

WASH Climate Resilient Development

Strategic Framework



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, 85 Country Water Partnerships and more than 3,000 Partner Organisations in 172 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.

Prepared in cooperation with HR Wallingford and the Overseas Development Institute (ODI)



WASH Climate Resilient Development

Strategic Framework

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Foreword by GWP

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Foreword by UNICEF

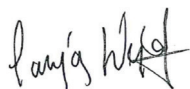
Climate and the environment are crucial determinants of child survival and development. Children are especially susceptible to air and water quality, temperature, humidity and vector-borne infections due to their less-developed physiology and immune systems. Additionally, epidemiological studies on climate and disease transmission show that many of the main killers of children are highly sensitive to climate variability.

In this context, water is the medium through which climate change is translated to other sectors such as health, nutrition, protection and education. In 2016, 2.1 billion lacked access to safe, readily available water at home and 4.5 billion lack access to safely managed sanitation. Climate change constitutes an added obstacle to ensuring access for unserved populations.

The United Nations Children's Fund (UNICEF) works in countries where resilience to cumulative stresses and shocks is often low and it is the marginalised and vulnerable communities that suffer the most. These countries are already some of the most affected by climate change. Changes in precipitation patterns and frequency of extreme events affect the quality and quantity of water supplies, and have an impact on the sustainability of sanitation and hygiene behaviours. Observations and evidence suggest that these countries will continue to be hit by changes in rainfall patterns, greater weather extremes and the increasing incidence of droughts and floods.

Achieving universal access to sustainable and safe water and sanitation in the post-2015 era is a human rights concern and is key to child survival and well-being. This is the core of UNICEF's Water, Sanitation and Hygiene (WASH) programming and cannot be achieved without due consideration of the risks posed by a changing climate and the resulting extreme events.

UNICEF, in collaboration with the Global Water Partnership (GWP), is happy to provide you with this *Strategic Framework for WASH Climate Resilient Development*. We would urge you to consider the content and apply it to the relevant parts of the programming in your country. Applying the Framework will help reduce the likelihood that girls, boys and families feel the effects of climate change; strengthen the reliability of WASH services; and strengthen the capacities of governments and communities to build resilience over time.

A handwritten signature in black ink, appearing to read 'Sanjay Wijesekera'.

Sanjay Wijesekera
Chief of Water, Sanitation, and Hygiene
UNICEF

Foreword by GWP

It is with great pleasure that I introduce this *Strategic Framework for WASH Climate Resilient Development*, which has been developed for practitioners by the United Nations Children's Fund (UNICEF) in partnership with the Global Water Partnership (GWP).

Climate change is the defining challenge of our time. There is now widespread consensus on the urgent need for action to tackle the impacts of climate change through well-targeted adaptation efforts. As the global water cycle is directly affected by climate change, people's access to safe water, sanitation and hygiene solutions can be significantly affected by extreme events such as floods and droughts, as well as growing water scarcity. Hence, GWP recognises the importance of this Strategic Framework, which looks at how the WASH sector can adapt to these challenges.

Improvements in water resources management will help manage climate risks now and in the future through better information, policy, regulation, allocation and cooperation. This reduces the vulnerability to current climate variability and paves the way for more proactive climate change adaptation.

Experiences from the work of our partners in Rwanda, Nepal, Sri Lanka, Pakistan, Peru and many other countries have demonstrated to us the urgent need to help poor people develop resilience to climate risks. GWP's Water, Climate and Development Programme (WACDEP) works in 60 countries and our collective experience shows that a cross-cutting approach to adaptation is needed, building partnerships, strengthening coordination frameworks across sectors, while linking local adaptation actions with national and regional economic development.

The *Strategic Framework for WASH Climate Resilient Development* builds on work done by GWP in Africa together with the African Ministers Council on Water (AMCOW), through the earlier *Strategic Framework for Water Security and Climate Resilient Development*, which focused on water resources issues.

This new *Strategic Framework for WASH Climate Resilient Development* is targeted towards WASH sector practitioners, providing guidance on the main elements to be considered in the planning and execution of actions aimed at building climate resilient WASH services. The Framework will also support delivery of high-level commitments on WASH such as the Dakar Declaration of the General Assembly of AMCOW. The Dakar Declaration prioritises water security and sanitation in the post-2015 development agenda, with a commitment to accelerate water security and sanitation for growth in Africa up to 2025.

This partnership with UNICEF, jointly undertaking work on climate resilience and WASH together with GWP, will help to close the loop of the water resources cycle and to promote policy coherence. We are delighted to work in partnership with UNICEF on this publication, merging our expertise on integrated water resources management and climate resilience with UNICEF's expertise on WASH. This document deserves a wide readership to ensure climate-smart WASH services for a more water-secure world in the future.



Ania Grobicki

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Executive Secretary
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1. Introduction

1.1 Climate change and WASH

Water is the primary medium through which climate change influences the Earth's ecosystem and thus the livelihood and well-being of societies.¹ Climate change directly impacts water resources and water services for all economic, social and environmental functions that water supports. Therefore, the impacts reach into many sectoral interests such as health, tourism, agriculture and industry.

Water-related climate risks arise from too much water, too little water or polluted water. For example, the occurrence of floods and droughts is expected to increase with a changing climate, with the Intergovernmental Panel on Climate Change (IPCC) predicting water-related disasters to increase in both frequency and severity, as the whole global water cycle is affected by climate change. In fact, in many places these changes are already taking place and the world is ill-prepared to respond to these risks. In turn, this will cause loss and damage, which affect the supply and delivery of water, sanitation and hygiene.²

Box 1.1: Climate variability and change

- Projections indicate warming by the end of the 21st century of between 0.3 and 5°C (centigrade).⁴
- With a 2°C global temperature rise, up to 10 million more people could be affected by coastal flooding each year. With a 4°C temperature rise, a 50% decrease in water availability could occur in East Africa and the Middle East.⁵
- In developing countries, the incidence of diarrhoea is expected to increase by around 5% for every 1°C increase in temperature.⁶
- US\$2.5 trillion economic losses from disasters so far this century – 70% relate to floods and droughts.
- Since the original Rio Earth Summit in 1992, floods, droughts and storms have affected 4.2 billion people (95% of all people affected by disasters).⁷

A changing climate brings with it uncertainties that compound those that are already inherent in the WASH sector, especially in developing countries that are the most vulnerable to these negative impacts. Despite increasing challenges with higher levels of warming, there are however opportunities to respond to the risks posed.³ Developing solutions to manage these escalating risks calls for new strategies and a stronger capacity to absorb expected changes.

1.2 WASH climate resilient development

The WASH sector is already affected in many different ways by weather and climate events (such as variability, seasonality and extreme events). This translates into negative impacts on drinking water availability and quality, and also in negative performance of sanitation and hygiene services. Future climate change will put an additional stress on delivering and sustaining health and well-being related outcomes, see Table 1.1.

¹ UN-Water (2010)

² IPCC (2014)

³ IPCC (2014)

⁴ IPCC (2013)

⁵ Stern (2007)

⁶ Campbell-Lendrum and Woodruff (2007)

⁷ UNISDR (2012)

Table 1.1: Examples of impacts of hazards on the WASH sector

Climate effect	Hazard	Impact on WASH sector
Decrease in precipitation	Drought	Reduction in raw water supplies, reduced flow in rivers, less dilution/increased concentration of pollutants in water, challenge to hygiene practices.
Increase in precipitation and severe weather	Flooding	Pollution of wells, inundation of wells, inaccessibility of water sources, flooding of latrines, damage to infrastructure, landslides around water sources, sedimentation and turbidity, challenges to sustainability of sanitation and hygiene behaviours, and waterborne diseases.
Increase in temperatures	Heatwaves	Damage to infrastructure, increase in pathogens in water leading to increased risk of disease.
	Melting and thawing of glaciers, snow, sea ice and frozen ground	Seasonality of river flows affected leading to a reduction in water availability in summer.
Sea-level rise	Flooding and saline intrusion into freshwater aquifers	Reduction in availability of drinking water, with high impacts on quality.

These impacts are intrinsically connected with public health impacts. For example, if there is a decline in the availability of water supplies (e.g. dry boreholes), people may be forced to drink contaminated water (e.g. untreated surface water) leading to an increase in waterborne disease. The pollution of wells and flooding of latrines also increase the risk of a higher incidence of infectious diseases. In addition, a reduction in water availability makes hygiene practices more challenging and behavioural change campaigns might not be effective in areas where access to water is increasingly constrained by the changing climate. A higher incidence of extreme events poses additional stress to the sustainability of both sanitation and hygiene practices. All of these impacts will result in higher costs for delivering and maintaining climate resilient services.

Resilience can be defined as the ability of people and systems to anticipate, adapt to and recover from the negative effects of shocks and stresses (including natural disasters and climate change) in a manner that reduces vulnerability, protects livelihoods, accelerates and sustains recovery, and supports economic and social development, while preserving cultural integrity.⁸ Climate resilient development involves measures and activities that will deliver benefits under all potential future climate scenarios and can cope with uncertainties over future conditions.

It differs from business-as-usual development in actively considering and addressing potential existing and future climate risks.

Various adaptation measures that respond to climate variability, and build upon existing land and water management practices, have the potential to strengthen the resilience of vulnerable communities to climate change and to improve water security, and thus directly contribute to sustainable development.

With respect to the WASH sector, climate resilience requires a focus on:

- Ensuring that WASH infrastructure and services are sustainable, safe and resilient to climate-related risks
- Ensuring that resilient WASH systems contribute to helping build community resilience to the impacts of climate change.

The need for responses that are robust to climate uncertainties alongside other pressures on resources, systems and services (e.g. demographic change, economic transition or increasing competition over limited resources) is undeniable. Acting now to identify, manage and minimise climate risks will offer benefits to long-term WASH programme performance

⁸ Interpretations and definitions will vary across organisations, for example “The ability of children, households, communities and systems to anticipate, manage, and overcome shocks and cumulative stresses” (UNICEF) and “The ability of a social or ecological system to resist, absorb, accommodate and recover from the effects of a (climate) hazard in a timely and efficient manner while retaining the same basic structure and ways of functioning” (GWP).

by decreasing the sensitivity of the WASH sector to uncertain climate futures.

1.3 Rationale for the Framework

In response to growing demands from governments and their development partners, this Strategic Framework advances sector thinking around WASH and climate change. The Framework is grounded in a core objective: 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. This encompasses both development and emergency preparedness programmatic spheres with climate resilience addressed as a cross-cutting issue encompassing elements of both disaster risk reduction (DRR) and climate change adaptation.

The principles and practices outlined in the Framework aim to complement and strengthen ongoing national and sectoral adaptation planning processes, for example those under the National Adaptation Plans (NAPs) process where WASH sector needs will be a key component.

2. Introducing the Strategic Framework

Key points

- This Strategic Framework advances sector thinking around WASH and climate change. It focuses on investments to increase the resilience of the WASH sector to current climate variability as well as to long-term changes in climate.
- The Framework is a resource for the WASH sector as a whole and it aims to inform and reinforce existing planning processes, and is NOT a new process in itself.
- The Framework highlights 'Why' climate resilient development is important and catalyses selected elements of 'What to do' in terms of action that can be taken now to strengthen resilience.

2.1 Scope and target audience

The Framework serves to:

- Set out the rationale and concepts for WASH climate resilient development
- Improve understanding of how to ensure that climate resilience is considered in WASH strategies, plans and approaches.

The Framework acknowledges the multi-level governance structures inherent in the WASH sector, recognises that each has a different part to play in WASH delivery and that climate resilience needs to be addressed at all levels.

The Framework is a resource for the WASH sector as a whole. The target audience includes government planners, decision makers and practitioners at

Strategic Framework for WASH climate resilient development

Guidance Note:

- Risk assessments for WASH

Technical Briefs:

- Linking risk with response: options for climate resilient WASH
- Appraising and prioritising options for climate resilient WASH

Technical Brief:

- Monitoring and evaluation for climate resilient WASH

Technical Briefs:

- Integrating climate resilience into national WASH strategies and plans
- Local participatory water supply and climate change risk assessment: modified water safety plans

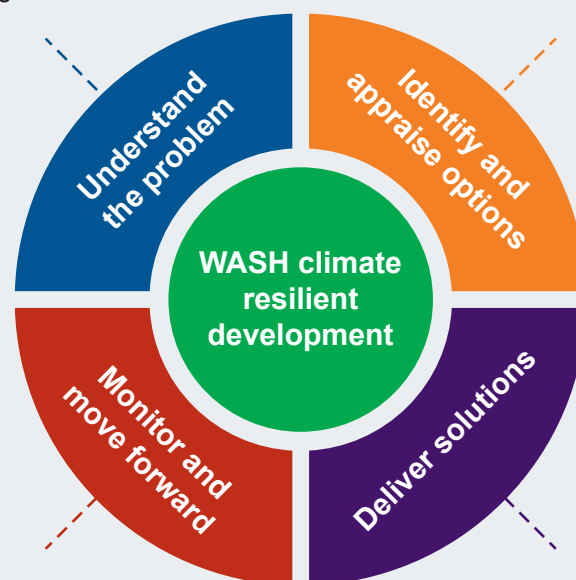


Figure 2.1: Structure of the Strategic Framework

national, sub-national and local levels responsible for WASH services provision, and their associated WASH development partners. The focus is primarily on rural WASH services encompassing small-scale and community systems.

The Framework is particularly relevant to those working in areas vulnerable to climate hazards and variability. It is also useful for others who are not directly involved in the WASH sector but are linked to it, for example in the health, development, water resources and DRR sectors.

Figure 2.1 shows the structure of the Strategic Framework. It is centred on four quadrants of activity:

- **Understand the problem:** This covers the various elements that help to understand the risks climate change poses to the WASH sector.
- **Identify and appraise options:** This covers the identification and appraisal of options to improve climate resilience.
- **Deliver solutions:** This covers the integration of options into existing strategies and plans, and their implementation.
- **Monitor and move forward:** This covers monitoring and the lessons learned from the implementation of climate resilient development activities.

2.2 Using the Framework

Users are encouraged to reflect on the principles and good practices outlined in the Framework and to embed these within their own particular contexts, roles and responsibilities. The Framework highlights ‘Why’ climate resilient development is important and catalyses selected elements of ‘What to do’ in terms of action that can be taken now to strengthen resilience.

Guidance on ‘What to do’ and support for implementation of the approaches, methods and tools recommended is provided in a number of Technical Briefs and a Guidance Note which set out good practice. These are illustrated by ‘Examples of how to ...’ for different contexts, approaches and technologies. The inter-relationship between the documents is shown in Figure 2.2.

The Technical Briefs and Guidance Note include:

- Risk assessments for WASH.
- Linking risk with response: options for climate resilient WASH
- Appraising and prioritising options for climate resilient WASH
- Integrating climate resilience into national WASH strategies and plans
- Local participatory water supply and climate change risk assessment: modified water safety plans
- Monitoring and evaluation for climate resilient WASH

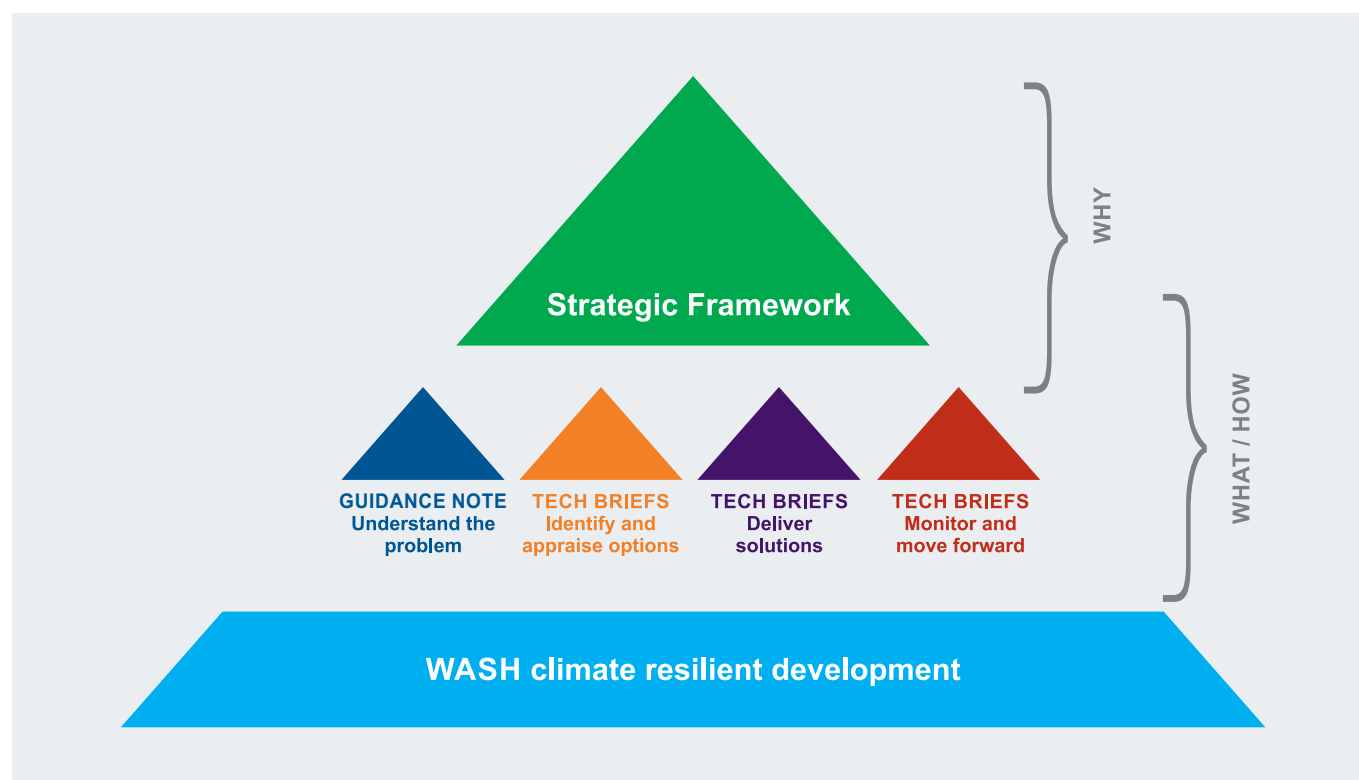


Figure 2.2: Why, what and how: the inter-relationship between the documents

3. Understand the problem

Key points

- It is vital that climate hazards, vulnerabilities and exposure are understood and that climate resilience becomes integral to strategic planning for WASH.
- A good place to start is to review existing strategies, plans and studies not only specific to climate change at a WASH sector level, but also more broadly at national and local levels.
- Stakeholder engagement can provide valuable input to strengthen understanding of climate hazards, vulnerabilities and exposure, particularly at the local/community level.
- An understanding of climate hazards, vulnerabilities and exposure is essential to determine how best to enhance climate resilience and to build adaptive capacity.

This phase of the Framework covers the various elements that help to understand the risks climate change poses to WASH service delivery. The main tasks are:

- Review existing relevant strategies, plans and studies to understand the priorities they outline and the risks climate variability and change pose
- Engage with stakeholders to better understand roles, responsibilities, risks, uncertainties and stakeholder needs
- Identify and understand climate hazards, vulnerabilities and exposure, and existing capacities to respond to these.

3.1 Existing strategies, plans and studies

It is necessary to identify existing relevant plans and strategies to understand the development priorities they outline for adaptation in the WASH sector. It also helps to identify opportunities for ensuring that climate resilience is addressed using existing initiatives.

This informs the argument for new investment strategies needed to improve climate resilience and guides the scope for further analysis. In many countries there is a focus on water resources and the productive use of water, but it is essential that all other components of WASH are included in this process too.

The following provide a useful starting point:

- National Adaptation Programmes of Action (NAPAs): NAPAs identify priority climate change adaptation activities in response to the immediate needs of a country with consideration to its vulnerability. They are prepared by Least Developed Countries (LDCs) to help in addressing the challenge of climate change. NAPAs use existing information and are action-oriented, with an emphasis placed on community-level input.⁹
- National Adaptation Plans (NAPs): NAPs provide a process of identifying medium- and long-term adaptation needs, and developing and implementing programmes and strategies to address these needs.¹⁰ WASH sector needs are a key component of any NAP process.
- Other National/Sub-national/Sectoral Strategies and Plans: to get the best understanding of national and, where possible, local contexts, any other strategies, plans and studies of relevance to the country or sub-region of WASH interests should also be identified and their priorities understood. For example, National Communications are produced for the United Nations Framework Convention on Climate Change (UNFCCC) and contain information on vulnerability and adaptation to climate change, and climate-related policies and measures.¹¹ Likewise, many countries may have already developed WASH sector strategies and plans that identify climate risks and priorities to address these.

Case study: National adaptation priorities related to WASH in Zambia¹²

A risk analysis workshop on climate change was held in Zambia to support the country-specific WASH profile. During this workshop, national-level documents were reviewed to identify climate change adaptation approaches within the WASH sector. The most relevant documents were:

1. National Policy on Environment
2. National Adaptation Programme of Action on Climate Change
3. Integrated Water Resources Management and Water Efficiency Plan
4. National Climate Change Response Strategy
5. Second National Communication of the Republic of Zambia under the UNFCCC.

⁹ http://unfccc.int/adaptation/workstreams/national_adaptation_programmes_of_action/items/7572.php

¹⁰ http://unfccc.int/adaptation/workstreams/national_adaptation_plans/items/6057.php

¹¹ http://unfccc.int/national_reports/items/1408.php

¹² UNICEF (2012)

3.2 Stakeholder involvement

Stakeholder analysis identifies those who have an interest or influence over WASH outcomes, and accounts for and strives to incorporate their needs. Stakeholders can provide inputs into many different aspects of the process, for example, in providing inputs on hazard and vulnerability assessments, in identifying adaptation options or in the dissemination of knowledge to local and national levels.

The types of stakeholders to involve will depend on the level at which the Framework is being applied and the institutional context. Stakeholders can be identified at various levels (national, sub-national, local) and across many institutions (government, private sector, non-governmental organisations) as well as communities and private individuals, each with precise roles in climate resilient development. An institutional mapping exercise can be helpful to recognise which organisations, both governmental and non-governmental, are involved and to identify where the gaps are.¹³

Participatory settings could include an experts' consultation meeting at broader scales, or a community meeting at the local level. These approaches provide the opportunity for stakeholders to discuss their concerns with others, for example on risks and uncertainties that could impact on the WASH sector. They allow for a commitment to be agreed among stakeholders to work towards a shared goal.

Box 3.1: Stakeholder participation at the community level¹⁴

The Climate Vulnerability and Capacity Analysis methodology is designed to build people's understanding about climate risks and adaptation strategies by prioritising local knowledge and combining it with scientific data. It provides a starting point for stakeholder engagement and can be used in any community that would like a greater understanding of their vulnerability to climate change. The emphasis on participatory learning promotes dialogue among stakeholders to identify the most appropriate adaptation actions.

Box 3.1 presents a methodology of stakeholder participation at the community level. By using these participatory approaches, local knowledge can be used to inform analyses.

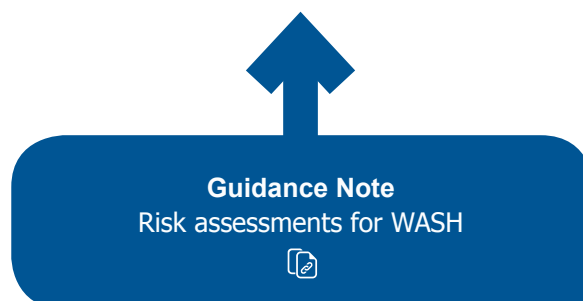
Often it is very effective to combine bottom-up and top-down decision-making, with stakeholder consultation at community, regional and national levels.

Care is needed to make sure stakeholder involvement is focused and includes only those with an interest in the proposed development to avoid it becoming an overly expensive and/or time-consuming activity.

3.3 Climate risk assessments

Climate change intensifies risks to WASH systems and risk-based planning and programming is essential. WASH systems that are informed by climate risk assessments will be more resilient and are more likely to withstand shocks and stresses. It also enables disaster risk reduction and climate change adaptation agendas to be brought together more explicitly in tackling underlying issues and solutions commensurate with the concept of no/low regrets interventions.

Risk is a composite of hazard, vulnerability, exposure and capacity. Analyses aim to show which communities and systems are most at risk from climate variability and change, providing valuable evidence in making the case for effective action by government and their WASH sector partners. In many countries, analyses have already been undertaken and, although they may not provide the required level of detail, can be a good starting point.



Hazards and hazardous events can be identified through site visits, stakeholder engagement and the review of historic and predictive information, depending on whether the approach is at a national or sub-national/local level. Some hazards will be easier to recognise than others and consideration should be given to factors that could introduce risks that are not immediately obvious.¹⁵ It is also important to remember that hazards may result from more than one cause and may have a number of impacts.

¹³ CARE International (2009)

¹⁴ CARE International (2009)

¹⁵ Bartram et al. (2009)

Case study: Hazard analysis in Asia¹⁶

Hazard analyses were completed as the first step in a number of UNICEF-supported child-centred risk assessments in Asia. Information on hazards was collected and analysed by UNICEF Country Offices including Pakistan, Lao PDR, Nepal, Indonesia and India. The majority made use of pre-existing multi-hazard assessments which had been developed by the national government, academic institutions or other agencies, and additional information was included as appropriate. For example, the Nepal Country Office added climate change data to its analysis.

The character and severity of impacts from climate hazards and extremes depend not only on the hazards themselves but also on exposure and vulnerability, and these are also critical factors for understanding how to respond and to adapt. Reducing exposure and vulnerability, and enhancing the extent to which systems and communities can adapt,¹⁷ will increase resilience to potential adverse impacts (see Figure 3.1).

Risks result from physical, social, economic and environmental factors. For the WASH sector, factors can include:

- Natural and physical, e.g. water storage, groundwater depth and recharge, water and sanitation infrastructure failure, groundwater contamination, sustainability of water supply, water supply/access to water for sanitation and hygiene practice, access to water in schools and health care facilities.
- Social, e.g. gender equity, urbanisation trend, population growth trend, conflict stability, location of children and older people in disaster areas.
- WASH sector capacities, e.g. staff environment understanding, environmentally sustainable WASH programme, availability of support staff in emergencies, WASH sector-wide capacity, organisations' capacity to respond to emergencies, suitable skill set of WASH staff, WASH coordination mechanisms at national and local levels for sector development, emergency preparedness and emergency response, environmental sustainability and climate change in DRR plans.
- National capacity, e.g. environmental management, governance and regulation, public health, national priorities considering WASH sustainability, national commitment to environmental sustainability, emergency preparedness and response.

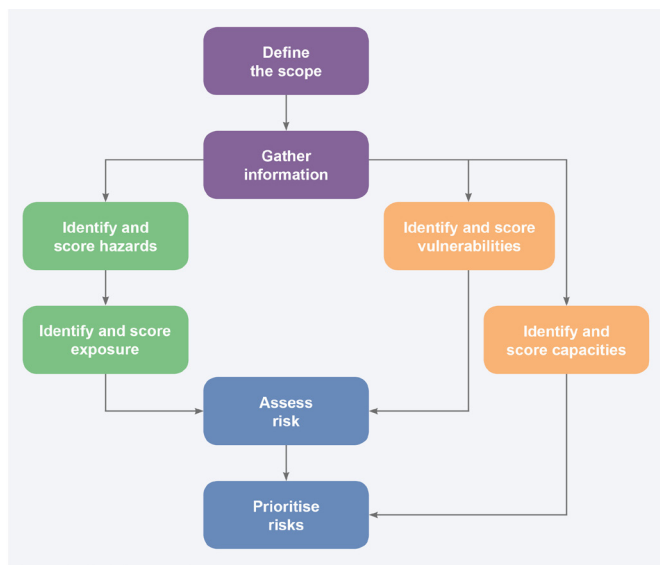


Figure 3.1: Assessment approach

When the hazard, vulnerability and exposure have been identified their significance can be evaluated to determine risk. Scoring systems, for example as high, moderate or low, allows the criticality of response and priorities for action to be identified. Scoring may sometimes be challenging owing to a lack of data and knowledge in many locations, and in this case local wisdom and stakeholder knowledge will be crucial.

¹⁶ UNICEF ROSA (2014)

¹⁷ Calow et al. (2011)

4. Identify and appraise options

Key points

- The emphasis should be on finding options that increase resilience to climate change, but still make sense under the current climate.
- Work with stakeholders to identify alternative designs or management practices that may enable them to better cope with climate variability and change.
- Screening to rank and prioritise options is an important step to ensure the most appropriate ones are implemented.

This phase of the Framework covers the identification and appraisal of options to improve climate resilience. The emphasis is on identifying measures that manage existing climate challenges but that also help manage future climatic change, therefore providing win-win or no/low regrets solutions. The main tasks are:

- Identify climate resilient development options
- Appraise options, recognising the tools and techniques available for use.

4.1 Identify options

Suitable options need to be identified for each of the risks. There are many opportunities in the WASH sector to implement no/low regrets actions. Figure 4.1 provides examples of typical interventions to achieve climate resilient development objectives, within a well defined Simplified Results Framework. The suitability of these options should always be considered in the specific local context. Further examples of good practice are given in the Technical Brief.



Case study: Rural sanitation in Pakistan¹⁸

The Pakistan Approach to Total Sanitation (PATS) is a comprehensive strategy which promotes improved sanitation and hygiene in peri-urban and rural areas. It focuses on ending the practice of open defecation and transforming hygiene behaviour, as well as sanitation marketing, wastewater collection, solid waste disposal and drainage. PATS was used by UNICEF and its partners to integrate DRR and climate resilience into a sanitation programme based on comprehensive multi-hazard mapping, and a vulnerability and capacity assessment of water and sanitation systems. Water and sanitation systems are built with modifications to mitigate risks, for example raised latrines and hand pumps. Improved hygiene behaviour is also promoted.

¹⁸ UNICEF (2014a)

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

<p>NATIONAL</p> <p>1. An ENABLING ENVIRONMENT conducive to climate resilient WASH services and communities</p>	<p>SUB-NATIONAL LEVEL/ WATERSHED LEVEL</p> <p>2. Water resources are MONITORED and MANAGED considering climate risks to WASH services and infrastructure</p>	<p>LOCAL AND PROJECT LEVEL</p> <p>3. ACCESS to climate resilient WASH infrastructure and services</p> <p>4. Climate resilient BEHAVIORAL CHANGE and GOVERNANCE at community and local level</p>
<p>STRENGTHEN WASH SECTOR ENABLING ENVIRONMENT</p> <p>1.1 Knowledge of climate risks generated and shared</p> <p>1.2 Climate risk informed policies, strategies, plans and programmes</p> <p>1.3 Adequate budget and resources allocated</p> <p>1.4 Plans implemented and monitored</p> <p>1.5 Inter-sectoral coordination strengthened with focus on health, food security and education sectors</p> <p>1.6 Strengthened Early Warning Systems in place</p>	<p>BUILD WATER RESOURCE MONITORING AND MANAGEMENT CAPACITY</p> <p>2.1 Water resource status and pressures understood</p> <p>2.2 Long-term monitoring systems implemented and maintained</p> <p>2.3 Guidelines/rules developed prioritising WASH services and accounting for hydrological change</p> <p>2.4 Agreed rules implemented for resource development and adaptive management</p>	<p>SUPPORT CLIMATE SMART INFRASTRUCTURE AND TECHNOLOGIES</p> <p>3.1 Project design and implementation of WASH standards strengthened</p> <p>3.2 Water storage enhanced and protected</p> <p>3.3 Water supplies diversified where possible</p> <p>3.4 Climate smart technologies (low and no-regret options) for WASH investigated and implemented</p> <p>SUPPORT INSTITUTIONAL REFORM AND BEHAVIOUR CHANGE</p> <p>4.1 Capacities and resources of local government and local private sector to implement and monitor WASH resilient programming strengthened</p> <p>4.2 Awareness and capacity of communities to respond to shocks and stresses is enhanced</p> <p>4.3 Local markets and supply chains extended and deepened to increase availability of climate resilient WASH products and services</p> <p>4.4 Early warning and response systems strengthened</p>
<p>1.1.1 Improving understanding of climate risks</p> <p>1.1.2 Understanding resilience of technology types</p> <p>1.1.3 Understanding WASH contribution to building community climate resilience</p> <p>1.2.1 Reviewing and updating WASH policies and strategies to account for climate risks</p> <p>1.2.2 Strengthening evidence based policy advocacy</p> <p>1.3.1 Making budget allocations available to enhance resilience of existing WASH systems</p> <p>1.3.2. Making budget allocations available to prioritize WASH interventions in identified risk areas</p> <p>1.3.3 Ensuring adequate emergency budget allocations for WASH sector</p> <p>1.4.1 Developing, implementing and monitoring plans</p> <p>1.4.2 Mainstreaming bottleneck analysis and planning</p> <p>1.5.1 Identifying and incorporating cross-sectoral considerations to manage climate risks</p> <p>1.5.2 Increasing partnership and collaborative working</p> <p>1.6.1 Ensuring Early Warning Systems predict and mitigate climate risks to WASH related outputs and outcomes</p>	<p>2.1.1 Assessing water resources – quantity and quality</p> <p>2.1.2 Assessing risks to water resources from climate change and other pressures</p> <p>2.2.1 Monitoring water availability and quality</p> <p>2.2.2 Monitoring patterns of use and climate-linked (and other) threats</p> <p>2.3.1 Developing agreed guidelines/rules across water sector informed by climate risks</p> <p>2.3.2 Supporting basin planning initiatives that coordinate water-using and polluting sectors and that prioritise support for the most vulnerable areas</p> <p>2.4.1 Developing new water sources in a resilient and sustainable manner</p> <p>2.4.2 Prioritising WASH in the allocation of resources between sectors</p>	<p>3.1.1 Ensuring conformity with climate-informed standards</p> <p>3.1.2 Supporting supervision and enforcement of standards</p> <p>3.2.1 Developing decentralised storage systems</p> <p>3.2.2 Strategically developing groundwater resources</p> <p>3.3.1 Spreading risk between different water sources and systems</p> <p>3.3.2 Targeting areas/communities affected by climate hazards and vulnerable sources by providing climate resilient WASH systems</p> <p>3.4.1 Adapting technologies to account for climate risks</p> <p>3.4.2 Exploring innovative, climate smart technologies (e.g. solar systems)</p> <p>3.4.3 Exploring wastewater reuse/ recycling, nutrient recovery and energy production from waste</p> <p>3.4.4 Improving sanitation and hygiene practices (e.g. ending open defecation) to reduce vulnerability</p> <p>4.1.1 Strengthening capacity of WASH professionals and practitioners</p> <p>4.1.2 Making sure sufficient resources are available for local WASH agencies in most vulnerable regions</p> <p>4.2.1 Education and training of community groups for climate-responsive WASH management</p> <p>4.2.2 Sharing knowledge on local WASH climate resilient options</p> <p>4.3.1 Supporting local markets and supply chains for resilient WASH systems/technologies</p> <p>4.4.1 Assessing status and functionality of early warning and response systems in relation to WASH needs</p> <p>4.4.2 Contingency planning for WASH – esp. droughts and floods</p> <p>4.4.3 Water Security and Water Safety Planning</p>

Figure 4.1: Simplified Results Framework for WASH climate resilience

4.2 Appraise options

There may be a number of options to choose from so it is important to screen these to ensure the most appropriate ones are implemented. Consideration must be given to the available financial and technical resources, the capacity to respond and the timeframe for implementation. In appraising options it is also essential to understand the effects of applying the options across related sectors, such as public health, environment, agriculture and livestock, which are affected by developments in the WASH sector. Specific questions that can help guide the selection include:¹⁹

- Is the option practical, given the timeframe and the resources available?
- How many people will benefit from its implementation?
- Will there be any unintended negative consequences (social, environmental, etc.)?
- How cost effective is it?
- What is the environmental sustainability in the short and long term? Will the option still be effective in 10 to 20 years?
- Is the option compatible with local/national development objectives?

- How will the implementation of the option reduce developmental risks in other sectors such as the environment and public health?
- Is the option socially acceptable at the local level?
- How successful is it likely to be?

More sophisticated appraisal techniques are available and can be used to help in the selection of options. Examples include cost-benefit analysis, multi-criteria analysis and the robust decision-making approaches. Examples and detail on using a range of different techniques is given in the Technical Brief.



¹⁹ Venton (2010)

5. Deliver solutions

Key points

- Integration of options into strategies and plans is important to ensure that options to increase climate resilience in the WASH sector benefit from established mechanisms for implementation.
- Effective institutional coordination across multi-level WASH governance structures will be required, as will the coordination with other sectors which can influence or impact on climate resilience.
- Carefully targeted programmes to strengthen the capacity of WASH sector professionals to address both short- and long-term climate uncertainties will be required at all levels.
- It is important to know what funding opportunities are available to inform the development of financing and investment strategies.

This phase of the Framework covers the integration of climate resilient options into existing planning processes for implementation. Overall integration of climate resilience into WASH sector strategies and plans is a government-led process but will also require that implementation partners integrate climate resilience into their own strategies and plans. The main tasks are:

- Understand the entry points for early action on WASH climate resilient development
- Strengthen capacity to plan, manage and deliver climate resilient solutions
- Investigate available funding opportunities and plan the budget for implementation
- Implement climate resilience measures.

5.1 Integrating options into strategies and plans

The selected options will need to be integrated into planning processes and implemented. Integration into strategies and plans is important to ensure that investments in the WASH sector are sustainable. It is a process which can occur at different levels, from local level/sub-national development plans to national planning systems. It is recommended that a “climate lens approach” is applied when formatting sector strategies as illustrated in Figure 5.1.

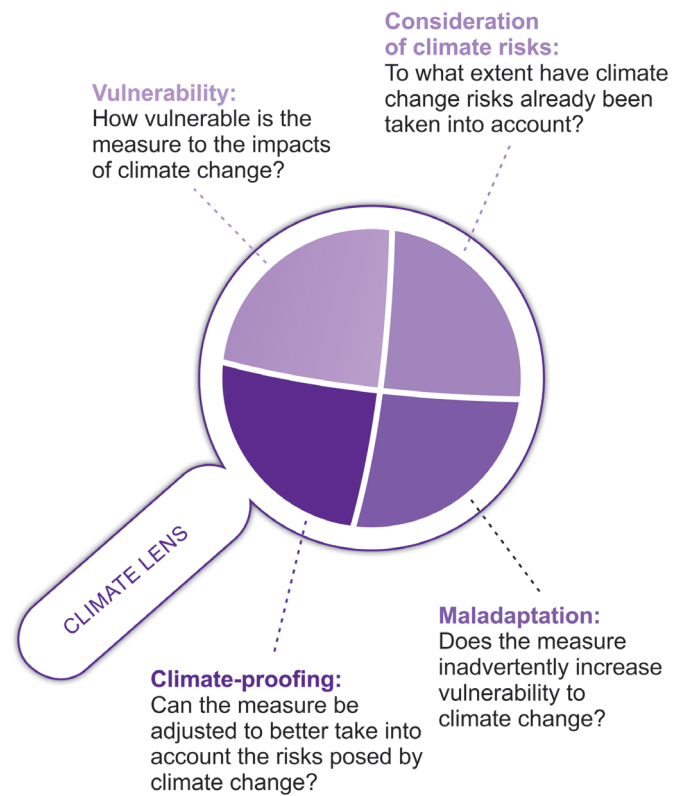


Figure 5.1: Elements of a ‘climate lens’ approach
Source: Adapted from OECD (2009)

Integration will involve preparation to determine how the options will be implemented and funded. It requires action across many sectors and planning levels because water resources used in the WASH sector are shared and influenced by other users.

This means that efficient and effective partnerships and coordination are needed across multi-level WASH governance structures. Roles and responsibilities need to be adequately clarified, particularly the roles of WASH departments in various ministries and the role of other ministries and departments in supporting climate resilient development outcomes. Approaches used

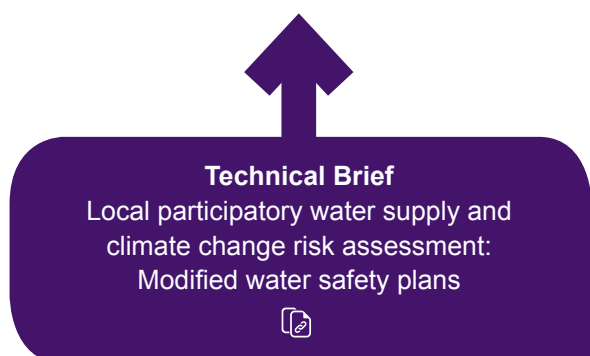
should be flexible and make use of effective learning mechanisms to raise awareness, to share experiences and to identify best practices.



Three core components have been defined for integration:²⁰

- **Finding entry points for integration:** this sets the stage for integrating climate resilience. It requires an understanding of the relevant institutional contexts as entry points are very much context specific and are based on particular national/sectoral settings and circumstances.
- **Integrating into policy processes:** this makes use of available evidence to integrate issues into ongoing policy processes, by including priority climate resilient interventions where necessary. It also looks at how to integrate across policies and legislative frameworks, e.g. a policy that aims to protect or enhance ecosystem services could be linked to climate resilient WASH services.
- **Meeting challenges associated with implementation:** this component aims to ensure that investments are integrated into sector financing, budgeting, implementation and monitoring.

Climate risk assessment is best addressed as an incremental step within existing planning assessments and processes. For example, climate resilience can be integrated in the Water Safety Plan (WSP) approach (Box 5.1). The Technical Brief gives further information.



Box 5.1: Integrating climate risks into the WSP approach

Water Safety Plans (WSPs) were developed for use as a tool to assess threats to the continuing supply of safe water. The approach is flexible and incorporates all steps in water supply, from catchment to consumer.²¹ The WHO water safety manual contains full details of the approach.²²

The WSP approach can be considered as a risk management approach whereby regular reviews and revisions of the WSPs ensure new risks are assessed and addressed. The flexibility of the WSP approach can be exploited to integrate climate risk screening as part of the WSP continuous improvement cycle. UNICEF is developing new guidance for a participatory approach to rural water safety planning that is 'robust to uncertainty', i.e. appropriate to a range of different rainfall and runoff conditions. This will help communities to build and manage their water supplies to safeguard water quality, prevent damage from environmental hazards and ensure the resilience of WASH interventions in the face of climate-related (and other) drivers of variability and change.

5.2 Capacity development

Capacity to address climate resilient issues in the WASH sector can be a limiting factor.²³ It brings new challenges that require additional knowledge, skills and approaches to supplement existing planning, decision-making and implementation processes. In the context of climate change, carefully targeted capacity strengthening programmes should focus, for example, on extending risk assessments to include climate change-related aspects, decision-making under uncertainty, and the identification and appraisal of options to manage potential risks and/or maximise opportunities climate change may bring.

Capacity development needs to be firmly grounded in existing institutional roles and responsibilities. Climate change is just one of many important and uncertain challenges faced by WASH professionals and practitioners and strengthening capacity should be seen as an evolution of existing skills and practices, rather than as a separate stream of activity.

²⁰ UNDP-UNEP (2011); Butterworth and Guendel (2012); UNICEF (2014b)

²¹ WHO (2012)

²² WHO (2008)

²³ Batchelor et al. (2009)

Capacity development will be important at all levels because each has a different part to play in the planning and delivery of WASH services. This will include national and local government planners and decision makers, WASH implementation partners and local WASH coordination platforms, particularly as local governance is a key element for sustained action to build climate resilience, see Box 5.2.

Box 5.2: Capacity development at the local level

The local level is very important for climate resilient development as climate change impacts are manifested locally, vulnerability and adaptive capacity are determined by local conditions, and adaptation activities need understanding of local priorities and capacity needs. Adaptation strategies may require new or modified technologies and behaviours and these, in turn, require helping communities and local institutions (local government and other) to develop certain types of new knowledge, abilities or skills. Capacity at local and decentralised levels needs to be strengthened accordingly and support activities could include for example²⁴: presenting climate change information in a way that can be easily understood by non-specialists, organising and disseminating information so that it can be selectively used at different institutional levels, and strengthening local government WASH planning processes.

5.3 Financing/funding opportunities

It is important to know what funding opportunities are available to underpin climate resilient development. Domestic public finance and state budgets alongside Overseas Development Assistance (ODA) have been, and will remain, key sources, although the importance of each will differ from country to country. Funding is also available from NGO, philanthropic and private sector sources. The emergence of international climate finance brings additional funds and maximising leverage from these funds will bring added benefits to the WASH sector. In some regions, funding to the water sector from global climate funds has begun to exceed that from climate change-related ODA.

The structure of global climate funds can seem complex. There are a range of funds, for example, the Adaptation Fund (AF), Green Climate Fund (GCF), Least Developed Countries Fund (LDCF), Special Climate Change Fund (SCCF), Pilot Program for Climate Resilience (PPCR) and others, and all these funds support countries in their efforts to increase resilience to climate variability and change. Each has specific funding allocation criteria, which provide guidance as to the type of activity likely to be supported. National climate change funds have been set up by a number of countries with the aim of coordinating and aligning the interests of multiple funding sources with their national priorities.

Much international attention is also now focused on the Green Climate Fund (GCF). This Fund was adopted as an operating entity of the financial mechanism of the UNFCCC at the end of 2011. Over time, it is expected to become a major multilateral financing mechanism to support climate action in developing countries.

Developing financing and investment strategies, including those for enhancing climate resilience, requires consideration of funding from all sources. Mapping out current funding sources, analysing how best to benefit from these and understanding how additional sources can bring most added-value is important. The Climate Funds Update provides information on the international climate finance initiatives available and is a good place to start to become informed on funding criteria and the types of activities supported.

5.4 Implementation of programmes/projects

Table 5.1 provides some examples of programmes and projects that seek to increase climate resilience in the WASH sector. These illustrate ways in which funds can be invested and how climate resilience can draw on a broad spectrum of measures, from improvements to WASH infrastructure to measures that build capacity.

²⁴ Batchelor et al. (2011)

Table 5.1: Examples of programmes and projects that have increased WASH climate resilience²⁵

Location	Project	Funded by	Description
Bangladesh	Creating Fresh Drinking Water in Brackish Aquifers	UNICEF and UKAid	This project was proposed as a cost effective and climate/disaster resilient option. It investigated the use of Managed Aquifer Recharge schemes in rural communities in coastal areas to improve access to drinking water and mitigate saline intrusion and cyclonic inundation. The project has increased access to safe water.
Ethiopia	Climate risk screening for rural water supply	Various, Projects led by ODI and UNICEF (as a partner)	Work to increase the resilience of rural water supplies to climate variability at change, with a focus on simple and affordable technologies. Produced field guidance for local government staff which is being integrated in a new WSP approach using remote sensing to locate "hard to find" sources of fresh water in water scarce regions.
Swaziland	Building resilience	GWP	The project aimed to build the resilience of a community affected by water challenges and recurrent droughts. Various capacity building activities were carried out, including training in conflict resolution, dam maintenance, and sanitation and hygiene.

²⁵ Calow et al. (Forthcoming, 2015); UNFCCC (2011); UNICEF (2014c)

6. Monitor and move forward

Key points

- In the context of scaled-up funding for climate change adaptation and increased resources from climate funds, it is becoming increasingly important to provide evidence that implementation is contributing to an increase in climate resilience.
- Monitoring in the context of WASH climate resilience requires SMART indicators to assess progress towards specific targets and objectives.
- Shared learning has the potential to speed-up and scale-up reliable and affordable responses to address climate risks.

This phase of the Framework covers monitoring and the lessons learned from the implementation of activities to strengthen climate resilience. The main tasks are:

- Review and strengthen monitoring programmes and systems
- Establish indicators to use in the monitoring process
- Disseminate and share lessons on what works well, and what does not.

6.1 Monitoring programmes and systems

Careful monitoring and evaluation of the outcomes of policies, strategies and interventions is vital in all WASH activities to ensure that the prospective benefits of interventions are being realised and to help improve the design of future interventions. In the context of scaled-up funding for climate change adaptation and increased resources from climate funds, it is becoming increasingly important to ensure appropriate key indicators are embodied in monitoring programmes and to provide evidence that implementation is contributing to an increase in climate resilience.

Monitoring is an ongoing process and monitoring programmes should be continually reviewed and strengthened. Key questions to consider when reviewing monitoring programmes and systems that respond to WASH climate resilience could include:

- Does monitoring of WASH programme implementation give adequate attention to assessing whether opportunities to increase climate resilience provide tangible benefits?

- Are outcomes related to enhanced climate resilience included in the results-based reporting on WASH achievements?
- Is the monitoring sufficient to make a judgement about the effective use of resources and comparative advantages of climate resilient development?
- To what extent will it be possible to show the improved results and lessons to further influence national WASH development frameworks?

It is important to also identify any challenges that may make it difficult to implement monitoring programmes. Monitoring climate resilience requires specific consideration of certain factors if it is to be effective (Box 6.1). A number of tools and frameworks are available which can help to address these challenges. Further details on these are given in the Technical Brief.

Technical Brief

Monitoring and evaluation
for climate resilient WASH



Box 6.1: Factors to consider in monitoring climate resilience²⁶

- Uncertainty about how and when changes in climate will occur and what effects there will be, particularly at a local level.
- Baselines shift and contexts change, meaning that comparison of data before and following the implementation of climate resilient development measures loses its validity.
- There is a lack of generic indicators that can be widely used in monitoring because resilience has to be grounded in the context, scale, sector and nature of the measure, all of which vary.
- Monitoring and evaluation normally look to demonstrate the attribution of changes to a specific measure. However, resilience and the implementation of measures is complex and often multi-sectoral, meaning that a modified approach to monitoring is required.
- Definitions of basic concepts may vary between agencies, while more specialised terms may only be well understood by one particular agency.

²⁶ Bours et al. (2014)

6.2 Monitoring indicators in the WASH sector

Indicators are key in monitoring and are used to help measure progress towards specific targets and objectives. They include:

- Process indicators, e.g. existence of risk assessments, resilience strategy/action plans based on the assessment results
- Performance indicators, e.g. appraisal/evaluation for staff, and for implementation of work plans

- Output/outcome indicators, e.g. risk assessment coverage, WASH coverage, disease prevalence, number of additional people provided with access to safe water supply and basic sanitation services given existing and projected climate, vulnerability and risk perception index.

Table 6.1 provides examples of the kind of aspects for which SMART indicators could be developed for different WASH planning and programming levels.

Table 6.1 Examples of indicators which can be used for the monitoring and evaluation of WASH climate resilience

Level	Examples of indicators
National level	<ol style="list-style-type: none"> 1. Are climate risk assessments used to inform policies, plans, strategies and targeting of programmes? 2. Are climate risk assessments being used to inform WASH budgets?
Sub-national level	<ol style="list-style-type: none"> 1. Are climate-resilience standards in place for the construction/installation of latrines and other sanitation infrastructure? 2. Are climate-resilience standards in place for the construction/installation of water points? 3. Do water allocation plans take into account sanitation and hygiene needs?
Local/project level	<ol style="list-style-type: none"> 1. Percentage of population with access to water points able to meet at least a 12 hour service daily all year round. 2. Percentage of households with access to a resilient latrine that does not flood during the wet season 3. Percentage of communities that have installed a community-based storage system, sufficient to support the entire community for at least 72 hours

6.3 Review experiences and share lessons learned

Joint learning among all categories of stakeholders has the potential to speed-up and scale-up reliable and affordable solutions and responses to climate risks. Sharing lessons among relevant stakeholder groups and forming learning alliances facilitates progress in

the implementation of measures.²⁷ This may include groups at the community and local level, or those at the regional, national and international levels to share in-country experiences. Documenting these findings and producing 'good practice' guidance will be useful resources for shared learning.

²⁷ WHO and IWA (2010)

7. References

- Bartram, J., Corrales, L., Davison, A., Deere, D., Drury, D., Gordon, B., Howard, G., Rinehold, A. and Stevens, M. (2009) *Water Safety Plan Manual: Step-By-Step Risk Management for Drinking-Water Suppliers*. World Health Organization, Geneva.
- Batchelor, C., Schouten, T., Smits, S., Moriarty, P. and Butterworth, J. (2009) *Perspectives on Water and Climate Change Adaptation. Climate Change and WASH Services Delivery – Is Improved WASH Governance the Key to Effective Mitigation and Adaptation?* IRC International Water and Sanitation Centre, The Hague.
- Batchelor, C., Smits, S. and James, A.J. (2011) *Adaptation of WASH Services Delivery to Climate Change and Other Sources of Risk and Uncertainty* (Thematic Overview Paper 24). IRC International Water and Sanitation Centre, The Hague. <http://www.ircwash.org/sites/default/files/Batchelor-2011-Adaptation.pdf>
- Bours, D., McGinn, C. and Pringle, P. (2014) *Monitoring & Evaluation for Climate Change Adaptation and Resilience: A Synthesis of Tools, Frameworks and Approaches*, 2nd edition. SEA Change CoP, Phnom Penh and UKCIP, Oxford.
- Butterworth, J. and Guendel, S. (2012) *WASH and Climate Change Adaptation Training Module: Factsheets. A training module prepared by the IRC International Water and Sanitation Centre for UNICEF and the National Water Resources Institute, Kaduna*. IRC International Water and Sanitation Centre, The Hague.
- Calow, R., Bonsor, H., Jones, L., O'Meally, S., MacDonald, A. and Kaur, N. (2011) *Climate Change, Water Resources and WASH. A Scoping Study*. Working Paper 337. Overseas Development Institute, London.
- Calow, R., Kebede, S., McKenzie, A. and Ludi, E. (Forthcoming, 2015) *Climate Risk Screening for Rural Water Supply*. Overseas Development Institute, London.
- Campbell-Lendrum, D. and Woodruff, R. (2007) *Climate Change: Quantifying the Health Impact at National and Local Levels*. Editors, Prüss-Üstün, A., Corvalán, C. (WHO Environmental Burden of Disease Series No.14). World Health Organization, Geneva.
- CARE International (2009) *Climate Vulnerability and Capacity Analysis Handbook*.
- Elliot, M., Armstrong, A., Lobuglio, J. and Bartram, J. (2011) In: De Lopez, T. (ed.), *Technologies for Climate Change Adaptation – The Water Sector*. UNEP, Roskilde.
- IPCC (2013) *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge and New York, 1535 pp, doi:10.1017/CBO9781107415324.
- IPCC (2014) Summary for policymakers. pp. 1-32. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge and New York.
- Oates, N., Ross, I., Calow, R., Carter, R. and Doczi, J. (2014) *Adaptation to Climate Change in Water, Sanitation and Hygiene: Assessing Risks and Appraising Options in Africa*. Overseas Development Institute, London.
- Stern, N. (2007) *The Economics of Climate Change: The Stern Review*. Cambridge University Press, Cambridge and New York.
- UNDP-UNEP (2011) *Mainstreaming Climate Change Adaptation into Development Planning: A Guide for Practitioners*. UNDP-UNEP. <http://www.unep.org/pdf/mainstreaming-cc-adaptation-web.pdf>
- UNFCCC (2011) *Climate Change and Freshwater Resources: A Synthesis of Adaptation Actions Undertaken by the Nairobi Work Programme Partner Organizations*. UNFCCC, Bonn.

UNICEF (2008) *Climate Change and Children*. UNICEF, New York.

UNICEF (2012) *WASH Hazard, Vulnerability Analysis and Adaptation to Climate Change in Zambia*. Prepared in coordination with the Government of the Republic of Zambia and UNICEF Zambia. UNICEF, New York.

UNICEF (2014a) *Quick Factsheet: Climate Resilient Development – Rural Sanitation in Pakistan at Scale in Monsoon Flood Affected Areas*. UNICEF, Pakistan Country Office.

UNICEF (2014b) *Mainstreaming Resilience into WASH Sector Programming*.

UNICEF (2014c) *Factsheet: Managed Aquifer Recharge (MAR): Creating Fresh Drinking Water in Brackish Aquifers*. UNICEF, Bangladesh Country Office.

UNICEF ROSA (2014) *Child-Centred Risk Assessment: Regional Synthesis of UNICEF Assessments in Asia*. UNICEF ROSA, Kathmandu.

UNISDR (2012) *Impacts of Disasters since the 1992 Rio de Janeiro Earth Summit*. UNISDR. Available at: http://www.preventionweb.net/files/27162_infographic.pdf

UN-Water (2010) *Climate Change Adaptation: The Pivotal Role of Water*. UN-Water. Available at: http://www.unwater.org/downloads/unw_ccpol_web.pdf

Van Steenberg, F. and Tuinhof, A. (2010) *Managing the Water Buffer for Development and Climate Change Adaptation. Groundwater Recharge, Retention, Reuse and Rainwater Storage*. BGR (Bundesanstalt für Geowissenschaften und Rohstoffe), the Co-operative Programme on Water and Climate (CPWC) and the Netherlands National Committee IHP-HWRP.

Venton, P. (2010) *How to Integrate Climate Change Adaptation into National-Level Policy and Planning in the Water Sector: A Practical Guide for Developing Country Governments*. Tearfund, Teddington.

World Health Organization (2008) *Water Safety Manual*. World Health Organization, Geneva.

World Health Organization (2012) *Water Safety Planning for Small Community Water Supplies: Step-By-Step Risk Management Guidance for Drinking-Water Supplies in Small Communities*. World Health Organization, Geneva.

World Health Organization and International Water Association (2010) *A Road Map to Support Country-Level Implementation of Water Safety Plans*. World Health Organization, Geneva.

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