

The United Nations World Water Development Report 2020

WATER AND CLIMATE CHANGE

Executive Summary



Climate change will affect the availability, quality and quantity of water for basic human needs, threatening the effective enjoyment of the human rights to water and sanitation for potentially billions of people. The hydrological changes induced by climate change will add challenges to the sustainable management of water resources, which are already under severe pressure in many regions of the world.

Food security, human health, urban and rural settlements, energy production, industrial development, economic growth, and ecosystems are all water-dependent and thus vulnerable to the impacts of climate change. Climate change adaptation and mitigation through water management is therefore critical to sustainable development, and essential to achieving the 2030 Agenda for Sustainable Development, the Paris Agreement on Climate Change and the Sendai Framework for Disaster Risk Reduction.

Impacts on water resources

Global water use has increased by a factor of six over the past 100 years and continues to grow steadily at a rate of about 1% per year as a result of increasing population, economic development and shifting consumption patterns. Combined with a more erratic and uncertain supply, climate change will aggravate the situation of currently water-stressed regions, and generate water stress in regions where water resources are still abundant today. Physical water scarcity is often a seasonal phenomenon, rather than a chronic one, and climate change is likely to cause shifts in seasonal water availability throughout the year in several places.

Climate change manifests itself, amongst others, in the increasing frequency and magnitude of extreme events such as heatwaves, unprecedented rainfalls, thunderstorms and storm surge events.

Water quality will be adversely affected as a result of higher water temperatures, reduced dissolved oxygen and thus a reduced self-purifying capacity of freshwater bodies. There are further risks of water pollution and pathogenic contamination caused by flooding or by higher pollutant concentrations during drought.

Much of the impacts of climate change will be manifested in the tropical zones where most of the developing world can be found

Many ecosystems, particularly forests and wetlands, are also at risk. The degradation of ecosystems will not only lead to biodiversity loss, but also affect the provision of water-related ecosystem services, such as water purification, carbon capture and storage, and natural flood protection, as well as the provision of water for agriculture, fisheries and recreation.

Much of the impacts of climate change will be manifested in the tropical zones where most of the developing world can be found. Small island developing states are typically environmentally and socio-economically vulnerable to disasters and climate change, and many will experience increasing water stress. Across the planet, drylands are expected to expand significantly. Accelerated melting of glaciers is expected to have a negative effect on the water resources of mountain regions and their adjacent lowlands.

Despite the growing evidence that the changing climate will affect the availability and distribution of water resources, some uncertainties remain, especially at local and basin scales. While there is not much disagreement about the temperature increases, which have been simulated by different general circulation models (GCMs) under specific scenario conditions, more variability and ambiguity exist in projected precipitation trends. Often, trends in extremes (heavier precipitation, heat, prolonged droughts) show a clearer direction than trends in annual precipitation totals and seasonal patterns.

Adaptation and mitigation

Adaptation and mitigation are complementary strategies for managing and reducing the risks of climate change.

Adaptation encompasses a combination of natural, engineered and technological options, as well as social and institutional measures to moderate harm or exploit beneficial opportunities from climate change. Adaptation options exist in all water-related sectors and should be investigated and applied where possible.

Mitigation comprises human interventions to reduce the sources or enhance the sinks of greenhouse gases (GHGs). While mitigation options are also available across every major water-related sector, they remain largely unrecognized.

International policy frameworks

Within the 2030 Agenda, water serves as an (often) unacknowledged but essential connecting factor for attaining the different Sustainable Development Goals (SDGs). As such, failure to adapt to climate change not only puts the realization of SDG 6 (the 'water goal') at risk, it also jeopardizes the achievement of most other SDGs. And while SDG 13 "Take urgent action to combat climate change and its impacts" includes specific targets and indicators, there is no formal mechanism linking SDG 13 to the goals of the Paris Agreement, resulting in parallel processes.

The challenges of development, poverty eradication and sustainability are intricately interwoven with those of climate change mitigation and adaptation, especially through water

Although water is not mentioned in the Paris Agreement *per se*, it is an essential component of nearly all the mitigation and adaptation strategies. However, water *is* identified as the number one priority for adaptation actions in most of the intended nationally determined contributions (INDCs) and is directly or indirectly related to all other priority areas. Similarly, water is hardly mentioned in the Sendai Framework itself, even though water flows through each of the priorities for action and is central to all its seven targets.

The challenges of development, poverty eradication and sustainability are intricately interwoven with those of climate change mitigation and adaptation, especially through water. Given water's role in mitigating and adapting to climate change, water could play a connecting role across the SDGs and across policy frameworks such as the Paris Agreement.

Water resources management, infrastructure and ecosystems

Climate change generates additional risks to water-related infrastructure, requiring an ever-increasing need for adaptation measures.

Water-related extremes exacerbated by climate change increase risks to water, sanitation and hygiene (WASH) infrastructure, such as damaged sanitation systems or flooding of sewer pumping stations. The consequent spread of faeces and associated protozoa and viruses can cause severe health hazards and cross-contamination.

For water storage infrastructure, there is a need to reassess the safety and sustainability of dams, and to evaluate them for potential modifications or decommissioning, for the minimization of their environmental and social impacts, and for the optimization of their services.

In many regions of the world, aquifers present the largest storage capacity, often orders of magnitude greater than surface water storage. Groundwater is also more buffered from seasonal and multi-year climate variability and less immediately vulnerable than surface water.

It is increasingly necessary to consider 'unconventional' water resources in future planning. Water reuse (or reclaimed water) is a reliable alternative to conventional water resources for a number of uses, provided that it is treated and/or used safely. Desalination can augment freshwater supplies, but it is generally energy-intensive and thus may contribute to GHG emissions if the power source is non-renewable. Atmospheric moisture harvesting such as cloud seeding, or fog water collection presents a low-cost and low-maintenance approach for localized areas where advective fog is abundant.

***Water reuse
(or reclaimed water)
is a reliable alternative
to conventional
water resources for
a number of uses,
provided that it is
treated and/or used
safely***

The bulk of the GHG emissions related to water management and sanitation either originates from the energy used to power the systems or the biochemical processes involved in water and wastewater treatment. Increasing water use efficiency and reducing unnecessary water consumption and water loss both translate into lower energy use and thus lower GHG emissions.

Wetlands accommodate the largest carbon stocks among terrestrial ecosystems, storing twice as much carbon as forests. Taking into account that wetlands offer multiple co-benefits – including flood and drought mitigation, water purification, and biodiversity – their restoration and conservation is of critical importance.

Disaster risk reduction

The current impacts and future anticipated risks associated with extreme events demand sustainable solutions for climate change adaptation and disaster risk reduction.

The range of available climate change adaptation and disaster risk reduction strategies includes hard (structural) and soft (policy instruments) approaches. Hard measures include enhanced water storage, climate-proof infrastructure, and crop resilience improvements through the introduction of flood- and drought-resistant crop varieties. Soft measures include flood and drought insurance, forecasting and early warning systems, land use planning, and capacity building (education and awareness).

Hard and soft measures often go together. Urban planning, for example, can help increase resilience to flood risks by featuring drainage systems that provide spaces to safely collect and store floodwater. The city thus acts as a 'sponge', limiting surges and releasing rainwater as a resource.

Modern communication methods such as social media and mobile phone services provide significant opportunities to help improve communication and early warning effectiveness. Drought and flood monitoring systems are also an important component of risk reduction.

Mainstreaming gender and community involvement in decision-making processes are key elements to disaster risk reduction strategies. Improved inter-agency coordination in water resources and disaster risk management is needed, especially in transboundary basins where it remains fragmented throughout most of the world.

Human health

Anticipated water-related health impacts of climate change are primarily food-, water- and vector-borne diseases, deaths and injury associated with extreme weather events such as coastal and inland flooding, as well as undernutrition as a result of food shortages caused by droughts and floods. Mental health impacts associated with illness, injury, economic losses and displacement may also be substantial, although difficult to quantify.

Climate change is likely to slow or undermine progress on access to safely managed water and sanitation

At the end of the Millennium Development Goals period (2000–2015), 91% of the global population used an improved drinking water source and 68% used improved sanitation facilities. Much remains to be done to reach the new, higher levels of safely managed water supply and sanitation services as defined under the SDGs for the 2.2 billion and 4.2 billion people respectively who lack this superior level of service.

Climate change is likely to slow or undermine progress on access to safely managed water and sanitation, and lead to ineffective use of resources if systems design and management are not climate-resilient. By extension, progress on the elimination and control of water- and sanitation-related disease will also be slowed or undermined by climate change.

Food and agriculture

The specific challenges for agricultural water management are twofold. The first is the need to adapt existing modes of production to deal with higher incidences of water scarcity and water excess (flood protection and drainage). The second is to 'decarbonize' agriculture through climate mitigation measures that reduce GHG emissions and enhance water availability.

The scope for adaptation in rainfed agriculture is determined largely by the ability of crop varieties to cope with shifts in temperature and to manage soil water deficits. Irrigation allows cropping calendars to be rescheduled and intensified, thus providing a key adaptation mechanism for land that previously relied solely on precipitation.

In terms of equivalent tonnes of CO₂, the largest contribution to agricultural GHG emissions is made by the release of livestock methane through enteric fermentation and manure deposited on pasture. For forestry, the greatest opportunity for mitigation involves reducing the emissions attributable to deforestation and forest degradation.

Agriculture has two main avenues for mitigation of GHGs: carbon sequestration through organic matter accumulation above and below the ground, and emission reduction through land and water management, including adoption of renewable energy inputs such as solar pumping.

Climate-Smart Agriculture (CSA) is a recognized suite of well-informed approaches to land and water management, soil conservation and agronomic practice that sequester carbon and reduce greenhouse gas emissions. CSA practices help to retain soil structure, organic matter and moisture under drier conditions, and include agronomic techniques (including irrigation and drainage) to adjust or extend cropping calendars to adapt to seasonal and interannual climate shifts.

Energy and industry

The water-related effects of climate change generate risks to business and power generation. Water stress can put a halt to manufacturing or energy generation. Impacts will also carry into operational aspects, affecting the supply of raw materials, disrupting supply chains, and causing damage to facilities and equipment.

The water-related effects of climate change generate risks to business and power generation

Energy is in the spotlight of climate change initiatives as about two-thirds of the world's anthropogenic GHGs come from energy production and use. There are a number of opportunities to mitigate GHGs and reduce water use at the same time. Reducing energy demand and increasing energy efficiency are starting points. One promising direction is the increased use of low-carbon renewable energy technology with little water requirements, such as solar photovoltaic (PV) and wind, the costs of which are becoming increasingly competitive with fossil fuel energy generation. While hydropower will continue playing a role in climate mitigation and adaptation of the energy sector, the overall sustainability of single projects needs to be assessed, taking account of potential water consumption through evaporation as well as GHG emissions from reservoirs, not to mention the potential ecological and socio-economic impacts.

For business, water stress is one of the main drivers for water reuse and efficiency. In concert with technology, a facility could look at day-to-day operations such as the use of washwater, and better monitoring and leak detection. On an expanded scale, a company might evaluate its water footprint and include those of its suppliers, which may have far-reaching effects if they are large water users.

Human settlements

The impacts of climate change on urban water systems include higher temperatures, reduced precipitation and more severe drought on the one hand, and increasing heavy precipitation and flooding events on the other. It is precisely these extremes that make the planning of urban space and the provision of infrastructure so difficult.

The physical infrastructure for delivery of water and sanitation facilities can also be disrupted, leading to contaminated water supplies and the discharge of untreated wastewater and stormwater into living environments. Vectorborne diseases such as malaria, rift valley fever, leptospirosis and others are often observed after flooding events.

Urban water resilience goes way beyond the traditional city boundaries. In cases where water supplies rely on distant watersheds, planning needs to look well beyond the city's boundaries and consider the long-term impacts of urban expansion on distant freshwater ecosystems and the local communities that also rely on them.

In small urban and rural settlements, use of water for agriculture and in some cases industrial applications results in reduced availability for domestic uses. Domestic supplies must be prioritized under the human rights to water and sanitation.

Nexus: Accounting for interlinkages

Adaptation and mitigation actions by one sector can directly influence its water demand, which can in turn augment or reduce the local/regional water availability (including quality) for other sectors. In cases of reduced water demand, such actions can lead to multiple benefits across sectors and boundaries, whereas increased water demand can result in the need for trade-offs over the allocation of limited supplies.

Water use requires energy. Therefore, any reduction in water use has the potential to reduce the energy demand from the water sector and thus help mitigate climate change (if said energy source is from fossil fuels). Conversely, energy production also requires water. With their very low water requirements, renewables such as wind, solar PV and certain types of geothermal power generation are by far the best energy alternatives from a water demand perspective.

Water efficiency measures in agriculture can increase water availability and reduce the energy needed for pumping, in turn further reducing the water needed for energy production. Increased use of renewable energy in agriculture (e.g. solar PV pumps) provide additional opportunities to lower GHG emissions and to support the livelihoods of smallholders. Since agriculture accounts for 69% of global water withdrawals, reducing food loss and waste could also have significant repercussions on water and energy demand, and thereby reducing GHG emissions.

Conservation agriculture allows soils to retain more water, carbon and nutrients, with additional ecological benefits. The biomass and soils of properly managed forests, wetlands and grasslands provide mitigation opportunities through carbon sequestration, with significant additional benefits in terms of nutrient cycling and biodiversity.

Improved approaches to the treatment of water, and especially wastewater, offer a range of mitigation opportunities. Untreated wastewater is an important source of GHGs. With more than 80% of all wastewater (globally) released to the environment without treatment, treating its organic matter prior to its release can reduce GHG emissions. The reuse of untreated or partially treated wastewater can reduce the amount of energy associated with water extraction, advanced treatment and, in cases where the wastewater is reused at or near the release site, transportation. The biogas produced from wastewater treatment processes can be recovered and used to power the treatment plant itself, rendering it energy-neutral and further enhancing energy savings.

Governance

Both climate and water management require mechanisms for oversight and coordination. Sectoral fragmentation and bureaucratic competition may pose serious challenges for the integration across scales. This calls for i) greater public participation to discuss and manage climate risk; ii) building adaptive capacities at multiple levels; and iii) prioritizing risk reduction for socially vulnerable groups.

'Good governance' involves adhering to principles of human rights, including effectiveness, responsiveness and accountability; openness and transparency; participation in the performance of key governance functions relating to policy and institutional arrangements; planning and coordination; and regulation and licensing. For the integration of substance, integrated water resources management (IWRM) provides a process to involve stakeholders across society, the economy and the environment.

Greater public participation to manage climate risk is suggested as a way to build adaptive capacities at multiple levels, avoid institutional traps and prioritize risk reduction for socially vulnerable groups. At the same time, scientific information and data also need to be made available at the local level and included as information into local multi-stakeholder decision processes.

There are many indications that young people are increasingly concerned about climate change

While governments remain responsible for leading national climate mitigation and adaptation measures as well as water governance, the process of change is always coproduced. There are many indications that young people are increasingly concerned about climate change. Cities have also become forerunners of climate action in many countries, and leading companies have made commitments to reduce their water footprint and GHG emissions in order to address their contribution to water stress and climate change.

Poverty, discrimination and vulnerability are closely related and typically intersect. Women and girls from minority ethnic groups or from remote or disadvantaged areas may suffer multiple forms of exclusion and oppression. When disasters hit, such inequalities can become exacerbated, making it more likely that poor people are affected. Poor people are also likely to lose relatively more than the non-poor.

Finance

Current levels of financing are inadequate to reach the international community's goal of universal availability and sustainable management of water and sanitation. Proponents of water projects could aim to increase the water sector's share of climate finance and emphasize water's ties to other climate-related sectors in order to ensure greater funding for water management.

Two promising trends are generating opportunities for water projects to access climate finance. The first is the increasing recognition of the mitigation potential within water and sanitation projects. This trend could be particularly advantageous, as mitigation made up 93.8% of climate financing in 2016, but water projects consisted of a fraction of 1% of that sum. The second trend is an increasing emphasis on financing climate adaptation.

Accessing climate finance can be competitive and difficult, especially for complex water projects that may transcend national boundaries. Bankable climate projects are those that have a clearly articulated link to climate change impacts, familiarity and strict compliance with funding procedures, and sometimes additional funding sources. In order to be considered bankable, projects hoping to use climate finance must explicitly address the causes and/or consequences of climate change. Projects that communicate and address risks, and capture co-benefits in other areas such as health, are also considered more bankable.

Differentiated strategies that specifically consider the resilience needs of marginalized groups should also be built into larger water-climate plans and projects.

Technological innovation

The challenges, in terms of technological innovation, knowledge management, research and capacity development, are to promote the generation of new tools and approaches through advanced research and development, and, equally as important, to accelerate the implementation of existing knowledge and technologies across all countries and regions. However, these actions will only lead to the intended outcomes if they are accompanied by awareness-raising, as well as educational and capacity development programmes, in order to widely disseminate the available knowledge and to stimulate the uptake of new and existing technologies.

Satellite-based earth observation can help identify trends in precipitation, evapotranspiration, snow and ice cover/melting, as well as runoff and storage, including groundwater levels. While remote sensing can reveal large-scale processes and features that are not easily observable via traditional methods, the temporal and spatial resolution may not be fully adequate for smaller-scale applications and data analysis. However, when backed with national statistics, field-based observations and numerical simulation models, remote sensing can contribute to a comprehensive assessment of climate change impacts related to water.

Evolutions in the field of data acquisition have been facilitated by high-speed internet networks and global coverage, as well as cloud computing and the enhancement of virtual storage capabilities. Wireless sensors for monitoring water consumption have been developed and are increasingly used to allow for remote water metering. Applications of big data analytics can help to obtain knowledge by processing the collection of continuous streams of water-related information and data, in order to extract actionable information and insights for improved water management. Citizen science and crowdsourcing have the potential to contribute to early warning systems and to provide data for validating flood forecasting models.

Regional perspectives

Domestic regulation of water resources development, use, conservation and protection forms the foundational pillar of water governance and is the prime instrument for the implementation of INDCs under the Paris Agreement.

While two-thirds of countries outline a general portfolio of water projects in their INDCs, only one in ten cite what could be called a detailed project proposal, and these originate either from domestic water planning processes or have emerged from previous climate funding proposals. However, the need for institutional reforms is well recognized in INDCs, often prioritized alongside infrastructure investments.

Regional approaches to support transformative shifts can play a critical role in national-level implementation by improving collaboration and coordination between responsible institutions; ensuring that action is based on sound information and evidence; and increasing access to both public and private finance for climate-resilient investment.

Sub-Saharan Africa

Impacts of climate variability on Africa's water resources are already acute, as exemplified by the recent decrease in rainfall in southern Africa. Water-related impacts of climate change on human health are also expected, through vector- and waterborne diseases (including by further challenging access to safe drinking water, sanitation and hygiene) and via malnutrition, given expected impacts on food security. In agricultural systems, especially in semi-arid areas, conventional livelihood-based approaches appear not robust enough to deal with the long-term impacts of climate change.

Policies and actions towards climate change adaptation and mitigation include: supporting resilience to droughts and floods through investing in and improving the climate resilience of WASH facilities; expanding social protection and introducing financial products like insurance; enhancing gender equality in the use and management of water resources; and improving water availability for agriculture through water harvesting, mulching and reduced tillage in rainfed systems.

Energy is politically important to fulfil the ambitions of many African countries in terms of economic transformation. It could provide a catalyst to encourage regional cooperation to address challenges at the water-energy-climate nexus, possibly opening up investment in regional power pools and the institutional mechanisms for energy trading.

Europe, Caucasus and Central Asia

Climate projections indicate increasing precipitation in northern Europe and decreasing precipitation in southern Europe. The Intergovernmental Panel on Climate Change (IPCC) highlights increasing challenges for irrigation, hydropower, ecosystems and human settlements in the region.

The key actions for more effective adaptation and more resilience to extremes in the region include: enhanced water efficiency and water saving strategies; monitoring and data sharing on water quantity and quality; improving coherence of climate change adaptation and water-related disaster risk reduction; and attracting funding from multiple sources (e.g. international, national and private).

In transboundary basins, technical and financial assistance can be shared up- or downstream, from wealthier to poorer riparian countries. However, even where funds are available, transboundary water management can be politically difficult. This points to the need to find a politically salient entry point around which to build cooperation. In some cases, climate change itself can be the factor that opens up the opportunity for cooperation.

Latin America and the Caribbean

Climate variability and extreme events already severely affect the region. In Central and South America, observed streamflow and water availability changes are projected to continue, affecting vulnerable regions.

Rapid urbanization, economic development and inequality are among the key socio-economic drivers of pressure on water systems with which climate impacts intersect. Poverty is persistent in most countries, contributing to the vulnerability to climatic change. Economic inequality also translates into inequality in access to water and sanitation, and vice versa. Increasing risks of waterborne diseases have a greater impact on poor people. Vulnerability is also high in rural areas, with climatic factors limiting economic options and driving out-migration.

For many countries in the region, climate change occurs against a backdrop of high levels of intersectoral competition for water, including between urban areas, the energy and agriculture sectors, and ecosystem needs.

The limited explicit mention of transboundary water–climate issues in development strategies is symptomatic of wider challenges in cooperation on transboundary waters in Latin America and the Caribbean.

Asia and the Pacific

There is high variation and low confidence in projected water-related impacts of climate change at the subregional scale in Asia and the Pacific. The region is highly vulnerable to climate-induced disasters and extreme weather events, which are disproportionately burdening poor and vulnerable groups. Water-related climate impacts intersect with other socio-economic trends that impact water quality and quantity, including industrialization (which is reshaping sectoral demand for water and increasing pollution), population growth and rapid urbanization. The latter have also increased exposure to water-related natural hazards such as floods.

Climate change and increasing demand for water will put additional stress on the region's groundwater resources, which are already experiencing severe stress in some areas due to increases in demand for irrigation.

At the national level, identified priorities to accelerate water–climate action include: enhancing water governance and water productivity to manage competition between the water needs of agriculture, energy, industry, cities and ecosystems; promoting nature-based solutions that can curb emissions and increase resilience; and integrating climate change and disaster risk reduction across the entire project and policy cycle.

Regional cooperation on investment and information, as well as on institutional areas such as governance, capacity and partnerships, is urgently needed in Asia's transboundary basins.

Western Asia and North Africa

Vulnerability to climate change is moderate to high across the region, with a generally increasing gradient from north to south. Runoff and evapotranspiration generally follow the same trends as precipitation, although evapotranspiration is limited by water scarcity.

The areas with the highest vulnerability to climate change are in the Horn of Africa, the Sahel and the southwestern part of the Arabian Peninsula, which comprise several of the region's Least Developed Countries. While their exposure to climate change varies, they all exhibit low adaptive capacity.

Intersecting with broad challenges of climate change and limited adaptive capacity are complex socio-economic and political dynamics, affecting water at the regional, national and subnational levels. Politicization and weaponization of water resources, displacement, and degradation of water infrastructure have been major challenges for countries affected by conflict. Inequalities in access to and control of water resources persist, especially across urban–rural and gender lines.

Regional stakeholders identified many priorities and opportunities relating to water, including: rendering urban development more sustainable; enhancing data, research and innovation; increasing the resilience of vulnerable communities exposed to floods and droughts, and threatened by food insecurity; furthering policy integration between mitigation, adaptation and sustainable development; and increasing access to finance, including via international climate funds and through the development of local markets and investment products.

The way forward

Given the cross-cutting nature of water and climate through different economic sectors and across society, trade-offs and conflicting interests need to be addressed at all levels in order to negotiate integrated and coordinated solutions. This requires an equitable, participatory, multi-stakeholder approach to water governance in the context of climate change.

There are increasing opportunities to more genuinely and systematically integrate adaptation and mitigation planning into water investments, rendering these investments and associated activities more appealing to climate financiers. Furthermore, various water-related climate change initiatives can also provide co-benefits such as job creation, improved public health, reduced poverty, the promotion of gender equality and enhanced livelihoods, among others.

Despite the mounting evidence that climate change is affecting the global hydrological cycle, much uncertainty remains when projecting its impacts over smaller geographical and temporal scales. However, this uncertainty must not be seen as an excuse for inaction. Rather, it should serve as an impetus to expand research, to promote the development of practical analytical tools and innovative technologies, to adopt no-regrets approaches, and to build the institutional and human capacity required to foster informed, science-based decision-making.

The need for greater cooperation between the water and climate communities exists well beyond the realm of scientific research. On the one hand, it is imperative that the climate change community, and climate negotiators in particular, give greater attention to the role of water and recognize its central importance in addressing the climate change crisis. On the other hand, it is equally (if not more) essential that the water community focuses its efforts to promote the importance of water in terms of both adaptation and mitigation, to develop concrete water-related project proposals for inclusion in NDCs, and to strengthen the means and capacities to plan, implement and monitor water-related activities in NDCs.

Combining climate change adaptation and mitigation, through water, is a win-win-win proposal. First, it benefits water resources management and improves the provision of water supply and sanitation services. Second, it directly contributes to combating both the causes and impacts of climate change, including disaster risk reduction. Third, it contributes, directly and indirectly, to meeting several of the Sustainable Development Goals (hunger, poverty, health, energy, industry, climate action and so on – not to mention SDG 6, the ‘water goal’ itself) and a host of other global objectives.

In an era characterized by a host of ‘gloom and doom’ studies and articles on climate change and other global environmental crises, this report proposes a series of practical responses, in terms of policy, financing and action on the ground, to support our collective objectives and individual aspirations to achieve a sustainable and prosperous world for all.

Prepared by WWAP | Richard Connor

This publication is produced by WWAP on behalf of UN-Water.

Cover illustration by Davide Bonazzi



© UNESCO 2020

The designations employed and the presentation of material throughout this publication do not imply the expression of any opinion whatsoever on the part of UNESCO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The ideas and opinions expressed in this publication are those of the authors; they are not necessarily those of UNESCO and do not commit the Organization.

For further information concerning copyrights and licensing, please refer to the full report available at www.unesco.org/water/wwap.

UNESCO World Water Assessment Programme

Programme Office for Global Water Assessment

Division of Water Sciences, UNESCO

06134 Colombella, Perugia, Italy

Email: wwap@unesco.org

www.unesco.org/water/wwap

We acknowledge with gratitude
the financial support provided by the
Government of Italy and Regione Umbria.



Regione Umbria

