

# WASH Climate Resilient Development

Technical Brief

Monitoring and evaluation for climate resilient WASH



## About UNICEF

UNICEF works in more than 100 countries around the world to improve water supplies and sanitation facilities in schools and communities, and to promote safe hygiene practices. We sponsor a wide range of activities and work with many partners, including families, communities, governments and like-minded organizations. In emergencies we provide urgent relief to communities and nations threatened by disrupted water supplies and disease. All UNICEF WASH programmes were designed to contribute to the Millennium Development Goal for water and sanitation.

## About GWP

The Global Water Partnership is an intergovernmental organisation of 13 Regional Water Partnerships, 86 Country Water Partnerships and more than 3,000 Partner Organisations in 183 countries. Its vision is a water secure world. Its mission is to advance governance and management of water resources for sustainable and equitable development through integrated water resources management (IWRM). IWRM is a process that promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems and the environment.

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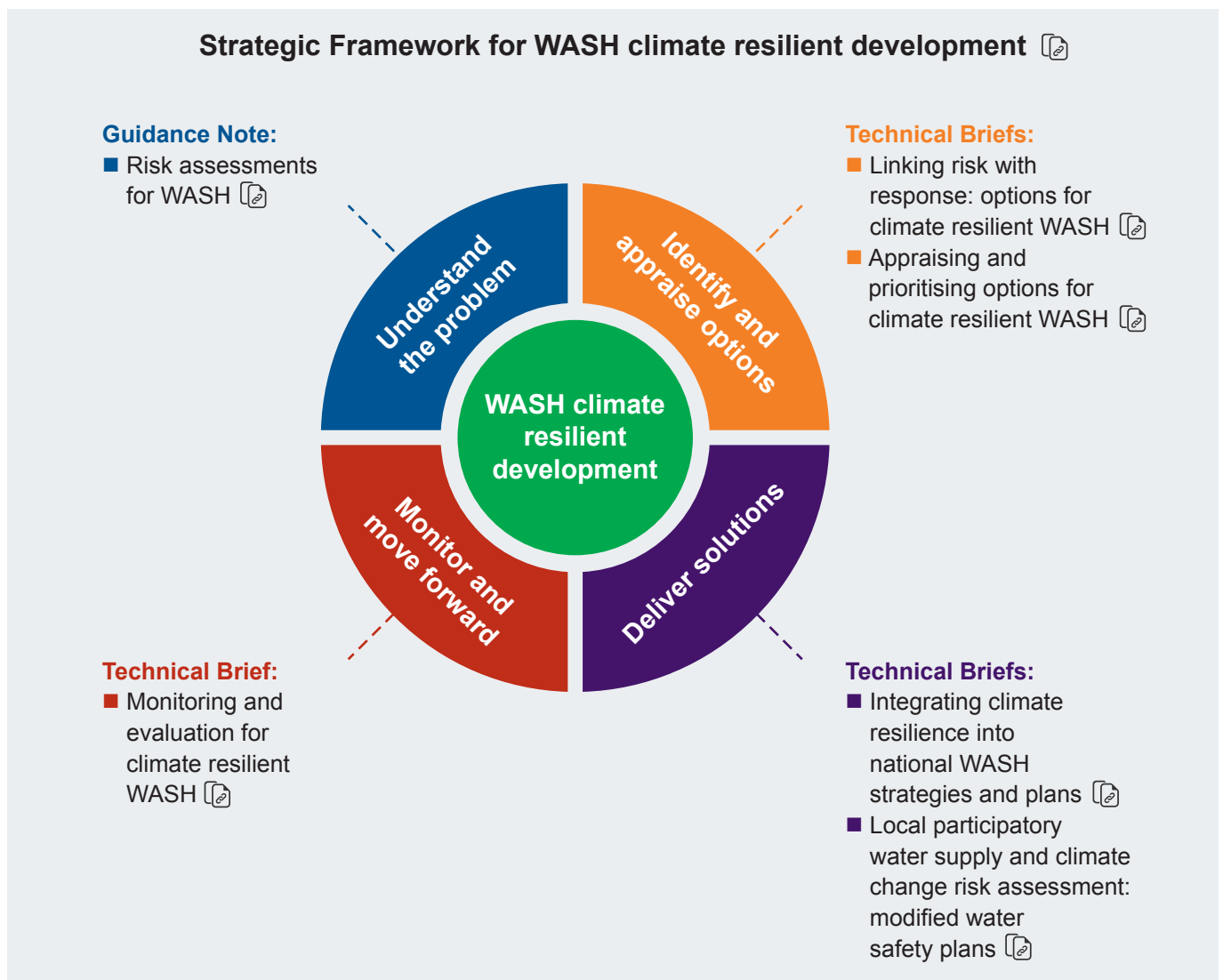
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# Supporting climate resilience in the WASH sector

This Technical Brief forms part of the Strategic Framework for WASH Climate Resilient Development, produced under a collaboration between GWP and UNICEF.<sup>1</sup> The Framework advances sector thinking around WASH and climate change, cutting across both development and emergency preparedness programmatic spheres; climate resilience is addressed as a cross-cutting issue encompassing elements of both disaster risk reduction and climate change adaptation.<sup>2</sup> It serves to set out the rationale and concepts for WASH climate resilient development, as well as improve understanding of how to ensure that climate resilience is considered in WASH strategies, plans and approaches.

The objective of the Strategic Framework is to support WASH service delivery that is resilient to the climate, both now and in the future. The Strategic Framework is centred around four quadrants of activity; this Technical Brief sits within the 'Monitor and move forward' quadrant, shown in the figure below.



<sup>1</sup> GWP and UNICEF (2014)

<sup>2</sup> <http://www.gwp.org/en/we-act/themesprogrammes/Climate-Resilience/WASH-Climate-Resilient-Development-a-GWP-UNICEF-Collaboration/>

# 1. Introduction

## 1.1 Background

Monitoring and evaluation (M&E) is vital to ensure that we can learn about which Water, Sanitation and Hygiene (WASH) interventions work and why, and what needs to be adjusted. When done well, it can demonstrate the effectiveness of projects and programmes, as well as generate new learning.<sup>3</sup>

Monitoring helps to track progress and demonstrate the impacts that different efforts have on improving conditions and services,<sup>4</sup> as well as being used to inform future policy, planning and investments. As more is learned about the effectiveness of different projects and programmes, this information is then fed back to inform decisions about whether any adjustments are necessary to improve performance.

Sustainable Development Goal (SDG) 13 aims to “take urgent action to combat climate change”. It includes increasing adaptation and resilience at both the national and community level, and building capacity at all levels to respond to the impacts of climate change. Because the impacts of climate change are most commonly related to water, the adaptation measures required will specifically target many aspects of the WASH sector, which are also covered in SDG 6: “ensure availability and the sustainable management of water and sanitation for all”.

The new SDGs provide an excellent opportunity to bridge the Water and Climate agendas and to make programmes more resilient to the impacts of climate change. Working on WASH climate resilience, through the implementation of the Strategic Framework for WASH Climate Resilient Development, provides a means of simultaneously supporting SDG 6 and SDG 13.

It is therefore vital to provide evidence that WASH interventions are contributing to an increase in climate resilience. Due to the many uncertainties involved in improving climate resilience, WASH programmes should involve forward-looking planning and implementation, and continuous learning and adjustment.<sup>5</sup>

### Box 1: Monitoring and evaluation<sup>6</sup>

**Monitoring** is the ‘ongoing process of tracking and reviewing WASH activities, their results, and the surrounding context’. WASH interventions, projects or programmes can be **evaluated** using the information generated from monitoring. Monitoring and evaluation are often considered as a single M&E system.

## 1.2. Aim and target audience

The core objective of the Strategic Framework is to provide sustainable WASH service delivery, both now and into the future. The emphasis is on climate resilient development, including strengthening the resilience of WASH systems; and on investments to manage current climate variability as well as long-term changes in climate.<sup>7</sup>

The aim of this Technical Brief is to set out how indicators can be identified and used to monitor and evaluate the effectiveness of measures introduced to enhance climate resilience, and their contribution to the overall sustainability of WASH services. The Brief focuses on the additionality that climate resilience M&E introduces when incorporated into existing M&E systems. It provides examples of typical monitoring indicators that can be used and/or adapted where necessary. The Brief also summarises the factors to consider in monitoring climate resilience, and suggests ways to address these challenges.

The Brief is designed to be a core component of national WASH climate resilience monitoring efforts. To gain a complete picture, however, supplementary, periodic surveys may also be necessary. Such efforts should be included alongside existing WASH monitoring efforts, rather form part of a new parallel system.

The data gathered in M&E has many uses at the global, national, sub-national and project levels. In many

<sup>3</sup> Bours et al. (2013)

<sup>4</sup> Schwemlein et al. (2016)

<sup>5</sup> Willows and Connell (2003)

<sup>6</sup> Spearman and McGray (2011)

<sup>7</sup> GWP and UNICEF (2014)

countries, the most urgent need is for basic national-level data on resilient WASH coverage. Only with such basic data can the sector effectively track progress, advocate for improved WASH resilience, and make informed choices on policy and resource allocation. All the monitoring indicators in this brief are generic. In some cases, the proposed indicators can be used at the country level with little or no modification; in other cases, some modification will be necessary to ensure the tools are fully relevant within the country context. The target audience for the Brief is the same as the Strategic Framework. It includes government planners, decision-makers and practitioners at national, sub-national and local levels responsible for WASH services provision, and their associated WASH development partners.

## 2. Indicators for climate resilient WASH

### 2.1. Introduction

Indicators are used to help measure progress towards specific targets and objectives. By tracking and monitoring key indicators, options and plans can be adjusted if necessary through a cycle of evaluation and learning. This Brief presents some example indicators that can be used for WASH and climate resilience.

The Brief follows on from the Technical Brief on 'Linking risk with response: options for climate resilient WASH' (referred to here as the Options Brief), which looks at how the WASH sector could adapt to climate change. It looks at key elements of the whole 'results chain', from programme design and commissioning, to project-level systems and technologies. A portfolio of options, most of which are no or low-regret options, have been arranged according to different levels and different responses, to fit a simplified Results Framework for climate resilient WASH (see Section 2.3).

This Technical Brief builds on the measures identified in the Options Brief. It provides example indicators that can be used in an M&E system for climate resilient WASH. It then discusses some of the challenges associated with climate resilience that make it difficult to implement M&E systems and shows how to address them, to ensure that M&E is effective.

### 2.2. Types of indicators

Indicators are useful for decision-making because they can quantify information so its significance is more readily apparent, and simplify information about complex phenomena to improve communication.<sup>8</sup> They can be used to structure the process for data collection and can be either quantitative or qualitative. Unlike quantitative indicators, which give a numeric measure, qualitative indicators depict the status of elements that are less easily quantifiable – for example, the perceived change in the reliability of different springs during a drought event.

Indicators may be used at different points in the results chain. These indicators include:<sup>9</sup>

- Activity indicators – actions taken or processes through which inputs are mobilised to produce specific outputs.
- Output indicators – the immediate effects of interventions or measures, or the direct products or deliverables of interventions or measures.
- Outcome indicators – the intermediate effects of an intervention or measure's outputs.

There are also proxy indicators, which can be used to represent elements that are difficult to measure (e.g. the presence of soap and water near a latrine

#### Box 2: UNICEF WASH Sustainability Framework<sup>10</sup>

One of the most significant challenges faced by the WASH sector is the post-programme sustainability of interventions. This can be addressed by improving the way that programmes are planned, delivered and monitored. UNICEF is working on a Sustainability Framework to provide support to governments in meeting commitments on the sustainability of interventions.

A key component of the Sustainability Framework is the 'Sustainability Check'. This process determines whether WASH services are being continuously provided at the level that they were initially designed for. It also assesses the factors which affect the sustainability and resilience of programme outputs, and the continuous delivery of these services. The results of the Sustainability Check can be used to provide recommendations on how sustainability, and the factors affecting it, can be improved to deliver programme and sector outcomes that are more sustainable and resilient.

The Sustainability Check guidance identifies some indicators that have a specific focus on climate resilience. These indicators are provided in this Technical Brief alongside the other suggested indicators that can be used to monitor climate resilience – see Section 2.4.

<sup>8</sup> Hammond et al. (1995)

<sup>9</sup> White and Sabarwal (2014)

<sup>10</sup> <http://www.sanitationmonitoringtoolkit.com/sanitation-monitoring-toolkit/monitoring-sustainability-and-sector-performance>

to indicate handwashing with soap); and aggregate indicators (e.g. Child Wellbeing Index, Human Development Index), which summarise and simplify complex information from multiple individual indicators.

### 2.3. Results Framework

The example indicators in this Technical Brief are arranged according to a simplified Results Framework, shown in Figure 2.1. The Results Framework:

- shows how results can be achieved at different levels to form a results chain, and how activities and outputs combine to produce results at the outcome level
- clearly defines the results chain for interventions within the climate resilient WASH programme
- makes it easier to measure the implementation and results of the intervention using appropriate and specific indicators.

The Results Framework sets out the key activities, outputs and outcomes recommended for climate resilient WASH. For each of the three levels – the national, sub-national/watershed, and local and project level – the framework identifies an intermediate outcome and associated outputs and activities.

- At the national level, the focus is on the enabling environment conducive to climate resilient WASH services and communities.
- At the sub-national/watershed level, the focus is on monitoring and management of water resources

in relation to climate risks to WASH services and infrastructure.

- At the local and project level, there are two separate intermediate outcomes. The first looks at access to climate resilient WASH infrastructure and services, while the second concerns behavioural change and governance at community and local levels.

### 2.4. Indicators

Indicators are provided for the national, sub-national/watershed, and local and project levels in Table 2.1, Table 2.2 and Table 2.3 respectively. The indicators cover water, sanitation and hygiene, including those relating to emergency preparedness and disaster risk reduction (DRR). They have been developed based on information in the Options Brief, and indicators in the UNICEF WASH Sustainability Framework and the GWP Simplified Results Framework.

It is important to note that these indicators are just some examples that can be used in M&E. Indicators could be adjusted depending, for example, on the hazard or the infrastructure that is being considered.

Indicators for climate resilient WASH services should be SMART (specific, measurable, achievable, relevant and time-bound). The time-bound component for most of the indicators can be defined based on the monitoring cycle that is being used in the M&E system.



# SIMPLIFIED RESULTS FRAMEWORK FOR WASH CLIMATE RESILIENCE

Rural WASH infrastructure and services are sustainable, safe and resilient to climate related risks; and WASH contributes to building community resilience to climate change

OUTCOME

INTERMEDIATE OUTCOME

OUTPUT

ACTIVITY

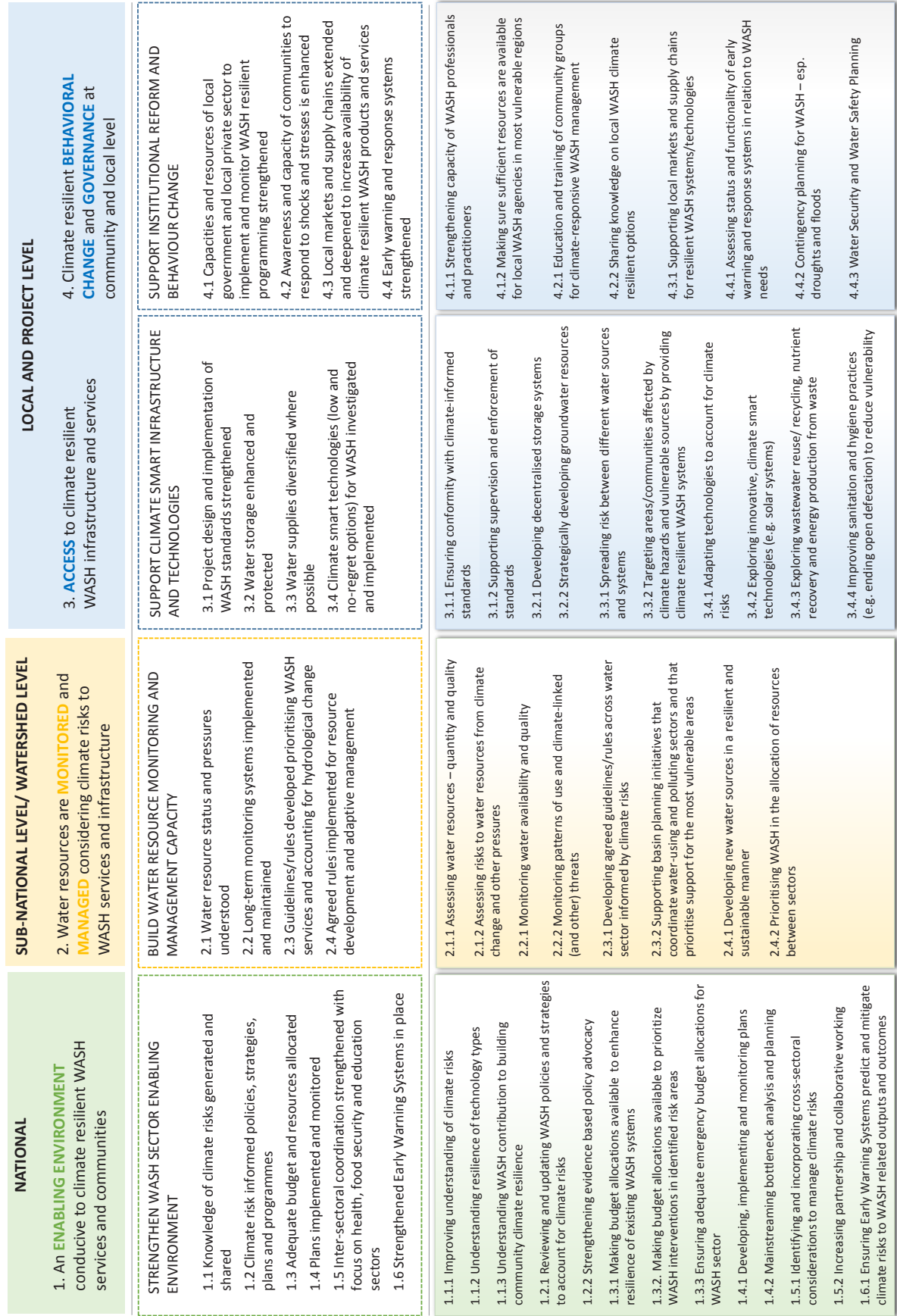


Figure 2.1: Simplified Results Framework for WASH climate resilience

Table 2.1: National

Outcome/output/activity	Indicator	Hazard	
<b>Intermediate outcome:</b> An enabling environment conducive to climate resilient WASH services and communities	Perceived adequacy of the enabling environment for climate resilient WASH services and communities	General	
	<b>Output:</b> Knowledge of climate risks generated and shared	Perceived adequacy of available evidence on the potential impacts of climate change on the WASH sector	General
		Do national WASH related ministries and departments understand climate risks and how best to respond to these?	General
		Is understanding of climate risks shared among experts and stakeholders?	General
	<b>Activity:</b> Improving understanding of climate risks	Has a national climate risk assessment been completed for the WASH sector?	General
		Are key national government agencies involved in carrying out climate risk assessments?	General
		Have government-led impact evaluations, which include the impact of climate, been carried out in the past 5 years?	General
		Is a process in place to review and update risk data each year?	General
	<b>Activity:</b> Understanding resilience of technology types	Percentage of water supply and sanitation technologies screened according to their suitability to withstand climate-related shocks and stresses	General
	<b>Activity:</b> Understanding WASH contribution to building community climate resilience	Has the link been established in-country between infectious disease prevalence (e.g. cholera) and a changing climate? How does climate change affect patterns and variability?	General
		What is the current state of WASH resilience in the country? Has a needs assessment been carried out?	General
	<b>Output:</b> Climate risk informed the development of policies, strategies, plans and programmes	Do national WASH policies, plans and strategies integrate climate resilience?	General
		Do policies, plans and strategies target the most vulnerable populations to improve WASH climate resilience?	General
		Percentage of national-level agreements that accommodate established climate change priorities for WASH	General
		Are there legal frameworks that integrate WASH and climate resilience?	General
		Does national climate change policy have targeted WASH objectives?	General
Is climate resilience included in the National WASH Strategy?		General	

Outcome/output/activity		Indicator	Hazard
	<b>Activity:</b> Reviewing and updating WASH policies and strategies to account for climate risks	Are climate risk assessments used to inform WASH budgets?	General
		Are climate risk assessments used to inform policies, plans, strategies and targeting of programmes?	General
		Are national government agencies supported in developing policies and strategies that integrate WASH and climate resilience?	General
		Have WASH policies been reviewed and updated to account for climate risks?	General
	<b>Activity:</b> Strengthening evidence-based policy advocacy	Are relevant government WASH agencies being influenced and encouraged by evidence-based policy advocacy efforts?	General
<b>Output:</b> Adequate budget and resources allocated		Is the total value of investment to build WASH resilience sufficient to meet the needs of the most vulnerable populations?	General
		Number of approved investment plans in place to fund WASH and climate resilience interventions	General
		Is funding available to support government-led efforts to revise statutes and laws?	General
		Is funding available to support technical capacity of regulatory bodies?	General
<b>Activity:</b> Making budget allocations available to enhance resilience of existing WASH systems		Is finance available to rebuild facilities or increase resilience of sanitation programmes in hazard-affected areas?	General
		Is investment available for monitoring water resources in drought prone areas?	Drought
<b>Activity:</b> Making budget allocations available to prioritise WASH interventions in identified risk areas		Is finance available to prioritise sanitation and hygiene interventions in identified cholera hot spots?	General
		Is finance available to prioritise sanitation and hygiene interventions in communities where open defecation is practised?	General
		Is finance available to prioritise strategic water supply provision in drought prone areas where water access is also limited?	General
<b>Activity:</b> Ensuring adequate emergency budget allocations for WASH sector		Number of CCTs (conditional cash transfers) available/administered to purchase emergency WASH supplies following a flood	Flooding
		Total value of emergency cash transfers to help with reinvestment and rebuilding	General
		Is targeted finance available in flood prone areas for the most vulnerable populations?	Flooding

Outcome/output/activity	Indicator	Hazard
<b>Output:</b> Plans implemented and monitored	Percentage of vulnerable population benefiting from effective integrated WASH and climate resilience planning	General
	Percentage of WASH and climate resilience plans being fully implemented	General
	Percentage of WASH and climate resilience plans monitored and reviewed regularly, e.g. every year	General
<b>Activity:</b> Developing, implementing and monitoring plans	Are climate risk assessments used to inform WASH plans?	General
	Are regulatory agencies in place to implement source/resource protection plans?	General
<b>Activity:</b> Mainstreaming bottleneck analysis and planning	Percentage of regions completing bottleneck analysis for the WASH sector, e.g. by using WASH BAT <sup>11</sup>	General
<b>Output:</b> Inter-sectoral coordination strengthened with focus on health, food security and education sectors	Do WASH related ministries and departments work collaboratively on providing climate resilient WASH services?	General
	Is there collaborative working among WASH ministries and departments to align WASH strategies and plans with national climate change priorities?	General
<b>Activity:</b> Identifying and incorporating cross-sectoral considerations for managing climate risks	Are cross-sectoral influences and actions (e.g. WASH – Health – Nutrition – Education) identified and taken into consideration as a mechanism to increase climate resilience?	General
	Has agreement been reached among WASH ministries, departments and implementation partners on the most important climate risks and how best to respond?	General
<b>Activity:</b> Increasing partnership and collaborative working	Has a national coordinating mechanism for mainstreaming water and climate issues into plans been established?	General
	Is there any collaboration with stakeholders on WASH climate resilience from outside the WASH sector? Is this adequate/does it include all the relevant sectors/stakeholders?	General
	Is there sufficient engagement in cross-sectoral dialogues in the WASH sector and in other sectors?	General
<b>Output:</b> Strengthened Early Warning Systems in place		
<b>Activity:</b> Ensuring Early Warning Systems predict and mitigate climate risks to WASH related outputs and outcomes	Does Early Warning Systems technology and associated policies and procedures (designed to predict and mitigate the impacts of climate change) account for impacts on WASH services?	General

<sup>11</sup> <http://www.washbat.org/>

Table 2.2: Sub-national/watershed

Outcome/output/activity		Indicator	Hazard
<b>Intermediate outcome:</b> Water resources are monitored and managed considering climate risks to WASH services and infrastructure		Percentage of water resources that are monitored and managed for climate shocks and stresses	General
		Percentage of water sources with a monitoring system in place, to understand how they are being affected by climate change	General
<b>Output:</b> Water resource status and pressures understood		Percentage of catchments where water resource pressures are well documented	General
		Percentage of communities where the status of local water resources is well understood	General
<b>Activity:</b> Assessing water resources – quantity and quality		Percentage of communities where hydrogeological conditions were properly assessed and documented before water point construction	General (SC Indicator)
		Percentage increase in investment in resource assessment and siting	General
		Percentage of catchments for which assessments have been completed on aquifer characteristics	General
<b>Activity:</b> Assessing risks to water resources from climate change and other pressures		Percentage of communities for which maps of areas at risk have been produced – e.g. those exposed to a combination of high climate risk, difficult hydrology, and potentially less resilient technologies	General
		Percentage of water resource assessments that consider climate impacts	General
		Percentage of latrines/sanitation structures in at risk areas for which an assessment of risk to structure and surrounding area has been completed	General
<b>Output:</b> Long-term monitoring systems implemented and maintained		Percentage of water sources with a water sampling programme in place to monitor water quality on at least a bi-monthly basis	General
		Percentage of communities with monitoring in place to support an effective early warning system	General
		Percentage of sanitation systems with monitoring programme in place for overflowing, damage to structures, etc.	General
		Perceived adequacy of monitoring systems for water resources (including availability, quality and abstractions)	General
<b>Activity:</b> Monitoring water availability and quality		Water quality monitoring programmes are completed during high risk periods	General
		Perceived change in quality of water due to drought or heavy rains	General
<b>Activity:</b> Monitoring patterns of use and climate-linked (and other) threats		Percentage of water sources able to remain functional and effectively meet demand during a drought event	Drought
		Percentage of latrines which remain safe and functional following heavy rains and/or flooding	Flooding
		Percentage of latrines which are immediately reconstructed following heavy rains and/or flooding	Flooding

Outcome/output/activity	Indicator	Hazard
<b>Output:</b> Guidelines/rules developed prioritising WASH services and accounting for hydrological change	Are climate-resilience standards in place for the construction/installation of latrines and other sanitation infrastructure?	General
	Are climate-resilience standards in place for the construction/installation of water points?	General
<b>Activity:</b> Developing agreed guidelines/rules across water sector, informed by climate risks	Percentage of catchments in drought risk areas where a leakage reduction programme has been developed and implemented	Drought
	Percentage of latrines sited using climate risk-based approaches	General
<b>Activity:</b> Supporting basin planning initiatives that coordinate water-using and polluting sectors and that prioritise support for the most vulnerable areas	Percentage of catchments for which an abstraction inventory has been compiled	Drought
	Percentage of total water sources (surface and groundwater) or catchments that have a permitting system in place for abstractions	Drought
	Percentage of total water sources (surface and groundwater) or catchments for which there is a permitting process in place for discharges	General
<b>Output:</b> Agreed rules implemented for resource development and adaptive management	Percentage of water points where a post-construction audit has been completed to ensure that it has been constructed according to climate-informed standards	General
	Percentage of new boreholes checked for yield and water quality before sign-off	General
	Percentage of catchments where water allocation planning is in place	Drought
	Percentage of sanitation structures which follow standards on preventing leakage	General
<b>Activity:</b> Developing new water sources in a resilient and sustainable manner	Number of new, higher-yielding sources developed as a percentage of total sources	General
	Percentage success rate for drilling using siting techniques compared with percentage success rate for drilling that does not use siting techniques	General
<b>Activity:</b> Prioritising WASH in the allocation of resources between sectors	Are projects in place that demonstrate the benefits of allocating sufficient water to sanitation and hygiene activities?	General
	Do water allocation plans take into account sanitation and hygiene needs?	General
	Percentage of catchments where lack of knowledge of the water resource system and water users inhibits implementation of effective water allocation practices	Drought

Note: SC Indicator is a Sustainability Check Indicator – see Box 2 for more details

Table 2.2: Sub-national/watershed

Outcome/output/activity	Indicator	Hazard
<b>Intermediate outcome:</b> Access to climate resilient WASH infrastructure and services	Percentage of population with access to water points that provide at least a 12-hour daily service all year round	Drought
	Percentage of population with access to springs that provide a continuous supply during a drought	Drought
	Percentage of population with access to soap and water at a handwashing facility during a drought period or following a flood	General
	Percentage of households with access to a resilient latrine that does not flood during the wet season	Flooding
<b>Output:</b> Project design and implementation of WASH standards strengthened	Percentage of households where latrines collapsed in the last year due to heavy rains or other extreme weather events	General (SC Indicator)
	Percentage of collapsed latrines which were immediately built following heavy rains or other extreme weather events	General
	Percentage of protected springs built using high strength, flexible, quality materials	General
	Percentage of dug wells (or boreholes) sited at least 20m from latrines and other sources of pollution risk	General
<b>Activity:</b> Ensuring conformity with climate-informed standards	Percentage of wells (or other infrastructure) constructed according to climate-informed standards in drought risk areas	Drought
	Percentage of latrines (or other sanitation infrastructure) for which a post-construction audit that assesses construction according to climate-informed standards has been completed Percentage of latrines (or other sanitation infrastructure) where a post-construction audit has been completed considering that it has been constructed according to climate-informed standards	General
	Percentage of water points constructed according to standards	General
	Percentage of latrines constructed according to climate-informed standards in flood risk areas	Flooding
<b>Activity:</b> Supporting supervision and enforcement of standards	Those responsible for latrine construction within the community have received sufficient guidance and follow-up on the siting and construction of climate resilient latrines	General (SC Indicator)
<b>Output:</b> Water storage enhanced and protected	Percentage improvement in compliance with water quality standards for microbial contamination	General
	Percentage of community-managed piped water supplies with safely managed treatment plants	General
	Percentage of safe and sufficient storage systems constructed in areas of flood or drought risk	General
	Percentage of rural domestic supply derived from household and community boreholes	General
	Percentage of water points that have dried up for at least 1 month out of the previous 12 months	Drought (SC Indicator)

Outcome/output/activity		Indicator	Hazard
<b>Activity:</b> Developing decentralised storage systems	Percentage of communities or households in drought risk areas that have access to an effective rainwater harvesting system	Drought	
	Percentage of communities that have installed a community-based storage system than can support the entire community for at least 72 hours	General	
	Percentage of households that have household storage systems to provide supplementary water supply	General	
	<b>Activity:</b> Strategically developing groundwater resources	Percentage increase in number of groundwater recharge schemes	General
		Percentage of shallow wells replaced with boreholes in areas of high pollution risk	General
		Percentage of water sources that are supplemented by back-up relief boreholes	General
		Percentage increase in green infrastructure systems used for flood control	Flooding
<b>Output:</b> Water supplies diversified where possible	Percentage of population in drought risk areas with access to alternative safe water sources	Drought	
	Percentage of communities in flood risk areas with access to alternative safe water sources	Flooding	
	Percentage of households in flood risk areas (or areas at risk from other hazards) who have soap and water available near latrine for handwashing	General	
<b>Activity:</b> Spreading risk between different water sources and systems	Percentage of water schemes in drought prone areas where boreholes (groundwater supplies) are supplemented by other sources such as treated surface water, rainwater, etc.	Drought	
	Percentage of boreholes in drought risk areas supplemented by additional boreholes	Drought	
<b>Activity:</b> Targeting areas/communities affected by climate hazards and vulnerable sources by providing climate resilient WASH systems	Number of water supply schemes with Water Safety Plans in place to protect against water contamination	General	
	Percentage of water points with source and catchment protection activities for preservation and protection of water sources	General	
<b>Output:</b> Climate smart technologies (low and no-regret options) for WASH investigated and implemented	Percentage of communities in flood prone areas where pit latrines have been upgraded to become more resilient	Flooding	
	Percentage of communities which use solar powered water systems as their main source of water	General	



Outcome/output/activity	Indicator	Hazard	
	<b>Activity:</b> Adapting technologies to account for climate risks	Percentage of wells in flood risk areas protected to reduce risk of contamination	Flooding
		Percentage of water intakes deepened to reduce risk of contamination from latrines in areas of flood risk	Flooding
		Percentage of water points with effective measures (barriers) to prevent contamination at the water point	General (SC Indicator)
		Percentage of dug wells upgraded to resilient boreholes in areas of drought risk	Drought
		Percentage of dug wells (or boreholes) adapted (e.g. well lining) in areas of flood and pollution risk	Flooding
		Percentage of pit latrines adapted (e.g. raised, sealed and covered) in areas of flood risk	Flooding
		Percentage of sewerage systems modified to use less water	General
		Percentage of sewerage systems upgraded to separate storm water from sewage	General
		Percentage of pit latrines in flood risk areas designed to allow regular pumping or emptying	Flooding
	<b>Activity:</b> Exploring innovative, climate smart technologies (e.g. solar systems)	Percentage of communities with access to climate resilient sanitation products and services	General
		Percentage of communities that have investigated use of climate smart water pumping systems (e.g. solar) and disinfection measures	General
		Percentage of households where uptake of climate smart technologies is limited by social barriers	General
	<b>Activity:</b> Exploring wastewater reuse/ recycling, nutrient recovery and energy production from waste	Percentage of communities where wastewater reuse and recycling systems have been tested and/or installed	General
		Sufficient funding is available to support installation of equipment for wastewater reuse and recycling	General
	<b>Intermediate outcome:</b> Climate resilient behavioural change and governance at community and local level	Percentage of population using sanitation and handwashing facilities following a flood, drought (or other hazard events)	General
Perceived adequacy of action at community and local level for WASH climate resilience		General	
	<b>Output:</b> Capacities and resources of local government and local private sector to implement and monitor WASH resilient programming strengthened	Percentage of WASH professionals/other stakeholders (including local private sector) with sufficient training to integrate WASH and climate resilience in the design of projects	General
		Percentage of local WASH agencies with sufficient funding for climate resilience	General

Outcome/output/activity		Indicator	Hazard
<b>Activity:</b> Strengthening capacity of WASH professionals and practitioners	Percentage of WASH staff with training and experience in climate change	General	
	Percentage of WASH professionals receiving training in early warning and response systems	General	
	Percentage of WASH professionals receiving training in emergency planning and procedures	General	
<b>Activity:</b> Making sure sufficient resources are available for local WASH agencies in most vulnerable regions	Finance available to support construction of low-cost, temporary latrines in flood risk areas	Flooding	
	Percentage of the poorest 20% of households receiving conditional cash transfers (CCTs) to support the upgrading of latrines in flood prone areas	General	
	Is sufficient funding available to operate and maintain sewerage systems in drought risk areas?	Drought	
	Percentage of local WASH agencies in flood risk areas that have sufficient technical equipment to manage early warning systems	Flooding	
<b>Output:</b> Awareness and capacity of communities to respond to shocks and stresses is enhanced	Percentage of community members who can recall key messages on how to construct and maintain resilient latrines from CATS triggering or other sensitisation sessions	General	
	Percentage of population aware of need to prioritise domestic water over other uses during drought periods	Drought	
	Percentage of community members with knowledge of risks of water quality deterioration resulting from intense rainfall events and flooding, and how to address them	General	
	Percentage of community members with adequate skills to operate, maintain, and repair WASH infrastructure	General	
	Percentage of population practising open defecation following a flood	Flooding	
	Percentage of households that have taken action to build/rebuild and/or upgrade latrines following heavy rains or other extreme weather events	General (SC Indicator)	

Outcome/output/activity		Indicator	Hazard
	<b>Activity:</b> Education and training of community groups for climate-responsive WASH management	Percentage of community members participating in education and training activities to raise awareness of risks from water quality deterioration during/after flooding	Flooding
		Percentage of community members participating in education and training activities to promote prioritisation of water for drinking over other uses	General
		Percentage of communities engaged and trained in climate risk assessments	General
		Percentage of communities with at least 3 WASH committee members participating in education and training activities on early warning systems with respect to WASH needs	General
		Percentage of population in drought (or other hazard) risk areas participating in hygiene education activities	General
		Percentage of population in drought (or other hazard) risk areas participating in Community Led Total Sanitation or other activities aimed at ending open defecation.	General
	<b>Activity:</b> Sharing knowledge on local WASH climate resilient options	Percentage of community members consulted on reliability and quality of different springs	General
		Percentage of communities where publications and strategies for WASH and climate resilience are developed and disseminated	General
		Percentage of communities that assess and review strategies for coping with current climate variability	General
	<b>Output:</b> Local markets and supply chains extended and deepened to increase availability of climate resilient WASH products and services	Percentage of households that report good access to affordable sanitation materials, products and services for improving the resilience of their latrines	General (SC Indicator)
Percentage of households that report good access to affordable products and services for improved hygiene activities (including handwashing)		General	
Percentage of communities that report easy availability of materials, products and services for improving the resilience of water points		General	
<b>Activity:</b> Supporting local markets and supply chains for resilient WASH systems/ technologies	Adequate funding is in place to support supply chain development in communities	General	
	Percentage of communities where initiatives are in place to create improved access to climate resilient WASH services and products	General	

Outcome/output/activity	Indicator	Hazard
<b>Output:</b> Early warning and response systems strengthened	Percentage of community members that consider early warning and response systems for a specific hazard to be sufficient following a flood, drought or other hazard	General
	Percentage of community members that consider emergency water plans to be adequate following flood, drought or other hazard events	General
<b>Activity:</b> Assessing status and functionality of early warning and response systems in relation to WASH needs	Percentage of communities that have assessed and reviewed early warning system for a specific hazard with respect to WASH needs	General
	Percentage of communities that receive adequate and timely warnings from early warning system during a flood, drought or other hazard event.	General
	Percentage of community members involved in the development and testing of early warning systems	General
	Percentage of community members in risk areas that receive and understand warnings from early warning systems	General
<b>Activity:</b> Contingency planning for WASH – esp. droughts and floods	Percentage of community members involved in the development and testing of contingency plans	General
	Percentage of communities with contingency plans in place for climate-related WASH emergencies	General
<b>Activity:</b> Water Security and Water Safety Planning	Is Water Safety Planning being upgraded to account for the effects of climate change on both water quality and water quantity?	General

Note: SC Indicator is a Sustainability Check Indicator – see Box 2 for more details

## 2.5. Selecting indicators

You may find it easier to use some indicators over others. This will depend on the data and information that is available. You need to make sure that you select indicators that are appropriate to what you want to achieve. Selecting poor or inappropriate indicators may lead to a misunderstanding of what works well, and what does not. The most appropriate indicators to use will depend on which of the intermediate outcomes, outputs and activities you are looking at. Are you interested in the WASH sector enabling environment, monitoring and managing water resources, access to climate resilient WASH infrastructure and services, or climate resilient behavioural change and governance at the community and local level? Is there a specific output that you would like to focus on, such as strengthening inter-sectoral coordination at the national level, or strengthening early warning and response systems at the local and project level?

Some further criteria to consider when selecting which indicators to use, depending on the context, include:<sup>12</sup>

- Are data sources available and collection methods viable for the chosen indicators? Are they easy to use with limited resources, time or expertise?
- Is there an appropriate mix between qualitative and quantitative indicators that you have selected? Qualitative indicators and information can be used to complement quantitative indicators.
- For selected indicators, can the results be used to help make decisions about WASH development in the context of climate resilience?
- Will data be available and information provided in a timely manner to fit in with important decision-making processes in the WASH sector, particularly those which 'lock in' investments for long periods of time?
- Who will be responsible for collecting data over the long term to ensure the sustainability of WASH services – e.g. implementing agencies, local/ governmental authorities, communities, etc. Is there agreement among all those involved that this is the best indicator or set of indicators to use?
- Where relevant, are indicators pro-poor and gender disaggregated?

Whichever indicators you decide to use in the M&E system, it is important to consider their limitations – you will need to interpret the resulting data accordingly. You will also need to make sure that any efforts are proportionate to the investment, because you do not want to spend a lot on an M&E system to evaluate an option that did not cost much to implement.<sup>13</sup> You may find it beneficial to use a mix of indicators, and M&E systems may use data from a number of different sources.<sup>14</sup> By using a variety of indicators, you can focus on different results at the various levels.

<sup>12</sup> Based on Spearman and McGray (2011) and Pringle (2011)

<sup>13</sup> Pringle (2011)

<sup>14</sup> Spearman and McGray (2011)

### 3. Factors to consider in monitoring climate resilience

There are a number of challenges associated with adapting to and improving climate resilience that may make it difficult to implement M&E systems.<sup>15</sup> Table 3.1 identifies these challenges and shows how to address them, to ensure that M&E is effective.

Table 3.1: Factors to consider in monitoring climate resilience

Factor	Challenges	How to ensure that M&E is effective
Long and short timeframes	M&E systems for climate resilient WASH services will need to track success over short to long timescales. The impacts of implementing different options may only become clear with changes in the climate in the long term.	Ensure an appropriate mix of activity, output, and outcome indicators. Ensure that M&E is carried out regularly so that progress can be tracked. M&E should be a continuous, learning process that informs decisions and enables options to be adjusted as necessary.
Uncertainty	Uncertainty about how and when changes in climate will occur, and what effects there will be, particularly at a local level, makes it more challenging to come up with appropriate objectives for M&E, and determine the success of a particular option.	To address this, use an approach which focuses on strengthening options in the future, and establish baselines to track what has changed from when the option was first implemented.
Monitoring non-events	If a hazard, such as a storm, flood or drought, does not occur during a monitoring cycle, then you may not be able to measure the success of a particular option as you originally intended.	Success may still be measured, but in a different way – for example, if these events are periodic, then the indicator would measure the number of cycles without this event occurring. If the option improves preparedness towards the hazard, then the indicator would seek to measure how well prepared a community or type of infrastructure is for that hazard.
Availability of baseline data	Good baseline data <sup>16</sup> are required to track progress and evaluate options. M&E should monitor and evaluate not only the option, but also the situation it is trying to address, or the changing environment in which the option has been implemented. Baselines for vulnerability and capacity might not be readily available.	It may be necessary to ensure that a data gathering element is built in to the initial phase of an option. This will have resource implications and should be considered when appraising and prioritising options. <sup>17</sup> Once a baseline has been established, data should be gathered periodically. The availability of baseline data varies depending on the type of indicator that is used; this will be more problematic for numeric indicators. For qualitative indicators, it will be less of an issue, because these are based largely on expert assessment. This initial assessment can therefore be used as the baseline.

<sup>15</sup> Based on the characteristics given in Bours et al. (2013)

<sup>16</sup> Changes in indicators can be compared against baseline data to track progress

<sup>17</sup> See Technical Brief on appraising and prioritising options for climate resilient WASH for details

Factor	Challenges	How to ensure that M&E is effective
Shifting baselines	High variability in baselines makes it difficult to compare data before and following the implementation of climate resilient options. This is because the contexts change, which means that any comparisons lose their validity. For example, for annual rainfall variability or probabilistic extreme events such as floods and droughts, there is high variability in the baseline.	As well as gathering data on the results of specific options, you will also need to collect data on climate and environmental trends (as well as other influential factors) and the occurrence of extreme events and disasters so that you can interpret the monitoring results in the context of climate risks. Quantitative indicators should be complemented by qualitative assessments, to help those involved understand how the impacts of interventions are influenced by these factors.
Generic indicators	There is a lack of generic indicators that can be widely used in monitoring because resilience is influenced by the context, scale, sector and nature of the option, all of which vary. It is also much more challenging to monitor and evaluate options that are non-technical or offer qualitative benefits – e.g. capacity-building activities. There may be difficulties in aggregating indicators at higher scales or in using national-level indicators to understand the effectiveness of options at local levels.	This Technical Brief has suggested a number of indicators that can be modified as necessary to suit the requirements of different M&E systems. Process indicators are used frequently in the context of adaptation because they measure the progress made towards implementing an option; this is useful when the outcome of the option cannot yet be evaluated. This often involves non-technical benefits such as capacity-building.
Contribution and attribution	M&E normally seeks to demonstrate the attribution of changes to a specific measure. However, climate change and climate resilience are complex, involving multiple sectors and scales, often with long timescales. This means that traditional approaches to M&E need to be adjusted.	You will need to be able to show how an option or programme of options can contribute to enhanced climate resilience. The use of appropriate indicators is one way of doing this, with quantitative indicators complemented by qualitative indicators and assessments, such as structured interviews and participatory vulnerability assessments. This can help those involved to understand the ways in which an intervention translates into an impact.
Varying use of definitions	Definitions of basic concepts may vary between agencies, while only a few may have a good understanding of more specialised terms. For M&E systems for climate resilience, it may be difficult to reach agreement on what constitutes a ‘success’ and therefore on what processes can be used to assess ‘effectiveness’.	To avoid any confusion, make sure you define the terms used in your M&E system and indicators.

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