Progress on Ambient Water Quality

GLOBAL INDICATOR 6.3.2 UPDATES AND ACCELERATION NEEDS

2021

United Nations | UN WATER

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Global indicator 6.3.2 updates and acceleration needs

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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 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).

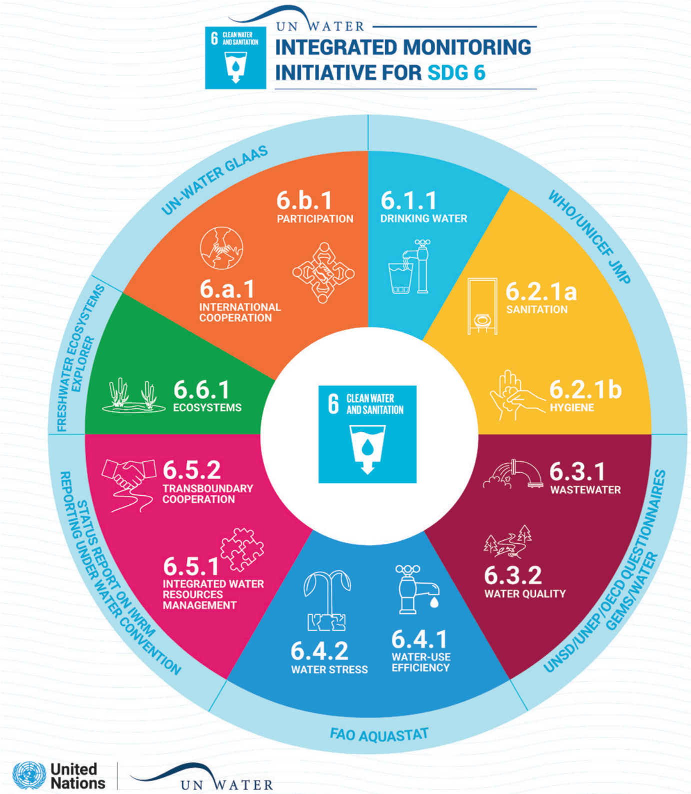
This joint effort enables synergies to be created across United Nations organizations and methodologies and requests for data to be harmonized, leading to more efficient outreach and a reduced reporting burden. At the national level, IMI-SDG6 also promotes intersectoral collaboration and consolidation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



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

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INTEGRATED MONITORING INITIATIVE FOR SDG 6

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Contents

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

UNEP foreword

Human health and well-being globally rely on nature and the services it provides. Rivers, lakes and groundwater are the main sources of fresh water and contribute to the livelihoods of hundreds of millions of farmers, fisherfolk and people employed, for example, in manufacturing, energy, tourism and recreation. Freshwater ecosystems are also hotspots of biodiversity. Their protection and restoration are essential if we are to achieve our climate goals in an ever-warming world. Polluted rivers, lakes and groundwater are putting at risk vital freshwater ecosystem services. One-third of freshwater fish species are threatened with extinction. One of the main drivers of this decline is pollution.

To monitor the world's progress on Sustainable Development Goal (SDG) 6 and inform decision-making, United Nations Environment Programme (UNEP) is proud to be part of the UN-Water Integrated Monitoring Initiative for SDG 6 and to serve as the custodian for indicator 6.3.2: "Proportion of bodies of water with good ambient water quality".

This year's update on the indicator highlights that water pollution is a global problem, independent of a country's level of development or gross domestic product. The specific sources of pollution may vary between countries and therefore will require targeted solutions, but action must be taken everywhere. One hopeful message underlined by the current data on indicator 6.3.2 is that many water bodies around the world are still in a good condition, so we must also join forces and do everything possible to protect these vital natural assets.

Inger Andersen

Executive Director of the United Nations Environment Programme

Lists of boxes, figures and tables

Ambient water quality highlights

Inaction to address water quality issues threatens human health, the economy and ecosystem health (Damania *et al*., 2019). The pollution of water bodies can be highly visible such as in algal blooms in lakes, or invisible if water contains certain chemicals or antibiotics. In either case, if nothing is done, human or ecosystem health can be adversely affected.

If target 6.3 is to be reached and water quality improved by 2030, an essential prerequisite is information. We need to know where water quality is good and where it is not, and how this quality is changing over time. The 2020 data drive for Sustainable Development Goal (SDG) indicator 6.3.2 resulted in over a 100 per cent increase in submissions compared with 2017 (89 compared with 39). This is a positive sign, and although the number of submissions is important, it is only the first step. More submissions mean more countries engaged with the indicator, and more information is being generated and shared, and it is here that the real success lies. Collecting these data and making them available helps to trigger action targeted at improving water quality.

Receiving these extra submissions has many additional benefits and knock-on effects that often go unseen unless showcased and described. For example, in reaction to the latest data drive for this indicator, some countries looked at their data in a new way. The indicator helped turn data into information whereas previously they had remained within the organization that generated them and their potential went unrealized. Some countries have reviewed their ambient water quality reporting processes and for the first time generated a national water quality picture. Previously, only state or subnational reporting was undertaken without any national aggregation. Also, and most significantly, some countries have used this opportunity to initiate ambient water quality programmes for the first time, or have used it to refocus existing monitoring efforts for this new purpose. All these examples, and many more, are described in this report to raise awareness of the importance of water quality in the international consciousness and initiate change.

Key takeaways for global policymakers

Data gaps in low-GDP countries. Over 75,000 water bodies were reported on in 2020, but over three-quarters of them were in 24 high-GDP countries. The poorest 20 countries reported on just over 1,000 water bodies. “More monitoring needed” can be an overused message, but a critically important one when people are using untreated water of unknown quality for drinking and domestic use (chapter 3).

Good water quality. In all world regions, in low-, medium- and high-income countries alike, there are water bodies that are still in good condition. Sixty per cent of water bodies – 45,966 out of 76,151 – assessed in 2020 were classified as having good ambient water quality. Protection is easier than restoration, so efforts to protect these water bodies must be initiated now so they can continue to provide benefits to communities and the environment (chapter 3).

Water quality threats. Although low-, middle- and high-income countries also reported poor water quality, the underlying drivers are likely to be different and therefore require country-specific actions. Agriculture and untreated wastewater pose two of the greatest threats to environmental water quality globally: they release excess nutrients into rivers, lakes and aquifers which damage ecosystem function. Measurements of nitrogen and phosphorus failed to meet their targets more often than the other water quality parameters of the indicator (chapter 3).

Lack of groundwater data. Of the 89 countries with data, only 52 reported information about groundwater, which is problematic because groundwater often represents the largest share of fresh water in a country. An understanding of the hydrogeological environment, the pressures on these resources, and how to monitor them effectively is lacking in many countries (chapter 3).

Building monitoring capacity. Ambient water quality data are not routinely collected in most countries. This means that water quality for 3 billion people is unknown and these people could be at significant risk. Furthermore, data on water quality from developing countries lacks detail, with the indicator calculated using relatively few measurements and without suitable environmental water quality standards. This lowers the reliability of the reporting (chapter 5).

Key takeaways for national policymakers

Positive trends for countries with robust monitoring systems. Nineteen of the 49 countries reporting in both 2017 and 2020 are on track to improve water quality. These are countries that have a robust monitoring system in place. This, in turn, supports the concept that monitoring is essential for positive management action (chapter 3).

Water quality data need to be embedded in management and policy action. To have the greatest impact, water quality data need to be embedded in management and policy actions and combined with improvements in outreach and communication aimed at all stakeholders to ensure water quality becomes everyone's business (chapter 4).

There are many threats to water quality. Nutrients from untreated wastewater effluent and agricultural run-off remain the greatest threat. Improving wastewater treatment rates and technologies, while simultaneously ensuring best management practices are applied in the agricultural sector, will have the greatest returns (chapter 5).

Collect data for the different SDG 6 indicators using the same spatial units. Collecting data using the same spatial units for all SDG 6 indicators will help to influence management action and policy change. For example, data on wastewater treatment levels and ambient water quality would help identify which river basins are making the most progress, and where efforts to improve water quality are not having the intended impact (chapter 5).

Capacity development in data management needed. Engagement with countries highlighted that capacity development in data management was one of the greatest and most urgent needs. Targeting this area would help make better use of data already available and help activate these data for management decisions (chapter 5).

Key takeaways for water quality experts and practitioners

Improved implementation of the methodology. The target values used by those implementing the indicator in their countries were much closer to those expected to reflect "good ambient water quality" compared to those used in 2017 (chapter 2).

Increased standardization. Comparing 2020 with 2017 indicator score results shows a slight contraction in the ranges observed, with the twenty-fifth and seventy-fifth percentiles moving towards the median for all water body types, and increases in the median values for both lakes and groundwater, with a substantial drop for rivers. This possibly suggests a greater degree in the standardization of approach in methodology implementation (chapter 3).

New indicator calculation service. Eighteen countries used the *indicator calculation service* provided by United Nations Environment Programme (UNEP) to reduce the reporting burden. Several of these countries chose to use data that they already regularly submit to GEMStat, the Global Environment Monitoring System for Freshwater (GEMS/Water) database. This meant these countries only needed to validate the indicator score generated on their behalf, which reduced the reporting burden (chapter 5).

Reducing reporting burden. Efforts are under way to reduce the reporting burden and duplication of effort for those countries engaged with existing regional frameworks. The 2020 data drive saw the first pilot to reuse data reported to the European Environment Agency by the 38 member and cooperating countries (chapter 5).

Key takeaways for general audience

Capacity development is having a positive impact. Capacity development for indicator 6.3.2 is having a positive impact already, but more action is needed to build on these efforts in least developed countries. This will expand monitoring and assessment activities to ensure that freshwater quality is everyone's business (chapter 1).

Significant regional gaps. The global coverage of indicator 6.3.2 information was much greater in 2020 than in 2017, but there are still significant data gaps. Most notable are those in Central, Southern and Western Asia. Outreach efforts are ongoing in these regions to encourage future submissions (chapter 3).

SDG 6.3.2 is a key indicator of the SDGs. Its importance extends beyond its associated target to many other SDGs that rely, directly or indirectly, on good ambient water quality. Information from indicator 6.3.2 can inform decisions relating to ending hunger (SDG 2), improving health (SDG 3), increasing access to energy (SDG 7), promoting sustainable tourism and industrialization (SDGs 8 and 9), reducing marine pollution (SDG 14) and safeguarding terrestrial biodiversity (SDG 15) (chapter 4).

Citizen scientists have a role to play. The collection of water quality data is an essential prerequisite if water resources are to be protected and the services we obtain from these freshwater ecosystems are to be maintained. Citizen scientists can play a significant role in data collection and their involvement has the additional benefit of promoting behavioural change and engagement in the management of water quality (chapter 5).

Amazonas, Brazil by Sébastien Goldberg

1. The value of good ambient water quality

The aim of this chapter is to shine a light on our often undervalued rivers, lakes and groundwaters, and to highlight their connection to the three planetary crises: climate change; biodiversity loss; and pollution. This chapter goes further and discusses how critical these waters are for sustainable development and describes the damage we continue to cause, despite stark evidence of the impact this is having. These water bodies have a natural capacity to tolerate pressures from human activities, but this capacity is limited, and has been exhausted in many instances. Action is needed now to protect water bodies that have good water quality, and to improve those that do not.

Indicator 6.3.2 monitors the proportion of bodies of water with good ambient water quality, in relation to national and/or subnational water quality standards. Based on measurements of five water quality parameters that provide information on the most common pressures on water quality at the global level, it indicates whether efforts to "improve water quality" by 2030 are on track.

The United Nations Environment Programme (UNEP) is the custodian agency for Sustainable Development Goal (SDG) indicator 6.3.2 and UNEP's Global Environment Monitoring Programme for Freshwater (GEMS/Water) is the implementing programme. All the SDG 6 indicators are coordinated by UN-Water under the Integrated Monitoring Initiative for SDG 6 (IMI-SDG6). Indicator 6.3.2 is one of two indicators of 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".**

1.1. Why Indicator 6.3.2 matters

There is a substantial water quality data gap at the global level, and despite decades of efforts, this gap has proved difficult to fill. SDG indicator 6.3.2 alone does not necessarily fill this gap, but it does bring together information on water quality in a consistent and reliable manner, and it also provides insight into where and how data are collected. Through engagement with countries, it helps to flag the challenges faced such as insufficient monitoring activities or an absence of ambient water quality standards.

Using this information, capacity development can be targeted to counter these challenges and thereby drive further data collection. The indicator and the resources provided by UNEP serve as a support mechanism for those organizations looking to initiate new and develop existing monitoring systems in their country.

The information that SDG indicator 6.3.2 provides does not necessarily improve water quality on its own – it is not the only missing piece of the puzzle. However, it does provide the platform and scientific basis for management action to be implemented and clears the pathway towards water quality improvement for all.

Many more countries reported in 2020 compared with 2017, and with this new information, a more complete picture of global water quality is being created.

1.2. Human and ecosystem health

Ecosystem services can be broadly categorized into three main types: provision, regulation and cultural. For aquatic ecosystems, examples of services include provision of water for drinking and fish for eating. Regulation services include regulation of water quality through processes that remove excess nutrients and breakdown of waste. Cultural services include the non-material benefits from amenity or recreation (Feeley *et al*., 2016). Degradation of ecosystems, including aquatic ecosystems, will lead to biodiversity loss, and impair these services we rely on.

World Water Day 2021, which celebrated how we value water in different ways, drew attention to these ecosystem services far beyond simply assigning a price per litre. The Day pushed people's thoughts beyond the provision services that are foremost in people's minds, and collected stories on the less tangible, regulation and cultural benefits such as recreational and spiritual ones that are essential for our health and well-being. Good water quality is central to how we value water, and it was shown that this essential asset is highly prized, and yet sorely missed when deprived (United Nations, 2021).

The links between water consumption, wastewater production and reuse are manifold and addressing a single aspect in isolation is difficult. Direct use of and contact with water of poor quality can be damaging to human health and well-being. A global study of croplands located close to urban areas estimates that approximately 36 million hectares are irrigated with wastewater, and of this total 82 per cent (29.3 million hectares or approximately the size of Italy) are located in countries where less than 75 per cent of wastewater is treated (Thebo *et al*., 2017). This overlap between untreated wastewater and reuse is a risk to farmers and consumers, but the level of this risk is unknown because monitoring of water quality is uncommon. Risks from pathogens are an immediate threat, but risks may also come from pollutants contained in the wastewater such as heavy metals, pharmaceuticals or micropollutants.

Poor ambient water quality has both geographical and gender implications – not all people are affected equally. Those living in less developed countries suffer more from polluted water sources, where there is less access to safe water and wastewater treatment levels are lower. To exacerbate this problem, women in these countries, who are largely responsible for the collection of water, may have to travel further to access clean water sources. This limits the time women can invest in education, income-generation activities or leisure, but also exposes them to a higher risk of suffering gender-based violence (UNEP and International Union for Conservation of Nature [IUCN], 2018).

Woman crossing a river. Madagascar. By Damian Ryszawy on Shutterstock

1.3. Threats to ambient water quality

Disturbance of aquatic ecosystems began around 10,000 years ago when villages and towns concentrated humans and their waste to previously unseen levels. At the same time, clearance of forests to make way for early agriculture led to sediment transport from the land into rivers and lakes and the waterways adjacent to early settlements and agricultural sites that served the dual purpose of supplying fresh water while simultaneously disposing of waste were put under further pressure. This trend continues today in many places, despite a better understanding of our dependency on good water quality, how fragile the ecosystems that supply it are, and the links between human and ecosystem health.

Today, our freshwaters face multiple threats from human activities. Some are relatively local and have an instant impact, like an untreated effluent source entering a river (United Nations World Water Assessment Programme [WWAP], 2017), while others are more widespread and persistent like agricultural nitrate pollution of groundwaters (Biswas and Jamwal, 2017; European Environment Agency [EEA], 2018). In addition to those that are well publicized and understood, freshwaters are under threat from a host of pressures that are less commonly described. These include pollution from organic micropollutants, pharmaceuticals and microplastics; disruption of natural flow patterns and loss of habitat connectivity from dam construction; introduction of invasive species; and changes to sediment budgets and habitat loss from sand mining.

There is a significant gap in our understanding of how these pressures interact and how aquatic ecosystems can cope under the backdrop of climate change. For example, how does an aquatic ecosystem cope if it receives nutrients far above natural levels, has had flow patterns and sediment budgets altered, receives a cocktail of pollutants, and a non-native species is showing signs of becoming invasive, while simultaneously experiencing changes to weather patterns and hydrological regimes?

1.3.1. Agriculture

Agriculture is essential to sustain us, but it continues to negatively affect our freshwaters and in terms of impact is one of the most widespread drivers of poor water quality. Globally, around 38 per cent of all land is used for agriculture, and this land and its adjacent freshwaters are inextricably linked (Chen *et al*., 2018). If we continue to degrade the land, this will impair water security by reducing the quality, quantity and reliability of water flows (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPBES], 2018). With the global population estimated to reach about 8.5 billion by 2030, and rise further to 9.7 billion by 2050 (United Nations Department of Economic and Social Affairs [UNDESA], Population Division, 2019), ensuring food security and sustainable agriculture to feed this growing population is essential to achieve the SDGs. Projections suggest the population of countries in sub-Saharan Africa could account for more than half of this growth (UNDESA, Population Division, 2019), and it is in this region where food security is most threatened – today, about 239 million sub-Saharan Africans are undernourished (Food and Agriculture Organization of the United Nations [FAO], United Nations Economic Commission for Africa [UNECA] and African Union Commission [AUC], 2020). Food security is about more than food production, but increasing agricultural output sustainably will be necessary to feed the growing population in a way that avoids further impact on freshwaters. As this report shows, there is a significant water quality data gap in this region.

Excess nutrients in our freshwaters can unbalance ecosystems and cause excessive growth of aquatic plants, leading to eutrophication, which can, in turn, lead to oxygen depletion, dead zones and biodiversity loss. Nutrients from fertilizers can enter waterways by being flushed from the land during rain events or by percolating down through the soils into groundwater. These nutrient losses can be controlled with good management, but even if all best management practices were applied today, depending on the soil and sediment type, as well as natural background levels, nutrients could still enter our freshwaters above natural rates due to a build-up in the soils and sediments, and could continue to be released into our rivers and lakes for many years into the future. In the United States of America alone, poor water quality due to eutrophication is estimated to cause damage which costs around USD 2.2 billion per year (Dodds *et al*., 2009).

In addition to increasing nutrient concentrations, agriculture can impact water quality in other ways. These impacts are determined by the type and intensity of the agriculture, which in turn are driven by the resources available, local climate, topography of the land, the soil type, history and market demands. Mobilization of sediment is a significant problem, especially in crop production systems that include periods of the year in which soils are exposed. Changes to natural flow patterns are created through land drainage and abstraction, while pesticides and pharmaceuticals used to treat animals can also enter surface and groundwaters.

In surface waters, studies have found that concentrations of pesticides exceed guideline limits in many countries and are high even in countries with stringent environmental regulations. Worldwide improvements to current pesticide regulations and agricultural pesticide application practices are needed (Stehle and Schulz, 2015). More of these chemicals reach our freshwaters than are necessary and they will have a direct impact on the flora and fauna found in them.

1.3.2. Wastewater

Untreated wastewater remains a significant problem in most countries (WWAP, 2017). In addition to nutrients and organic matter entering freshwaters, wastewaters can also contain a cocktail of toxic compounds including those from the food and beverage, textiles, printing and manufacturing sectors, many of which are rarely monitored. With an estimated 80 per cent of wastewater being discharged into water bodies without any prior treatment, industry is globally responsible for dumping tons of heavy metals, solvents and other wastes directly into water bodies each year (WWAP, 2017).

Pharmaceutical products and organic micropollutants that are not adequately treated in standard wastewater treatment processes (Coggan *et al*., 2019) enter our freshwaters in unknown concentrations. Many of these have the capacity to accumulate along food chains to concentrations where they can mimic the natural hormones of fish, for example, or have other sublethal impacts that can affect ecosystem function (Organisation for Economic Co-operation and Development [OECD], 2019).

1.3.3. Mining

Mining activities have made the headlines in recent years, usually the result of a tailings dam breach that releases toxic waste and sediment hundreds of kilometres downstream. But less dramatically, routine mining operations and abandoned mines continue to impact freshwaters from both industrial- and artisanal-scale enterprises. Acid mine drainage and mining-affected water can release toxic substances such as heavy metals that can be extremely harmful to those ecosystems downstream.

1.3.4. Water quality and climate change

Climate change is already affecting and will continue to affect the quality, quantity and availability of water for basic human needs (United Nations Educational, Scientific and Cultural Organizations [UNESCO] and UN-Water, 2020). The extent and degree of the impact is still uncertain (Whitehead *et al*., 2009), but it is expected that water quality impacts could be driven primarily by changes in rainfall patterns. For example, increases in rainfall and rain storm intensity may result in wastewater collection systems from domestic and industrial sources directly becoming overwhelmed and releasing untreated wastewater directly into water courses. This will lead to excess pollutants entering rivers and lakes and also an increased risk of pathogenic contamination. Drought conditions may cause freshwater resources to become more saline as river flow is reduced. Reductions in rainfall, particularly in agricultural areas, could result in increases in salt, both on land and in the water, as well as a reduction in the dilution of contaminants.

Acid mine drainage colours a river orange. Cyprus. By Anna Kucherova on Shutterstock

Freshwater bodies in close proximity to coasts are at risk from sea level rise, but more widely, higher water temperatures will reduce the concentration of dissolved oxygen available to animals and plants living in the water and will also drive biogeochemical imbalances. These imbalances may lead to more frequent algae blooms, and faster growth of pathogens (Chapra *et al*., 2017).

In arctic areas, where temperatures are predicted to increase further than at lower latitudes, freshwater ecosystems are at risk from toxins stored in the ice. Mercury and polychlorinated biphenyls (PCBs) were found to increase between 2000 and 2008 in Canadian fish, and this pattern was attributed to increased temperatures over this same period (Jackson *et al*., 2010). The higher temperatures led to higher rates of algae growth and the release of contaminants once stored in melting ice. These two factors combined lead to accumulation of these toxins in fish.

Recent studies have also looked at the relationship between water quality and climate change from another perspective – how water quality can affect climate change. It has been discovered that polluted water bodies release greenhouse gases at far higher rates than unpolluted water bodies and therefore can exacerbate climate change. When river water quality deteriorated from "acceptable" to "very heavily polluted", its global warming potential increased tenfold (Ho *et al*., 2020).

1.4. Gathering information on global ambient water quality status and trends

To understand the status and trends of freshwater quality at the global level is an enormous and complicated task. Although the picture is incomplete, high-quality information is available for certain regions and for particular aspects of water quality, and sustained efforts are ongoing to fill these existing knowledge gaps. An example of these efforts is available in the initial baseline report to the fifth session of the United Nations Environment Assembly (UNEA 5) as part of the World Water Quality Assessment (WWQA). The baseline report (WWQA, 2021) is a precursor to the full assessment and builds on the 2016 *Snapshot of the World's Water Quality* (UNEP, 2016) to provide a global picture. In the latest report, which lays the foundation for future work, the key relevant findings are listed below.

- In 2020, anthropogenic nutrient sources contribute more than 70 per cent of river nutrient loading (Beusen *et al.,* 2016).
- Harmful algae blooms are now spreading in many river basins (Glibert, 2017; 2020).
- Concentration hotspots are, for most contaminants, densely populated areas, particularly those where wastewater treatment is limited. Groundwater arsenic and surface water salinity concentration hotspots include China, India and Mongolia.
- Estimates of water quality impacts on food security reveal that over 200,000 square kilometres of agricultural land in South Asia may be irrigated with saline water, exceeding the FAO guideline for irrigation water of 450 milligrams per litre.
- It is estimated that over 154,000 square kilometres of agricultural land in South Asia may be irrigated with groundwater with arsenic concentrations that exceed the World Health Organization guideline value of 10 micrograms per litre.

- First estimates of water quality impacts on food security show hotspots in Africa, north-eastern China, India, the Mediterranean, Mexico, the Middle East, parts of South America, and the United States of America.

- Aquaculture and mariculture production are important to produce high-quality protein, but both could be at risk because of water pollution such as from increased nutrient concentrations.

- Wastewater reuse in irrigation is an option to overcome water shortages and to close the nutrient cycle; however, the food may become contaminated by faecal coliform bacteria and other pathogens, antimicrobial resistant microorganisms and chemicals in wastewater that has not been sufficiently treated.

Biodiversity loss is one of the three planetary crises that are most relevant right now. At the forefront of this loss are freshwater fish. This group are key to the health of aquatic ecosystems, as well as supporting livelihoods and providing food and opportunities for recreation. Unfortunately, the number of species that are threatened or endangered globally provides a useful metric on the state of aquatic ecosystems. The IUCN Red List estimates that approximately 30 per cent of all monitored species are threatened with extinction and in 2020 alone, 80 species went extinct (IUCN, 2021). There are number of pressures beyond water quality that affect fish populations and their ability to survive such as dam construction, invasive species, dredging of habitat, water extraction and wildlife crime (Hughes *et al*., 2021), but a damaged aquatic ecosystem is less able to tolerate direct pressures on water quality such as extra nutrients and pollutants and is less likely to provide the ecosystem services we rely on.

1.5. What action is currently being taken?

The centrality of water to achieving the SDGs is recognized, as is the fact that the quality of that water directly impacts human and ecosystem health – but what is being done to safeguard and improve water quality?

1.5.1. Decade of Action and SDG 6 Global Acceleration Framework

The SDG 6 Global Acceleration Framework[1] is a new, unifying initiative that aims to deliver fast results at an increased scale.

It is part of the United Nations Secretary-General's Decade of Action to deliver the SDGs by 2030. The Framework, coordinated by UN-Water, is driven by country demand and will unify the international community's support to countries to achieve SDG 6. The acceleration of SDG 6 implementation supports many – if not all – other SDGs, particularly those related to health, education, food, gender equality, energy and climate change (UN-Water, 2016).

Action is driven by five accelerators, as shown in Figure 1.

1 Available at https://www.unwater.org/publications/the-sdg-6-global-acceleration-framework/.

Figure 1. The SDG 6 Global Acceleration Framework action pillar accelerators

Source: UN-Water (2020).

Data and information: Build trust through data generation, validation, standardization and information exchange for decision-making and accountability.

Financing: Optimize financing for water and sanitation. Funding gaps impede implementation of water quality monitoring and assessment programmes. Improved targeting, better utilization of existing resources, and mobilization of additional domestic and international funding are required.

Capacity development: A better-skilled workforce improves service levels and increases job creation and retention in the water sector (see Focus Box 1).

Innovation: Leverage and scale-up innovative practices and technologies.

Governance: National and international collaboration across boundaries and sectors will make SDG 6 everyone's business.

FOCUS BOX 1. COUNTRY STORY – SIERRA LEONE AND CAPACITY DEVELOPMENT

Background

Sierra Leone reported on SDG indicator 6.3.2 for the first time in 2020.

In 2017, during the baseline data drive for this indicator, the national focal point **highlighted data gaps**, and identified the need to **build capacity** in the country to ensure water quality data could be reliably collected.

As a first step, the national focal point, Mr Mohamed Sahr E Juanah, Director of Hydrological Services within the National Water Resources Management Agency (NWRMA) undertook a **Postgraduate Diploma in Freshwater Quality Monitoring and Assessment** with the United Nations Development Programme Global Environment Monitoring System (UNEP GEMS)/Water Capacity Development Centre at University College Cork, and went on to complete his Master's thesis.

Using the **knowledge** he gained during his studies, he:

- designed a monitoring programme
- secured suitable field equipment
- implemented the programme and collected data
- analysed the data and classified the water quality of the Rokel River basin for the first time.

Rokel River at Rogbere bridge, Sierra Leone.
Photo credit: NWRMA.

Outcomes

The new monitoring programme included the establishment of:

- defined monitoring stations and a monitoring regime
- prescribed analytical procedures
- quality control and quality assurance protocols
- standard operating procedures.

The first data set collected for Sierra Leone using these criteria will be used as a baseline for future monitoring campaigns.

Staff of the NWRMA were trained in water quality monitoring and assessment.

It was identified that the Rokel basin has a naturally high phosphate content and very low electrical conductivity values.

An SDG Indicator score of **41.7** was reported. Of the 12 water bodies classified, seven failed to meet the 80 per cent compliance criteria and measures to tackle the causes of pollution are needed.

Future

- **Expand** monitoring to neighbouring basins and eventually to national level.
- **Develop** laboratory-based analytical capacity.
- Ensure additional staff **are trained** through continuous professional development courses.
- Develop a **data management** framework that allows the data to be stored, analysed, and shared more easily.
- Further refine the **target values** used to classify water quality, to improve the sensitivity of the assessment.
- Implement **management actions** to identify and **mitigate pollution** and **improve water quality** over time.

1.5.2. World Water Quality Alliance

The World Water Quality Alliance[2] (WWQA) is a global, voluntary and flexible multi-stakeholder network that advocates the central role of freshwater quality in achieving prosperity and sustainability. It explores and communicates water quality risks in global, regional, national and local contexts and points towards solutions for maintaining and restoring ecosystem and human health and well-being, aiming to serve countries throughout the lifetime of the 2030 Agenda for Sustainable Development and beyond. The WWQA was convened to respond to the request made by the United Nations Environment Assembly (UNEA) in UNEP/EA.3/Res.10 on “Addressing water pollution to protect and restore water-related ecosystems” for UNEP to develop a world water quality assessment. Recognizing that a transdisciplinary partnership is necessary to deliver this, UNEP has already convened over 50 partner organizations (including United Nations agencies, researchers, civil society and the private sector) that have expressed interest in engaging in the assessment and also in helping UNEP to identify priority agendas and action around emerging issues related to water quality more broadly. A major output of the WWQA so far is the *World Water Quality Assessment* (World Water Quality Alliance [WWQA], 2021), the most recent findings of which are summarized on page 6 overleaf. The assessment develops the concepts published in the Framework for Freshwater Ecosystem Management (UNEP, 2017) (see chapter 5). SDG monitoring will improve data availability to support the assessment. Simultaneously, the Framework will provide a holistic base to combine these monitoring and assessment aspects for the protection of ecosystems, thereby linking with other SDG 6 indicators. This will provide more information on the factors and pressures influencing water quality, as well as their impacts and the corresponding responses, rather than just on the perceived status quo. The benefits of this holistic approach to freshwater ecosystem management are discussed again in chapter 5.

Plastic waste next to a child in a boat. Negro River, Amazon. By Nelson Antoine on Shutterstock

2 See https://communities.unep.org/display/WWQA.

2. Monitoring ambient water quality

In 2030, without data based on sound and reliable monitoring of water quality, it will be impossible to know whether our efforts to reach target 6.3 have been met. This chapter explains why monitoring is so important and provides a brief overview of the indicator 6.3.2 methodology. This section also explains why obtaining clear and reliable information on the state and trends of water bodies can be difficult, and discusses the various approaches to monitoring beyond the in situ approach used for indicator 6.3.2 reporting. Finally, it lists the capacity-development materials produced to support those tasked with reporting.

2.1. Monitoring methodology

Monitoring programmes are carefully designed to answer specific questions. For example, a programme designed to answer questions about ambient water quality status and trends will differ from one designed to answer questions about the extent and scale of a chemical spill. The type of programme that is required for indicator 6.3.2 reporting requires data to be collected systematically on basic water-quality parameters over a wide spatial scale and in a consistent and regular manner. If designed well, bringing these data together will make patterns clear and help answer questions concerning water quality at different spatial scales such as national or river basin level, as well as over time such as "is our water quality improving or degrading"?

Water quality can be monitored using various methods that are designed to address specific information gaps. Indicator 6.3.2, at its most basic, uses methods that focus on the physico-chemical characteristics of water that change in response to pressures that are globally relevant. These are nutrient enrichment, oxygen depletion, salinization, and acidification (Table 1).

There are many other water quality parameters that are often routinely measured such as heavy metals or pesticides, as well as alternative monitoring approaches such as those that look at the species that live in the water, and Earth observation techniques that rely on satellite imagery. These additional parameters and approaches are captured under Level 2 monitoring and are summarized in Figure 2. Level 1 monitoring maintains the global comparability of the indicator and focuses on parameters that can be analysed in the field and do not require laboratory facilities, whereas Level 2 goes further and provides the flexibility for countries to include information that may be of national concern or relevance. Further details on the indicator methodology and supporting materials can be found on the SDG 632 Support Platform.[3]

3 See https://communities.unep.org/display/sdg632/Documents+and+Materials?preview=/32407814/38306675/CEDEUS-DGA-Implementation%20of%20SDG%20Indicator%206.3.2%20in%20Chile-v2020.pdf.

Table 1. Suggested parameters for Level 1 parameter groups (in bold), the relevant water body types and reasons for their inclusion in the global indicator

Parameter group	Parameter	River	Lake	Groundwater	Reason for inclusion
Oxygen	**Dissolved oxygen**	●	●		Measures oxygen depletion
	Biological oxygen demand, chemical oxygen demand	●			Measures organic pollution
Salinity	**Electrical conductivity** Salinity, total dissolved solids	●	●	●	Measures salinization and helps characterize the water body
Nitrogen*	**Total oxidized nitrogen** Total nitrogen, nitrite, ammoniacal nitrogen	●	●		Measures nutrient pollution
	Nitrate**			●	Consumption threatens human health
Phosphorus*	**Orthophosphate** Total phosphorus	●	●		Measures nutrient pollution
Acidification	**pH**	●	●	●	Measures acidification and helps characterizes the water body

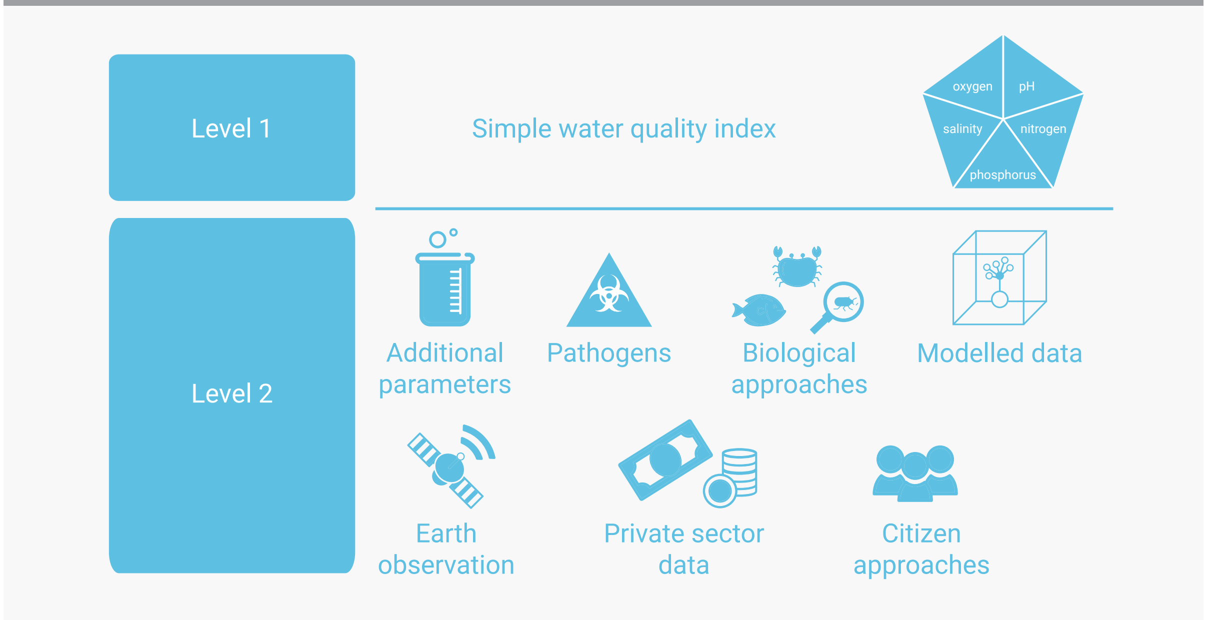
* Countries should include the fractions of nitrogen and phosphorus which are most relevant in the national context.

** Nitrate is suggested for groundwater due to the associated human health risks.

Source: UN-Water (2018b).

Level 2 approaches may include biological or microbiological methods, satellite-based Earth observation techniques, or citizen science initiatives (See Focus Box 2). These are summarized in, but not limited to, those shown in Figure 2.

Figure 2. Example of Level 1 and Level 2 data sources that can be used for SDG indicator 6.3.2 reporting



Source: UNEP GEMS/Water (2020).

Biological approaches include using animals or plants and algae that live in the water. Microbiological approaches may look for the presence or absence of bacteria that are known to be harmful to humans. Satellite-based Earth observation techniques analyse the colour and reflectance of images of the surface of water bodies at various wavelengths, captured by satellites. These can be used to measure optically active parameters, such as chlorophyll or turbidity. Recent developments in information and communications technology have fuelled the growth and popularity of citizen approaches to data collection.

These allow data to be collected using simple kits and can accurately geolocate the data collected using mobile devices. These citizen initiatives may lack the accuracy and precision of laboratory-based analyses but have the advantage of being able to collect data at many more locations and at a greater frequency than conventional monitoring. Many private-sector companies that abstract water directly or discharge to water bodies collect data on quality to fulfil compliance requirements, and modelling approaches have potential to help fill data gaps.

FOCUS BOX 2. MINISASS – CITIZEN BIOMONITORING FOR INDICATOR 6.3.2

Background

miniSASS allows non-specialists to determine the quality of water in streams and rivers. By counting the different groups of **macroinvertebrates**, users can generate a score that reflects the **health of the river** for that location at a point in time.

miniSASS was developed based on the South African Scoring System **(SASS)** and uses a streamlined taxonomic system that reduces the required classification skills to easily identifiable features such as the number of tails or pairs of legs.

The miniSASS method has been **rigorously tested** and was found to reliably predict a SASS score.

This method is widely used in South Africa and neighbouring countries. **Globally**, it has been effectively applied in India at high altitude, as well as in Brazil, Canada, Germany and Viet Nam.

The miniSASS platform is maintained by the organization **GroundTruth** that verifies the incoming data and is supported by the **Water Research Commission of South Africa**. More information is available at www.minisass.org/website.

Method

Biomonitoring methods such as miniSASS have been used for decades to assess water quality. These methods rely on the presence, absence or abundance of species that are driven by their tolerance of water quality. Some species are **more sensitive than others** and are not found where water quality is poor.

Samples are collected by disturbing the river substrate and collecting the macroinvertebrates in a net. The sample is emptied into a white tray, and using a simple dichotomous key, users are guided through the **classification process**. More sensitive groups such as stoneflies are scored higher than tolerant groups such as leeches or worms.

There are five possible categories of water quality ranging from **"Natural"** through to **"Very poor"**.

Potential

Efforts to engage citizens in water quality data-collection programmes can accelerate progress on target 6.3 by simultaneously **filling data gaps** and **engaging citizens**, creating ownership of the SDGs.

Empowering citizens with the **tools of scientific data collection** and providing **education** on water quality concepts establishes a connection between local knowledge of the pressures on water bodies and the observed in-stream water quality. This connection can be a **powerful motivation** to help drive change.

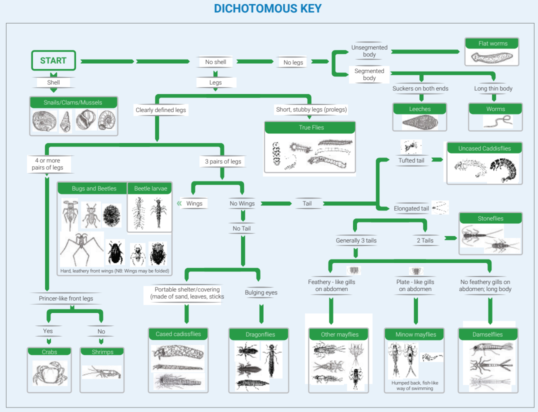
Future

Acceptance of citizen-derived data for official SDG reporting is rare. To build confidence, **upscaling and testing** of these methods is needed to ensure these data both are and are **seen to be suitable**.

This method has **global potential**, but further testing is needed to ensure the method is **optimized** for local conditions – it works, but could performance be improved?

miniSASS has the potential to **complement** physico-chemical data currently used for indicator 6.3.2 to provide a **comprehensive picture** of water quality.

DICHOTOMOUS KEY



miniSASS dichotomous key used to identify macroinvertebrates. Photo credit: miniSASS.org.

2.1.1. Target values

It is important to recognize that ambient water quality within the indicator 6.3.2 framework is not considered with any particular "use" of water in mind. This is because it is important that the quality of water in our rivers, lakes and aquifers is compared with natural conditions before it is designated for a particular human use.

Indicator 6.3.2 uses a target-based approach to classify water quality. This means that the measured values are compared with numerical values that represent "good water quality". These targets may be water quality standards that are defined by national legislation or they may be derived from knowledge of the natural or baseline status of water bodies.

Targets can be nationwide values, or alternatively, they can be water-body-specific or even site-specific. The more specific a target, the better it is at indicating potential pollution problems.

Setting specific target values that relate to an unimpacted reference condition or a *benchmark* against which to measure change is challenging because many ecosystems have been impacted for so long that we have lost sight of their original natural condition. It is beyond practical measures to restore all water bodies to this natural condition, but estimating this state provides us with good information for management. A full overview of this topic is covered in UNEP's Framework for Freshwater Ecosystem Management (UNEP, 2017).

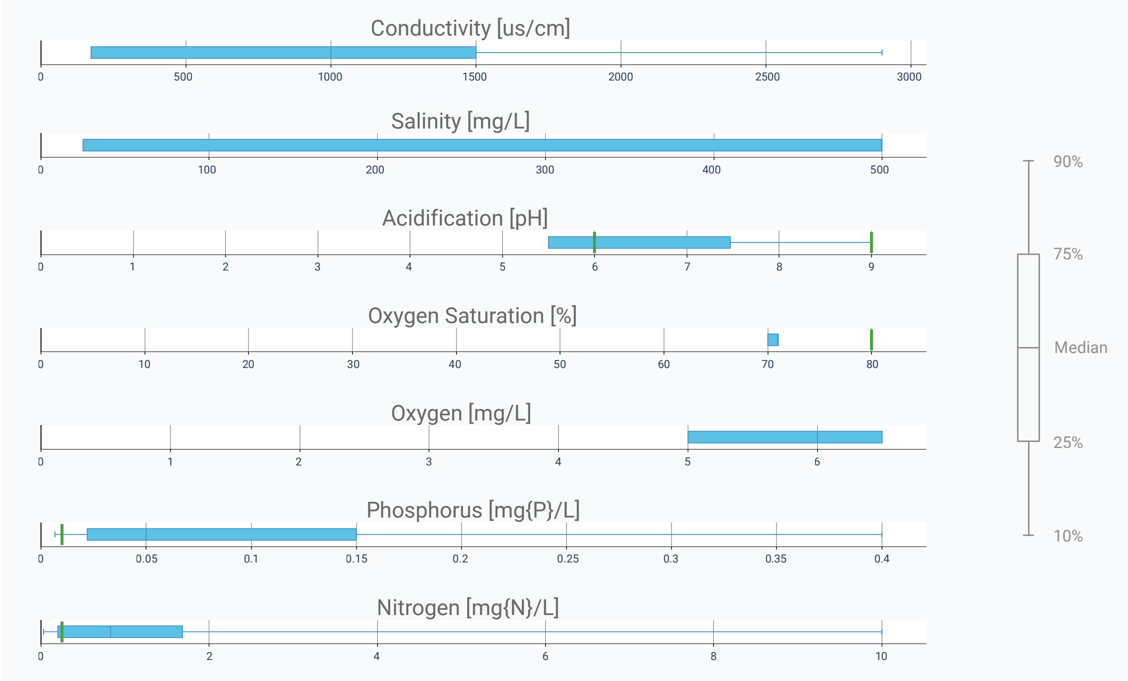
Careful information gathering that leads to a more complete understanding of the natural variation of freshwaters over both space and time creates a more complete picture to better define "good ambient water quality". Only then can we fully understand how human activities have impacted – and are impacting – these water bodies by comparing the current state to this reference condition. Collecting data and reporting on SDG indicator 6.3.2 can provide this information which is an essential prerequisite for water quality management.

How did countries apply the target value concept in 2020?

The target value concept has a significant bearing on the indicator score reported by a country and influences its international comparability. Figure 3 shows the range of indicator scores reported for the core parameter groups in 2020. Salinity is represented by conductivity and salinity, while oxygen is represented by oxygen saturation and oxygen concentration. The various fractions of the core parameters (nitrogen and phosphorus) that countries reported (for example, total oxidized nitrogen or nitrate for nitrogen, or total phosphorus or orthophosphate for phosphorus) have been converted to element concentrations in milligrams per litre. The left- and right-hand side of the boxes represent the twenty-fifth and seventy-fifth percentiles, respectively.

There was a wide range of target values reported (Figure 3), but importantly, there was a substantial improvement when compared with those targets used in 2017. For example, in 2017, pH targets ranged from 3.26 to 10, whereas in 2020, they ranged between 5.5 and 9. Similarly, in 2017, the lowest target value used for per-cent oxygen saturation of oxygen was 30 compared with 70 in 2020. Using the same target for all water bodies is not recommended due to the natural variation of water bodies, but this contraction in the range of targets used suggests that the indicator methodology is being applied more consistently and in-line with the recommended methodology and optional target values suggested by UNEP (Warner, 2020).

Figure 3. Range of target values for the five core parameters, reported by countries during the 2020 data drive



Note: The green lines represent the optional target values suggested by UNEP GEMS/Water.

For comparison, these optional target values are indicated in Figure 3 by green vertical lines for pH, oxygen saturation phosphorus and nitrogen.

2.1.2. Spatial reporting units

The indicator methodology allows reporting at different spatial levels. Countries can choose which spatial level to report at. National-level reporting requires countries to report for each water body type at the national level alone. Countries also have the choice to report at the river-basin (reporting basin district or "RBD"), or water-body levels. Reporting by subnational hydrological units allows differences in water quality to be made clear for managers and policymakers. The RBD concept provides a practical spatial unit that can be used for management purposes.

This is especially relevant for countries that share transboundary waters where strategic efforts to assess and manage water quality are of benefit to all countries.

Water bodies are smaller units that lie wholly within an RBD. It is these smaller discrete units that are classified as being either "good" or "not good" water quality. The impacts of poor water quality are felt at this local level, where actions to improve quality are carried out. There are three types of water body: a section or a tributary of a river; a lake; and an aquifer. Ideally, river water bodies should be delineated to ensure they are homogeneous in terms of water quality.

This allows the water body to be classified as "good" or "not good" using fewer monitoring stations. Each lake water body may require many monitoring locations to ensure that quality can be classified reliably, and aquifer water bodies require a thorough understanding of the hydrogeological environment.

2.1.3. Classification of ambient water quality

To classify whether a water body is of "good ambient water quality" or not, a threshold is applied where 80 per cent or more of monitoring values meet their targets. This is applied at the monitoring location level, using data collected over the three-year reporting period to classify a monitoring location as either "good" or "not good", and if there is more than one within a water body, this binary classification is aggregated up to the water body level. To calculate an RBD or national indicator score, the total number of water bodies classified as good as a proportion of the total number classified is used.

For example, if a country assessed 20 water bodies and 15 were classified as "good", the national indicator score would be 75. Detailed information on the classification method is described in the *Introduction to SDG indicator 6.3.2* document.[4]

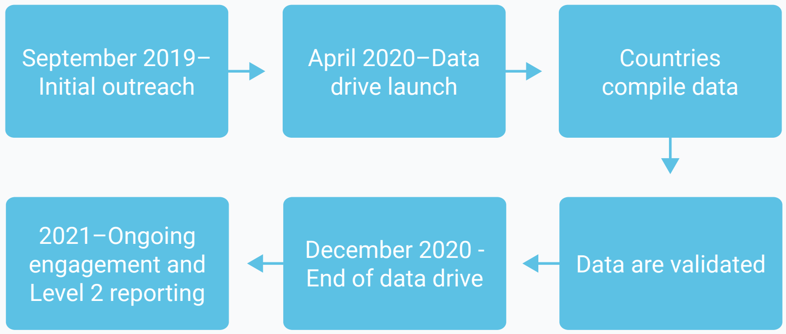
2.2. Summary of capacity-development activities and resources

Efforts to reach out to countries and address queries and challenges were performed through the SDG indicator 6.3.2 Helpdesk. This served as the first point of contact for those tasked with reporting for their country. Initial outreach began in 2019 to raise awareness about the upcoming data drive and to confirm old, or establish new, focal points.

Woman on a boat. Peru. By Belikova Oksana on Shutterstock

4 See https://communities.unep.org/display/sdg632/Documents+and+Materials?preview=/32407814/38306458/SDG_632_Introduction%20to%20the%20Methodology_EN%20(3).pdf.

Figure 4. Schematic of 2020 data drive for SDG indicator 6.3.2 showing key milestones



Following the first baseline data drive of 2017, UNEP sought feedback from countries to identify aspects of the methodology and the reporting workflow that were found to be most challenging. In response, and guided by the feedback, a series of documents and videos were created to help those tasked with reporting and new processes were put in place.

Central to these efforts was the SDG 6.3.2 Support Platform.[5] This platform served as the source for all related support and as a repository for documents and videos that covered any essential knowledge gaps identified, as well as targeted in-depth technical knowledge. This page has been accessed over 3,000 times since the launch of the 2020 data drive. The materials available on this platform are summarized in Table 2 below. Efforts were made to translate the materials into all six United Nations languages, where possible.

In addition to dealing with queries and providing feedback in 2020, for the first time, the Helpdesk offered countries the opportunity to use an indicator calculation service. This service meant that those struggling to report due to either technical or resource constraints were able to send their data to UNEP, and have their indicator calculated on their behalf. This was then returned to the country focal point for validation before being finalized.

5 See https://communities.unep.org/display/sdg632/Documents+and+Materials?preview=/32407814/38306458/SDG_632_Introduction%20to%20the%20Methodology_EN%20(3).pdf.

Table 2. Capacity-development materials created to support the 2020 data drive for SDG indicator 6.3.2

Title	Format		Description	Languages
Introduction to indicator 6.3.2			A short, condensed version of the "step-by-step methodology" that communicates the core concepts of the methodology. A video was also created.	EN, FR, SP, RU, AR, CN
Level 1 reporting template			An Excel template which is the primary reporting mechanism.	EN, FR, SP, RU
Reporting workflow description and demonstration			Provides an overview of the reporting steps to be taken to fill-in the Level 1 reporting template.	EN, FR, SP, RU, AR, CN
Technical documents and videos: 1. Monitoring programme design 2. Target values 3. Monitoring and reporting on groundwaters 4. Level 2 monitoring			Detailed technical information on critical aspects of the indicator methodology.	EN, FR, SP, RU, AR, CN (Videos EN, FR, SP)
Official step-by-step methodology			The official step-by-step methodology guide that was revised in 2018.	EN
Case studies			A series of case studies that tell stories of national implementation of the indicator or methodological innovation.	EN
Resource repository			A repository of relevant information published by scientific and national regulatory organizations.	EN

Water sample being taken. By kosmos111 on Shutterstock

3. Global status on ambient water quality

This section presents a summary of the 2020 data drive results and compares them with those from 2017 where relevant and they are discussed in terms of the new information they provide. To gain further insight, these data are combined with additional data sets including national gross domestic product (GDP) and information from other SDG 6 indicators.

In 2020, countries were given the option to report for both the current data drive and also, to report retrospectively for 2017.

Several countries chose this retrospective option because they were either unable to report in 2017, or because they have since updated their method of implementing the indicator and to ensure better temporal comparability over time, they chose to overwrite their previous 2017 submission. Table 3 shows a summary of the submissions received for both the 2017 and 2020 reporting periods.

Table 3. Summary of number of country submissions during each data drive including retrospective submissions

Description	Number of countries
Countries that reported in 2017	39[a]
Countries that reported in 2020 for the 2017 data period	21[b]
Total unique country reports for the 2017 data period	59
Countries that reported in 2020	89
Countries that reported for both the 2017 and 2020 data periods	49
Total unique country reports	96[c]

Notes:

[a] Excluding five countries with or without unreliable national indicator data.

[b] Including retrospective updates.

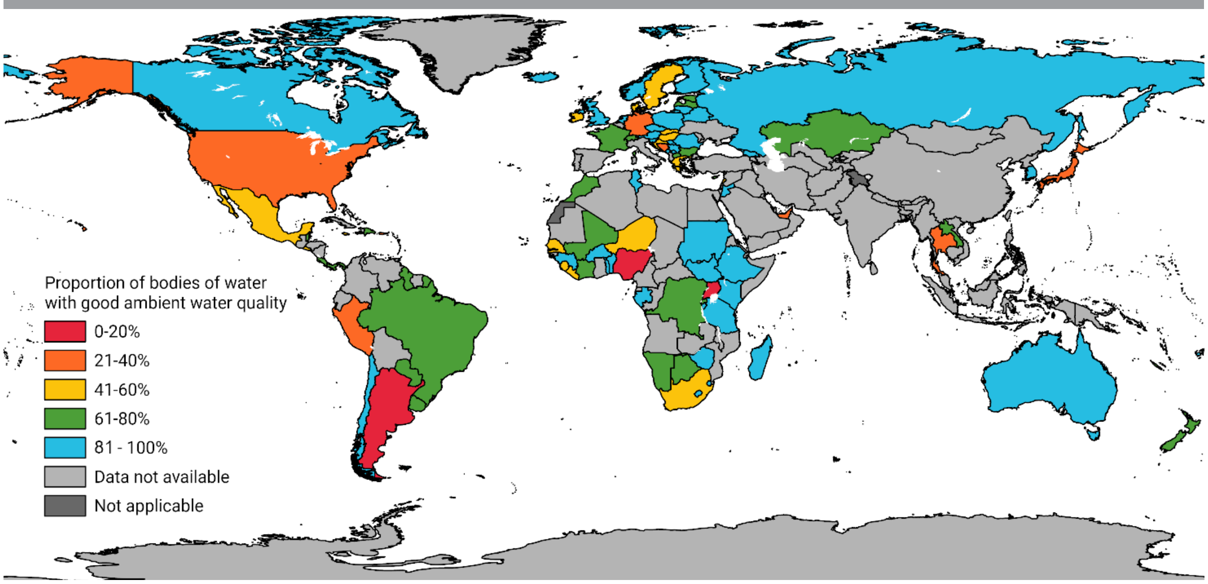
[c] There are 96 because information was available for 96 countries. Some countries only reported in 2017 and some reported for both data drives.

3.1. Global ambient water quality summary

The 96 countries for which information is now available for indicator 6.3.2 are shown in Figure 5. The global coverage of submissions is much greater compared with 2017, but still there are significant data gaps. Most notable are those in Central, Southern and Western Asia. Outreach efforts are ongoing in these regions to encourage future submissions.

Figure 5 also shows the proportion of water bodies classified as having good ambient water quality in each country. These results, although important, should be considered along with the supporting information that is submitted with a country's indicator score such as the number of water bodies reported on, and the number of water quality data records used in the calculation. This supplementary information is included in annex 1.

Figure 5. Map of latest available national indicator data, including submissions from 2017 and 2020 from 96 countries showing proportion of water bodies classified as having good ambient water quality



Source: Adapted from UN-Water (2021).

Many water bodies are still in good condition. A positive finding from the 2020 data drive was that 60 per cent of water bodies assessed (45,966 out of 76,151) have good ambient water quality. Protection is easier than restoration, so efforts to protect these water bodies must begin now. Identifying these water bodies is the first step to ensuring their protection, and although countries are asked to provide only aggregated data, the "raw" data prior to aggregation allows those water bodies that failed to meet the "good" classification to be identified (see Focus Box 3).

FOCUS BOX 3. COUNTRY STORY – CHILE AND THE IMPLEMENTATION OF SDG 6.3.2 METHODOLOGY

Background

Chile is long and narrow with rivers draining from the Andes in the east to the Pacific Ocean in the west. This **unique geography** creates an interesting hydrological environment with many short, high-gradient river basins that cover a huge latitudinal range (17° – 55° S).

The Dirección General de Aguas (the Chilean water agency – DGA) operates and maintains an extensive water quality monitoring network that stretches the length of the country, with over **one million** water quality records in their database. All **data are publicly available** through its *Banco Nacional de Aguas* (National Water Bank – BNA).

Method

DGA undertook in-depth analysis of the indicator methodology with the support of the Center for Sustainable Urban Development (CEDEUS) which is available on the Support Platform[1].

This comprehensive process involved **data cleaning** and **validation** to ensure only reliable data were used; definition of **reporting basins** and river **water body** units; selection of **monitoring stations** based on activity and data coverage; and target setting.

A **site-specific** target approach was developed using a hierarchical process:

1. available ambient water quality standards
2. historical data availability (2000–2014)
3. standards defined for specific water uses.

The report went on to calculate annual indicator scores and make suggestions for future work and improvements.

For the 2020 data drive, this method was slightly revised by designating the monitoring station as the "water body" rather than using the larger river basin hydrological units. This approach provided information at a finer resolution to help support management action. This same method was applied retrospectively to the 2017 data period.

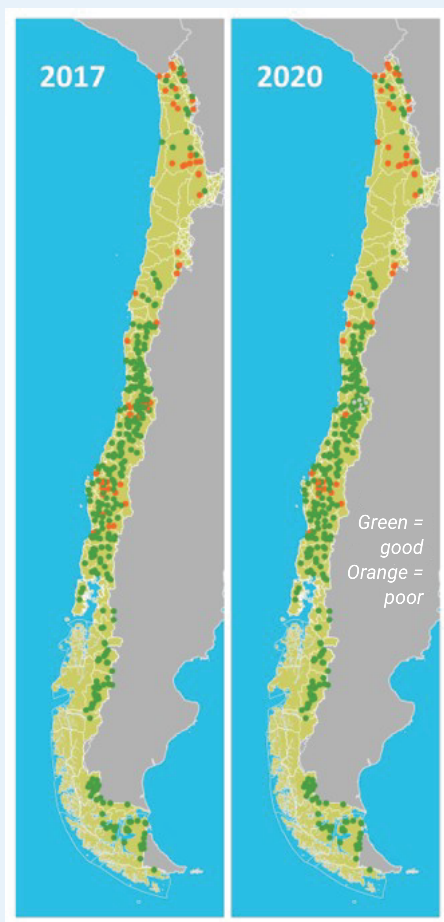
1 Centro de Desarrollo Urbano Sustentable and Dirección General de Aguas (2020). *Implementation of SDG Indicator 6.3.2 in Chile: Proportion of Bodies of Water with Good Ambient Water Quality.* Santiago, Chile. Available at https://communities.unep.org/display/sdg632/Documents+and+Materials?preview=/32407814/38306675/CEDEUS-DGA-Implementation%20of%20SDG%20Indicator%206.3.2%20in%20Chile-v2020.pdf.

Outcomes

The 2017 and 2020 submissions are summarized below.

Year	Number of river basins	Number of water bodies	Number of monitoring values	Indicator 6.3.2 score
2017	50	404	7,996	85.6
2020	50	413	7,169	84.0

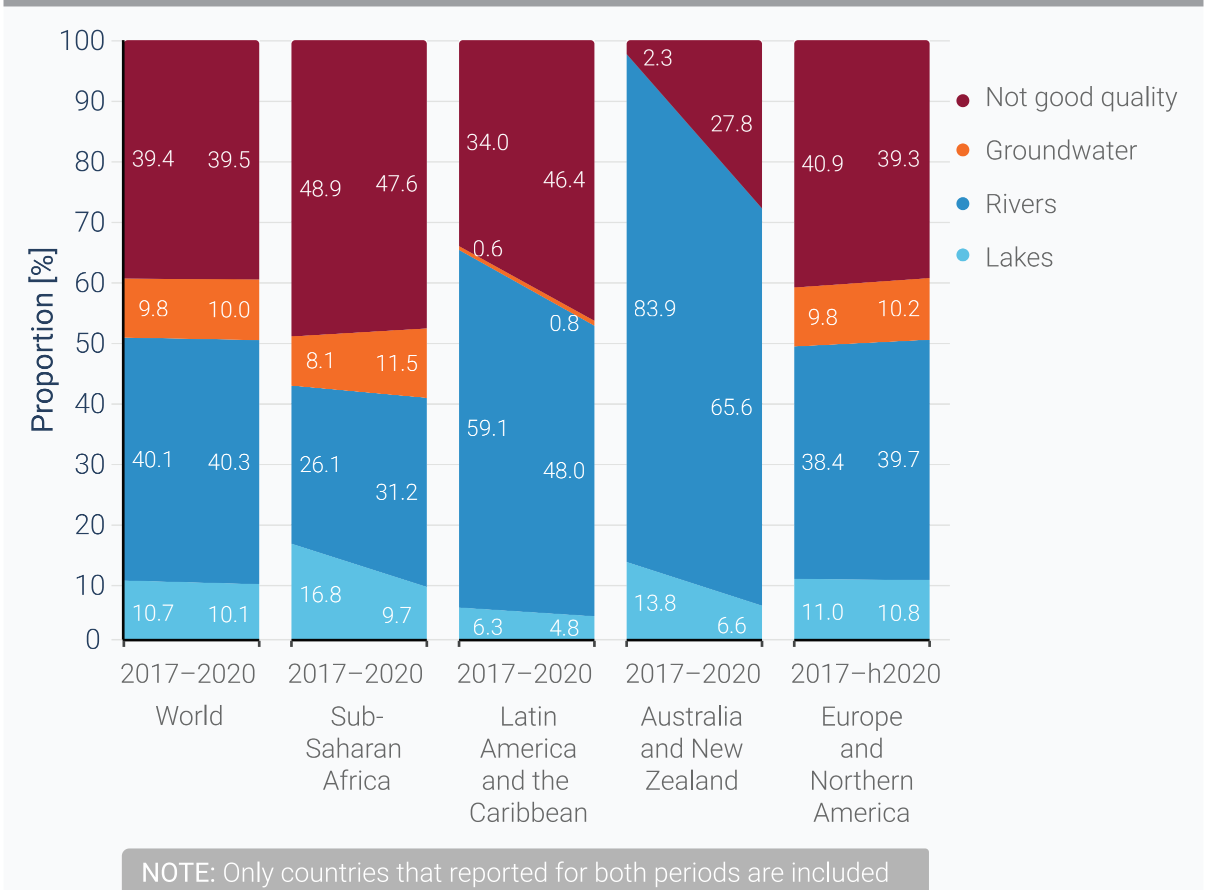
Using the core parameters of indicator 6.3.2, the water quality of Chile is generally good, with **84** per cent of water bodies classified as good. This is a slight reduction compared with the 2017 score of **85.6**. Further site-level investigation and analysis will be necessary to identify the cause of this trend.



3.2. Regional outlook

Figure 6 shows the change in the proportion of water bodies classified as "good" between 2017 and 2020 for different world regions. This figure, which can only represent those countries that reported for both data periods, shows that at both the global scale (left column), and for the European and Northern America region (right column), there was minimal change in the indicator score. The other world regions show more significant changes, both positive and negative, but as discussed in detail overleaf, any trends observed here are likely to be caused by changes in the implementation of the indicator at the national level rather than any real change in water quality.

Figure 6. Proportion of water bodies with good ambient water quality in countries that reported for both the 2017 and 2020 data drives, by water body type and SDG region

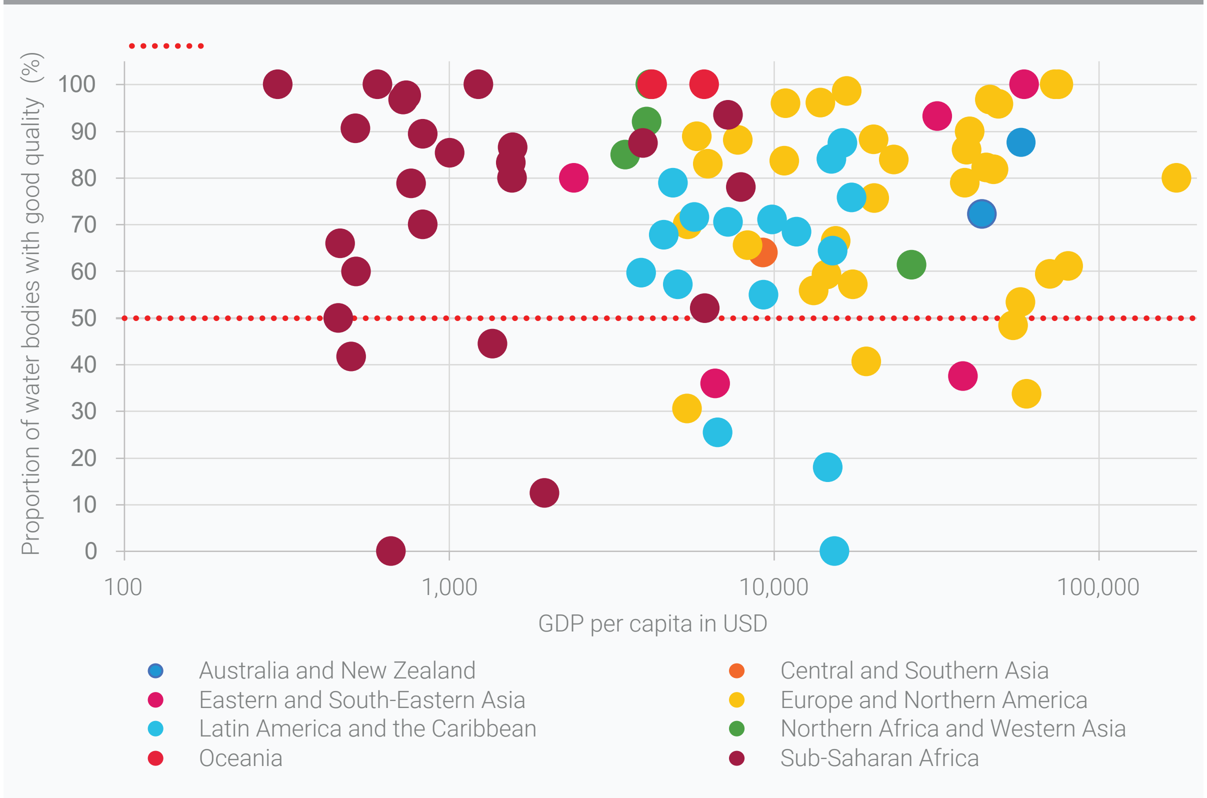


Notes: The red area at the top of the figure represents the proportion of water bodies not classified as "good". Only countries that reported for both periods are included in the figure.

Both good and poor water quality was reported in all world regions. Water quality is a pressing issue, wherever you live. As shown in Figure 7, in which each country is indicated by a dot, in all regions, the proportion of water bodies with good ambient water quality (indicated by the colour of the dots) varies.

Figure 7 also shows that the **reported water quality is not related to GDP**. Low-, middle- and high-income countries alike reported both good and poor water quality. The drivers of poor water quality are likely to be different, since in low-income countries, wastewater treatment levels are lower, whereas in higher-income countries where wastewater treatment rates are much higher and farming operations are more intensive and industrialized, run-off from agriculture is relatively a more serious problem.

Figure 7. Proportion of water bodies with good ambient water quality in countries, compared with their gross domestic product per capita (2017–2020)



Source: Adapted from UN-Water (2021).

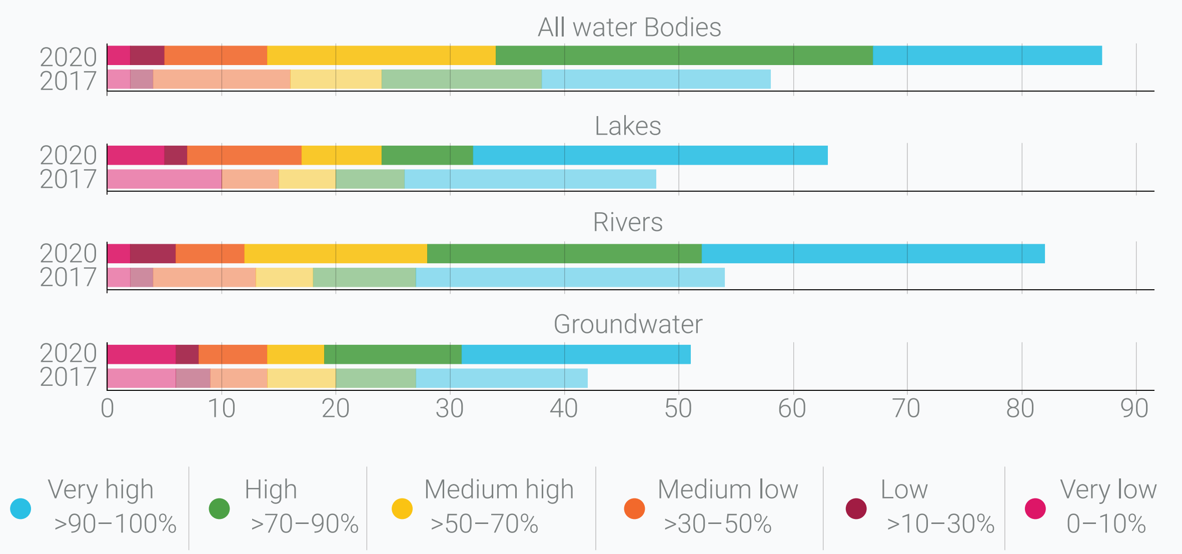
Notes: Each dot represents a country. The red dotted line represents the 50 per cent mark – countries above this line reported that the majority of their water bodies were of good quality. Both rich and poor countries reported both good and poor water quality.

3.3. Summary of global ambient water quality by water body type

The national indicator scores for both 2017 and 2020 are shown in Figure 8. These results have been classified into six groups, ranging from very low (less than 10 per cent of water bodies with good quality) to very high (more than 90 per cent of water bodies with good quality) and split by water body type.

The water body type that countries most frequently reported was rivers, followed by lakes and then groundwater. This was a repeat of the pattern observed in 2017. The greatest increase observed was also in rivers, followed by lakes and lastly, groundwaters. This trend reinforces the bias towards monitoring surface waters.

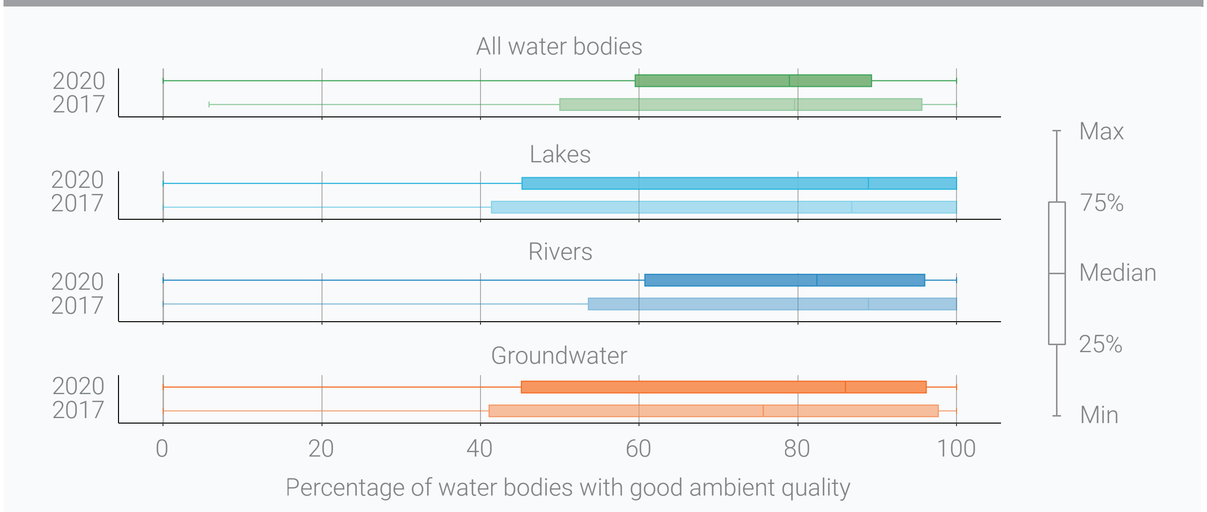
Figure 8. Number of countries that reported on indicator 6.3.2 in 2017 and 2020, split by water body type and aggregated into six categories of water quality



The range of indicator scores for both 2017 and 2020 for the different water body types, and total scores, are shown in Figure 9. This figure shows the results split by water body type and expressed using descriptive statistics (left of box = twenty-fifth, notch median, right of box = seventy-fifth percentiles; the left and right whiskers represent minimum and maximum scores, respectively). The individual indicator scores ranged between 0 per cent (no water bodies with good quality) and 100 per cent (all water bodies with good quality) for both data periods. The median score of all submissions was 80 per cent for the 2017 data period and 78 per cent for 2020.

Comparing 2020 with 2017 results shows a slight contraction in the ranges observed with the twenty-fifth and seventy-fifth percentiles moving towards the median for all water body types and increases in the median values for both lakes and groundwaters with a substantial drop for rivers. This possibly suggests a greater degree of standardization of approach in the methodology implementation.

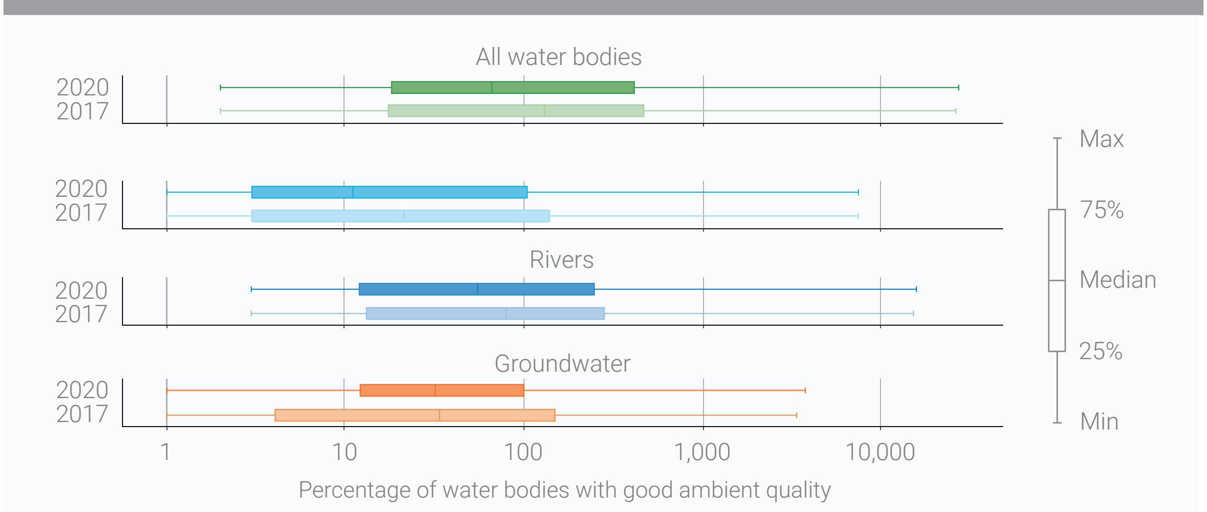
Figure 9. Range of indicator 6.3.2 scores reported for 2017 and 2020 data periods



The number of water bodies that countries included in their reports is summarized in Figure 10. Similar to Figure 9, the results are split by water body type and expressed by the same descriptive statistics. Figure 10 shows that the minimum and maximum number of water bodies a country reported on remained similar between 2017 and 2020.

However, despite an overall increase in the total number of water bodies reported on in this data drive because of the increase in the number of countries reporting, the median number reported by each country was lower in 2020 than it was in 2017.

Figure 10. Number of water bodies reported on in the 2017 and 2020 data periods



Note: The x-axis is on a logarithmic scale.

Lack of groundwater data. Groundwaters were reported on less frequently than rivers and lakes for both the 2017 and 2020 data drives. Of the 89 countries with data available, only 50 have information about groundwater, which is problematic because groundwater often represents the largest share of fresh water in a country. An understanding of the hydrogeological environment, the pressures on these resources, and how to monitor them effectively is lacking in many countries.

3.4. How does the capacity to monitor water quality vary between countries?

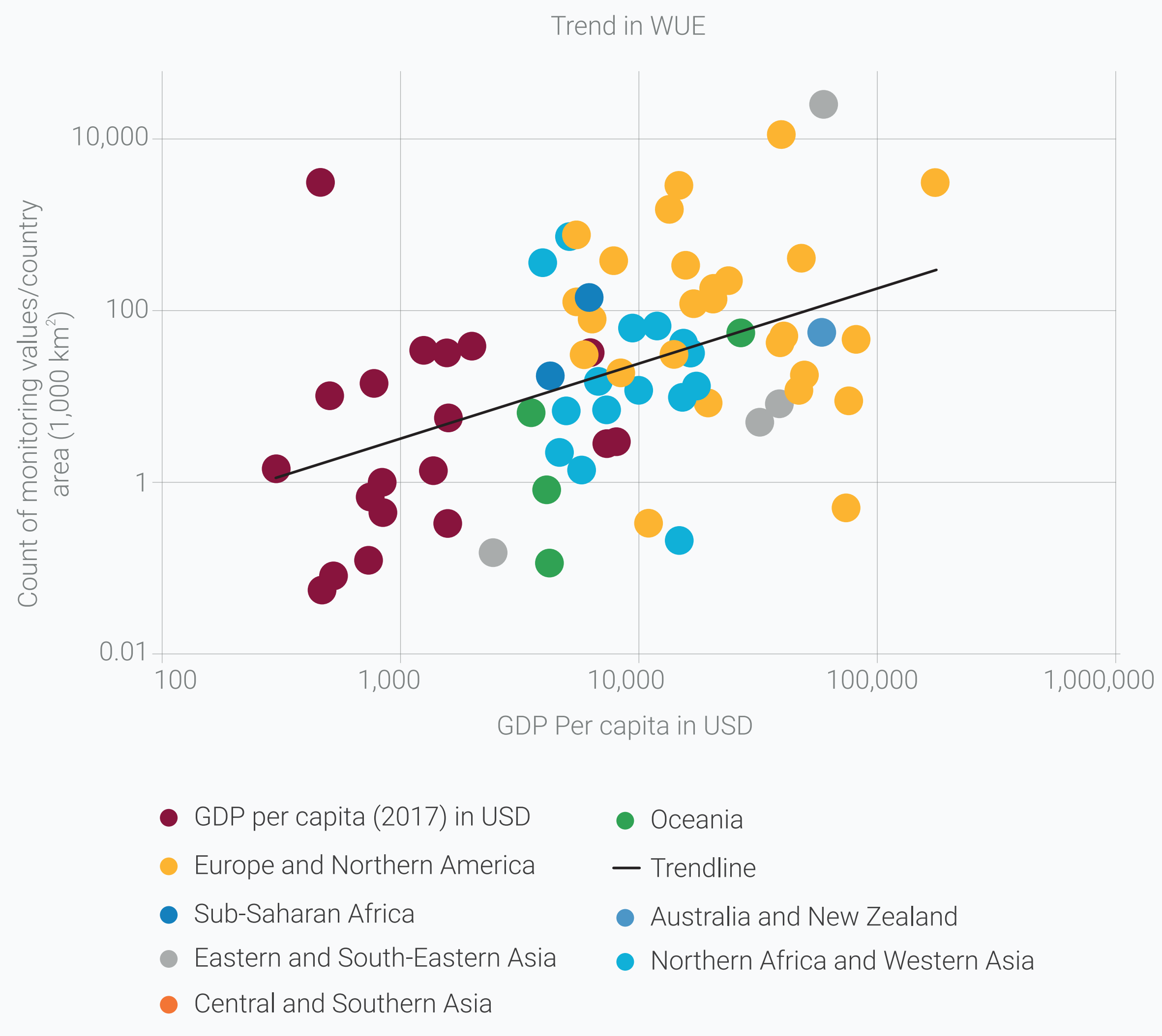
Despite an increase in the overall level of reporting, several capacity challenges emerged during engagement with countries and from the analysis of the submissions received.

A clear message evident from both the 2017 and 2020 data drives is that the **capacity to monitor is much less in low-income countries.** In many of these countries, water-quality data are not routinely collected, meaning that over **3 billion people** could be at risk because the health status of their freshwater ecosystems is unknown. Without monitoring, there is an information gap on the current health of aquatic ecosystems and no baseline against which to measure future change. This means that health and livelihoods, which are dependent on the services provided by these ecosystems, are at significant risk if the ecosystems are not able to continue to provide services such as clean water to drink and fish to eat. “More monitoring needed” can be an overused message, but a critically important one, especially when there is an overlap between this information gap and the people using untreated water for drinking and domestic use.

Figure 11 shows the linear relationship between GDP per capita and the amount of data used to calculate the indicator score per country. The relationship shows that as wealth increases, so does the capacity to monitor.

Untreated wastewater entering a river. By recepaktas on Shutterstock

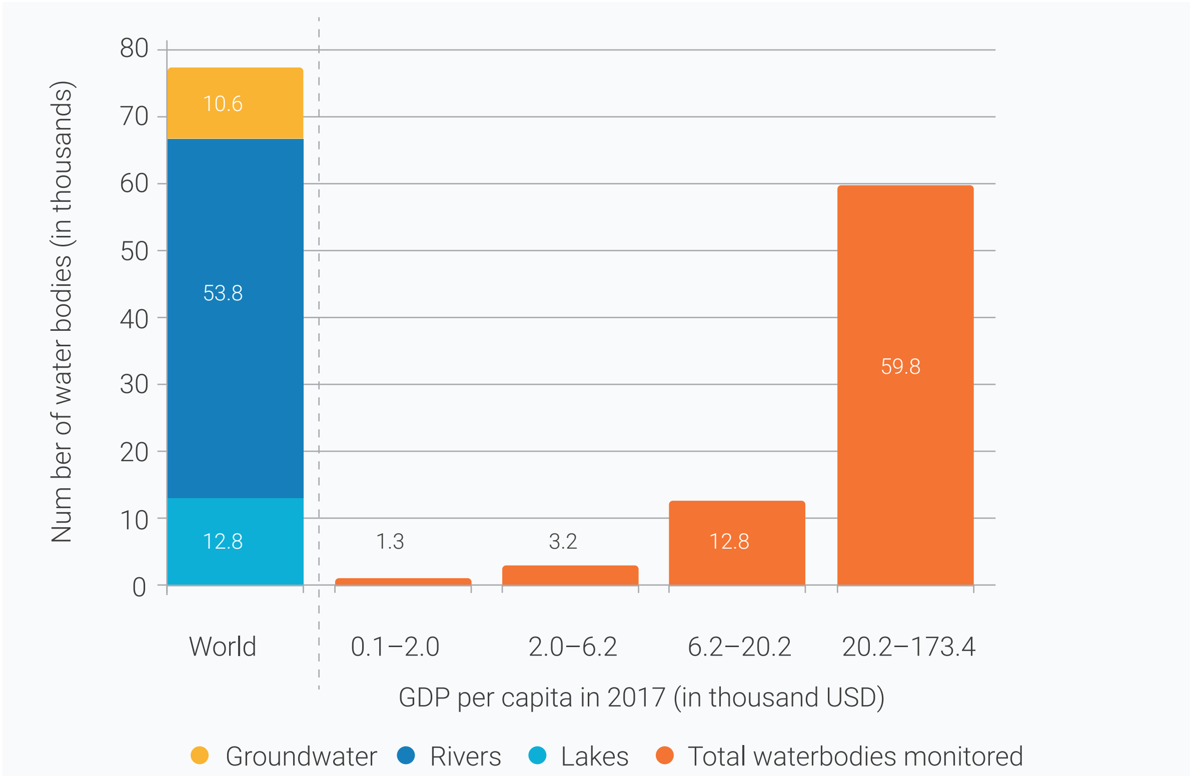
Figure 11. Number of monitoring values per country area reported by countries, compared with their gross domestic product per capita (2017–2020)



Note: Each dot represents a country.

To **make this disparity between rich and poor countries clearer**, the left column of Figure 12 shows the number of water bodies reported on in countries that submitted data in 2020. The four columns on the right-hand side of the diagram represent groups of countries partitioned by GDP (each column represents approximately 20 countries). This figure shows that the richest 24 countries (right-hand column) submitted data on over three-quarters of the total number of water bodies (59,800) upon which we have information at the global level. The poorest 20 countries reported on just over 1,000 water bodies.

Figure 12. Monitoring efforts expressed as the number of water bodies by water body type, partitioned by gross domestic product quartiles



Source: Adapted from UN-Water (2021).

In addition to reporting on fewer water bodies, the submissions from low-GDP countries also lacked detail, with the indicator calculated using relatively few measurements and without suitable environmental water quality standards being used – this lowers the reliability of a submission.

Robust monitoring systems are needed to determine whether management actions are effective. The data showed that 19 of the 49 countries that reported for both reporting periods (2017 and 2020) are on track to improve water quality. These 19 are countries that have a robust monitoring system in place, which supports the concept that monitoring is essential for positive management action. Without a monitoring system that provides reliable information on where water quality is good and where it is not, it is not possible to determine the effectiveness of management actions.

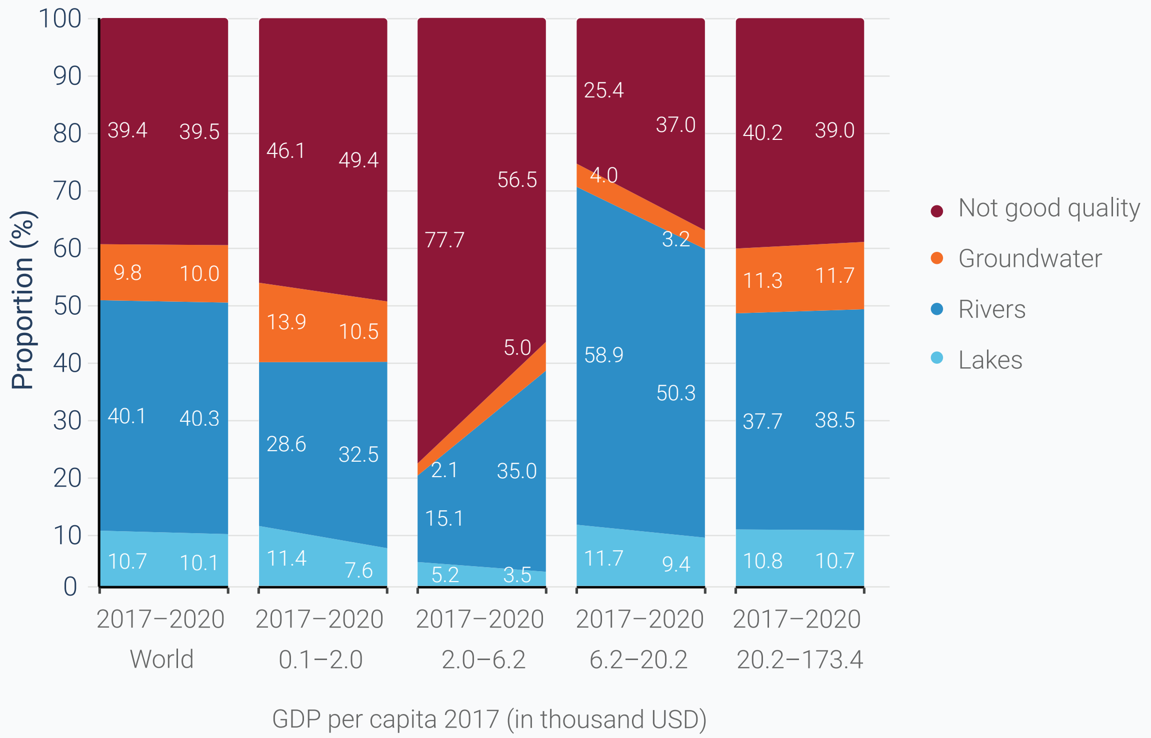
At the global level, initial examination appears to show a slight improvement in the total number of water bodies reported as having "good ambient water quality" in 2020 compared with 2017 (left column of Figure 13): while the proportion of lakes decreased slightly (10.7 to 10.1), there was a slight rise for rivers (40.1 to 40.3) and for groundwaters (9.8 to 10). However, these **results should be considered with caution**. A breakdown by GDP shows that water quality remained stable in the richest countries (right column) and the-second poorest, whereas in the poorest and second-richest countries, substantial changes in water quality were observed.

These changes (improving and degrading trends) go far beyond what would be expected to occur over this time frame and changes in reporting and data may be responsible.

A closer look at country submissions shows significant changes in the way that the reporting methodology was implemented in all but the richest countries, and it is this change in implementation, rather than a change in water quality, that is reflected in the results. For example, a change in the data flow from monitoring programmes, driven either by economic or institutional factors, can dramatically alter the indicator score reported: a country may have changed the number or type of water bodies included in the indicator calculation between the two reporting periods (for example, rivers in 2017, and groundwaters only in 2020). Similarly, there may have been efforts to extensively expand monitoring, and a country may have reported on many more water bodies in 2020 compared with 2017. Both of these examples could lead to a substantial change in the national indicator score and need to be accounted for when examining results.

Okavango Delta, Botswana by Amaryllis Liampoti on Unsplash

Figure 13. Proportion of water bodies with good ambient water quality, by water body type and gross domestic product



NOTE: Only countries that reported for both periods are included

4. Indicator 6.3.2 interlinkages across the SDGs

The importance of indicator 6.3.2 is key not just to SDG 6, but also to many other SDGs that rely on good ambient water quality, whether directly or indirectly. Information from indicator 6.3.2 can inform decisions related to ending hunger (SDG 2), improving health (SDG 3), increasing access to energy (SDG 7), promoting sustainable tourism and industrialization (SDG 8 and 9), reducing marine pollution (SDG 14) and safeguarding terrestrial biodiversity (SDG 15). In this way, developing strategic partnerships that both use and provide indicator 6.3.2 data will significantly contribute to the achievement of the SDGs.

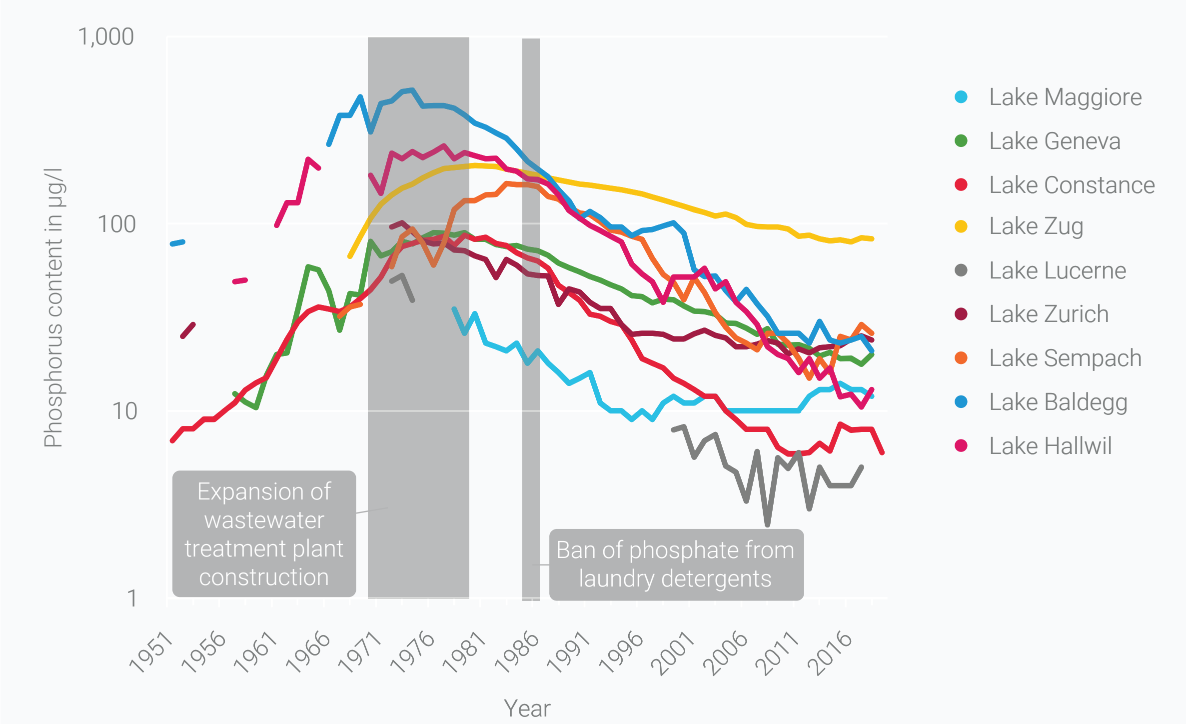
4.1. Indicator 6.3.1 – Proportion of wastewater safely treated

The close relationship between the two target 6.3 indicators on wastewater treatment (6.3.1) and ambient water quality (6.3.2) is demonstrated by historical data collected for the national and transboundary lakes of Switzerland, which show a clear reduction in lake phosphorus content following implementation of nutrient control measures in the lake catchments (Figure 14).

These measures were namely the expansion of construction of wastewater treatment plants in the 1970s, and the ban of phosphate in laundry detergents, which came into effect in the country in 1986. Each lake is unique and responded slightly differently, but a significant reduction is clearly observed in each one.

Inle Lake, Myanmar by Jade Marchand on Unsplash

Figure 14. Phosphorus concentration in lakes of Switzerland (1951–2019)



Source: Adapted from Switzerland, Federal Office for the Environment of Switzerland (F2021).

Note: Lake Geneva and Lake Zurich: volume-weighted annual average of depth profiles; other lakes: spring circulation levels.

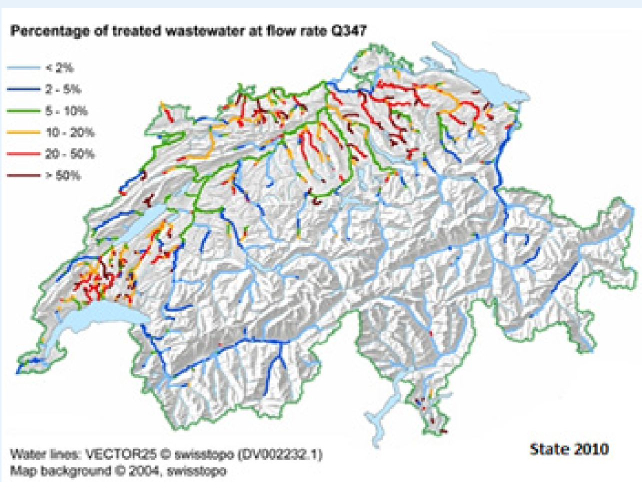
At the national level, a country with a high level of wastewater treatment (6.3.1) does not necessarily report a high indicator score for good ambient water quality (6.3.2). This is not surprising given that indicator 6.3.2 monitors more than just the impacts from wastewater. The core parameters of indicator 6.3.2 include nutrients (N and P), oxygen, electrical conductivity and pH, which can all be affected not only by wastewater effluents, but also by nutrients from agriculture, changes in salinity (electrical conductivity) from over-abstraction or seawater intrusion, and by acidification (pH) from deposition of sulfur- and nitrogen-containing compounds from industrial emissions into the air. The relationship between the two indicators is expected to become clear over time at the national and subnational level, with improvements in wastewater treatment reflected in improved water quality. As with the Swiss lakes, trend analysis should show clear improvements.

This relationship will also become more evident with future development in the implementation and reporting workflow of both indicators, but only if the baseline data are collected and analysed now.

FOCUS BOX 4. CASE STUDY: TWO STRONGLY INTERLINKED INDICATORS TO IMPROVE WATER QUALITY: WASTEWATER AND SAFE REUSE

Background

Indicators 6.3.1 and 6.3.2 are intrinsically related in that ambient water quality is strongly affected by the discharge of wastewater produced by human activities into the aquatic environment. Water pollution is caused by not only the discharge of point sources of pollution such as municipal sewage and industrial wastewater, but also non-point sources of pollution 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 significantly reduce the load of pollution discharged to the environment. However, wastewater treatment plants themselves are a major point source of pollution affecting ambient water quality, because the treated effluents are still highly enriched in nutrients and hazardous substances like micro-pollutants which are not sufficiently removed by conventional treatment processes.



Link between indicators

The physico-chemical parameters used in the Level 1 monitoring of indicator 6.3.2, are, in general, routinely measured in wastewater treatment plants, along with additional microbiological and chemical contaminants such as faecal bacteria and heavy metals. These parameters are used: i) to evaluate wastewater treatment plants' performance efficiency, ii) to set the regulatory standards for wastewater discharged to surface waters, and iii) to develop guidance for water reuse applications without any risk to human and environmental health.

The impact of the effluent discharge on ambient water quality also strongly depends on its dilution in receiving water bodies. The figure indicates that many streams in the densely populated area of northern Switzerland contain more than 20 per cent wastewater effluent. The water body's capacity to receive pollutants is based on dry weather flow here (Q347, which is reached or exceeded 347 days per year on average). Reduced dilution capacity of point source effluents during dry summers is one of the reasons for some observed decline in water quality. Under future climate change scenarios, where freshwater supplies might be placed under more stress, the quality and quantity of effluent discharge to receiving streams may become even more relevant. Reclaimed municipal wastewater is also readily used as source water for groundwater recharge in many regions.

Case study by Florian Thevenon (UN Habitat).
Source: Abegglen and Siegrist (2012).

4.2. Indicator 6.6.1 – Change in the extent of water-related ecosystems over time

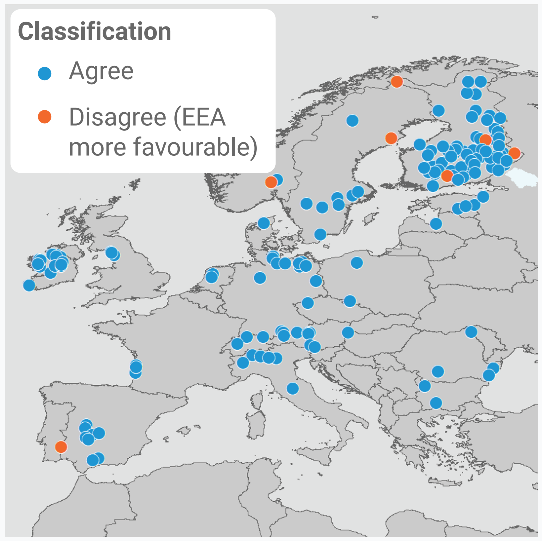
UNEP's indicator 6.6.1 team and partners developed a water quality sub-indicator that uses an Earth observation (EO) approach to assess water quality. This quality assessment method focuses on large lakes and comprises two indicators– chlorophyll-a and turbidity. These are reported as a change in water quality from a reference period. The chlorophyll indicator is most closely linked to the nutrient core parameters of indicator 6.3.2 (nitrogen and phosphorus), because high nutrient loads can lead to excessive algae growth in lakes, which in turn increases the chlorophyll-a signature in large water bodies. This can be detected from space.

For indicator 6.3.2, countries do not routinely submit data at the parameter level, so an analysis was only possible where parameter-level data were available. This was the case for European countries that submit data to the European Environment Agency (EEA) as part of their obligations under the European Union Water Framework Directive (WFD) (Focus Box 5).

To compare the in situ data from the EEA with the EO chlorophyll-a data, a classification method was devised that was similar to the method used to generate the pan-European indicator scores (Focus Box 5). However, it differed in that only nitrogen and phosphorus data were used, and it focused on lakes alone. It used the same target values to classify each lake as of either "good" or "not good" water quality.

The results showed good agreement between the two approaches (Figure 15). However, though promising, further testing is needed to determine the potential of this approach as a "gap-filling" approach for indicator 6.3.2. This is due to the insufficient variation in the water quality of the lakes used in the study, with the majority classified as good by both approaches. Further testing requires lakes with water quality ranging from very poor to very good.

Figure 15. Map comparing European Environment Agency in situ nitrogen and phosphorus data classification with indicator 6.6.1 chlorophyll-a classification based on Earth observation data for lakes



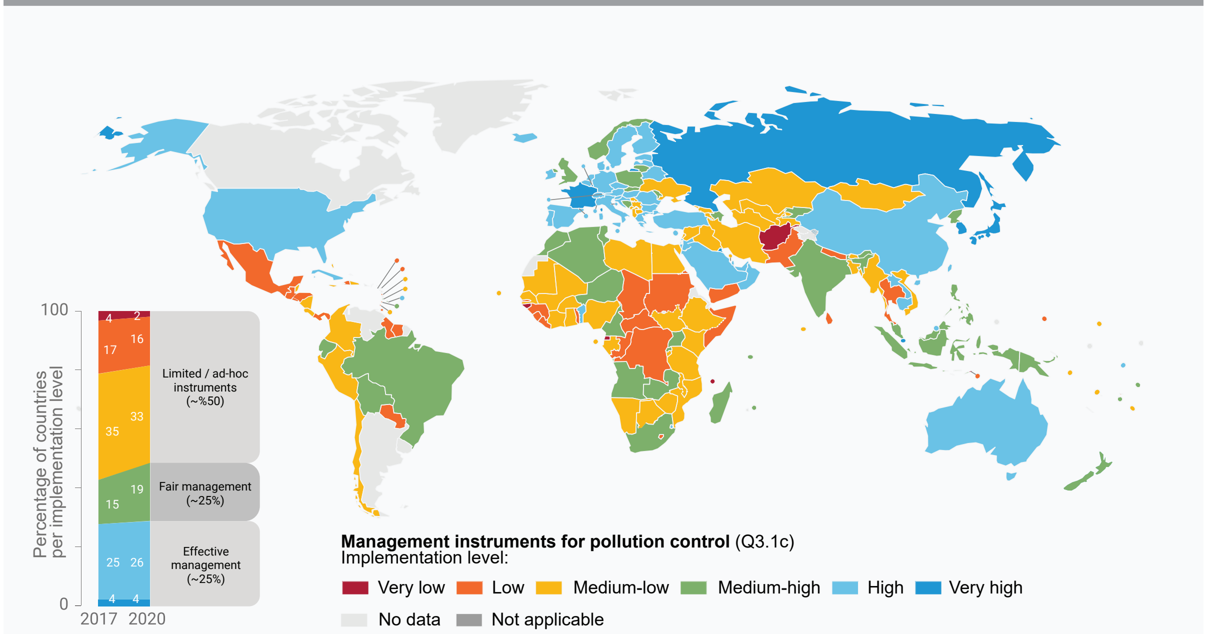
4.3. Indicator 6.5.1 – Degree of integrated water resources management implementation (0–100)

Indicator 6.5.1 is reported on through country surveys covering various aspects of water resources management, including water quality and freshwater ecosystem management.[6] Countries score each question on a scale of 0 to 100. Under indicator 6.5.1, approximately 50 per cent of countries report limited management instruments for pollution control, being either only ad hoc, or with limited coverage and enforcement across stakeholders and ecosystem types (Figure 16).

This is supported by findings from indicator 6.3.2 that water quality monitoring programmes are extensive and advanced in wealthier countries, but water quality data are not routinely collected in many less developed countries (see chapter 3). While some progress has been made in the implementation of pollution control instruments between 2017 and 2020, the rate of implementation needs to be accelerated to achieve target 6.3 (see chapter 5).

6 For more information on indicator 6.5.1, including reports and results, see http://iwrmdataportal.unepdhi.org/.

Figure 16. Development and implementation of management instruments for pollution control, as reported under indicator 6.5.1 (2020)



Source: UNEP (2021).

5. How to accelerate ambient water quality improvements

River meandering through farmland. USA. By B Brown on Shutterstock

This chapter highlights the key challenges identified during the 2020 data drive and suggests solutions framed around the Decade of Action and the five accelerators of the SDG 6 Global Acceleration Framework (see chapter 1). It also highlights the activities already under way and how the findings from this data drive can fuel further acceleration by identifying mechanisms and entry points for effective action.

The increased level of reporting and engagement with countries during the 2020 data drive was a strong positive development. During the first baseline data drive of 2017, useful information was provided by the 39 countries that reported, but the number of submissions was insufficient to draw many substantial conclusions, and the 2018 indicator progress report (UN-Water, 2018a) focused on how to increase submission rates and improve the methodology. Since then, in-depth engagement and provision of improved support mechanisms has resulted in more than a **100 per cent increase** in the rate of quality-assured submissions received (89 in 2020 compared with 39 in 2017). These extra submissions have added substantially to the global water quality picture, and the increased level of engagement with countries that were both able and unable to report has elevated the profile of water quality in the global consciousness. Nevertheless, further acceleration is needed if SDG 6 is to be achieved by 2030.

Methods to improve water quality are well known, such as increasing wastewater treatment rates and improving treatment technology, and ensuring that best management practices are applied to sectors with point-source and diffuse inputs (e.g. agriculture, mining). To help target these efforts and to improve water quality, information on where it is improving and where it is degrading in response to water quality pressures, as well as on efforts to improve water quality, is essential. This information helps to secure buy-in from all stakeholders and ensure that water quality is everyone's business.

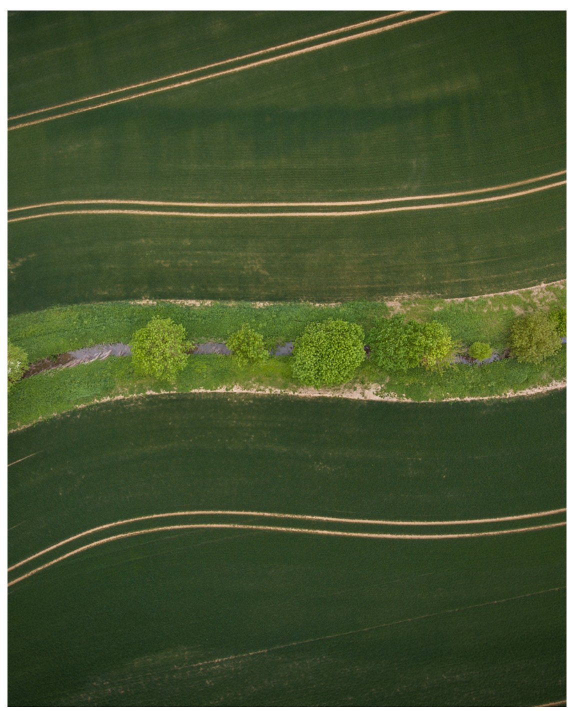
The release of nutrients from agriculture and untreated wastewater poses the most widespread threat to environmental water quality globally. An in-depth analysis of submissions from countries that supplied parameter-level data showed that nitrogen and phosphorus failed to meet their targets more often than the other water quality parameters of Level 1 reporting. This means that for these countries, and quite likely for most countries, **reducing nutrient release and transport will have the greatest positive impact on water quality**.

A good example of how water quality information can provide the basis for sustainable management of freshwater ecosystems is outlined in the Framework for Freshwater Ecosystem Management (UNEP, 2017).

The framework provides a holistic guide to address each country's unique challenges. It suggests a logical step-by-step process that serves as a long-term planning tool to improve understanding of the value of ecosystems and identify the best methods to protect and restore them. Information on water quality (indicator 6.3.2), the extent of water-related ecosystems (indicator 6.6.1), and governance structures measured by the degree of integrated water resource management (indicator 6.5.1) each provide vital input to this framework.

5.1. Acceleration of data collection, availability and management

Data availability remained the greatest challenge for countries during the 2020 data drive. This was most evident in low-GDP countries, which reported on fewer water bodies and used fewer data to classify their water bodies compared with richer countries. As shown in chapter 3, the 20 countries with the lowest GDP of those that reported, reported on only a fraction of the total number of water bodies reported globally. The reasons behind this reporting deficiency are many and can be addressed from all five accelerators.



Trees and shrubs maintained along a river to protect water quality. France. By Yulian Alexeyev on Shutterstock

5.1.1. Capacity development

A functioning monitoring programme is essential to distinguish whether efforts to improve water quality are effective or not. A monitoring programme with the capacity to collect, manage, analyse and assess water quality data is a challenge for many countries, and efforts to report on this indicator are susceptible to breakage anywhere along this chain.

Capacity development can take many forms. Sierra Leone (Focus Box 1) demonstrates how **high-level training and engagement can yield transformative results over a relatively short time frame**. These positive impacts were the result of enthusiasm and engagement at both the institutional and individual level. Sierra Leone went from being unable to report for this indicator in 2017 to reporting reliably for the most important river basin in the country in 2020. This first data set serves as an important baseline for future monitoring campaigns, and its creation has generated many additional benefits such as staff training, design and development of a monitoring programme, and improved data management capacity within the National Water Resource Management Agency.

Cases like Sierra Leone are just now starting to show results and will ultimately lead to better water resource management. This training was provided by the GEMS/Water Capacity Development Centre,[7] which was established in 2015 specifically to provide training and support for water quality monitoring and assessment. To date, the centre has engaged with 107 countries from six different regions; **the online courses and in situ workshops have reached 126 people from 43 countries alone**. The postgraduate diploma and master's degree courses have been undertaken by 35 students to date (17 women and 18 men), while the continuous professional development course has been undertaken by 66 students (26 women and 40 men). Although information on the gender of focal points is not currently sought by UNEP, a provisional analysis of indicator 6.3.2 focal points revealed that there is a 74 to 88 ratio in favour of men. Going forward, UNEP will encourage gender balance for all capacity-development activities, including workshops and training events.

In 2020, **groundwaters were again the water body type least reported on**. While many countries know the location of aquifers and their importance as water sources, where the groundwater comes from and goes to may not be well understood. Capacity development is needed to make sure that groundwater monitoring programmes are appropriately designed to ensure good network coverage, suitable sampling points, frequent sampling and appropriate choice of parameters. In countries where monitoring is aspirational, there is a need to identify aquifers, understand groundwater flow systems and develop simple conceptual hydrogeological models. This is important because the source of recharge, which could be infiltration from rainfall or surface water bodies, is also likely to be a source of pollution inputs to the aquifer, thereby contributing to quality deterioration. Similarly, the locations of discharge to springs, rivers, lakes, wetlands or water wells are the points at which poor groundwater quality impacts on these receptors.

Capacity development is needed to help fill capacity gaps in key areas within the organizations tasked with reporting. These are:

- monitoring programme design
- data management
- quality assurance and control

7 See www.ucc.ie/en/gemscdc/.

- monitoring and assessment of groundwaters
- assessment of water quality
- data presentation and outreach.

5.1.2. Data and information

Engagement with countries throughout the 2020 data drive clearly highlighted that, in addition to data creation and collection, other aspects of data management are a significant limitation in many countries. All aspects of the data management cycle, from collection and storage through to assessment and presentation, need attention. The organizations tasked with reporting would benefit from training in the technical aspects of data management, and in methods of analysis, presentation and communication of data to the wider stakeholder audience.

Many organizations use spreadsheets in place of database software for all aspects of their data management without protocols for data input, storage, archiving and retrieval. This can lead to errors in the data stored, and shortcomings and difficulties in the analysis and presentation of results, which inhibits data sharing and communication.

International standards to exchange water quality monitoring data, as well as aggregated indicator data, are lacking. Several countries, such as the United States, have developed national water quality data exchange standards, and efforts are under way to develop a common international standard within the Open Geospatial Consortium (OGC)/ World Meteorological Organization Hydrology Domain Working Group[8] as part of the WaterML 2.0 suite of standards to facilitate the exchange of water quality monitoring data. The Inter-agency Expert Group on SDG Indicators (IAEG-SDGs) Working Group on Statistical Data and Metadata Exchange (SDMX)[9] has developed SDMX-based data exchange specifications for all SDG indicators, including indicator 6.3.2. These specifications can be used by National Statistical Offices and other governmental authorities to exchange indicator data, but they are rather complex and do not yet cover all indicator reporting elements. Further standardization work, tools and capacity development are required to enable countries to use these standards for interoperable data exchange.

Joggins Lake, Canada by Ron Whitaker

8 See www.ogc.org/projects/groups/hydrologydwg.
9 See https://unstats.un.org/sdgs/iaeg-sdgs/sdmx-working-group/.

5.1.3. Innovation

The twenty-first century offers new and exciting opportunities for innovation in water quality monitoring and assessment. A good example is the WWQA triangle approach of in situ and remote sensing and modelled data (chapter 1), and machine learning approaches as demonstrated in the World Bank report, *Quality Unknown: The Invisible Water Crisis* (Damania *et al.*, 2019). These approaches, coupled with advances in, and increased accessibility to, information communication technology (ICT) will help leverage and coordinate new and existing efforts towards achieving SDG 6.

There is substantial interest in the potential of citizen science initiatives, such as those demonstrated in the case studies, to help fill data gaps. The use of the miniSASS[10] biomonitoring approach developed in South Africa (Focus Box 2) and in situ physico-chemical approaches[11] shows that if properly designed and implemented, such initiatives can provide greater spatial coverage than traditional laboratory-based monitoring networks (Bishop *et al.*, 2020). These approaches, which involve citizen scientists in data-collection efforts, offer the additional benefit of promoting behavioural change and engaging citizens in water quality. The efficacy of these approaches is being tested further in a number of small-scale pilot initiatives in different world regions and the approaches will be supported by the creation of the Citizen Scientist 632 Toolbox.

Trainee citizen scientists learning about water quality. By Monkey Business Images on Shutterstock

10 See www.minisass.org/en.
11 See https://freshwaterwatch.thewaterhub.org.

This Citizen Scientist 632 Toolbox will contain information and guidance on a range of tools that allow citizens to contribute to indicator 6.3.2 data collection while simultaneously learning about water quality management. The tools will vary in complexity, from observational measurements to advanced biomonitoring, and will enable citizens from a range of backgrounds and expertise to contribute. The toolbox will provide guidance and information on:

- physico-chemical data collection of nutrients, pH and turbidity
- biomonitoring data using macroinvertebrates and macrophytes
- observational information such as presence of smells, effluent inputs, algae growth and floating macrophyte coverage.

The toolbox could also be a two-way portal: in addition to offering citizens the opportunity to contribute to data collection, it could enable them to learn about their water body and the pressures in their catchment area.

Institutional buy-in is essential to ensure that the data generated by citizens are incorporated into SDG 6 reporting, and that efforts to test the most appropriate mechanisms for combining regulatory and citizen data streams are ongoing.

5.1.4. Financing

Securing and optimizing sufficient financing for water quality monitoring is a major challenge for many countries with competing pressures on limited resources. Funding deficits impede implementation of water quality monitoring and assessment programmes, and result in gaps in the data record that can be difficult to fill. Better targeting and utilization of existing resources, and mobilization of additional domestic and international funding are required.

The financial resources needed to implement a robust and well-designed ambient water quality monitoring programme can vary significantly. A basic programme covering the core parameters for a few key water bodies can be implemented with relatively limited resources using field test kits, whereas a more advanced programme that covers a greater range of parameters with increased monitoring frequency and includes sampling of many more monitoring locations can cost much more. Quality control and assurance, and reliable data management are key programme design aspects to include when costing a monitoring programme.

To protect water bodies and improve water quality, it is essential to enhance farming management practices and increase wastewater treatment, especially in regions with high population growth such as Africa. As a first step towards accelerated policy action, investment is needed in all regions to expand country monitoring networks and establish national water quality standards.

5.1.5. Governance

Governance of water quality is complex, with roles and mandates overlapping between the various ministries and organizations responsible for water quality management. Furthermore, different ministries and organizations may use different administrative units, making management action more difficult. These institutional in-country complexities around water quality need to be addressed urgently.

Given that rivers, lakes and aquifers do not recognize international borders, transboundary cooperation at both the national and international level is essential for sustainable management of water resources. Most countries have adopted common hydrologically based administrative units, but not all; this is an essential first step for effective transboundary cooperation. In terms of legislation, monitoring and reporting is often carried out in the absence of ambient water quality standards and therefore has no legal standing. These standards need to be embedded in national and international legislation.

Coordination across institutions, and development of coordinated and sustainable water legislation, are some of the primary aims of integrated water resources management (IWRM), which is measured by indicator 6.5.1. Furthermore, indicator 6.5.2 measures the extent of transboundary cooperation. In this way, working towards target 6.5 – to implement integrated water resources management at all levels, including through transboundary cooperation as appropriate – is likely to directly support the achievement of target 6.3.

5.2. Acceleration summary

Each of the five accelerators of the SDG 6 Global Acceleration Framework have significant relevance for indicator 6.3.2, and if considered, will help “get SDG 6 back on track” (United Nations, 2018). Capacity development and data and information are the most significant and urgently needed accelerators, but each of the five are interlinked and cannot be considered in isolation. For example, improving data availability requires training in data collection, stronger data infrastructure, utilization of innovative data sources and approaches to data gathering, sufficient financial resources, and a positive enabling environment.

Once data collection and management practices have been strengthened, for greatest impact, these generated data need to be embedded in management and policy actions, and combined with improvements in outreach and communication aimed at all stakeholders to ensure that water quality becomes everyone’s business. One way to achieve this is to ensure that institutions responsible for water quality participate in the SDG 6 IWRM Support Programme.[12] This programme assists governments in designing and implementing Action Plans, as an entry point to accelerate progress towards the achievement of water-related SDGs and other development goals, in-line with national priorities. The IWRM Acceleration Package[13] is available to all countries to facilitate government-led multi-stakeholder processes to develop Action Plans. The participation of institutions responsible for water quality in the SDG 6 IWRM Support Programme will directly support action on target 6.3. In a similar manner, it is recommended that indicator 6.3.2 focal points participate in the multi-stakeholder reporting process under SDG 6.5.1, so that they can communicate with stakeholders from across the water community on the importance of water quality management for achieving multiple development objectives. This would also allow institutions responsible for water quality to advocate making water quality monitoring and management an integral part of broader planning for sustainable water resources management.

12 See www.gwp.org/en/sdg6support/consultations.
13 See www.gwp.org/en/sdg6support/consultations/where-we-need-to-go/acceleration-package.

Stappitzer See, Mallnitz, Austria by Aydin Hassan on Unsplash

6. The future of indicator 6.3.2 implementation

Freshwaters are indispensable for human development, but they are also receive pollution and are affected by land-use change. Although the situation is bleak for some water bodies, and full restoration to a natural state is beyond the scope of practical measures, there are many that can be restored with careful management, and others that are relatively untouched by human impact and need protection. Central to careful management is information on where our rivers, lakes and groundwaters are of good quality, and where they are of poor quality. We also need information on the sources and types of pollutants, the pathways by which pollutants are entering these water bodies, and their impact. Armed with this information, management action can be effectively targeted to ensure that both human and ecosystem health are protected.

Indicator 6.3.2 is a relatively new indicator, but already there are signs that engagement with the process and implementation of the indicator has elevated international awareness. The positive impacts resulting from improved uptake of water quality monitoring and reporting need to be showcased to ensure that further successes are possible and that the centrality of water quality for sustainable development is recognized.

6.1. Next steps

The **feedback process** that followed the 2017 baseline data drive led UNEP to make methodological and organizational improvements in implementation. These included alignment of the reporting framework with existing ones to reduce reporting burden, delivery of in-depth support materials, supply of optional target values, development of the indicator calculation services, and the design of the Level 2 reporting workflow. This feedback process will be repeated in 2021, targeting both countries that were able to report in 2020 and those that were not, to learn where further improvements can be made.

Communication with the **correct national focal points** was again a challenge in 2020, although it was much improved compared with the 2017 data drive. In addition to the 89 submissions received, 46 countries acknowledged the roll out, 22 of which committed to work on their submission but were unable to complete it in time. To improve communication channels, UNEP plans to provide regular and frequent updates to ensure that focal points are kept informed.

The in-depth country engagement that formed part of the 2020 data drive has offered insight into the capacity gaps that organizations tasked with reporting face when reporting on indicator 6.3.2. Using this information, a **customized capacity-development strategy** could be created for each country outlining steps that would lead to a more complete and reliable indicator score for the next data drive, and help advance national water resource management.

6.2. Implementation upgrades

The submission procedure will be revised to further reduce the reporting burden for countries. The new indicator calculation service was used by 18 countries in 2020; this was in addition to the 14 European countries that approved their submission based on the indicator scores calculated by GEMS/Water from existing available data (Focus Box 5). This service will be further developed.

There are plans to create an **online submission platform** that automates the indicator 6.3.2 submission process. Additional functionality such as calculation of the indicator score based on input water quality data and associated metadata would help streamline the process. This platform could generate products such as a confidence rating (discussed later in the chapter) at different spatial scales (national or river basin) and a water quality score card to provide extra information on which parameter has the greatest influence on the indicator score. It could also show the impact of using different target values on the indicator score in real time.

The concept of a **common SDG 6 subnational reporting unit framework** is being considered by the IMI-SDG6 team and several SDG 6 indicator teams. The benefits of such an approach would align data across all SDG 6 indicators. For example, data on wastewater treatment levels and water quality would help to identify which river basins are making the most progress, and those where efforts to improve water quality are not having the intended impact. Efforts will continue in preparation for the next data drive.

Level 2 reporting remains optional for countries that have completed Level 1 reporting. Countries were not formally asked to report at Level 2 during 2020 to avoid overburdening them. Part of the ongoing engagement between UNEP and countries will include requests for Level 2 information during the inter-data drive years (2021 and 2022).

A **confidence rating** was applied to submissions received in 2020. This rating uses metadata submitted along with the indicator to provide a numeric value that represents the "reliability" of the score. It also provides information on how the constituent metrics rate (annex 2). The individual constituent metrics of each country were assigned a rating from one (worst) to five (best) based on objective criteria and the confidence rating was then calculated as an unweighted average of these five metrics. shows the global average along with the twenty-fifth and seventy-fifth percentiles for all submissions received in 2020. The overall average confidence rating of all five metrics was 3.7 and of the five, target specificity scored the lowest, and time frame and frequency scored the highest. This approach will be expanded and offered as supplementary information that can be supplied at different spatial scales to provide insight into country indicator scores.

FOCUS BOX 5. REGIONAL REPORTING: EUROPEAN ENVIRONMENT INFORMATION AND OBSERVATION NETWORK (EIONET)

Background

The 38 member and cooperating countries of the EEA regularly report data on the state of their water bodies through its e-reporting infrastructure, Reportnet, as part of existing reporting obligations under different EU directives (especially the WFD) and annual state of the environment reporting. These data feed into the Water Information System for Europe (WISE) and form the basis for pan-European water quality indicators and assessments. Following the **request** of several European countries to **reuse existing regional data flows** for SDG indicator 6.3.2 reporting to reduce reporting burdens and harmonize results, the EEA and UNEP have developed and piloted a methodology to calculate indicator 6.3.2 data for European countries based on **annual averages of selected core parameter concentrations** for surface-water bodies and groundwater bodies available in WISE.

Method

Indicator results were calculated in a two-step process:

Step 1: EEA calculated for each monitoring station and water body an **annual statistical water quality classification** for selected water quality parameters for the period 1992–2018, based on annual average concentration data available in the EEA Waterbase database. The pan-European quintiles of parameter concentration levels were used as target values for classification into five quality classes.

EEA published the resulting data and accompanying analytics through several online dashboards for review and further processing.

Step 2: The indicator 6.3.2 help desk used the fortieth percentile to further classify each water body into "good" or "not good" quality status, using a "one out, all out" approach for the 2017 and 2020 reporting periods covering the time periods 2013–2015 and 2016–2018, respectively. After further aggregating to River Basin Districts (as defined in the WFD) and to country levels, the results were shared with the countries for review, adoption or replacement with their own indicator data.

Link to full story here: https://communities.unep.org/display/sdg632/Documents+and+Materials

Outcome

Using the harmonized methodology, indicator data for 36 European countries were calculated, ranging between 0 per cent and 100 per cent of assessed water bodies with good quality (on average **76 per cent for the 2017 reporting period and 79 per cent for 2020)**. Extremely low and high indicator values occurred most often in countries where there were few monitoring data available.

The quality status of the assessed groundwater bodies was considerably lower (49 per cent on average) and showed a decrease between reporting periods compared with the assessed surface waters, which showed a slight increase. For the groundwater bodies, only nitrate data were used due to data availability, and the fact that the applied target value of 6.8 mg NO3/l is relatively low compared with the European standard of 50 mg/l, resulting in many groundwater bodies being classified as "not good".

Out of the 23 European countries that were covered by the pilot study and had an official indicator focal point, 14 approved the pilot data, four countries provided their own reporting data and five are pending review (April 2021).

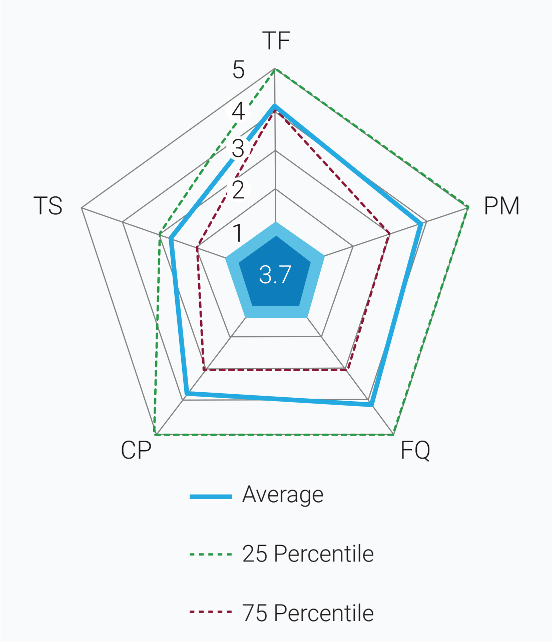
Future

The pilot study provided insights into the **opportunities and challenges** of reusing existing reporting data at the European level. These will be used to further **evolve** the methodology and feedback process with countries.

Data availability could be further enhanced by including WFD reporting data covering a wider range of water bodies and parameters (Level 2 reporting). The selected "one out, all out" **classification approach** could be replaced with an averaging approach more in line with the general indicator methodology, reducing the impact of single parameters and increasing comparability with reporting data from other regions.

Countries requested more time for the data review and the possibility of modification of selected target values. This could be achieved by **establishing a dedicated Reportnet reporting process** that is harmonized with existing reporting obligations.

Figure 17. Confidence rating of global submissions for the 2020 data drive



6.3. Proposed new supports

Target values were again an issue, with large variations in the targets applied (chapter 2, Figure 3). While some variation is expected, the degree of variation exceeded the expected range and some countries applied water-use targets rather than ambient water quality targets. This information can again be used to **help those countries develop their own standards and target values** and work towards future data drives when indicator 6.3.2 will be benchmarked against a more meaningful reference point.

Defining how much data is enough to report reliably is important but difficult. Considerable differences were observed in the amount of data used by countries to calculate the indicator. However, the data threshold required varies depending on the hydrological environment and the natural variation in water quality: a relatively arid country that relies largely on groundwater will require far fewer data than a temperate country with defined seasonality and a larger number of water bodies that exhibit great fluctuations in water quantity and quality over the year. However, although it is not possible to set an absolute threshold, **guidelines on minimum data requirements** can be suggested and used for assessment.

The Citizen Scientist 632 Toolbox (chapter 5) will contain information and guidance for a range of tools that allow citizens to contribute to indicator 6.3.2 data collection while simultaneously learning about water quality management.

The tools will vary in complexity, from observational measurements to advanced biomonitoring, and enable citizens with a range of backgrounds and expertise to contribute.

6.4. Expected outcomes

Strategic partnerships that both use and supply water quality data for indicator 6.3.2 data are critical if SDG 6 is to be achieved. Work has begun on **overlaying the findings of this data drive with other data sets**, but as data supply improves, future possibilities will emerge that allow greater insight into the relationship between water quality status and its drivers and help bring about change. For example, the generation and sharing of high spatial- and temporal-resolution data on exactly where and when water quality is poor and where it is good, combined with data on supply treatment, or an analysis of the potential gender impacts of poor water quality, will help channel action towards improving the lives of those most affected.

Indicator 6.3.2 is currently classified as Tier II by the IAEG-SDGs. This means that the "indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not regularly produced by countries" (IAEG-SDGs, 2021). If more countries engage with UNEP on this indicator and submit data, it can be **upgraded to Tier I.** This means that the "indicator is conceptually clear, has an internationally established methodology and standards are available, and data are regularly produced by countries for at least 50 per cent of countries and of the population in every region where the indicator is relevant" (IAEG-SDGs, 2021). With more SDG 6 indicators upgraded to Tier I, custodian agencies will be increasingly able to assess the status of SDG 6, and get countries on track to ensure availability and sustainable management of water and sanitation for all.

Lake George, Uganda by Random Institute on Unsplash

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Annexes

Annex 1. Indicator reporting results from 2017 and 2020 covering 96 countries

Country	2017 score				2020 score				Score change (2017–2020)
	LW	RW	GW	Total	LW	RW	GW	Total	
Andorra		100.00	75.00	92.86		86.00		86.00	-6.86
Antigua and Barbuda					0.00			0.00	
Argentina						0.00	21.88	17.95	
Australia						92.00	87.00	87.65	
Austria	91.94	80.12	94.57	80.44	95.56	81.42	96.24	81.77	1.33
Belarus					93.08	91.26	62.81	88.88	
Belize						60.00	100.00	78.95	
Benin					100.00	100.00	88.89	89.42	
Bosnia and Herzegovina	100.00	4.89	16.67	5.79	100.00	28.35	94.74	30.58	24.79
Botswana	94.44	94.74	7.69	50.00		90.00	75.00	78.00	28.00
Brazil	33.62	71.75	64.86	63.25	46.96	75.87	67.86	71.02	7.77
Bulgaria	100.00	99.12	28.05	69.85	100.00	98.96	25.61	65.56	-4.29
Burkina Faso					100.00	100.00	95.29	97.70	
Burundi					100.00	100.00	100.00	100.00	
Canada						82.19		82.19	
Chile		85.64		85.64		84.02		84.02	-1.62
Costa Rica						68.48		68.48	
Côte d'Ivoire					100.00	66.67		80.00	
Croatia					71.43	55.00	91.00	55.85	
Cyprus	100.00	94.29	12.50	61.67	100.00	94.12	9.09	61.40	-0.27
Czechia	0.00	100.00	40.99	67.01	100.00	97.45	37.89	88.19	21.18

Country	2017 score				2020 score				Score change (2017–2020)
	LW	RW	GW	Total	LW	RW	GW	Total	
Democratic Republic of the Congo						66.00		66.00	
Denmark					38.00	54.00	75.00	53.42	
Dominican Republic					88.89	50.00		70.59	
El Salvador		43.33		43.33		59.68		59.68	16.35
Estonia	100.00	100.00		100.00	44.20	86.20	100.00	75.65	-24.35
Eswatini						87.50		87.50	
Ethiopia					100.00	96.43		96.77	
Fiji	100.00	100.00	100.00	100.00		100.00	100.00	100.00	0.00
Finland	100.00	100.00	85.61	95.98	100.00	100.00	86.87	96.84	0.86
France	99.28	97.79	41.08	83.53	100.00	92.53	39.43	78.93	-4.60
Gabon					100.00	91.30	100.00	93.55	
Georgia							92.00	92.00	
Germany	72.41	35.08		38.99					
Greece	100.00	94.60	0.00	49.25	100.00	96.53	0.00	40.62	-8.63
Guinea			80.89	80.89					
Guyana						67.76		67.76	
Hungary	41.77	53.60	81.98	57.66	34.04	60.72	78.38	59.33	1.67
Iceland	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
Ireland	45.78	56.72	91.42	61.69	50.45	53.18	92.22	59.44	-2.25
Jamaica		92.08		92.08		94.31	33.40	57.21	-34.87
Japan	75.00	30.00	0.00	37.50	75.00	30.00	0.00	37.50	0.00
Jordan	90.00	66.67	100.00	92.00	100.00			100.00	8.00
Kazakhstan					38.71	72.53		63.94	
Kenya	0.00	30.52	42.18	35.50	33.33	90.38	90.32	86.52	51.02
Lao People's Democratic Republic					80.00	80.00		80.00	
Latvia	59.27	67.84	100.00	65.43	68.12	61.55	100.00	66.54	1.11
Lebanon	0.00	50.00	100.00	50.00					

Country	2017 score				2020 score				Score change (2017–2020)
	LW	RW	GW	Total	LW	RW	GW	Total	
Lesotho	0.00	33.33	0.00	16.67	100.00	100.00		100.00	83.33
Liberia					100.00	33.33		50.00	
Liechtenstein		77.78	100.00	80.00		77.78	100.00	80.00	0.00
Lithuania	100.00	99.26		99.55	100.00	97.71		98.65	-0.90
Madagascar	94.59	94.12	81.58	90.91	94.59	94.12	81.58	90.67	-0.24
Mali					0.00	77.78		70.00	
Marshall Islands	100.00		100.00	100.00					
Mexico					58.27	53.09		54.91	
Montenegro	100.00	100.00	0.00	94.12	90.91	86.67	100.00	88.10	-6.02
Morocco	85.94	76.14	76.27	79.15					
Namibia	60.00	85.71	100.00	78.57					
Netherlands	99.01	100.00	62.50	95.88	99.01	100.00	62.50	95.86	-0.02
New Zealand	87.64	99.58		97.70	40.35	80.07	0.00	72.21	-25.49
Niger						60.00		60.00	
Nigeria	41.00	66.27		52.46	7.77	15.05		12.46	-40.00
North Macedonia	0.00	12.50	0.00	8.70		70.01		70.01	61.31
Norway	100.00	100.00	100.00	100.00	100.00	100.00	0.00	100.00	0.00
Panama					100.00	63.64		64.36	
Paraguay					66.67	75.21	0.00	71.61	
Peru		36.84		36.84	23.58	25.62		25.41	-11.43
Poland	100.00	97.26	66.47	95.63	98.77	98.40	58.82	96.14	0.51
Republic of Korea	0.00	82.61	96.01	87.29	87.76	82.61	96.01	93.30	6.01
Romania	66.67	92.74	56.76	84.15	66.67	93.16	44.44	83.67	-0.48
Russian Federation	83.33	100.00		96.00	83.33	100.00		96.00	0.00
Rwanda	0.00	37.50		30.00	66.67	75.00	100.00	78.79	48.79
Samoa					100.00	100.00		100.00	
Senegal		0.00	66.67	44.44		66.67	33.33	44.44	0.00
Serbia					100.00	77.14	88.46	83.07	
Sierra Leone						41.70		41.70	
Singapore	100.00			100.00	100.00			100.00	0.00
Slovakia	0.00	98.39	49.32	71.86	0.00	100.00	47.30	57.15	-14.71

Country	2017 score				2020 score				Score change (2017–2020)
	LW	RW	GW	Total	LW	RW	GW	Total	
Slovenia	9.09	80.43	90.48	75.81	27.27	89.51	78.57	83.89	8.08
South Africa	62.50	37.05		46.92	43.50	52.32	74.19	52.11	5.19
South Sudan	100.00	100.00	100.00	100.00					
Sudan	70.00	100.00	90.00	86.05					
Sweden	48.85	31.77	97.70	45.13	52.96	34.58	97.62	48.37	3.24
Switzerland		100.00		100.00	36.36	100.00		61.11	-38.89
Thailand						36.00		36.00	
Togo					100.00	100.00	100.00	100.00	
Trinidad and Tobago							87.50	87.50	
Tunisia						83.00	86.00	84.94	
Uganda	100.00	100.00		100.00	0.00	0.00		0.00	-100.00
United Arab Emirates	0.00		50.00	40.00					
United Kingdom of Great Britain and Northern Ireland	99.37	95.95	56.20	87.10	100.00	95.99	57.76	89.90	2.80
United Republic of Tanzania					80.00	87.00		85.33	
United States of America						32.63		33.67	
Uruguay					73.04	76.88		75.85	
Zimbabwe		76.47		76.47		83.33		83.33	6.86

Note: LW: lake water bodies; RW: river water bodies; GW: groundwater bodie

ANNEX 2. CONFIDENCE RATING METRIC DESCRIPTIONS

Metric	Description
Time frame	How the assessed period overlaps with the time window of the previous three years for the current data drive
Proportion monitored	How much of the country area is represented by the area of the assessed water bodies
Frequency	Whether the average monitoring frequency of the assessed water bodies is in accordance with suggestions provided by the indicator methodology
Core parameters	The proportion of the indicator core parameters included in the assessment
Target specificity	Whether the water quality targets are specific for water body types, or even water bodies, or whether a single set was applied for the country as a whole

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/

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