

Definition of climate-resilient water sanitation and hygiene services

DEFINITION:

Climate-Resilient Water, Sanitation and Hygiene (WASH) services anticipate, respond to, cope with, recover from, adapt to or transform based on climate-related events, trends and disturbances, all while striving to achieve and maintain universal and equitable access to safely managed services, even in the face of an unstable and uncertain climate, where possible and appropriate, minimising emissions, and paying special attention to the most exposed vulnerable groups.

The need for a definition

Given the increasing climate risks, water, sanitation and hygiene stakeholders are integrating climate change adaptation and mitigation into their operations. There is, however, no universally agreed definition of what constitutes a climate-resilient water supply, sanitation or hygiene service.

The adoption of the [UAE Global Climate Resilience Framework](#) at COP28¹, which prioritizes working towards "climate-resilient water supply and climate-resilient sanitation" as a key target, has created an urgent need for stakeholders to align on a clear and comprehensive definition.

To address this, **the Sanitation and Water for All (SWA) Climate Action Task Team** has provided a consultation platform, bringing together its diverse members to work collaboratively and reach broad consensus on a definition that reflects the sector's collective experience and expertise.

This definition will help standardize efforts across the sector and support the development of

¹ Decision 2/CMA.5 on the Global goal on adaptation, paragraph 9

indicators that align with existing global processes, including:

- **The UNICEF-WHO Joint Monitoring Programme (JMP) and the UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLASS), [ongoing work to review and develop indicators, measures, and methods for global monitoring of the climate resilience of WASH services](#)**
- **The United Nations Framework Convention on Climate Change (UNFCCC) two-year UAE-Belém work programme, on the development of indicators for measuring progress achieved towards the targets outlined in the UAE Framework.**

Agreeing on this definition is also essential for climate policies like Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) and for promoting the access to, and effective use of, climate financing mechanisms for water, sanitation and hygiene. The Green Climate Fund (GCF), has developed [guidelines for developing water supply and sanitation climate financing proposals](#).² which

² GCF is about to launch the GCF Water Project Design Guideline's Part 3: Practical Guidelines for Designing Climate-

could, for example, benefit from such a definition. A consensus on what constitutes climate-resilient water supply and climate-resilient sanitation will also strengthen the sector’s credibility, avoiding the risk of fragmented approaches and inconsistent criteria among partners.

Definition of climate-resilient water supply, sanitation and hygiene services

The definition of climate-resilient water supply, sanitation and hygiene services builds upon existing work by many organizations and researchers, which was drawn on to reach consensus on the **key attributes of climate resilient services**. Hence the focus on characteristics such as anticipate, adapt etc. in the definition.

Meanwhile, for monitoring or assessment purposes, climate resilience of water supply, sanitation and hygiene services **as an outcome** can be assessed through **service functionality and user experience**, in meeting the needs of the whole population in the short-, medium- and long-term. Given the diversity and context-specificity of climate impacts, locally determined thresholds for service level, reliability, acceptability, affordability and safety are likely to be required.

The different key elements of the definition of climate resilient water, sanitation and hygiene services are described below:

Definition fragment	Our explanation of Climate-Resilient Water, Sanitation and Hygiene services
<p>“Climate-resilient water supply, sanitation and hygiene services”</p>	<p>This terminology is aligned with the explicit mention in the UAE Framework for Global Climate Resilience of the global target “a climate-resilient water supply, climate-resilient sanitation and towards access to safe and affordable potable water for all.” Although the world “hygiene” is not explicitly mentioned in the UAE Framework, it should be considered under the scope of “water and sanitation.”</p> <p>The concept of climate-resilient development is described by the IPCC Sixth Assessment Report (AR6) as an integrated approach that combines climate adaptation and mitigation with sustainable development to enhance the capacity of human and natural systems to withstand and recover from climate impacts. This approach aims to reduce vulnerability, minimize exposure to climate hazards, and build the adaptive capacity while promoting social equity, environmental integrity, and economic sustainability.</p> <p>Therefore, this definition of climate-resilient water supply, sanitation and hygiene, places the emphasis on the resilience of the “services,” rather than the infrastructure alone and also includes elements of the broader enabling environment which are needed to achieve resilience.</p>

Resilient Sanitation Projects. The document will be available here: [Sectoral guide: Water security | Green Climate Fund](#)

<p>“anticipate”</p>	<p>To describe what “anticipate climate-related events, trends, and disturbances” means for climate-resilient water, sanitation, and hygiene services, we refer to IPCC concepts for climate risk management and adaptation planning.</p> <p>The IPCC AR6 defines <i>anticipation</i> as part of proactive adaptation, which involves forward-looking approaches to manage climate risks. This includes understanding future climate projections, trends, and possible disturbances (such as more intense storms, prolonged droughts, or rising sea levels) and to act to reduce vulnerabilities.</p> <p>Anticipation therefore implies being prepared for climate hazards that may impact water, sanitation and hygiene services, by employing early warning systems, forecasting, and risk assessments that incorporate climate scenarios. The IPCC AR6 highlights that anticipating climate impacts requires the use of climate information systems, scenario-based planning, and integrating local knowledge with scientific data. Such analysis and data could be used to forecast changes in water availability, contamination risks, or service disruptions due to extreme weather events, and to proactively develop strategies to reduce or avoid service interruption.</p> <p>Additionally, the IPCC AR6 underscores that anticipating trends includes not only recognizing direct physical impacts (like storms or floods) but also understanding slow-onset changes. For water, sanitation and hygiene, examples include shifts in precipitation patterns, rising temperatures, or salinization of water resources, which can affect the availability and quality of water, sanitation and hygiene services. These anticipatory actions for shocks and slow-onset changes should aim at reducing exposure and vulnerability of water and sanitation infrastructure, ensuring service continuity, and maintaining or improving the infrastructure resilience.</p>
<p>“respond to”</p>	<p>The IPCC AR6 differentiates types of adaptation, including anticipatory versus reactive. Implementation of adaptation through iterative risk management decision-making emphasises that <u>anticipating and responding</u> to climate change does not consist of a single set of judgements at a single point in time, but rather an ongoing cycle of assessment, action, reassessment, learn and response (IPCC AR6, WGII, Chapter 1, 2022).</p> <p>Anticipatory responses:</p> <ul style="list-style-type: none"> • The IPCC highlights how responses are not limited to sudden climate impacts but also address slow-onset events such as sea-level rise and prolonged droughts (IPCC AR6, WGII, Chapter 4, 2022). In relation to WASH, adaptation responses must evolve in the face of gradual trends, such as improving wastewater treatment facilities to prevent contamination due to rising water tables, retrofitting water infrastructure to adapt to decreasing water availability, updating preparedness and response plans, or adapting policies and strategies. Effective responses also include efforts to minimize the risk of future events by building social capital and reducing underlying vulnerabilities. The IPCC’s AR6 underscores the importance of strengthening infrastructure resilience, improving resource management, and reducing exposure through better planning and design of water and sanitation systems. Ensuring that WASH systems are not only reactive but also adaptive and robust against recurring climate stresses is key (IPCC AR6, WGII, Chapter 4, 2022). <p>Reactive responses:</p> <ul style="list-style-type: none"> • The IPCC describes how reactive adaptation occurs after a climate-related impact, focusing on immediate but also short-term recovery efforts to minimize immediate harm and support recovery. (IPCC AR6, WGII, Chapters 16 and 17, 2022). Disaster response strategies, such as emergency water supply, sanitation and hygiene, protect public health and reduce human suffering during extreme events like floods, droughts, and storms. This includes deploying rapid responses to maintain water quality and access, managing waste and sanitation and hygiene facilities, and securing alternative water sources during climate disasters. Reactive responses also include rebuilding infrastructure, adjusting water management practices, and strengthening sanitation systems to overcome altered conditions.

<p>“cope with”</p>	<p>The IPCC has studied and described the relationships between coping, coping capacity and adaptive capacity and concluded that a population cannot adapt its way through the aftermath of a disastrous climate event (e.g. hurricane), it must cope instead. Its coping capacity, or capacity to respond, is a function of currently available resources that can be used to cope, and determines the population’s ability to survive. Repeated use of coping mechanisms without adequate time and provisions for recovery can reduce coping capacity and shift a population into poverty. Rather than leaving resources for adaptation, communities forced to cope can become increasingly vulnerable to future hazards. (IPCC, SR, WGs I and II, Section 1.4.1.2, 2012)</p> <p>In the context of climate-resilient WASH services, coping with climate-related events, trends, and disturbances refers to the ability to manage and endure the immediate impacts of climate stressors while maintaining the functionality of essential services. Coping involves strategies that focus on short-term survival and stability, often under resource-constrained or highly uncertain conditions. These include reactive adaptation responses, such as emergency provision of essential WASH services, but also temporary adjustments to infrastructure, and short-term reliance on backup systems when climate events (e.g., floods, droughts) overwhelm regular services. Coping also applies to responses to gradual changes like declining water quality or increased salinity. In these cases, coping might involve rationing water use, upgrading filtration systems, or altering sanitation practices to maintain functionality.</p> <p>While these measures are crucial for human survival, they may not reduce the underlying vulnerability of services to future events. Indeed, coping strategies can become unsustainable over time. For example, over-reliance on groundwater extraction during droughts may provide a temporary solution, but if such practices are prolonged, they can lead to resource depletion and ecosystem degradation. Therefore, the IPCC underscores that those reactive responses and strategies for coping with extreme heat, floods, and droughts often necessitate transitioning to more transformative adaptation measures to ensure long-term sustainability to avoid maladaptation (IPCC WGII, Chapter 16, Section 16.3, 2022).</p> <p>Another important consideration is recognizing that coping with climate disturbances often involves social and economic strategies, such as adjusting water pricing, rationing access to vulnerable groups, or implementing temporary subsidies to ensure equitable access to basic services. The IPCC recognizes the role of such socio-economic measures in cushioning populations during climate events, but notes that these are often stop-gap measures rather than long-term solutions (IPCC AR6, WGII, Chapter 7, Section 7.4.6, 2022).</p>
<p>“recover from”</p>	<p>In adaptation literature, recovery is seen as an integral part of adaptation, focusing on restoring systems to their pre-disaster state while enhancing resilience against future climate impacts. It may involve rebuilding infrastructure, restoring services, and ensuring that the essential needs of communities are met, while integrating lessons learned to strengthen future resilience.</p> <p>Several sources point towards a framework for recovery, emphasizing not only the return to baseline conditions but also the opportunity to “build back better,” encouraging that recovery processes not only restore what was lost but also improve the resilience of the infrastructure and services to future risks. For example, the World Bank report, “Building Back Better: Achieving resilience through stronger, faster and more inclusive post-disaster reconstruction,” concludes that better reconstruction would reduce overall losses due to natural disasters by more than 60 percent.</p> <p>Aligned to this are the IPCC’s Special Report on Global Warming of 1.5°C highlights on the importance of long-term recovery strategies, which include not only physical rebuilding but also the strengthening of institutional and governance frameworks. This ensures that recovery actions are sustainable, inclusive, and equitable, particularly for vulnerable and exposed populations. Recovering services from slow-onset events such as sea-level rise or drought requires structural changes in how services are managed, with an emphasis on transformative recovery that adapts to evolving climate conditions (IPCC SR1.5, Chapter 5, Section 4.4.1, 2018).</p>

<p>“adapt to or transform based on climate-related events, trends and disturbances”</p>	<p>The most up to date definition of adaptation by the IPCC in relation to human systems (IPCC Annex II: Glossary, 2022) refers to the process of “adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities.” In relation to natural systems, adaptation is defined as “the process of adjustment to actual climate and its effects.”</p> <p>The IPCC describes how incremental adaptations to change in climate are understood as extensions of actions and behaviours that already reduce the losses or enhance the benefits of natural variations in extreme weather/climate events. However, most recently, the IPCC also describes how in a warming world, incremental adaptation will not always suffice to adjust to the negative impacts from climate change leading to substantial residual risks and, in some cases, the breaching of adaptation limits. As such, IPCC has increasingly promoted the concept of transformational adaptation, involving larger system-wide change (as compared with in-system change), and which includes addressing structural inequalities. According to the IPCC transformational adaptation will increasingly be necessary as a complement for helping individuals and communities to cope with climate change and therefore this aspect is a fundamental part of the definition of climate-resilient WASH systems.</p> <p>An example of transformative adaptation in water, sanitation and hygiene can be found in the city of Chennai (India). There, through the initiative called “Water in Circular Economy and Resilience,” the city’s water management practices have been fundamentally altered in light of increasing water scarcity and climate vulnerabilities. By integrating wastewater reuse, energy recovery, and innovative water governance, Chennai has transitioned from traditional reliance on fresh water to a more resilient, diversified water supply system.</p>
<p>“all while striving to achieve and maintain universal and equitable access to safely managed services, even in the face of an unstable, uncertain climate”</p>	<p>Water and sanitation are basic human rights. Moreover, the Sustainable Development Goals (SDGs) 6.1 and 6.2 aim to achieve universal and equitable access to safely managed water and sanitation services. These service levels are defined by the WHO-UNICEF Joint Monitoring Programme as access to sanitation and drinking water facilities that meet specific criteria to ensure health and safety.</p> <ul style="list-style-type: none"> • Safely Managed Drinking Water: Access to improved drinking water sources that are on premises, available when needed, and free from contamination. • Safely Managed Sanitation: Use of improved sanitation facilities that are not shared and where excreta are either safely disposed of in situ or treated off-site. • Basic Hygiene Service: Presence of a handwashing facility with soap and water available at home. <p>The definition includes mention of ‘achieving and maintaining’ these service levels in light of the low levels of access in many countries highly exposed to climate impacts, and in recognition of the threat that climate change poses for maintaining existing service levels at all times, including in locations that had already achieved universal access to safely managed services. This definition aligns with the SDG and JMP service levels, while recognizing that lower levels of service (e.g. basic) could -in certain cases- be climate resilient.</p>
<p>“where possible and appropriate, minimising emissions,”</p>	<p>In line with IPCC AR6 definition of ‘climate resilient development’ as encompassing pursuit of adaptation and mitigation concurrently, opportunity to minimise emissions associated with the delivery of water, sanitation and hygiene services should be considered. Recent figures suggest that water, sanitation and hygiene services contribute to more than 5% of global greenhouse gas emissions, the definition of climate-resilient water, sanitation and hygiene incorporates elements of mitigation, contributing towards a low-carbon sector. In doing so, it is critical that such efforts do not compromise service function, user experience or increase public health risks.</p>

“and paying special attention to the most exposed vulnerable groups.”

In the same way that the Sustainable Development Goal 6.2 articulates the importance of “paying special attention to the needs of women and girls and those in vulnerable situations,” in the context of climate change, there is wide recognition that climate change disproportionately affects the most vulnerable groups, which in many cases are those with the lowest levels of service. In addition, this point recognises that not all populations will be equally impacted by climate hazards, and hence the importance of a focus on climate resilient water, sanitation and hygiene services in those locations and populations that are most vulnerable to climate hazards. Unless directly addressed, those inequalities will not be eliminated. The focus on vulnerable groups also has an intergenerational-equity lens, and emphasizes the need to consider not only the current users but also the next generations.

Criteria for climate resilient WASH services

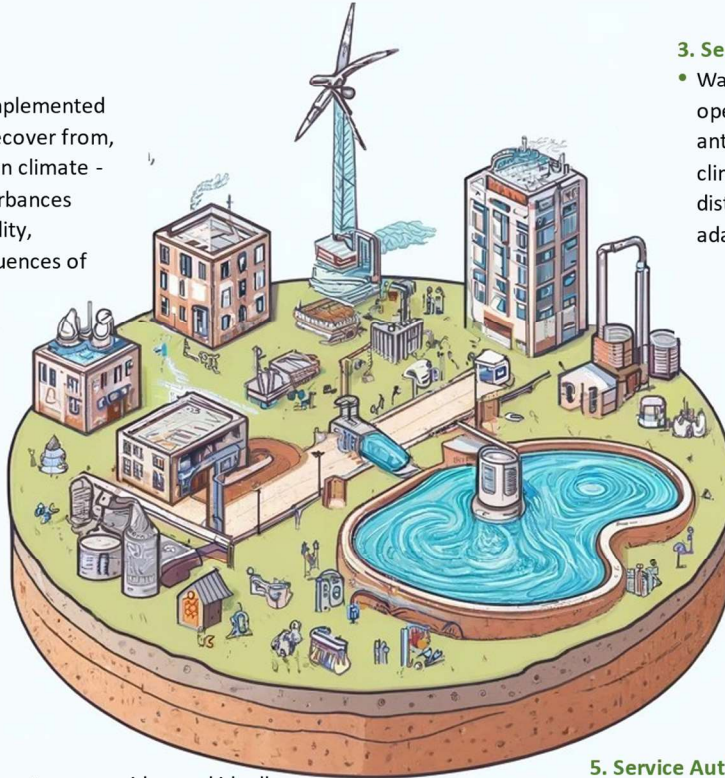
In line with the agreed definition, a set of seven criteria for climate-resilient WASH services is described across five relevant dimensions:

- 1) infrastructure;
- 2) the environment;
- 3) service providers;
- 4) users and wider society;
- 5) service authorities and governance;

Criteria for Climate-Resilient Water, Sanitation and Hygiene Services

1. Infrastructure

- Water, Sanitation and Hygiene infrastructures are designed, implemented and maintained to cope with, recover from, adapt to and transform based on climate - related events, trends and disturbances (e.g. through robustness, flexibility, redundancy, minimising consequences of failure etc.).



3. Service Providers

- Water, Sanitation and Hygiene services are operated by service providers equipped to anticipate, adapt, and recover services from climate-related events, trends and disturbances, guaranteeing reliability and adaptability.

4. Users and wider society

- Water, Sanitation and Hygiene users are informed, empowered and engaged, including the most vulnerable groups, to promote accountability among service providers and local authorities.
- Water, Sanitation and Hygiene systems consider, and ideally contribute to wider societal resilience by addressing inequalities and inclusion, fostering linkages with other sectors, building adaptive and transformative capacities, and drawing on indigenous knowledge.

2. The environment

- Water, Sanitation and Hygiene systems consider, and ideally contribute to sustainable management, use of, restoration and protection of catchments, surface and groundwater resources and related nutrient cycles and ecosystems.
- Water, Sanitation and Hygiene infrastructures systems minimize greenhouse gas emissions without compromising service function, user experience or increasing health risks.

5. Service Authorities & Governance

- Water, Sanitation and Hygiene services are supported by strong and inclusive governance that enable anticipatory, adaptive and transformative responses to expected climate risks and an uncertain climate, facilitating coordinated efforts for resilience building and service provision and ensuring access and use of hydrological and climate data for informed decisions.

Main principles that apply to the definition

- **Universal:** This definition aims to be applicable to all countries and contexts regardless of its human, social, ecological and financial capacities. It emphasizes those currently receiving the lowest levels of service (or no service) -who are often the most vulnerable to climate hazards-, as well as those with existing water supply, sanitation and hygiene services.
- **Solutions adapted to the local context:** Understanding that the definition should be universal, but the activities to achieve the desired outcome are context-specific because there is no one-size-fits all solution. Each stakeholder in each context is likely to develop their own strategies and guidelines aiming at complying with the agreed definition.
- **Aspirational:** Aiming to depict an aspirational state of water, sanitation and hygiene services. Although this state might not be fully realized in many cases and contexts, it serves as a driving force for continuous adaptation.
- **Transformational:** Recognizing that climate change risks can undo decades of progress in the sector, it is crucial to make significant and immediate shifts in planning and programming. Stakeholders supporting water, sanitation and hygiene services need to introduce new ways of working to incorporate climate risks and uncertainty into decision-making, planning, design and management of infrastructure and services.
- **Able to evolve:** Recognizing that mainstreaming climate resilience in water, sanitation and hygiene planning, programming and systems is likely to take some time, and acknowledging the diversity of countries and contexts, the criteria of what is (and what is not) a climate resilient water, sanitation and hygiene service should also be able to evolve over time.

About SWA

Sanitation and Water for All (SWA) is a UNICEF-hosted partnership working towards a joint objective of water, sanitation, and hygiene for all, always, and everywhere. The partnership uses innovative ways to increase political support for the human rights to water and sanitation. It does this through the mobilization of partners in governments, utilities, regulators, donors, financial institutions, UN agencies, civil society and research organizations, and the private sector. For this exercise, we engaged in a thorough consultative process, inviting both SWA members and non-SWA members of the SWA Climate Action Task Team to participate and provide valuable inputs.

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