been used at present for monitoring indicator 6.3.1.

Another relevant issue regarding the indicator monitoring is that whether wastewater is classified as safely treated or not depends on the WWTP's compliance rate to the effluent standards (i.e. its performance). Many wastewater plants produce effluents which do

18 Estimates of total household wastewater generated were made for all 234 countries and territories; however, due to a lack of data, volumes of household wastewater safely treated were only compiled for 128.

not meet quality standards, due to improper design or loading. Moreover, effluent standards rely on both national and local requirements, as well as on specific water uses and potential reuse options, and therefore this approach may not provide strictly comparable quantitative variables between countries. For the purposes of the present global monitoring and in the absence of data on compliance for the total and industrial wastewater component, technology-based proxies are used, in which compliance is assumed if the treatment plant provides at least secondary treatment (Box 3).

2.2.2. Domestic (household) wastewater statistics

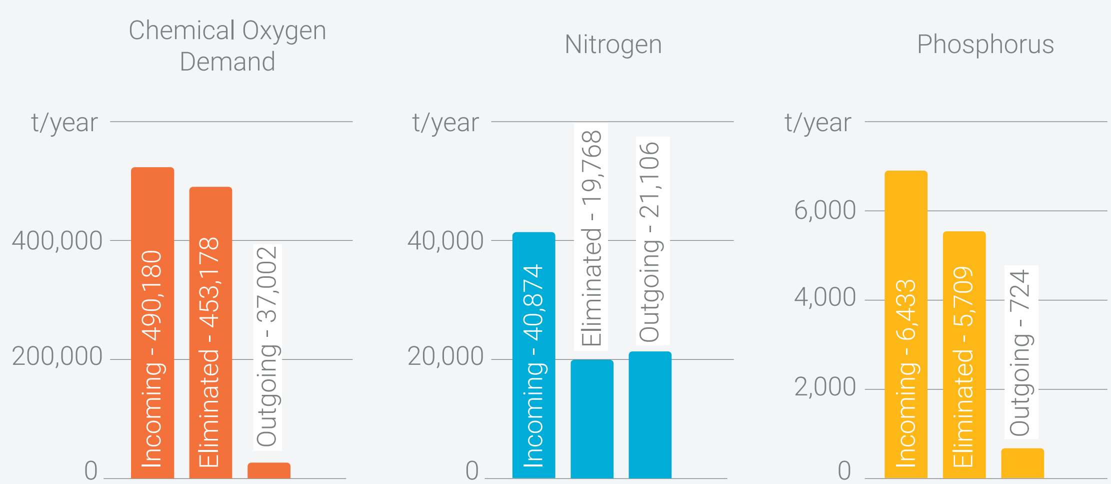
Country estimates for the proportion of household wastewater safely treated are not reported directly by countries. Rather, they are calculated independently by WHO on the basis of volumes generated and treated. Country estimates draw on the data directly reported to UNSD and OECD/Eurostat in addition to national sources of data (typically from NSO databanks or wastewater sector reports from regulatory agencies) that have been directly compiled by WHO into a household wastewater database. The national data collected by the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) for the production of estimates of safely managed drinking water (SDG indicator 6.1.1) and sanitation services (SDG indicator 6.2.1a) have also been drawn upon, as described in section 2.1.2.

Marcin Jozwiak on Pexels

Box 6. The effects of the implementation of wastewater treatment on water quality in Switzerland

The concentration of many (organic) pollutants is routinely monitored in effluents from sewage treatment plants in order to control the capacity of the receiving system and thereby dilute the discharged pollutant loads. Figure 5 presents estimates of the incoming, eliminated and outgoing charges of Chemical Oxygen Demand, nitrogen and phosphorus by wastewater treatment plants (WWTPs) in Switzerland in 2011.

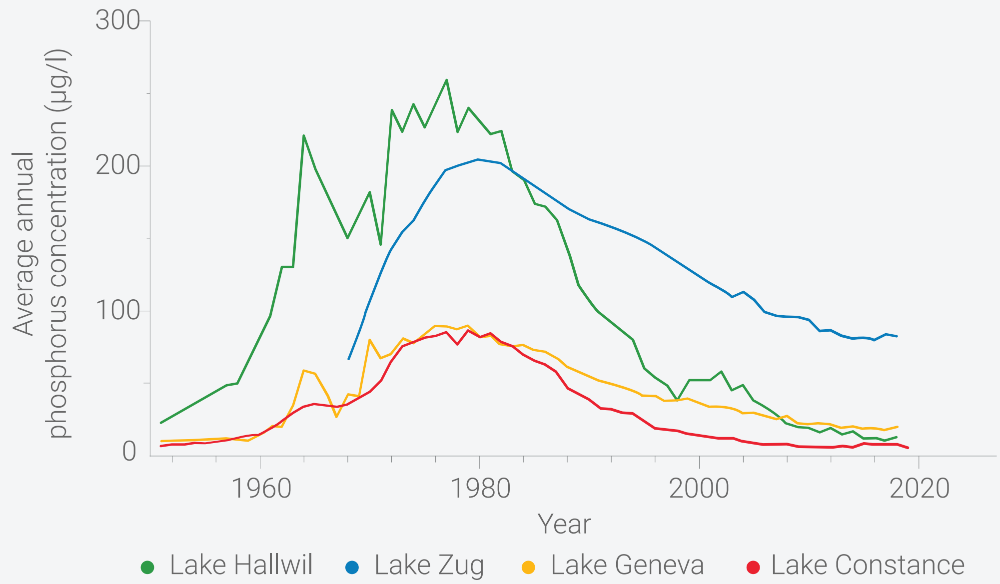
Figure 5. Incoming, eliminated and outgoing charges of Chemical Oxygen Demand, nitrogen and phosphorus by wastewater treatment plants in Switzerland in 2011, in tons per year



Source: Swiss Water Association and Swiss Association of Municipal Infrastructure (2011).

Before the implementation of WWTPs in the 1970s, wastewater was discharged directly into rivers and lakes, leading to the proliferation of algae and aquatic plants, dying fish and swimming bans (i.e. eutrophication). This widespread decline in surface water quality was due to an overall enrichment of water bodies with nutrients (especially phosphorus and nitrate). The construction of WWTPs in the 1970s and the later introduction of phosphate precipitation, as well as the ban on phosphates in laundry detergents in 1986, led to a significant reduction in the phosphorus concentration in most Swiss water bodies and a significant improvement in the surface water quality (Figure 6).

Figure 6. Concentration of phosphorus in four major lakes over the last five decades



Source: Swiss Federal Office for the Environment (2020).

2.3. Data-collection process

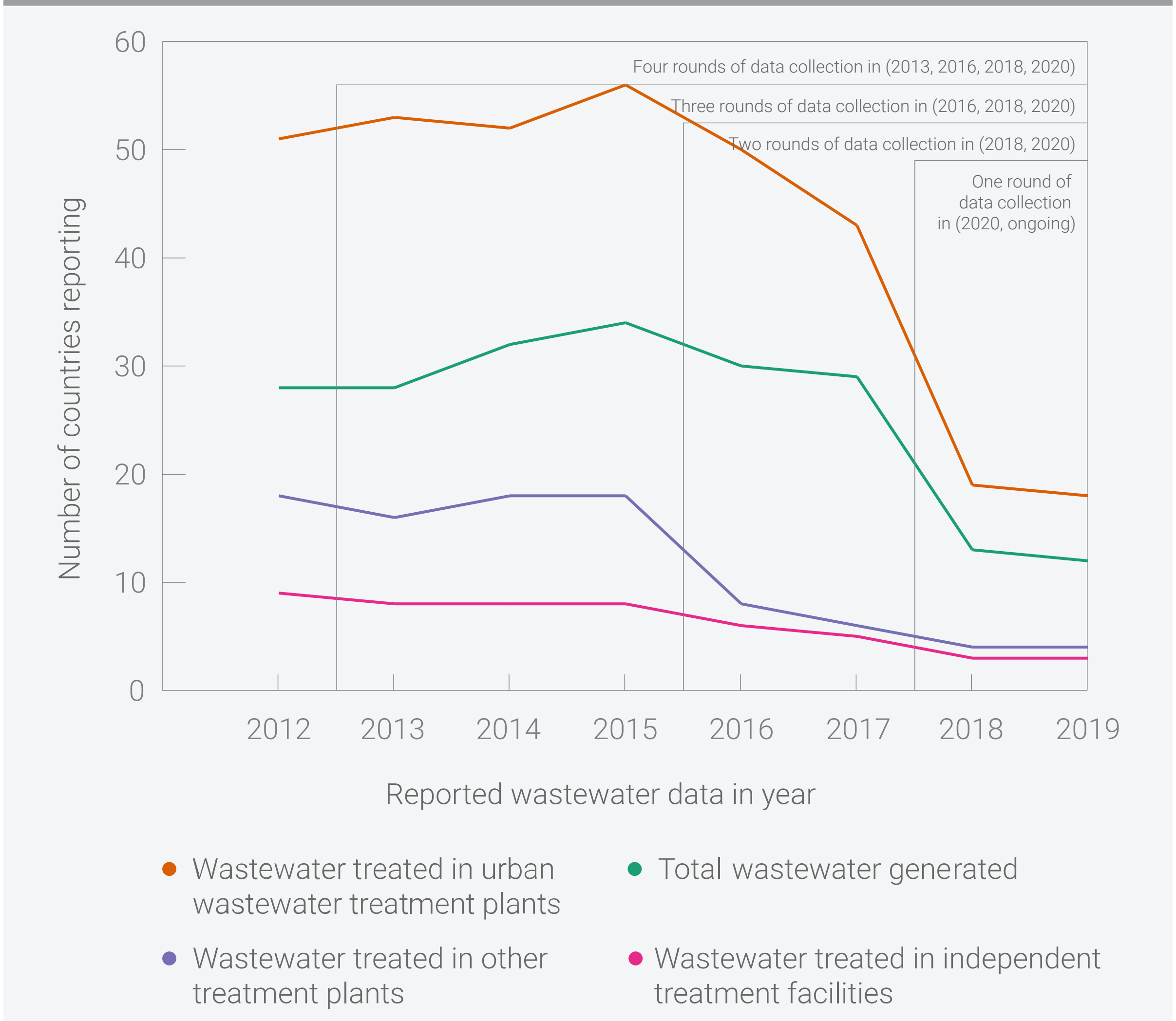
2.3.1. Total and industrial wastewater statistics

The UNSD/UNEP Questionnaire on Environment Statistics has collected data on wastewater generation and treatment since 2013, which has included data from as far back as 1990 for some countries. The questionnaire is sent to approximatively 165 countries, covering both national and city levels. However, the average response rate across each data-collection cycle has been around 50 per cent and data completeness and quality remain a challenge.

Since 2013, four rounds of data collection have been conducted (in 2013, 2016, 2018 and 2020 – see Figure 7), and since countries often need several years to compile and report statistics for recent years, there are relatively few data for the years 2016 onwards. This report therefore focuses on total and industrial wastewater statistics for 2015, where data coverage is higher.

Eurostat collects data from Member States of the EU and the European Free Trade Association (EFTA), as well as the respective candidate countries. OECD works with all its Member States not covered by Eurostat. It is also important to note that some other databases reporting wastewater data exist (for example, FAO's AQUASTAT), but use definitions that are not necessarily aligned with the ones presented in this report, so these data sources were not used to report on indicator 6.3.1.

Figure 7. Number of countries reporting on total flows of wastewater generated and treated



Source: United Nations Statistics Division and United Nations Environment Programme (2020).

***Note:* Data from four rounds of the UNSD/UNEP Questionnaire (2013, 2016, 2018 and 2020 (ongoing)).**

The wastewater data reported to Eurostat, OECD and UNSD have been endorsed by governments through NSOs and do not require a further country consultation process for validation. For those variables relevant to this indicator that are collected via the UNSD/UNEP Questionnaire, data for up to 37 countries are available in some years (for example, for wastewater treated in urban WWTPs), whereas for other relevant variables, data for 30 countries or less may be available for a given year (annex 1). Data received via the UNSD/UNEP Questionnaire are published on the UNSD website in the form of indicator tables[19] (inland water resources) as well as in country files[20].

Wastewater statistics remain relatively sparse on a global scale. UN-Habitat and WHO will therefore continue to disseminate information about future rounds of data collection and will liaise with their technical focal points in regions and countries to engage them in capacity-building and work with them to produce data which could then feed into the official statistical system via the NSOs. It is expected that in the near future, improved reporting of the total and industrial wastewater data collected can be achieved, to better populate the SDG indicator 6.3.1 and cover more than half of all countries and the total global population.

2.3.2. Domestic (household) wastewater statistics

WHO developed a household wastewater database including data compiled from the sources described in section 2.2.2. This database includes a set of 40 variables that were defined and used in calculations covering household wastewater volumes and proportions generated and safely treated across all relevant wastewater streams (Figure 3). The data compiled (or assumptions applied) for each of these variables have been presented in publicly available Excel "country files". Draft estimates and country files were circulated to national focal points for consultation from November 2020 through to January 2021. Feedback was received from 47 countries and estimates were revised as needed and finalized in March 2021. The final country files are available on the WHO website[21].

The main challenges related to data collection included:

- a lack of metadata on how reported data were measured or estimated (including the precise composition of numerators and denominators in proportional estimates)
- inconsistencies in definitions, terminology or methods applied to populate some variables
- a general lack of data, particularly in low- and middle- income countries.

Key opportunities to enhance data collection in the future lie in the potential standardization of processes and methods (particularly those associated with the ongoing initiatives of the global and regional databanks) and the national-level dialogue and advocacy through country consultation processes. Improvements to the quality and quantity of household wastewater data may be achieved when key national stakeholders are aware that the data are being compiled for global monitoring and to inform wastewater policy, strategy and programmes at national level.

19 See https://unstats.un.org/unsd/envstats/qindicators.
20 See https://unstats.un.org/unsd/envstats/country_files.
21 See https://www.who.int/teams/environment-climate-change-and-health/water-sanitation-and-health/monitoring-and-evidence/water-supply-sanitation-and-hygiene-monitoring/2021-country-files-for-sdg-6.

Kelly Lacy on Pexels

3. Results and analysis

3.1. Total and industrial wastewater statistics

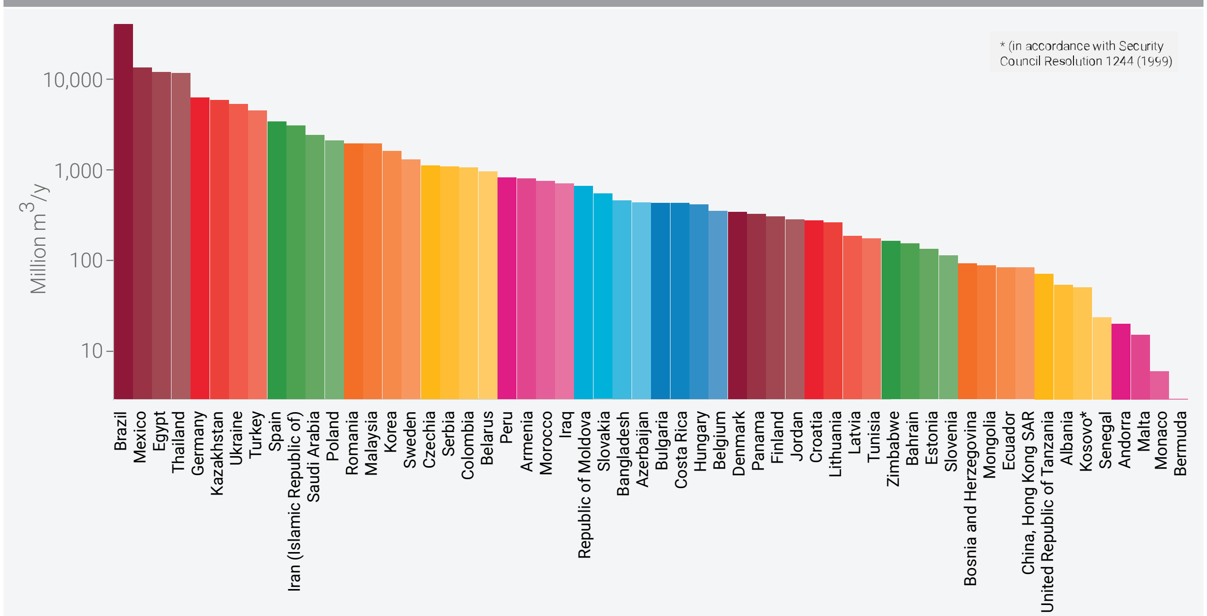
This section focuses on the 2015 total and industrial wastewater statistics to provide a baseline for total and industrial wastewater generation and treatment in the context of the 2030 Agenda. No regional aggregates were produced due to low country coverage. Some wastewater variables have time series available for multiple years, while others currently only have discrete year availability. The year 2015 presents the most complete data coverage over the last decade (annex 1 and Figure 7). The data could not be weighted by population, because the data were not necessarily representatives of the entire population of the countries. For instance, some countries mentioned that their reported data were only concerning one city. However, in general, there is no information about the population covered by the reported data, while the percentage of population connected to WWTPs can be very low, especially in low-income countries.

3.1.1. Total wastewater

Total wastewater generation in 2015

National data available for total wastewater generated in 2015 by economic activities and households accounted for 131,871 million m^3 from the 56 reporting countries covering 22 per cent of the global population (1,569 million inhabitants; 84 litres (L) of reported wastewater generated per capita) (Figure 8 and Figure 9). Such relatively low data coverage does not allow estimation of regional and global wastewater flows generated for this time period. The reporting was nonetheless higher in the EU Member States, with 25,378 million m^3 of total wastewater generated from 23 countries (360 million inhabitants; 70 L of reported wastewater generated per capita).

Figure 8. Total reported wastewater flows generated in 2015 (million m³), by country



Source: Eurostat (2021); OECD (2021); UNSD (2021).

The disaggregation of the flow of wastewater generated by economic and household activities (Figure 10) shows that there is significant variability in the composition of total wastewater flows generated. This variability is due to different national water uses and dominant sectors, as well as to some individual economic activities not being reported on for some countries. For instance, some countries only reported on the household or on the industrial fractions, whereas some countries did not provide details about the sources of the annual flow of wastewater generated. Overall, reporting is higher for the domestic sector, most likely due to improved monitoring of drinking water supplied to consumers through public water systems, which facilitates estimation of the volume produced and collected by the public sewerage system (Box 7).

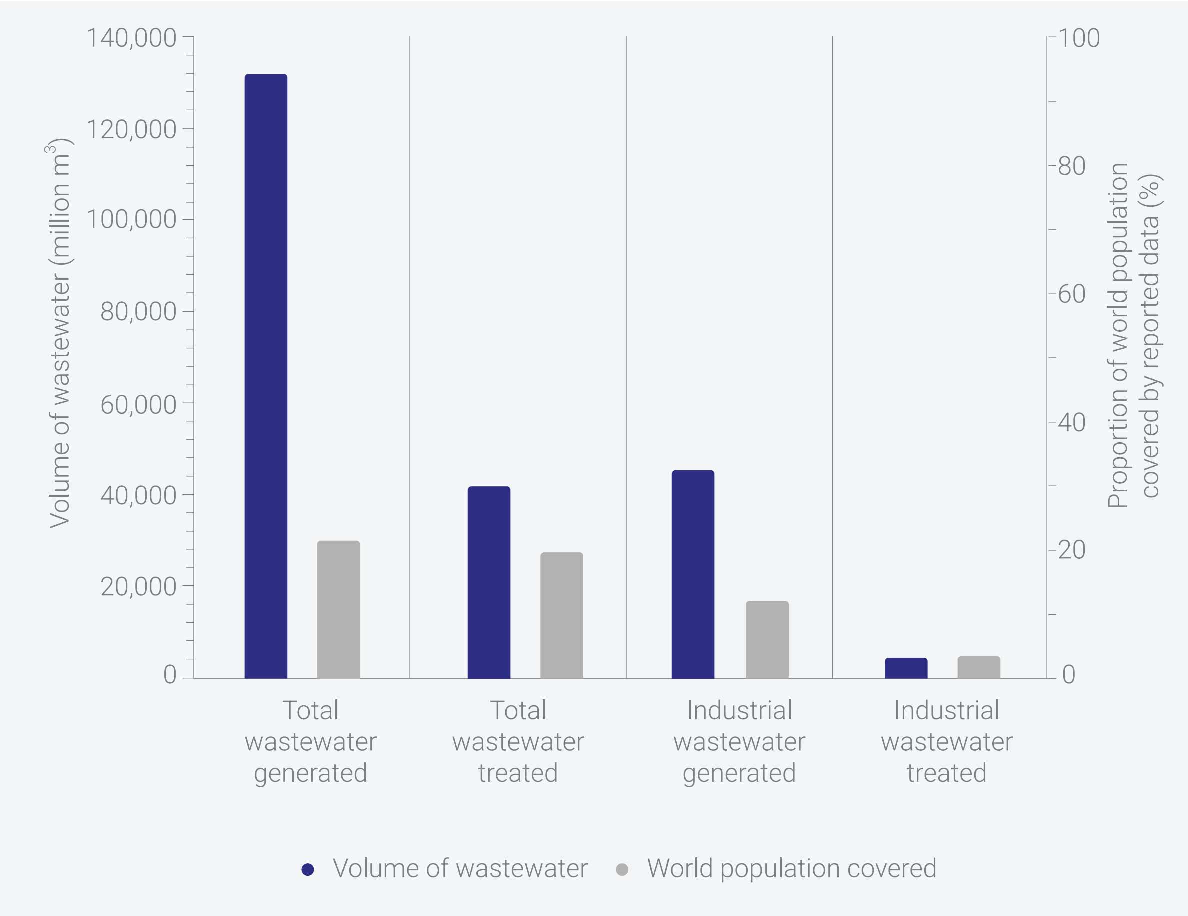
There are two main reasons for the lack of reporting of industrial wastewater generated:

i) As explained in Box 7, industrial activities are extracting substantial quantities of self-abstracted water that are generally not included in the national statistics which focus on drinking water.

ii) There is an overall lack of accessible water accounting by the industrial sector.

In addition to the lack of a monitoring/control system or proper institutional water framework, it is also worth mentioning the illegal use of water, which is a reality almost everywhere, and yet does not appear in the accounts of the water used, either by a public or private register of rights.

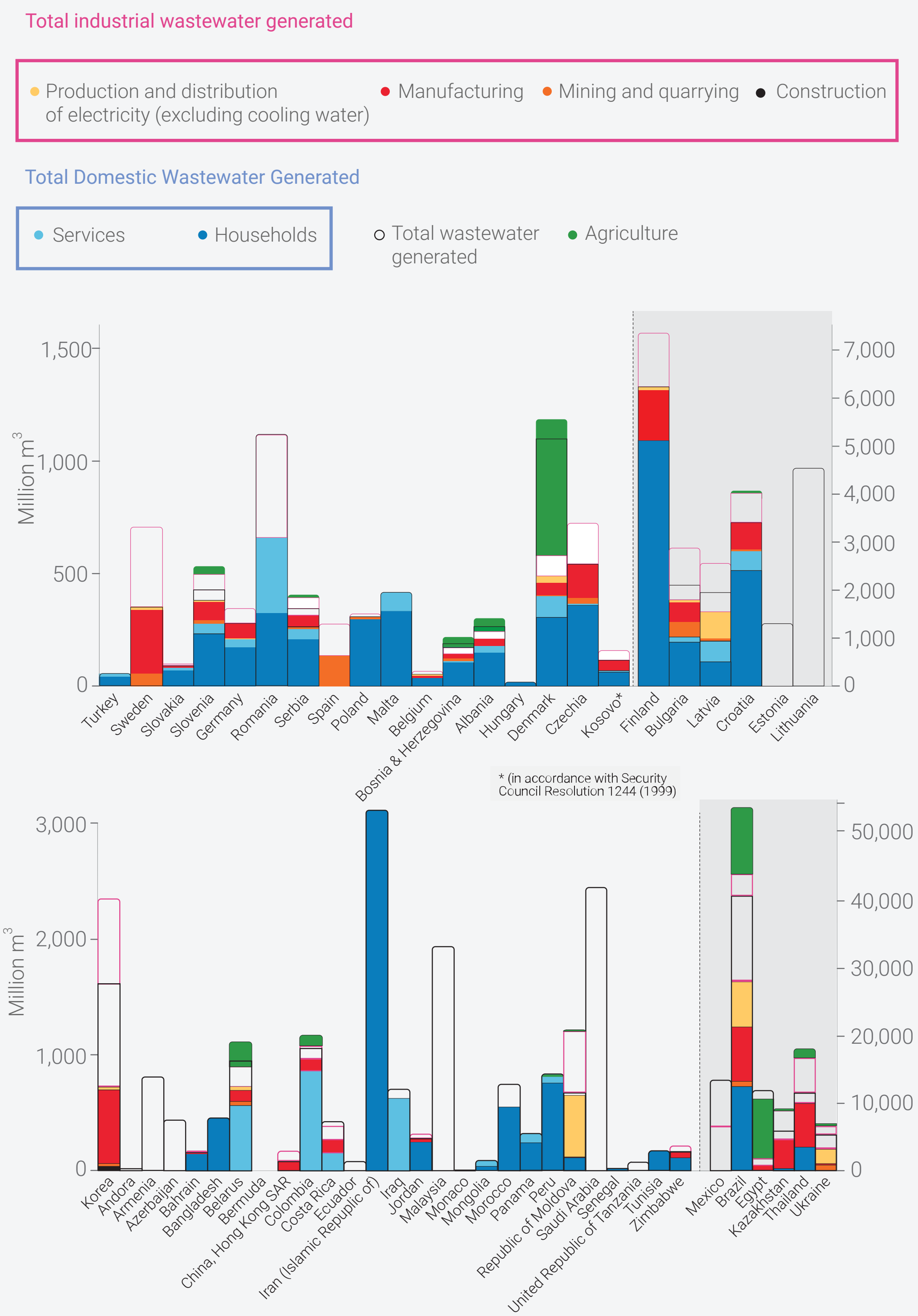
Figure 9. Total and industrial flows of wastewater generated and treated (million m³) in 2015 (in blue, left y-axis), with the corresponding world population covered by reported data (in grey, right y-axis)



Source: Eurostat (2021); OECD (2021); UNSD (2021).

Figure 10 also suggests that the main industrial source of wastewater originates from the manufacturing industries, although the accounting in some other sectors such as in the mining and agriculture industries is certainly largely limited by the use of self-supplied water resources not connected to the municipal drinking water supply.

Figure 10. Total wastewater flow generated (million m³) by point sources in 2015, disaggregated by economic industrial activities and households (top) in EU Member States, and in other countries (bottom) with the six highest values reported on the right y-axis



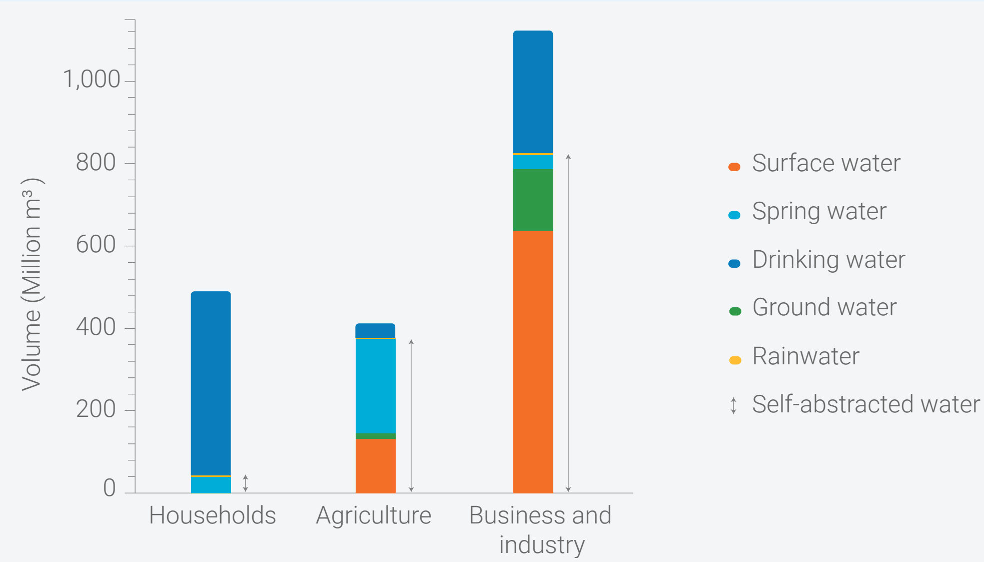
Source: Eurostat (2021); OECD (2021); UNSD (2021).

Box 7. The Swiss economy – non-reported industrial water consumption from self-supply

As regards water consumption in Switzerland, the drinking water annual statistics of the Swiss Gas and Water Industry Association (SGWA) are usually shown. However, the resources of the trade, industry and agriculture economic activities are not included in the annual statistics which focus on drinking water. In addition to public water supplies, they also extract substantial quantities of water. According to the 2007/2008 investigation by the SGWA and supported by the Federal Office for the Environment (FOEN), half of the water requirements of the Swiss economy are covered by sectors' use of their own resources (i.e. self-abstracted water).

In Switzerland, more water (roughly 25 per cent more) is obtained privately than through the public water supply. Over a third of the potable water (about 467 million m^3 of groundwater and spring water) of the around 1,250 million m^3 total is used privately (i.e. not through the public water supply). Sixty-four per cent of privately obtained water (self-sufficiency) comes from surface waters, 14 per cent from groundwater and 22 per cent from springs. The use of specially collected rainwater is around 0.5 per cent. Private and public water abstraction together correspond to 3.7 per cent of the annual precipitation. The chemical industry uses more than twice as much surface water in 2006 as it did in 1972 — 280 million m^3, a quarter of the total water requirement for business and industry (1,123 million m^3). At 411 million m^3, the water requirement of agriculture is almost as large as the requirement of all private households, which require 490 million m^3.

Figure 11. Complete overview of water demand in Switzerland, by water sources



Source: **Freiburghaus (2009).**

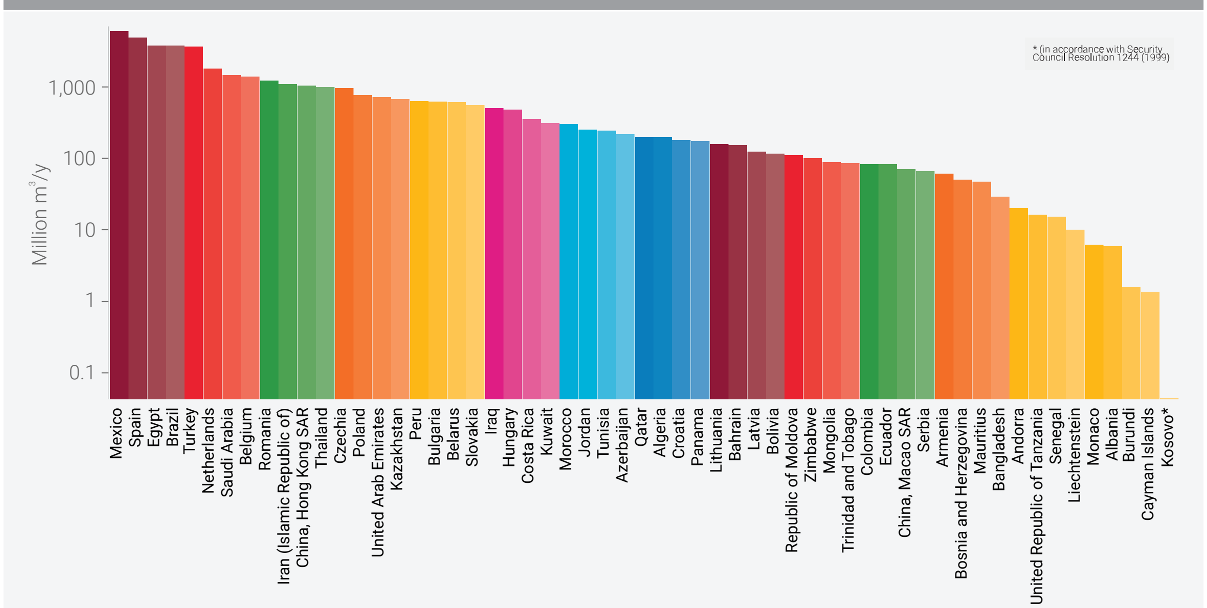
Note: **The vertical arrows highlight the self-abstracted water which is not included in the annual statistics.**

Total wastewater treated in 2015

National data available for the total wastewater treated in 2015 accounted for 41,642 million m^3 from the 57 reporting countries covering 20 per cent of the global population (1,433 million inhabitants; 29 L of wastewater treated reported per capita) (Figure 9 and Figure 12). Such relatively low data coverage does not facilitate the estimation of regional and global wastewater flows generated for this time period. The reporting was nonetheless higher in the EU Member States, with 16,838 million m^3 of total wastewater treated from 16 countries (261 million inhabitants; 64 L of wastewater treated reported per capita).

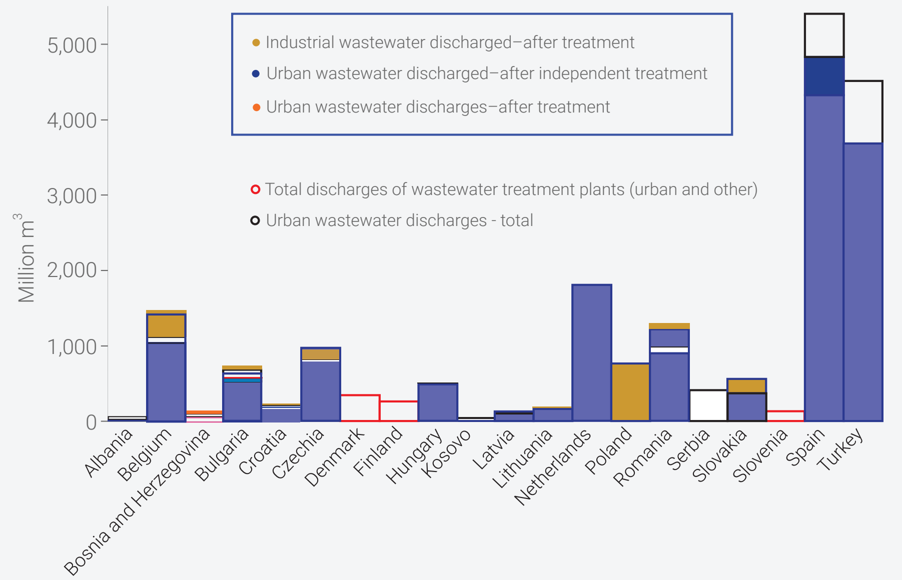
The disaggregation of the flow of wastewater treated by type and/or level of treatment (Figure 13) shows that the reported variables largely differ among countries, most likely depending on national infrastructure and management capacities in public utilities, but also due to important variations in data reporting. For instance, some countries reported statistics on wastewater generation but not on wastewater discharge/treatment. Similarly, some countries reported statistics on wastewater discharge/treatment but not on wastewater generation.

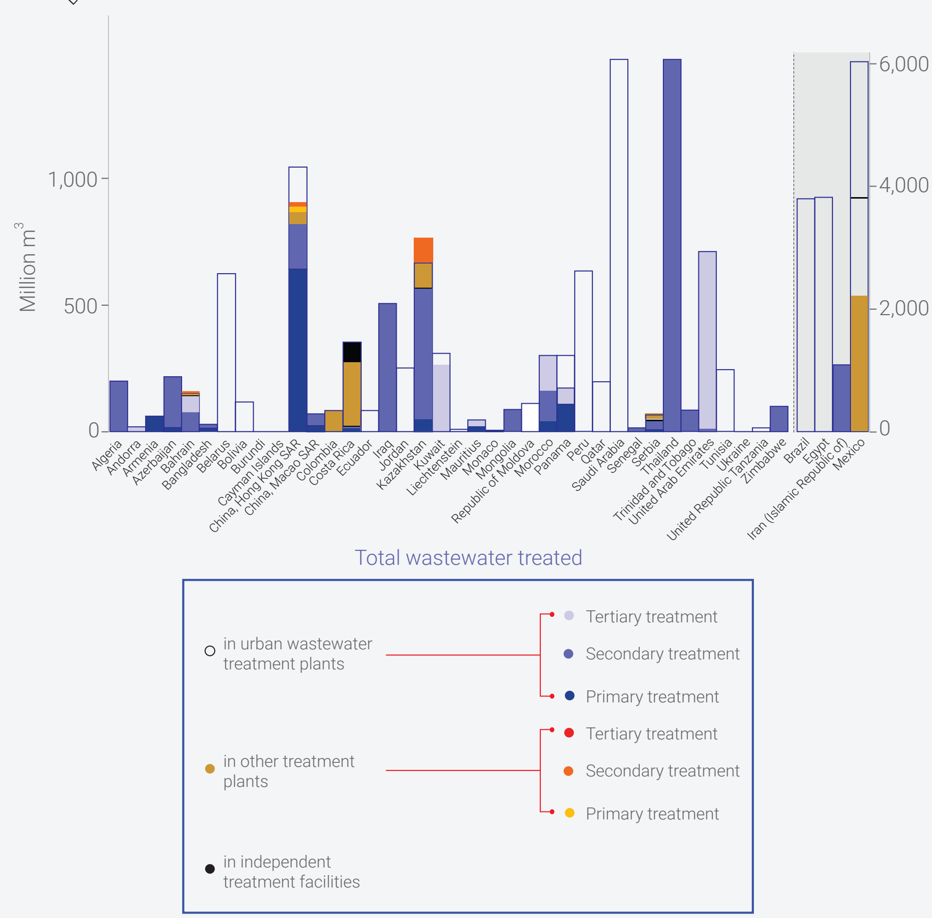
Figure 12. Total reported wastewater flows treated (million m^3) in 2015, by country



Source: Eurostat (2021); OECD (2021); UNSD (2021).

Figure 13. Total wastewater flows discharged (million m³) in 2015, disaggregated by treatment type and/or level in 2015 (top) in EU Member States, and (bottom) in other countries with the four highest values reported on the right y-axis





Source: Eurostat (2021); OECD (2021); UNSD (2021).

Overall, wastewater treated in urban WWTPs (the UNSD variable) and/or treated urban wastewater discharged (the OECD/Eurostat variable) are the main source of data available to assess the flow of wastewater treated (Figure 13), highlighting the importance of the municipal wastewater utilities disclosing reliable and accessible wastewater data. However, it is important to note that municipal wastewater flows can include a significant proportion of wastewater produced by industries, services and institutions in addition to household wastewater collected in sewers; but also, run-off and urban stormwater inputs, so that the associated wastewater flow cannot be exclusively attributed to domestic sources. It is finally striking to note that industrial wastewater statistics on wastewater flows treated are seldom available, so the corresponding industrial treated wastewater flow may be particularly underestimated.

Proportion of wastewater (safely) treated in 2015

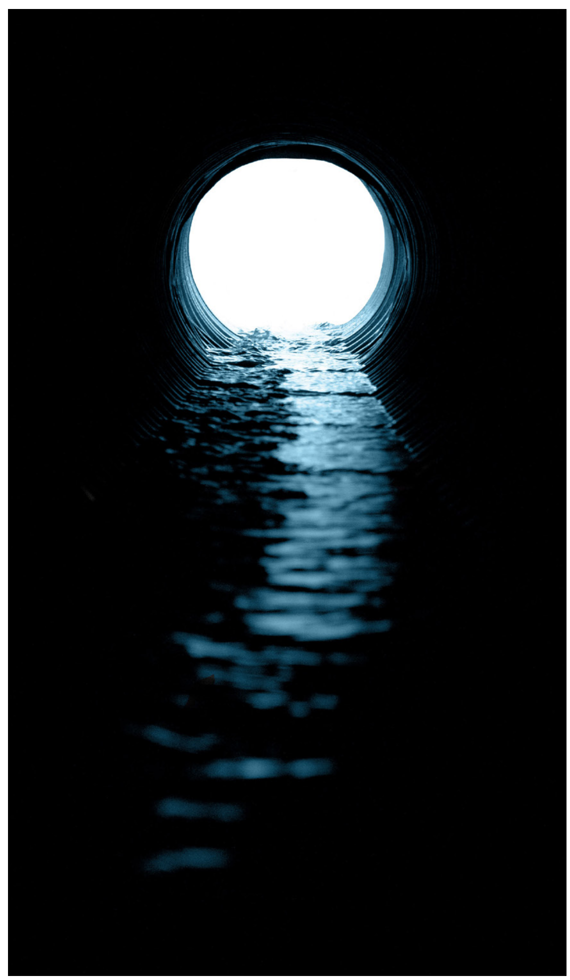
Among the 42 countries reporting on both total wastewater generation and total wastewater treatment variables in 2015 (Figure 14), 32 per cent of total wastewater flows received at least some treatment (36,732 million m^3 of wastewater treated out of the 113,178 million m^3 of wastewater generated), whereas the proportion of the total safely treated wastewater accounts for 17 per cent, based on the 15 countries reporting treatment levels (i.e. at least secondary treatment) to UNSD (4,115 million m^3 of wastewater treated out of the 24,102 million m^3 of wastewater generated).

It is important to note that some countries' proportions were higher than 100 per cent (i.e. some countries reported higher volumes of wastewater treated than generated), most likely for at least one of the following reasons:

i) improved monitoring of wastewater flows treated, especially in municipal WWTPs, which can treat an important proportion of run-off water collected in the drainage basin, as well as some illegal wastewater generated

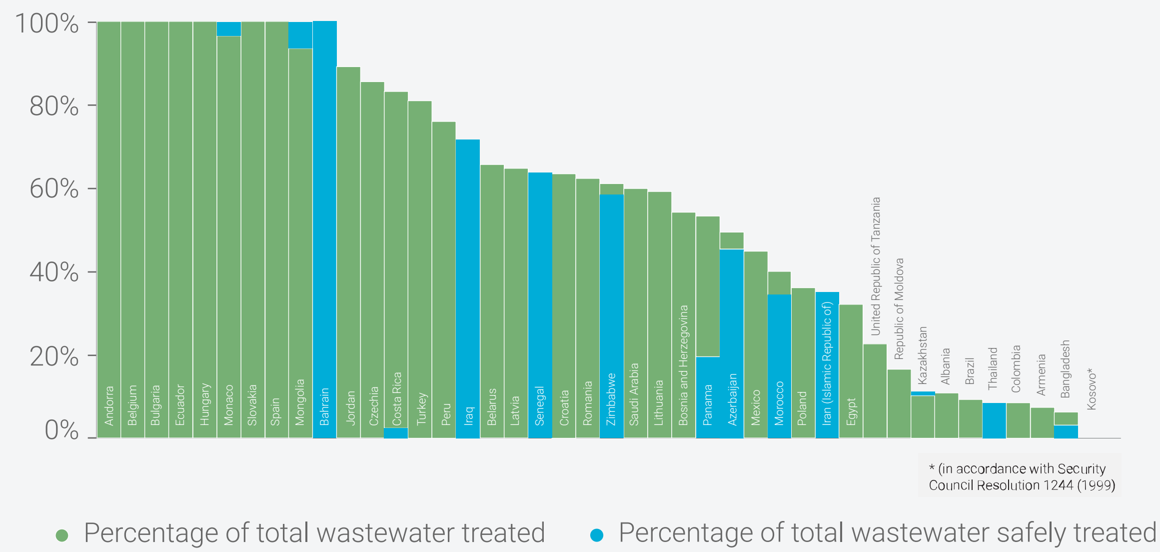
ii) a relative lack of monitoring and/or reporting of the wastewater generated by some economic activities, especially by industries (see next paragraph)

iii) the absence of reporting on self-supplied water resources which are generally not included in the national statistics, which in turn tend to be exclusively focused on drinking water (Box 7).



Scott Rodgerson on Unsplash

Figure 14. Countries' proportions of the total flow of wastewater treated versus the total flow of wastewater generated (per cent) in 2015, including safely treated wastewater (i.e. receiving at least secondary treatment)



Source: Eurostat (2021); OECD (2021); UNSD (2021).

3.1.2. Industrial wastewater

Industrial wastewater generation in 2015

National data available for the volume of industrial wastewater generated in 2015 accounts for 45,311 million m^3 for the 32 reporting countries (879 million inhabitants; 52 L of industrial wastewater generated reported per capita) (Figure 9). The reporting of industrial wastewater statistics is higher in EU Member States, with 5,293 million m^3 of industrial wastewater generated for the 16 reporting countries (180 million inhabitants; 29 L of industrial wastewater generated reported per capita). The industrial wastewater flow generated in 2015 disaggregated by economic activities and households is reported in Figure 10.

Industrial wastewater treated in 2015

National data available for the volume of industrial wastewater treated accounts for 4,296 million m^3 for the 15 reporting countries (254 million inhabitants; 17 L of industrial wastewater treated reported per capita) (Figure 9), with Mexico contributing to about half of this flow, at 2,220 million m^3 of industrial wastewater treated. The reporting of industrial wastewater statistics is higher in EU Member States, with 1,927 million m^3 of industrial wastewater treated for the 10 reporting countries (105 million inhabitants; 18 L of industrial wastewater treated reported per capita). The industrial wastewater flow treated in 2015 disaggregated by type and/or level of treatment is reported in Figure 13.

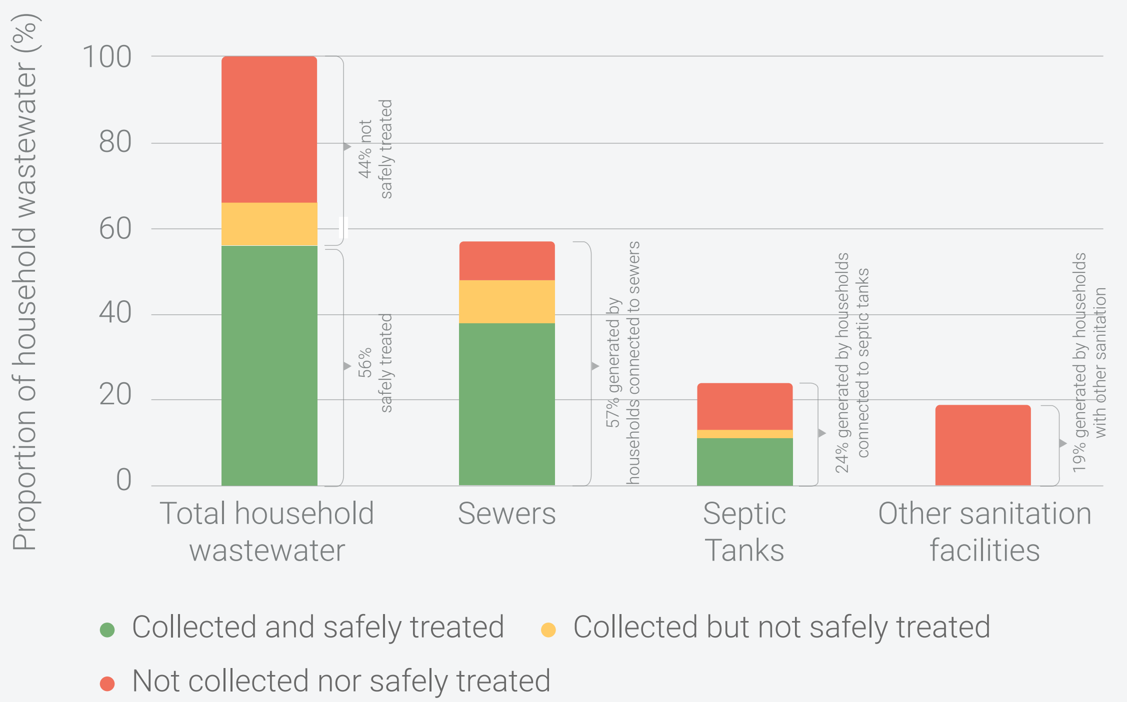
Propotion of industrial wastewater (safely) treated

The industrial wastewater flow treated divided by the industrial wastewater flow generated (Figure 15) by the 14 countries reporting on both variables accounts for 30 per cent (4,293 million m^3 of industrial wastewater treated/14,310 million m^3 industrial wastewater generated), and 3 per cent for the three countries and territories reporting safely treated industrial wastewater to UNSD (121 million m^3 of industrial wastewater safely treated/4,327 million m^3 of industrial wastewater generated, of which 4,235 million m^3 was generated by Kazakhstan).

Figure 15. Proportion of industrial wastewater flows treated (per cent) in 2015, by country

Source: Eurostat (2021); OECD (2021); UNSD (2021).

Figure 16. Breakdown of household wastewater flows generated, collected and safely treated – Total and by wastewater stream



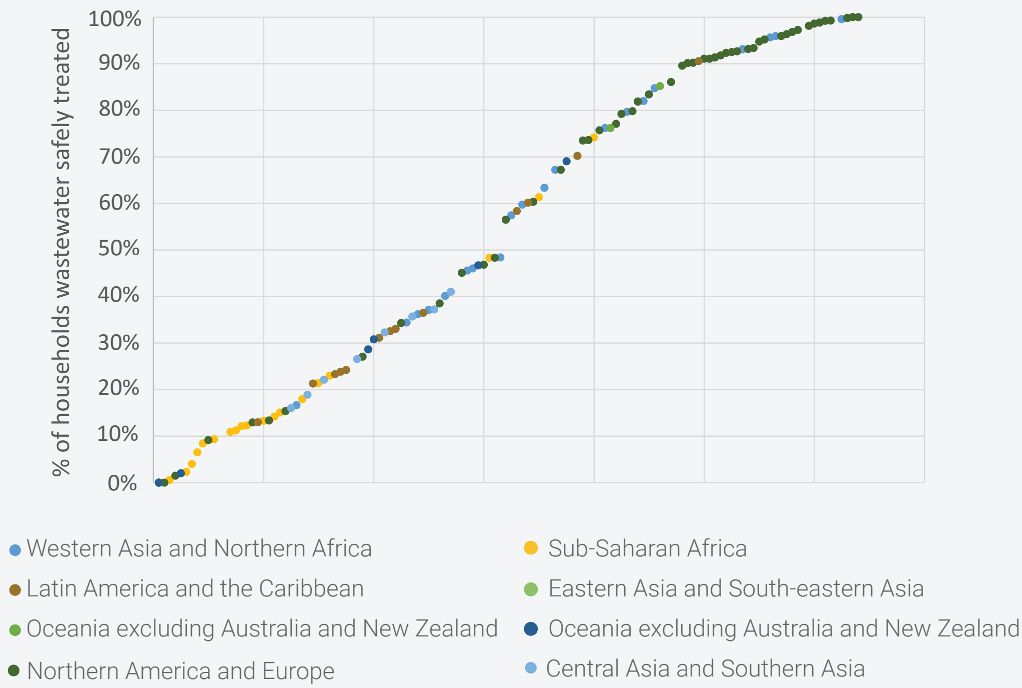
3.2. Domestic (household) water statistics

Based on the methodology described in section 2.1.2, an estimated 271 billion m^3 of household wastewater was generated globally in 2020. Estimates of total household wastewater generated were produced for 234 countries and territories, covering 100 per cent of the global population. Of the total volume of household wastewater generated, 150 billion m^3 (55.5 per cent) was estimated to have been safely treated (Figure 16).

Country estimates on the proportion of household wastewater safely treated were produced for 128 countries and territories (54.7 per cent), representing 87.4 per cent of the global estimated volume of wastewater generated and 80.1 per cent of the world's population. The 128 country estimates are presented from lowest (0 per cent) to highest (100 per cent) in Figure 17, colour-coded by SDG region. The median proportion of household wastewater safely treated was 58 per cent. Among the bottom 27 per cent of countries, less than a quarter of household wastewater was safely treated. Among the top 25 per cent of countries, more than 90 per cent of household wastewater was safely treated. The data, calculations, and sources used for each country are separately presented in 128 country files[22] and summarized in annex 4.

22 See https://www.who.int/teams/environment-climate-change-and-health/water-sanitation-and-health/monitoring-and-evidence/water-supply-sanitation-and-hygiene-monitoring/2021-country-files-for-sdg-6.

Figure 17. Estimated proportions of household wastewater safely treated, by country and SDG region (n=128) (2020)



Yogendra Singh on Pexels

Figure 18. Estimated proportions of household wastewater safely treated (2020)

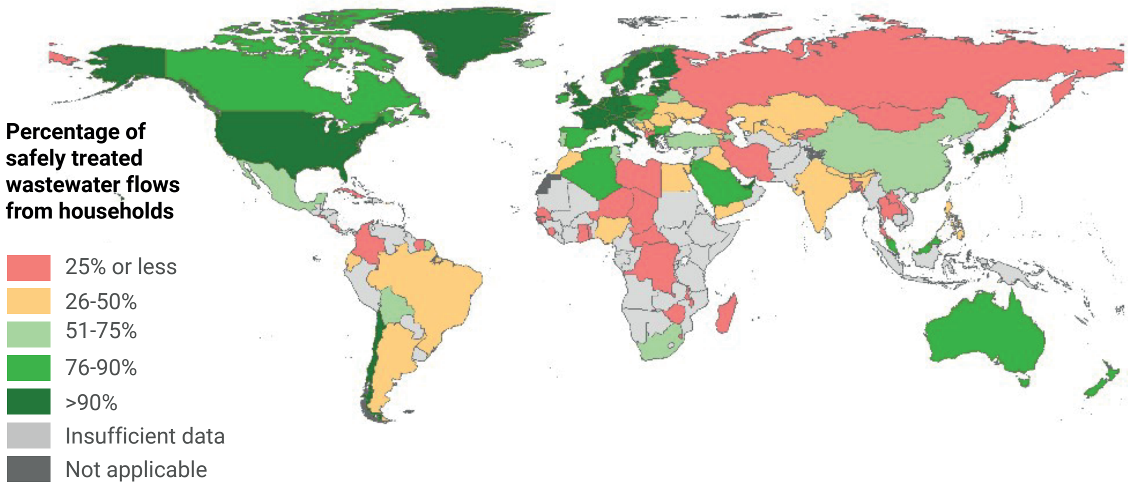
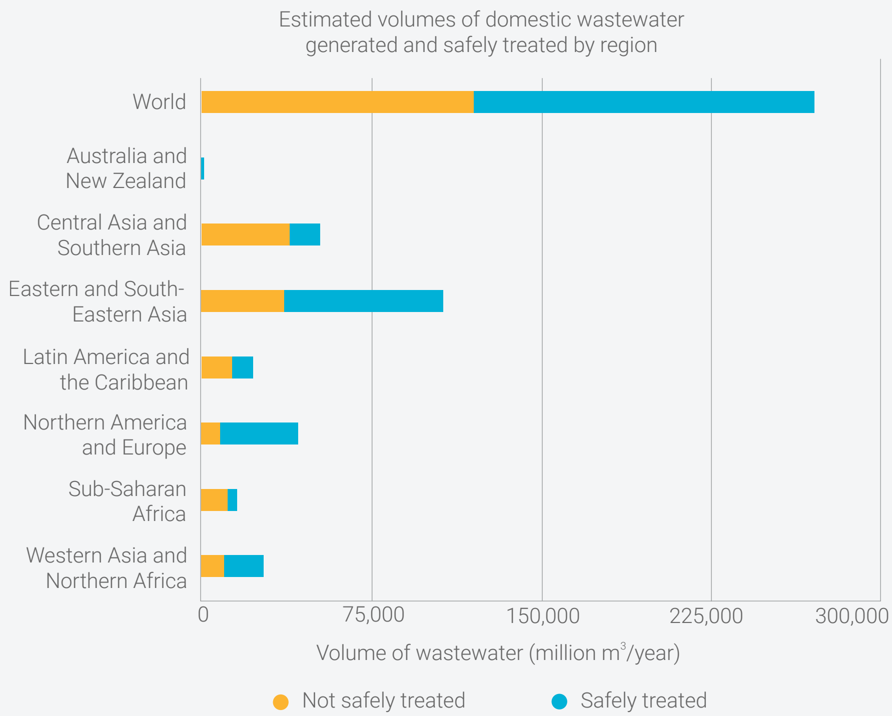
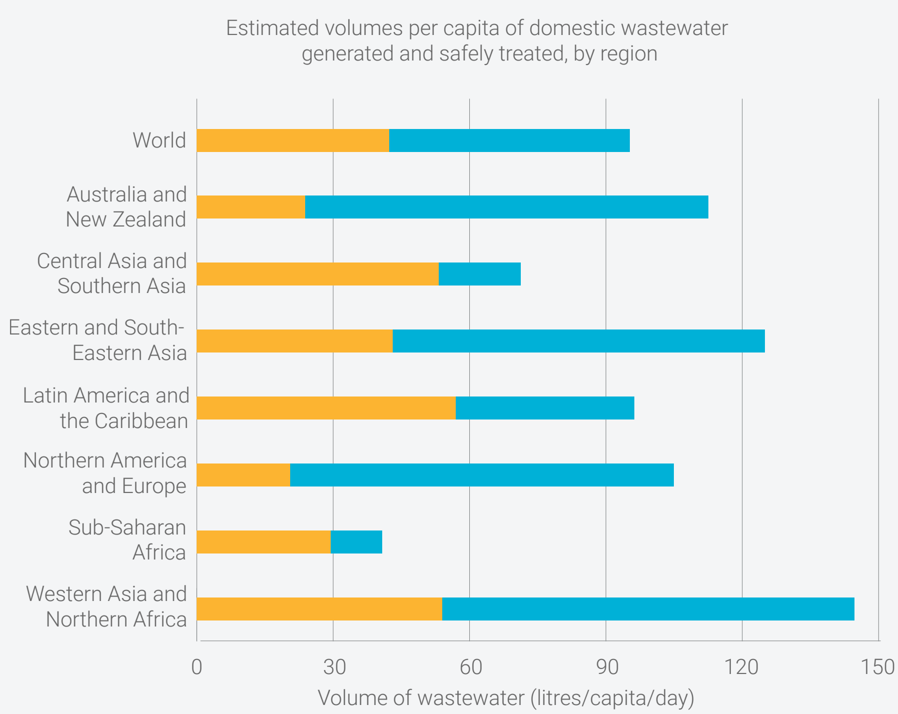


Figure 18 presents a map of the 128 country estimates for safely treated household wastewater and indicates those countries where estimates could not be determined due to insufficient data, notably in sub-Saharan Africa and Oceania.

Global and regional volumes of household wastewater generated, safely treated and not safely treated are presented in Figure 19. Each entire bar represents the estimated total volume of wastewater generated in 2020 while the colour codes indicate the proportions that were safely and not safely treated. Of the 234 countries and territories for which total household wastewater generated was estimated, 85 per cent were calculated by WHO (as described in section 2.1.2), while 15 per cent were reported directly from national sources. For volumes of household wastewater safely treated, regional averages (weighted by volume generated) were used and applied to countries for which a country estimate could not be calculated (due to a lack of data). The largest volumes of wastewater generated were in the Eastern and South-Eastern Asia region – more than double any other region. Per-capita volumes of wastewater generated were highest in Western Asia and Northern Africa.

Figure 19. Estimated volumes (top) and volumes per capita (bottom) of household wastewater generated and treated, by SDG region (2020)





Regional estimates of the proportion of household wastewater flows safely treated are presented in Figure 20, with estimates ranging from 25 per cent in Central Asia and Southern Asia to 80 per cent in Europe and Northern America. No regional estimate was reported for Oceania (excluding Australia and New Zealand) due to low data coverage (<50 per cent coverage by volume of wastewater generated).

Figure 21 presents the individual variables contributing to safely treated wastewater along the wastewater management chain (covering containment, collection and treatment) and for each wastewater stream (sewage treated off-site, septic tank faecal sludge treated on-site, and septic tank faecal sludge treated off-site). The proportions presented at each step represent global averages and are inclusive of data from the 128 countries for which country estimates were established.

Each proportion has been estimated using a mix of reported country data and assumptions, further details for which are described in the Methodological Note. As depicted in the bottom-left of the figure, wastewater flows generated by households without sewer connections or septic tanks were not considered to be safely treated in their entirety. Wastewater flows generated by households with sewer or septic tank connections were also not counted as safely treated if they were not contained, not collected or not safely treated on-site or off-site.

Figure 20. Estimated proportions of household wastewater safely treated, by region

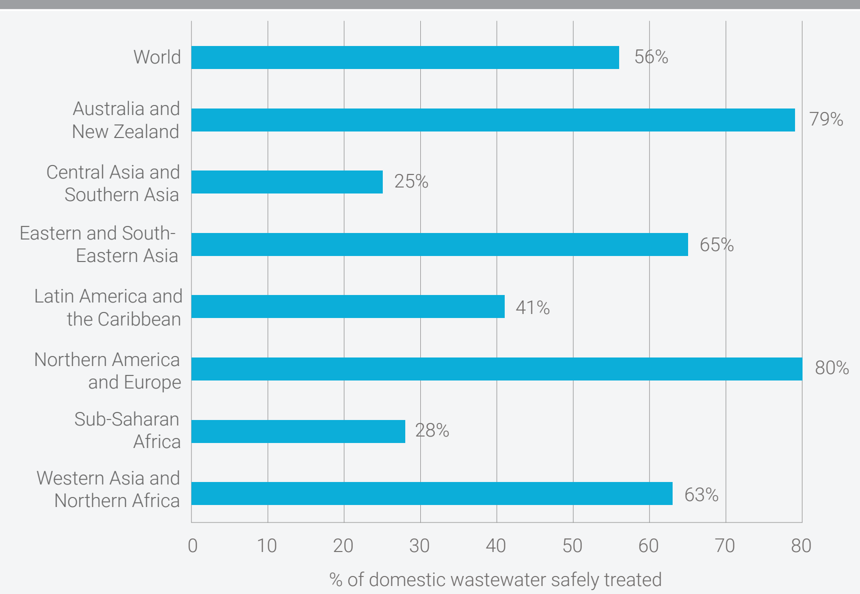


Figure 21. Household wastewater flow diagram and respective globally aggregated estimates (n=128) (2020)

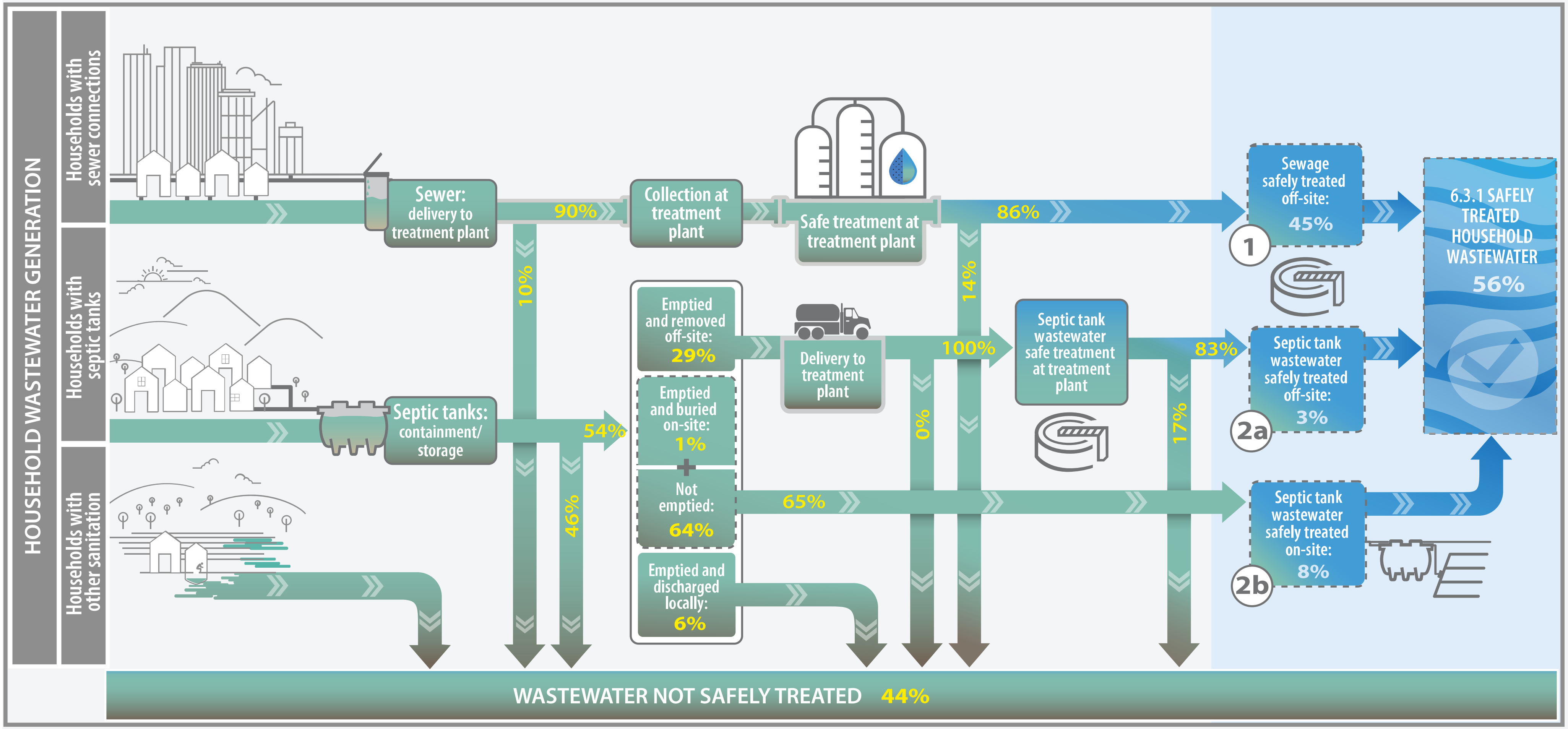
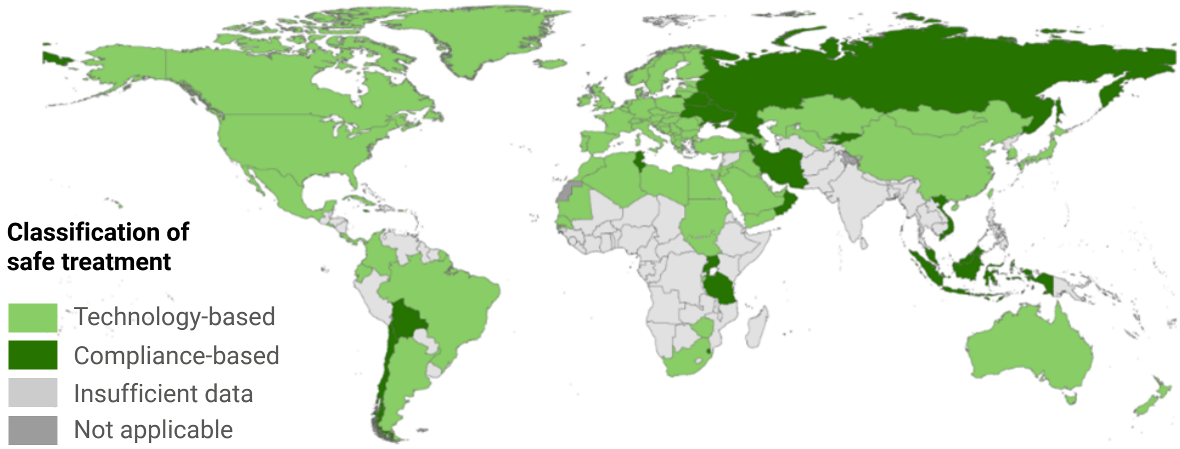


Figure 22. Safely treated sewer wastewater flows determined based on compliance or technology (2020)



Globally, approximately three-quarters (78 per cent) of sewer wastewater flows were estimated to be safely treated (Figure 16), based either on compliance with standards or treatment technology (secondary or higher).

Figure 22 presents the geographic distribution of safely treated sewer wastewater[23] estimates that were based on compliance versus technology. While the intention of SDG 6.3.1 is to define "safely treated" sewer flows on the basis of compliance with discharge standards, the majority of countries for which sewer wastewater treatment performance data were compiled (n=120) reported against treatment technology level (82 per cent), while a minority (18 per cent) reported against compliance.

As shown in Figure 21, 10 per cent of wastewater flows generated by households with sewer connections were estimated as not having been collected by WWTPs, most likely due to direct discharges and (in principle) combined sewer overflows. Among flows collected at WWTPs, approximately 14 per cent were not safely treated. Several factors may contribute to collected sewer wastewater not being safely treated. Treated wastewater may not comply with discharge standards, or, collected wastewater flows may have only been treated by primary processes (i.e. physical removal). Additionally, wastewater may have been collected at the WWTP but discharged without any treatment (due to dysfunctional systems, systems operating over their design capacity, or those experiencing long-term maintenance or rehabilitation). The prevalence of non-safely treated flows in these categories cannot yet be effectively quantified due to a lack of data.

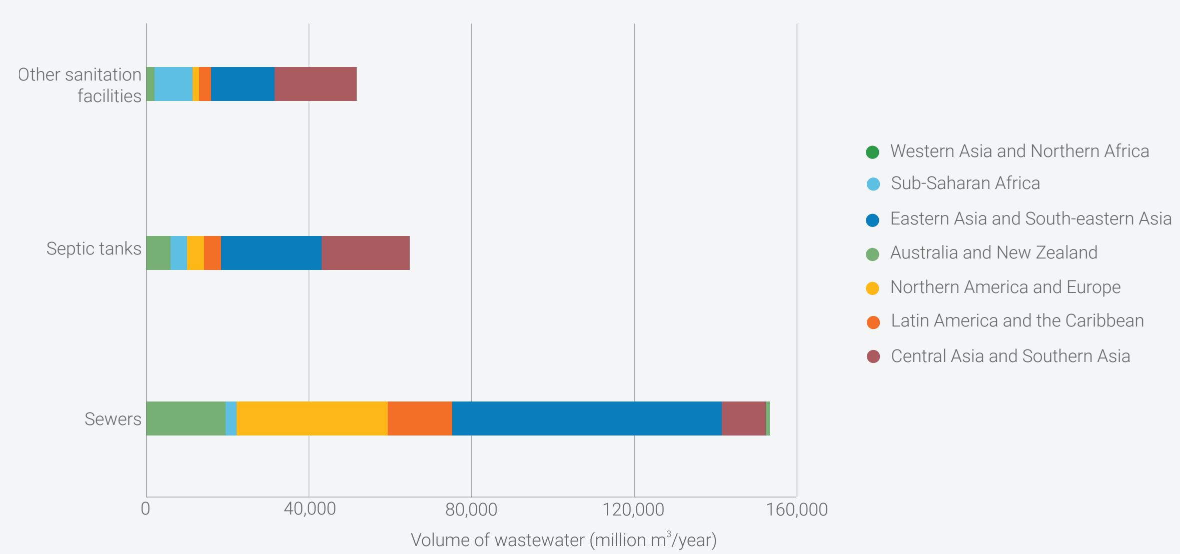
Of the wastewater generated by households with septic tanks, 35 per cent was estimated to have been safely treated on-site and 13 per cent safely treated off-site. The remaining 52 per cent were

23 Only four countries reported safely treated wastewater figures specifically for septic-tank derived faecal sludge, the data for which have been excluded from Figure 22.

estimated as not having been safely treated. The majority of non-safely treated septic tank flows were the result of the estimated proportion of uncontained septic tank wastewater (46 per cent), due to systems that have been incorrectly designed, operated or maintained[24]. Of the 54 per cent of septic tank flows estimated to be properly contained, approximately 65 per cent were estimated to have remained on-site (the majority of which remained in the tank unemptied or treated and discharged per the tank's design and were therefore considered safely treated). Approximately 29 per cent of contained septic tank flows were estimated to have been treated and discharged by the tank, with faecal sludge emptied and removed off-site, of which 83 per cent was safely treated at centralized treatment facilities. The remaining 6 per cent of contained septic tank flows were estimated to have been emptied and disposed of locally.

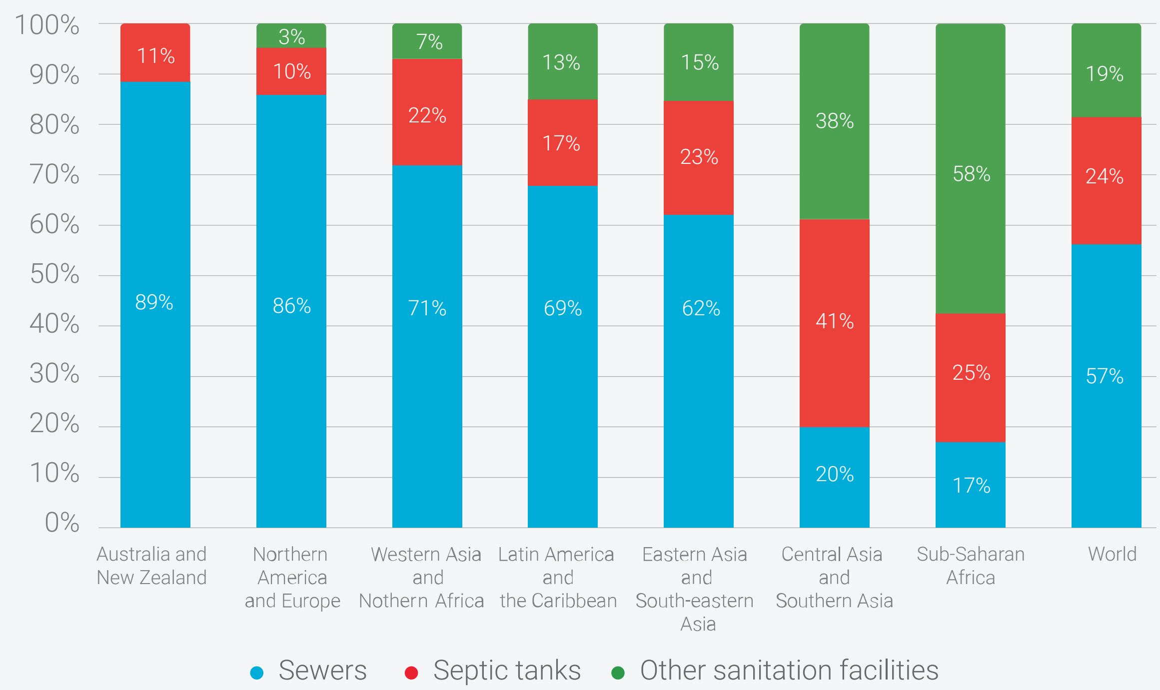
Figure 23 and Figure 24 present total and proportional volumes of household wastewater generated by wastewater stream, respectively (including a breakdown by SDG region in Figure 23). Even though less than half of the global population has sewer connections, these households tend to use more domestic water and therefore produce more wastewater than households with other sanitation facilities. Accordingly, the majority of household wastewater in 2020 was generated by households with sewer connections (154 million m^3/year; 56 per cent), 24 per cent (65 million m^3/year) by those with septic tanks, and 19 per cent (52 million m^3/year) originated from households with all other types of sanitation facilities. The majority of wastewater generated by households without sewers or septic tanks originated from Central Asia and Southern Asia (39 per cent; 20 million m^3/year), Eastern Asia and South-Eastern Asia (30 per cent; 16 million m^3/year), and sub-Saharan Africa (18 per cent; 9.5 million m^3/year).

Figure 23. Estimated volumes of wastewater generated by households with various types of sanitation facilities, by region (n=234)



24 And to a lesser extent, from the result of reported data from national septic tank inspection programmes (Box 5) or proportions of septic tank flows comprised of secondary or higher independent treatment (from the Eurostat databank).

Figure 24. Proportion of wastewater generated by households with various types of sanitation facilities, by region



The proportions of household wastewater generated by each of the three sanitation categories are presented by region in Figure 24. Very high proportions of total household wastewater are generated from sewer connections in Australia and New Zealand (89 per cent) and Europe and Northern America (86 per cent). In Central and Southern Asia, the largest proportion of household wastewater flows are generated by households with septic tanks (41 per cent) while in sub-Saharan Africa, the largest proportion is produced by households with all other sanitation facilities (58 per cent). For all other regions, the majority of household wastewater generated was discharged into sewers.

Two-thirds of all household wastewater is estimated to have been collected at either WWTPs or septic tanks in 2020 (Figure 16).

Of the estimated total volume of household wastewater collected, the majority was sewer wastewater collected at WWTPs (83 per cent), followed by septic tank wastewater for which faecal sludge was collected on-site (11 per cent), and septic tank wastewater for which faecal sludge was collected off-site (5 per cent). Of the total volume of household wastewater safely treated, the majority was sewer wastewater treated at WWTPs (84 per cent), followed by septic tank wastewater treated or disposed on-site (11 per cent), and septic tank wastewater for which faecal sludge was emptied, taken off-site, and treated at centralized treatment facilities (5 per cent).

Examining sewer wastewater flows specifically, Figure 25 demonstrates that 10 per cent of flows were not collected (direct discharges), while 90 per cent were collected at WWTPs, of which

78 per cent (of total sewer flows) were safely treated and 12 per cent were not safely treated. Regarding septic tank wastewater flows, Figure 26 demonstrates that 49 per cent of septic tank wastewater flows were not collected (either 1: not contained; 2: contained but emptied and discharged locally; or 3: contained, emptied and removed off-site, but not delivered to a treatment plant), while 51 per cent were collected, of which 35 per cent (of total septic tank flows) were safely treated on-site. Approximately 16 per cent (of total septic tank flows) were successfully emptied and removed off-site and delivered to a treatment plant, of which 13 per cent (of total flows) were safely treated while 3 per cent were not.

Figure 25. Sewer wastewater collected and safely treated

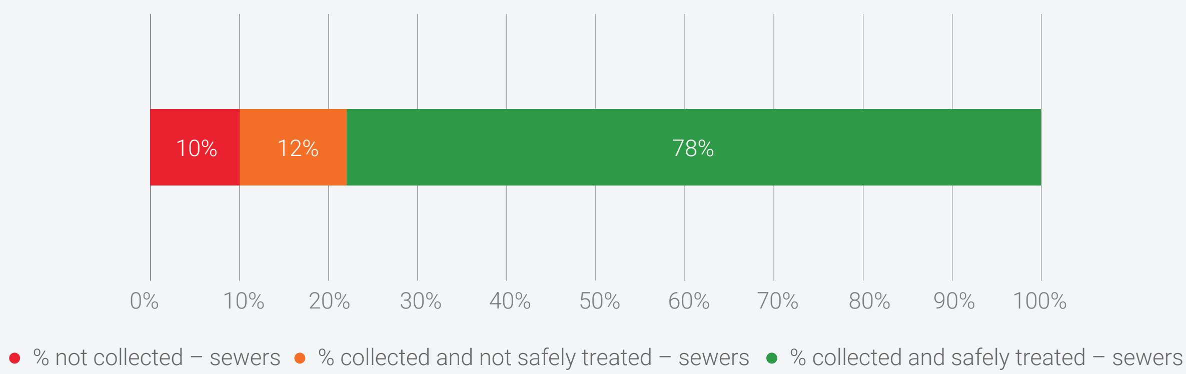
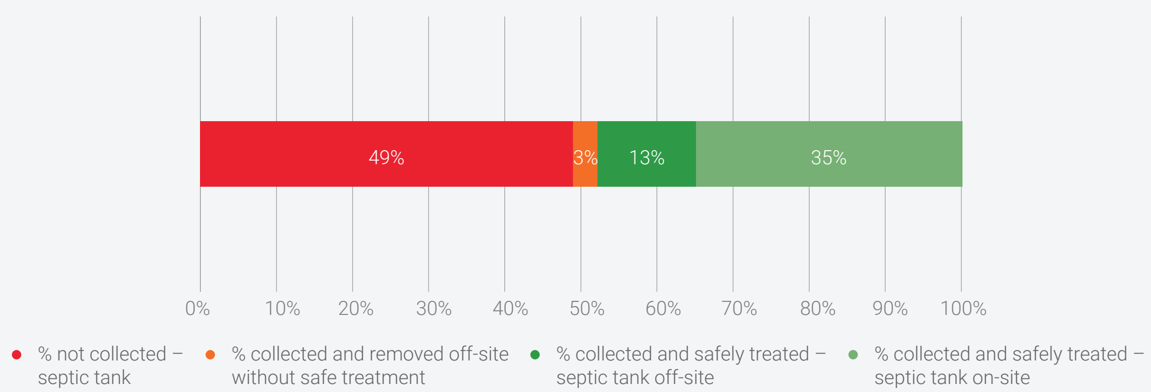


Figure 26. Septic tank wastewater collected and safely treated



4. Conclusion

The year 2015 has the most complete data coverage for total and industrial wastewater statistics over the last decade and was used to develop this global baseline. The total wastewater flows generated by various economic activities and households accounted for 131,871 million m^3 from 56 reporting countries (covering 22 per cent of the global population) and the total wastewater treated for 41,642 million m^3 from 57 reporting countries (covering 20 per cent of the global population). Among the 42 countries reporting on both total wastewater generation and total wastewater treatment in 2015, only a third of total wastewater flows received at least some treatment. Only 14 countries reported on both generation (14,310 million m^3) and treatment (4,293 million m^3) of industrial wastewater, with one-third of the volume reportedly undergoing treatment. With the exception of EU Member States, the relatively low geographic coverage and extremely small flows reported for total and industrial wastewater per capita do not at present allow for regional and global estimates of the proportion of total wastewater flows safely treated.

Because household wastewater generation can be estimated on the basis of populations using various types of sanitation facilities and estimations of safely treated proportions have been supported by a set of assumptions to fill in data gaps, data coverage is much higher for households than for total or industrial wastewater. Slightly more than half (56 per cent) of all household wastewater was estimated to have been safely treated prior to discharge in 2020, which aligns with a recent academic calculation (52 per cent as reported by Jones, 2021). However, this headline finding detracts from very clear disparities between high-income countries and low- and middle-income countries.

This report also unearths some methodological limitations on monitoring the proportion of safely treated wastewater, especially the fact that many countries do not have data available on both the generation and treatment of wastewater flows, and to a certain extent that reported data may not necessarily reflect the reality of the physical flows. In some countries, the wastewater flow generated may be highly underestimated due to the relative lack of reporting of non-municipal sources (especially of self-supplied industry and illegal water use), whereas the volume of treated wastewater flows can be inflated compared with volumes of wastewater generated, by the input of run-off water from precipitation in the collection and treatment systems through sewer networks. The breakdown of wastewater generation and treatment by type and/or level of treatment also demonstrates that the reported variables largely differ among countries, depending on the dominant national water uses

Ashish Kumar Pandey on Pexels

by economic activities and certainly due to the capacity of monitoring and data-collecting systems. Overall, most countries are at least not exhaustively reporting on the volumes of wastewater generated and treated by industrial activities.

The monitoring of sewer wastewater flows discharged in compliance with the standards remains rare. Further advocacy may be needed – particularly among high-income countries – to promote such monitoring at the national level, as well as inclusion of compliance-based indicators in structured monitoring and reporting systems. Data coverage for sewer wastewater collection and safe treatment, and septic tank emptying, appears to be improving. However, many components of the household wastewater management chain are not currently monitored at the national level and require reasonable assumptions to allow for its complete characterization at country level. Data on the containment of septic tank wastewater flows remain heavily reliant on assumptions and would benefit from improved data quantity and quality (ideally through national septic tank inspection programmes, for which a case study has been presented in Box 5). In addition to increasing the proportion of countries reporting on these components, the assumptions used in their absence can be further refined in the future based on emerging quality research and validation based on empirical data. Issues with data quality remain, and an exploration of how wastewater data are being estimated, calculated, and/or directly measured at the country level (by NSOs or relevant agencies) is needed to better understand limitations, areas for improvement and needs for capacity-development. Harmonization of wastewater monitoring approaches, methodologies and terminology will support such improvements to global monitoring. Advocacy on the importance of wastewater monitoring remains a priority in most regions, and efforts to promote SDG 6.3.1 may motivate more routine monitoring of the sector. An example demonstrating the connection between strong monitoring and sector performance is provided in Box 8.

Box 8. In Mexico, a well-established wastewater monitoring programme has been used to inform sector policy and investment, resulting in a consistent and significant strengthening of sector performance

Mexico has established and sustained an extensive and detailed wastewater monitoring programme. Beyond just generating data and reporting on annual progress, the Mexican authorities have used the data to inform sector strategy, investment, targeting and planning. The result has been significant and consistent progress towards increasing sewerage and safely treated wastewater coverage.

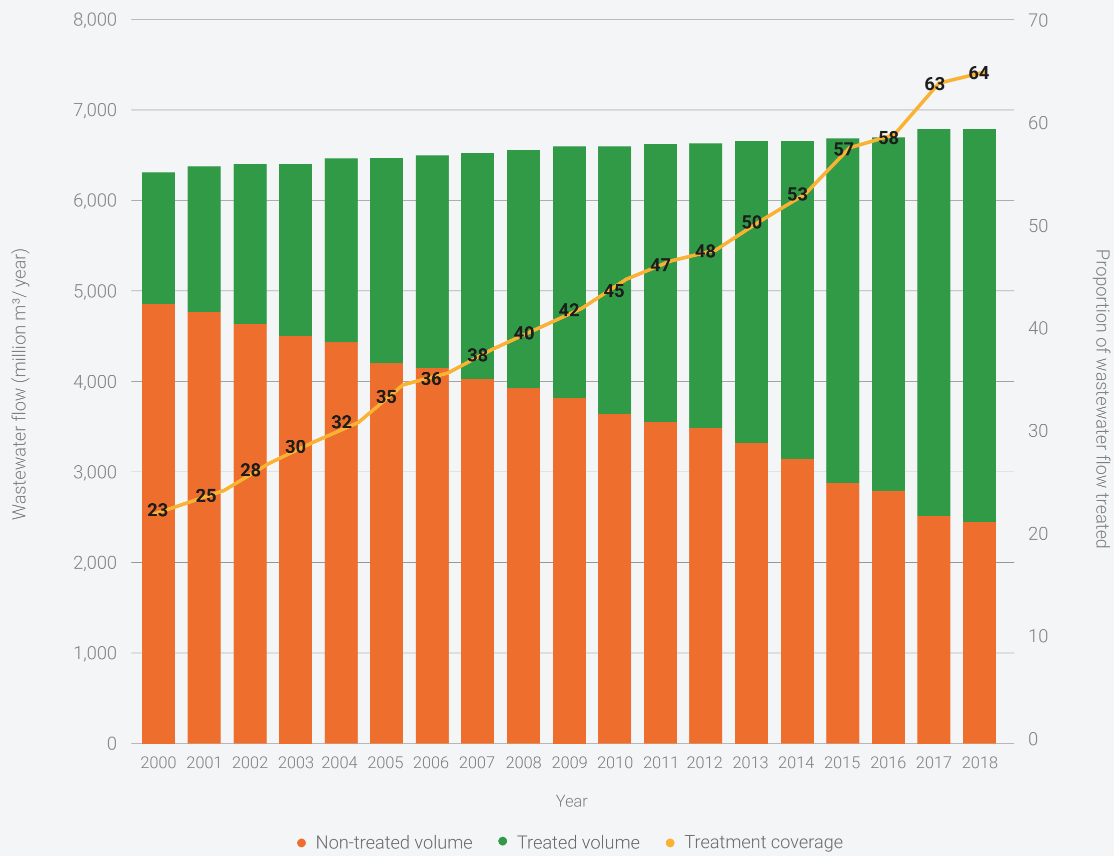
The National Water Commission of Mexico (CONAGUA) is responsible for the regulation, control, protection and sustainable use of Mexico's waters. CONAGUA publishes an annual Situation of the Drinkable Water, Sewerage and Sanitation subsectors report that provides a detailed account of investments, initiatives and progress across the subsector. The latest edition of the report (2019) presents the most recent national wastewater statistics.

Sewerage coverage has increased steadily from 72.4 per cent of households in 1995 to 91.4 per cent in 2015. Some regional disparities in coverage remain, with two states reporting less than 80 per cent of households connected to sewers. Remarkably, sewerage coverage in rural areas rose from 29.7 per cent in 1995 to 74.2 per cent in 2015.

In 2018, there were 2,540 wastewater treatment plants operating in the country with a capacity of 181.2 m^3/second – an increase from 469 plants and 48 m^3/second in 1995. The actual flows processed at treatment plants utilized 76 per cent of total treatment capacity. From 1995 to 2015, treatment capacity was almost doubling every 10 years. In 2018 alone, 58 new treatment plants were established, while 25 were rehabilitated, and 3 were expanded.

Figure 27 presents total volumes of collected wastewater (in sewers) that are treated and non-treated. In 2018, the proportion of collected wastewater that was treated was 64 per cent, nearly tripling since 2000.

Figure 27. Volume of wastewater collected and treated, and proportion treated, in Mexico (2000–2018)



Source: CONAGUA (2019).

4.1. Acceleration needs and recommendations

The wastewater statistics extracted from the three international databases (Eurostat, OECD and UNSD) show that these existing frameworks could be readily used to collect standardized wastewater data from the majority of the world's countries and population, while reducing the monitoring burden that this SDG indicator reporting could impose on countries. An improved reporting of (non-domestic) wastewater flows generated by sources and treated by type/level of treatment is therefore required to obtain more knowledge on global wastewater flows, and to promote sustainable and safe wastewater (reuse) strategies (Box 4), to the benefit of the global population's health and livelihoods. It is consequently important that the content of indicator 6.3.1 rapidly fosters monitoring progress and improves the knowledge base for decision makers and the public, even if it oversimplifies some technical realities and some differences in reporting wastewater sources and flows. Notwithstanding the data limitations, disaggregation of data on wastewater generation by source according to households, services and industry helps to identify heavy polluters and consequently, apply the "polluter pays" principle to incentivize wastewater treatment and enforce water quality standards. As such, wastewater monitoring is an essential first step to accelerating investments in wastewater collection and treatment.

Global efforts continue to be needed to move households up the sanitation ladder (as per SDG 6.2.1), as it is estimated that over one-third of the global population is not yet connected to sewers or septic tanks – mostly in sub-Saharan Africa, Central and Southern Asia and Eastern and South-Eastern Asia. However, as households move up the sanitation ladder, the corresponding increase in demand for water consumption and wastewater production must be acknowledged by national development stakeholders. Gaps in the collection and/or safe treatment of sewer and septic tank wastewater flows remain significant in some countries and regions. Low levels of sewer wastewater collection appear to be most common in Central and Southern Asia. Lower levels of safe treatment of wastewater collected at WWTPs appear to be most common in Central and Southern Asia, sub-Saharan Africa and Latin America and the Caribbean. Septic tank emptying and removal of faecal sludge were found to be less common in Central and Southern Asia. Urban populations not yet connected to centralized sewer systems should be identified and prioritized. As people gain access to piped water in the home – either from public supplies or from private systems – they will shift from dry to waterborne sanitation systems like septic tanks, and without support and oversight to ensure that such systems safely manage both the solid and liquid fractions of wastewater, there is a risk that waterborne sanitation increases the spread of excreta and pathogens, with negative effects on both public health and the environment. Over 2 billion people drink water that is contaminated with faecal material (viz. SDG target 6.1.1), which is in large part due to unsafe collection, storage and treatment of wastewater.

Considering the potential threats to the environment posed by the discharge of insufficiently treated or diluted wastewater, some water quality parameters routinely monitored in WWTPs' effluents and aquatic systems could be included in the indicator 6.3.1 reporting process to estimate the pollutant load being discharged from domestic and industrial wastewater sources. In the near future, indicator 6.3.1 could also incorporate the flow of wastewater safely reused to support SDG 6 implementation and climate change adaptation, and better protect human health and the aquatic environment.

Target 6.3 wording aims at "minimizing release of hazardous chemicals and materials" and "substantially increasing recycling and safe reuse globally", with the political intention of protecting human health and the environment, combating water scarcity and ensuring that the reuse of wastewater is safe. Although such considerations are not currently addressed by the global indicators and methodology, a further enhancement of indicator 6.3.1 would be to consider the wastewater pollutant loads discharged into the environment using the same sources of data and without developing supplementary indicators. In fact, some water quality parameters which are commonly monitored in WWTPs to evaluate the strength of effluent released from conventional sewage treatment plants to surface waters or streams (for example, Biochemical Oxygen Demand (BOD – Box 9 and Box 10)) could be easily used in this respect. Such new developments could also include some of the core set of the five parameters which are used for reporting on indicator 6.3.2 for tracking the percentage of water bodies in a country with good ambient water quality (dissolved oxygen, electrical conductivity, nitrogen, phosphorus and pH), since i) some of these parameters are routinely monitored in the effluents of WWTPs, and ii) ambient water quality is intrinsically linked to the (non) treatment of wastewater and to the physicochemical characteristics of the effluents discharged in the aquatic environment. Boxes 9 and 10 demonstrate that non-domestic sources of wastewater are responsible for a higher proportion of organic matter discharged into surface waters, so BOD_5 loads (by economic activities) should be factored into improved wastewater monitoring.

Furthermore, a supplementary variable on wastewater recycling and safe reuse at the country and regional level could also be considered in future revisions of the SDG indicator framework to address the aims of target 6.3 more comprehensively and act on the major and increasing concerns around adapting to climate warming impacts on local and regional hydrological resources. However, a standardized definition of (safe) reuse would be required for such monitoring purposes, in which the required levels of treatment would have to correspond to the level of risk to human health and environment for specific reuse type.

Considering waterborne disease risks and potential bacteriological contamination of water supplies, bacteriological standards could be imposed, especially considering the increasing reuse of (raw) wastewater in agriculture in many countries. The environmental and health hazards associated with the widespread presence of persistent micropollutants in (treated) wastewater streams (for example, heavy metals, herbicides, pesticides, pharmaceuticals and hormones) should be also considered regarding the safe reuse options.

4.1.1. Interlinkages

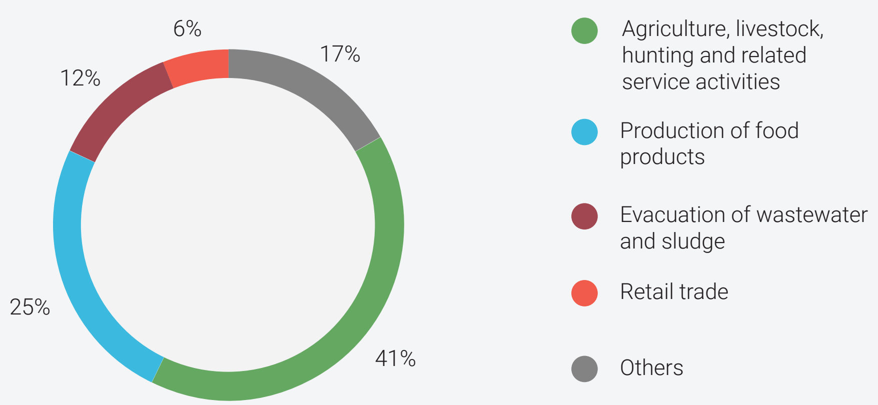
The household component of indicator 6.3.1 is closely linked to indicator 6.2.1a on the "proportion of population using safely managed sanitation services" and draws upon some of the same data sources. Indicator 6.3.1 is also directly linked to the indicator 6.3.2 (Box 11) on the "proportion of bodies of water with good ambient water quality", because unsafe wastewater leads to degradation in quality of the receiving waters. It thereby directly informs progress towards target 6.3 and it is strongly linked to target 6.6 on water-related ecosystems, as well as target 14.1 on marine pollution (for example, on coastal eutrophication), 6.4 on water use and scarcity (for example, on water recycling and reuse), and 6.1 on drinking water quality.

Geamana, Romania by Jaanus Jagomägi on Unsplash

Box 9. The mass of organic pollutant discharged by commercial and industrial activities in Costa Rica

Given the growing demand for information from national users and multilateral organizations on physical and economic water statistics, the Costa Rican Ministry of Finance publishes the Water Statistical Compendium, a set of data and key indicators useful for the integrated management of water resources in Costa Rica. The environmental statistics and indicators are aligned to international standards established by the United Nations Statistics Division (UNSD). The indicator on pollutant content of discharged wastewater reports disaggregated data grouped by economic activity (ISIC code). The emissions of all the generating entities of each group of economic activity are added for each of the parameters presented (for example, total suspended solids, fats and oils) regarding items emitted into the environment by wastewater generators after treatment, either through direct discharge to bodies of water or through reuse. The indicator of relative loads of Biochemical Oxygen Demand (BOD) by economic activity, as a percentage of the total BOD related to wastewater discharged in Costa Rica, is considered an interesting data relationship that is not regularly produced at the national level. However, it is consistent with the intention, which is to demonstrate the importance of disaggregating existing data on commercial and industrial wastewater discharged (directly) to the environment, because it represents a high proportion of the total wastewater flow, but also of the mass of organic matter discharged into surface water (Figure 28).

Figure 28. Relative loads of Biochemical Oxygen Demand in Costa Rica by economic activity, as a percentage of the total Biochemical Oxygen Demand related to wastewater discharged (2018)



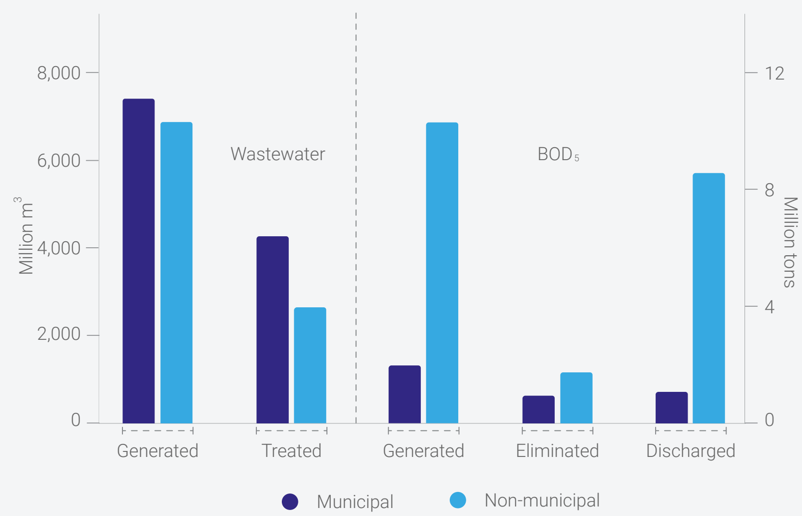
Source: Costa Rica, Ministry of Finance (2020).

Figure 28 represents the relative loads of BOD in Costa Rica by economic activities, as a percentage of the total BOD related to wastewater discharged in 2018. Agriculture and livestock represent 41 per cent, food production 25 per cent, discharge of wastewater and sludge 12 per cent, retail trade 6 per cent, and other economic activities 17 per cent. Together with the BOD discharged by non-municipal sources reported by Mexico (Box 11), the disaggregated data by economic activity from Costa Rica demonstrate the importance of filling the existing data gaps on commercial and industrial wastewater discharged to the environment, because they represent a high proportion of total wastewater flow but also of the mass of organic matter discharged into receiving waters.

Box 10. Organic pollutants present in municipal and non-municipal wastewaters of Mexico

Wastewater discharges can be classified as "municipal" or "non-municipal". Municipal discharges are generated in population centres and collected in urban and rural sewerage systems, while non-municipal discharges are those generated via other uses, such as self-supplied industry and those that are discharged directly to national water bodies without being collected by sewerage systems. The five-day Biochemical Oxygen Demand quality parameter (BOD_5) is an indicator of the amount of organic matter present in water bodies. The increase in the concentration of BOD_5 in ambient waters decreases the dissolved oxygen content available for aquatic living organisms and therefore adversely impacts aquatic ecosystems. Such an increase can be due to the (treated) wastewater discharges from industrial, commercial and domestic point sources, but also the diffuse pollution from agricultural run-off and soil erosion. Figure 29 presents the disaggregated municipal and non-municipal discharges by flow (in million m^3) and BOD_5 (in million tons) in Mexico. Although the municipal wastewater flow generated is higher than the wastewater flow generated by non-municipal sources, the BOD_5 generated by non-municipal sources is much higher than the municipal ones. The pollutant load from urban centres (municipal discharges) generated 2.00 million tons of BOD_5 per year, from which 1.83 million tons of BOD_5 were collected in sewers, and 0.92 million tons were removed during treatment in the systems. The pollutant load from non-municipal uses (including industry) generated 10.32 million tons of BOD5 per year, from which 1.75 million tons were removed during treatment in the systems. Together with the discharged loads disaggregated by economic activities reported from Costa Rica (Box 9), the estimation of the organic pollution loads by non-municipal sources from Mexico demonstrate the importance of filling the existing data gaps on commercial and industrial wastewater discharged to the environment, because they represent a high proportion of total wastewater flow but also of the mass of organic matter discharged into surface waters.

Figure 29. Municipal and non-municipal wastewater discharges in Mexico



Source: CONAGUA (2018).

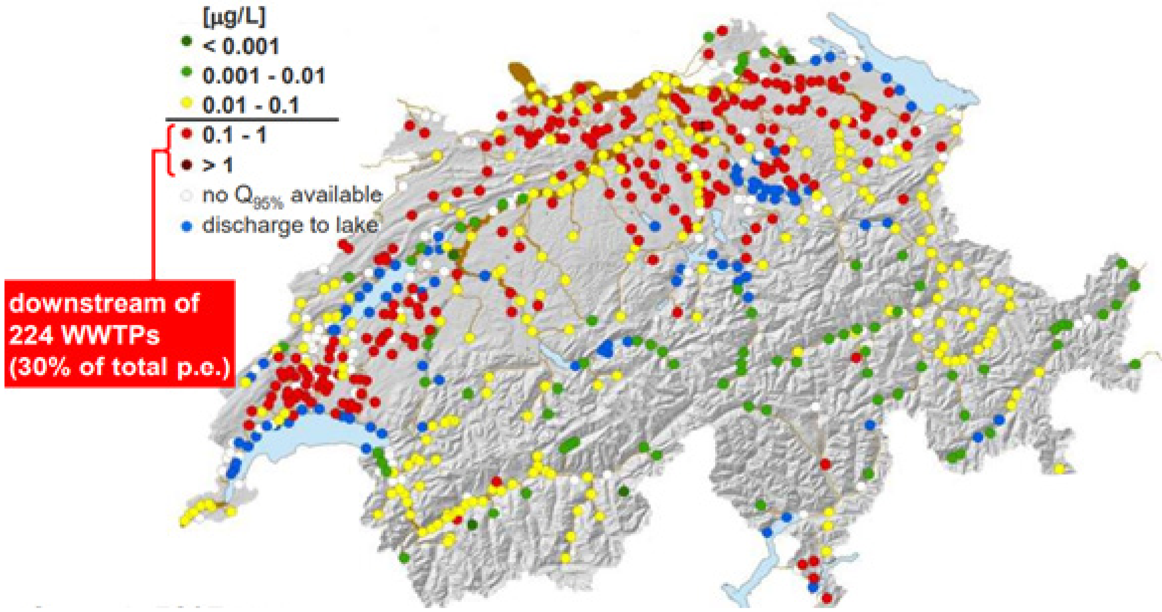
Note: The data for municipal discharges are estimated based on the coverage reported in the progress of the National Water Program 2014–2018.

Box 11. Two strongly interlinked indicators to improve water quality, wastewater and safe reuse

Indicators 6.3.1 and 6.3.2 are intrinsically linked since the quality of ambient water is strongly affected by the discharge of wastewater produced by human activities into the aquatic environment. Water pollution is caused by the discharge of point sources of pollution such as municipal sewage and industrial wastewater, but also by non-point sources of pollution from diffuse sources such as polluted run-off from agricultural areas draining into a river, or wet and dry transfer of atmospheric pollutants to water bodies and river basin drainage areas. When properly managed, wastewater treatment plants (WWTPs) significantly reduce the load of pollution discharged to the environment. WWTPs nevertheless represent a major point source of pollution affecting ambient water quality, because the treated effluents are still highly enriched with nutrients and hazardous substances like micropollutants (or contaminants of emerging concern) that are not sufficiently removed by conventional treatment processes. The physicochemical parameters used in the level 1 monitoring of indicator 6.3.2 (dissolved oxygen, electrical conductivity, nitrogen, phosphorus and pH) are generally routinely measured in WWTPs, with additional microbiological and chemical contaminants such as faecal bacteria and heavy metals, to i) evaluate WWTPs' efficiency, ii) set the regulatory standards for wastewater discharged to surface waters, and iii) develop guidance for water reuse applications without any risk to human and environmental health. Reclaimed municipal wastewater, for instance, is readily used as source water for groundwater recharge in many places.

The impact of the effluent discharge on ambient water quality also strongly depends on its dilution in receiving bodies of water. Field studies showed that pharmaceutical residue concentrations spike in the river samples collected downstream of WWTPs, so that elevated concentrations of micropollutants (for example, herbicides and pharmaceuticals) are expected in small rivers with a high fraction of treated wastewater. Figure 30 shows the highest calculated concentrations of the anti-inflammatory drug diclofenac in rivers at minimal river flow ($Q^{95\%}$) downstream of WWTPs, which are the main source for micropollutants in the aquatic environment. The water body's capacity to receive pollutants is here based on dry weather flow (Q^{347}, i.e. on average 347 days per year, which is reached or exceeded on average over 95 per cent of the days). The reduction of the dilution capacity of point source effluents during the dry season is exacerbating the observed decline in water quality. Under future climate change scenarios, where freshwater supplies might become more stressed, the quality and quantity of wastewater discharge to receiving streams may become even more crucial to maintain ecosystems health and environmental flows.

Figure 30. Calculated anti-inflammatory drug (diclofenac) concentrations in rivers at minimal river flow ($Q^{95\%}$) downstream of wastewater treatment plants



Source: Ort and others (2009).

References

CDP (2019). *CDP Global Water Report 2019. Cleaning up their act: Are companies responding to the risks and opportunities posed by water pollution?* London. Available at https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/005/165/original/CDP_Global_Water_Report_2019.pdf?1591106445.

Costa Rica, Ministry of Finance (2020). *Water Statistical Compendium.* San José.

Damania, Richard, and others (2019). *Quality Unknown: The Invisible Water Crisis*. Washington, DC: World Bank Group. Available at https://doi.org/10.1596/978-1-4648-1459-4.

Dickin, Sarah, and others (2020). Sustainable sanitation and gaps in global climate policy and financing. *npj Clean Water*, vol. 3, No. 24.

Eurostat (2020). Water statistics. Available at https://ec.europa.eu/eurostat/web/environment/water. Accessed on 1 July 2021.

Eurostat (2021). Water statistics. Available at https://ec.europa.eu/eurostat/web/environment/water. Accessed on 1 July 2021.

Food and Agriculture Organization of the United Nations (2015). AQUASTAT - FAO's Global Information System on Water and Agriculture. Available at http://www.fao.org/aquastat/en/overview/methodology/water-use. Accessed on 1 July 2021.

Freiburghaus, Matthias (2009). Wasserbedarf der Schweizer Wirtschaft [Water demand of the Swiss economy]. *GWA. Gas, Wasser, Abwasser,* vol. 12, No. 09, pp. 1001–1009.

Jones, Edward R., and others (2021). Country-level and gridded estimates of wastewater production, collection, treatment and reuse. *Earth System Science Data* vol. 13, No. 2, pp. 237–254.

Malik, Omar A., and others (2015). A global indicator of wastewater treatment to inform the Sustainable Development Goals (SDGs). *Environmental Science & Policy*, vol. 48, pp. 172–185.

Mekonnen, Mesfin M. and Hoekstra, Arjen Y. (2016). Four billion people facing severe water scarcity. *Science Advances,* vol. 2, No. 2, e1500323.

Mexico, National Water Commission (2018). *Statistics on Water in Mexico. 2018 Edition.* Coyoacán.

Mexico, National Water Commission (2019). *Situation of the Drinkable Water, Sewerage and Sanitation subsectors.* Coyoacán.

Organisation for Economic Co-operation and Development (2020). Water. Available from https://data.oecd.org/environment.htm#profile-Water. Accessed on 1 July 2021.

Organisation for Economic Co-operation and Development (2021). Water. Available from https://data.oecd.org/environment.htm#profile-Water. Accessed on 1 July 2021.

Organisation for Economic Co-operation and Development and Eurostat (2018). *Data Collection Manual for the OECD/Eurostat Joint Questionnaire on Inland Waters and Eurostat regional water questionnaire. Concepts, definitions, current practices, evaluations and recommendations. Version 4.* Luxembourg: Eurostat.

Ort, Christoph, and others (2009). Model-based evaluation of reduction strategies for micropollutants from wastewater treatment plants in complex river networks. *Environmental Science & Technology,* vol. 43, No. 9, pp. 3214–3220.

Qadir, Manzoor, and others (2020). Global and regional potential of wastewater as a water, nutrient and energy source. *Natural Resources Forum,* vol. 44, No. 1, pp. 40– 51.

Republic of Ireland, Environmental Protection Agency (2020a). *National Inspection Plan 2018–2021 – Domestic Waste Water Treatment Systems.* Wexford.

Republic of Ireland, Environmental Protection Agency (2020b). Raw data received by email.

Rodriguez, Diego J., and others (2020). *From Waste to Resource: Shifting Paradigms for Smarter Wastewater Interventions in Latin America and the Caribbean.* Washington, D.C.: World Bank Group.

Sato, Toshio, and others (2013). Global, regional, and country level need for data on wastewater generation, treatment, and use. *Agricultural Water Management,* vol. 130, pp. 1–13.

Swiss Water Association and Swiss Association of Municipal Infrastructure (2011). *Coûts et prestations de l'assainissement* [Costs and benefits of sanitation]. Glattburg and Bern.

Switzerland, Federal Office for the Environment (2020). Teneur en phosphore de quelques lacs [Phosphorus content of several lakes]. Available at https://www.bfs.admin.ch/bfs/fr/home/statistiques/espace-environnement/indicateurs-environnement.assetdetail.12767202.html. Accessed on 14 July 2021.

United Nations Department of Economic and Social Affairs, Statistics Division (2008). *International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4.* New York: United Nations. Available at https://unstats.un.org/unsd/publication/seriesm/seriesm_4rev4e.pdf.

United Nations Educational, Scientific and Cultural Organization (2020). *The United Nations World Water Development Report 2020: Water and Climate Change.* New York. Available at https://doi.org/10.18356/e2014dcb-en.

United Nations Statistics Division (2020a). UNSD Environmental Indicators — Inland Water Resources. Available at https://unstats.un.org/unsd/envstats/qindicators. Accessed on 1 July 2021.

United Nations Statistics Division (2020b). Environment Statistics — Country Files from the UNSD/UNEP Data Collection on Environment Statistics. Available at https://unstats.un.org/unsd/envstats/country_files. Accessed on 1 July 2021.

United Nations Statistics Division (2021a). UNSD Environmental Indicators — Inland Water Resources. Available at https://unstats.un.org/unsd/envstats/qindicators. Accessed on 1 July 2021.

United Nations Statistics Division (2021b). Environment Statistics — Country Files from the UNSD/UNEP Data Collection on Environment Statistics. Available at https://unstats.un.org/unsd/envstats/country_files. Accessed on 1 July 2021.

United Nations Statistics Division and United Nations Environment Programme (2020). UNSD/UNEP Questionnaire 2020 on Environment Statistics — Water. Available at https://unstats.un.org/unsd/envstats/questionnaire. Accessed on 1 July 2021.

UN Water (2017). *Integrated Monitoring Guide for Sustainable Development Goal 6 on Water and Sanitation — Targets and global indicators.*

World Business Council for Sustainable Development (2020). *Wastewater Zero: A Call to Action for Business to Raise Ambition for SDG 6.3.* Geneva.

World Economic Forum (2019). *The Global Risks Report 2019.* 14th edition. Geneva.

World Water Assessment Programme (2017). *The United Nations World Water Development Report 2017. Wastewater: The Untapped Resource.* Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO).

Annexes

Annex I. Data availability

Wastewater generation and treatment : number of countries reporting using UNSD/UNEP Questionnaire on Environment Statistics

Line	Category	Unit	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	No. of countries with any data (1990–2019)
1	Total wastewater generated	1000 m^3/d	10	13	21	18	19	10	14	18	18	19	21	20	21	22	22	24	26	29	24	23	11	10	35
2	by: Agriculture, forestry and fishing (ISIC 01–03)	1000 m^3/d	10	12	12	11	11	5	9	9	11	11	11	11	12	11	12	12	12	15	10	9	4	4	18
3	Mining and quarrying (ISIC 05–09)	1000 m^3/d	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	5	4	4	6
4	Manufacturing (ISIC 10–33)	1000 m^3/d	7	7	11	11	13	6	9	10	11	11	11	11	12	13	15	15	16	17	12	12	5	5	23
5	Electricity, gas, steam and air conditioning supply (ISIC 35)	1000 m^3/d	3	3	3	3	3	3	4	4	5	5	5	5	5	5	5	5	5	5	5	6	4	4	7
of which by:																									
6	Electric power generation, transmission and distribution (ISIC 351)	1000 m^3/d	6	8	10	10	10	5	7	7	8	8	8	8	9	9	9	10	10	10	6	6	4	4	12
7	Construction (ISIC 41–43)	1000 m^3/d	1	2	2	2	2	2	3	3	4	4	4	4	4	4	5	5	5	5	5	6	3	4	7
8	Other economic activities	1000 m^3/d	0	1	2	2	2	2	3	3	5	5	5	5	5	4	6	7	7	7	8	7	3	3	8

Line	Category	Unit	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	No. of countries with any data (1990–2019)
9	Households	1000 m³/d	6	9	13	13	12	3	9	10	12	13	14	14	16	17	17	17	19	21	14	12	3	2	30
10	Wastewater treated in urban wastewater treatment plants	1000 m³/d	20	25	35	28	29	13	20	24	26	26	28	29	31	34	35	35	36	39	31	27	13	12	56
of which:																									
11	Primary treatment	1000 m³/d	2	2	7	7	8	8	15	16	17	17	17	18	18	19	20	21	22	24	17	15	8	9	32
12	Secondary treatment	1000 m³/d	2	2	6	6	7	7	16	18	18	19	20	21	21	23	22	23	24	26	18	16	6	7	35
13	Tertiary treatment	1000 m³/d	2	2	6	6	6	6	12	15	16	16	15	15	15	16	15	16	16	17	11	11	6	7	23
14	Wastewater treated in other treatment plants	1000 m³/d	8	9	12	9	9	4	7	7	7	8	8	9	10	10	9	7	9	10	8	6	4	4	18
of which:																									
15	Primary treatment	1000 m³/d	1	1	3	3	3	3	6	6	6	6	6	7	8	8	7	6	7	7	4	4	2	2	8
16	Secondary treatment	1000 m³/d	1	1	3	3	3	4	7	7	7	7	7	8	9	9	8	6	7	7	5	4	2	2	10
17	Tertiary treatment	1000 m³/d	1	1	3	3	3	3	6	6	6	6	7	7	7	7	7	6	6	6	3	3	1	1	7
18	Wastewater treated in independent treatment facilities	1000 m³/d	7	10	15	12	12	4	6	6	6	6	7	8	8	8	9	8	8	8	6	5	3	3	13
19	Non-treated wastewater	1000 m³/d	14	15	24	18	18	11	13	14	16	18	19	19	21	23	22	23	24	25	19	18	11	10	33
20	Sewage sludge production (dry matter)	1000 t	6	8	10	14	10	10	17	18	16	16	15	15	17	17	19	20	21	22	16	16	6	6	33

Annex II. Country data (total and industrial wastewater)

Country	Year	Data source	Activity	Value	Unit
Albania	2015	Eurostat	Total wastewater generated	53.900	million m^3
Andorra	2015	UNSD	Total wastewater generated	20.009	million m^3
Armenia	2015	UNSD	Total wastewater generated	810.665	million m^3
Azerbaijan	2015	UNSD	Total wastewater generated	438.073	million m^3
Bahrain	2015	UNSD	Total wastewater generated	155.308	million m^3
Bangladesh	2015	UNSD	Total wastewater generated	456.250	million m^3
Belarus	2015	UNSD	Total wastewater generated	948.000	million m^3
Belgium	2015	Eurostat	Total wastewater generated	352.310	million m^3
Bermuda	2015	UNSD	Total wastewater generated	2.960	million m^3
Bosnia and Herzegovina	2015	Eurostat	Total wastewater generated	92.900	million m^3
Brazil	2015	UNSD	Total wastewater generated	40,684.813	million m^3
Bulgaria	2015	Eurostat	Total wastewater generated	426.074	million m^3
China, Hong Kong Special Administrative Region	2015	UNSD	Total wastewater generated	82.666	million m^3
Colombia	2015	UNSD	Total wastewater generated	1,057.212	million m^3
Costa Rica	2015	UNSD	Total wastewater generated	424.958	million m^3
Croatia	2015	Eurostat	Total wastewater generated	279.690	million m^3
Czechia	2015	Eurostat	Total wastewater generated	1,119.100	million m^3
Denmark	2015	Eurostat	Total wastewater generated	343.131	million m^3
Ecuador	2015	UNSD	Total wastewater generated	83.787	million m^3
Egypt	2015	UNSD	Total wastewater generated	11,899.000	million m^3
Estonia	2015	Eurostat	Total wastewater generated	136.990	million m^3
Finland	2015	Eurostat	Total wastewater generated	308.000	million m^3
Germany	2015	Eurostat	Total wastewater generated	6,231.255	million m^3
Hungary	2015	Eurostat	Total wastewater generated	417.299	million m^3
Iran (Islamic Republic of)	2015	UNSD	Total wastewater generated	3,109.435	million m^3
Iraq	2015	UNSD	Total wastewater generated	704.596	million m^3
Jordan	2015	UNSD	Total wastewater generated	282.420	million m^3
Kazakhstan	2015	UNSD	Total wastewater generated	5,918.840	million m^3
Korea	2015	OECD	Total wastewater generated	1,612.820	million m^3

Country	Year	Data source	Activity	Value	Unit
Kosovo (under United Nations Security Council resolution 1244/99)	2015	Eurostat	Total wastewater generated	50.533	million m^3
Latvia	2015	Eurostat	Total wastewater generated	188.452	million m^3
Lithuania	2015	Eurostat	Total wastewater generated	267.880	million m^3
Malaysia	2015	UNSD	Total wastewater generated	1,931.349	million m^3
Malta	2015	Eurostat	Total wastewater generated	15.410	million m^3
Mexico	2015	OECD	Total wastewater generated	13,455.758	million m^3
Monaco	2015	UNSD	Total wastewater generated	6.141	million m^3
Mongolia	2015	UNSD	Total wastewater generated	87.746	million m^3
Morocco	2015	UNSD	Total wastewater generated	750.002	million m^3
Panama	2015	UNSD	Total wastewater generated	323.392	million m^3
Peru	2015	UNSD	Total wastewater generated	833.303	million m^3
Poland	2015	Eurostat	Total wastewater generated	2,100.800	million m^3
Republic of Moldova	2015	UNSD	Total wastewater generated	672.220	million m^3
Romania	2015	Eurostat	Total wastewater generated	1,944.600	million m^3
Saudi Arabia	2015	UNSD	Total wastewater generated	2,444.770	million m^3
Senegal	2015	UNSD	Total wastewater generated	23.717	million m^3
Serbia	2015	Eurostat	Total wastewater generated	1,097.200	million m^3
Slovakia	2015	Eurostat	Total wastewater generated	547.779	million m^3
Slovenia	2015	Eurostat	Total wastewater generated	115.300	million m^3
Spain	2015	Eurostat	Total wastewater generated	3,456.702	million m^3
Sweden	2015	Eurostat	Total wastewater generated	1,299.000	million m^3
Thailand	2015	UNSD	Total wastewater generated	11,519.168	million m^3
Tunisia	2015	UNSD	Total wastewater generated	174.397	million m^3
Turkey	2015	Eurostat	Total wastewater generated	4,534.024	million m^3
Ukraine	2015	UNSD	Total wastewater generated	5,343.000	million m^3
United Republic of Tanzania	2015	UNSD	Total wastewater generated	71.341	million m^3
Zimbabwe	2015	UNSD	Total wastewater generated	164.741	million m^3
Wastewater generated by private households					
Albania	2015	Eurostat	Wastewater generated by private households	43.200	million m^3
Bahrain	2015	UNSD	Wastewater generated by private households	145.781	million m^3

Country	Year	Data source	Activity	Value	Unit
Bangladesh	2015	UNSD	Wastewater generated by private households	456.250	million m^3
Bosnia and Herzegovina	2015	Eurostat	Wastewater generated by private households	70.000	million m^3
Brazil	2015	UNSD	Wastewater generated by private households	12,537.968	million m^3
Bulgaria	2015	Eurostat	Wastewater generated by private households	234.036	million m^3
Colombia	2015	UNSD	Wastewater generated by private households	869.241	million m^3
Costa Rica	2015	UNSD	Wastewater generated by private households	162.248	million m^3
Croatia	2015	Eurostat	Wastewater generated by private households	175.570	million m^3
Czechia	2015	Eurostat	Wastewater generated by private households	326.500	million m^3
Denmark	2015	Eurostat	Wastewater generated by private households	208.424	million m^3
Finland	2015	Eurostat	Wastewater generated by private households	296.000	million m^3
Germany	2015	Eurostat	Wastewater generated by private households	5,114.693	million m^3
Hungary	2015	Eurostat	Wastewater generated by private households	335.271	million m^3
Iran (Islamic Republic of)	2015	UNSD	Wastewater generated by private households	3,109.435	million m^3
Iraq	2015	UNSD	Wastewater generated by private households	627.106	million m^3
Jordan	2015	UNSD	Wastewater generated by private households	252.100	million m^3
Kazakhstan	2015	UNSD	Wastewater generated by private households	467.492	million m^3
Kosovo (under United Nations Security Council resolution 1244/99)	2015	Eurostat	Wastewater generated by private households	34.626	million m^3
Latvia	2015	Eurostat	Wastewater generated by private households	106.913	million m^3
Lithuania	2015	Eurostat	Wastewater generated by private households	148.655	million m^3
Malta	2015	Eurostat	Wastewater generated by private households	15.410	million m^3
Mongolia	2015	UNSD	Wastewater generated by private households	32.814	million m^3

Country	Year	Data source	Activity	Value	Unit
Morocco	2015	UNSD	Wastewater generated by private households	552.413	million m^3
Panama	2015	UNSD	Wastewater generated by private households	238.274	million m^3
Peru	2015	UNSD	Wastewater generated by private households	759.621	million m^3
Poland	2015	Eurostat	Wastewater generated by private households	925.100	million m^3
Romania	2015	Eurostat	Wastewater generated by private households	504.400	million m^3
Senegal	2015	UNSD	Wastewater generated by private households	23.717	million m^3
Serbia	2015	Eurostat	Wastewater generated by private households	304.900	million m^3
Slovakia	2015	Eurostat	Wastewater generated by private households	360.500	million m^3
Slovenia	2015	Eurostat	Wastewater generated by private households	63.600	million m^3
Spain	2015	Eurostat	Wastewater generated by private households	2,410.000	million m^3
Thailand	2015	UNSD	Wastewater generated by private households	3,598.668	million m^3
Tunisia	2015	UNSD	Wastewater generated by private households	174.397	million m^3
Zimbabwe	2015	UNSD	Wastewater generated by private households	118.685	million m^3
Wastewater generated by services					
Albania	2015	Eurostat	Wastewater generated by services	10.700	million m^3
Belarus	2015	UNSD	Wastewater generated by services	568.050	million m^3
Bosnia and Herzegovina	2015	Eurostat	Wastewater generated by services	13.800	million m^3
Bulgaria	2015	Eurostat	Wastewater generated by services	44.059	million m^3
Croatia	2015	Eurostat	Wastewater generated by services	35.000	million m^3
Czechia	2015	Eurostat	Wastewater generated by services	335.300	million m^3
Denmark	2015	Eurostat	Wastewater generated by services	45.023	million m^3
Hungary	2015	Eurostat	Wastewater generated by services	82.028	million m^3

Country	Year	Data source	Activity	Value	Unit
Kosovo (under United Nations Security Council resolution 1244/99)	2015	Eurostat	Wastewater generated by services	3.925	million m^3
Latvia	2015	Eurostat	Wastewater generated by services	6.170	million m^3
Lithuania	2015	Eurostat	Wastewater generated by services	28.793	million m^3
Mongolia	2015	UNSD	Wastewater generated by services	54.933	million m^3
Panama	2015	UNSD	Wastewater generated by services	79.954	million m^3
Peru	2015	UNSD	Wastewater generated by services	59.495	million m^3
Poland	2015	Eurostat	Wastewater generated by services	105.300	million m^3
Republic of Moldova	2015	UNSD	Wastewater generated by services	115.377	million m^3
Romania	2015	Eurostat	Wastewater generated by services	433.100	million m^3
Serbia	2015	Eurostat	Wastewater generated by services	96.400	million m^3
Slovakia	2015	Eurostat	Wastewater generated by services	8.400	million m^3
Slovenia	2015	Eurostat	Wastewater generated by services	7.500	million m^3
Spain	2015	Eurostat	Wastewater generated by services	408.000	million m^3
Sweden	2015	Eurostat	Wastewater generated by services	140.000	million m^3
Wastewater generated by industries					
Belgium	2015	Eurostat	Wastewater generated by industries	352.310	million m^3
Bahrain	2015	UNSD	Wastewater generated by industries	9.527	million m^3
Belarus	2015	UNSD	Wastewater generated by industries	166.210	million m^3
Bosnia and Herzegovina	2015	Eurostat	Wastewater generated by industries	8.600	million m^3
Brazil	2015	UNSD	Wastewater generated by industries	15,668.791	million m^3
Bulgaria	2015	Eurostat	Wastewater generated by industries	111.355	million m^3
China, Hong Kong Special Administrative Region	2015	UNSD	Wastewater generated by industries	82.630	million m^3

Country	Year	Data source	Activity	Value	Unit
Colombia	2015	UNSD	Wastewater generated by industries	103.732	million m^3
Costa Rica	2015	UNSD	Wastewater generated by industries	110.960	million m^3
Croatia	2015	Eurostat	Wastewater generated by industries	68.120	million m^3
Czechia	2015	Eurostat	Wastewater generated by industries	453.900	million m^3
Denmark	2015	Eurostat	Wastewater generated by industries	75.268	million m^3
Egypt	2015	UNSD	Wastewater generated by industries	912.500	million m^3
Estonia	2015	Eurostat	Wastewater generated by industries	136.990	million m^3
Finland	2015	Eurostat	Wastewater generated by industries	12.000	million m^3
Germany	2015	Eurostat	Wastewater generated by industries	1,116.562	million m^3
Jordan	2015	UNSD	Wastewater generated by industries	30.320	million m^3
Kazakhstan	2015	UNSD	Wastewater generated by industries	4,234.986	million m^3
Korea	2015	OECD	Wastewater generated by industries	1,612.820	million m^3
Kosovo (under United Nations Security Council resolution 1244/99)	2015	Eurostat	Wastewater generated by industries	11.982	million m^3
Latvia	2015	Eurostat	Wastewater generated by industries	30.346	million m^3
Lithuania	2015	Eurostat	Wastewater generated by industries	33.736	million m^3
Mexico	2015	OECD	Wastewater generated by industries	6,670.000	million m^3
Panama	2015	UNSD	Wastewater generated by industries	5.164	million m^3
Poland	2015	Eurostat	Wastewater generated by industries	1,070.400	million m^3
Republic of Moldova	2015	UNSD	Wastewater generated by industries	542.317	million m^3
Romania	2015	Eurostat	Wastewater generated by industries	1,005.300	million m^3
Serbia	2015	Eurostat	Wastewater generated by industries	90.000	million m^3

Country	Year	Data source	Activity	Value	Unit
Slovakia	2015	Eurostat	Wastewater generated by industries	178.779	million m^3
Slovenia	2015	Eurostat	Wastewater generated by industries	44.100	million m^3
Spain	2015	Eurostat	Wastewater generated by industries	600.202	million m^3
Sweden	2015	Eurostat	Wastewater generated by industries	1,159.000	million m^3
Thailand	2015	UNSD	Wastewater generated by industries	6497.000	million m^3
Ukraine	2015	UNSD	Wastewater generated by industries	3,324.877	million m^3
Zimbabwe	2015	UNSD	Wastewater generated by industries	46.056	million m^3
Wastewater generated by agriculture, forestry and fishing					
Bahrain	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	0.000	million m^3
Belarus	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	213.740	million m^3
Bosnia and Herzegovina	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	0.500	million m^3
Brazil	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	9,938.452	million m^3
Bulgaria	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	36.624	million m^3
China, Hong Kong Special Administrative Region	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	0.037	million m^3
Colombia	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	88.841	million m^3
Croatia	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	1.000	million m^3
Czechia	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	3.400	million m^3
Denmark	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	14.416	million m^3
Egypt	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	8,869.500	million m^3

Country	Year	Data source	Activity	Value	Unit
Kazakhstan	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	297.001	million m^3
Latvia	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	45.023	million m^3
Lithuania	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	56.696	million m^3
Monaco	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	0.000	million m^3
Peru	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	4.380	million m^3
Republic of Moldova	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	14.527	million m^3
Romania	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	1.800	million m^3
Serbia	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	605.900	million m^3
Slovakia	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	0.100	million m^3
Slovenia	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	0.100	million m^3
Spain	2015	Eurostat	Wastewater generated by agriculture, forestry and fishing	38.500	million m^3
Thailand	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	1,423.500	million m^3
Ukraine	2015	UNSD	Wastewater generated by agriculture, forestry and fishing	361.400	million m^3
Wastewater generated by mining and quarrying					
Belarus	2015	UNSD	Wastewater generated by mining and quarrying	31.180	million m^3
Belgium	2015	Eurostat	Wastewater generated by mining and quarrying	55.810	million m^3
Brazil	2015	UNSD	Wastewater generated by mining and quarrying	756.526	million m^3
Bulgaria	2015	Eurostat	Wastewater generated by mining and quarrying	14.107	million m^3

Country	Year	Data source	Activity	Value	Unit
Croatia	2015	Eurostat	Wastewater generated by mining and quarrying	2.310	million m^3
Denmark	2015	Eurostat	Wastewater generated by mining and quarrying	7.994	million m^3
Estonia	2015	Eurostat	Wastewater generated by mining and quarrying	136.990	million m^3
Finland	2015	Eurostat	Wastewater generated by mining and quarrying	12.000	million m^3
Korea	2015	OECD	Wastewater generated by mining and quarrying	25.740	million m^3
Latvia	2015	Eurostat	Wastewater generated by mining and quarrying	9.172	million m^3
Lithuania	2015	Eurostat	Wastewater generated by mining and quarrying	0.530	million m^3
Poland	2015	Eurostat	Wastewater generated by mining and quarrying	310.700	million m^3
Republic of Moldova	2015	UNSD	Wastewater generated by mining and quarrying	2.336	million m^3
Romania	2015	Eurostat	Wastewater generated by mining and quarrying	51.600	million m^3
Serbia	2015	Eurostat	Wastewater generated by mining and quarrying	3.900	million m^3
Slovakia	2015	Eurostat	Wastewater generated by mining and quarrying	22.400	million m^3
Slovenia	2015	Eurostat	Wastewater generated by mining and quarrying	1.100	million m^3
Spain	2015	Eurostat	Wastewater generated by mining and quarrying	28.400	million m^3
Sweden	2015	Eurostat	Wastewater generated by mining and quarrying	51.000	million m^3
Ukraine	2015	UNSD	Wastewater generated by mining and quarrying	969.000	million m^3
Wastewater generated by manufacturing industries					
Bahrain	2015	UNSD	Wastewater generated by manufacturing industries	9.527	million m^3
Belarus	2015	UNSD	Wastewater generated by manufacturing industries	97.710	million m^3
Belgium	2015	Eurostat	Wastewater generated by manufacturing industries	281.730	million m^3
Bosnia and Herzegovina	2015	Eurostat	Wastewater generated by manufacturing industries	8.600	million m^3
Brazil	2015	UNSD	Wastewater generated by manufacturing industries	7,987.315	million m^3

Country	Year	Data source	Activity	Value	Unit
Bulgaria	2015	Eurostat	Wastewater generated by manufacturing industries	80.209	million m^3
China, Hong Kong Special Administrative Region	2015	UNSD	Wastewater generated by manufacturing industries	82.630	million m^3
Colombia	2015	UNSD	Wastewater generated by manufacturing industries	103.732	million m^3
Costa Rica	2015	UNSD	Wastewater generated by manufacturing industries	110.960	million m^3
Croatia	2015	Eurostat	Wastewater generated by manufacturing industries	64.470	million m^3
Denmark	2015	Eurostat	Wastewater generated by manufacturing industries	51.397	million m^3
Egypt	2015	UNSD	Wastewater generated by manufacturing industries	912.500	million m^3
Germany	2015	Eurostat	Wastewater generated by manufacturing industries	1,050.468	million m^3
Jordan	2015	UNSD	Wastewater generated by manufacturing industries	30.320	million m^3
Kazakhstan	2015	UNSD	Wastewater generated by manufacturing industries	4,234.986	million m^3
Korea	2015	OECD	Wastewater generated by manufacturing industries	636.360	million m^3
Kosovo (under United Nations Security Council resolution 1244/99)	2015	Eurostat	Wastewater generated by manufacturing industries	4.392	million m^3
Latvia	2015	Eurostat	Wastewater generated by manufacturing industries	17.119	million m^3
Lithuania	2015	Eurostat	Wastewater generated by manufacturing industries	30.174	million m^3
Panama	2015	UNSD	Wastewater generated by manufacturing industries	5.164	million m^3
Poland	2015	Eurostat	Wastewater generated by manufacturing industries	408.900	million m^3
Republic of Moldova	2015	UNSD	Wastewater generated by manufacturing industries	4.052	million m^3
Serbia	2015	Eurostat	Wastewater generated by manufacturing industries	54.600	million m^3
Slovakia	2015	Eurostat	Wastewater generated by manufacturing industries	148.100	million m^3
Slovenia	2015	Eurostat	Wastewater generated by manufacturing industries	40.600	million m^3
Spain	2015	Eurostat	Wastewater generated by manufacturing industries	571.802	million m^3

Country	Year	Data source	Activity	Value	Unit
Sweden	2015	Eurostat	Wastewater generated by manufacturing industries	1047.000	million m^3
Thailand	2015	UNSD	Wastewater generated by manufacturing industries	6,497.000	million m^3
Ukraine	2015	UNSD	Wastewater generated by manufacturing industries	151.600	million m^3
Zimbabwe	2015	UNSD	Wastewater generated by manufacturing industries	46.056	million m^3
Wastewater generated by production and distribution of electricity (excluding cooling water)					
Belarus	2015	UNSD	Wastewater generated by production and distribution of electricity (excluding cooling water)	36.620	million m^3
Belgium	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	14.770	million m^3
Brazil	2015	UNSD	Wastewater generated by production and distribution of electricity (excluding cooling water)	6,924.950	million m^3
Bulgaria	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	7.791	million m^3
Croatia	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	1.340	million m^3
Denmark	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	2.420	million m^3
Germany	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	66.094	million m^3
Korea	2015	OECD	Wastewater generated by production and distribution of electricity (excluding cooling water)	27.830	million m^3
Kosovo (under United Nations Security Council resolution 1244/99)	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	7.590	million m^3
Latvia	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	3.000	million m^3

Country	Year	Data source	Activity	Value	Unit
Lithuania	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	1.702	million m^3
Poland	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	54.300	million m^3
Republic of Moldova	2015	UNSD	Wastewater generated by production and distribution of electricity (excluding cooling water)	535.930	million m^3
Romania	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	551.600	million m^3
Serbia	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	29.800	million m^3
Slovakia	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	4.600	million m^3
Slovenia	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	0.000	million m^3
Sweden	2015	Eurostat	Wastewater generated by production and distribution of electricity (excluding cooling water)	10.000	million m^3
Ukraine	2015	UNSD	Wastewater generated by production and distribution of electricity (excluding cooling water)	2,203.000	million m^3
Wastewater generated by construction					
Belarus	2015	UNSD	Wastewater generated by construction	0.700	million m^3
Bulgaria	2015	Eurostat	Wastewater generated by construction	3.956	million m^3
Denmark	2015	Eurostat	Wastewater generated by construction	0.771	million m^3
Korea	2015	OECD	Wastewater generated by construction	38.750	million m^3
Latvia	2015	Eurostat	Wastewater generated by construction	0.759	million m^3
Lithuania	2015	Eurostat	Wastewater generated by construction	0.549	million m^3

Country	Year	Data source	Activity	Value	Unit
Poland	2015	Eurostat	Wastewater generated by construction	0.100	million m^3
Republic of Moldova	2015	UNSD	Wastewater generated by construction	0.000	million m^3
Romania	2015	Eurostat	Wastewater generated by construction	7.400	million m^3
Serbia	2015	Eurostat	Wastewater generated by construction	0.800	million m^3
Slovakia	2015	Eurostat	Wastewater generated by construction	0.000	million m^3
Slovenia	2015	Eurostat	Wastewater generated by construction	0.100	million m^3
Spain	2015	Eurostat	Wastewater generated by construction	0.000	million m^3
Ukraine	2015	UNSD	Wastewater generated by construction	1.277	million m^3
Zimbabwe	2015	UNSD	Wastewater generated by construction	0.000	million m^3
Total wastewater treated					
Albania	2015	Eurostat	Total wastewater treated	5.900	million m^3
Algeria	2015	UNSD	Total wastewater treated	197.465	million m^3
Andorra	2015	UNSD	Total wastewater treated	20.009	million m^3
Armenia	2015	UNSD	Total wastewater treated	60.553	million m^3
Azerbaijan	2015	UNSD	Total wastewater treated	217.175	million m^3
Bahrain	2015	UNSD	Total wastewater treated	153.336	million m^3
Bangladesh	2015	UNSD	Total wastewater treated	29.200	million m^3
Belarus	2015	UNSD	Total wastewater treated	624.000	million m^3
Belgium	2015	Eurostat	Total wastewater treated	1,405.250	million m^3
Bolivia	2015	UNSD	Total wastewater treated	117.457	million m^3
Bosnia and Herzegovina	2015	Eurostat	Total wastewater treated	50.500	million m^3
Brazil	2015	UNSD	Total wastewater treated	3,805.023	million m^3
Bulgaria	2015	Eurostat	Total wastewater treated	627.255	million m^3
Burundi	2015	UNSD	Total wastewater treated	1.570	million m^3
Cayman Islands	2015	UNSD	Total wastewater treated	1.375	million m^3
China, Hong Kong Special Administrative Region	2015	UNSD	Total wastewater treated	1,043.334	million m^3
China, Macao Special Administrative Region	2015	UNSD	Total wastewater treated	70.445	million m^3

Country	Year	Data source	Activity	Value	Unit
Colombia	2015	UNSD	Total wastewater treated	84.239	million m^3
Costa Rica	2015	UNSD	Total wastewater treated	354.159	million m^3
Croatia	2015	Eurostat	Total wastewater treated	177.940	million m^3
Czechia	2015	Eurostat	Total wastewater treated	958.900	million m^3
Ecuador	2015	UNSD	Total wastewater treated	83.787	million m^3
Egypt	2015	UNSD	Total wastewater treated	3,821.550	million m^3
Hungary	2015	Eurostat	Total wastewater treated	482.452	million m^3
Iran (Islamic Republic of)	2015	UNSD	Total wastewater treated	1,093.175	million m^3
Iraq	2015	UNSD	Total wastewater treated	505.890	million m^3
Jordan	2015	UNSD	Total wastewater treated	252.100	million m^3
Kazakhstan	2015	UNSD	Total wastewater treated	666.198	million m^3
Kosovo (under United Nations Security Council resolution 1244/99)	2015	Eurostat	Total wastewater treated	0.043	million m^3
Kuwait	2015	UNSD	Total wastewater treated	309.155	million m^3
Latvia	2015	Eurostat	Total wastewater treated	122.181	million m^3
Liechtenstein	2015	UNSD	Total wastewater treated	10.100	million m^3
Lithuania	2015	Eurostat	Total wastewater treated	158.980	million m^3
Mauritius	2015	UNSD	Total wastewater treated	47.523	million m^3
Mexico	2015	OECD	Total wastewater treated	6,032.000	million m^3
Monaco	2015	UNSD	Total wastewater treated	6.141	million m^3
Mongolia	2015	UNSD	Total wastewater treated	87.746	million m^3
Morocco	2015	UNSD	Total wastewater treated	301.052	million m^3
Netherlands	2015	Eurostat	Total wastewater treated	1,806.497	million m^3
Panama	2015	UNSD	Total wastewater treated	172.681	million m^3
Peru	2015	UNSD	Total wastewater treated	634.475	million m^3
Poland	2015	Eurostat	Total wastewater treated	760.900	million m^3
Qatar	2015	UNSD	Total wastewater treated	197.490	million m^3
Republic of Moldova	2015	UNSD	Total wastewater treated	111.727	million m^3
Romania	2015	Eurostat	Total wastewater treated	1,214.500	million m^3
Saudi Arabia	2015	UNSD	Total wastewater treated	1,468.030	million m^3
Senegal	2015	UNSD	Total wastewater treated	15.154	million m^3
Serbia	2015	UNSD	Total wastewater treated	66.430	million m^3
Slovakia	2015	Eurostat	Total wastewater treated	550.700	million m^3

Country	Year	Data source	Activity	Value	Unit
Spain	2015	Eurostat	Total wastewater treated	4,834.000	million m^3
Thailand	2015	UNSD	Total wastewater treated	983.994	million m^3
Trinidad and Tobago	2015	UNSD	Total wastewater treated	85.534	million m^3
Tunisia	2015	UNSD	Total wastewater treated	245.426	million m^3
Turkey	2015	Eurostat	Total wastewater treated	3,681.735	million m^3
United Arab Emirates	2015	UNSD	Total wastewater treated	711.056	million m^3
United Republic of Tanzania	2015	UNSD	Total wastewater treated	16.198	million m^3
Zimbabwe	2015	UNSD	Total wastewater treated	100.876	million m^3
Industrial wastewater treated					
Bahrain	2015	UNSD	Industrial wastewater treated	7.556	million m^3
Belgium	2015	Eurostat	Industrial wastewater treated	359.610	million m^3
Bosnia and Herzegovina	2015	Eurostat	Industrial wastewater treated	45.800	million m^3
Bulgaria	2015	Eurostat	Industrial wastewater treated	59.933	million m^3
China, Hong Kong Special Administrative Region	2015	UNSD	Industrial wastewater treated	38.986	million m^3
Croatia	2015	Eurostat	Industrial wastewater treated	16.850	million m^3
Czechia	2015	Eurostat	Industrial wastewater treated	162.500	million m^3
Kazakhstan	2015	UNSD	Industrial wastewater treated	13.505	million m^3
Latvia	2015	Eurostat	Industrial wastewater treated	15.285	million m^3
Lithuania	2015	Eurostat	Industrial wastewater treated	7.957	million m^3
Mauritius	2015	UNSD	Industrial wastewater treated	3.285	million m^3
Mexico	2015	OECD	Industrial wastewater treated	2,220.000	million m^3
Poland	2015	Eurostat	Industrial wastewater treated	760.900	million m^3
Romania	2015	Eurostat	Industrial wastewater treated	309.600	million m^3
Slovakia	2015	Eurostat	Industrial wastewater treated	188.600	million m^3

Country	Year	Data source	Activity	Value
Albania	2015	Eurostat	Proportion of total wastewater treated (%)	11
Andorra	2015	UNSD	Proportion of total wastewater treated (%)	100
Armenia	2015	UNSD	Proportion of total wastewater treated (%)	7
Azerbaijan	2015	UNSD	Proportion of total wastewater treated (%)	50
Bahrain	2015	UNSD	Proportion of total wastewater treated (%)	99
Bangladesh	2015	UNSD	Proportion of total wastewater treated (%)	6
Belarus	2015	UNSD	Proportion of total wastewater treated (%)	66
Belgium	2015	Eurostat	Proportion of total wastewater treated (%)	100
Bosnia and Herzegovina	2015	Eurostat	Proportion of total wastewater treated (%)	54
Brazil	2015	UNSD	Proportion of total wastewater treated (%)	9
Bulgaria	2015	Eurostat	Proportion of total wastewater treated (%)	100
Colombia	2015	UNSD	Proportion of total wastewater treated (%)	8
Costa Rica	2015	UNSD	Proportion of total wastewater treated (%)	83
Croatia	2015	Eurostat	Proportion of total wastewater treated (%)	64
Czechia	2015	Eurostat	Proportion of total wastewater treated (%)	86
Ecuador	2015	UNSD	Proportion of total wastewater treated (%)	100
Egypt	2015	UNSD	Proportion of total wastewater treated (%)	32
Hungary	2015	Eurostat	Proportion of total wastewater treated (%)	100
Iran (Islamic Republic of)	2015	UNSD	Proportion of total wastewater treated (%)	35
Iraq	2015	UNSD	Proportion of total wastewater treated (%)	72
Jordan	2015	UNSD	Proportion of total wastewater treated (%)	89
Kazakhstan	2015	UNSD	Proportion of total wastewater treated (%)	11

Country	Year	Data source	Activity	Value
Kosovo (under United Nations Security Council resolution 1244/99)	2015	Eurostat	Proportion of total wastewater treated (%)	0
Latvia	2015	Eurostat	Proportion of total wastewater treated (%)	65
Lithuania	2015	Eurostat	Proportion of total wastewater treated (%)	59
Mexico	2015	OECD	Proportion of total wastewater treated (%)	45
Monaco	2015	UNSD	Proportion of total wastewater treated (%)	100
Mongolia	2015	UNSD	Proportion of total wastewater treated (%)	100
Morocco	2015	UNSD	Proportion of total wastewater treated (%)	40
Panama	2015	UNSD	Proportion of total wastewater treated (%)	53
Peru	2015	UNSD	Proportion of total wastewater treated (%)	76
Poland	2015	Eurostat	Proportion of total wastewater treated (%)	36
Republic of Moldova	2015	UNSD	Proportion of total wastewater treated (%)	17
Romania	2015	Eurostat	Proportion of total wastewater treated (%)	62
Saudi Arabia	2015	UNSD	Proportion of total wastewater treated (%)	60
Senegal	2015	UNSD	Proportion of total wastewater treated (%)	64
Slovakia	2015	Eurostat	Proportion of total wastewater treated (%)	100
Spain	2015	Eurostat	Proportion of total wastewater treated (%)	100
Thailand	2015	UNSD	Proportion of total wastewater treated (%)	9
Turkey	2015	Eurostat	Proportion of total wastewater treated (%)	81
United Republic of Tanzania	2015	UNSD	Proportion of total wastewater treated (%)	23
Zimbabwe	2015	UNSD	Proportion of total wastewater treated (%)	61

Country	Year	Data source	Activity	Value
Proportion of industrial wastewater treated (%)				
Bahrain	2015	UNSD	Proportion of industrial wastewater treated (%)	79
Belgium	2015	Eurostat	Proportion of industrial wastewater treated (%)	100
Bosnia and Herzegovina	2015	Eurostat	Proportion of industrial wastewater treated (%)	100
Bulgaria	2015	Eurostat	Proportion of industrial wastewater treated (%)	54
China, Hong Kong Special Administrative Region	2015	UNSD	Proportion of industrial wastewater treated (%)	47
Croatia	2015	Eurostat	Proportion of industrial wastewater treated (%)	25
Czechia	2015	Eurostat	Proportion of industrial wastewater treated (%)	36
Kazakhstan	2015	UNSD	Proportion of industrial wastewater treated (%)	2
Latvia	2015	Eurostat	Proportion of industrial wastewater treated (%)	50
Lithuania	2015	Eurostat	Proportion of industrial wastewater treated (%)	24
Mexico	2015	OECD	Proportion of industrial wastewater treated (%)	33
Poland	2015	Eurostat	Proportion of industrial wastewater treated (%)	71
Romania	2015	Eurostat	Proportion of industrial wastewater treated (%)	31
Slovakia	2015	Eurostat	Proportion of industrial wastewater treated (%)	100

Annex III. Country data (household wastewater)

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Afghanistan	425.573	4.7%	13.2%	82.1%	-	-	-	-	-	-	-	**-**
Albania	72.863	79.5%	4.2%	16.3%	22.101	35.5%	50.0%	30.3%	9.730	14.9%	35.5%	**13.4%**
Algeria	1,320.124	97.7%	1.1%	1.2%	1,005.499	77.4%	50.0%	76.2%	1,005.499	77.4%	50.0%	**76.2%**
American Samoa	1.910	49.3%	39.5%	11.2%	1.318	100.0%	50.0%	69.0%	1.318	100.0%	50.0%	**69.0%**
Andorra	2.707	100.0%	0.0%	0.0%	2.707	100.0%	NA	100.0%	2.707	100.0%	NA	**100.0%**
Angola	566.751	26.4%	64.0%	9.7%	-	-	-	-	-	-	-	**-**
Anguilla	0.475	1.3%	97.8%	0.9%	-	-	-	-	-	-	-	**-**
Antigua and Barbuda	2.710	1.4%	94.5%	4.1%	-	-	-	-	-	-	-	**-**
Argentina	1,550.907	58.8%	25.0%	16.2%	965.243	84.6%	50.0%	62.2%	565.831	45.7%	38.5%	**36.5%**
Armenia	103.542	71.7%	2.3%	26.1%	75.387	100.0%	50.0%	72.8%	41.503	54.7%	38.7%	**40.1%**
Aruba	3.611	5.1%	93.9%	1.1%	-	-	-	-	-	-	-	**-**
Australia	874.835	90.4%	9.6%	0.0%	832.792	100.0%	50.0%	95.2%	666.377	79.5%	44.9%	**76.2%**
Austria	713.414	92.6%	6.4%	1.1%	703.396	100.0%	94.8%	98.6%	703.396	100.0%	94.8%	**98.6%**
Azerbaijan	234.972	62.7%	5.4%	32.0%	146.944	95.5%	50.0%	62.5%	134.866	87.5%	47.9%	**57.4%**
Bahamas	13.542	21.8%	77.9%	0.3%	-	-	-	-	-	-	-	**-**
Bahrain	150.855	91.3%	8.7%	0.0%	144.261	100.0%	50.0%	95.6%	144.261	100.0%	50.0%	**95.6%**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Bangladesh	4,898.125	11.0%	23.7%	65.3%	1,070.215	100.0%	45.8%	21.8%	784.243	50.0%	44.4%	**16.0%**
Barbados	9.935	3.4%	4.3%	92.3%	-	-	-	-	-	-	-	**-**
Belarus	262.589	77.2%	12.0%	10.8%	218.035	100.0%	48.6%	83.0%	148.287	67.7%	35.1%	**56.5%**
Belgium	417.590	89.1%	10.7%	0.2%	383.292	97.0%	50.0%	91.8%	383.292	97.0%	50.0%	**91.8%**
Belize	13.581	8.9%	65.6%	25.5%	-	-	-	-	-	-	-	**-**
Benin	158.119	2.7%	11.9%	85.4%	-	-	-	-	-	-	-	**-**
Bermuda	2.179	5.0%	0.0%	95.0%	0.109	100.0%	NA	5.0%	0.033	30.0%	NA	**1.5%**
Bhutan	24.401	19.4%	68.0%	12.6%	12.742	100.0%	48.3%	52.2%	10.002	50.0%	46.1%	**41.0%**
Bolivia (Plurinational State of)	361.242	56.9%	15.1%	28.0%	232.774	100.0%	50.0%	64.4%	210.575	89.9%	47.5%	**58.3%**
Bonaire, Sint Eustatius and Saba	0.799	0.4%	0.0%	99.6%	-	-	-	-	-	-	-	**-**
Bosnia and Herzegovina	82.000	55.5%	40.5%	4.0%	38.744	48.7%	50.0%	47.2%	38.373	48.1%	49.7%	**46.8%**
Botswana	70.063	1.7%	5.8%	92.5%	-	-	-	-	-	-	-	**-**
Brazil	8,442.762	69.2%	13.1%	17.7%	4,902.963	74.5%	50.0%	58.1%	2,788.429	40.4%	38.6%	**33.0%**
British Virgin Islands	1.042	22.6%	74.3%	3.1%	-	-	-	-	-	-	-	**-**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Brunei Darussalam	47.215	95.4%	0.0%	4.6%	-	-	-	-	-	-	-	**-**
Bulgaria	228.340	86.3%	13.7%	0.0%	180.949	83.9%	50.0%	79.2%	180.828	83.8%	50.0%	**79.2%**
Burkina Faso	243.552	1.6%	5.9%	92.5%	-	-	-	-	-	-	-	**-**
Burundi	106.322	1.0%	16.0%	83.0%	-	-	-	-	-	-	-	**-**
Cabo Verde	17.566	31.0%	62.0%	6.9%	-	-	-	-	-	-	-	**-**
Cambodia	333.842	29.0%	64.2%	6.8%	-	-	-	-	-	-	-	**-**
Cameroon	423.639	2.4%	28.5%	69.1%	-	-	-	-	-	-	-	**-**
Canada	1,311.894	82.1%	11.4%	6.5%	1,172.875	95.6%	95.6%	89.4%	1,010.976	81.5%	88.6%	**77.1%**
Cayman Islands	5.539	20.3%	76.2%	3.5%	-	-	-	-	-	-	-	**-**
Central African Republic	36.926	0.6%	0.6%	98.8%	0.334	100.0%	50.0%	0.9%	0.211	50.0%	44.6%	**0.6%**
Chad	137.593	2.2%	3.3%	94.5%	5.222	100.0%	47.7%	3.8%	3.113	50.0%	34.8%	**2.3%**
Channel Islands	5.685	87.3%	12.4%	0.3%	5.317	100.0%	50.0%	93.5%	5.192	97.5%	49.8%	**91.3%**
Chile	768.666	89.1%	9.5%	1.5%	720.545	99.9%	50.0%	93.7%	695.894	96.4%	49.1%	**90.5%**
China	71,480.701	70.6%	11.4%	18.1%	51,721.371	94.5%	50.0%	72.4%	46,305.098	84.2%	47.3%	**64.8%**
China, Hong Kong Special Administrative Region	295.531	93.0%	0.0%	7.0%	274.869	100.0%	50.0%	93.0%	253.154	92.1%	48.0%	**85.7%**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
China, Macao Special Administrative Region	72.051	100.0%	0.0%	0.0%	72.051	100.0%	NA	100.0%	50.075	69.5%	NA	**69.5%**
Colombia	1,726.417	80.6%	16.6%	2.8%	666.246	37.6%	50.0%	38.6%	367.085	18.7%	37.4%	**21.3%**
Comoros	21.696	7.4%	7.7%	84.9%	-	-	-	-	-	-	-	**-**
Congo	117.724	2.1%	24.6%	73.3%	-	-	-	-	-	-	-	**-**
Cook Islands	0.551	36.9%	36.9%	26.2%	-	-	-	-	-	-	-	**-**
Costa Rica	170.096	21.0%	77.3%	1.7%	68.440	15.9%	47.8%	40.2%	39.588	5.4%	28.7%	**23.3%**
Côte d'Ivoire	499.084	12.4%	32.0%	55.6%	-	-	-	-	-	-	-	**-**
Croatia	128.353	58.1%	35.7%	6.2%	81.115	78.1%	50.0%	63.2%	77.423	74.0%	48.7%	**60.3%**
Cuba	375.138	64.6%	16.5%	18.9%	95.801	26.8%	50.0%	25.5%	90.717	24.9%	49.1%	**24.2%**
Curaçao	5.711	17.8%	81.8%	0.4%	-	-	-	-	-	-	-	**-**
Cyprus	74.987	54.9%	44.7%	0.4%	50.382	100.0%	27.5%	67.2%	50.382	100.0%	27.5%	**67.2%**
Czechia	368.508	85.9%	14.1%	0.0%	332.439	96.8%	50.0%	90.2%	332.120	96.7%	50.0%	**90.1%**
Democratic People's Republic of Korea	710.785	53.6%	13.6%	32.8%	-	-	-	-	-	-	-	**-**
Democratic Republic of the Congo	1,019.604	1.0%	28.1%	70.9%	149.844	100.0%	48.6%	14.7%	125.008	50.0%	41.8%	**12.3%**
Denmark	231.025	92.3%	7.7%	0.0%	222.085	100.0%	50.0%	96.1%	221.650	99.8%	50.0%	**95.9%**
Djibouti	19.154	9.3%	20.6%	70.1%	3.758	100.0%	50.0%	19.6%	2.094	50.0%	30.5%	**10.9%**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Dominica	2.118	15.6%	72.8%	11.6%	-	-	-	-	-	-	-	**-**
Dominican Republic	363.786	16.7%	72.1%	11.1%	-	-	-	-	-	-	-	**-**
Ecuador	592.921	69.3%	28.5%	2.1%	252.074	23.3%	92.5%	42.5%	184.468	10.0%	84.7%	**31.1%**
Egypt	6,800.000	74.5%	21.1%	4.5%	3,622.656	57.4%	50.0%	53.3%	3,097.078	48.2%	46.0%	**45.5%**
El Salvador	212.549	45.5%	21.8%	32.7%	27.525	4.5%	50.0%	12.9%	27.525	4.5%	50.0%	**12.9%**
Equatorial Guinea	15.038	34.7%	20.0%	45.3%	-	-	-	-	-	-	-	**-**
Eritrea	55.935	6.8%	11.6%	81.6%	-	-	-	-	-	-	-	**-**
Estonia	45.010	89.0%	4.2%	6.8%	40.988	100.0%	50.0%	91.1%	40.988	100.0%	50.0%	**91.1%**
Eswatini	23.980	16.1%	12.4%	71.5%	5.354	100.0%	50.0%	22.3%	4.294	77.0%	44.2%	**17.9%**
Ethiopia	1,356.103	2.8%	6.9%	90.3%	-	-	-	-	-	-	-	**-**
Falkland Islands (Malvinas)	0.115	100.0%	0.0%	0.0%	-	-	-	-	-	-	-	**-**
Faroe Islands	1.712	0.0%	90.7%	9.3%	0.727	NA	46.8%	42.4%	0.000	NA	0.0%	**0.0%**
Fiji	23.723	27.6%	68.8%	3.6%	-	-	-	-	-	-	-	**-**
Finland	302.000	84.6%	15.4%	0.0%	278.696	100.0%	50.0%	92.3%	278.696	100.0%	50.0%	**92.3%**
France	2,839.920	82.0%	18.0%	0.0%	2,626.960	100.0%	58.4%	92.5%	2,626.960	100.0%	58.4%	**92.5%**
French Guiana	18.942	50.8%	41.1%	8.1%	13.517	100.0%	50.0%	71.4%	13.297	98.1%	49.5%	**70.2%**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
French Polynesia	9.645	19.0%	80.0%	1.0%	-	-	-	-	-	-	-	**-**
Gabon	58.886	44.9%	0.0%	55.1%	-	-	-	-	-	-	-	**-**
Gambia	45.986	3.0%	41.8%	55.2%	10.801	100.0%	49.0%	23.5%	5.127	50.0%	23.1%	**11.1%**
Georgia	185.438	62.1%	1.9%	36.1%	86.568	73.9%	44.1%	46.7%	85.284	72.8%	43.9%	**46.0%**
Germany	5,121.589	96.0%	3.4%	0.6%	5,083.794	100.0%	95.8%	99.3%	5,083.794	100.0%	95.8%	**99.3%**
Ghana	557.195	6.1%	38.3%	55.6%	128.088	100.0%	44.1%	23.0%	67.564	50.0%	23.7%	**12.1%**
Gibraltar	1.181	100.0%	0.0%	0.0%	1.181	100.0%	NA	100.0%	1.181	100.0%	NA	**100.0%**
Greece	365.224	85.3%	14.7%	0.0%	338.384	100.0%	50.0%	92.7%	338.384	100.0%	50.0%	**92.7%**
Greenland	1.935	94.8%	5.2%	0.0%	1.885	100.0%	50.0%	97.4%	1.882	99.8%	50.0%	**97.2%**
Grenada	3.611	7.4%	64.1%	28.5%	-	-	-	-	-	-	-	**-**
Guadeloupe	24.832	39.7%	48.7%	11.6%	-	-	-	-	-	-	-	**-**
Guam	5.892	71.7%	26.1%	2.2%	-	-	-	-	-	-	-	**-**
Guatemala	561.029	49.1%	10.6%	40.3%	-	-	-	-	-	-	-	**-**
Guinea	238.275	4.1%	23.8%	72.1%	-	-	-	-	-	-	-	**-**
Guinea-Bissau	25.473	3.1%	44.4%	52.4%	6.306	100.0%	48.7%	24.8%	5.451	50.0%	44.7%	**21.4%**
Guyana	26.277	2.3%	69.7%	28.1%	-	-	-	-	-	-	-	**-**
Haiti	92.671	2.5%	37.9%	59.6%	-	-	-	-	-	-	-	**-**
Honduras	314.339	45.7%	29.3%	25.0%	-	-	-	-	-	-	-	**-**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Hungary	351.612	83.8%	16.2%	0.0%	315.220	97.3%	50.0%	89.6%	314.919	97.2%	50.0%	**89.6%**
Iceland	11.957	94.1%	5.9%	0.0%	11.605	100.0%	50.0%	97.1%	8.785	75.0%	49.0%	**73.5%**
India	34,532.503	17.6%	50.6%	31.8%	10,334.614	37.1%	46.2%	29.9%	9,171.047	18.5%	46.0%	**26.6%**
Indonesia	6,903.279	15.6%	81.4%	3.0%	-	-	-	-	-	-	-	**-**
Iran (Islamic Republic of)	3,365.665	36.3%	1.2%	62.5%	824.271	65.8%	50.0%	24.5%	742.863	59.2%	47.5%	**22.1%**
Iraq	916.077	30.2%	61.7%	8.1%	433.799	60.3%	47.2%	47.4%	339.753	60.1%	30.7%	**37.1%**
Ireland	169.169	68.2%	25.4%	6.3%	144.492	97.5%	74.3%	85.4%	141.116	94.6%	74.3%	**83.4%**
Israel	303.290	99.2%	0.8%	0.1%	295.934	98.0%	50.0%	97.6%	282.348	93.5%	48.8%	**93.1%**
Italy	2,080.443	98.6%	1.4%	0.0%	2,065.721	100.0%	50.0%	99.3%	1,971.023	95.4%	48.8%	**94.7%**
Jamaica	90.100	26.3%	28.6%	45.0%	-	-	-	-	-	-	-	**-**
Japan	12,023.035	80.2%	18.6%	1.2%	11,760.600	100.0%	94.5%	97.8%	11,760.600	100.0%	94.5%	**97.8%**
Jordan	267.400	66.9%	30.1%	2.9%	219.258	100.0%	50.0%	82.0%	219.258	100.0%	50.0%	**82.0%**
Kazakhstan	535.820	37.4%	8.6%	54.0%	221.583	99.1%	50.0%	41.4%	191.126	84.7%	46.4%	**35.7%**
Kenya	831.778	12.8%	11.9%	75.3%	-	-	-	-	-	-	-	**-**
Kiribati	2.646	17.7%	52.0%	30.3%	1.127	100.0%	47.9%	42.6%	0.815	50.0%	42.2%	**30.8%**
Kuwait	536.212	100.0%	0.0%	0.0%	536.212	100.0%	NA	100.0%	454.171	84.7%	NA	**84.7%**
Kyrgyzstan	174.260	20.3%	1.1%	78.6%	34.597	95.0%	49.6%	19.9%	32.924	90.3%	48.4%	**18.9%**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Lao People's Democratic Republic	221.346	1.3%	23.8%	74.9%	28.383	100.0%	48.5%	12.8%	22.347	50.0%	39.8%	**10.1%**
Latvia	97.712	85.4%	9.2%	5.4%	92.333	100.0%	98.7%	94.5%	91.014	98.5%	98.0%	**93.1%**
Lebanon	292.975	84.8%	13.1%	2.1%	-	-	-	-	-	-	-	**-**
Lesotho	30.661	3.0%	2.9%	94.2%	-	-	-	-	-	-	-	**-**
Liberia	50.990	1.0%	55.2%	43.9%	-	-	-	-	-	-	-	**-**
Libya	521.515	76.8%	9.1%	14.1%	86.741	15.7%	50.0%	16.6%	86.741	15.7%	50.0%	**16.6%**
Liechtenstein	1.336	98.7%	1.2%	0.1%	1.311	98.8%	50.0%	98.1%	1.311	98.8%	50.0%	**98.1%**
Lithuania	159.313	93.4%	0.0%	6.6%	148.872	100.0%	NA	93.4%	148.723	99.9%	NA	**93.4%**
Luxembourg	21.880	98.6%	1.4%	0.0%	21.422	98.6%	50.0%	97.9%	21.081	97.0%	49.6%	**96.3%**
Madagascar	348.941	3.3%	17.2%	79.6%	40.549	100.0%	48.6%	11.6%	32.464	50.0%	44.7%	**9.3%**
Malawi	211.880	5.5%	8.8%	85.6%	20.747	100.0%	48.4%	9.8%	13.721	50.0%	42.1%	**6.5%**
Malaysia	1,864.812	83.8%	16.2%	0.0%	1,713.095	100.0%	50.0%	91.9%	1,637.764	95.4%	48.8%	**87.8%**
Maldives	18.557	67.1%	32.6%	0.3%	-	-	-	-	-	-	-	**-**
Mali	332.669	2.7%	8.1%	89.2%	-	-	-	-	-	-	-	**-**
Malta	18.999	98.4%	1.5%	0.0%	18.848	100.0%	50.0%	99.2%	2.918	15.5%	7.7%	**15.4%**
Marshall Islands	1.784	44.6%	53.2%	2.1%	-	-	-	-	-	-	-	**-**
Martinique	17.933	46.6%	51.9%	1.5%	-	-	-	-	-	-	-	**-**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Mauritania	88.973	5.3%	28.2%	66.5%	-	-	-	-	-	-	-	**-**
Mauritius	66.746	23.3%	6.7%	70.0%	17.760	100.0%	50.0%	26.6%	8.872	46.6%	36.6%	**13.3%**
Mayotte	9.270	59.8%	36.4%	3.8%	-	-	-	-	-	-	-	**-**
Mexico	4,357.560	84.0%	15.5%	0.5%	2,679.294	64.0%	50.0%	61.5%	2,543.648	62.0%	41.0%	**58.4%**
Micronesia (Federated States of)	2.768	19.1%	55.9%	24.9%	-	-	-	-	-	-	-	**-**
Monaco	1.375	100.0%	0.0%	0.0%	1.375	100.0%	NA	100.0%	1.331	96.8%	NA	**96.8%**
Mongolia	33.470	24.9%	0.3%	74.8%	3.716	44.0%	47.1%	11.1%	3.491	41.3%	45.3%	**10.4%**
Montenegro	21.674	45.4%	53.2%	1.4%	11.187	56.6%	48.7%	51.6%	9.769	56.6%	36.5%	**45.1%**
Montserrat	0.172	20.4%	79.5%	0.1%	-	-	-	-	-	-	-	**-**
Morocco	552.427	58.5%	18.2%	23.3%	228.077	55.0%	50.0%	41.3%	199.664	47.3%	46.5%	**36.1%**
Mozambique	482.183	2.4%	22.1%	75.5%	-	-	-	-	-	-	-	**-**
Myanmar	1,329.169	1.4%	31.3%	67.3%	-	-	-	-	-	-	-	**-**
Namibia	60.897	51.1%	3.1%	45.8%	-	-	-	-	-	-	-	**-**
Nauru	0.378	23.2%	29.3%	47.5%	-	-	-	-	-	-	-	**-**
Nepal	754.824	6.7%	72.7%	20.6%	316.791	100.0%	48.5%	42.0%	280.799	50.0%	46.5%	**37.2%**
Netherlands	724.510	99.6%	0.4%	0.0%	723.138	100.0%	50.0%	99.8%	723.138	100.0%	50.0%	**99.8%**
New Caledonia	15.558	33.5%	33.5%	32.9%	-	-	-	-	-	-	-	**-**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
New Zealand	370.328	85.2%	14.8%	0.0%	342.969	100.0%	50.0%	92.6%	315.308	91.6%	47.9%	**85.1%**
Nicaragua	192.413	29.7%	12.6%	57.6%	69.405	100.0%	50.0%	36.1%	55.901	87.0%	25.0%	**29.1%**
Niger	264.281	2.1%	16.4%	81.6%	27.072	100.0%	50.0%	10.2%	10.572	50.0%	18.2%	**4.0%**
Nigeria	2,962.368	21.9%	49.8%	28.4%	1,975.605	100.0%	90.0%	66.7%	1,430.575	50.0%	75.1%	**48.3%**
Niue	0.054	0.0%	99.8%	0.8%	69.405	-	-	-	55.901	-	-	**-**
North Macedonia	76.400	80.8%	11.2%	7.9%	65.654	100.0%	45.6%	85.9%	6.969	8.2%	22.2%	**9.1%**
Northern Mariana Islands	1.918	57.1%	42.6%	0.4%	-	-	-	-	-	-	-	**-**
Norway	281.774	84.7%	13.4%	1.9%	269.580	97.7%	96.7%	95.7%	213.180	74.1%	96.7%	**75.7%**
Oman	208.066	23.3%	76.3%	0.3%	-	-	-	-	-	-	-	**-**
Pakistan	5,899.345	35.8%	39.9%	24.3%	-	-	-	-	-	-	-	**-**
Palau	0.588	76.6%	23.3%	0.1%	-	-	-	-	-	-	-	**-**
Panama	266.146	34.2%	42.6%	23.2%	-	-	-	-	-	-	-	**-**
Papua New Guinea	137.458	16.2%	11.0%	72.8%	-	-	-	-	-	-	-	**-**
Paraguay	241.725	8.7%	46.6%	44.7%	-	-	-	-	-	-	-	**-**
Peru	952.760	73.6%	5.3%	21.1%	-	-	-	-	-	-	-	**-**
Philippines	3,193.071	8.4%	84.3%	7.4%	1,564.218	100.0%	48.2%	49.0%	1,371.321	50.0%	46.0%	**42.9%**
Poland	1,521.850	64.4%	35.6%	0.0%	1,245.662	99.5%	50.0%	81.9%	1,245.662	99.5%	50.0%	**81.9%**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Portugal	483.400	65.0%	29.1%	5.8%	382.059	99.1%	50.0%	79.0%	355.700	91.6%	48.1%	**73.6%**
Puerto Rico	100.244	100.0%	0.0%	0.0%	100.244	100.0%	-	100.0%	32.579	32.5%	-	**32.5%**
Qatar	441.633	99.9%	0.1%	0.0%	439.632	99.6%	50.0%	99.5%	439.632	99.6%	50.0%	**99.5%**
Republic of Korea	1,790.431	99.5%	0.0%	0.5%	1,781.928	100.0%	NA	99.5%	1,781.928	100.0%	NA	**99.5%**
Republic of Moldova	110.808	43.3%	11.6%	45.1%	54.436	100.0%	50.0%	49.1%	42.655	77.0%	44.2%	**38.5%**
Réunion	55.849	51.5%	45.3%	3.2%	41.415	100.0%	50.0%	74.2%	41.415	100.0%	50.0%	**74.2%**
Romania	498.400	54.8%	1.5%	43.7%	258.270	93.1%	50.0%	51.8%	240.839	86.8%	48.4%	**48.3%**
Russian Federation	4,095.275	95.1%	0.6%	4.2%	3,909.075	100.0%	50.0%	95.5%	529.273	13.4%	28.3%	**12.9%**
Rwanda	121.414	4.6%	1.4%	94.1%	-	-	-	-	-	-	-	**-**
Saint Barthélemy	0.346	5.7%	87.7%	6.5%	-	-	-	-	-	-	-	**-**
Saint Helena	0.210	52.7%	47.3%	0.0%	-	-	-	-	-	-	-	**-**
Saint Kitts and Nevis	1.837	7.6%	88.3%	4.1%	-	-	-	-	-	-	-	**-**
Saint Lucia	6.126	5.3%	85.7%	9.0%	-	-	-	-	-	-	-	**-**
Saint Martin (French Part)	0.892	60.2%	39.7%	0.2%	-	-	-	-	-	-	-	**-**
Saint Pierre and Miquelon	0.175	38.8%	38.8%	22.5%	-	-	-	-	-	-	-	**-**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Saint Vincent and the Grenadines	3.683	7.8%	70.3%	21.9%	-	-	-	-	-	-	-	**-**
Samoa	6.423	0.2%	96.5%	3.2%	3.104	100.0%	49.8%	48.3%	2.998	0.0%	48.4%	**46.7%**
San Marino	2.121	85.0%	15.0%	0.0%	1.962	100.0%	50.0%	92.5%	1.913	97.4%	49.3%	**90.2%**
São Tomé & Príncipe	3.595	36.7%	15.2%	48.1%	-	-	-	-	-	-	-	**-**
Saudi Arabia	7,721.814	59.7%	40.3%	0.0%	6,165.466	100.0%	50.0%	79.8%	6,149.304	99.7%	49.9%	**79.6%**
Senegal	449.175	10.5%	47.9%	41.5%	117.784	44.4%	44.9%	26.2%	63.633	44.4%	19.8%	**14.2%**
Serbia	300.300	57.1%	39.5%	3.4%	87.997	22.4%	41.8%	29.3%	81.240	19.9%	39.7%	**27.1%**
Seychelles	3.323	17.4%	82.5%	0.2%	-	-	-	-	-	-	-	**-**
Sierra Leone	83.396	2.2%	19.3%	78.4%	9.867	100.0%	49.7%	11.8%	6.999	50.0%	37.7%	**8.4%**
Singapore	240.870	100.0%	0.0%	0.0%	240.870	100.0%	NA	100.0%	240.870	100.0%	NA	**100.0%**
Sint Maarten (Dutch part)	1.415	9.7%	45.2%	45.1%	-	-	-	-	-	-	-	**-**
Slovakia	367.055	69.3%	26.6%	4.1%	301.730	99.4%	50.0%	82.2%	292.856	96.2%	49.2%	**79.8%**
Slovenia	56.990	72.2%	26.8%	1.0%	39.554	94.4%	4.7%	69.4%	38.300	91.4%	4.6%	**67.2%**
Solomon Islands	14.377	12.0%	22.3%	65.8%	-	-	-	-	-	-	-	**-**
Somalia	261.365	13.0%	9.1%	78.0%	-	-	-	-	-	-	-	**-**
South Africa	1,700.115	74.1%	3.4%	22.5%	1,120.739	84.6%	95.2%	65.9%	1,042.024	78.5%	91.8%	**61.3%**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
South Sudan	74.534	4.1%	1.7%	94.3%	-	-	-	-	-	-	-	**-**
Spain	2,425.000	95.2%	1.0%	3.7%	2,126.160	91.5%	50.0%	87.7%	2,085.884	89.8%	49.5%	**86.0%**
Sri Lanka	615.560	2.2%	1.9%	96.0%	-	-	-	-	-	-	-	**-**
State of Palestine	167.116	57.0%	18.0%	25.1%	107.556	100.0%	41.2%	64.4%	104.712	99.3%	34.0%	**62.7%**
Sudan	947.294	2.2%	13.5%	84.3%	-	-	-	-	-	-	-	**-**
Suriname	19.868	2.4%	94.0%	3.6%	8.988	100.0%	45.6%	45.2%	4.732	50.0%	24.0%	**23.8%**
Sweden	576.000	88.2%	11.4%	0.4%	548.355	100.0%	61.5%	95.2%	548.355	100.0%	61.5%	**95.2%**
Switzerland	421.351	99.5%	0.0%	0.5%	417.999	99.7%	NA	99.2%	417.999	99.7%	NA	**99.2%**
Syrian Arab Republic	537.650	86.5%	7.9%	5.6%	-	-	-	-	-	-	-	**-**
Tajikistan	223.353	24.3%	4.8%	70.9%	-	-	-	-	-	-	-	**-**
Thailand	3,540.500	13.7%	83.1%	3.2%	1,182.163	100.0%	23.7%	33.4%	863.963	50.0%	21.1%	**24.4%**
Timor-Leste	36.148	14.6%	21.5%	63.9%	-	-	-	-	-	-	-	**-**
Togo	95.634	0.7%	60.1%	39.2%	28.820	100.0%	49.0%	30.1%	14.381	50.0%	24.5%	**15.0%**
Tokelau	0.046	34.1%	34.1%	31.8%	-	-	-	-	-	-	-	**-**
Tonga	3.649	2.9%	88.6%	8.5%	1.645	100.0%	47.6%	45.1%	1.044	50.0%	30.6%	**28.6%**
Trinidad and Tobago	48.579	20.3%	74.0%	5.7%	-	-	-	-	-	-	-	**-**
Tunisia	174.397	59.9%	17.2%	22.9%	114.630	98.8%	37.8%	65.7%	104.160	88.9%	37.3%	**59.7%**
Turkey	4,342.236	94.6%	0.0%	5.4%	3,627.649	88.3%	50.0%	83.5%	2,749.758	66.9%	44.0%	**63.3%**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Turkmenistan	211.333	28.5%	2.0%	69.5%	-	-	-	-	-	-	-	**-**
Turks and Caicos Islands	1.249	10.0%	66.7%	23.4%	-	-	-	-	-	-	-	**-**
Tuvalu	0.405	75.4%	8.2%	16.4%	0.322	100.0%	50.0%	79.5%	0.008	0.0%	25.0%	**2.0%**
Uganda	490.072	1.9%	6.4%	91.7%	-	-	-	-	-	-	-	**-**
Ukraine	1,432.001	54.9%	0.9%	44.1%	793.292	100.0%	50.0%	55.4%	490.964	61.7%	40.4%	**34.3%**
United Arab Emirates	342.742	98.2%	0.0%	1.8%	336.458	100.0%	NA	98.2%	328.720	97.7%	NA	**95.9%**
United Kingdom of Great Britain and Northern Ireland	2,378.726	97.8%	2.0%	0.2%	2,350.221	100.0%	50.0%	98.8%	2,350.221	100.0%	50.0%	**98.8%**
United Republic of Tanzania	978.516	1.1%	20.7%	78.3%	-	-	-	-	-	-	-	**-**
United States of America	11,573.556	84.7%	15.2%	0.1%	10,682.842	100.0%	50.0%	92.3%	10,539.431	98.6%	49.6%	**91.1%**
United States Virgin Islands	3.596	42.3%	57.4%	0.2%	-	-	-	-	-	-	-	**-**
Uruguay	120.503	61.9%	33.8%	4.3%	-	-	-	-	-	-	-	**-**
Uzbekistan	770.407	40.4%	0.8%	58.9%	313.870	100.0%	50.0%	40.7%	248.579	79.1%	44.8%	**32.3%**
Vanuatu	6.312	5.6%	35.0%	59.4%	-	-	-	-	-	-	-	**-**

Country	Total household wastewater generated (million m³)	Proportion of household wastewater generated – Sewers (%)	Proportion of household wastewater generated – Septic Tanks (%)	Proportion of household wastewater generated – All other sanitation (%)	Total household wastewater collected (million m³)	Proportion of sewer household wastewater collected (%)	Proportion of septic tank household wastewater collected (%)	Proportion of household wastewater collected (%)	Total household wastewater safely treated (million m³)	Proportion of sewer household wastewater safely treated (%)	Proportion of septic tank household wastewater safely treated (%)	Proportion of household wastewater safely treated (%)
Venezuela (Bolivarian Republic of)	876.127	98.0%	1.1%	0.9%	-	-	-	-	-	-	-	**-**
Viet Nam	2,867.548	1.3%	73.2%	25.5%	-	-	-	-	-	-	-	**-**
Wallis and Futuna Islands	0.388	31.5%	31.5%	37.1%	-	-	-	-	-	-	-	**-**
Yemen	598.365	52.5%	34.7%	12.8%	345.109	76.8%	50.0%	57.7%	205.855	40.3%	38.1%	**34.4%**
Zambia	269.393	19.4%	18.2%	62.4%	-	-	-	-	-	-	-	**-**
Zimbabwe	115.931	26.0%	6.0%	68.0%	28.903	84.5%	49.7%	24.9%	26.655	77.1%	49.2%	**23.0%**

Notes:

- : Insufficient data.

NA: Not applicable because there is no wastewater generated by this classification of household sanitation.

Annex IV. Regional and global data (household wastewater)

Country	Total household wastewater generated (million m³)*	Proportion of household wastewater generated – Sewers (%)*	Proportion of household wastewater generated – Septic Tanks (%)*	Proportion of household wastewater generated – All other sanitation (%)*	Total household wastewater collected (million m³)**	Proportion of sewer household wastewater collected (%)**	Proportion of septic tank household wastewater collected (%)**	Proportion of household wastewater collected (%)**	Total household wastewater safely treated (million m³)***	Proportion of sewer household wastewater safely treated (%)***	Proportion of septic tank household wastewater safely treated (%)***	Proportion of household wastewater safely treated (%)***
Australia and New Zealand	1,245.163	88.9%	11.1%	0.0%	1175.760	100.0%	50.0%	94.4%	981.686	83.0%	46.1%	78.8%
Central and Southern Asia	52,449.725	20.4%	41.5%	38.1%	13,128.684	49.7%	46.3%	29.1%	13,355.294	30.7%	45.9%	25.5%
Eastern and South-Eastern Asia	106,983.806	62.1%	23.2%	14.7%	70,343.265	95.7%	51.1%	74.2%	70,047.283	86.9%	48.8%	65.5%
Latin America and the Caribbean	22,968.636	69.4%	17.3%	13.3%	12,051.068	77.1%	52.3%	64.5%	9,380.477	46.9%	41.9%	40.8%
Europe and Northern America	42,769.821	86.5%	10.1%	3.4%	38,826.152	98.5%	55.4%	90.8%	34,405.402	86.6%	54.5%	80.4%
Oceania excluding Australia and New Zealand	236.471	20.0%	28.3%	51.7%	-	-	-	-	-	-	-	-
Sub-Saharan Africa	16,258.826	16.8%	24.8%	58.5%	3,738.972	89.4%	73.3%	45.5%	4,487.141	67.9%	58.2%	27.6%
Northern Africa and Western Asia	27,762.057	70.9%	21.8%	7.3%	18,068.217	80.7%	49.5%	70.2%	17,405.416	71.8%	46.2%	62.7%
World	270,674.505	56.8%	24.1%	19.2%	157,339.635	90.0%	50.6%	66.5%	150,232.379	77.6%	48.0%	55.5%

Notes:

- : Insufficient data.

* : Based on estimates computed for all countries/territories in the region.

** : Based on estimates from only those countries/territories with 6.3.1 household estimates in the region (n=128 for "World").

*** : Based on estimates computed for all countries/territories in the region, with regional averages imputed for those without 6.3.1 household estimates (n=128 for "World").

Learn more about progress towards SDG 6

6 CLEAN WATER AND SANITATION

How is the world doing on **Sustainable Development Goal 6**? View, analyse and download global, regional and national water and sanitation data: https://www.sdg6data.org/

Sustainable Development Goal (SDG) 6 expands the Millennium Development Goal (MDG) focus on drinking water and basic sanitation to include the more holistic management of water, wastewater and ecosystem resources, acknowledging the importance of an enabling environment. Bringing these aspects together is an initial step towards addressing sector fragmentation and enabling coherent and sustainable management. It is also a major step towards a sustainable water future.

Monitoring progress towards SDG 6 is key to achieving this SDG. High-quality data help policymakers and decision makers at all levels of government to identify challenges and opportunities, to set priorities for more effective and efficient implementation, to communicate progress and ensure accountability, and to generate political, public and private sector support for further investment.

The 2030 Agenda for Sustainable Development specifies that global follow-up and review shall primarily be based on national official data sources. The data are compiled and validated by the United Nations custodian agencies, who contact country focal points every two to three years with requests for new data, while also providing capacity-building support. The last global “data drive” took place in 2020, resulting in status updates on nine of the global indicators for SDG 6 (please see below). These reports provide a detailed analysis of current status, historical progress and acceleration needs regarding the SDG 6 targets.

To enable a comprehensive assessment and analysis of overall progress towards SDG 6, it is essential to bring together data on all the SDG 6 global indicators and other key social, economic and environmental parameters. This is exactly what the SDG 6 Data Portal does, enabling global, regional and national actors in various sectors to see the bigger picture, thus helping them make decisions that contribute to all SDGs. UN-Water also publishes synthesized reporting on overall progress towards SDG 6 on a regular basis.

Summary Progress Update 2021: SDG 6 – Water and Sanitation for All	Based on latest available data on all SDG 6 global indicators. Published by UN-Water through the UN-Water Integrated Monitoring Initiative for SDG 6. https://www.unwater.org/publications/summary-progress-update-2021-sdg-6-water-and-sanitation-for-all/
Progress on Household Drinking Water, Sanitation and Hygiene – 2021 Update	Based on latest available data on SDG indicators 6.1.1 and 6.2.1. Published by World Health Organization (WHO) and United Nations Children's Fund (UNICEF). https://www.unwater.org/publications/who-unicef-joint-monitoring-program-for-water-supply-sanitation-and-hygiene-jmp-progress-on-household-drinking-water-sanitation-and-hygiene-2000-2020/
Progress on Wastewater Treatment – 2021 Update	Based on latest available data on SDG indicator 6.3.1. Published by WHO and United Nations Human Settlements Programme (UN-Habitat) on behalf of UN-Water. https://www.unwater.org/publications/progress-on-wastewater-treatment-631-2021-update/
Progress on Ambient Water Quality – 2021 Update	Based on latest available data on SDG indicator 6.3.2. Published by United Nations Environment Programme (UNEP) on behalf of UN-Water. https://www.unwater.org/publications/progress-on-ambient-water-quality-632-2021-update/
Progress on Water-Use Efficiency – 2021 Update	Based on latest available data on SDG indicator 6.4.1. Published by Food and Agriculture Organization of the United Nations (FAO) on behalf of UN-Water. https://www.unwater.org/publications/progress-on-water-use-efficiency-641-2021-update/
Progress on Level of Water Stress – 2021 Update	Based on latest available data on SDG indicator 6.4.2. Published by FAO on behalf of UN-Water. https://www.unwater.org/publications/progress-on-level-of-water-stress-642-2021-update/
Progress on Integrated Water Resources Management – 2021 Update	Based on latest available data on SDG indicator 6.5.1. Published by UNEP on behalf of UN-Water. https://www.unwater.org/publications/progress-on-integrated-water-resources-management-651-2021-update/
Progress on Transboundary Water Cooperation – 2021 Update	Based on latest available data on SDG indicator 6.5.2. Published by United Nations Economic Commission for Europe (UNECE) and United Nations Educational, Scientific and Cultural Organization (UNESCO) on behalf of UN-Water. https://www.unwater.org/publications/progress-on-transboundary-water-cooperation-652-2021-update/
Progress on Water-related Ecosystems – 2021 Update	Based on latest available data on SDG indicator 6.6.1. Published by UNEP on behalf of UN-Water. https://www.unwater.org/publications/progress-on-water-related-ecosystems-661-2021-update/
National Systems to Support Drinking-Water, Sanitation and Hygiene – Global Status Report 2019	Based on latest available data on SDG indicators 6.a.1 and 6.b.1. Published by WHO through the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) on behalf of UN-Water. https://www.unwater.org/publication_categories/glaas/

UN-Water reports

UN-Water coordinates the efforts of United Nations entities and international organizations working on water and sanitation issues. By doing so, UN-Water seeks to increase the effectiveness of the support provided to Member States in their efforts towards achieving international agreements on water and sanitation. UN-Water publications draw on the experience and expertise of UN-Water's Members and Partners.

SDG 6 Progress Update 2021 – summary	This summary report provides an executive update on progress towards all of SDG 6 and identifies priority areas for acceleration. The report, produced by the UN-Water Integrated Monitoring Initiative for SDG 6, present new country, region and global data on all the SDG 6 global indicators.
SDG 6 Progress Update 2021 – 8 reports, by SDG 6 global indicator	This series of reports provides an in-depth update and analysis of progress towards the different SDG 6 targets and identifies priority areas for acceleration: Progress on Drinking Water, Sanitation and Hygiene (WHO and UNICEF); Progress on Wastewater Treatment (WHO and UN-Habitat); Progress on Ambient Water Quality (UNEP); Progress on Water-use Efficiency (FAO); Progress on Level of Water Stress (FAO); Progress on Integrated Water Resources Management (UNEP); Progress on Transboundary Water Cooperation (UNECE and UNESCO); Progress on Water-related Ecosystems (UNEP). The reports, produced by the responsible custodian agencies, present new country, region and global data on the SDG 6 global indicators.
UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS)	GLAAS is produced by the World Health Organization (WHO) on behalf of UN-Water. It provides a global update on the policy frameworks, institutional arrangements, human resource base, and international and national finance streams in support of water and sanitation. It is a substantive input into the activities of Sanitation and Water for All (SWA) as well as the progress reporting on SDG 6 (see above).
United Nations World Water Development Report	The United Nations World Water Development Report (WWDR) is UN-Water's flagship report on water and sanitation issues, focusing on a different theme each year. The report is published by UNESCO, on behalf of UN-Water and its production is coordinated by the UNESCO World Water Assessment Programme. The report gives insight on main trends concerning the state, use and management of freshwater and sanitation, based on work done by the Members and Partners of UN-Water. Launched in conjunction with World Water Day, the report provides decision-makers with knowledge and tools to formulate and implement sustainable water policies. It also offers best practices and in-depth analyses to stimulate ideas and actions for better stewardship in the water sector and beyond.

The progress reports of the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP)	The JMP is affiliated with UN-Water and is responsible for global monitoring of progress towards SDG6 targets for universal access to safe and affordable drinking water and adequate and equitable sanitation and hygiene services. Every two years the JMP releases updated estimates and progress reports for WASH in households, schools and health care facilities.
Policy and Analytical Briefs	UN-Water's Policy Briefs provide short and informative policy guidance on the most pressing freshwater-related issues that draw upon the combined expertise of the United Nations system. Analytical Briefs provide an analysis of emerging issues and may serve as basis for further research, discussion and future policy guidance.

UN-Water planned publications

- **UN-Water Policy Brief on Gender and Water**
- **Update of UN-Water Policy Brief on Transboundary Waters Cooperation**
- **UN-Water Analytical Brief on Water Efficiency**

More information: https://www.unwater.org/unwater-publications/

United Nations | UN WATER UN HABITAT World Health Organization