

Informal progress report and methodological note

Water expert group

UAE-Bélem work programme on indicators

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¹ Juma wasn't able to participate in the water expert group's activities during phase 1 and most of phase 2, due to personal reasons. She was able to participate at the later stage of phase 2, with the support on communication from her colleague Ms. Beatriz Lima Ribeiro.

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1. Introduction

The global water challenges, exacerbated by climate change, underscore the urgent need to build water-related resilience as a cornerstone of sustainable development. Water is the primary medium through which climate impacts are felt, with over 90% of disasters being water-related² and the majority of adaptation measures also incorporate water in one way or the other.³ Strengthening resilience to all water-related hazards, such as floods and droughts, as well as water scarcity, is critical for safeguarding human rights, economic stability, and environmental health. Equally important is ensuring connectivity between water resilience efforts and broader global processes such as the Global Stocktake under the Paris Agreement, National Adaptation Plans, Sustainable Development Goals (not only SDG 6 on clean water and sanitation, as water is central to achievement of all SDGs), the Sendai Framework for Disaster Risk Reduction, and the Global Biodiversity Framework. These interlinkages foster coherence across water, climate, biodiversity, and disaster risk agendas, enabling integrated and holistic solutions that address systemic vulnerabilities while advancing global goals.

Under the UAE–Belém work programme, outlined in the UAE Framework for Global Climate Resilience, the water target aims at “[s]ignificantly reducing climate-induced water scarcity and enhancing climate resilience to water-related hazards towards a climate-resilient water supply, climate-resilient sanitation and access to safe and affordable potable water for all,” in alignment with the Global Goal on Adaptation (GGA) of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal referred to in Article 2.

In September 2024, the SB chairs convened a group of experts to assist in the technical work of the UAE–Belém work programme on indicators for monitoring targets under the Global Goal on Adaptation⁴. The objectives of this document are:

1. to present the methodology adopted by the water expert group for selecting or refining existing indicators and developing new indicators (as needed) for measuring progress towards water-related targets; and
2. to provide a progress update of ongoing assessment, including a preliminary non-exhaustive list of potential indicators, as well as detailed assessment on the relevance, strength, weaknesses and recommendations of selected indicators.

In summary, the water expert group has identified a preliminary list of indicators that could potentially be used to monitor progress towards GGA target 9a, based on the methodology detailed in Section 3 below. We use the sub-components of the water target (five subcomponents), as well as a two-tier system based on global monitoring and reporting readiness (Tier 1 is where an indicator is already a part of global reporting system; Tier 2 is otherwise), to group the selected indicators. We also added an additional category of indicators on enablers and means of implementation that would contribute across the five sub-components of the water target. A summary of the initial list of selected indicators and their analyses are provided in Section 5. It is important to note that this preliminary list of indicators is by no means final and perfect, as clearly shown in our analysis of their strengths and weakness. Remaining gaps and recommended next steps for indicator development are provided in Sections 6 and 7.

² <https://www.un.org/sustainabledevelopment/blog/2015/11/un-report-finds-90-per-cent-of-disasters-are-weather-related/>

³ Caretta, M.A., A. Mukherji, M. Arfanuzzaman, R.A. Betts, A. Gelfan, Y. Hirabayashi, T.K. Lissner, J. Liu, E. Lopez Gunn, R. Morgan, S. Mwanga, and S. Supratid, 2022: Water. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 551–712, doi:10.1017/9781009325844.006

⁴ <https://unfccc.int/documents/640902>

2. Progress as of April 30th 2025

Since 17 October 2024, the water expert group has met regularly to coordinate review activities in two main phases:

Phase 1 by COP29 (October-November 2024): Initial assessment and screening of long list

During the first phase, the water expert group assessed the relevance of 1,046 indicators mapped to the water-related target (9a) within the UAE framework for Global Climate Resilience. The review focused on criteria identified in the SB60 Conclusions on:

- 12(a) The relevance of the indicators to measuring progress towards one or more of the targets referred to in paragraphs 9–10 of decision 2/CMA.5;
- 12(b) The specific relevance of the indicators to adaptation, including enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change.

From this review the Water Expert Group categorized at least 427 indicators as relevant for 12a (310 indicators not relevant) and at least 312 of the indicators as relevant for 12b (306 indicators not relevant). More details on these findings can be found in the Informal Progress Report from the Water Expert Group from 6 November 2024⁵.

Phase 2 post COP29 (January-April 2025): Identification of preliminary list of potential indicators

During the second phase, the Water Expert Group carried out a more detailed assessment of the long list of indicators identified as relevant, considering the technical strengths and weaknesses of each indicator and taking into account the various criteria provided in CMA 6, paragraphs 12, 17 and 20, as well as SB60 GGA paragraph 12 a to l.

To ensure the selection of indicators that are practical, measurable, and aligned with the GGA, the Water Expert Group agreed on the approach and methodology outlined in section 3. Exchanges with other experts confirmed that this is broadly in line with approaches adopted by other expert groups, indicating the existence of a common methodological approach in reviewing and selecting indicator related to thematic targets and adaptation cycle.

3. Description of the methodological approach

3.1 Objective and guiding principles

Developing a framework of global and contextual indicators:

- Building on existing international frameworks where indicators are relevant to the specific targets of the global goal on adaptation (such as relevant indicators from Sustainable Development Goals (SDGs) and Sendai Framework).
- Modifying indicators under existing international frameworks to addressing specific gaps to be aligned with GGA.
- Developing new indicators to address specific gaps if needed.

The proposed indicator selection process prioritizes the use of adaptation-related indicators aligned with the GGA from established international frameworks (such as the SDGs and the Sendai Framework) and modifications and additions when needed, while adhering to the following criteria:

- 1) **Relevance:** Indicator selection must consider the relevance of indicators to the targets of the framework and to enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change. These indicators must directly measure the desired adaptation outcomes or actions, ensuring they are effective in driving data production and informing policy decisions in the context of water-related challenges.
- 2) **Feasibility:** Indicators should be clearly defined and practically measurable. While relevance is paramount, indicators should not be excluded solely due to difficulties in calculation or data availability in some countries, including developing countries. In addition, other sources of input can be recommended to be used to complement the data available. This approach recognizes that reporting on

⁵ <https://unfccc.int/topics/adaptation-and-resilience/workstreams/global-goal-on-adaptation/experts-informal-progress-reports-november-2024-uae-belem-work-programme>

relevant indicators can stimulate data collection efforts and serve as part of broader capacity-building activities.

- 3) **Inclusivity:** Selected indicators should allow for disaggregation by time, space, population groups, and other relevant dimensions where appropriate. This ensures that diverse experiences, vulnerabilities, and inequities are captured, supporting more inclusive and equitable adaptation monitoring.

If the existing indicators do not adequately address specific elements of the target, experts will seek to suggest modifications or supplement with new indicators.

In addition, the selection, refinement and /developing processes seek to ensure the relevance of the indicators to the GGA, alignment with various criteria proposed by parties under this work programme (e.g. SB 60 GGA, Paragraph 12 which states criteria 12 a to 12 l), CMA 6, Para 12, 17 and 20 as well as consistency with Article 7, paragraph 1, of the Paris Agreement.

This approach benefits countries and data producers by leveraging, as well as building on existing data collection systems and expertise, while allowing scope for modifications and additions to ensure that indicators are adaptation specific and aligned with the GGA. The main objective of this blended approach is to utilise the collective expertise of this group to provide a comprehensive list of indicators that addresses the gaps in existing indicator frameworks and meets specific water-related target in the context of GGA. Moreover, this methodology is not limited to water-related adaptation but can also be applied to the other thematic targets of the UAE framework for which global indicator frameworks already exist.

Overall, it seeks to provide a consistent, flexible, and scalable approach for refining the existing and developing new indicators that address diverse adaptation challenges, ensuring coherence across all aspects of the GGA while maintaining relevance to national and local contexts.

3.2 Assessment process

Largely in line with approaches taken by other expert groups, the Water Expert Group have followed a stepwise assessment process as detailed in below.

Step 1: Unpacking

Unpack the water target and define key concepts and terms.

Step 2: Screening

Screen long list of indicators submitted for 9a based on relevance to target (12a) and relevance to adaptation (12 b). For Step 2, at least two water expert group members were involved to review each indicator.

Step 3: Consolidation

Consolidate preliminary assessment.

YES – both expert reviewers gave the assessment of “YES”

NO - both expert reviewers gave the assessment of “NO”

MAYBE - Results were consolidated and any discrepancies between reviewers classed as “MAYBE”

Step 4: Clustering

Map indicators by target five sub-components:

- Significantly reducing climate-induced water scarcity
- Enhancing climate resilience to water-related hazards
- Towards a climate-resilient water supply
- Towards a climate-resilient sanitation
- Access to safe and affordable potable water for all

Step 5: Prioritisation

Prioritise potential indicators using the scoring formula outlined in annex 3.

For each sub-component, identify, filter by indicator type (i.e. input, process, output, outcome) and pick the most relevant indicators for measuring progress in adaptation action. The scoring is indicative and the selection of the indicator that goes in the final list is based on expert judgment, informed by the scoring.

The selection is done to ensure that all 9a components are covered and that for each component there is at least one indicator of each type (input, process, output, outcome). It should be noted that the same action/ outcome indicator could be used for more than one sub-component, if relevant.

Step 6: Assessment

Assess the suitability of potential indicators and identify gaps

For each of the sub-components assess the strengths and weaknesses and make recommendations for a) building on existing indicators, b) modifying existing indicators, c) developing new indicators

3.3 Definition of adaptation capacity, resilience and vulnerability

We used the following definitions from IPCC AR6 Glossary for the components of the GGA, related to the water-related target.

- **Adaptive capacity:** The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities or to respond to consequences (MA, 2005).⁶
- **Resilience:** The capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure. Resilience is a positive attribute when it maintains capacity for adaptation, learning and/or transformation (Arctic Council, 2016).⁷
- **Vulnerability:** The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

3.4 Definition of indicator types (input, process, output, outcome)

We used the following definitions to classify indicators by type:

- **Input:** Input indicators measure the resources (financial, human, institutional, or material) allocated to an activity or policy, to track what is being invested or provided to enable adaptation or mitigation.
- **Process:** **process indicators** monitor the activities or actions undertaken using the inputs to ensure that the right steps are being followed and that implementation is on track.
- **Output:** Immediate and direct result of an activity or intervention.⁸
- **Outcome:** Mid-term of intermediary level result; could be the sum of outputs.⁹
- **Enablers of implementation:** An enabler is a factor or condition that facilitates or supports the effectiveness of climate adaptation or mitigation actions to create the environment where adaptation or mitigation can happen successfully. Examples of enablers includes policies, institutions and institutional strengthening, policies, laws and legislation etc and can include means of implementation.
- **Means of Implementation (MOI):** refers to the resources and support mechanisms that make it possible for countries—especially developing countries—to carry out climate action. MOI help to bridge the gap between planning and action by providing necessary support. The three sub-components of MOI are: finance, technology transfer and capacity building.

We note the limitation of such simple categorisation of indicators, given the complexities of water and other environmental and social systems and the interlinkages between different thematic targets under the GGA as well as between sub-components of the water target. In many cases, the distinction between, for instance, output and outcome, is not clear-cut, and the categorisation can sometimes change depending on the description of indicator (i.e. what is measured and how it is measured of the same underlying activity).

3.5 Global versus contextual indicators

Although the current list of indicators included in this report focuses on global indicators, we acknowledge that a dual-layer approach, distinguishing global and contextual indicators, is essential for balancing universal relevance with national specificity. Global indicators provide a framework for measuring progress across countries, ensuring

⁶ MA, 2005: Appendix D: Glossary. In: Ecosystems and Human Well-being: Current States and Trends. Findings of the Condition and Trends Working Group [Hassan, R., R. Scholes, and N. Ash (eds.)]. Millennium Ecosystem Assessment (MEA). Island Press, Washington, DC, USA, pp. 893–900.

⁷ Arctic Council, 2016: Arctic Resilience Report. M. Carson and G. Peterson (eds). Stockholm Environment Institute and Stockholm Resilience Centre, Stockholm, <http://www.arctic-council.org/arr>

⁸ https://unfccc.int/files/cooperation_support/least_developed_countries_portal/ldc_expert_group/application/pdf/training_workshop_on_implementing_napa_training_materials_eng.pdf

⁹ https://unfccc.int/files/cooperation_support/least_developed_countries_portal/ldc_expert_group/application/pdf/training_workshop_on_implementing_napa_training_materials_eng.pdf

consistency and international cooperation in measurements. At the same time, contextual indicators offer flexibility, allowing countries to address unique national circumstances and priorities. This approach ensures that the proposed list of indicators remains robust and coherent while enabling tailored responses to local adaptation challenges, fostering more effective and inclusive climate action. The contextual indicators can capture where appropriate and when suited cross-cutting consideration as they are described in /CMA6 para 21 d, e, f, g.

3.6 Indicators for means of implementation and enablers

IPCC AR6 emphasises the importance of means of implementation (which includes finance, technology transfer and capacity building) in enhancing adaptive capacity and building resilience¹⁰. It is important for countries to have a complete picture from input to outcome in order to identify gaps and allocate (often limited) resources more effectively.

An important unresolved question is the extent to which indicators for enabling factors and the means of implementation should be cross-cutting or specific to thematic targets. We have identified some indicators that could potentially be used for monitoring the water target but these need to be reviewed together with those proposed by experts working on other targets.

3.7 Coverage of water related aspects of other thematic targets when relevant

We acknowledge that some aspects of other thematic targets have critical implications on the water target: for example, target 9d (as it relates to “....restoration and conservation and the protection of terrestrial, inland water....”); 9b as it relates to food and agriculture, as agriculture accounts for the majority of global freshwater use; 9c as it relates to health and relevance of safe water for preventing water-related diseases; and 9e as it relates to water-related infrastructure.

The current list of indicators included in this report does not yet provide a systematic analysis of cross-cutting aspects with other thematic targets. However, the list does include indicators also relevant to other targets, such as food, health, ecosystem and infrastructure.

In the next phase, the cross-cutting relevance of the selected indicators can be more systematically identified and presented.

¹⁰ IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001

4. Experiences from the process

The assessment process and the current list of indicators are both by no means perfect at this stage. Throughout the process, the challenges encountered come not only from the complexities embedded the concept and definition of water resilience itself, but also from the need to balance various practical aspects of a set of indicators that could work across countries with very different contexts, capacity and resources.

- **Global versus local:** Having a set of global indicators does not and should not underplay the diverse contexts and complexities of water resilience: water resilience issues differ greatly by region due to variations in climate, geography and socio-economic development. It will also continue being shaped by a mix of environmental, social, economic, and institutional factors. Capturing all these dimensions in a practical and rather static set of indicators is challenging.
- **Lack of globally agreed frameworks on water resilience:** There is no universally accepted set of frameworks or definitions for water resilience. This makes it hard to agree on which indicators can comprehensively capture all the key elements on a global scale.
- **Data gaps and measurement inconsistencies:** even for existing monitored indicators from global frameworks, data gaps and inconsistencies in measurement methods exist in many countries. This poses a challenge to have a balanced set of indicators that reflect all the key aspects of the water target whilst remaining practical.
- **Lack of standardised indicators for means and implementation and enablers:** indicators for monitoring means of implementation and enablers are generally less well developed represent a major data gap.
- **Lack of disaggregated data to identify inequalities:** disaggregation of indicators is essential to identify subnational inequalities in adaptation and resilience. While some water-related indicators can be disaggregated by geographic location (e.g. urban/rural, river basin and/or administrative unit) relatively few can be disaggregated by socioeconomic characteristics of the affected population (e.g. wealth, education, ethnicity, religion, language or migratory status) and even fewer can be disaggregated by individual characteristics (e.g. age, sex).
- **Insufficient metadata for comprehensive assessment:** lastly for many of the indicators submitted there is insufficient information on the indicator definition, the sources of national data, and the method used to calculate the indicator and aggregate data at local, national and global levels. This highlights the need for further efforts to develop standardized indicators that can be integrated into national monitoring systems.

In addition, like many other expert groups, limited time availability to work through a very long list of indicators, and limited opportunities that could enable experts to work together in a more collaborative and efficient manner, also posed challenges in progressing the work. In particular, there has been insufficient time to review the linkages between the indicators identified under the different thematic and dimensional targets. Nevertheless, we appreciate the virtual meetings and the in-person workshop organised by the GGA secretariat so far, given the tight timeline and limited resources available.

5. Preliminary list of potential indicators

The following table shows how the preliminary list of potential indicators relate to the sub-components of the water target and to cross-cutting enablers and means of implementation. Tier 1 indicators are considered highly relevant to the target and assessment criteria and are already established in other global frameworks or already widely monitored and reported. Tier 2 indicators are considered relevant to the target and assessment criteria, but are not yet widely monitored and reported, or may be subject to different local contexts. The table includes 13 unique Tier 1 indicators and a non-exhaustive list of 20 Tier 2 indicators. While many elements of the GGA water target could be partly addressed using existing indicators, the expert group notes the need for some of these indicators to be modified or combined with others, and also the potential for identification of new indicators to cover all aspects of the target. See Section 6 for a more detailed assessment of individual indicators.

Table 2: Overview of water target related indicators

Sub-components	9a-1 Significantly reducing climate-induced water scarcity	9a-2 Enhancing climate resilience to water-related hazards	9a-3 Towards a climate-resilient water supply	9a-4 Towards a climate-resilient sanitation	9a-5 Access to safe and affordable potable water for all	Enablers (policies, institutions, laws, plans, strategies) and MoI (Finance, Capacity Building, Technology Transfer)
Tier 1 indicators	<p>SDG 6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (<i>outcome</i>)</p> <p>SDG 6.4.1: Change in water-use efficiency over time (<i>output</i>)</p> <p>SDG 6.5.1: Degree of integrated water resources management (<i>process</i>)</p>	<p>Sendai Framework D-1: Damage to critical infrastructure attributed to disasters (<i>outcome</i>)</p> <p>SDG 1.5.4, 13.1.3, SF E-2: Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies (<i>process</i>)</p> <p>SDG 6.5.2: Proportion of transboundary basin area with an operational arrangement for water cooperation (<i>process</i>)</p>	<p>SDG 6.1.1: Proportion of population using safely managed drinking water services (<i>outcome</i>)</p> <p>UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) indicator - A4. Proportion of countries undertaking climate risk assessments for national planning of drinking water, sanitation and hygiene (WASH) (<i>process</i>)</p> <p>SDG 6.4.1 (<i>output</i>)</p> <p>SDG 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 (<i>process</i>)</p>	<p>SDG 6.2.1a: Proportion of population using safely managed sanitation services (<i>outcome</i>)</p> <p>SDG 6.3.1 Proportion of domestic and industrial wastewater safely treated (<i>outcome</i>)</p> <p>UN-Water GLAAS indicator - A4 (<i>process</i>)</p> <p>SDG 6.b.1 (<i>process</i>)</p>	<p>SDG 6.1.1 (<i>outcome</i>)</p> <p>UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) indicator – A9. Proportion of countries taking measures to improve and extend WASH services to populations disproportionately affected by climate change (<i>process</i>)</p>	<p><u>SDG 6.5.1 (<i>process</i>)</u></p> <p>SDG 6.a.1: Amount of water- and sanitation-related official development assistance (ODA) that is part of a government-coordinated spending plan (<i>input</i>)</p> <p><u>SDG 6.b.1 (<i>process</i>)</u></p> <p>UN-Water GLAAS indicator - A4 (<i>process</i>)</p>
Tier 2 indicators	Water use index (<i>outcome</i>)	Early Warnings for All Initiative (EW4All) by	Number of males and females with year-round	SDG 3.9 Mortality rate attributed to unsafe water,	Percentage of poor people in vulnerable communities	Existence of plans and mechanisms for the

(non-exhaustive list of relevant examples)	<p><i>Territory affected by water scarcity (outcome)</i></p> <p>Proportion of bodies of water with good ambient water quality <i>(outcome)</i></p>	<p>WMO - Observation Networks (2.1): number of countries with multi-hazard monitoring systems and stations sharing data internationally. This ensures comprehensive data collection for water-related hazards like floods and droughts <i>(output)</i></p> <p>SDG 15.1.2: Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type <i>(output)</i></p> <p>Implementation of actions in drought risk management plans <i>(process)</i></p> <p>Proportion of government expenditure on DRR in relation to GDP <i>(input)</i></p> <p>Number of people permanently displaced from homes as a result of flood, drought or sea-level rise <i>(outcome)</i></p> <p>% of population living in flood prone areas <i>(outcome)</i></p>	<p>access to reliable and safe water supply despite climate shocks and stresses <i>(outcome)</i></p> <p>Changes in mountain glacier mass balance, permafrost, and snowpack <i>(outcome)</i></p>	<p>unsafe sanitation, and lack of hygiene <i>(outcome)</i></p> <p>Number of people reached with climate- resilient at least basic sanitation services <i>(outcome)</i></p>	<p>with access to safe and reliable water disaggregated by gender <i>(outcome)</i></p>	<p>integration of strategies on water-related hazards and infrastructure across national development plans to reduce vulnerabilities across sectors <i>(process)</i></p> <p>Number of major river basins with comprehensive water resources assessment using climate lens increased <i>(process)</i></p> <p>Rate of access to financing for adaptation projects involving the promotion of integrated water resource management</p> <p>Investments to enable improvement in systems for enhanced capture capacity for water supply <i>(input)</i></p> <p>Investments to enable improvement in systems for enhanced capture capacity for water supply <i>(input)</i></p> <p>No. of staff from key institutions trained as pool of trainers/resources on IWRM and CC mitigation <i>(output)</i></p> <p>Appropriate technologies on IWRM, CCA and mitigation <i>(output)</i></p>
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Note: **Tier 1** indicators are considered highly relevant to the target and assessment criteria and are already established in other global frameworks or widely monitored and reported. **Tier 2** indicators are considered relevant to the target and assessment criteria, but are not yet widely monitored and reported, or may be subject to different local contexts.

6. Detailed assessment of individual indicators

The following tables on individual indicators provide a simple indicator matrix, mapping their relevance towards associated subcomponent(s) of the water target, and categorizing based on type of indicators (input, process, output, outcome) and whether they represent enablers and/or means of implementation. The tables also provide brief analysis on their relevance towards the GGA, their strengths and weaknesses as indicators to track progress, as well as recommendation for their use and further refinement, if






necessary. While many elements of the GGA water target could be addressed using existing indicators, the expert group notes the need for some of these indicators to be modified or combined with others, and also the potential for identification of new indicators to cover all aspects of the water target.

5.1 Significantly reducing climate-induced water scarcity

Monitoring climate-induced water scarcity requires information on the balance between availability and demand for freshwater resources and how these are affected by climate change. Indicators of adaptation should ideally measure both the actions taken to manage water resources more effectively and the desired outcomes including increased water-use efficiency, increased availability and quality, and reduced vulnerability to climate-induced scarcity. Data should ideally be standardized to enable disaggregation of affected areas and population groups and aggregation of data at national and global levels.

Our preliminary assessment shows that this sub-component of the GGA water target is already partly addressed by existing Tier 1 global indicators used for monitoring SDG targets on water stress (6.4.2), water-use efficiency (6.4.1), and integrated water resource management (6.5.1). The water expert group recommends building on existing systems of data collection and reporting, integrating information on climate-induced changes in the water availability and management responses, and progressive disaggregation of data to identify affected sectors, geographic areas and population subgroups. These could potentially be complemented with additional Tier 2 indicators on water exploitation, territory affected by water scarcity and ambient water quality, but further work is required to develop data standards to enable aggregation and reporting at national and global level.






Tier 1 indicators for 5.1

ID#	5					
Indicator	SDG 6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources					
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all	
						
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation			
Outcome			N/A			
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)			
Reducing vulnerability Strengthening resilience			Established outcome indicator with existing guidance and system of reporting under SDG 6.4.2. Part of a <u>Global set of Climate Change Statistics and Indicators</u> adopted by UN Statistical Commission in 2022. Included in UNSD/UNEP/OECD/ Eurostat <u>Questionnaire on Environment Statistics</u> . 180 countries have reported on this indicator in the past 5 years. Withdrawal can			






	<p>potentially be disaggregated by agriculture, industry and services. Ongoing efforts to disaggregate by river basin. Level of water stress provides a useful indicator of vulnerability to climate-induced water scarcity.</p> <p>Meets 12 a; b (reducing vulnerability); d; e; f; g; h; and is quantitative in nature (12c) of SB 60 decision text; meets 17 a, b, c of CMA Para 17; already a SDG indicator, so there is data and methodological readiness</p>
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)	Recommendation (build on existing, modify existing, develop new)
<p>Does not directly measure or attribute climate-induced water scarcity. Additional data needed to assess the impact of climate change on availability of renewable freshwater resources. Environmental flow requirements are a part of the indicator calculation but this is difficult to assess.</p> <p>Limited subnational disaggregation of at-risk areas and groups. Ideally to be calculated for individual water basins. It is less useful when calculated for entire (large) countries.</p> <p>The cause of water stress could be climate change related; or poor management related, or a combination of both. However, if the level of water stress reduces over time, it can indicate lesser vulnerability and can contribute to more resilience in the future.</p>	<p>Consider building on existing SDG 6.4.2 indicator and combining with information on climate-induced changes in availability of renewable freshwater resources.</p> <p>Consider progressive disaggregation by agriculture, industry and services and by subnational region or river basin.</p>


 - directly relevant |
 
 - indirectly relevant |
 
 - not relevant

ID#	309				
Indicator	SDG 6.4.1: Change in water-use efficiency over time				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all

					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Output					
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
<p>Strengthening resilience</p> <p>Reducing vulnerability</p>			<p>Established output indicator with existing guidance and system of reporting under SDG 6.4.1. Measured as the ratio of dollar value added to the volume of water used. Can be disaggregated by sector (agriculture, forestry and fishing, industry and services). Can be used to target sectors with high use and low efficiency. Data on water use comes from national line ministries and data on value generation from National Statistical Offices. 168 countries have reported on this indicator in the past 5 years. Increasing water-use efficiency (repairing leaking water distribution systems, using less thirsty crops and investing in new technology) can result in more sustainable and resilient food and industrial production systems. Water savings are also associated with energy savings, as less water needs to be extracted, treated, transported and heated.</p> <p>Meets 12 a (water target related); 12 b (strengthens resilience); 12c-h; existing SDG indicator, so there is data and methodological readiness</p>		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
<p>Water use efficiency is a complex concept, improving water use efficiency sometimes can have rebound effect of more water consumption, but overall, higher efficiency in water use is better than lower efficiency, all other things being constant. Regional differences in climate and water availability should be considered in the interpretation of this indicator.</p>			<p>Consider building on existing SDG 6.4.1 indicator with progressive disaggregation by sector</p> <p>Disaggregation of water-use efficiency in urban consumption, industrial consumption and particularly agricultural consumption (ID5675, ID5676, ID5678) enables better targeting of sectors with high use and low efficiency.</p>		

ID#	2964				
Indicator	SDG 6.5.1: Degree of integrated water resources management				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all

					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Process			Enabler		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
<p>Enhancing adaptive capacity</p> <p>Strengthening resilience</p>			<p>Established process indicator with existing guidance and system of reporting under SDG 6.5.1. Country <u>survey</u> of the status of management instruments to support IWRM at national level (0-100). Q3.1b instruments for sustainable and efficient water use management include demand management measures (e.g. technical measures, financial incentives, education and awareness raising to reduce water use and/or improve water-use efficiency, conservation, recycling and re-use), monitoring water use (including the ability to disaggregate by sector), mechanisms for allocating water between sectors (including environmental considerations). Data available for 191 countries in the last 5 years. Disaggregated by degree of implementation. Potential indicator of capacity to adapt to climate-induced water scarcity.</p> <p>Potential indicator of strengthened resilience to water-related hazards. Established action indicator with existing guidance and system of reporting under SDG 6.5.1. Country <u>survey</u> of the status of management instruments to support IWRM at national level (0-100). Q3.1e instruments to reduce impacts of water related disasters include understanding disaster risk; strengthening disaster risk governance; investing in disaster risk reduction; and enhancing disaster preparedness. ‘Impacts’ include social impacts (such as deaths, missing persons, and number of people affected) and economic impacts (such as economic losses in relation to GDP). Disaggregated by degree of implementation. Aggregated for global reporting every ~3 years.</p>		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Does not specifically address responses to climate change. Lacks subnational disaggregation of at-risk areas and population groups. Self-reported with no independent verification.			<p>Consider building on existing SDG 6.5.1 survey and integrating climate change considerations into IWRM assessment.</p> <p>Relevant to multiple sub-components of 9a</p> <p>Links with target 10 b and sub-components for EWS.</p>		

Tier 2 indicators for 5.1

ID#	Indicator	Recommendation
119	Water use index (<i>outcome</i>)	Complementary to Tier 1 indicator #5 water stress. Proxy indicator for water stress. Does not include environmental flows. Data for this indicator are primarily available in Europe, including all EU Member States, plus the United Kingdom, Iceland, Norway, Switzerland, Bosnia and Herzegovina, North Macedonia, Albania, Serbia, Türkiye, and Kosovo. ¹¹
109	Territory affected by water scarcity (<i>outcome</i>)	Complementary to Tier 1 indicator #5 water stress. Percentage and area affected by subnational region relevant for national planning. Data availability unknown. Further work required to develop data standards to enable aggregation and reporting.
877	Proportion of bodies of water with good ambient water quality (<i>outcome</i>)	Indirectly relevant for reducing climate induced water scarcity. Protection and restoration of water quality can increase availability and lower the costs of treatment. Directly relevant to target 9d (Ecosystems) . SDG indicator 6.3.2 monitors the proportion of bodies of water with good ambient water quality, as per national and/or subnational water quality standards and based on measurements of five water quality parameters. Data available for 123 countries in the last 5 years.






¹¹ https://ec.europa.eu/eurostat/databrowser/view/sdg_06_60/default/table?lang=en

5.2 Enhancing climate-resilience to water-related hazards

Monitoring climate-resilience to water-related hazards requires information on different types of climate-related water hazards.¹² Indicators of adaptation should ideally measure both the actions taken to identify and mitigate risks and the desired outcomes such as reducing the health and economic impacts of slow- and rapid-onset water-related disasters. Data should ideally be standardized to enable disaggregation of affected areas and population groups and aggregation of data at river basin, national and global levels.

Our preliminary assessment shows that this sub-component of the GGA water target is already partly addressed by existing Tier 1 global indicators used for monitoring Sendai targets on damage to critical infrastructure (D-1) and implementation of local disaster risk reduction strategies (E-2). The water expert group recommends building on existing systems of data collection and reporting to enable reporting on the extent to which DRR strategies address water-related hazards and to routinely disaggregate damage to critical infrastructure by type of hazard (including water-related hazards). These could potentially be complemented with additional Tier 2 indicators on implementation of multi-hazard warning systems and drought risk management plans, government expenditure on DRR in relation to GDP, and people displaced by water-related disasters, but further work is required to develop data standards to enable aggregation and reporting at national and global level.






Tier 1 indicators for 5.2

ID#	3004				
Indicator	Sendai Framework D-1: Damage to critical infrastructure attributed to disasters				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Outcome			N/A		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience			Established outcome indicator with existing guidance and system of reporting under SF D-1. Data available for 84 countries as per the latest Sendai Framework Monitor. ¹³ Disaggregated by health facilities, educational facilities and other critical infrastructure. Aggregated for global reporting at least every two years, although explicitly mandated.		

¹² For complete list see UNDRR-ISC Hazard Information Profiles. <https://www.undrr.org/media/73913/download?startDownload=20250503>






¹³ <https://sendaimonitor.undrr.org/>

Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)	Recommendation (build on existing, modify existing, develop new)
Generic DRR indicator does not specifically address or disaggregate water-related hazards. Lacks disaggregation by W and Z. Self-reported with no independent verification.	Consider modifying existing indicator to directly address and disaggregate water-related hazards

ID#	2590				
Indicator	SDG 1.5.4, 13.1.3, SF E-2: Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Process			Enabler		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience			Established process indicator with existing guidance and system of reporting under SF E-2. Data available for 108 countries as per the latest Sendai Framework Monitor. ¹⁴		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Generic DRR indicator does not specifically address or disaggregate water-related hazards. Lacks disaggregation by W and Z. Self-reported with no independent verification.			Consider modifying existing indicator to directly address and disaggregate water-related hazards		

ID#	2935
Indicator	SDG 6.5.2: Proportion of transboundary basin area with an operational arrangement for water cooperation

¹⁴ <https://sendaimonitor.undrr.org/>

Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Process			Enabler		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
			Established process indicator with existing guidance and system of reporting under SDG 6.5.2. 153 countries share transboundary waters and cooperation is important for effective management of water-related hazards. 124 countries have reported on this indicator in the last 5 years. Builds on other reporting mechanisms such as the European Water Convention. Includes information disaggregated by individual river basins and lake basins. Ongoing efforts to include information on countries efforts to tackle the impacts of climate change and disaster risk reduction at the transboundary level (see recent report).		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Specificities and operational details on water cooperation vary across different transboundary water basins with existing agreements. Moreover, transboundary basin area may change over time due to impacts from both human activities and climate change impacts. Thus, an increase or decrease of the proportion may not necessarily be a straightforward indication of positive or negative developments. It will have to be assessed together with the details of the operational arrangements as well as hydrological information of transboundary water basins.			Consider building on existing reporting mechanisms for SDG 6.5.2 and further developing indicators relating to data and information exchange (including joint alarm systems for water-related hazards) and development of joint or coordinated plans to address the transboundary impacts of climate change.		

Tier 2 indicators for 5.2

ID#	Indicator	Recommendation
2955	Early Warnings for All Initiative (EW4All) by WMO - Observation Networks (2.1): number of countries with multi-hazard monitoring	Early warning systems are considered important output indicators for monitoring resilience to water-related hazards. Established output indicators with existing guidance and reporting under

	systems and stations sharing data internationally. This ensures comprehensive data collection for water-related hazards like floods and droughts (output)	SF-G1. Indicator G1 combines several sub-elements related to early warning systems, including: G2: Number of countries with multi-hazard monitoring and forecasting systems. G3: Number of people covered by early warning information. G4: Percentage of local governments with plans to act on early warnings. G5: Number of countries with accessible and usable disaster risk information at national and local levels. Consider building on SF-G1 and disaggregating by major hazard types (including water-related hazards). Directly related to target 10a Impact, vulnerability and risk assessment
2616	SDG 15.1.2: Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type	Established indicator with existing guidance and system of reporting under SDG 15.1.2 (metadata). Data available for X countries in 2023. Indirectly related to target 9a sub-components reducing climate-induced water scarcity and enhancing resilience to water related-hazards. Directly related to target 9d Ecosystems.
275	Implementation of actions in drought risk management plans (process)	Strategies for responding to water-related hazards are considered important process indicators. Data availability unknown. Consider expanding to cover strategies for other water related hazards and developing a composite indicator for monitoring extent of implementation. Further work required to develop data standards to enable aggregation and reporting. Directly related to target 10c Implementation
2591	Proportion of government expenditure on DRR in relation to GDP (input)	Water-related investments and financing are considered important input indicators. The Sendai Framework promotes the development of DRR expenditure satellite accounts to standardize and improve tracking of DRR investments. Consider disaggregating expenditure by major hazard types (including water-related) and assessing the extent to which existing investment and financing is adequate to meet needs.
5441	Number of people permanently displaced from homes as a result of flood, drought or sea-level rise (outcome)	Impacts of water related hazards are considered important outcome indicators. While exposure is important population displacement and economic losses provide the most useful measures of resilience. SF-B3 tracks number of people whose damaged dwellings were attributed to disasters per 100,000 population. Consider scope for disaggregation by main type of water related disaster (flood, drought or sea-level rise)
5338	% of population living in flood prone areas (outcome)	The indicator is a reflection of the population's hazard exposure and does not fully capture active risk management measures. In addition, we recognise that, at least in certain situations, retreat and relocation from areas with water-related hazards that potentially cannot be reasonably or feasibly mitigated is an important measure to strengthen resilience of communities and reduce vulnerability. Further work required to develop data standards to enable aggregation and reporting.

Furthermore, the Water Expert Group has identified additional indicators that warrant further examination for potential modification or aggregation, with the possibility of inclusion as water-related or cross-cutting indicators:






- 42: Rural population with access to early warning systems
- 43: Timeliness of early warning systems
- 46: Functioning of disaster risk reduction platforms
- 2958: Members producing impact-based warnings for water hazard
- 2960: Procedures for issuing water-related hazard warnings
- 2961: DRR platforms with meteorological service participation
- 3006: People with disrupted livelihoods due to disasters
- 5598: Funding for strengthening weather forecast systems
- 5599: Funding for mobile-based forecast communication
- 880: Population exposed to drought
- 889: Ecosystems vulnerable to drought under effective management
- 120: Funds for flood protection
- 121: Investment in flood protection
- 1406: Land affected by drought or floods
- 5347: GDP losses from extreme rainfall
- 5397: Areas exposed to climate-induced hazards
- 5600: Areas vulnerable to flood, drought and landslide hazards
- 5718: Economic losses from floods and drought

5.3 Towards a climate-resilient water supply






Monitoring climate-resilient water supply requires information on different types of supplies including for domestic, agricultural and industrial uses. Indicators of adaptation should ideally measure both the actions taken to strengthen climate-resilience of water supply systems and services and the desired outcomes such as availability and quality of water supplies in the context of climate-related shocks and stresses. Data should ideally be standardized to enable disaggregation of affected areas and population groups and aggregation of data at national and global levels.

Our preliminary assessment shows that this sub-component of the GGA water target is already partly addressed by existing Tier 1 global indicators used for monitoring SDG targets on water-use efficiency (6.4.1), safely managed drinking water (6.1.1) and participation in water and sanitation management (6.b.1). The water expert group recommends building on existing systems of data collection and reporting, integrating information on exposure to climate-related hazards, and progressive disaggregation of data to identify affected areas and population subgroups. The group also recommends taking into account recommendations from the ongoing global review of options for enhanced monitoring of climate-resilient WASH services. The selected Tier 1 indicators could potentially be complemented with additional Tier 2 indicators on resilience of domestic, agricultural and industrial water supplies to different climate shocks and, where relevant, to changes in mountain glacier mass balance, permafrost, and snowpack but further work is required to develop data standards to enable aggregation and reporting at national and global level.






Tier 1 indicators for 5.3






ID#	309				
Indicator	SDG 6.4.1: Change in water-use efficiency over time				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Output					
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience Reducing vulnerability			Established output indicator with existing guidance and system of reporting under SDG 6.4.1. Measured as the ratio of dollar value added to the volume of water used. Can be disaggregated by sector (agriculture, forestry and fishing, industry and services). Can be used to target sectors with high use and low efficiency. Data on water use comes from national line ministries and data on value generation from National Statistical Offices. 168 countries have reported on this indicator in the past 5 years. Increasing water-use efficiency (repairing leaking water distribution systems,		

	<p>using less thirsty crops and investing in new technology) can result in more sustainable and resilient food and industrial production systems. Water savings are also associated with energy savings, as less water needs to be extracted, treated, transported and heated.</p> <p>Meets 12 a (water target related); 12 b (strengthens resilience); 12c-h; existing SDG indicator, so there is data and methodological readiness</p>
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)	Recommendation (build on existing, modify existing, develop new)
Water use efficiency is a complex concept, improving water use efficiency sometimes can have rebound effect of more water consumption, but overall, higher efficiency in water use is better than lower efficiency, all other things being constant. Regional differences in climate and water availability should be considered in the interpretation of this indicator.	<p>Consider building on existing SDG 6.4.1 indicator with progressive disaggregation by sector</p> <p>Disaggregation of water-use efficiency in urban consumption, industrial consumption and particularly agricultural consumption (ID5675, ID5676, ID5678) enables better targeting of sectors with high use and low efficiency.</p>

ID#	2968				
Indicator	UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) indicator - A4. Are climate risk assessments undertaken for national water, sanitation and hygiene (WASH) planning?				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Process			N/A		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience			Potential input indicator for climate resilient water supply and climate resilient sanitation. Established system of reporting under UN Water GLAAS. Baseline data available for ~100 countries. Aggregated for global reporting every 2-3 years.		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Only covers risk assessments for domestic water and sanitation services.			Consider building on existing reporting under UN Water GLAAS and assessing the extent to which climate risk assessments for water and sanitation services are implemented at different		

	levels. See recommendations from ongoing JMP/GLAAS joint technical review of options for enhanced monitoring of climate-resilient WASH services (review outputs).
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ID#	1332				
Indicator	SDG 6.1.1: Proportion of population using safely managed drinking water services				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Outcome			N/A		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience			Potential indicator of climate resilience. Established outcome indicator with existing guidance and system of reporting under SDG 6.1.1. Standard international classification based on national data sources (survey, census, admin). Comparable estimates available for 142 countries in 2022 (51% of global population). Disaggregated by rural, urban. Aggregated for global reporting every 2 years (6.1.1 metadata).		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Climate relevant but not climate specific. Does not directly measure resilience of drinking water services to climate-related hazards. Lacks subnational disaggregation of at-risk areas and groups.			Consider building on existing JMP service ladder for drinking water services and combining with information on whether populations are exposed to or impacted by specific climate-related hazards (e.g. floods, droughts, storms). Consider further subnational disaggregation beyond urban/rural including by at risk geographic areas and vulnerable socio-economic groups. See recommendations from ongoing JMP/GLAAS joint technical review of options for enhanced monitoring of climate-resilient WASH services (review outputs).		

ID#	1374				
Indicator	SDG 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				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Process			Enabler		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Enhancing adaptive capacity			<p>Potential indicator of enhanced adaptive capacity. Established process indicator with existing guidance and mechanism for reporting under SDG 6.b. The indicator tracks existence of defined procedures for community participation in law or policy, and levels of community participation. Data available for 147 countries in 2022. Disaggregated by drinking water, sanitation, hygiene and water resources management.</p> <p>Meets 12a, b, c (could be both quantitative – how many, and qualitative, how good are those policies and procedures), can meet 12 e, could be relevant for different contexts (12 f), should be easy to interpret (12g); should meet 12 j (best available science), and if community participation is included, then 12 l is also met. Can be disaggregated 12i</p>		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Climate relevant but not climate specific. Participation can help to ensure that climate adaptations address the needs of different water users and that no one is left behind. Generic indicator does not directly measure community participation in activities related to climate adaptation.			Proportion of water management agencies and utilities (surface water, groundwater agency and all sectoral water use agencies and utilities - water supply and sanitation, agricultural water resources, and hydro-electric) with operational policies and procedures for climate resilient water supply that incorporates best practices like community participation.		

Tier 2 indicators for 5.3

ID#	Indicator	Recommendation
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5565	Number of males and females with year-round access to reliable and safe water supply despite climate shocks and stresses (outcome)	Possible complementary to Tier 1 indicator #1332 safely managed drinking water. Requires additional information on population impacted by climate shocks. Data availability unknown. Further work required to develop data standards to enable aggregation and reporting.
3054	Changes in mountain glacier mass balance, permafrost, and snowpack	Possible contextual indicator. As an important source for freshwater resources for many countries, it is important to monitor this indicator for assessing long-term resilience of water supply.

Furthermore, the Water Expert Group has identified additional indicators that warrant further examination for potential modification or aggregation, with the possibility of inclusion as water-related or cross-cutting indicators:






- 205: Connection to public water supply and sewerage
- 491: Households with safe water supply
- 885: People with climate-resilient basic water
- 916: Improved water sources and sanitation
- 5483: Guidelines for climate resilient drinking water supply
- 5508: Proportion of households with safe water supply
- 5519: Population with year-round access to safe drinking water
- 5539: Population with access to safe water and improved sanitation
- 5571: Households accessing portable water
- 5697: Access to safe water in vulnerable communities
- 5698: Urban households with piped water
- 5770: Population with reliable access to safe drinking water

5.4 Towards a climate-resilient sanitation






Monitoring climate-resilient sanitation requires information on the safe management of different types of wastewater including domestic (sewered and non-sewered) and industrial. Indicators of adaptation should ideally measure both the actions taken to strengthen climate-resilience of sanitation systems and services and the desired outcomes such as reduced health risks and pollution and increased recycling and reuse. Data should ideally be standardized to enable disaggregation of affected areas and population groups and aggregation of data at national and global levels.






Our preliminary assessment shows that this sub-component of the GGA water target is already partly addressed by existing Tier 1 global indicators used for monitoring SDG targets on safely managed sanitation (6.2.1a) and safe treatment of wastewater (6.3.1), and UN Water GLAAS indicators on climate risk assessment for WASH services. The water expert group recommends building on existing systems of data collection and reporting, integrating information on exposure to climate-related hazards, and progressive disaggregation of data to identify affected areas and population subgroups. The group also recommends taking into account recommendations from the ongoing global review of options for enhanced monitoring of climate-resilient WASH services. The selected Tier 1 indicators could potentially be complemented with additional Tier 2 indicators on mortality and morbidity associated with inadequate WASH services and coverage of sanitation and wastewater services that are resilient to climate change, but further work is required to develop definitions and data standards for the latter to enable aggregation and reporting at national and global level.

Tier 1 indicators for 5.4

ID#	2966					
Indicator	SDG 6.2.1: Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water					
Sub-component (s)	Significantly reducing climate-induced scarcity	reducing water	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
						
Type of indicator (input, process, output, outcome)				Enablers (specify) and/or Means of Implementation		
Outcome				N/A		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)				Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience				Potential indicator of climate resilience. Established outcome indicator with existing guidance and system of reporting under SDG 6.2.1a. Standard international classification based on national data sources (survey, census, admin). Comparable estimates available for 135 countries in 2022 (86% of global population). Disaggregated by rural, urban. Aggregated for global reporting every 2 years (6.2.1a metadata).		

Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)	Recommendation (build on existing, modify existing, develop new)
Climate relevant but not climate specific. Does not directly measure resilience of sanitation services to climate-related hazards. Lacks subnational disaggregation of at-risk areas and groups.	Consider building on existing JMP service ladder for sanitation services and combining with information on whether populations are exposed to or impacted by specific climate-related hazards (e.g. floods, droughts, storms). See recommendations from ongoing JMP/GLAAS joint technical review of options for enhanced monitoring of climate-resilient WASH services (review outputs).

ID#	893				
Indicator	SDG 6.3.1: Proportion of domestic and industrial wastewater flows safely treated				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Outcome			N/A		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience			Potential indicator of climate resilience. Established outcome indicator with existing guidance and system of reporting under SDG 6.3.1. Standard international classification based on national data sources. Comparable estimates available for XXX countries in 2022. Disaggregated by domestic and industrial. Aggregated for global reporting every 2 years (6.3.1 metadata).		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Climate relevant but not climate specific. Does not directly measure resilience of wastewater management to climate-related hazards. Lacks subnational disaggregation of at-risk areas and groups.			Consider building on existing reporting under SDG 6.3.1 and combining with information on whether treatment plants are exposed to or impacted by specific climate-related hazards (e.g. floods, droughts, storms). See recommendations from ongoing JMP/GLAAS joint technical review of options for enhanced monitoring of climate-resilient WASH services (review outputs).		

ID#	2968				
Indicator	UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) indicator - A4. Are climate risk assessments undertaken for national water, sanitation and hygiene (WASH) planning?				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Process			N/A		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience			Potential input indicator for climate resilient water supply and climate resilient sanitation. Established system of reporting under UN Water GLAAS. Baseline data available for ~100 countries. Aggregated for global reporting every 2-3 years.		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Only covers risk assessments for domestic water and sanitation services.			Consider building on existing reporting under UN Water GLAAS and assessing the extent to which climate risk assessments for water and sanitation services are implemented at different levels. See recommendations from ongoing JMP/GLAAS joint technical review of options for enhanced monitoring of climate-resilient WASH services (review outputs).		

Tier 2 indicators for 5.4

ID#	Indicator	Recommendation
876	Mortality rate attributed to unsafe water, unsafe sanitation, and lack of hygiene (<i>outcome</i>)	Possible complementary indicator to Tier 1 indicators access to safe drinking water and sanitation services. Climate related hazards such as floods and droughts are not the only risk factors for unsafe WASH but mortality and morbidity attributable to unsafe WASH could potentially be used

		as a proxy indicator of vulnerability to climate change together with national data on infectious disease outbreaks (e.g. cholera). Directly linked to Target 9c Health
884	Number of people reached with climate- resilient at least basic sanitation services (<i>outcome</i>)	Possible complementary to Tier 1 indicator #2966 safely managed sanitation. Further work required to develop definitions of climate-resilient sanitation and data standards for collection aggregation and reporting.

Furthermore, the Water Expert Group has identified additional indicators that warrant further examination for potential modification or aggregation, with the possibility of inclusion as water-related or cross-cutting indicators:

- 5626: Reduction in the morbidity rate of diseases linked to water, sanitation and hygiene
- 475: Households with safe water and sanitary toilets
- 2502: Basic sanitation services (disaggregated)
- 5583: Improved sanitation services
- 5732: Population with access to basic sanitation
- 5733: Population with handwashing facilities
- 205: Proportion of residents connected to public water supply and public sewerage






5.5 Access to safe and affordable potable water for all






Monitoring access to safe and affordable potable water for all requires information on drinking water service levels and the affordability of drinking water services for different population sub-groups. Data should ideally be standardized to enable disaggregation of service levels for geographic areas and for vulnerable groups and aggregation of data at national and global levels.

Our preliminary assessment shows that this sub-component of the GGA water target can be partly addressed by existing Tier 1 global indicators used for monitoring SDG targets on safely managed drinking water (6.1.1) and UN Water GLAAS indicators on measures to improve and extend WASH services to populations disproportionately

affected by climate change. The water expert group recommends building on existing systems of data collection and reporting, integrating information on exposure to climate-related hazards, and progressive disaggregation of data to identify affected areas and population subgroups. The selected Tier 1 indicators could potentially be complemented with additional Tier 2 indicators addressing other contextual aspects of drinking water safety and affordability, but further work is required to develop data standards to enable aggregation and reporting at national and global level.

Tier 1 indicators

ID#	1332				
Indicator	SDG 6.1.1: Proportion of population using safely managed drinking water services				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Outcome			N/A		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience			Potential indicator of climate resilience. Established outcome indicator with existing guidance and system of reporting under SDG 6.1.1. Standard international classification based on national data sources (survey, census, admin). Comparable estimates available for 142 countries in 2022 (51% of global population). Disaggregated by rural, urban. Aggregated for global reporting every 2 years (6.1.1 metadata).		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Climate relevant but not climate specific. Does not directly measure resilience of drinking water services to climate-related hazards. Lacks subnational disaggregation of at-risk areas and groups.			<p>Consider building on existing JMP service ladder for drinking water services and combining with information on whether populations are exposed to or impacted by specific climate-related hazards (e.g. floods, droughts, storms).</p> <p>Consider further subnational disaggregation beyond urban/rural including by at risk geographic areas and vulnerable socio-economic groups.</p> <p>See recommendations from ongoing JMP/GLAAS joint technical review of options for enhanced monitoring of climate-resilient WASH services (review outputs).</p>		

ID#	2971				
Indicator	UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) indicator – A9. To what extent are there measures to improve and extend services to the following populations in national WASH policies and plans a) populations disproportionately affected by climate change?				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Process			Enabler		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Strengthening resilience			Potential input indicator for climate resilient water supply and climate resilient sanitation. Established system of reporting under UN Water GLAAS. Baseline data available for ~100 countries. Aggregated for global reporting every 2-3 years.		
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)			Recommendation (build on existing, modify existing, develop new)		
Only covers risk assessments for domestic water and sanitation services.			Consider building on existing reporting under UN Water GLAAS and assessing the extent to which climate risk assessments for water and sanitation services are implemented at different levels. See recommendations from ongoing JMP/GLAAS joint technical review of options for enhanced monitoring of climate-resilient WASH services (review outputs).		

Tier 2 indicators for 5.5






ID#	Indicator	Recommendation
5697	Percentage of poor people in vulnerable communities with access to safe and reliable water disaggregated by gender (outcome)	Potential complementary indicator focused on drinking water quality in communities vulnerable to climate change. Further work required to develop definitions of vulnerable communities and data standards for collection aggregation and reporting at national and global levels.

5.6 Enablers and/or Means of Implementation

Indicators for enablers (such as policies, legal frameworks etc.) and/or Means of Implementation (including finance, capacity building and technology transfer) for target 9a are needed to ensure that implementation of all sub-components of the water target are adequately supported. However, this may require information on both national policies, capacities and finances, which are often highly country context specific. Indicators have been divided into four categories: institutions, laws and policies (largely captured under IWRM), finance, capacity building, and technology transfer. While some enabling factors are specific to individual thematic targets and their sub-components, others may be relevant to multiple thematic targets and may therefore be better addressed under the dimensional targets (10a-d). The following indicators will therefore need to be reviewed together with those proposed by experts working on other targets.

Our preliminary assessment shows that this sub-component of the GGA water target is already partly addressed by existing Tier 1 global indicators used for monitoring SDG targets on integrated water resource management (6.5.1) and ODA for WASH as part of a government coordinated spending plan (6.a.1). The water expert group recommends building on existing systems of data collection and reporting, integrating information on climate-induced changes in the water availability and management responses, and progressive disaggregation of data to identify affected sectors, geographic areas and population subgroups. These could potentially be complemented with additional Tier 2 indicators on finance, capacity building and technology transfer but significant additional work is required to develop data standards to enable aggregation and reporting at national and global level.

Tier 1 indicators for Institutions, laws and policies (enablers)

ID#	2964				
Indicator	SDG 6.5.1: Degree of integrated water resources management				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Process			Enabler		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Enhancing adaptive capacity Strengthening resilience			Established process indicator with existing guidance and system of reporting under SDG 6.5.1. Country <u>survey</u> of the status of management instruments to support IWRM at national level (0-100). Q3.1b instruments for sustainable and efficient water use management include demand management measures (e.g. technical measures, financial incentives, education and awareness raising to reduce water use and/or improve water-use efficiency, conservation, recycling and re-		

	<p>use), monitoring water use (including the ability to disaggregate by sector), mechanisms for allocating water between sectors (including environmental considerations). Data available for 191 countries in the last 5 years. Disaggregated by degree of implementation. Potential indicator of capacity to adapt to climate-induced water scarcity.</p> <p>Potential indicator of strengthened resilience to water-related hazards. Established action indicator with existing guidance and system of reporting under SDG 6.5.1. Country <u>survey</u> of the status of management instruments to support IWRM at national level (0-100). Q3.1e instruments to reduce impacts of water related disasters include understanding disaster risk; strengthening disaster risk governance; investing in disaster risk reduction; and enhancing disaster preparedness. ‘Impacts’ include social impacts (such as deaths, missing persons, and number of people affected) and economic impacts (such as economic losses in relation to GDP). Disaggregated by degree of implementation. Aggregated for global reporting every ~3 years.</p>
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)	Recommendation (build on existing, modify existing, develop new)
Does not specifically address responses to climate change. Lacks subnational disaggregation of at-risk areas and population groups. Self-reported with no independent verification.	<p>Consider building on existing SDG 6.5.1 survey and integrating climate change considerations into IWRM assessment.</p> <p>Consider including indicators that will capture how all relevant water agencies (surface water, groundwater agency and all sectoral water use agencies- water supply and sanitation, agricultural water resources, and hydro-electric) are including climate resilience water management principles in their plans and policies.</p> <p>Relevant to multiple sub-components of 9a</p> <p>Links with target 10b Planning and sub-components for EWS.</p>

Tier 2 indicators for Institutions, laws and policies (enablers)






ID#	Indicators for Enablers (covering institutions, laws, policies, plans, strategies)	Recommendation
1425 2968	Existence of plans and mechanisms for the integration of strategies on water-related hazards and infrastructure across national development plans to reduce vulnerabilities across sectors (process) UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) indicator - A4. Are climate risk assessments undertaken for national water, sanitation and hygiene (WASH) planning (process)	Consider incorporating some of these aspects in Tier 2 indicators (various water sectors, various agencies) to reflect on how all relevant water agencies (surface water, groundwater agency and all sectoral water use agencies- water supply and sanitation, agricultural water resources, and hydro-electric) are including climate resilience water management principles in their plans and policies.

486	Number of major river basins with comprehensive water resources assessment using climate lens increased (process)	
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Furthermore, the Water Expert Group has identified additional indicators that warrant further examination for potential modification or aggregation, with the possibility of inclusion as water-related or cross-cutting indicators:

- 484: Number of groundwater management plan (GMP) with climate lens increased
- 250: Number of local water planning programs including adaptation to climate change
- 5781: Number of climate change adaptation responses adopted by water management institutions
- 5483: Operation and maintenance guideline and standard on climate resilient supply of safe drinking water published

Tier 1 indicators for Finance

ID#	2967				
Indicator	SDG 6.a.1: Amount of water- and sanitation-related official development assistance (ODA) that is part of a government-coordinated spending plan				
Sub-component (s)	Significantly reducing climate-induced water scarcity	Enhancing climate resilience to water-related hazards	Towards a climate-resilient water supply	Towards a climate-resilient sanitation	Access to safe and affordable potable water for all
					
Type of indicator (input, process, output, outcome)			Enablers (specify) and/or Means of Implementation		
Input			Means of Implementation		
GGA relevance (enhancing adaptive capacity, strengthening resilience, reducing vulnerability)			Strengths (relevance, feasibility and other criteria from CMA6 para 12, 17 and 20)		
Enhancing adaptive capacity Strengthening resilience			Established action indicator with existing guidance and system of reporting under SDG 6.a.1. Data aggregated for global reporting every 2-3 years. For 2023, data were available for indicator 6.a.1 for 135 aid receiving countries. The OECD Development Assistance Committee (DAC) has been collecting data on aid flows since 1973 through the OECD Creditor Reporting System (CRS) based on a standard methodology and agreed definitions from member countries and other aid providers. The CRS		

	currently disaggregates ODA for water supply and sanitation among several categories including: sector policy and administration, water resources conservation, large and basic water supply and sanitation systems, river basins development, waste management/disposal, and education and training in water supply and sanitation. The Rio marker for climate change adaptation was created in 2009 and implemented in reporting starting in 2010 for OECD DAC data on ODA and other official flows. A scoring system of three values is used, in which official development finance activities reported to the DAC CRS are screened and “marked” as either (i) targeting the conventions as a “principal” objective (score “2”) or (ii) as a “significant” objective (score “1”), or (iii) not targeting the objective (score “0”).
Weaknesses (relevance, feasibility and criteria from CMA6 para 12, 17 and 20)	Recommendation (build on existing, modify existing, develop new)
<p>Generic MoI indicator only covers ODA for water supply and sanitation and does not specifically address financing for climate adaptation.</p> <p>The WHO UN-Water GLAAS team has recently published a white paper identifying opportunities to further develop and improve monitoring of the means of implementation for water and sanitation (SDG 6). Improving monitoring of the Means of Implementation for water and sanitation</p>	<p>Consider building on existing reporting of MoI for SDG 6 and adopting recommendations from white paper including: Analyse and report disaggregated data for ODA flows by a) water and sanitation sub-sectors, show results where feasible by SDG 6 indicator and policy marker (including climate adaptation), b) donor perspective and c) type of aid and channels for how aid is provide</p> <p>Relevant to multiple sub-components of 9a</p>

Tier 2 indicators for Finance

ID#	Indicators for Finance	Recommendation
5369	Rate of access to financing for adaptation projects involving the promotion of integrated water resource management	Consider incorporating some of these aspects in Tier 2 indicators (various water sectors, various agencies, various purpose for which funding is needed) into the SDG 6 ODA indicator to make sure there is disaggregated and nationally specific information is available.
5286	Investments to enable improvement in systems for enhanced capture capacity for water supply	

Furthermore, the Water Expert Group has identified additional indicators that warrant further examination for potential modification or aggregation, with the possibility of inclusion as water-related or cross-cutting indicators:

- 913: Number of countries with prevention, response, and financing strategies for climate-induced water-related hazards
- 5287: Resource mobilized to improve water infrastructure
- 2979: UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) indicator - D8. Has the national government received climate finance for WASH activities
- 120: Funds for flood protection
- 121: Investments in flood protection

- 5598: Money allocated/spent on strengthening the systems of short-term weather forecasts
- 5599: Money allocated/spent on developing the mobile phone-based communication system for short-term weather forecasts

While no Tier 1 indicators were identified for Capacity Building or Technology Transfer (that is no global indicator as a part of SDG, Sendai or other similar frameworks), the following Tier 2 indicators were identified for these two aspects of Means of Implementation.

Tier 2 indicators for Capacity Building

ID#	Indicators for Capacity Building	Recommendation
479	No. of staff from key institutions trained as pool of trainers/resources on IWRM and CC mitigation (output)	None of these indicators are considered suitable in their current form but the items listed could potentially be used to develop a more comprehensive indicator/set of indicators covering various aspects of capacity building of professionals in water agencies (surface water, groundwater, drinking water, agricultural water, hydropower, sanitation sector) who manage water resources on best practices of climate resilient water management practices, as well as awareness raising of water users and consumers from all water use sectors.

Furthermore, the Water Expert Group has identified additional indicators that warrant further examination for potential modification or aggregation, with the possibility of inclusion as water-related or cross-cutting indicators:

- 4258: Number of stakeholders trained in the monitoring and maintenance of hydraulic structure
- 5757: Number of people participating in awareness-raising workshops related to water adaptation

Tier 2 indicators for Technology Transfer

ID#	Indicators for Technology Transfer	Recommendation
481	Appropriate technologies on IWRM, CCA and mitigation	None of these indicators are considered suitable in their current form but the items listed could potentially be used to develop a more comprehensive indicator/set of indicators covering various aspects of technology transfer in water agencies (surface water, groundwater, drinking water, agricultural water, hydropower, sanitation sector) who manage water resources on best practices of climate resilient water management practices.

6. Remaining gaps

Both Tier 1 and Tier 2 indicators underwent a thorough assessment, including evaluations by individual experts and group discussions. However, due to time constraints, Section 5 focuses on summarizing the assessment of Tier 1 indicators. If needed, a written assessment for Tier 2 indicators can be developed at a later stage.

Moreover, metadata and interlinkage with other thematic areas for both Tier 1 and 2 indicators will have to be further developed, which could help further refine the list, especially providing additional information on feasibility and potential consolidation with other lists proposed by other expert groups.

The selection and evaluation of indicators in this report were primarily conducted within the Water Expert Group. Given time limitations, the group has not had the opportunity to engage with other thematic expert groups to discuss potential cross-cutting indicators or review those proposed by other groups. As a result, the indicators included in this report could benefit from further refinement through cross-group reviews and discussions. Such a process would help consolidate and identify cross-cutting indicators and address any gaps essential for assessing, enhancing, and tracking resilience on the ground.

7. Recommendations for next steps after SB62

There is clearly further work to be carried out by the Expert Groups in order to consolidate the emerging findings and technical recommendations. In the meantime, we have the following recommendations for next steps after SB62:

- **Support and provide opportunities for collaboration** between different thematic groups, especially for cross-cutting indicators.
- **Explore and adopt data tools or platforms** to help improve efficiency and facilitate collaboration within and across different expert groups.
- **Engage the statistics community:** Collaborate with international and national statistics agencies to explore the use of already existing official statistics, the standardisation of definitions, classifications and methods, and to consider established data collection processes.
- **Consult with thematic experts** from UN Water etc. for technical advice on further development of water supply and sanitation metrics.
- **Continuous feedback:** Maintain open channels with parties for iterative improvements to the indicator framework.
- **To facilitate the team of experts' work,** the list of indicators and respective methodology should be reviewed and approved by all members of the group prior to any final submission.

In addition, with mobilising and scaling adaptation finance being highlighted as one of the most urgent issues by many parties, this work programme on indicators should also explore common areas and seek potential alignment with impact measurements of climate adaptation/resilience investments being developed in the private sector, such as the suggested impact reporting indicators for climate adaptation projects published by the International Capital Market Association (ICMA)¹⁵ and the proposed set of adaptation and resilience example metrics for investors prepared by UNEP FI¹⁶, etc. A unified framework or common set of indicators for adaptation monitoring and evaluation - applicable from national-level progress tracking to project-level impact reporting - can help lower barriers to adaptation finance by improving comparability, transparency, and coherence across scales.¹⁷

¹⁵ <https://www.icmagroup.org/sustainable-finance/impact-reporting/green-projects/>

¹⁶ <https://www.unepfi.org/themes/climate-change/adaptation-resilience-impact-a-measurement-framework-for-investors/>

¹⁷ <https://napglobalnetwork.org/wp-content/uploads/2024/05/napgn-en-2024-mel-toolkit-nap-processes.pdf>

Annex 1: Indicator grouping and scoring

Given the large number of indicators deemed potentially relevant by the water group after initial screening (790), remaining indicators are sorted on descending order of the score S calculated as follows:

- 1- We reviewed the mapping of the indicators to the 12 GGA targets (9a, ..., 9g and 10a,...10s) and to the 5 water target subcomponents
- 2- $S_{targets} = \frac{\text{Number of targets}}{12}$
- 3- $S_{components} = \frac{\text{Number of components}}{5}$
- 4- $S_{data} = 1$ if reported in an international framework, 0 otherwise
- 5- $S = 0.25S_{data} + 0.25S_{targets} + S_{components}$

While the weighting is arbitrary, it gives priority to indicators that simultaneously cover a maximum of target 9a components, and a maximum of other targets.

Grouping of indicators identified from the above process.

This interim list of potential indicators informed the discussion of the Water Expert Group and the determination of the preliminary list of potential indicators as presented in Section 5 and 6 in the main report

Group 1: Water stress and scarcity

- ID 5: SDG 6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
- ID 109: Territory affected by water scarcity

Group 2: Water-use efficiency

- ID 246: Water Distribution Network Infrastructure Leakage Index (ILI)
- ID 309: SDG 6.4.1: Change in water-use efficiency over time
- ID 5675: Water efficiency in urban consumption
- ID 5676: Water efficiency in industrial consumption
- ID 5677: Water efficiency in agriculture

Group 3: Water quality

- ID 877: Proportion of bodies of water with good ambient water quality (Note MN: Should be SDG 6.3.2 "Proportion of bodies of water with good ambient water quality")

Group 4: IWRM and climate integration

- ID 250: Water planning programs including climate adaptation
- ID 251: Water agencies' program dedicated to climate change
- ID 479: Staff trained as trainers on IWRM and climate adaptation
- ID 481: Appropriate technologies on IWRM and climate adaptation
- ID 484: Groundwater management plans with climate lens
- ID 486: River basins with climate-informed water resources assessment
- ID 566: Degree of integrated water resources management
- ID 2964: SDG 6.5.1: Degree of integrated water resources management
- ID 4258: Stakeholders trained in hydraulic structure monitoring
- ID 5781: Climate adaptation responses by water management institutions

Group 5: Water conservation awareness

- ID 5757: People participating in water adaptation awareness workshops

Group 6: Water-related investments and financing

- ID 120: Funds for flood protection
- ID 121: Investments in flood protection
- ID 2591: Government expenditure on DRR in relation to GDP
- ID 2967: SDG 6.a.1: Official development assistance for water and sanitation
- ID 5286: Investments for water supply capture capacity
- ID 5287: Resources for water infrastructure
- ID 5369: Financing for adaptation projects involving IWRM
- ID 5746: Water/sanitation ODA in government-coordinated plans

Group 7: Early warning systems, platforms and funding

- ID 42: Rural population with access to early warning systems
- ID 43: Timeliness of early warning systems
- ID 46: Functioning of disaster risk reduction platforms
- ID 2955: Countries with multi-hazard monitoring systems
- ID 2958: Members producing impact-based warnings for water hazards
- ID 2960: Procedures for issuing water-related hazard warnings
- ID 2961: DRR platforms with meteorological service participation
- ID 3006: People with disrupted livelihoods due to disasters
- ID 3136: Finance mechanisms for early action plans
- ID 5598: Funding for strengthening weather forecast systems
- ID 5599: Funding for mobile-based forecast communication

Group 8: Drought and water-related hazard strategies

- ID 275: Implementation of drought risk management plans
- ID 880: Population exposed to drought
- ID 889: Ecosystems vulnerable to drought under effective management
- ID 913: Strategies for climate-induced water hazards
- ID 914: Green/grey infrastructure for water hazards
- ID 915: Integration of water-hazard strategies
- ID 1425: Plans for water-hazard strategies across sectors

Group 9: Water-related hazards impact assessment

- ID 1406: Land affected by drought or floods
- ID 5347: GDP losses from extreme rainfall
- ID 5397: Areas exposed to climate-induced hazards
- ID 5449: People displaced by water-related disasters
- ID 5600: Areas vulnerable to flood, drought and landslide hazards
- ID 5718: Economic losses from floods and drought

Group 10: Water access, infrastructure and drinking water

- ID 205: Connection to public water supply and sewerage
- ID 434: SDG 6.1.1: Population using safely managed drinking water services
- ID 491: Households with safe water supply
- ID 565: Safely managed and accessible drinking water
- ID 885: People with climate-resilient basic water
- ID 916: Improved water sources and sanitation
- ID 918: Safely managed and accessible drinking water
- ID 1374: Community participation in water/sanitation management
- ID 5483: Guidelines for climate resilient drinking water supply
- ID 5508: Proportion of households with safe water supply
- ID 5519: Population with year-round access to safe drinking water
- ID 5539: Population with access to safe water and improved sanitation
- ID 5565: Year-round water access despite climate shocks
- ID 5571: Households accessing portable water
- ID 5697: Access to safe water in vulnerable communities
- ID 5698: Urban households with piped water
- ID 5770: Population with reliable access to safe drinking water

Group 11: Sanitation services and access

- ID 435: SDG 6.2.1: Population using sanitation services and hand-washing facilities
- ID 475: Households with safe water and sanitary toilets
- ID 884: Climate-resilient basic sanitation services
- ID 919: Safely managed sanitation with proper waste disposal
- ID 2502: Basic sanitation services (disaggregated)
- ID 5583: Improved sanitation services
- ID 5732: Population with access to basic sanitation

- ID 5733: Population with handwashing facilities

Group 12: Water-related health impacts

- ID 473: Water-borne climate-sensitive diseases
- ID 876: Mortality from unsafe water, sanitation, and hygiene
- ID 5626: Reduction in water-related disease morbidity

Group 13: Water supply adaptation planning

- ID 278: Water supply contingency plans
- ID 5678: Water companies with adaptation plans for extreme events
- ID 5775: Protection of vulnerable urban water sources

Group 14: Climate risk assessment and financing for WASH

- ID 2968: Climate risk assessments for WASH planning
- ID 2979: Government climate finance for WASH activities