Global Climate Action
United Nations Climate Change

Marrakech Partnership

CLIMATE ACTION PATHWAY

WATER

Vision and Summary

2021

VISION STATEMENT

It is 2050 and the full 10 per cent[1] contribution of the water sector to the global mitigation goal of the Paris Agreement has been attained through the **protection** and **restoration** of freshwater resources for ecosystems and people; the sustainable **use** and distribution of water for agriculture, energy, industry, and human settlements; and the **reuse** of freshwater and wastewater at a global scale. All activities to **extract, store, deliver, use, treat and reuse water** have been fully decarbonized in environmentally sustainable ways, and these activities have transitioned from being largely non-renewable to becoming a **source of net-positive renewable energy**. This has been achieved predominantly by harnessing the **embedded energy, water and nutrient content of wastewater**, which is used in circular models of urban and rural development. Water infrastructure and services – both man-made and natural – have been planned, adequately financed, and built to be **robust and flexible across a range of possible climate futures**. They are **providing reliable services for all**, tailored to local management capacities and municipal and community needs while eliminating water overuse and losses. In **cities**, the provision of water and energy has been combined and optimized into decentralized, circular and resilient systems. **Half of all freshwater ecosystems and inland waters,** particularly those that have the greatest potential to sequester carbon, such as **wetlands, peatlands and mangroves**, are protected and restored, maximizing their transformative potential for carbon mitigation and sequestration, bending the curve on biodiversity loss, boosting resilience for communities and livelihoods and preventing the spread of pandemics due to deforestation and the destruction of ecosystems. Carbon emissions from **agriculture and food systems** have been reduced or sequestered to the tune of up to 2.07 gigatonnes thanks to the widespread deployment of **smart and efficient irrigation technologies**. **Regenerative agricultural practices** that achieve sustainable water footprints are now the norm and are practiced on farms the world over, safeguarding farmers and their livelihoods. They result in multiple benefits, including **water and energy conservation**, improved soil health, carbon sequestration and prevention of environmental pollution and degradation. A further 13.8 gigatonne carbon emission reduction has been achieved thanks to, among other things, the application of alternate wetting and drying cycles in **rice production**. Use of water and wastewater in the production of **energy** has been fully optimized, reducing maladaptive impacts on water-dependent ecosystems and services. **Business, trade** and **financial decisions** from the public and private sectors prioritize and **align with the protection, sustainable use and reuse of freshwater resources and ecosystems**, providing direct finance, green jobs, market signals and incentives that continue to drive the innovation required for further water transformation. Despite achieving the goal of limiting global warming to 1.5 degrees Celsius, 380 million more people live in water-stressed regions in 2050 than in 2020.[2] These **people are thriving,** however, thanks to universally accessible, safe and adequate water supplies and sanitation services, effectively preventing and containing pandemics such as COVID-19 while raising all people out of poverty and ensuring the human right to water and sanitation is fully realized. Governments have prioritized water governance at the highest levels thanks to adequate and effective **cross-sectoral institutional, legal and regulatory frameworks and resources** for implementing and promoting sustainable and resilient water management, sustainable water provision and allocation, and protection of people and places while providing appropriate government incentives that ensure water is directed to societies' most essential needs, especially those of the most vulnerable. Crucially, **vibrant civil society**

- [1] 2020, Stop Floating, Start Swimming: Water & Climate Change – Interlinkages & Prospects for future Action, GIZ, https://everydrop-counts.org/water-climate-report.
- [2] https://www.carbonbrief.org/world-population-facing-water-stress-could-double-by-2050-as-climate-warms.

organizations including trade unions are actively engaged in spurring cross-sectoral innovation and collaboration and are holding key stakeholders accountable for maintaining the achieved water transformation.

The next ten years are critical to realizing this 2050 vision, which requires difficult decisions by all. The required speed and scale can be achieved only through robust, active interventions by governments and regulatory bodies, with coordinated, actionable interim targets for structural economic transformation.

SYSTEM TRANSFORMATION SUMMARY

Smart management of water and freshwater ecosystems can offer a range of impactful, largely untapped solutions for mitigating carbon emissions. For example, the use, storage, distribution and treatment of water and wastewater together contribute to about 10 per cent of global greenhouse gas emissions.[3] Further, wetlands accommodate the largest carbon stocks among terrestrial ecosystems and yet their loss rate is three times higher than that of forests, rendering **water management and the protection of freshwater ecosystems vital elements of global climate mitigation** activities and strategies. At the same time, **climate change manifests itself primarily through changes in the water cycle**. Over the last 25 years, floods, droughts and other water-related events have caused more than 90 per cent of major weather-related disasters, and the **frequency and intensity of such events are expected to greatly intensify if we do not halt dangerous climate change** as rapidly as possible. Projections suggest that a failure to limit the global temperature increase to 1.5 degrees will have catastrophic consequences on the availability and quality of water for basic human needs, including food and energy provision, jeopardizing the human right to water and sanitation for billions of people as well as the preservation of vital ecosystems and indeed, life itself. By investing in the resilience of our water resources, services and systems, we can reduce climate risks to people, ecosystems and economies. Identifying and accelerating action on **water-related solutions for climate change mitigation and resilience, therefore, are a win-win proposition. It is time to tap that potential.**

A triple transformation is required to succeed: the adequate **protection** of water resources, freshwater ecosystems and people; a water **use revolution** in the production of food and energy and a transformation in the water infrastructure required to service cities and other human settlements and industries; and a paradigm shift in the **reuse** of water and wastewater.

For this vision to be realized, the following key levers of change must be activated:

Policy and regulation, at local, national, and international levels, have a key role to play in:

- protecting water resources and freshwater ecosystems and halting and reversing the degradation and enabling large-scale restoration of critical wetland systems;
- ensuring sustainable, universal and fair access to water, sanitation and hygiene through just and inclusive water governance;

[3] See footnote 1.

- reallocating water towards society's most essential needs, including for populations most vulnerable to the impacts of climate change (the most vulnerable populations will vary by socioecological context);
- implementing policies that enable the complete and net-zero treatment, reuse and recycling of wastewater;
- building an enabling environment that encourages system-scale planning and actively plans for sustainable renewable energy options; and
- preventing, preparing for and responding to water-related humanitarian disasters and post-disaster rehabilitation.

Policy frameworks such as Integrated Water Resources Management (IWRM)[4] and water system resilience thinking can further support the coordinated management of water as an essential resource for climate adaptation and mitigation activities across sectors and geographic boundaries. While none of these interventions are new, many are politically challenging. Therefore, triggering change requires a water-related ambition loop, which is a positive feedback loop in which bold government policies and private sector leadership reinforce each other and jointly take water, ecosystem, and climate action to the next level.

The **financial and investor communities**, alongside empowered citizens, are catalysts of systemic change. On the one hand, there needs to be recognition, in their engagement, of water resources as a public good. On the other hand, water services have a cost, and private actors and investors have a role to play in improving water management and its role in the fight against climate change. Financial and investment institutions can spur the development, upscaling and uptake of critical technologies, policies and practices through the adoption of bold commitments to water security and through their cascading influence on the entire economy via portfolio holdings, loan books and other assets. Each sends a strong signal from the private sector to government in support of ambitious climate and water policy, serving to close the ambition loop. Mandatory greenhouse gas and water reporting and consideration of climate and water risks in financial decision-making, accompanied by appropriate policy measures, pushes corporate practices away from carbon-intensive, non-resilient water-related practices and towards more sustainable ones. The public and private finance sector will also need to direct investment into the protection of water resources and freshwater ecosystems in addition to strengthening institutional and civil society capacity. Funding for climate change mitigation and adaptation in the water sector must increase, with priority given to the least developed countries. In addition, access to funding must be facilitated for the most disadvantaged countries, regions and communities for as long as is required to build in-country capacity, test innovative funding models (10–15 years) and sustain solutions over the long term. In order to boost resilience to climate change, building financial resilience and addressing wider financial challenges for water are essential.

Demand from industry, agriculture and domestic consumers will need to shift from ever increasing use of scarce freshwater resources and unchecked pollution to regenerative and restorative approaches that align with the protection of freshwater resources, ecosystems and people, the recognition of water resources as a public good and of the human right to water and sanitation. The adoption of demand-side public

[4] Integrated Water Resources Management (IWRM), as recognized in Sustainable Development Goal 6, target 5 (SDG 6.5) as well as in international law (the 1992 Helsinki Convention, the 1997 New York Convention), at the scale of the hydrographic basins of lakes, rivers and aquifers, helps to balance competing uses, limit waste of this precious resource and adapt to climate change.

commitments to practicing and embracing circular economy principles will be essential in triggering the wastewater revolution, as will a profound realization of the value of water, evidenced by adopting bold targets and linking them to C-suite compensation. Triggers of change for industry and agricultural demand include transparency, regulatory, reputational, legal and market mechanisms, whereas consumers overwhelmingly respond to the promotion of "greener" consumption and production habits and their associated economic and health benefits through advertising, marketing and public dialogue, further reinforcing the positive ambition loop for business and governments.

Civil society plays a role in increasing public awareness of the externalities of the current high-carbon, low-resilience approach to water and sanitation provision as well as degradation and loss of freshwater and coastal ecosystems through accountability monitoring, campaigns and calls-to-action, addressing research and policy gaps and improving information on sustainable choices. Civil society facilitates multi-stakeholder partnerships and dialogues that can enable a shared vision and plans for and investments in a transformation to a landscape that is more resilient to water shocks and stresses and brings returns to nature, the local economy and human well-being. Civil society can also influence policy by advocating for climate and water-supportive legislative change, working towards systems transformation, driving collective action and holding actors to account.

Technology and innovation generators are needed to deliver and scale up water reuse techniques and zero-carbon desalination. Advances in earth observation and real-time sensors, earth systems research as well as the widescale use of virtual and augmented reality concepts for demand-side stakeholders focused on the water-climate nexus may help to stimulate industry and consumer demand and improve decision-making. The value of local and indigenous knowledge is essential in developing and implementing responses at all levels.

This Marrakech Partnership Water Climate Action Pathway (W-CAP) aspires to fundamentally align with all other Climate Action Pathways. This alignment is essential, given the strong interlinkages across the water–climate–energy–food–environment nexus, which can lead to synergies and cross-benefits in many cases, and impose difficult choices and trade-offs in others. This version of the W-CAP identifies key areas of synergy and co-benefits. Success in these pathways is fundamental to success in the water sector and vice versa. As such, readers should engage with the other Pathways to gain a fuller picture of the water-related change needed to win the Race to Zero and the Race to Resilience.

MILESTONES TOWARDS 2050

By 2021	By 2025	By 2030	By 2040
• All nationally determined contributions (NDCs) and national adaptation plans (NAPs), especially those representing the most water-stressed regions of the world, are updated to include resilient water management approaches and tools for GHG	• Ensure all NDCs and NAPs are accompanied by a specific water plan and budget that addresses the climate–water interactions across all sectors, including energy and industry, agriculture and livestock, forestry and land use, public health, ecosystems and	• Ensure water and wastewater utilities reach complete decarbonization and improved climate resilience through climate risk management. • Protect and restore 30 per cent of the Earth's water-related natural ecosystems	• Industrial activities that jeopardize climate and water are phased out and a just transition to a net-zero, climate resilient future achieved. • Ensure the global water sector is a net-positive provider of renewable

mitigation, such as low-carbon urban water supply and wastewater management and carbon sequestration through freshwater ecosystems such as wetlands, peatlands and mangroves. • Governments (national and local), multilateral organizations and civil society organizations make a concerted effort to further unlock climate finance from relevant funds for water-related projects that prioritize the world's most vulnerable communities and populations, in tandem with strengthened efforts to secure development finance, private sector interests, innovative funding sources and financing tools. • Work with civil society organizations and communities to develop social accountability and water stewardship pilot programmes.	biodiversity, urban wastewater management, and urban regional planning and infrastructure. • Double the share of sustainable renewable energy used in water extraction, supply, treatment, and reuse. At the same time, ensure that the level of water extraction and consumption in energy generation does not increase with a greater share of freshwater being allocated for use in renewable energy generation than fossil fuel-based generation activities.	so as to maximize carbon sequestration and ecosystem services by natural ecosystems such as wetlands and coastal habitats. • Build resilient and healthy societies by achieving universal and equitable access to safe, affordable and climate-resilient drinking water and sanitation services and enshrining the human right to water in policy and law, especially servicing the most vulnerable populations who are first to be affected by the impacts of climate change.	energy and nutrients, and that 100 per cent of all municipal, industrial and agricultural wastewater is treated for reuse or discharge into the environment. • Double the area of protected water-based ecosystems and the number of free-flowing rivers since 2020. • Ensure 100 water-insecure cities around the world achieve net-zero emissions and are no longer water-stressed.

PROGRESS

Progress is under way.

Protect

In the past 40 years, wetlands in many developed areas have been protected or even restored. In 2019, 19 per cent of global wetlands were listed on the Ramsar List of Wetlands of International Importance.

Approximately 1.8 billion people have gained access to basic drinking water services since 2000, but there are vast inequalities in the accessibility, availability and quality of these services. It is estimated that 1 in 10 people (785 million) still lack basic drinking water services, including 144 million who drink untreated surface water. Some 2.2 billion people around the world do not have safely managed drinking water services, 4.2 billion people do not have safely managed sanitation services, and 3 billion lack basic handwashing facilities (World Health Organization (WHO), United Nations Children's Fund (UNICEF), 2019).

Approximately 2.1 billion people have gained access to basic sanitation services since 2000, but in many parts of the world the waste produced is not safely managed. Some 2 billion people still lack basic sanitation, of whom 7 out of 10 live in rural areas and one third in the least developed countries (WHO, UNICEF, 2019).

Use

Water resource managers in countries such as Chile, Mexico, the Netherlands and Zambia are building climate risk into their management and infrastructure plans, working to ensure that investors in new or retrofitted water infrastructure – including natural infrastructure – can adequately evaluate risks and trade-offs and withstand a range of climate impacts.

A total of 515 financial institutions with USD 106 trillion in assets and 147+ large purchasers with over USD 4 trillion in procurement spend are requesting thousands of the world's most water-impactful companies to report the actions they are taking to halt the global water crisis. Almost 3,000 responded in 2020, up from 150 a decade ago.

Reuse

In 2020, the European Union introduced new regulation on minimum requirements for water reuse for agricultural irrigation, which will enable a six-fold increase in the volume of wastewater that can be safely reused: from one to six billion cubic metres.

Innovative funding mechanisms such as green and blue bonds are on the rise, with over USD 12 billion in investments globally as at 2020.

FACTS & FIGURES

- The use, storage, distribution and treatment of water and wastewater together contribute to about 10 per cent of global greenhouse gas emissions (GIZ 2020).
- The International Union for Conservation of Nature (IUCN) projects that when natural infrastructure is combined with engineered or built infrastructure, performance can be optimized and financial benefits accrued. For water infrastructure this amounts to an added value of USD 29 trillion per year in services, such as filtering contaminated water and storm protection.
- Electricity use by the water sector is mainly for the abstraction (40 per cent), conveyance (25 per cent) and treatment (20 per cent) of water and wastewater, representing some 4 per cent of global electricity production. Energy consumption in the water sector is expected to double by 2040 as a result of increasing desalination of seawater (International Energy Agency (IEA), 2016). Further, the formation of methane and nitrous oxide in landfills, open sewers, dams and lagoons amounted to an estimated 13 per cent of global non-carbon-dioxide emissions in 2005 (United States Environmental Protection Agency, 2012).
- It has been estimated that the water sector worldwide could reduce its energy use by 15 per cent by 2040 (IEA, 2016).
- Wetlands, including peatlands, accommodate the largest carbon stocks among terrestrial ecosystems and store twice as much carbon as forests (Crump, 2017; Moomaw et al., 2018). However, wetlands are under a lot of pressure and their loss rate is three times higher than that of forests (Ramsar Convention on Wetlands of International Importance, 2018).

- Griscom et al. (2017) suggest that around a third of GHG mitigation by 2030 can be attained through nature-based mitigation, to which wetlands can contribute a share of 14 per cent. Taking into account that wetlands offer multiple co-benefits – including flood and drought mitigation, water purification and biodiversity – conservation of wetlands is an important mitigating measure.
- Just 3.5 per cent of the Earth's water is fresh, that is, with few dissolved salts. Over 68 per cent of Earth's freshwater is locked up in ice and glaciers. Another 30 per cent is in groundwater (National Aeronautics and Space Administration, 2016).
- Studies predict that water scarcity will continue to increase in the future, with around 52 per cent of the world's population living in water-stressed regions by 2050 (Kölbel et al., 2018).
- By 2050, the number of people at risk of floods will increase from its current level of 1.2 billion to 1.6 billion. In the early to mid-2010s, 1.9 billion people, or 27 per cent of the global population, lived in severely water-scarce areas. By 2050, this number will increase to 2.7–3.2 billion people (United Nations, 2020).
- As at 2019, 12 per cent of the world population drinks water from unimproved and unsafe sources. More than 30 per cent of the world population, or 2.4 billion people, live without any form of sanitation (United Nations, 2020).
- More than 2 billion people live in countries experiencing high water stress. The situation will likely worsen as the population and the demand for water grow, and as the effects of climate change intensify (United Nations, 2018).
- With the existing climate change scenario, by 2030 water scarcity in some arid and semi-arid places will displace 24–700 million people (United Nations World Water Development Report 2009).
- IUCN found that more than 80 per cent of the world's ecological processes that form the foundation for healthy marine, freshwater and terrestrial ecosystems, such as changes to genetic diversity or seasonal migration, are already showing signs of distress owing to climate change.
- Untreated sewage emits around 40 kilograms of carbon dioxide equivalent per year per person (International Water Association).
- Although water is receiving a growing share of adaptation finance (32 per cent in 2018), it attracts a small share of climate finance overall (less than 3 per cent) owing to the overall focus on mitigation. Only 18 per cent of international public climate finance for water in 2018 went to low-income countries; more than half of this was loans (WaterAid and ODI, 2021).

CLIMATE ACTION TABLES – STRUCTURE