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Cooperation Opportunities for Improved Integration Across SDG6

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FOREWORD

Water runs through every aspect of life, linking various sectors, places, people and temporal scales. As water stress increases, it is crucial that decisions made about freshwater are mindful of other users. Calls have multiplied in recent decades for increased coherence in actions across water use, protection and clean-up. A critical incentive for policy coherence, Sustainable Development Goal 6, has spurred coordinated action to realize sustainable access to safe water for all by 2030.

Yet, to this day, a strong separation persists between water for domestic needs, and water for other human and environmental needs. Water Resource Management (WRM) and Water, Sanitation and Hygiene (WASH) have evolved to become two distinct sectors and separate fields of policy implementation. As a result, water usage is governed in parallel spheres that differ in their governance systems, spatial scope, infrastructure and expertise. This separation has resulted in the proliferation of institutions at different administrative levels, with overlapping competences and work tailored to relatively narrow mandates in order to solve problems that are in fact related and inter-dependent. This fragmented set-up has many detrimental outcomes, from conflicting agency priorities and inefficiencies, to unmet needs.

As countries prepare for the mid-term review of the Water Action Decade and the achievement of the 2030 Agenda, as well as meeting the Sendai Framework for Disaster Risk Reduction and the goals of the Paris Agreement, addressing this institutional fragmentation between WRM and WASH will be critical. This report is intended to assist water practitioners and policymakers to overcome this fragmentation and to make the long overdue transformative shift towards integrated and holistic approaches to addressing the water crisis and advancing global agendas. Among its starting points is the fact that water management is fundamental to the realization of human rights to water and sanitation, as well as the human right to a healthy environment. Conversely, the report emphasizes that WASH engagement with WRM on sustainable water use, source-water protection and pollution prevention is key to safeguarding water sources, both now and in the future.

The challenge is not to reverse the dichotomy within the water sector, but to initiate and expand coordination mechanisms that respect expertise and diverging mandates. Looking for synergies and strategic opportunities for cooperation, the report advances pragmatic and specific responses to institutional complexity to achieve more equitable and effective policy outcomes.

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Executive summary

The lack of coordination between Water Resources Management (WRM) and Water, Sanitation and Hygiene (WASH) and the resulting institutional fragmentation represent a major bottleneck, impeding greater progress on Sustainable Development Goal 6 (SDG6) to ensure the availability and sustainable management of water and sanitation for all. Policy and institutional fragmentation obstructs efficient water management, generates conflict between users and uses of water resources, and challenges the realization of equitable access. Overlapping institutional mandates and gaps often lead to missed opportunities and inefficient use of resources. Cooperation is necessary to maximize the positive co-benefits, minimize disputes and reduce the negative impacts on water resources, and to improve protection from water hazards at a time of intensification of climatic and hydrological variability.

Fragmentation is difficult to overcome and requires progressive reforms and a concerted effort from all concerned actors. With the impetus of the 2030 Agenda for Sustainable Development and the acceleration of climate change, growing populations, new types of pollutants and biodiversity loss, there is a growing recognition that cooperation across sectors is key to progress. UN-Water has identified the alignment of policies, strategies and approaches and overcoming institutional fragmentation as important steps in accelerating progress on SDG6 (UN-Water, 2020a). This document aims to capitalize on this momentum with recommendations for concrete action.

A framework towards stronger cooperation

This report proposes a framework that can be used to improve cooperation for the achievement of SDG6, focusing on the WRM–WASH divide. The framework is structured around five joint outcomes that are critical elements for water systems to deliver the SDGs by 2030. A total of 18 cooperation areas outline tangible entry points to prompt cooperative action towards achieving the joint outcomes.

Joint outcome 1 – Equitable water resources allocation: considering domestic water use at every step of decision-making for water resources planning and allocation processes can contribute to the fulfilment of the Human Rights to Water and Sanitation (HRWS) and the Human Right to a Healthy Environment (HRHE), while also meeting the needs of multiple water uses, such as

water-dependent ecosystems and species, agriculture and irrigation, human consumption of aquatic foods, aquaculture, industrial and commercial use, water-based recreation, and traditionally owned cultural values.

Joint outcome 2 – Sustainable water management: WASH engagement with WRM on sustainable water use, source-water protection and pollution prevention is key to safeguarding water resources, both now and in the future. This is achieved through the use of agreed criteria in decisions that are related to the allocation of water resources to different uses in a fit-for-purpose manner that respects the needs of current and future users to the extent that this is feasible, without causing environmental degradation.

***Joint outcome 3 – Drought and flood disaster resilience*:** cooperation between WASH and WRM actors in flood and drought mitigation and preparedness planning, as well as sharing early warnings and greater coordination during response, recovery and learning, can help prevent water hazards from becoming disasters. Cooperation helps to avert localized flooding and pollution from poor WASH services, helps to continue delivering services when hazards strike, and aids recovering from extreme water-related events.

***Joint outcome 4 – Climate resilience WASH*:** sound water-resource and meteorological information needs to be available and shared to allow for informed assessment of WASH service vulnerability and, in the implementation of adaptation options, in planning and developing climate-change policy and building the case for accessing climate finance. With collaboration on adaptation efforts, complementary strategies for mitigation are needed to reduce the impacts of WASH interventions on the environment (adaptation), while also managing and reducing the risks of climate change (mitigation).

***Joint outcome 5 – Integrated Water Resources Management (IWRM)*:** the management of both domestic and other water needs ought to benefit from greater cooperation in the formulation of policy and strategy and from enhanced, coordinated participation in the mechanisms that facilitate joint working and information-sharing. There are also benefits to be gained from greater collaboration in planning processes, in water resources monitoring, in regulation and in capacity-development interventions at local, sub-national, national and transboundary levels.

Key messages

Recognizing the complex links that exist between WASH and WRM and the benefits of their integration for the achievement of SDG6, this report has four key messages:

Message 1: Cooperation and alignment between WASH and WRM are necessary

The current division between WASH and WRM and the resulting policy and institutional fragmentation between levels are among the greatest challenges to accelerating progress towards meeting SDG6 at a time of worsening water crisis. Domestic water needs, environmental flows and water usage for agriculture, irrigation, energy and industry can all benefit from more collaborative decision-making, more deliberate information-sharing and joint access to funding.

Message 2: It is possible to overcome fragmentation through cooperation at policy and institutional levels

Integrating the management and development of WASH and WRM operations requires greater alignment of their vision and strategies, which are driven by water-governance functions. Successful examples of cooperative actions show that aligning WRM and WASH practices for greater equity, improved sustainability and resilience, and an integrated approach to water allocation and use benefits both WRM and WASH.

Message 3: Cooperation across sectors and actors needs to be scaled up

To make a significant contribution to progress on SDG6 within the 2030 timeframe, cooperative processes need to be mainstreamed and upheld over time. The water sector needs to reach out and take the aspirations, needs and concerns of users in other sectors into account more effectively.

Message 4: Overcoming fragmentation through cooperation requires commitment and strong leadership

The UN-Water SDG6 Global Acceleration Framework provides the momentum to catalyse the necessary transformative shift to truly strengthen WRM–WASH cooperation. This document offers a framework to address these issues systematically.

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Introduction

Water Resource Management (WRM) and Water, Sanitation and Hygiene (WASH) have evolved to become two distinct sectors with separate governance systems, infrastructure and expertise, existing as fields of policy implementation that interact only partially. This division translates into a diversity of fragmented norms, interests, regulations and water entitlements that are often difficult to reconcile. Policy fragmentation is compounded by institutional fragmentation: mixed and overlapping responsibilities for water across various government agencies and administrative levels, and the existence of a wide range of stakeholders and jurisdictions using or being affected by water, within and outside the sectors directly concerned with water.

This intra- and inter-sectoral policy and institutional fragmentation has been identified as an important bottleneck that needs to be overcome in order to accelerate progress towards Sustainable Development Goal 6 (SDG6)[1] (UN-Water, 2020a). Water issues must be addressed coherently in an integrated way across the SDGs (UN-Water, 2016), the Paris Agreement[2] and the Sendai Framework for Disaster Risk Reduction[3] and the Agenda for Humanity[4] in order for resilient and sustainable progress to be made. It is also critical to promote greater coherence of humanitarian and development action in crises and transitions to long-term sustainable development and to reduce vulnerabilities to build resilience (OCHA, 2017). The advent of these interlinked global agendas presents a renewed opportunity to address the long-standing challenge of 'silo-based' approaches, by capitalizing on the recognition that cooperation is essential to go beyond 'business as usual'.

Despite widespread acknowledgement of the need to strengthen WRM–WASH cooperation and integration and notable past and ongoing

1 Sustainable Development Goal (SDG) 6 is 'Ensure availability and sustainable management of water and sanitation for all' with eight targets and 11 indicators. United Nations. url: https://sdgs.un.org/goals/goal6

2 Legally binding international treaty on climate change, adopted by 196 Parties at COP 21 in Paris on 12 December 2015 and entered into force on 4 November 2016. United Nations Framework Convention on Climate Change (UNFCCC). url: https://unfccc.int/sites/default/files/english_paris_agreement.pdf

3 The Sendai Framework for Disaster Risk Reduction 2015–2030 outlines seven clear targets and four priorities for action to prevent new and reduce existing disaster risks. United Nations Office for Disaster Risk Reduction (UNDRR). url: https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030

4 The Agenda for Humanity, New Way of Working (NWOW) calls on humanitarian and development actors to work collaboratively together, towards 'collective outcomes' that reduce need, risk and vulnerability over multiple years. United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 2017. url: http://agendaforhumanity.org/sites/default/files/20170228%20NWoW%2013%20high%20res.pdf

work[5] to document, draw attention to and galvanize action for WASH integration with other WRM-related disciplines (e.g., broader water security, wetland management, freshwater biodiversity conservation), fragmentation and lack of cooperation persist.

This report aims to catalyse accelerated joint WRM–WASH action on tackling the water crisis facing countries around the world. Its specific purpose is to increase understanding of, and attention towards, the links between WRM and WASH, and to raise awareness of the concrete opportunities that can be taken to strengthen cooperation between WRM and WASH decision-makers and practitioners in-country. The report undertakes an in-depth analysis of five proposed 'joint WRM–WASH outcomes' and 18 related 'WRM–WASH cooperation areas' to provide a 'WRM–WASH cooperation framework' and a related menu of opportunities for strengthening cooperation, all illustrated with case studies.

This report is intended to support the international community, particularly the United Nations family in-country, to identify areas where cooperation on water issues of shared interest will be beneficial for addressing water crises. It serves as a reference point and framework for United Nations Resident Coordinators and United Nations Country Teams to structure coordinated support to countries, including through its recommendations, which align with the SDG6 Global Acceleration Framework (UN-Water, 2020a).

This report is also intended to be a useful resource to support countries in navigating the broader cooperation required for the successful implementation of the United Nations Children's Fund (UNICEF)'s 'Water security for all' (UNICEF, 2021a) initiative, which aims to ensure that all children have access to a safe and affordable water supply and live in water-secure communities by 2030. UNICEF recognizes that this ambitious goal cannot be achieved alone, with effort required from all members of society and all sectors, working with governments, donors, international and national organizations (including the wider United Nations family), research institutions, the private sector and, critically, communities themselves. This report can help countries to identify concrete opportunities for strengthening broader cooperation, which can in turn help to accelerate progress towards the goal.

The Theory of Change (TOC) defines the long-term goals for WASH–WRM cooperation and identifies the preconditions needed to accomplish it (see Figure 1). The outcome sought is to ensure a safe, clean and sufficient water supply for all, in a way that respects the integrity of environmental flows.

The TOC states that actions taken by WRM and WASH actors to implement the 18 'cooperation areas' will contribute to five types of joint outcome. Although all five joint outcomes are closely related and interdependent in their contribution to achieving the long-term impact, they reflect clear directions for different sectors to align their commitments and for all relevant actors to take cooperative action. The joint outcome of Integrated Water Resources Management (IWRM) underpins all other areas, playing a key role in strengthening the enabling environment for integration, a stronger institutional framework (including participation), effective WRM (including

5 For example: the IRC-led Watershed Programme (https://watershed.nl/); Wetlands International's reports in 2017 (WASH and Water Security. Integration and the role of civil society) and 2010 (Wetlands and Water, Sanitation and Hygiene (WASH): Understanding the linkages); African Biodiversity Collaborative Group's reports, 'Freshwater Conservation and Water, Sanitation and Hygiene Integration Guidelines: A Framework for Implementation in sub-Saharan Africa' (n.d.)' and 'Linking Biodiversity Conservation and Water, Sanitation and Hygiene: Experiences from sub-Saharan Africa (2012). United Nations Children's Fund, 'Evaluation Synthesis of United Nations System and Development Bank Work Towards SDG6', UNICEF Evaluation Office, New York, 2021.

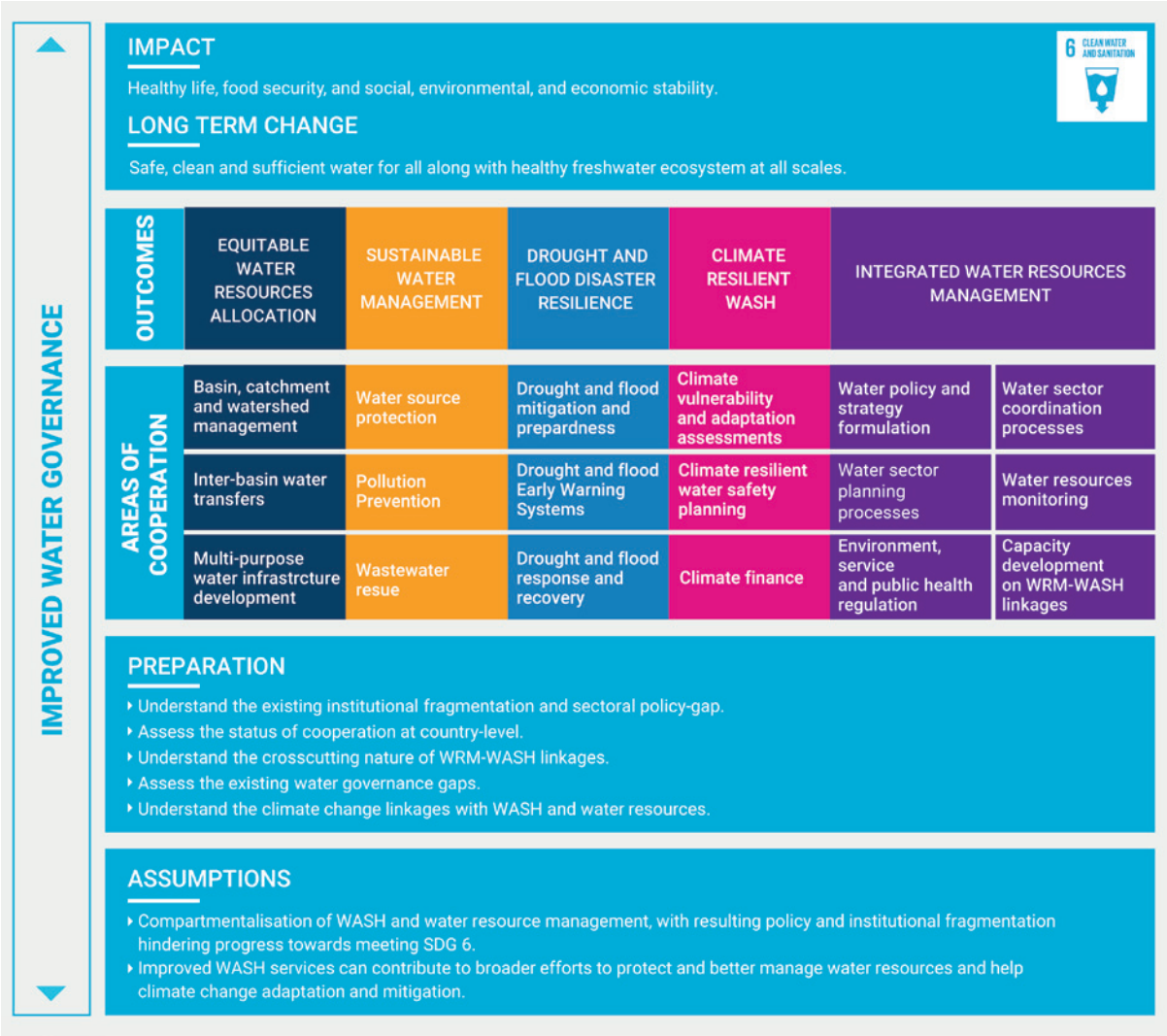

Figure 1: Theory of Change

those shared across national boundaries) and achieving equitable water allocations, and sustainable, resilient WRM and services.

The TOC further suggests that five types of preparatory work are needed to accelerate cooperation. Efficient inter-sectoral cooperation requires all relevant actors to:

- clarify and recognize institutional fragmentation and sectoral policy gaps
- assess existing occurrences of cooperation
- recognize links between WRM and WASH
- assess existing water-governance gaps
- clarify links between climate change, WASH and WRM.

Important assumptions behind the TOC are:

- the compartmentalization of WASH and WRM and the resulting policy and institutional fragmentation are two of the greatest

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challenges to protecting and accelerating progress towards meeting SDG6

- improved WASH services can contribute to broader efforts to protect and better manage water resources and help climate-change adaptation and mitigation. Conversely, WRM is fundamental to the realization of HRWS.

WASH in the water cycle: understanding the links

Drinking water and sanitation services are both affected by (and in turn affect) water resources, with both positive and negative impacts, depending on the effectiveness of WASH programming. This influence is centred on the two main attributes of water – quantity and quality.

Resilient, sustainable and safely managed WASH services (especially drinking water services and sewered sanitation) typically depend on a certain quantity of water, ideally of good ambient quality, in order to achieve a good service-level outcome in a cost-effective manner. Similarly, a safe and biodiverse ecosystem depends, in part, on an adequate quantity and quality of wastewater being discharged from a sanitation service that can include, but is not limited to, ensuring good-quality wastewater discharge and solid waste management to avoid pollution of water sources. Improved access and proper treatment of solid wastewater, together with measures such as water protection and climate-change adaptation, can reduce the negative impacts of sanitation on aquatic ecosystems (USAID, 2019a; Wetlands International, 2010).

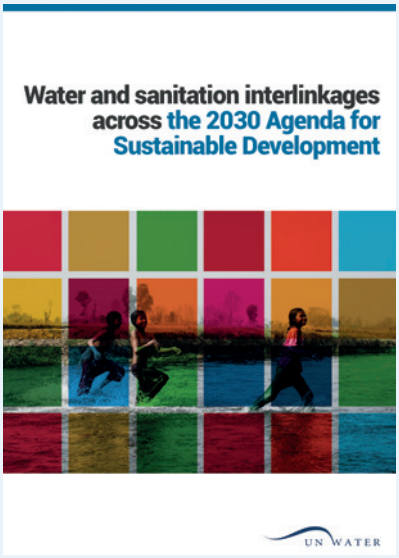
TARGET	INDICATOR (CUSTODIAN AGENCIES)
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services (World Health Organization (WHO)/United Nations Children's Fund (UNICEF))
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	6.2.1a Proportion of population using safely managed sanitation services (WHO/UNICEF) 6.2.1b Proportion of population using a handwashing facility with soap and water available (WHO/UNICEF)
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated (WHO/United Nations Human Settlements Programme (UN-Habitat/United Nations Statistics Division (UNSD)) 6.3.2 Proportion of bodies of water with good ambient water quality (United Nations Environment Programme/UNSD)
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time (Food and Agriculture Organization of the United Nations (FAO)) 6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (FAO)
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	6.5.1 Degree of integrated water resources management implementation (0–100) (United Nations Environment Programme) 6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation (United Nations Educational, Scientific and Cultural Organization (UNESCO)/United Nations Economic Commission for Europe (UNECE))
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	6.6.1 Change in the extent of water-related ecosystems over time (United Nations Environment Programme/Ramsar Convention)
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies	6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan (WHO/United Nations Environment Programme/Organisation for Economic Co-operation and Development (OECD))
6.b Support and strengthen the participation of local communities in improving water and sanitation management	6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management (WHO/United Nations Environment Programme/OECD)

Source: Adapted from United Nations, Department of Economic and Social Affairs (2017)

Figure 2: Targets and indicators of SDG6 (UN, 2018)

The objectives set by SDG6 go well beyond the provision of WASH services. WASH-related targets and targets on water scarcity, water pollution, biodiversity and ecosystem protection, disaster risk reduction, leveraging water for peace and water management are fundamentally interdependent (see Figure 2). Understanding and acting on these links is key to unlocking the full potential of SDG6. In addition, none of the SDG6 targets can be achieved in isolation (UN-Water, 2016), as the degree of progress in meeting one target will affect progress towards the others (see Box 1).

Box 1: SDG6 interlinkages



To realize the 'availability and sustainable management of water and sanitation for all', it is essential to manage competing demands for water resources and to exploit synergies between water uses, reuse and recycling, and ecosystem protection and ambient water quality.

Increased access to sanitation (SDG6.2) must be matched by increased wastewater treatment (SDG6.3) if good ambient water quality (SDG6.3) and healthy water-related ecosystems (SDG6.6) are to be sustained.

Good ambient water quality (SDG6.3) greatly facilitates the provision of safe drinking water (SDG6.1), which in turn must be provided sustainably (SDG6.4), without negative consequences for water-related ecosystems (SDG6.6).

Increasing recycling and safe reuse (SDG6.3) and water-use efficiency (SDG6.4), under the right governance structures (SDG6.5), makes more water available for drinking (SDG6.1) and other uses (SDG6.4) and can reduce impacts on water-related ecosystems (SDG6.6). Thus, sustainable water supply and use (SDG6.4), good ambient water quality (SDG6.3) and healthy water-related ecosystems (SDG6.6) are closely interdependent.

Source: UN-Water, 2016: Water and Sanitation Interlinkages across the 2030 Agenda for Sustainable Development.

The following target-level links within SDG6 are especially critical in the context of this study:

- ensuring the availability of a sufficient quantity (SDG6.4) and good ambient quality (SDG6.3) of freshwater resources in order to secure access to safely managed drinking water services (SDG6.1)
- achieving access to sanitation that is safely managed (SDG6.2), leading to improved ambient water quality (SDG6.3), which contributes to protecting water-related ecosystems (SDG6.6).

A representation of such links can be seen in North Africa and Western Asia, for example, where there is a correlation between the proportion of wastewater safely treated (SDG6.3.1a) and the proportion of the population using a safely managed drinking water service that is free from contamination (SDG6.1.1) (see Figure 3). This suggests these two indicators are correlated, with the absence of safe treatment of wastewater potentially preventing access to a safe drinking water service.

Given the links that exist between water resources and drinking water/sanitation services in the wider water cycle, a more coherent, holistic, outward-looking approach to drinking water and sanitation service delivery is required, not least to accelerate progress towards SDG6.

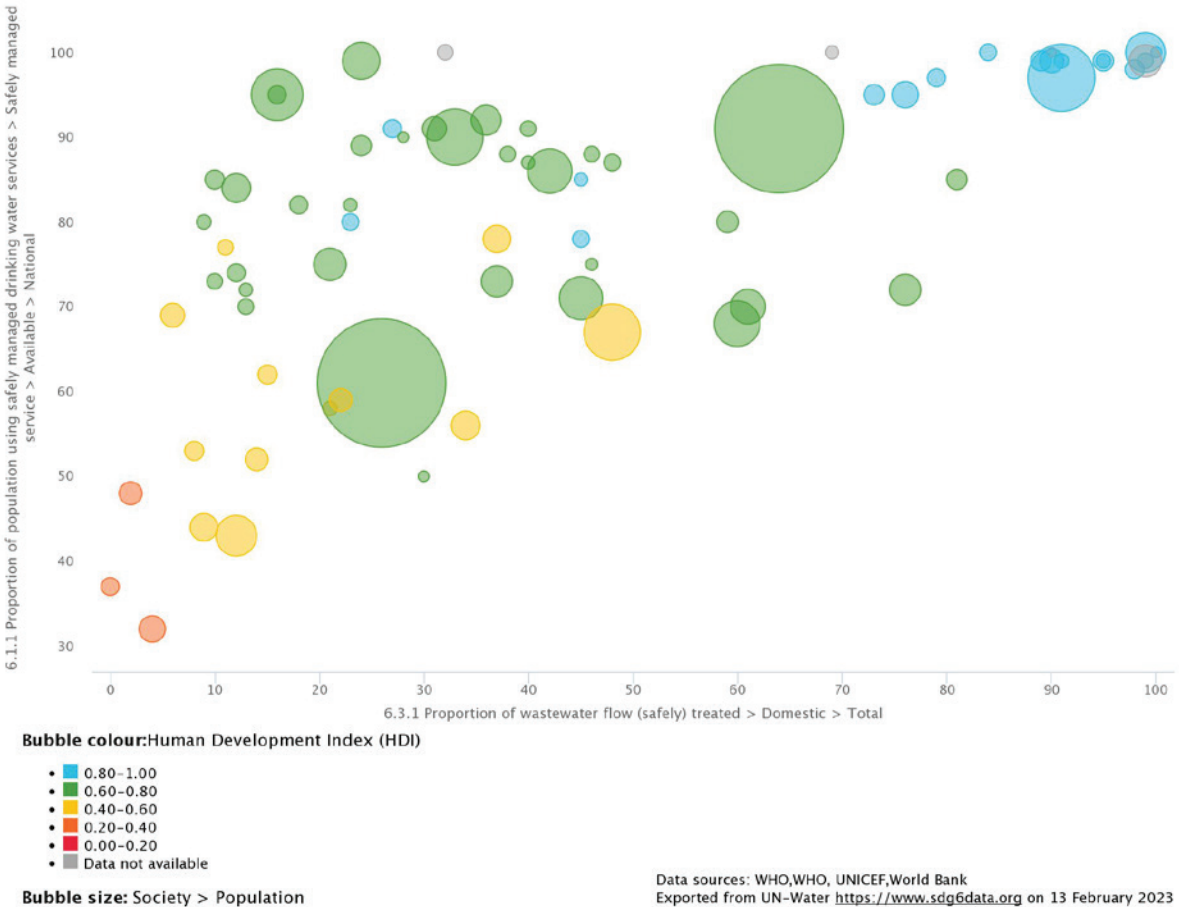


Figure 3: Proportion of population using a safely managed drinking water service available when needed (SDG6.1.1) vs proportion of household wastewater safely treated (SDG6.3.1a) (UN-Water, n.d.-b)

Respective roles of WRM and WASH in connected global agendas

Because of the central role of water in a vast array of sectors, effective cooperation between WRM and WASH actors contributes to advancing global agendas beyond the SDGs. Better alignment of policies and practices across WASH and WRM supports greater global policy coherence. Aligned WASH and WRM policies and strengthened cooperation between the two areas will help accelerate and sustain progress in the following agendas

- **Ensure basic WASH service continuity during disasters under the Sendai Framework for Disaster Risk Reduction (DRR)** through cooperation on structural and non-structural measures over the whole cycle of disaster management and resilience building (i.e., mitigation–preparedness–response–recovery–learning–adapting). This requires the assessment, design, construction and operation of drinking water and sanitation services, as well as assessment of hand-hygiene facilities and infrastructure that can contaminate water sources without drainage, while factoring in potential

changes in water quantity and quality caused by disasters such as drought or floods.

- **Under the Paris Agreement,** ensure climate-resilient WASH services through climate-change adaptation efforts. This requires an understanding of water resources, and planning for mitigating climate risks and uncertainty in changes to the quantity, accessibility and quality of water resources. With climate adaptation, WRM and WASH could together contribute to mitigation efforts, for example through better wastewater and sanitation management. Examples are improving operational conditions in wastewater treatment plants, **extending wastewater collection and treatment systems**, including through decentralized solutions, and **adopting resource recovery and reuse solutions**. Such solutions could be 'win–wins' for development, **sustainable operation of treatment systems** and climate-change mitigation.

- The goal of reducing risks and vulnerability is a shared vision, falling under the SDGs and the **2017 Agenda for Humanity: New Way of Working**. Better collaboration between WASH and WRM is of the utmost importance to: accelerating WASH service delivery in fragile and conflict-affected contexts; preventing water-related tensions between groups and political entities; and ensuring the HRWS. This cannot be achieved by focusing solely on humanitarian and emergency approaches. Emergency preparedness and prevention measures must be incorporated into policies and strategies, as well as in all planning, monitoring and review, institutional arrangements (service delivery, coordination and accountability), and capacity development.

- Progressively realize **HRWS** in the context of increasing competing demands on water resources, while **not undermining the realization of other rights**, such as **the human right to a healthy environment (HRHE)** (UN-Water, 2021a). Addressing HRWS is likely to become more prominent due to increasing pressure on scarcer resources and the threats arising from climate change and a lack of wastewater treatment and disposal, as acknowledged in a UNGA resolution on the HRWS (A/RES/74/141, 19 December 2019). While supporting the progressive realization of the HRWS, the fulfilment of human rights should not undermine or compromise other rights, including the HRHE, which could be undermined by unsafe wastewater and faecal sludge discharges into the environment.

2. WRM–WASH fragmentation

Water management is practised by numerous actors, including households, industries and farmers, who plan and arrange for their immediate and future water needs. At a strategic level, however, there are specific actors with mandated responsibilities for ensuring – by way of information, capacity development, regulation, economic incentives, etc. – that the totality of the water resources in a locality, region or country is protected, maintained and used sustainably.

For the purposes of this work, the use of 'WRM' in terms such as 'WRM–WASH links', 'WRM–WASH fragmentation' and 'joint WRM–WASH outcomes' refers to the actual discipline of WRM and the dedicated WRM institutions involved and their relationships with WASH. 'WRM' also encompasses environmental, agricultural, industrial and hydropower-related water resources needs, uses, influences and stakeholder groups. Of course, WASH service provision and WASH-related water resource uses, influences and groups are also part of WRM. However, the reality is that often WRM and WASH are treated in a fragmented way.

WRM–WASH fragmentation refers to the separation between the institutions involved in WRM (e.g., water resources divisions/ departments, basin or catchment authorities, etc.) and the actors involved in WASH (e.g., water and sanitation divisions/departments, water and sewerage utilities, domestic consumers, etc.). It also refers to the fragmentation seen between non-WASH water-resources-dependent and influencing groups (e.g., agriculture, industry, hydropower) and WASH actors, with or without the involvement of WRM institutions. Fragmentation is often generally referred to as 'silo' working or a 'silo-based' approach, where there is a breakdown in cooperation, or no cooperation exists. In addition, fragmentation could occur between WRM regulators (i.e., environmental-related to wastewater) and WASH-focused regulators (i.e., economic regulators and public health regulators).

The interest and priorities of different water users differ. Given the multiple interactions between water, sanitation and hygiene, environment, economy and society, some scholars argue that approaching issues from a water-centric frame is inadequate in achieving sustainable and equitable solutions. A shift is needed to understand the ways in which water matters to various actors and sectors. Breen et al. (2018), in explaining this in the context of understanding the fragmentation in agricultural wetland drainage, state that fragmentation

exists within institutional arrangements that manage water resources, such as a lack of coordination between drainage, watershed management and drinking water.

Fragmentation poses challenges because an action taken by one actor that influences the water resource that another actor relies on or aims to protect can have negative implications for the latter actor's interest. Examples of fragmentation include diffuse agricultural pollution upstream of a drinking water abstraction point caused by careless use of pesticides or lack of regulated use, or, conversely, a non-compliant urban wastewater discharge that damages the river ecosystem downstream of an underperforming wastewater treatment plant. This is why cooperation is necessary to maximize the positive co-benefits and minimize negative conflicts between users and uses of water resources.

Fragmentation can happen at any level – global, regional, national, municipal, and at community and basin, catchment and watershed levels – as well as across and between levels.

Fragmentation is seen at a global level, for example in the United Nations system, where UN-Water coordinates on water issues with 33 United Nations members,[6] each with a different stake in water, some from a WASH perspective, but most from a productive uses or environmental perspective. Related to this and in terms of international Official Development Assistance (ODA), the 'water and sanitation sector' (as defined by the Organisation for Economic Co-operation and Development (OECD) (OECD, n.d.), which includes WASH and WRM, is detached from other interested and relevant areas, such as irrigation, hydropower, water-related ecosystems and biodiversity. In the context of SDG6, efforts to overcome fragmentation at international and national levels are being seen, most notably through the UN-Water SDG6 Global Acceleration Framework (UN-Water, 2020a). This framework aims to support the building of a global movement in the international community, generating awareness and advocating for more unified, aligned and coordinated support to countries for accelerated progress across SDG6.

At a regional level, fragmentation can perhaps be most clearly seen through the dependence on transboundary river and aquifer basins, which are home to more than 40 per cent of the world's population (UN-Water, 2019b), but that often lack cooperation between countries. In some cases, the use of water resources in one country has negative implications for other countries, and cooperation on shared water resources may be lacking. Despite the importance of cooperation, global monitoring of SDG6.5.2 shows that arrangements for transboundary water cooperation are often absent, with only 59 per cent of transboundary basin area countries covered by operational arrangements in 2020 (UN-Water, 2021b) (see Figure 4).

At national level, fragmentation can usually be seen in the governmental institutional setup at national level. It is rarely the case that all WASH activities are governed in the ministry that also deals with WRM and environmental issues (Wetlands International, 2017). Even when WASH comes under the jurisdiction of the same ministry as WRM, silos exist within departments. WASH is often divided into 'water supply' and 'sanitation/hygiene' and institutionally split under different ministries,

6 UN-Water's Members and Partners all have specific mandates and focus areas related to water and sanitation. The list and who does what can be accessed at https://www.unwater.org/about-unwater/members/

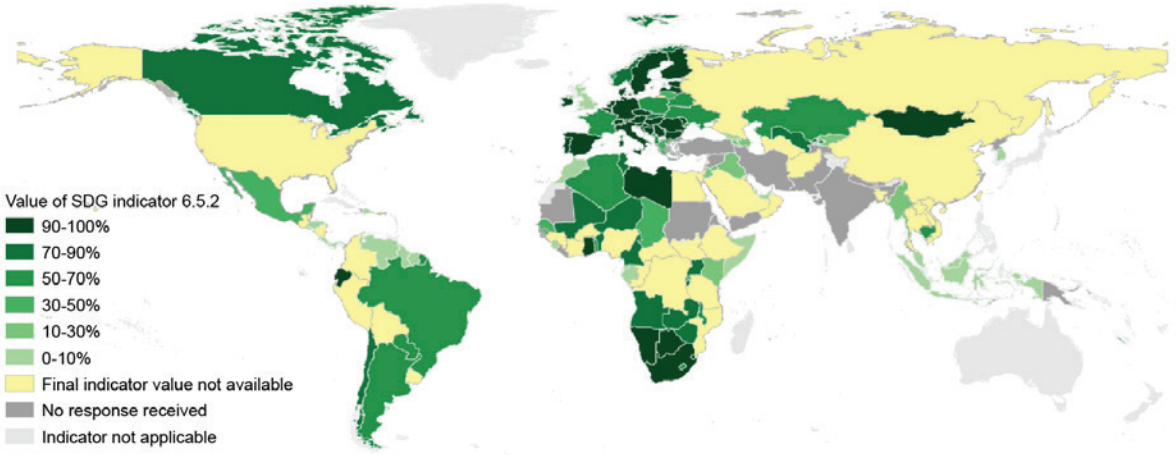


Figure 4: Proportion of transboundary basin area countries with an operational agreement for cooperation (UN-Water; UNESCO, 2021)

with water supply institutionally housed with or without WRM. In addition, fragmentation occurs due to different water resources user groups being split across multiple ministries, e.g., irrigation with agriculture, hydropower with energy, and water-related ecosystems with environment, with all of these having different institutional homes than WRM and/or WASH. Even if multiple areas of water are institutionally housed under the same ministry, it does not necessarily translate to cooperation and integrated approaches. This fragmentation is normal and perhaps unavoidable, due to the relevance of water resources across many areas.

Overcoming national fragmentation is important, however. Often, it is tackled through overarching water policies and inter-ministerial water coordination mechanisms. However, even where these policies and coordination mechanisms exist, they do not necessarily function effectively or consider water issues in an integrated way, as can be seen, for example, from evidence of a review of 10 Sector Performance Reports (see WRM–WASH Cooperation Area 16: Water resources monitoring). There are some notable examples of institutional fragmentation being addressed through the creation of dedicated, overarching water ministries, such as Ghana's Ministry of Sanitation and Water Resources and India's Ministry of Jal Shakti, which covers water resources and drinking water and sanitation.[7]

Even if fragmentation is not an issue at national level in government, it may be evident in the wider water sector, including within the United Nations and its partners. Different mission-based, water-related development partners and organizations may have different priorities (Wetlands International, 2017), which may be reinforcing or conflicting. Unfortunately and despite the best of intentions, the emergence of a WASH 'sector' and its promotion by WASH actors as a sector in its own right (IRC, 1999) may have contributed to WRM–WASH fragmentation. There are examples

7 May 2019 under the second Modi ministry. This was formed by merging two ministries: the Ministry of Water Resources, River Development & Ganga Rejuvenation and the Ministry of Drinking Water and Sanitation. url: https://en.wikipedia.org/wiki/Ministry_of_Jal_Shakti, https://jalshakti.gov.in/

where WASH-specific policies and strategies have been developed through ODA, with little or no reference to its links with water resources.[8] The narrow focus of such policies, strategies and national plans risks sending the wrong message to those enacting them. Furthermore, with project interventions accounting for 85% of water supply and sanitation aid in 2013 (WaterAid, 2017), aid dependence may also play a role in promoting fragmentation, as projects are often required to have very specific objectives. One could speculate that due to the often huge WASH financing gap (Hutton & Varughese, 2016), ODA may be welcomed by governments, with a lower priority placed on aligning donor-funded initiatives with policies on water resources and associated plans. This is a situation where non-governmental WRM–WASH fragmentation can contribute to or exacerbate general water sector fragmentation.

In the 2021 Global Water Policy Report (Water Policy Group, 2021), national water leaders pinpointed 'fragmented water institutions' as the challenge of greatest concern for good water management. This challenge, highlighted as being within the control of governments, may be compounded by similarly fragmented external support. *The Evaluation Synthesis of UN System and Development Bank Work Toward SDG 6* (UNICEF, 2021b) has suggested that increased synergies between projects and organizations are needed to meet targets and optimize outcomes more efficiently. This echoes the findings of an evaluation of UNDP projects *Ensuring Water Access to Safe and Clean Water Resources* (Garcia & Kunová, 2021), which indicated that programme coherence between IWRM and WASH programmes creates positive synergies.

A legacy of generally fragmented United Nations support to countries has led to United Nations Development System Reform since 2019 (UN, n.d.), with the emergence of a revised framework for country support that is more responsive to the needs of countries. The United Nations Sustainable Development Cooperation Framework (UNSDG, 2019) is intended for use by United Nations Country Teams (UNCT) and United Nations agencies in-country to provide more coordinated and integrated support to Member States in tackling their most pressing development issues, which could include water, and may require drawing from UN and partner expertise from outside the country. In this context, UN-Water has launched a Task Force on Country Level Engagement and a Pilot Offer to United Nations country offices globally, which aims to bring together United Nations agencies interested in water issues in-country and to provide them with support, including under the SDG6 Global Acceleration Framework.

Sub-nationally (i.e., at provincial/district, municipal, community, basin, catchment or watershed level), there are numerous possible reasons for fragmentation. Perhaps the first and most obvious is a mismatch in multi-level governance between WRM and WASH, caused by differences in institutional decentralization and administrative arrangements. While WRM is sometimes either fully centralized at national level or decentralized at regional/basin level, WASH is more often fully decentralized, with authority for service provision delegated to district/provincial government, and technical staff situated in district or provincial headquarters. These mismatches may hinder full communication and cooperation at the sub-national level.

Another reason for fragmentation is the fact that WRM and WASH programmes, projects and activities tend to be operational on different scales, be it district (WASH) or basin (WRM), or be it whether target groups are households

8 The Papua New Guinea (PNG) National Water, Sanitation and Hygiene (WASH) Policy 2015–2030 can be accessed here: https://png-data.sprep.org/system/files/WaSH_POLICY04.03.2015.pdf

and communities (WASH) or non-citizens (WRM), with the different profiles of actors further complicating the picture. WRM may be purely government led, whereas local WASH actors may be a mix of government and non-government (Wetlands International, 2017).

Another issue at sub-national level is the lack of involvement of WASH actors and domestic water user groups in wider basin, catchment or watershed platforms, where issues on productive uses of water and the environment are discussed and agreed (see WRM–WASH Cooperation Area 1: Basin, catchment and watershed management). This may be for many reasons, possibly because platforms do not exist for public consultation, or the power imbalances that exist between domestic water user groups, government officials, irrigation associations, and industry and energy groups. Better engagement and coordination among different water resource users – particularly women, who are ultimately water stewards in their households and on smallholdings – may be an opportunity to find common ground, avoid conflict and find synergies that could lead to cost savings, e.g. in multi-purpose water infrastructure development (see WRM–WASH Cooperation Area 3: Muti-purpose water infrastructure development), or in agricultural groups benefiting from municipal wastewater and sewage-sludge reuse (see WRM–WASH Cooperation Area 6: Wastewater use).

The divide between urban water users and rural custodians of basin water sources adds another aspect to fragmentation. In several Latin American countries, partnerships between urban users and rural custodians have been established through the efforts of The Nature Conservancy's Water Funds.

In the context of fragile and conflict-affected regions, the humanitarian–development divide exacerbates fragmentation between WRM and WASH.[9] The New Deal for Engagement in Fragile States[10] recognized that development cooperation in fragile states differs fundamentally from engagement with 'other developing countries', and that success requires both aid donors and recipients to 'do things differently' by designing interventions that reflect the unique context of fragility in each state. This must be taken into account when assessing such fragmentation. In fragile contexts, strengthening accountability among different actors becomes even more crucial, not just in WASH service delivery, but also among WRM stakeholders. In fragile and conflict-affected countries, WASH services are mostly led by external support agencies, which increases the complexity of interrelationships. These services are often provided as part of humanitarian aid efforts. However, over the years, there has been a growing need to focus on the convergence of humanitarian and development efforts across WASH programming approaches, such as the 2017 Agenda on Humanity: New Way of Working (OCHA, 2017). The UNICEF report on *Water Under Fire* (2019) highlights the need for WASH programmes in fragile and conflict-affected countries to focus on the humanitarian–development nexus (HDN),[11] in order to reverse the slow progress in WASH service delivery, to prevent water-related tensions between groups and political entities, and to secure the HRWS for all, at all times.

It is important to focus on this strong relationship between water and the HDN from the perspective of water demands, particularly when considering primary uses of water for drinking and sanitation. Furthermore, inclusive

9 A 'fragile' context is one in which there is exposure to risk where the state, system and/or communities have insufficient coping capacity to manage, absorb or mitigate those risks.

10 The New Deal for Engagement in Fragile States can be accessed here: https://europa.eu/capacity4dev/public-fragility/wiki/new-deal-engagement-fragile-states

dialogue on the water sources and services provided will not only promote development, but also help to avoid conflict and facilitate peace negotiations, promoting the triple nexus. This aligns the ambitious targets set by the SDGs and the commitments of the Grand Bargain, as part of the Agenda for Humanity: New Way of Working initiative to not only meet the SDGs, but also to reduce risk, vulnerability and overall levels of need (SIWI & UNICEF, 2020).

Fragmentation, while understandable, is difficult to overcome and requires a concerted effort from all concerned actors and progressive reforms, especially due to the wide range of stakeholders involved in the water sector. Now, with the impetus of the SDGs and climate change, the recognition that WASH cannot and should not be acting in isolation and that wider cooperation on water is key to progress is leading to reform in WASH approaches. This momentum needs to be further capitalized on.

WRM–WASH fragmentation and SDG6 progress

SDG6 is off track (UN-Water, 2021b): unless the current rates of progress increase substantially, SDG6 targets will not be met by 2030 (UN, 2020). The global trend shows that for access to safely managed water and sanitation and the required growth to meet the targets by 2030, a fourfold increase in current progress is required (UN-Water, 2021b). There is also acceleration needed to meet other SDG6 targets, for example a doubling in the current rate of progress for the degree of IWRM implementation (SDG6.5.1) (UN-Water, 2021b). Another example is SDG6.3.1 on wastewater, where only 59 per cent of all domestic wastewater flows are collected and safely treated (UN, 2018) and where an acceleration in safely managed sanitation (SDG6.2.1a) would directly support progress.

Fragmentation is one key bottleneck for progress with SDG6, with policy and institutional fragmentation between levels, actors and sectors meaning that decisions taken in other sectors (e.g. agriculture, energy, health, environment) often do not consider the associated impacts on water availability and water quality, and issues do not receive the necessary political attention (UN-Water, 2020a). In this context of insufficient progress hindered by fragmentation, UN-Water launched the SDG6 Global Acceleration Framework, which aims to deliver fast results at increased scale as part of the Decade of Action to deliver the SDGs by 2030 (UN-Water, 2020a). The framework sets out the international community's support to countries through four action pillars and five accelerators (see Box 2). The action pillar 'align' focuses on 'reducing fragmentation through aligning operational and financial strategies, policies and approaches in support of countries'.

One of the aims of this report is to provide practical guidance and entry points for governments, the United Nations and other stakeholders at country level for structuring discussions and taking action to overcome WRM–WASH fragmentation. Recommendations for how WRM–WASH cooperation can contribute to operationalizing the SDG6 Global Acceleration Framework at country level are given in the Conclusion.

11 'Peace' is also often added to this relationship, referred to as the humanitarian–development–peace nexus, or 'triple nexus'.

Box 2: SDG6 Global Acceleration Framework (UN-Water, 2020)

The SDG6 Global Acceleration Framework aims to deliver fast results at increased scale as part of the Decade of Action to deliver the SDGs by 2030. By committing to the framework, the United Nations system and its multi-stakeholder partners, driven by country demand and coordinated through UN-Water, will unify the international community's support to countries to rapidly accelerate towards national targets for SDG6.

The international community will catalyse broad stakeholder action by dramatically improving support to countries to achieve SDG6 on water and sanitation through four action pillars (engage; align; accelerate; and account), with action driven by five accelerators:

1. Financing. Optimized financing is essential to get resources behind country plans.
2. Data and information. Data and information target resources and measure progress.
3. Capacity development. A better skilled workforce improves service levels and increases job creation and retention in the water sector.
4. Innovation. New, smart practices and technologies will improve water and sanitation resources management and service delivery.
5. Governance. Collaboration across boundaries and sectors will make SDG6 everyone's business.

It is important to note, that under the 'align' action pillar, the SDG6 Global Acceleration Framework will reduce fragmentation through aligning operational and financial strategies, policies and approaches in support of countries. One strategy for achieving this is committing to sustainability by supporting whole-systems approaches. In this context, the framework will reduce policy and institutional fragmentation between levels, actors and sectors, including harmonization of the different mandates of institutions.

3. WRM–WASH cooperation

Based on a literature review and expert consultation (see Annex A), a conceptual framework for WRM–WASH cooperation is proposed (see Figure 5). The intention of the framework is to set out the key cooperation areas that can form concrete and tangible entry points for WRM and WASH actors to cooperate on in working towards achieving the joint outcomes. The cooperation areas have been defined based on what might be considered to be widely established and recognized topics or sub-disciplines. They reflect areas where both actors must cooperate for success, rather than areas where WRM can influence WASH (or vice versa) without any interaction.

The five joint outcomes naturally overlap (e.g., 'drought and flood disaster resilience' and 'climate-resilient WASH'), and the foundational outcome 'integrated water resources management (IWRM)' overlaps all the other outcomes. This means it is unlikely that one area will be considered completely independently of the others, and in fact it is recommended to keep the overlap and links in mind when using this framework, in order to consider issues and solutions in an integrated way. WRM–WASH cooperation areas may also overlap to some extent, for example upstream–downstream links between source-water protection and pollution prevention.

What follows is a more in-depth exploration of each of these outcomes and cooperation areas, providing the reasons why cooperation is needed to achieve each outcome and illustrating what successful cooperation looks like. Case studies offer examples of where cooperation has helped overcome fragmentation. The case studies presented here are sometimes relevant for multiple outcomes and cooperation areas, again highlighting the interlinked nature of the framework.

Joint Outcome 1: Equitable water resources allocation

Water use in WASH is small when compared with other water resources uses, especially agriculture, which typically accounts for 70 per cent of a country's water use (World Bank, 2018). In the context of the HRWS, General Comment 15 states that 'priority in the allocation of water must be given to the right to water for personal and domestic uses,' along with water for other covenant rights, including 'the right to adequate food' to prevent starvation and disease through subsistence farming (UN, 2003). There are some examples of multi-sectoral and systematic approaches to the prioritization of water allocation for domestic uses at local levels, for example in Indonesia (Dinar et al., 1997) and Thailand (Bird

et al., 2008). The prioritization of the HRWS may not always, however, translate into WASH being adequately considered in water resources planning and allocation processes. A lack of prioritization may lead to inequitable water resources allocation, violation of the HRWS and conflicts between competing water resources users and uses. At the same time, prioritized allocation of water for domestic purposes and unconditional transfer of water for HRWS under drought conditions, if not done with some incentives and monitoring mechanisms, can disincentivize water utilities to save water and exacerbate water scarcity for other water resources users, such as small-scale farmers, as in Tanzania (Komakech et al., 2012).

Joint WRM-WASH Outcomes		WRM-WASH Cooperation Areas	
1	Equitable water resources allocation	1	Basin, catchment, and watershed management
		2	Inter-basin water transfers
		3	Multi-purpose water infrastructure development
2	Sustainable water management	4	Source water protection
		5	Pollution prevention
		6	Water reuse
3	Drought and flood disaster resilience	7	Drought and flood mitigation and preparedness
		8	Drought and flood monitoring and Early Warning Systems
		9	Drought and flood response and recovery
4	Climate resilient WASH	10	Climate vulnerability and adaptation assessment
		11	Climate resilient Water Safety Planning
		12	Climate finance
5	Integrated water resources management	13	Water policy and strategy formulation
		14	Water sector coordination processes
		15	Water sector planning processes
		16	Water resources monitoring
		17	Environmental, service, and public health regulation
		18	Capacity development on WRM-WASH linkages

Figure 5: WRM–WASH cooperation framework

As water resources planning encompasses all water resources uses, including WASH, it is logical that domestic water use must be a key consideration at every step of decision-making for water resources planning and allocation processes. Domestic water user groups and WASH actors should be involved in these processes (see WRM–WASH Cooperation Area 1: Basin, catchment, and watershed management). Improved cooperation in water resources allocation to ensure equitable water resources allocation in all contexts (see WRM–WASH Cooperation Area 2: Inter-basin water transfers) and through exploiting synergies (see WRM–WASH Cooperation Area 3: Multi-purpose water infrastructure development) can contribute to fulfilment of the HRWS, while also meeting the needs of productive water user groups.

Thus, water allocation must consider several factors, including water scarcity, where better cooperation is needed to prioritize water allocation for drinking and domestic use in water-scare situations, ensuring that wastewater does not undergo expensive treatment procedures if it can be used for agricultural irrigation safely.

Three key areas of WRM–WASH cooperation for equitable water resources allocation are:

- basin, catchment and watershed management
- inter-basin water transfers
- multi-purpose water infrastructure development.

An overview of each cooperation area follows. Opportunities for equitable water resources allocation are presented at the end.

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COOPERATION AREA 1: BASIN, CATCHMENT AND WATERSHED MANAGEMENT

Why is WRM–WASH cooperation important?

WASH actors, such as service providers and domestic water user groups, should be actively engaged in discussion and decision-making about basin, catchment and watershed management to: i) ensure that the water allocation and water quality needs of WASH services are adequately considered in the context of the competing demands of different user groups; and ii) understand how upstream WASH services influence water resources flows and water quality downstream for other user groups.

Basin, catchment and watershed management starts with setting national policies, laws, regulations and plans for water resources based on sound data, and extends to water resources planning and management, for example through Water Resources Users Associations (WRUAs) or similar bodies at basin, catchment and watershed level. At local and community level, water resources planning and allocation occur more informally, including through dispute and conflict resolution mechanisms, rather than more official, formal structures.

Management processes, water allocation, and monitoring and exchange of information on flooding and infrastructure projects also occur at transboundary level, i.e., when two or more countries share a river or aquifer basin. These are influenced by different interests and objectives for water use, and often linked to national development and security objectives. The overexploitation of water resources in one riparian country can endanger the ecosystem of another and have dire consequences for the reliability and sustainability of water supplies, creating tension if those impacts present challenges for riparian neighbours (UN-Water, n.d.). To mitigate conflicts over shared resources, international water treaties and agreements are signed between riparian and river basin organizations as institutions are

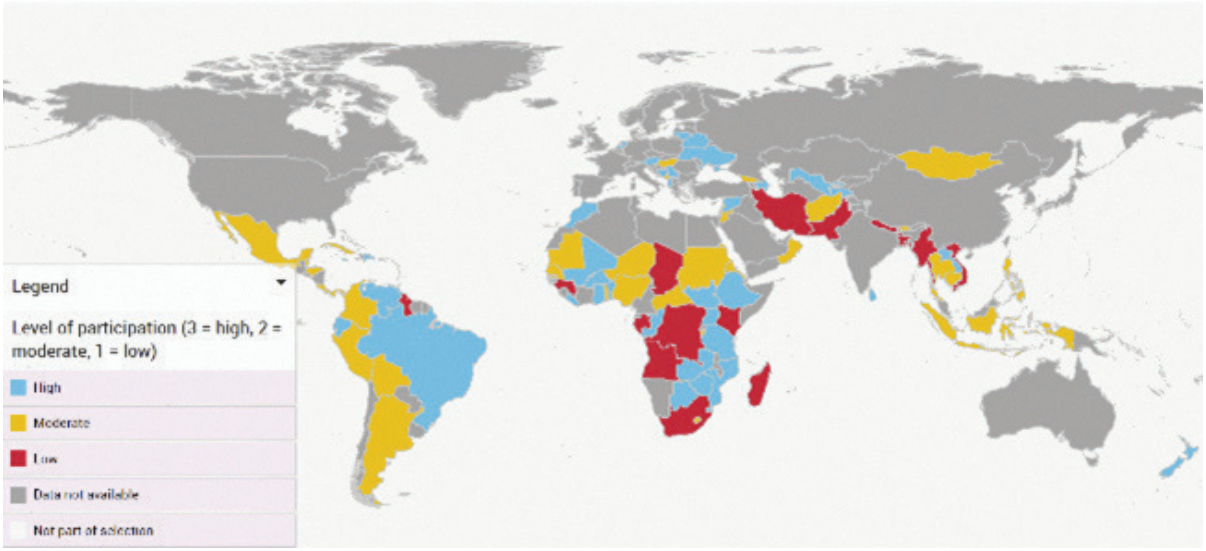

Figure 6: Extent of local community participation in water resources planning and management (SDG6.b.1) (UN-Water, n.d.-a)

established. These are based on the principles of international water law and management and provide the platforms and instruments for joint river basin management, such as Joint River Basin Organizations (JRBOs). It follows that strengthening institutional arrangements nationally and locally in order to monitor, assess and manage shared resources is a prerequisite for transboundary water cooperation. Examples of cooperation are:

- development of Environmental Impact Assessments (EIAs) that are aligned with internationally recognized best practice
- development of international River Basin Management Plans (RBMPs)
- shared data and information management
- design and implementation of joint monitoring programmes and networks
- well-established systems of monitoring and data-sharing, such as early warning systems for extreme hydrological events across riparian states (Schmeier & Vogel, 2018).

These planning and management processes require the participation and cooperation of a diverse set of stakeholders, each with a stake in the water resources within a defined geographical area, including domestic water users and user groups, and WASH actors acting on behalf of domestic water users. To ensure equitable water resources allocation, basin, catchment and watershed planning and management approaches need to be inclusive, with representation from all users and actors within the water resources unit of planning and management (e.g., the basin or catchment). Inclusive processes, including for women and indigenous, minority and vulnerable groups, will ensure that all voices are heard. This is particularly important where a basin or catchment hosts significant agricultural activity, particularly in rural areas, where the voice of domestic user groups may carry less weight.

SDG6.b.1 measures the level of community participation in various aspects of water and sanitation management at country level, including in water resources planning and management. Although the global baseline is incomplete, data shows that although most reporting countries have procedures defined in law or policy for the participation of local communities in water resources planning and management nationally, actual participation is low (see Figure 6).

Where participation does occur, interaction between communities and the local water resources authority is needed. Examples of citizen–state dialogue on coordinating WRM and WASH planning and allocation locally can be seen in Kenya (Laikipia and Kajiado Counties), where a Water Dialogue Forum (WDF) model has been adopted. This model aims to empower citizens to:

- engage meaningfully in citizen–state dialogue for development initiatives
- promote coordinated planning at catchment level
- avoid the duplication of initiatives (Gai & Jeths, 2017).

Also in Kenya (IRC, 2014), the Resources, Infrastructure, Demand and Access (RIDA) framework is used. This innovative model applies an integrated, area-based planning approach encompassing all local water uses (domestic, livestock, agriculture), all local water resources and all local water stakeholders (e.g., operators, users, government). Examples fall under the International Union for the Conservation of Nature (IUCN) Water and Nature Initiative and Tacaná project (in Mexico/Guatemala) (Barchiesi & Córdoba, 2016).

The project developed a water planning and community management model through broad community participation, engaging local political authorities in environmental management, building community capacity in IWRM and forging strategic collaboration with government and non-governmental organizations (NGOs). Under this initiative, 14 micro-watershed councils were formed in Guatemala and nine committees in Mexico, comprising local governments and communities living within watersheds, thus facilitating collaboration across different levels and sectors.

COOPERATION AREA 2: INTER-BASIN WATER TRANSFERS

Why is WRM–WASH cooperation important?

Cooperation between WRM and WASH actors is required for planning and executing the transfer of raw untreated water, treated water and/or wastewater between basins or within a basin to resolve imbalances in supply and demand within a recipient basin. Cooperation is particularly important to ensure that Inter-Basin Water Transfers (IBTs) do not compromise the domestic water needs in the source basin, or damage the environment in either basin.

Water resources assessments and planning at basin or catchment level may reveal an existing or projected deficit in water resources due to demand exceeding sustainable supply. Often, a real or perceived deficit may be due to increasing water demand related to the socio-economic development aspirations within a certain basin. In these circumstances, inter- or intra-basin water transfers may become an attractive option to address perceived water scarcity in a recipient basin by drawing surface water or groundwater from a 'donor' basin that has a perceived water surplus.

Inter-Basin Water Transfers (IBTs) are often controversial (Pittock et al., 2009) and may become increasingly so, in the context of

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uncertainty over localized climate-change impacts. However, IBTs are a reality in many countries and require WRM–WASH cooperation for multiple reasons. Although IBTs can sometimes benefit the municipal water supply in the recipient basin, including in meeting domestic WASH needs,[12] usually, IBTs are primarily for the benefit of other water resources uses – primarily irrigation, hydropower and flood and drought management.

As IBTs have implications for water resources users in both donor and recipient basins, both from a water quantity as well as a water quality perspective, cooperation is required to ensure allocations remain equitable between and within basins, and to avoid environmental damage.

Given the usual trend of IBTs being implemented for non-WASH water resources needs, the main rationale for WRM–WASH cooperation on IBTs is from the WASH perspective to ensure that withdrawals from the donor basin do not have immediate implications for access to WASH services, primarily from the donor basin. The WASH users most vulnerable to inequitable water resources allocation due to IBTs are rural communities, who may have limited influence over the decisions made about large-scale IBTs. This makes WASH involvement in IBT planning and consultation critical, in order to protect the human right to water for the most vulnerable in the donor basin, who may already be experiencing low levels of drinking water. This means that not only municipal WASH service providers need to be engaged in IBT planning and consultation, but also domestic water user groups in rural areas. During IBT planning, it is important for WASH actors to ensure assessments of the amount of surplus water in the donor catchment take into consideration potential increases in demand that are required to meet the gap between baseline drinking water service levels and the advanced service levels required for safely managed water.[13] In addition, the intended recipient basin must demonstrate that other demand and supply management solutions have been exhausted: these solutions include improving irrigation efficiency or investigating solar power. IBT planning must also be climate resilient, ensuring monitoring systems and preparedness plans are in place to cope and adapt to disasters and uncertainties, along with ensuring WASH actors are provided with timely and reliable data.

In the relatively small number of cases where an IBT benefits WASH in a recipient basin, WASH providers must engage with WRM actors, primarily to prevent or mitigate ecological damage to both the donor and recipient basins and to ensure that WASH and non-WASH water resources user groups in the donor basin are still able to have their water resources needs met. Furthermore, in cases when treated or untreated wastewater is disposed of in other basins as a result of IBT, ambient water quality should be ensured in the recipient basins.

Despite increasing evidence and pressure to only use IBT as a last resort (Pittock et al., 2009), after exhausting other approaches in the recipient basin, such as water conservation, wastewater reuse and desalination, IBTs are likely to continue to receive interest and WRM–WASH cooperation will be important in upholding equitable water resources allocation.

12 See, for example Vishakhapatnam and Chennai in India (CMDA, 2010); Israel, Lesotho and South Africa, Botswana, Mexico, and Lima, Peru (Snaddon et al., 1999); Beirut, Lebanon (FAO & IHE-Delft, 2019); and Iran (National Research Council, 2005).

13 Note that SDG6.1 requires everyone to have a drinking water source on their domestic premises.

COOPERATION AREA 3: MULTI-PURPOSE WATER INFRASTRUCTURE DEVELOPMENT

Why is WRM–WASH cooperation important?

Cooperation by WRM and WASH actors to jointly plan, design, finance and execute infrastructure projects of different sizes that factor in multiple uses of water is important to ensure that synergies and efficiencies are exploited. This can ensure more equitable water resources allocation between water resources user groups and help to avoid conflict.

A key area of WRM–WASH cooperation is exploiting synergies and financing large-scale, multi-purpose water infrastructure (e.g., multiple-use dams) or small-scale Multiple Use Water Services (MUS) programmes (Barbara Van Koppen & Stef Smits, 2010) for mutual benefit. Depending on the scale of the project, cooperation may be between WRM institutions and WASH actors, along with other relevant user groups for larger projects (e.g., agriculture, industry, energy etc.), or directly between different user groups (e.g., WASH with agriculture) without WRM institution involvement, particularly for micro- and small-scale community projects.

Cooperation is key to ensuring that different water user groups are involved in the consultation and design phase of projects. This helps to ensure that the proposed infrastructure brings multiple benefits and helps to prevent or mitigate any negative implications for water resources user groups, thus ensuring equitable water resources allocation and upholding the human rights to water and a healthy environment. If water services are not planned in an integrated way, this can lead to conflict, as seen in Peru, where a small rural water supply system has been built and destroyed more than once because upstream users from another community wanted water from that source for their cows (Kome & Willet, 2006).

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Case study 1: Water-use master planning in Nepal

Nepal is a mountainous country with a majority rural population. In the Far and Mid-Western regions, food insecurity and water scarcity are common in these characteristically dry regions, which receive on average 1,500mm less annual rainfall than Eastern Nepal. With population growth and climate change, water is becoming increasingly scarce, driving growing demand and conflict over water for domestic, agricultural and industrial uses. Decision-making for water planning at community level has often resided with powerful social elites and political parties, often failing to reflect the priorities and needs of all stakeholders, especially marginalized groups. In this highly patriarchal society, women have traditionally had limited influence, control or even access to water. Additionally, well-voiced and organized communities manage to secure greater and renewed investment and attention from development actors, resulting in a skewed distribution of resources. This type of top-down planning, with little community engagement and participation, often results in a lack of sustainability and resilience in water projects.

Since 2015, Nepal has been changing to a federal system of government. Municipalities are responsible for formulating policy, rules and standards, and for planning, budgeting, implementing, monitoring and regulating in respect of the water sector, including for WASH services and agricultural sector development. While typically a men's domain, local water management is going through unprecedented transformation, as the increased outward migration of men has skewed village populations towards women, making their participation in water management and governance ever more important.

The Rural Village Water Resources Management Project (RVWRMP) is an example of a participatory approach towards equitable water resources allocation at community level. It has pioneered participatory approaches of 'multiple-use water services' at scale and embedded these in local government. RVWRMP leveraged localized decision-making for the development of water systems, putting it into the hands of those who will interact with and use water systems the most, through the employment of Water Use Master Plans (WUMPs). First piloted in Nepal in 1998, a WUMP is a 17-step participatory and inclusive approach, with plans designed and implemented locally and based on the principles of Integrated Water Resources Management (IWRM). In the pre-planning phase, a Village Development Committee (VDC) is identified and ward committees are established. During planning, ward committees and the VDC identify existing assets, water sources and needs, and determine the priorities for a five-year period. In the post-planning phase, the WUMP is introduced at district level in an attempt to secure interest and financing for actions on the priority list. A critical dimension was to ensure that the WUMP's goals were responsive to gender equality and social inclusion. Studies were conducted to understand the extent and appropriateness of disaggregated data and how these data were used to inform the WUMP.

The majority of WUMP priorities related to drinking water supply, with 59% of schemes centred on gravity-flow piped drinking water. However, 68% of the schemes were used for vegetable growing (in addition to domestic uses), as the project's design allowed less time to be spent on water collection and promoted the use of tap-stand drainage for irrigating home gardens and small vegetable plots. Even when drinking water was the priority, few schemes (28%) were designed to service only drinking water, and this was where drinking water needs coincided with very low water flows and limited volumes of water available to households. Significant improvements in drinking water service levels were achieved, with water-fetching times, most often a burden faced by women, improving from 20.5% of households reporting a fetching time of 15 minutes or less to 47.6% of households achieving this in a four- to five-year period. Lower fetching times meant households were now able to sustain home gardens (taken up by 11,581 additional households) and increase livestock numbers.

There are cases where drinking water and productive water resources uses have been successfully incorporated into project design, operation and maintenance, helping to improve the financial stability of a user organization (Kome & Willet, 2006), with agricultural and other large-scale users contributing to cost recovery. There are also examples of financing of multi-purpose water infrastructures, such as dams in Lebanon (IFAD, 2015), and many examples of project support for local MUS to integrate development objectives (food security, livelihoods, health, gender equality etc.) through the use of WUMPs (see Case study 1) (Helvetas, n.d.), Madagascar,[14] Honduras,[15] the UNDP intervention on community water initiative in Mali, Niger and Senegal,[16] and integrated water harvesting technologies in Yemen[17]). These initiatives, sometimes with the objective of building climate resilience, help to overcome fragmentation between water resources users and uses locally and promote the involvement of government WRM institutions and WASH actors. The involvement of development partners and Civil Society Organizations (CSOs) in these local projects can contribute to overcoming institutional fragmentation.

OPPORTUNITIES TO COOPERATE FOR EQUITABLE WATER RESOURCES ALLOCATION

- **Raise awareness among non-WASH actors, including WRM and other water user groups, on the HRWS and build capacity on how to plan for and implement equitable water resource allocation.** The Human Rights Based Approach (HRBA) to IWRM Training Manual and Facilitators Guide (Cap-Net UNDP et al., 2017) provides a practical, step-by-step approach to do just that. It can be disseminated to relevant stakeholders, including through orientation and training sessions held in communities. This may also raise awareness among domestic water user groups and communities to build capacity to defend their rights, and encourage domestic water user group engagement in basin, catchment and watershed management.

- **Close the policy implementation gap on community engagement in WRM (SDG6.b.1) and support meaningful WASH engagement in basin, catchment and watershed management.** This can be supported in several ways, through legislation and regulatory enforcement and also by bridging the gap by building bottom-up IWRM (Wetlands International, 2017) through grassroots, informal, micro-level watershed management entities, such as what has been done using the WDF and RIDA models in Kenya and the Tacaná project in Mexico and Guatemala. These informal structures present an opportunity to link with more formal mechanisms at higher levels. Raising awareness among communities about WRM–WASH links is an important strategy for encouraging WASH engagement in bottom-up WRM. It is especially important to ensure the active participation of women in both informal and formal mechanisms.

14 Multiples Uses of Water in Madagascar: drinking water, agriculture and livestock, UNICEF, 2018. url: https://www.unicef.org/media/91361/file/Multiple-Uses-of-Water-in-Madagascar-drinking-water-agriculture-and-livestock.pdf

15 Caring for and learning to manage water: Adaptation measures to climate change, to reduce stress due to water scarcity, UNDP, 12 February 2017. url: https://pnudhonduras.exposure.co/cuidando-y-aprendiendo-a-manejar-el-agua

16 Community water initiative in Mali, Niger and Senegal creating community-based water and sanitation schemes to improve food security, livelihoods and resource conservation. UNDP, 2013. url: https://sgp.undp.org/images/CWI%20FINAL%20PDF.pdf

17 Integrated Water Harvesting Technologies to Adapt to Climate Change Induced Water Shortage – Yemen, UNDP, 2013. url: https://www.adaptation-undp.org/sites/default/files/downloads/yemen-ldcf.pdf

© UNICEF/UN0348914/Modola S

- **WRM institutions should strive to make water resources monitoring data available to WASH service providers, who should in turn strive to make in-house water resources monitoring data (e.g., flow, abstraction/ discharge, water quality) available for basin planning.** Free information-sharing and capacity development on data use will help to stimulate more robust basin, catchment and WASH services planning.

- **Cooperate to avoid the need for IBTs and to avert the negative impacts of IBTs on the HRWS, equitable water resources allocation and the environment.** Joint work by WRM and WASH actors to demonstrate other strategies (e.g., water-supply augmentation or irrigation efficiency) to meet demand in the intended recipient basin can help avert IBTs. If IBTs go ahead, WRM–WASH cooperation is key to ensuring that the HRWS is upheld, including through ensuring that projected demand in the donor basin factors in progressive service-level improvements needed for achieving SDG6.2.1, and so that affected WASH communities are compensated with alternative water supplies.

- **A paradigm shift to design and implement small-scale MUS that transcend water sub-sectors is required to develop resilient and sustainable water services that factor in current and future integrated development objectives of communities** (Wetlands International, 2017). There are good examples of where MUS projects have aligned at local levels with different development objectives, resulting in more financially sustainable services, thanks to higher levels of cost recovery for MUS operation and maintenance. These could serve as models for large-scale institutional integration, as seen in Nepal (Helvetas, n.d.), where the MUS approach is embedded in local governance mechanisms. WRM–WASH cooperation at the consultation and design

stage is particularly important to ensure a balanced approach. The MUS approach also provides an avenue to instill environmental sustainability by explicitly incorporating environmental flows as another multiple use (Bonnardeaux, 2012). MUS could also serve as an entry point to integrating local source-water protection, including through a localized Payment for Ecosystem Service (PES) that implements catchment management activities using a portion of MUS user fees.

Joint Outcome 2: Sustainable water management

In the context of the global crisis of increasing water stress, water scarcity and deteriorating ambient water quality, sustainable water management is increasingly critical and can only be achieved through close WRM–WASH cooperation.

Lack of connected upstream/downstream cooperation between WRM and WASH actors on sustainable water resources abstractions and discharges may lead to environmental damage, biodiversity and livelihood losses, inefficient water use and direct and indirect risks to human health through exposure to, or consumption of, polluted water.

WASH actors and water resources users are accountable to one another to ensure their respective use of water resources is sustainable. This means that one user's use of water does not infringe on another user's ability to secure a sufficient quantity and quality of water for their needs and will not cause environmental degradation. This essentially requires each actor to gain a deeper understanding of, and appreciation for, their place in the water cycle and the potential upstream and downstream influence or impacts their behaviour may have on another group or the environment (Gaya et al., 2020). Joint efforts from WRM and WASH actors and water resources user groups are needed to:

- reduce the volume of water resources abstracted from the environment (see WRM–WASH Cooperation Area 6: Wastewater reuse),
- reduce pollution arising from their respective activities (see WRM–WASH Cooperation Area 5: Pollution prevention), and
- take steps to protect strategic water resources used for drinking (see WRM–WASH Cooperation Area 4: Source water protection).

WASH engagement with WRM on source-water protection and pollution prevention aspects of sustainable water management can be considered the key contributions of WASH in relation to freshwater biodiversity conservation (hence why freshwater biodiversity conservation is not included as a dedicated cooperation area in the framework).

With increasing pressure on water resources in terms of pollution and demand, strengthening cooperation for sustainable water management will become increasingly critical for safeguarding water resources, both now and in the future.

Three key areas of WRM–WASH cooperation for sustainable water management are:

- source-water protection
- pollution prevention.
- wastewater reuse

An overview of each cooperation area follows. Opportunities for sustainable water management are presented at the end.

COOPERATION AREA 4: SOURCE-WATER PROTECTION

Why is WRM–WASH cooperation important?

Source-water protection relates to the protection and restoration of water sources used by WASH service providers, sometimes linked to Water Safety Planning (WSP) or Sanitation Safety Planning (SSP). Source-water protection typically requires cooperation between WASH service providers, upstream landowners and communities, other potentially polluting entities and WRM authorities.

Source-water protection, which can focus on protecting either the quality and quantity of water, or both, takes many forms, at many different scales. These range from large-scale PES approaches used by some municipalities, notably New York (Abell et al., 2017; UN-Water, 2018), to micro-watershed scale catchment management approaches, such as reforestation of recharge zones for strategic drinking water sources.[18] The larger the scale, the greater the number of actors involved, including WRM, WASH and other water resources user groups. By contrast, in micro-scale approaches, there may be no or limited involvement of WRM institutions or formal associations of water user groups, with instead the direct involvement of landowners and water user groups, each with a stake in the water source. Given the involvement of multiple upstream and downstream actors, WRM–WASH cooperation is critical to ensure success.

PES for WASH is where WASH service providers, typically public or private water utilities and municipalities, finance landowners upstream of drinking water abstraction points to change behaviours and land-use practices, often to protect water quality in order to reduce the risks and costs of the water treatment and water supply process. The PES approach is particularly developed in Latin America, with many examples of municipalities paying to protect upstream water sources. A similar and very successful approach is seen in Quito, Ecuador, where the Nature Conservancy and Quito Water Company set up a water fund, with contributions made by a wide range of water resources users in the basin. Interest accrued on the investment is used to fund watershed conservation. Another well-known example outside Latin America is the Upper Tana-Nairobi Water Fund in Kenya.[19]

Other approaches to source-water protection include working with local communities in catchments, as seen in some Latin American and African WASH and freshwater conservation initiatives. Examples are context specific and typically include interventions such as:

- reforestation of catchments and recharge zones, with costs subsidized through the provision of tools, supplies and technical assistance in Peru[20]

18 Water for People, Watershed Reforestation in Guatemala. url: https://waterforpeople.app.box.com/s/cylg1xu0qxwj2b1fvvsyj2c5wpfjrbpo

19 The Nature Conservancy Upper Tana–Nairobi Water Fund in Kenya. url: https://www.nature.org/content/dam/tnc/nature/en/documents/Nairobi-Water-Fund-Business-Case_FINAL.pdf

20 Water for People, Sowing and harvesting water for human use in Peru. url: https://waterforpeople.app.box.com/s/7fl1eq2wprf42y6w64sm1l1bvuilk9iq

- spring and wetland restoration, invasive plant removal and environmentally driven livestock management in Mzimvubu, South Africa[21]
- spring-shed management to protect the reliability and year-round availability of spring-water sources through integrated landscape management requiring long-term collaboration among agencies responsible for forestry, water, agriculture and conservation, and local communities in Nepal[22]
- development of a water tariff that integrates climate resilience and sustainable development, and demonstrates good practice in PES services and source-water protection in Costa Rica (see Case study 2).

As there is sometimes a limited presence of dedicated WRM institutions locally, cooperation on source-water protection at watershed scale can sometimes be found between WASH and conservation or livelihood actors, or directly between domestic and other water resources users in each of the cooperating communities. Aside from certain examples (e.g., Latin America Water Funds),[23] WASH engagement in source-water protection appears relatively limited in the Global South, but there are efforts to increase progress in this area, such as in Uganda, where a framework and guidelines for source-water protection have been developed, primarily targeting water service providers and intending to help water infrastructure managers and government officials at national and district levels to 'identify the risk to a water source and engage the people and organizations responsible for the problem in a positive way that lead[s] to a mutually beneficial outcome' (Ministry of Water and Environment, 2013).

For WASH actors, WHO's Water Safety Planning (WSP) approach[24] offers a good entry point for engaging in source-water protection. The approach requires the identification of risks to water supply from 'catchment to consumer' and the implementation of control measures (including source-water protection) to mitigate these. A 2017 global analysis showed substantial scaling-up of the WSP approach since 2004, both in terms of the number of countries adopting it, and also within those countries the number of WSPs implemented, with 45% of countries at scale-up stage (WHO, 2017b). This represents an opportunity for scaling up WRM–WASH cooperation on source-water protection, linked to WSPs.

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21 Africa Biodiversity Collaborative Group, The convergence factor: Lessons from integrating freshwater conservation and WASH in Africa. url: http://www.abcg.org/action/document/show?document_id=927

22 State-of-the-art approaches for evidence-based springshed management to increase resilience to climate change in Nepal. IWMI, 2019. url: https://wle.cgiar.org/state-art-approaches-evidence-based-springshed-management-increase-resilience-climate-change-nepal

23 The Nature Conservancy, Latin America Water Funds. url: https://waterfundstoolbox.org/regions/latin-america

24 Davison, A. et al, 2005. Water safety plans: managing drinking-water quality from catchment to consumer. url: https://apps.who.int/iris/bitstream/handle/10665/42890/WHO_SDE_WSH_05.06_eng.pdf?sequence=1&isAllowed=y

Case study 2: Use of water tariffs in source-water protection, climate resilience and sustainability

Water services in Costa Rica are provided to the close to 5 million inhabitants by a mix of different providers, including the National Institute of Aqueducts and Water (50.7%), community-led aqueducts or Asadas (25.5%), municipalities (13.8%), Empresa de Servicios Públicos de Heredia S.A., a public company (5%) and others (5%). These providers are regulated by the Public Services Regulating Authority (ARESEP), which is legally required to oversee the provision of public services, including by regulating tariffs. This arrangement has mostly worked well since Costa Rica has a high provision of safe drinking water. As of 2021, 93.5% of the population has access to safe drinking water in their homes and overall coverage of drinking water is close to 98%. However, water quality and availability do not have a secure future because the surface and groundwater bodies that provide most of the safe drinking water are under increasing pressure from climate change and pollution. As climate change progresses, droughts, storms, sea-level rise (saline intrusion) and higher temperatures are impacting on the water sector and the ecosystems on which it depends. For example, since 2019, the country has suffered at least two hurricanes that have affected the infrastructure needed to provide safe drinking water, as well as droughts and forest fires that have degraded the ecosystems of water sources. Additionally, pollution from wastewater and especially from agricultural activities upstream also threatens water sources.

To respond to the challenges faced by water providers in Costa Rica, a new water tariff was developed, with climate change and sustainable development in mind. The aim of the tariff is to protect the resource and to improve and guarantee its availability and quality. Called 'Tarifa para la Protección del Recurso Hídrico', its development was led by ARESEP, with support from TNC, CEDARENA (a local NGO) and service providers. The tariff is intended to encourage service providers to finance projects that protect water sources from pollution and increase resilience to climate change. The tariff would also incentivize consumers to increase efficiency and re-use of water and to avoid wastage. The tariff is applied by the Costa Rica Institute of Water and Sewage Systems (Aqueducts and Instituto Costarricense de Acueductos y Alcantarillados, or AYA), a public entity that supplies the greater metropolitan area and other urban areas inland in order to protect the upper basin of the Barranca River and the sub-basin of La Paz River in Alajuela. The funds have been used to carry out studies to determine the river sources' areas of influence and the priority areas for intervention, with new projects in the pipeline. Empresa de Servicios Públicos de Heredia S.A. (ESPH), a public utility corporation covering the municipalities of Heredia, San Rafael and San Isidro de Heredia, uses the funds generated by the tariff for its PROCUENCAS programme. This aims to restore, conserve and protect the Ciruelas, Segundo, Bermúdez, Tibás, Pará and Las Vueltas micro-basins, which are crucial areas for the country's aquifers. ESPH prepares a five-year strategy for ARESEP that includes a set of prioritized projects to be funded by the new tariff, including details of how projects would benefit the service and estimated costs. If accepted, adjustments to the tariff are determined by calculating the difference between the funds necessary for the projects and the estimated income from the current tariff, while also considering the fundamental human right to water. The projects that can be financed through the tariff include: i) basic studies (hydrological, hydrogeological, socioeconomic, resource and climate monitoring) to identify areas requiring protection; ii) purchase of land technically identified as an area of interest in a basic study; iii) actions to protect, preserve and restore ecosystems related to water availability and infrastructure to facilitate percolation and recharge; iv) agro-silvopastoral systems and related practices that protect water sources and recharge areas; v) sustainable production practices that minimize the impact on water sources, including agrochemical management, solid waste, soil conservation, minimal water use, biodigesters, fertilization with waste and composting; and vi) actions to promote a new water culture through formal and non-formal education, promotion of good practice and involvement of communities in participatory management to guarantee the human right to access to drinking water.

COOPERATION AREA 5: POLLUTION PREVENTION

Why is WRM–WASH cooperation important?

Cooperation of WRM and WASH actors for the protection of water bodies from pollution arising from wastewater and sanitation services is critical for protecting and conserving water-related ecosystems as well as downstream drinking water sources. This requires the cooperation of WASH service providers, WASH users, landowners, other water resources user groups and WRM authorities to ensure a fully functional sanitation 'containment–emptying–transport–treatment–reuse/disposal' chain, preventing pollution losses to the environment and related adverse effects.

As much as it is important for WASH actors to engage with WRM institutions and other water resources user groups for upstream drinking source-water protection (see WRM-WASH Cooperation Area 4: Source water protection"), it is also important for WASH actors to engage with WRM actors in preventing downstream pollution. After all, domestic wastewater (sewered and non-sewered) is the primary source of faecal and organic pollution in the rivers of Latin America and the Caribbean (LAC), Africa and Asia. WASH actors (e.g., water and wastewater utilities) should have a duty of care to users of downstream water resources and the environment. In addition, wastewater treatment produces sewage sludge that must be disposed of safely or reused (UNEP, 2016). In municipalities, it is not only domestic wastewater that is cause for concern, but also industrial wastewater that may flow through the same sewerage networks and same treatment and disposal systems used by WASH service providers. In rural settings, the primary sanitation typology may be on-site sanitation, such as pit latrines and septic tanks, which can be a major source of faecal pollution (e.g. in Africa and Asia), and organic pollution (in Africa), or there may be no sanitation at all, with open defecation or direct wastewater discharge polluting the environment (UNEP, 2016). This means it is important for WRM and WASH actors to work together to strengthen and close the sanitation chain in both urban and rural settings to ensure that wastewater and sewage sludge is not discharged to the environment before it has been adequately treated. Figure 7 shows an example of the different points of the sanitation chain at which untreated wastewater and faecal sludge can be lost to the environment.

Where a significant source of pollution arising from domestic or industrial wastewater is identified, it is possible for WRM, environment and WASH actors to work jointly to find solutions, as seen in refugee transit centres in Ecuador,[25] where WASH actors have worked closely with environment actors to put in place a sustainable wastewater treatment solution to reduce wastewater pollution.

It may not always be the WASH actors, the 'polluters', who need to think about taking the lead in pollution prevention. As seen in Senegal[26] and Mozambique,[27] some Community Led Total Sanitation (CLTS) initiatives have been driven by environmental conservation actors, especially in

25 Local authorities lead sanitation and environmental initiative in Rumichaca. UNHCR (n.d.). url: https://www.globalcompactrefugees.org/article/local-authorities-lead-sanitation-and-environmental-initiative-rumichaca

26 Community water initiative in Mali, Niger and Senegal creating community-based water and sanitation schemes to improve food security, livelihoods and resource conservation. UNDP, 2013. url: https://www.undp.org/sites/g/files/zskgke326/files/publications/CWI2012Booklet2.pdf

27 Integration of Water, Sanitation and Hygiene (WASH) and Freshwater Conservation: Overview and Background, Case Studies and Enabling Conditions. Coca Cola & IRC, 2016. url: https://www.ircwash.org/resources/integration-water-sanitation-and-hygiene-wash-and-freshwater-conservation

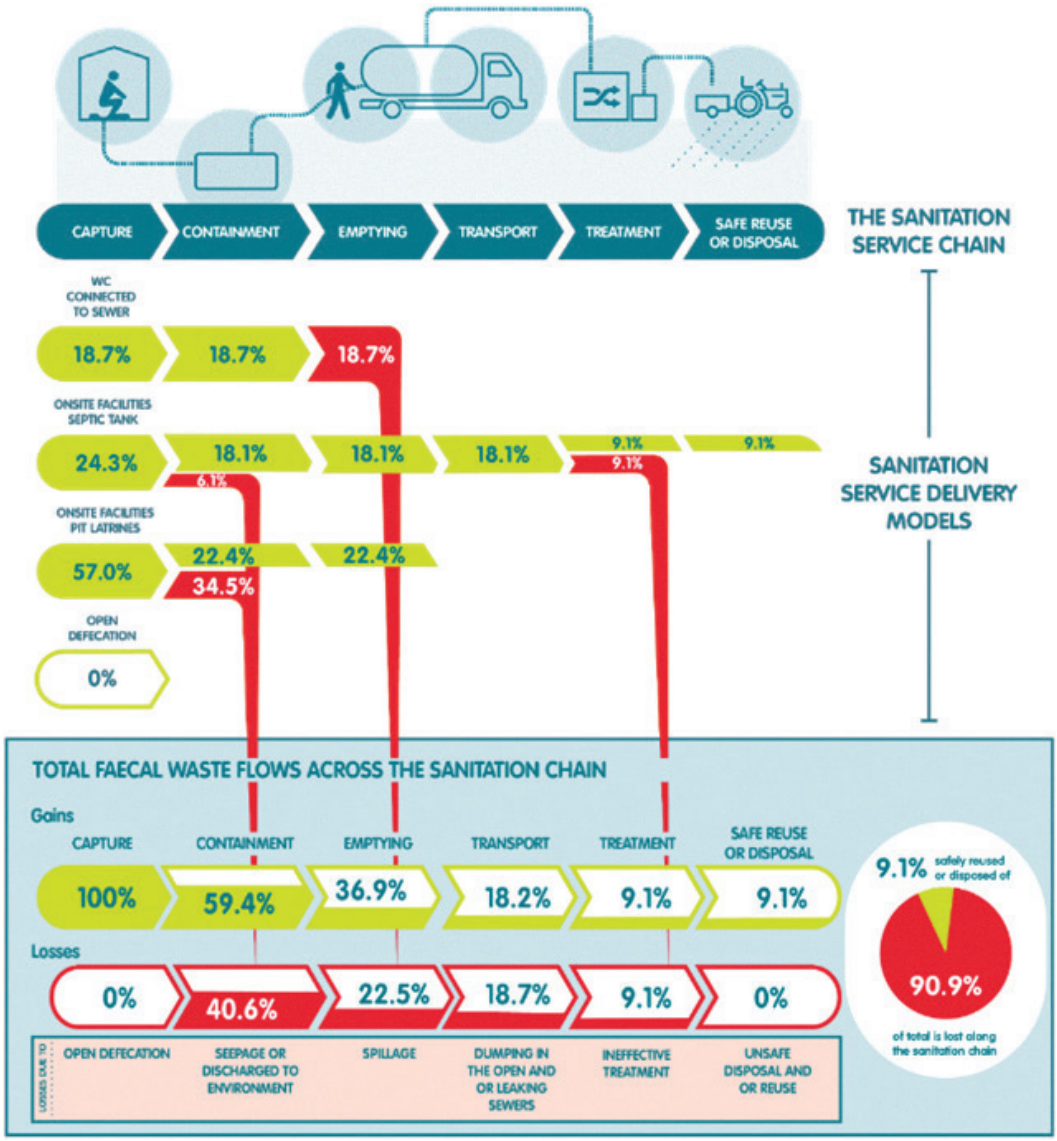


Figure 7: Faecal waste losses across the sanitation chain: example from Siem Reap, Cambodia[28]

coastal marine environments where protecting biodiversity and livelihoods is the focus, rather than health- and WASH-related perspectives.

Finally, there are examples in several countries in Asia where pollution prevention through wastewater assimilation in wetlands brings wide-reaching benefits for livelihoods, ensuring food security and promoting biodiversity at the same time (see Case study 3).

28 Source: https://www.washsystemsacademy.org/

Case study 3: Using wetlands for wastewater assimilation in India and Laos

Kolkata in India is home to more than 14 million people. The city sits on the banks of the Hooghly River, connecting Kolkata with the Ganges. As the population of Kolkata has swelled due to inward migration from rural areas, so too has the volume of wastewater produced, with approximately 750ml of sewage generated every day. **Vientiane**, in Laos, is home to roughly 10% of Laos' population of 7 million people. Vientiane sits on the banks of the Mekong River and is home to an estimated 1,500 km2 of permanent or seasonal wetlands, water bodies and floodplains.

In these cities, the proximity to swamp lands has resulted in these ecosystems being on the receiving end of urban wastewater and sewage. The natural filtration properties of wetlands means that these well-placed swamps and marshes serve as natural wastewater treatment plants, preventing the pollution of vital river basins such as the Ganges and Mekong. In Kolkata, more than 75% of the city's wastewater is discharged untreated to the East Kolkata Wetlands (EKW). In Vientiane, inoperative wastewater treatment infrastructure and reliance on septic tanks and soak pits, coupled with a high water table and impermeable soils, have resulted in wastewater being discharged directly to That Luang Marsh (TLM).

In Kolkata, it was discovered that the wastewater presented opportunities to local fisheries through wastewater aquaculture. Fisher people independently established shallow pools (*bheris*) in which nutrient-rich sewage would flow, supporting the growth of plankton used for fish feed. After a few days of settling in these pools, the organic pollution of the wastewater reduces significantly. The water is then cycled out and made available for rice and vegetable cultivation. Once it was discovered that the wetlands and its farmers were in essence treating the city's wastewater and discharging clean water back to the environment, as well as ensuring the food security of the city, the wetlands were recognized as an essential service that needed protection. The EKW were declared a Wetland of International Importance under the Ramsar Convention in 2002, and the EKW Conservation and Management Act 2006 established the EKW Management Authority (EKWMA). EKWMA is tasked with preserving the productive nature of the wetlands and thus the livelihoods that rely on them, as well as ensuring effective wastewater treatment by protecting the EKW against commercial and industrial development.

In Vientiane, due to its location on flat and fertile terrain, the TLM has become home to aquaculture, fisheries and rice paddies, as well as supplying home gardens and small-scale animal husbandry. Integrated wastewater and wetland management that balances ecological and economic needs is at the heart of efforts to conserve and restore the TLM. Supported by the European Union, WWF and the Wild Fowl and Wetland Trust, the Government of Laos is implementing the WATER project (Wastewater Treatment through Effective Wetland Restoration of the TLM). The project provides guidance on how wetland functions can be maximized for the benefit of people and the environment.

The EKW and TLM serve as invaluable water treatment and pollution prevention functions that must be preserved, supported and enhanced. They serve as excellent examples of the co-benefits of WRM–WASH cooperation. Without water resources actors such as the fisher people and agrarians making use of sewage effluents and wetlands management authorities helping to sustain these ecosystems, the cities of Kolkata and Vientiane would face enormous infrastructure and maintenance costs to achieve the same level of water treatment as is being achieved by these high-functioning ecosystems. On average, the EKW efficiency rate is in excess of 80% for the removal of organic pollutants and 99.99% effective in reducing coliform bacteria. Pollution prevention and water treatment, however, are only a small fraction of the wealth of benefits that these ecosystems provide. In Kolkata, the wetland system forms an integral part of the city's food security, generating more than 15,000 tonnes of fish and an average of 150 tonnes of vegetable produce every year. In Vientiane, TLM provides flood protection and carbon capture, and has a minimum economic benefit estimated at roughly USD5 million a year.

COOPERATION AREA 6: WASTEWATER USE

Why is WRM–WASH cooperation important?

Measures taken jointly by WRM and WASH actors to improve the conservation of water resources through reducing water usage, including through the reuse of wastewater from WASH services, are important for sustainable water management, both now and in the future. One key strategy for water conservation is wastewater reuse, particularly for agricultural irrigation to reduce dependence on freshwater sources. Wastewater reuse requires strong cooperation by WASH service providers, agricultural and irrigation water resources user groups and WRM authorities for promoting, scaling up and regulating safe wastewater reuse.

Water conservation through withdrawing less freshwater from the environment is one key strategy for tackling water stress and water scarcity and for preserving freshwater reserves, both now and for the future. WRM and WASH actors can cooperate in water conservation in several ways, especially in the area of wastewater reuse. Municipal domestic wastewater, if treated to an adequate safe standard, can be used by for crop irrigation, as well as in the energy, industry and recreation sectors, thus reducing dependence on new freshwater withdrawals. There is plenty of scope for WRM and WASH actors and water resources users to cooperate in this area, typically among water and sewerage utilities and the irrigation community.

Domestic wastewater reuse, often in agriculture, can be considered an emerging area for WASH and the wider water sector in the Global South. It is seeing more and more interest (e.g., in Namibia),[29] especially in water-scarce areas, particularly in the Middle East and North Africa (MENA) region (e.g., Gaza,[30] United Arab Emirates,[31] Kuwait,[32] Morocco[33] and Tunisia[34]), with still much more potential to develop wastewater reuse for irrigation (see Figure 8).

Some countries in dry areas (such as Jordan, Israel and Tunisia) have national standards and regulations in place for water recycling and reuse (UN-Water, 2020b; World Bank, 2018). One of the world's most water-scarce countries, Jordan, has included reuse in its national policies and strategies for water, including the Water Substitution and Reuse Policy 2016 (Ministry of Water and Irrigation, 2016). WRM–WASH cooperation has been key in turning policies and strategies into actionable plans, using a roadmap (Ministry of Water and Irrigation, 2020) for scaling up wastewater reuse (SDG6.3.1) in agriculture that is linked to progressing access to safely managed sanitation (SDG6.2.1a) (see Case study 4), as well as greywater reuse guidelines (UNDP & OFID, 2018). In the roadmap, there is a forecast of the wastewater generation potential at provincial level, totalling 371 million cubic meters (mcm) by 2030, an increase of over 90 mcm from 2018 levels (see Figure 9).

29 Sanitation and Water Reuse – Implementation Concept, CUVE Waters, 2015. http://www.cuvewaters.net/fileadmin/edit/Downloads/Publications/cuvewaters-papers-11-2015.pdf

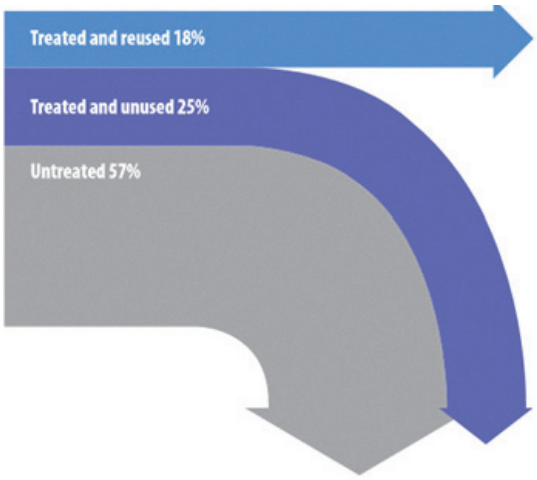
30 Construction-khan-younis-waste-water-treatment-plant, UNDP. url: https://www.ps.undp.org/content/papp/en/home/projects/construction-of-khan-younis-waste-water-treatment-plant--kywwtp-.html

31 United Arab Emirates Water Conservation Strategy, UAE, 2010. url: http://extwprlegs1.fao.org/docs/pdf/uae147095.pdf

32 Aleisa, E. & K. Alshayji. 2019. Analysis on Reclamation and Reuse of Wastewater in Kuwait. url: https://kuwaitjournals.org/jer/index.php/JER/article/view/4026

33 Appui à la Gestion Intégrée des Ressources en Eau – Programme AGIRE. GIZ, 2017. url: https://agire-maroc.org/pole-prioritaire-eau/programme-dappui-a-la-gestion-integree-des-ressources-en-eau/

34 Tunisia Irrigated Agriculture Intensification Project, World Bank, 2018. url: http://documents1.worldbank.org/curated/en/185781527823837426/pdf/PAD-04302018.pdf



Source: World Bank using data from FAO AQUASTAT (database).
Note: The figure was generated by summing country-level data on wastewater treated and reused from FAO AQUASTAT. Country-level data are based on estimates provided by the governments and are subject to variations in estimation methods and year of collection.

Figure 8: Share of collected wastewater that is untreated, treated, and treated and reused in irrigation in MENA (World Bank, 2018)

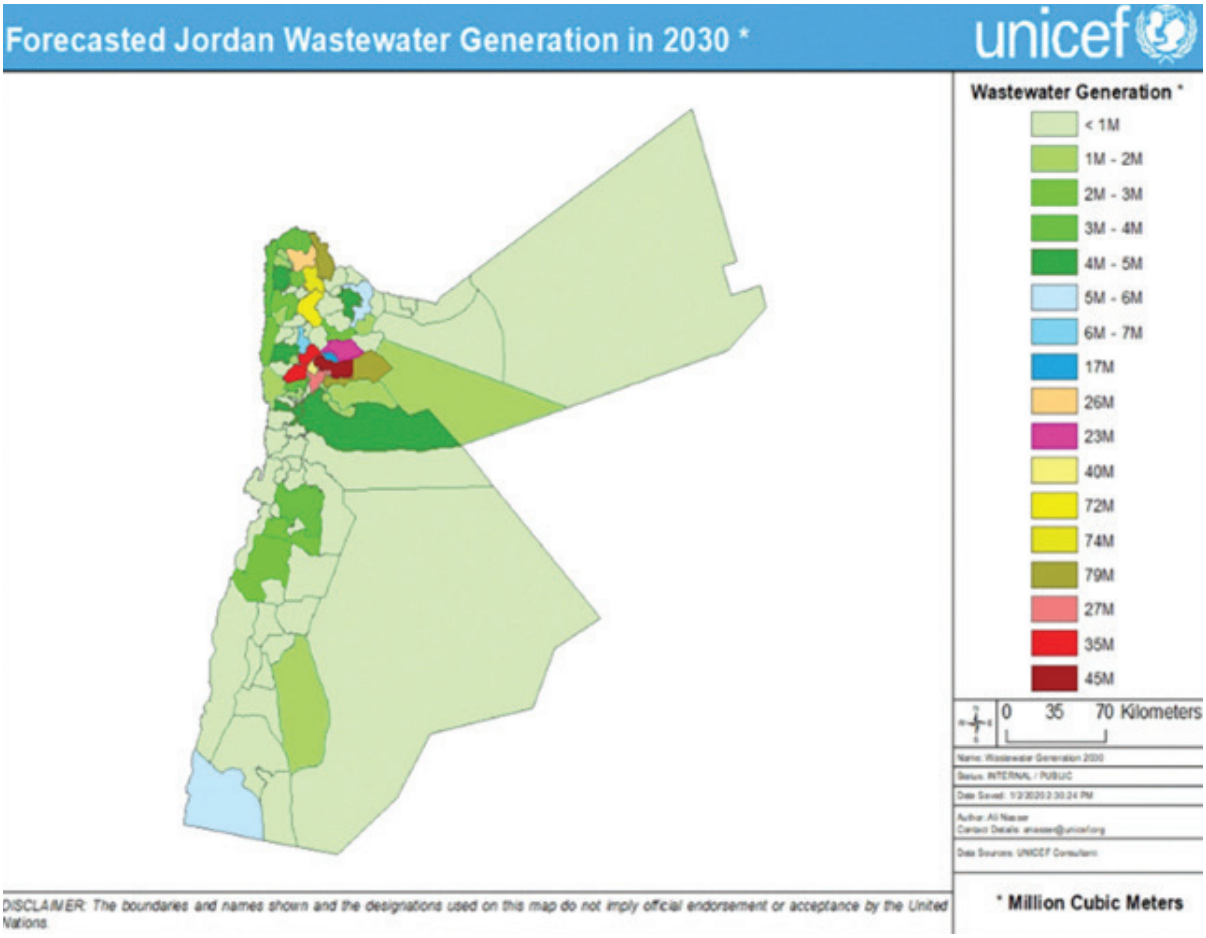


Figure 9: Forecast Jordan wastewater generation in 2030, by province

Despite the challenges that many developing countries face in increasing the proportion of wastewater collected and treated, its reuse presents a significant opportunity. With volumes of wastewater set to increase with population growth and urbanization, reuse presents a chance to mitigate the effects of increasing water stress and scarcity, climate change, eutrophication and the pressure on natural resources. Moreover, full nutrient recovery from wastewater would offset 13.4% of the global demand for these nutrients in agriculture (UN-Water, 2020b).

Case study 4: Jordan's sanitation and water reuse roadmap 2030

Water supply and sanitation in Jordan is characterized by severe water scarcity, with the country considered one of the most water-scarce countries in the world. Renewable water resources are less than 100m3 per person per year, and the current total uses exceed the renewable supply. The difference (the water used that is not renewable) comes from non-renewable and fossil groundwater extraction and the reuse of treated wastewater. High population growth (expected to double by 2050), overexploitation of groundwater reserves and the impacts of climate change are expected to aggravate the situation further.

Jordan is one of the leading countries in the region in the treatment and reuse wastewater, with 92% of domestic treated wastewater reused in 2017. This represents 14% of Jordan´s water budget, which plays an important role in narrowing the gap between supply and demand in the agricultural sector. According to Jordan's Water Strategy (2016–2025), wastewater is considered a source of water in the national water budget. SDG6 targets 6.1, 6.2, 6.3 and 6.4 (and selected monitoring indicators) are closely connected in the case of the water-scarcity context faced by Jordan, calling for close collaboration between WASH and WRM stakeholders, with a holistic view needed to bridge otherwise fragmented WASH and WRM agendas. Advancing in a coordinated way, the implementation of SDG6 sanitation targets 6.2.1a (safely managed sanitation) and 6.3.1 (wastewater treatment) presents an opportunity for more treated wastewater being made available for irrigation, which reduces dependency on freshwater sources, leaving more available to meet drinking water demand to achieve SDG6.1 (safely managed drinking water). Therefore, advancing on the sanitation targets also means advancing on SDG6.4, which aims to 'address water scarcity and substantially reduce the number of people suffering from water scarcity'. However, failure to prioritize sanitation and wastewater treatment and limited consideration of WASH in wider WRM approaches mean that the full potential of water reuse is yet to be realized.

In this context, the Ministry of Water and Irrigation (MWI) put in place a taskforce to assess progress towards SDG6. A starting point was to update the information for SDG6.2.1a by monitoring and identifying the constraints and gaps related to SDG6.3 on the reuse of treated wastewater in the agricultural sector. UNICEF, in collaboration with Sanitation and Water for All (SWA), supported MWI in strengthening the enabling environment for the sanitation and water reuse agenda in Jordan, and proposed a sanitation and water reuse roadmap as part of WASH–WRM coordination meetings hosted by the Jordan Water Donor Group. Support from FAO for Jordan's Ministry of Agriculture was also secured, as the agency focusing on building the country's capacities in water use linked to arable land. As a result, **a sanitation and water reuse roadmap has been conceptualized.** The development of the roadmap required a consultative approach. The roadmap acknowledges the relevance of existing policies and strategies and their implementation plans (e.g., Strategic National Wastewater Masterplan) and does not aim to replace them. Rather, it has taken existing policies and implementation plans to achieve SDG6.2.1a and 6.3.1 targets to a more detailed level. This was done in order to clarify what needs to be done in terms of infrastructure development and the operation and maintenance of sanitation services to achieve the desired wastewater treatment and reuse targets. The roadmap aims to trigger the achievement of universal

and sustainable sanitation services at the lowest regional level. Under the roadmap, 80% of Jordan's population will be covered by centralized wastewater collection systems by 2030. With the achievement of established targets, the roadmap links an estimation of the volume of wastewater generated by 2030 to the achievement of SDG6.3.1.

The next step is to agree on roles and responsibilities of the different government and non-government WRM and WASH actors for roadmap implementation (i.e., Ministry of Agriculture and Environment, FAO, UNDP, UN-Habitat, UNICEF, WHO, World Bank and others), including establishing an inter-ministerial body to monitor progress.

OPPORTUNITIES TO COOPERATE FOR SUSTAINABLE WATER MANAGEMENT

- **Realize the potential that wetlands hold for pollution prevention, wastewater reuse and source-water protection by cooperating to undertake a country wetlands ecosystem services assessment (including quantifying the benefits to WASH) and put national protection arrangements in place.** Wetlands can be an excellent means to achieve multi-sectoral integration, including WASH, biodiversity, livelihoods, food security, pollution prevention, wastewater reuse and source-water protection. These opportunities should be exploited.
- Promote collaboration in improving aquifer management, which provides

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opportunities to store water that has been processed for future use or to assist in the remediation of wastewater.

- **Introduce and scale up the successful Source to Sea approach[35] to bring together WRM and WASH actors to mitigate risks they have in common.** Relevant issues include mitigating upstream sediment loss that affects downstream water treatment and supply, and mitigating or recovery of nutrient loading from wastewater that can cause downstream eutrophication.

- **Scale up the engagement of WASH providers in PES and Water Fund approaches and, with related WRM institutions and water resources user groups, achieve co-benefits in source-water protection and watershed conservation.** The successful Water Fund approach in Latin America has not been scaled up outside the region; its feasibility for other regions should be explored further.

- **Scale up catchment management aspects of Climate Resilient Water Safety Planning (CRWSP) by engaging WRM institutions and water resources user groups in hazard and risk assessments of drinking water-source catchment** (see the recommendations WRM-WASH Cooperation Area 11: Climate Resilient Water Safety Planning for more detailed opportunities for CRWSP).

- **In the short term, ensure that wastewater tariffs factor in the costs of mitigating the negative impacts on the environment (the 'polluter pays' principle)** (Wetlands International, 2017), but look to long-term solutions, such as wastewater reuse for pollution prevention.

- **For basin-planning purposes, consider wastewater a valuable water resource, not just an inconvenient discharge, in order to maximize benefits, and improve efficiency and resource allocation** (Diego et al., 2020).

- **Stimulate a conducive, enabling environment for wastewater reuse acceptance and scale-up, recognizing its multiple benefits in WASH service improvements, water conservation and food security**. This could be done through wastewater reuse policies and strategies and may require support for developing innovative financing and sustainable business models (Diego et al., 2020). It may be necessary to increase capacity and implement wastewater reuse strategies. Given the sensitivity of this topic in terms of social and cultural acceptability, awareness-raising and education on the benefits and safety of the approach is critical.

- **Scale up constructed artificial wetlands for wastewater treatment in conjunction with conventional approaches, including where existing wastewater treatment systems are failing or overwhelmed** (Wetlands International, 2010).

Joint Outcome 3: Drought and flood disaster resilience

Drought and floods put additional stress on water resources (both surface and groundwater), reinforcing increased competition among different water users, exacerbating different forms of water pollution and damaging water infrastructures, which in turn affects access to WASH facilities, and increases the risk of water-washed, water-related and/or waterborne

35 Mathews, R. E., A. Tengberg, J. Sjödin & B. Liss-Lymer. 2019. Implementing the source-to-sea approach: A guide for practitioners. SIWI, Stockholm. url: https://siwi.org/wp-content/uploads/2019/07/source-to-sea-guide_webb.pdf

and communicable diseases. This indirectly affects the affordability of WASH services, where water scarcity, increasing demand and competition and the need for reconstruction and renovation of infrastructures result in rising costs (OHCHR, n.d.). Ineffectiveness in managing drought and floods is a major hurdle to meeting the normative criteria of HRWS: availability; accessibility; quality and safety; affordability; and acceptability (OHCHR, 2014). Conversely, poor WASH services, especially in urban settings (improper disposal of solid waste, poorly maintained sewers and related storm-water overflow, untreated sewage and saturation of sewage capacity) could also result in continuous and long-term flooding risks and related environmental pollution (Asiedu, 2020; Jha et al., 2012). To prevent localized flooding events, WRM actors must also engage with WASH actors in flood prevention and preparedness planning.

Disaster management has multiple steps, from mitigation and preparedness planning, to monitoring and prediction, to response and recovery (see Figure 10) (Global Water Partnership & WMO, 2014; Wilhite & Svoboda, 2000). The newly emerged concept of resilience-building emphasizes the additional 'learning, adapting and transforming' phases post-disaster and on ensuring that systems are prepared to face future risks (Imperiale & Vanclay, 2016; Johannessen & Wamsler, 2017).

A lack of cooperation on drought and flood mitigation and preparedness planning, sharing of early warnings and coordination during response, recovery and learning may lead to reduced WASH service levels during droughts or floods, and in the worst case, the discontinuity of WASH services when they are needed the most. In addition, lack of awareness and cooperation can lead to wastage of water by WASH services and users, which could further aggravate water scarcity during droughts.

WRM institutions and WASH actors should therefore cooperate to ensure that drought and flood mitigation actions and preparedness and management plans adequately consider

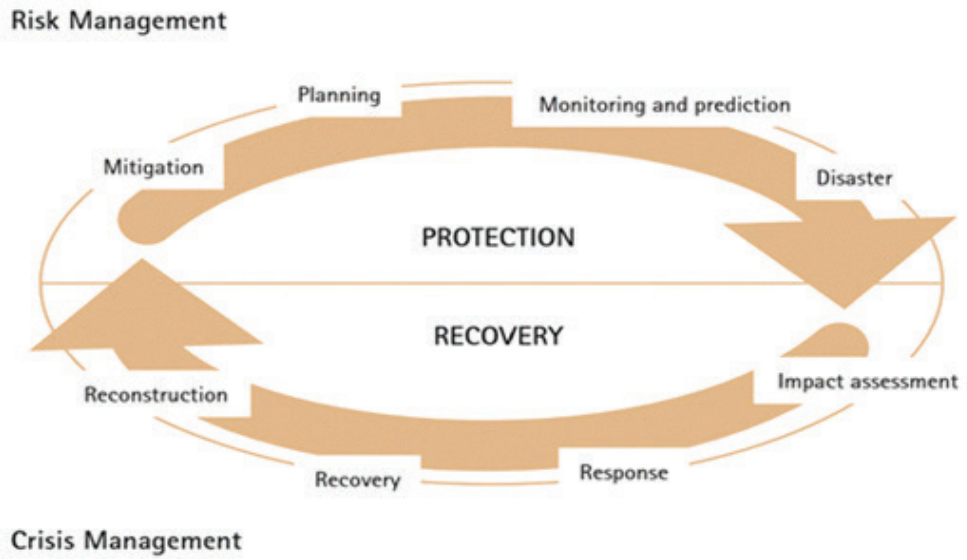

Figure 10: Cycle of disaster management (Global Water Partnership & WMO, 2014)

measures for ensuring the continuity of access to WASH services during a drought or flood and prevention of localized flooding and pollution from poor WASH services (see WRM-WASH Cooperation Area 7: Drought and flood mitigation and preparedness). This should include prioritizing drinking water over the allocation of water for productive uses. Ensuring the continuity of WASH services under drought and flood conditions contributes to achieving the Sendai Framework for Disaster Risk Reduction (Article 18, Target d). (It should be noted that mitigation should happen throughout the disaster management cycle, but is most effective when undertaken proactively, hence its inclusion alongside preparedness activities).

Cooperation is also critical for drought and flood monitoring and prediction through Early Warning Systems (EWS) (see WRM-WASH Cooperation Area 8: Drought and flood EWS) and during the response, recovery and learning phases of a drought or flood event (see WRM-WASH Cooperation Area 9: Drought and flood response and recovery). The act of cooperation throughout the full disaster management cycle itself builds resilience in drought and flood disaster management systems. An example of cooperation can be seen in Cape Town, where a water resilience tool, the City Water Resilience Approach (CWRA), and an assessment tool, the City Water Resilience Framework (CWRF), have contributed towards Cape Town becoming a water-resilient city by 2030 (see Case study 5).

Three key areas of WRM–WASH cooperation for drought and flood disaster resilience are:

- mitigation and preparedness
- early warning systems
- response and recovery.

There is significant overlap between this joint WRM–WASH outcome and the subsequent joint WRM–WASH outcome of 'climate-resilient WASH', which also entails building resilience to climate-induced droughts and floods. However, drought and flood resilience are first dealt with here, as drought and flood are not always induced by climate change, but are commonly occurring disasters that have long been dealt with in WASH emergency preparedness and response disciplines. Note that climate-resilient WASH also considers hazards and risks beyond drought and flood, such as sea-level rise and storms.

Case study 5: Building water resilience in Cape Town, South Africa

Cape Town, South Africa and its surrounding areas faced a severe three-year drought, culminating in 2018, with media reporting that the city might run out of water. The crisis led to the 'Day Zero' campaign, with city authorities announcing severe water restrictions. Along with drought, the city also faces other water-related shocks and stresses that are often ignored, including flooding during the wet season and in the informal settlements due to a lack of formalized stormwater drainage; weak enforcement of water regulations around groundwater abstractions; and lack of national contingency funding, which has resulted in delayed drought response at the city level.

WRM–WASH fragmentation has been a barrier to Cape Town's drought and flood resilience. Whilst overall the city authority has responsibility for both WRM and WASH, in reality these functions sit under different directorates, with the Water and Sanitation Department under the Directorate of Informal Settlements, Water and Waste Services, and the Catchment, Stormwater and River Management Department being under the Transport, Roads and Stormwater Directorate. Nationally, the Department of Water and Sanitation is responsible for WRM and oversees the allocation of

water from the six dams Cape Town relies on so heavily (they form 98% of the water supply), under the Western Cape Water Supply System (WCWSS). Under WCWSS, the Department of Water and Sanitation coordinates allocation, but the engagement of municipal and local stakeholders (e.g. agricultural boards) in decision-making processes has been lacking.

The application of the City Water Resilience Approach (CWRA) in Cape Town in 2019 brought together a diverse group of stakeholders, including WRM and WASH actors, creating an opportunity to build water-resilience capacity and an integrated Water Resilience Strategy for the city. CWRA is a step-by-step methodology built around two main tools. One is the OurWater digital tool that maps WRM and WASH assets and related stakeholder mapping. The other is the City Water Resilience Framework (CWRF), which helps assess the city's water-resilience capacity in an integrated way, addressing both WRM and WASH jointly. The CWRF assessment for Cape Town found a coordination gap between the agencies responsible for WRM and WASH, in terms of multi-level coordination with the Department of Water and Sanitation and WCWSS. It was also found that laws around groundwater abstraction were outdated, and little data available on private groundwater abstractions. It recommended that more sustainable funding sources be accessed in order to maintain and expand WASH and stormwater infrastructure, and that improvements be made in disseminating drought-related information to different agencies and sectors. Following an assessment workshop, actions were identified to address gaps and promote water resilience. An example of actions identified includes promoting Water Sensitive Urban Design (WSUD), which focused on stormwater management to help reduce the amount of rainwater in the city's drainage network as well as minimizing flooding and sewage outflows. Other proposed actions are the development of a Decision Support System (DSS) towards improved collective WRM decision-making, including for drought and flood management.

Through the application of CWRA, the city has created a 'vision for a resilient future' for urban water management, as defined in its Water Strategy. The strategy focuses on five key areas: i) safe access to WASH services; ii) wise use of water by all water users; iii) sufficient, reliable water from diverse sources; iv) shared benefits from regional water resources through collaborative approaches; and v) a water-sensitive city with diverse water resources, diversified infrastructure and optimal use of stormwater and urban waterways for the purposes of flood control, aquifer recharge, water reuse and recreation, and protection of the ecosystem through adequately enforced regulation. The Water Strategy provides a roadmap towards Cape Town becoming a water-resilient city by 2030 and acheiving water-sensitive city status by 2040.

COOPERATION AREA 7: DROUGHT AND FLOOD MITIGATION AND PREPAREDNESS

Why is WRM–WASH cooperation important?

Involvement and cooperation between WRM and WASH actors in drought and flood mitigation and preparedness are critical to ensuring coordination on implementing long-term mitigation actions (e.g., water-supply augmentation). Cooperation is also critical for ensuring the continuity of basic WASH services during disasters. It is important at the planning stage for WRM and WASH actors to freely share information on water resources, demand and vulnerable areas and populations, in order to define a robust preparedness strategy and plan.

There has been a shift from crisis management to risk management in drought and flood disaster management (Gerber & Mirzabaev, 2017). Mitigation and preparedness are central to proactive risk management.

Along with resilient recovery, learning and adaptation post-disaster, these help build drought and flood resilience.

Whilst short-term structural and non-structural mitigation can help reduce the impacts of droughts and floods during an active disaster, mitigation actions are most effective when taken proactively to build resilience. An important mitigation action requiring cooperation is water-supply augmentation, which might include WASH cooperating with WRM institutions in securing access to contingency water resources, including potentially IBTs. Flood mitigation measures are often undertaken with a long-term perspective such as Nature Based Solutions (NBS), Green–Blue infrastructure and flood proofing infrastructure. An NBS-related flood mitigation strategy is WRM investment and planning in wetland management to improve water storage benefits, further increasing flood protection by an estimated 50% (Leon et al., 2018). NBS has become a popular approach that uses natural systems in risk reduction to provide critical ecosystem services, such as wetlands for flood mitigation, supporting stormwater management, watershed management, water harvesting and protecting/restoring upland forests, creating green spaces and sustainable urban drainage systems that help reduce the impacts of flood and drought, including on WASH services (OECD, 2020; Oral et al., 2020; Ramírez-Agudelo et al., 2020). For example, in Brazil, NBS efforts have largely contributed towards flood protection, as well as helping to increase water flows during dry periods. In Mexico City, NBS and Blue–Green infrastructures have had good effects on flood reduction and flood management (CWRA, 2019a).

As it is not possible to fully prevent a drought or flood through mitigation actions alone, preparedness is essential to manage drought and flood risk and build resilience. Drought and flood preparedness planning is cyclical and should be a collaborative and consultative process, involving WRM institutions, WASH actors and representatives from other water resources user groups, as well as other stakeholder groups. For drought preparedness, generally, a 10-step cycle is appropriate (see Figure 11). Cooperation is most needed at:

- step 1 – ensuring WRM and WASH representation in the national drought commission
- step 3 – ensuring all water resources user groups (domestic and non-domestic) are involved, consulted and reach consensus
- step 4 – receiving relevant information from each WRM, WASH and water resources user group, including on available financial and at-risk interest groups and their location
- step 10 – ensuring WRM and WASH actors participate and contribute to evaluations and revisions of plans based on collective and individual experiences of ongoing and past drought and flood events.

The plan (step 5) should include monitoring, EWS and prediction; risk and impact assessment; and mitigation and response (Global Water Partnership & WMO, 2014). An example of a drought preparedness plan that follows this logic and structure can be seen in Sierra Leone (Massaquoi, 2018).

Planning and preparedness for flood risk include structural and non-structural measures. The non-structural measures for which cooperation is required include developing policies, strategies and plans that include basin-wide planning, inter-agency coordination and establishing an EWS.

Figure 11: Ten-step drought policy and preparedness cycle (Global Water Partnership & WMO, 2014)

Flood emergency planning is needed at community, local, district, state and national levels. Oxfam's initiative in Colombia to work on a common strategy to integrate WASH with Disaster Risk Reduction (DRR) efforts has contributed to increased collaboration among local stakeholders. This has resulted in strengthening contingency planning to respond better to flood events in the future, raising awareness on the need for safe water and sanitation during flooding, and local empowerment through training in flood risk management at all stages of the WASH planning cycle, from source selection to siting of infrastructure (Morris-Iveson, n.d.). Along with these localized plans, it is important to ensure that the flood emergency/ contingency plan aligns with basin-wide flood management planning (often led by WRM actors) to ensure a holistic assessment of flood risks and vulnerabilities (see Figure 12).

Drought and flood preparedness and management plans also provide context on drought and flood issues and identify roles and responsibilities in the event of a drought or flood and the contributions from each actor or group, including WRM and WASH actors and organizations representing other water resources user groups (e.g., agriculture). It is likely in a given country context that drought and flood preparedness plans will be dealt with through separate planning processes, and eventually, final separate plans will be prepared.

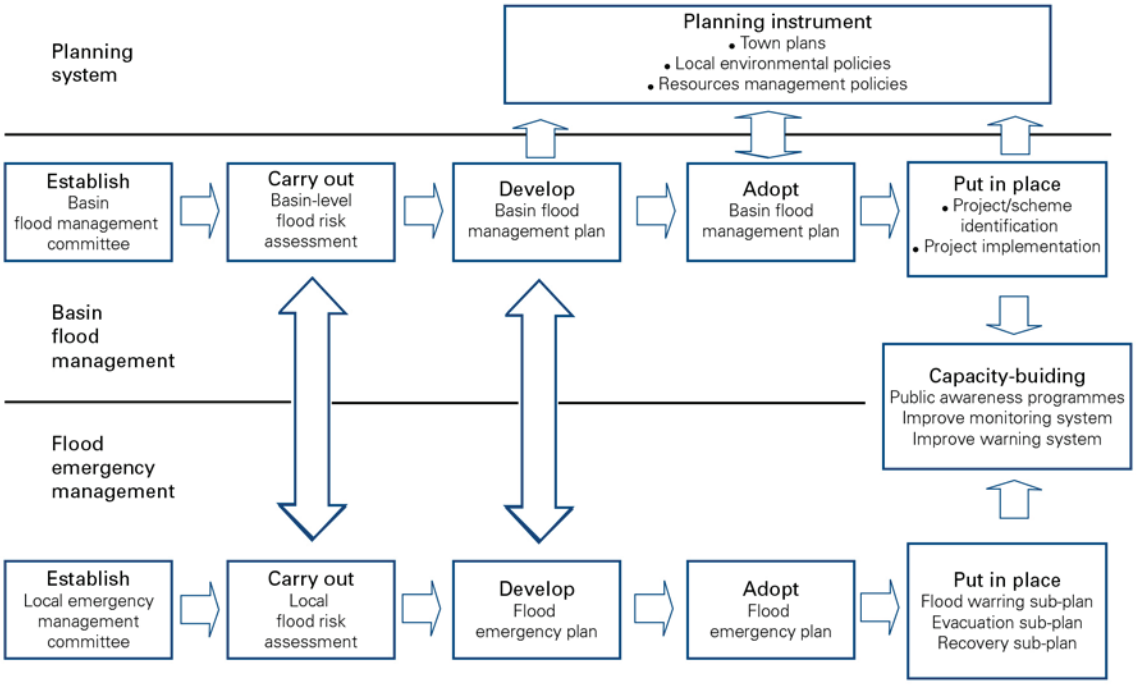

Figure 12: Interaction between basin-wide flood management planning and flood emergency planning (WMO, 2006c, p.43; adapted from ARMCANZ, 2000, p.11) (WMO et al., 2011)

COOPERATION AREA 8: DROUGHT AND FLOOD MONITORING AND EARLY WARNING SYSTEMS

Why is WRM–WASH cooperation important?

Drought or flood early warning systems (EWS) and the water resources monitoring networks they rely on may be managed by meteorological or WRM actors with other stakeholders and may also depend on monitoring data provided by WASH service providers.

Cooperation is important from a WASH perspective to ensure that early warnings are received from WRM actors in a timely manner to help make decisions that ensure the continuity of WASH services. From a WRM perspective, cooperation is important because WASH service providers (notably water utilities) have water resources monitoring data collected in-house for operational purposes that may prove valuable in strengthening the robustness of the dataset on which the EWS is based.

EWS have several components (see Figure 13):

- risk knowledge: systematically collect data and undertake risk assessments
- monitoring and warning service: develop hazard monitoring and early warning services
- response capability: use training, conduct drills and build institutional capacity to implement EWS
- dissemination and communication: communicate risk information and early warnings, using clear, timely information (UNDP, 2018).

Figure 13: Key elements of EWS

While the first three components must be well developed at the pre-disaster phase, a dissemination and communication plan, while prepared in advance, must be adapted in response to the changing situation. With the existence of EWS communication infrastructures, it is necessary to design strategies that contain:

- appropriate interactions among all relevant stakeholders
- effective and customized warning messages
- standard protocols for disseminating warnings to ensure there is no contradictory or incomplete information.

In terms of WRM–WASH cooperation for EWS, it is critical that these actors participate jointly, along with other actors (e.g., meteorology actors) across all these steps, to ensure that there is consensus on the parameters and thresholds used for the EWS and also that they communicate freely and share data and information on water resources in both directions. Cooperation between and with risk assessment committees that interpret what the monitoring and early warnings mean for their respective areas, in terms of who is potentially affected and the likely impacts, is also key. The monitoring undertaken to support EWS is also critical in

informing drought and flood preparedness and management plans, whose robustness depends on both historical and current data.

Drought EWS are particularly relevant for WASH, especially for drinking water and sewerage services. Early warnings of drought allow WRM institutions and water resources user groups to manage the available water resources in a way that prioritizes WASH. Early warnings also allow WASH actors, primarily service providers and consumers, to change their behaviours and to ration water use to try and ensure continuity of services throughout a drought. If thresholds are set by consensus between WRM, WASH and other relevant actors, and drought management response actions are linked to the various agreed threshold levels, EWS can provide a transparent and unambiguous way of enacting drought preparedness and management plans, and communicate drought information and any actions required to the general public. An example of where a drought EWS has been used to support decision-making for ensuring drinking water security is in Maharashtra, India (see Case study 6; UNICEF et al., 2015).

Flood EWS, including community-based flood EWS, encompass different components, such as conducting flood hazard and risk mapping and forecasting. Early warnings of flooding are beneficial in a number of ways for WASH service continuity (Shakya et al., 2019; Tarchiani et al., 2020). They allow time for WASH services to be protected from expected flood damage, and for the storage of drinking water. Early warnings of flood also allow municipal water abstraction intakes to be temporarily closed to prevent flooding of reservoirs and water treatment works, and ensure that people are able to evacuate and reach safe locations with functioning WASH services. In flood-prone Bangladesh, 7–10-day flood forecasts successfully predicted flooding events and allowed communities to store additional drinking water (UNISDR, 2013). In municipalities where wastewater sewers and surface water sewers are combined to some extent, with joint sewer overflows, EWS for sewer flooding may contribute to building resilience and to mitigating or preventing sewer overflows, pollution of the environment and related biodiversity losses and risks to human health. For example, in Lisbon, an innovative, real-time urban EWS for flooding and pollution events was built for the Alcântara basin to provide timely information to wastewater management entities (Matos et al., 2014).

In the case of a water utility or service provider that has a river intake or groundwater well, the water resources monitoring data collected for operational purposes could complement other water resources data points in a broader EWS. This is one way in which WASH–WRM cooperation can benefit other water resources users, by strengthening the dataset used for the EWS.

Case study 6: Drought Early Warning Systems in Maharastra, India

The state of Maharashtra in India is one of the worst drought-hit states in the country, with nearly 50% of its area at risk. Recurrent droughts have occurred over the 2000s and 2010s, threatening drinking water security and agricultural productivity.

Groundwater is its main source of water, with nearly 85% of the rural population relying on wells for domestic use and an estimated 2 million irrigation wells (2019). Overexploitation of the easily accessible aquifers and poor water management are major contributing factors to drought, alongside lack of monsoon rainfall. In some hot and arid regions (e.g., Marathawada and parts of Vidarbha), the wells often dry up during the summer and even before summer in some areas due to unsustainable agricultural practices. The diverse environmental conditions within the state lead to significant regional variation in the availability of water resources, further complicating WRM. Poor water management is also seen in the fragmented drought management between actors (WASH–irrigation–disaster management) and the lack of robust groundwater monitoring systems linked to drought EWS. Maharashtra's measures and approaches to drought management have focused on the agricultural sector. Its drought management plan (2017) specifies the different institutions responsible for drought management, but does not include the Department of Water and Sanitation. In the DRR plan, structural and non-structural measures do not specify interventions associated with WASH, and some measures (such as the construction of a large number of farm ponds) may actually put wells used for drinking water at risk of drought. At the state level, the Groundwater Survey and Development Agency monitors the depth-to-water levels in wells and their seasonal fluctuations. However, there may be limitations in the usefulness of the monitoring system and assessment methodology, in terms of the estimation of water availability in drinking water supply wells across the seasons.

To address this monitoring gap, UNICEF, in collaboration with the Groundwater Survey and Development Agency, the Institute for Resource Analysis and Policy Hyderabad and the Maharashtra Remote Sensing Application Centre, Nagpur, developed a decision support tool, which was piloted in the Chandrapur district. This has been used to monitor groundwater levels and to estimate the availability of drinking water (quantity and quality) and improve drought predictions, based on real-time monitoring of rainfall and pre- and post-monsoon groundwater levels. Furthermore, using rainfall and water-level data, the tool can estimate the quantity of useable groundwater in the aquifer from annual precipitation as well as run-off from the catchment and base flows (including lean-season flows), predict cropping and irrigation intensities, in terms of the number of villages likely to be affected by drought, and extrapolate summer water levels in wells and the emergence of a drinking water shortage. To develop the model, historical data for a selected location was collected and a monitor appointed by the government to collect data on water quality from villages using mobile technology. To ensure that the analysed data is available to all water users, a web-based decision support tool, the 'Mahabhujalvedh', was developed. This assists daily and monthly water-level monitoring, and includes data on the availability of water-level maps, recharge prioritization maps and predictability on drought. This is helping stakeholders to better manage their groundwater resources and improving the allocation of water for all purposes.

This kind of WRM–WASH cooperation on integrated approaches to drought preparedness, EWS and planning will be critical in the success of national and state government water programmes, such as the Pradhan Mantri Krishi Sinchayee Yojana ('more crop per drop'), the National Rainfed Area Development Programme and the Jal Jeevan Mission for universal household piped drinking water by 2024.

COOPERATION AREA 9: DROUGHT AND FLOOD RESPONSE AND RECOVERY

Why is WRM–WASH cooperation important?

Cooperation at the onset and during a drought or flood event is important for enacting short-term mitigation actions (e.g., flood control to protect WASH infrastructure) and aligning the operationalization of contingency plans. However, cooperation is perhaps most important for the recovery and learning phases in order to build resilience. This is done through developing more resilient WASH services that better factor in drought and flood risks, and through collective learning to inform improved long-term mitigation and preparedness action.

While there might not be much cooperation in the immediate Post Disaster Needs Assessment (PDNA), some cooperation is required to coordinate short-term mitigation actions (e.g., flood control to protect WASH infrastructure) and to align drought and flood contingency plans for WRM and WASH. This means that the water utility contingency plan should adhere to the overarching drought and flood preparedness and management plans, which in turn should factor in WASH needs. The early response measures for drought may differ from those for flood events due to the slow onset of drought, making it difficult to determine when the disaster occurred and what the response measures should be (Raikes et al., 2019). In the case of floods, where evacuation might be needed, ensuring that emergency shelters have access to safe WASH services will require coordination with WASH actors.

Cooperation is key in recovery and reconstruction and in the learning, adaptation and transformation phases for building resilience. In terms of recovery, where WASH services have failed due to lack of sufficient water resources in the case of drought, or where there were service outages and water safety breaches in the case of flooding, it may be necessary for WASH actors to cooperate with WRM institutions to plan for more resilient services and management in the future. This could be facilitated by more robust water resources assessments to inform the design of WASH systems. During droughts and floods, providers often resort to exploring and investing in alternative post-disaster water supply sources (groundwater, rainwater collection, water purchase, pipe interconnection with neighbouring water utilities etc.). Towards this and in terms of building resilience in the system, WASH actors must coordinate with WRM, along with ensuring that these alternative water sources are safe, reliable and sufficient over the medium- to long term. During the Cape Town drought, the city had to invest significantly in alternative sources of water, such as temporary desalination and groundwater sources, which resulted in a financial burden for the city authorities and its residents. Moreover, the lack of regulation and enforcement around water issues (e.g., groundwater abstraction, alternative water sources and providers, investment in private augmentation schemes for drinking water) erected additional obstacles to explore these alternatives (CWRA, 2019b). Therefore, a coordinated redundancy and resilience strategy is needed to ensure systems have the ability to face uncertainties and can withstand disruption and continue to function. This includes building awareness among different water users on water-use efficiency, and ensuring there are buffers and back-up sources of water supply, including from neighbouring or different water users. One example is the UNICEF initiative in Bangladesh, piloted with Dhaka University and the Government of Bangladesh, which created safe underground water by storing rainwater

and using a managed aquifer recharge (MAR) system, for use when traditional sources had been damaged by floods and storm surges (UNICEF, n.d.).

Ensuring that WRM infrastructure (such as flood mitigation embankments and drainage) is reconstructed in a timely fashion is important in protecting WASH services. This can be achieved through establishing an integrated Disaster Recovery Framework (GFDRR, 2020), as can be seen in the case of Malawi (Department of Disaster Management Affairs, 2015), where the Water Resources Department in the Ministry of Agriculture, Irrigation and Water Development was responsible for the overall recovery process for water through constructing both WASH and WRM flood mitigation infrastructure, following a major flood event in 2015.

In addition to cooperation in building more resilient WASH services as part of a recovery that 'builds forward better' in a stronger, faster and more inclusive way (Hallegatte et al., 2018), it is important for WRM and WASH actors to cooperate on building resilience to future drought and flood events. This should be done through collective learning and related adaptation based on the learning, including through revising mitigation and preparedness activities and plans to make them more fit for purpose for future drought and flood events.

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OPPORTUNITIES TO COOPERATE FOR DROUGHT AND FLOOD DISASTER RESILIENCE

- **Ensure WRM–WASH cooperation in the development of drought policy and preparedness mechanisms, as well as in the operationalization stage, to ensure that the human rights to water and a healthy environment are adequately prioritized in the event of drought.** This includes ensuring cooperation between the different committees involved in operationalizing the preparedness mechanism, such as an overarching National Drought Committee, Drought Management Unit (DMU) and specialized committees, such as risk or impact assessment committees and response and mitigation committees.

- **Use drought EWS as a transparent and unambiguous way of enacting drought preparedness and management plans for upholding the human rights to water and a healthy environment during a drought.** If early warning thresholds are set by consensus between WRM, WASH and other relevant actors (e.g., meteorology actors) and drought management response actions (e.g., prioritizing water for domestic uses) are linked to the various agreed thresholds, drought EWS can provide a transparent and unambiguous way of enacting drought preparedness and management plans and for communicating drought information and the actions required to the public.

- **Scale up NBS and Blue–Green infrastructure solutions for flood mitigation and preparedness, including wetland management for increased storage and flood retention.**

- **Domestic water-use efficiency and conservation should not be overlooked as an important localized drought alleviation strategy.** As seen in the Cape Town Day Zero campaign, awareness on water use efficiency by different water users was backed up by concrete data and information and disseminated through different platforms. For example, a public dashboard showing water consumption resulted in reduced domestic water usage from 1,200 mld in the summer of 2015 to 500 mld in January 2018.

- **Explore cooperation on improving EWS robustness by through securing expanded hydrological datasets by obtaining in-house water resources monitoring data from WASH service providers (e.g., intake levels, water table depth etc.)**.

- **Bring together multi-sectoral stakeholders for a visioning exercise on water resilience (including drought and flood resilience) and develop a water-sector-wide resilience strategy at the appropriate scale** (see Case study 5).

- **Build forward better after drought and flood through more resilient WASH service development and management arrangements (e.g., CRWSP) by promoting cooperation in developing and implementing an integrated Disaster Recovery Framework.** Any proposed WASH services expansion and improvements in the context of the COVID-19 recovery can also be leveraged to build more disaster-resilient WASH services.

- **Scale up cooperation during the disaster response to ensure alternative water supplies and to prevent pollution resulting from sewer and sanitation flooding.**

Joint Outcome 4: Climate Resilient WASH

Water is one of the key elements through which climate change impacts are channelled. Climate change impacts include changes to the quantity, quality and accessibility of water resources used for WASH services. Essentially, this means that for WASH services to be resilient and sustainable, it is necessary to build their resilience to climate change, as well as the resilience of the systems that support them and the adaptive capacity of users who rely on them.

Climate Change Adaptation (CCA) is one key strategy for building resilient WASH services, systems and users. Adaptation strategies and options can emphasize both 'hard' and 'soft' adaptations, i.e., structural or non-structural approaches. Hard infrastructural approaches include protecting water resources or WASH structures, expanding water storage capacity to bridge climate-induced drought, or developing more resilient WASH services, such as drilling deeper boreholes. Soft adaptations include building the adaptive capacity of people and systems to diversify the use of drinking water supplies, or working with communities to establish improved water management approaches, such as in Burkina Faso (WaterAid, 2013). To improve water security and resilience, WaterAid and Oxfam developed a Community Based Water Resources Management (CBWRM) approach, implemented in five countries of Africa's Sahel region (Burkina Faso, Chad, Mali, Niger and Nigeria) and Ghana.[36] In Burkina Faso, CBWRM has been applied across 150 households in three villages. The project included water resources monitoring training for community volunteers, members of water user committees and local NGOs. Communities in Burkina Faso have asserted that their understanding of seasonal variation in rainfall and groundwater levels has greatly improved since they started to monitor and record water resources data. Monitoring activities have also helped the community to prioritize certain water uses and users, with another set of community-accepted rules taking hold during periods of drought. For example, the community now prioritizes drinking water abstractions and access for women, particularly as the dry seasons drags into its later days. To avoid conflict and over-competition, all users are restricted to one water container at a time when water is scarce, to ensure everyone at least receives their minimum requirement, before additional abstractions are made. Sanctions are applied against water users who do not follow these rules, which are carried out by the water user committee. In summary, CBWRM improves household and community water security and climate change resilience by building a link between domestic water services and the water resources on which they rely, effectively pairing approaches for domestic water supply with the principles of IWRM (Bunclark et al., 2011; WaterAid, 2013, 2016).

Other approaches could include Climate Resilient Water Safety Planning (CRWSP; see WRM–WASH Cooperation Area 11: Climate Resilient Water Safety Planning) to identify risks and put in place control measures to mitigate these, such as establishing water conservation protocols in preparation for drought-related water shortages and establishing community-based EWS.

Through CCA and in the context of uncertainties surrounding the exact nature and magnitude of climate change impacts, emphasis is placed

36 Also sometimes referred to as the Securing Water Resources Approach (SWRA) (WaterAid, 2016)

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on identifying and implementing 'no-regrets' or 'low-regret' adaptations, where those options may realize benefits for WASH services and users regardless of the actual eventual climate change impacts. Options are often identified in a robust, evidence-based approach that comprises a climate change vulnerability and adaptation (V&A) assessment to build the rationale (see WRM–WASH Cooperation Area 10: Climate vulnerability and adaptation assessments). To avoid maladaptation, a key foundation of V&A assessment is to ensure that sound water resources and meteorological information is available and used, including at the identification and feasibility stages of assessment. This requires cooperation in what is quite a sophisticated technical area often requiring the involvement of hydrologists, hydrogeologists, meteorologists, climate modellers and water resources and water supply engineers. Building a strong, evidence-based climate rationale is critical in securing climate finance (see WRM–WASH Cooperation Area 12: Climate finance).

Three key areas of WRM-–WASH cooperation for climate-resilient WASH are:

- climate vulnerability and adaptation assessments
- Climate Resilient Water Safety Planning
- climate finance.

An overview of each cooperation area follows. Opportunities for climate-resilient WASH are presented at the end.

COOPERATION AREA 10: CLIMATE VULNERABILITY AND ADAPTATION ASSESSMENTS

Why is WRM–WASH cooperation important?

As climate change adaptation essentially involves understanding and planning for changes in the quantity and quality of water resources to ensure WASH services are more resilient and sustainable, it is essential that WRM actors cooperate with WASH actors on V&A assessments. This cooperation is essential to ensure that WASH-related climate V&A assessments and subsequent adaptation plan implementation are informed by robust water resources information.

Climate vulnerability and adaptation (V&A) assessments for WASH aim to identify suitable hard and soft 'no-regrets' or 'low-regrets' adaptation options that help build resilient WASH services in the face of uncertain climate change impacts. Essentially, this entails gaining a comprehensive understanding of the baseline water resources situation and then making and assessing how the situation may change in the future due to climate change under different emission scenarios, and then applying a formula to determine vulnerability. Based on this vulnerability assessment, further analysis is then undertaken to understand the root causes of vulnerability and to develop suitable adaptation options to reduce vulnerability and thus increase resilience. These adaptation options should be supported by scientific evidence (in this case, by robust data on water resources), and potentially implemented jointly by WRM and WASH actors (e.g., establishing a hydrological EWS). Cooperation in this process is key to ensuring an evidence-based and scientifically robust approach.

Under the UNICEF Water Security for All initiative (UNICEF, 2021a), many countries in Africa, MENA and Asia are undertaking a form of national V&A assessment to look into priority hazards and related exposures and the underlying vulnerabilities related to WASH, and then planning for appropriate adaptation response measures. The key objective is to build climate-resilient WASH into country programmes and to identify gaps and entry points with new stakeholders, including protracted conflicts, fragile or humanitarian settings, and development contexts (see Case study 7). The V&A assessments are led and guided by climate change taskforces, which encompass broad, multi-sectoral representation, including WASH, WRM, and climate and environment institutions and actors.

Another good example of cooperation for climate V&A assessments is found in the Solomon Islands, where, under the Solomon Islands Water Sector Adaptation Project (SIWSAP), the government's Water Resources Division led climate V&A assessments and subsequent plan implementation in 11 communities across the country, in cooperation with the Rural WASH (RWASH) government office, as well as other stakeholders (e.g., climate change officers) (UNDP, n.d., 2016). To facilitate robust assessments based on robust data, water resources officials and climate officials cooperated in interpreting data in terms of the scenarios and projections for changes in water resources due to anticipated climate change impacts based on regional scenarios.

Although this WRM–WASH cooperation area primarily focusses on V&A assessments at sub-national and local levels, there is also plenty of scope for cooperation at national and water-sector level. In this regard, there may need to be cooperation on broader, national multi-sectoral V&A assessments that inform National Adaptation Plans (NAPs) and may also inform adaptation aspects of each country's Nationally Determined Contributions (NDCs) or Long-Term Low-Emissions Development Strategies (LT-LEDS).

Case study 7: Developing the climate narrative for WASH services

The WASH sector needs an unprecedented paradigm shift to incorporate a climate-resilience focus in both policymaking and programming. UNICEF, in collaboration with SIWI, has been supporting several countries in making this shift. Through extensive multi-stakeholder consultation, a demonstrated climate rationale has been formulated, in which the observed and projected impacts of climate change on WASH services are articulated through a solid analysis, and technical and non-technical solutions are identified to mitigate and adapt to the climate risks.

In some countries, the assessment has been conducted through the climate-risk-informed WASH Bottleneck Analysis Tool (BAT). The WASH BAT enables the development of costed and prioritized plans to remove the bottlenecks that constrains progress in the WASH sector. The WASH BAT has been used across different regions and in more than 80 countries. The overall aim is to elevate the efficiency of WASH-sector resources to achieve more sustainable and equitable outcomes. Along with critical components on WASH, a new version of the WASH BAT has been developed that takes a comprehensive climate risk assessment as its starting point, and then formulates specific solutions. Thus, the WASH BAT blends two different analyses into a single process, building on a common participatory approach for implementation

The process first aims to increase understanding of the nature of risks and shocks, as well as the potential impacts on WASH services and facilities. The analysis of risks and their drivers before the WASH BAT workshop helps prioritize risks to be addressed in the analysis. It is important to mention that both tools can still work well when used separately. This new modality of the WASH BAT has been implemented in a few countries, such as State of Palestine, Paraguay, Bolivia and Honduras. The context of assessment in each country varied. For example, in Honduras, it was aimed at supporting the education sector to assess the challenges and proposed actions to better respond to climate-change-related emergencies for WASH, particularly in school settings.

Beyond the diagnosis of the enabling environment for WASH, the focus of the exercise in other countries has been on the appraisal of a set of technical and non-technical solutions for delivering sustainable and climate-resilient services at national, regional, service-provider and community levels. This approach is complementary to the WASH BAT, while some countries have opted for implementing both sequentially (e.g., Uganda, Chad and the Central African Republic).

Other activities can further strengthen the WASH climate narrative to achieve specific outputs. For instance, if the aim is to influence the elaboration of climate policy documents (e.g. NDC, NAP), it is crucial to review and understand what the key national climate priorities are in each country, as well as identifying to what extent WASH, children and the most vulnerable have been included in those. It is equally important to understand whether climate resilience is adequately integrated into existing WASH policies and national strategies. In parallel, a climate financing review might help assess whether the WASH sector in particular, or the water sector more generally, has (or will in the future) benefit from climate financing schemes. This includes an assessment of climate financing from national budgets, bilateral donors, multilaterals (such as the Green Climate Fund, Global Environmental Facility and Adaptation Fund), philanthropy and the private sector.

COOPERATION AREA 11: CLIMATE RESILIENT WATER SAFETY PLANNING

Why is WRM–WASH cooperation important?

Ensuring safe drinking water services depends not only on water quality but also on the availability of the freshwater needed to continuously operate a safe drinking water service. As the availability of freshwater is under increasing threat from climate change, Climate Resilient Water Safety Planning (CRWSP) is one risk-management approach for mitigating risks in both water availability and water quality. It relies on robust water resources information to identify water availability hazards and related control measures in the plan. Cooperation is needed to implement the water availability control measures in the CRWSP.

As a safe drinking water supply depends on having sufficient water resources for continuity, in addition to having safe water quality, Climate Resilient Water Safety Planning (CRWSP) (WHO, 2017a) goes beyond assessing water-quality hazards. CRWSP also considers the hydrology and hydrogeology of the basin or catchment in which the drinking water source is situated and assesses the climate risks that may affect

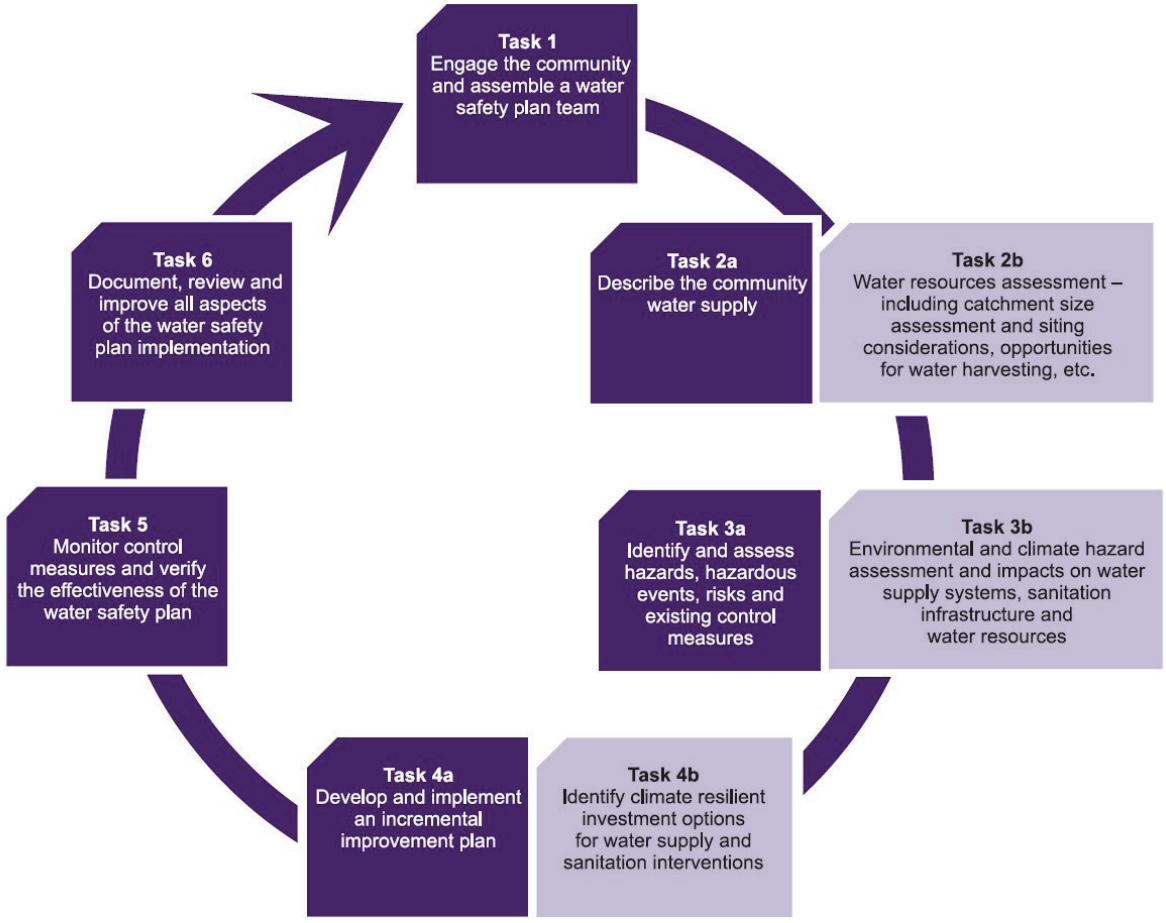

Figure 14: Modified WSP that considers climate change hazard and risk (UNICEF & GWP, 2015)

the quality and availability of the drinking water source. Climate risks may be more disaster related, directly affecting system functionality, or may be slower onset risks, placing increasing stress on a drinking water service.

A simplified, modified WSP process that integrates climate hazards and risk can be seen in Figure 14. WHO guidance sets out how to integrate climate risk (and by association water resources information) into a standard WSP process, to build climate resilience into the system (WHO, 2017a). The integration of climate risk and water resources in a WSP starts with ensuring that the WSP team established to put the WSP in place, or to revise an existing WSP, has sought additional expertise from water resources experts, in addition to WASH experts. Subsequently, key steps where WRM–WASH cooperation should occur in the development and implementation of the WSP are: i) including water resources characteristics (past, present and future) when describing the water supply system; ii) factoring in demands and needs of other water resources user groups in the analysis; iii) considering the 'strategic risks posed by source-water scarcity and the competing users of water in a catchment' (WHO, 2017a); iv) considering the impacts of changing water resources availability and quality on the water supply system due to climate change; and v) identifying and jointly implementing WRM-related control measures to mitigate climate risks.

Once the climate risks are identified, control measures are then identified and put in place incrementally to ensure not only a safe water supply, but also one that is resilient to anticipated impacts of climate change on the water resources on which it depends. Examples of cooperation on CRWSP can be seen in the Pacific, where Vanuatu and Fiji have adopted the approach through their Drinking Water Safety and Security Planning (DWSSP) approach (UNICEF Pacific, 2018).

COOPERATION AREA 12: CLIMATE FINANCE

Why is WRM–WASH cooperation important?

As climate finance represents a large pool of largely untapped resources for basic WASH (especially basic sanitation), it is important for WASH actors to cooperate and associate with WRM actors in jointly accessing climate finance, particularly CAA finance.

The reasoning is threefold: i) to build a strong case for climate-resilient WASH-related finance proposals, centred on making the case for risks to basic WASH services and defining adaptation strategies, for which technical assistance may be required from WRM actors; ii) to provide evidence that climate financing is more likely to be channelled for WRM-related activities than basic WASH activities; and iii) to compensate for the lack of Multi-Lateral Climate Finance (MLCF) accredited agencies that focus on WASH, leading to the need for WASH actors to associate with accredited WRM-focused entities.

Water is well represented in NDCs to the Paris Agreement. Over 100 countries in the first-round NDCs described water as one of the top five sectors vulnerable to climate change (Pauw et al., 2018), with approximately 9% of all NDC activities connected to SDG6, which has proportionally high activity across all the SDGs (DIE & SEI, 2022). Evidence shows that the water sector is prioritized more strongly in NDCs by low-income countries and in the South Asia, LAC and Sub-Saharan Africa regions (DEI & SEI, 2022). On closer inspection, it can be seen that most of the

630-plus NDCs' water-connected activities are CCA focused (87%) and relate mainly to improving water management, increasing water supply and developing more efficient irrigation systems. At the target level, the more directly WASH-focused SDG targets 6.1, 6.2 and 6.3 are the least represented (see Figure 15). The lack of representation of SDG6.3 and SDG6.2 is most pronounced, with only 2% of NDCs dealing with sanitation access and 3% with wastewater management (Dickin et al., 2020).

Despite a generally strong emphasis on water in NDCs, the under-representation of WASH compared with WRM corresponds to an under-representation of basic WASH in climate financing.

A WaterAid analysis for international public climate-related finance for water, as tracked by the OECD Development Assistance Committee (DAC) 2000–2018, shows it is dominated by large infrastructure water resources development and management (particularly for hydropower and irrigation), alongside large (primarily urban) water and sanitation systems, which receive over a third of the total each (Mason et al., 2020). Sub-sectors corresponding to basic WASH (primarily rural and community scale) received around a tenth of the total, with grant climate finance for basic WASH in Least Developed Countries (LDCs) receiving a smaller portion than for water resources development and management (see Figure

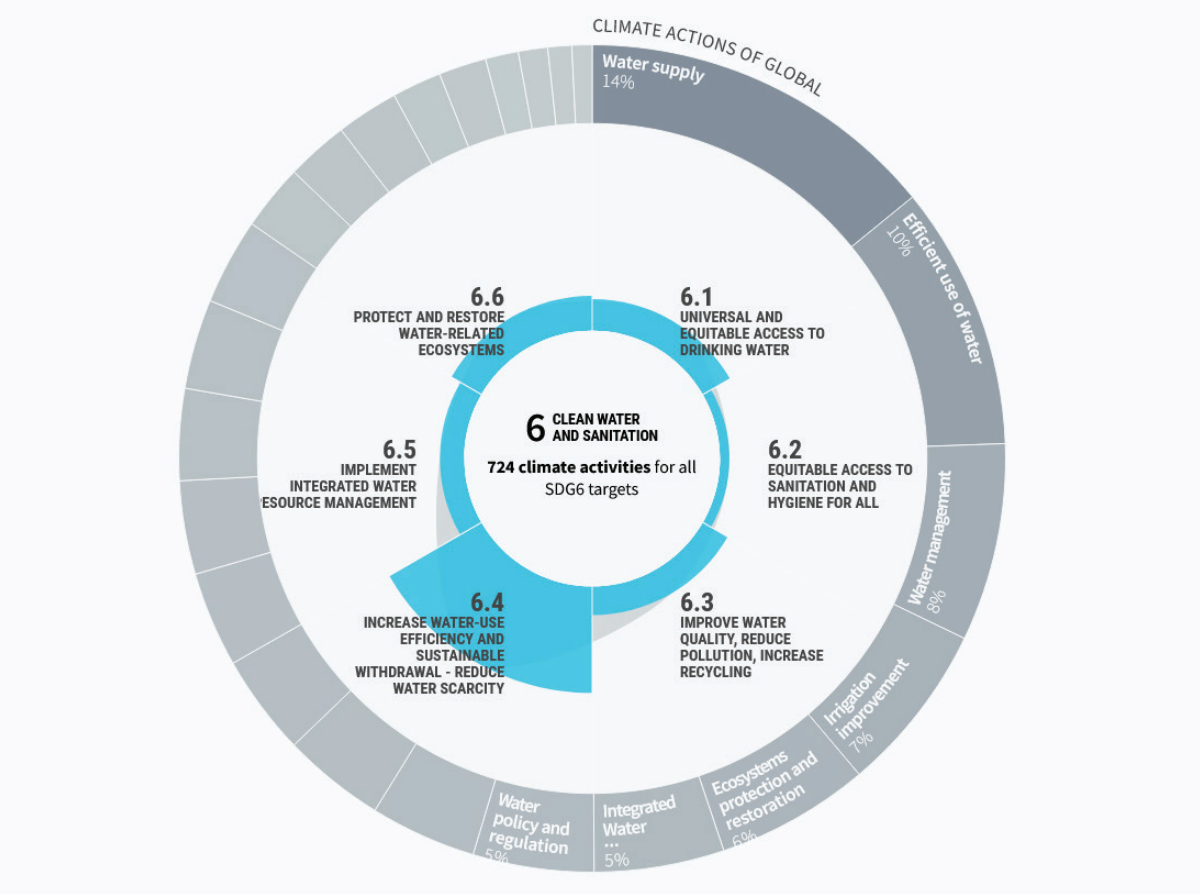

Figure 15: NDC water-connected activities by theme and by SDG6 target (DIE & SEI, 2022)

16), illustrating that only a limited number of WASH climate-financing proposals to MLCF schemes have succeeded. The financing situation is most alarming for sanitation and wastewater, with only 7% of approved Global Climate Fund project proposals by 1 April 2019 including a specific sanitation or wastewater element, and only 3% of total climate-related ODA mitigation and adaptation finance for water supply and sanitation being related to basic sanitation and large sanitation systems in 2017 (Dickin et al., 2020). This can perhaps be explained partly by the lack of WASH-focused actors that have succeeded in becoming MLCS-accredited entities, compared with the WRM-focused actors.

The lower levels of finance being devoted to basic WASH rather than WRM might also be explained by an initial analysis that indicates that donors are more likely to consider WRM activities as being climate related, with financing flows to WASH systems, both basic and large, less likely to be tagged as 'principally' related to climate change (see Figure 17).

Given the lack of MLCF accreditation among WASH actors and the donor perception that WRM is more principally climate related, WASH actors, particularly those concerned with basic WASH, could benefit from cooperating with WRM actors in accessing climate finance. Cooperation in accessing climate finance is also key to ensure that technically strong proposals are prepared that factor in the links between WRM and WASH and the influence of climate change. This coordination between water stakeholders in preparing strong joint proposals is a key recommendation of UN-Water (UN-Water, 2019a), and something in which a number of countries such as Lebanon, Jordan and Madagascar have been active (see Case study 8).

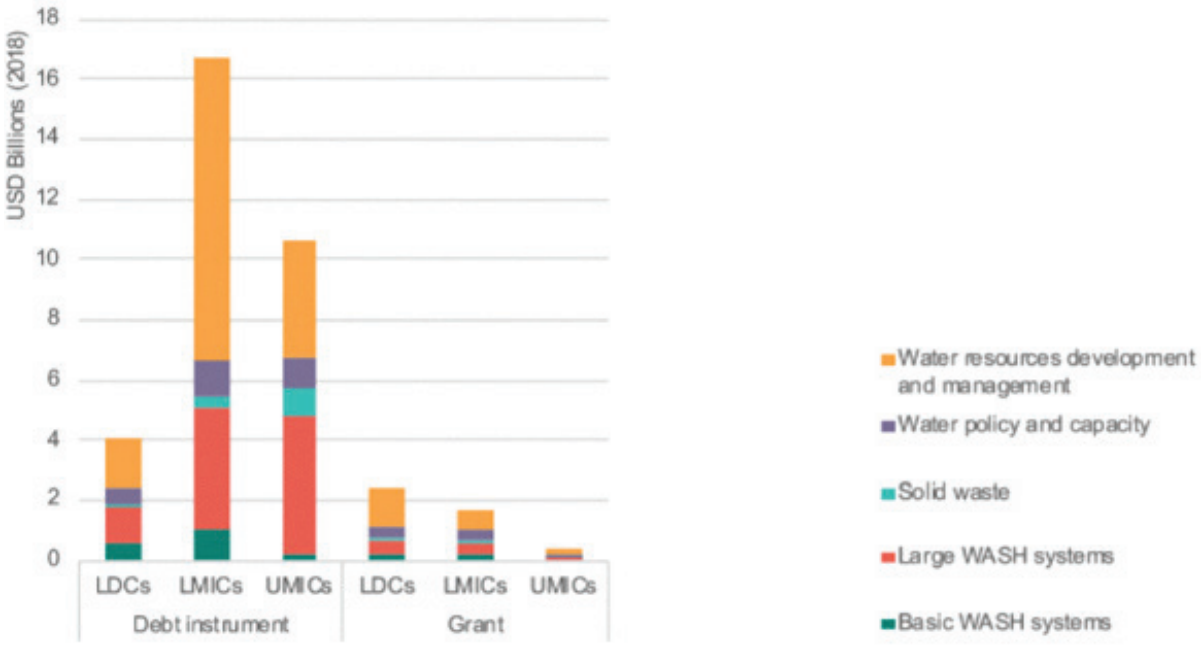

Figure 16: Climate-related development finance to water-related themes, by financial instrument and income group, 2000–2018 (Mason et al., 2020)

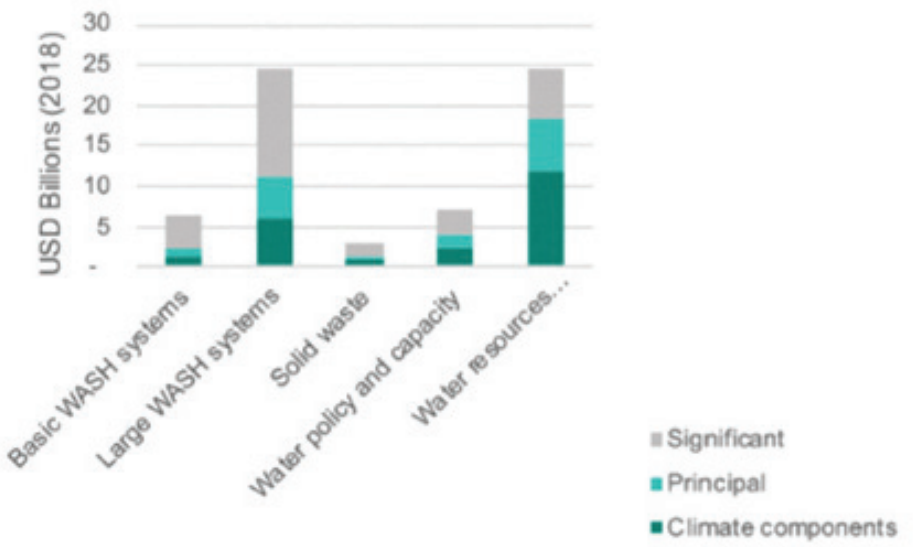

Figure 17: Climate finance flows to water 2008–2018, by climate objective (Mason et al., 2020)

Case study 8: The WRM–WASH nexus in climate finance

With increasingly severe droughts, floods and extreme weather events, the billions of people without safely managed water and sanitation services are vulnerable to the unpredictable impacts of climate change. These vulnerable communities are in urgent need of climate finance support, and yet rural and community-scale water and sanitation receives only around a tenth of total CAA funding for water programmes.

A very limited number of WASH MLCF proposals have succeded. One of the multiple reasons for this is because acccess to MLCF streams is limited to accredited entities, and many leading WASH organizations (including UNICEF) are not accredited. On this basis, access to MLCF streams for WASH-related proposals have depended mostly on partnering with accredited entities working more broadly with WRM, such as UNDP, FAO and UN-Habitat, among others. To address this perceived lack of coordination among water stakeholders when pursuing climate financing, the UN-Water Policy Brief on Water and Climate Change included among its recomendations that, when targeting multilateral, bilateral and other sources of climate financing, WRM and WASH stakeholders should ensure that proposals bring together multiple water considerations, including sanitation, wastewater and hygiene, health, agriculture, energy and industry, and ecosystems. There are some examples of overcoming WRM–WASH fragmentation when pursuing MLCF, demonstrating that strong water and sanitation proposals can be successful when developed jointly with WRM actors.

In Jordan and Lebanon, the respective ministries of the environment and of water and irrigation and UN-Habitat and UNICEF collaborated in the development of a USD14m regional proposal to the Adaptation Fund (AF). The proposal aimed to increase resilience to climate-change-related water challenges of both displaced persons

and host communities. The implementing entity, accredited to the AF and leading the discussions with respective governments, was UN-Habitat, working in close collaboration with UNICEF as executing entity. UNICEF supported the integration of WASH aspects in what was initially a broader WRM-focused concept. At pre-concept stage, national plans and strategies were consulted and workshops conducted in each country with a wide-range of stakeholders to identify the main climate-change issues, especially related to local needs for water resources and water supply and sanitation, informing the selection of proposed interventions. The overall aim of the project is to support a sustainable, multi-faceted water management approach by reducing water use from unsustainable sources, for example by reducing water losses, increasing water-use efficiency, supporting water harvesting and promoting the use of unconventional sustainable water resources.

In **Madagascar**, UNDP and UNICEF, among others, applied for USD5.8m in climate financing from the Least Developed Countries Fund. A project was jointly developed that aimed to enhance the adaptation capacities and resilience to climate change in several rural communities. The coordination and the management arrangements were defined in detail during the preparation phase of the project, with the Ministry of the Environment and Forestry ensuring overall coordination of the project, in close collaboration with the Directorate of Agricultural Production, the General Directorate of Water, the Department of Livestock and the Silo National des Graines Forestières (SNGF). The project has allowed for the collection and production of reliable climate and agro-meteorological information and forecasts and the transfer of water-based adaptation measures to vulnerable communities in the selected regions. Adaptation measures with WRM–WASH co-benefits included: i) remote-sensing techniques to support the development of reliable groundwater suitability maps in drought-prone areas, thus improving the success rate of borehole siting, while also adding to the national water resources dataset; and ii) implementation of a Multiple Use Water Systems (MUS) approach in drought-prone communities, ensuring domestic and livelihood-related water security.

OPPORTUNITIES TO COOPERATE FOR CLIMATE-RESILIENT WASH

- **WASH actors should proactively seek cooperation with WRM institutions to define and implement robust climate-change adaptation approaches for climate-resilient WASH** that consider resilient water-source development and build the adaptive capacity of communities and individuals for WRM. This can be achieved by supporting increased community understanding and monitoring of water resources, as seen in the case of WaterAid's CBWRM and SWRA. As communities and households use water sources for multiple purposes, an integrated approach to resilient WRM in communities should be jointly pursued. Lack of cooperation could contribute to maladaptation, at worst, with WASH actors taking decisions about water resources without proper consultation with WRM institutions.

- **Strengthen WRM and WASH engagement and cooperation on climate-change policy development (e.g., NDC, NAP and LT-LEDS development) to ensure that WRM–WASH links and basic WASH (especially sanitation) both feature.** Climate policies should acknowledge the importance of WRM–WASH cooperation for successful adaptation and resilience.

- **WASH actors should seek out technical assistance from WRM and meteorological institutions on V&A assessments for quantifying anticipated climate-change impacts on water sources at the appropriate scale. Conversely, WRM should seek out WASH actors when undertaking V&A assessments to understand the impact of water scarcity on livelihoods.** Countries could adopt global good practice on V&A assessments for water resources and WASH, adapting these to the country context and developing country-level SOPs for assessments that detail how WRM and WASH actors and others should cooperate in their application.

- **Exploit catchment management aspects of CRWSP to integrate water-resources-related climate hazards and risks into assessments, for broader benefit to other water resources user groups in the upstream catchment, in addition to benefits for drinking source-water protection.** WASH should seek engagement with WRM institutions to introduce and scale up CRWSPs, adjust regular WSPs to integrate climate resilience, and involve WRM institutions and water resources user groups in hazard and risk assessments at catchment level (see e.g., from Pacific, Fiji and Vanuatu; UNICEF Pacific, 2018).

SIWI/Pakistan/AntoineDelepiere

- **Develop SOPs for the CRWSP process based on global good practice that detail WRM–WASH cooperation in the process.** Ideally, WRM institutions and water resources user groups should be involved throughout CRWSP, and, as a minimum, WRM institutions should be called on to provide the required water resources information and interpretation, if WASH actors do not have the capacity to support the implementation of control measures related to water resources. Countries could potentially seek technical assistance from WHO for introduction and scale-up.
- **Raise awareness of decision-makers on the lack of a focus on WASH in CCA finance and make the case for expanding basic WASH climate finance more strongly.** The climate finance analysis for water by WaterAid and by SEI and SIWI are useful reports that can be shared with decision-makers at all levels.
- **WASH actors should continue to urgently seek MLCF accreditation (e.g., GCF accreditation) and associate with WRM actors to access climate finance for basic WASH, especially sanitation** (including through UN inter-agency cooperation e.g., Lebanon–Jordan and Madagascar). They need to build integrated proposals that have a strong climate rationale for WASH, and explore the conflict aversion angle, whereby climate change increases water scarcity, leading to conflict between different water users to the detriment of the human rights to water and a healthy environment.
- **WRM and WASH should cooperate to explore climate mitigation finance opportunities in the context of SDG6.3.1 on wastewater treatment as a mitigation strategy.** They need to strengthen the argument that climate mitigation finance for improved wastewater treatment can have multiple benefits beyond emissions reduction, including improving sanitation, safely managed service levels and water conservation through wastewater reuse.

Joint Outcome 5: Integrated Water Resources Management and governance

WRM–WASH fragmentation occurs at all levels, including at national water sector level. Fragmentation at national water sector level can also potentially be a bottleneck affecting cooperation at sub-national and local levels. Therefore, overcoming fragmentation nationally is critical for providing coherent and integrated delivery of SDG6 in a country because it unlocks sub-national and local cooperation. Providing an enabling environment for cooperation that feeds down from national to sub-national and local levels is critical. Overcoming fragmentation is part of what the UN-Water SDG6 Global Acceleration Framework aims to achieve, through driving its 'align' action pillar within the UN system and beyond.

The rationale for Integrated Water Resources Management (IWRM) is now widely accepted internationally as the way forward for efficient, equitable and sustainable development and management of the world's limited water resources, and for coping with conflicting demands (United Nations, n.d.). IWRM is hence critical for cooperation across water uses. This outcome – constituting SDG6.5 – can support the strengthening of cooperation under all of the previous four outcomes.

The most widely accepted definition of IWRM states that it is 'a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems' (GWP, 2011). It is often graphically represented as the 'IWRM comb' (see Figure 18).

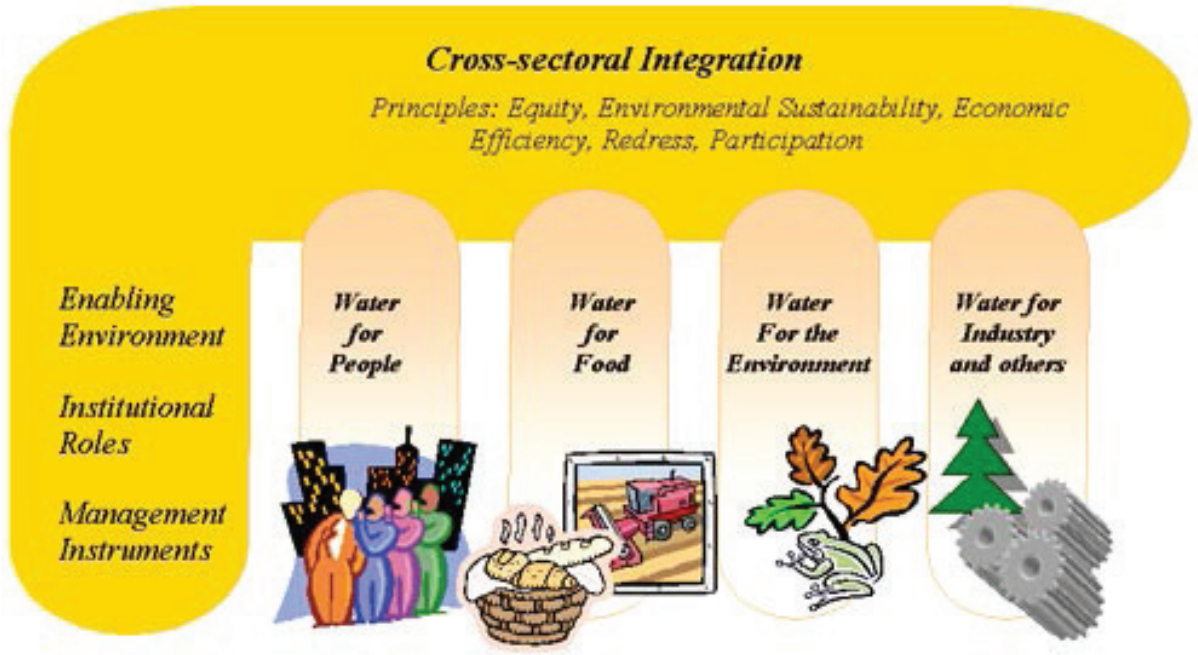

Figure 18: IWRM and its links to sub-sectors (Farhat Karim Hashmi et al., n.d.)

Global monitoring of SDG6.5.1 is structured around four dimensions of IWRM:

1. **Enabling environment:** In an enabling environment, national and sub-national policies and laws outline the importance of integrated approaches to WRM. Plans are needed to operationalize policy and regulatory frameworks.
2. **Institutions and participation:** Institutional and stakeholder participation across sectors is needed at all levels to implement plans and enforce regulations.
3. **Management instruments:** Data and information need to be provided to all relevant stakeholders to allow for informed decision-making, covering aspects such as sustainable use, pollution control, ecosystem management and DRR.
4. **Financing:** Budgets at the national and local level for investments and ongoing infrastructure and management costs are needed to implement management instruments and fund institutions. Revenue raising is an important part of this (UNEP, 2021).

Whereas most countries seem to struggle with the financing of management and infrastructure, more than half of the countries in the world are relatively advanced on the other three dimensions (see Figure 19). In countries where policy frameworks reflecting IWRM principles are not in place, institutions and stakeholders might struggle to gain sufficient political backing and mandate to implement integrated and cross-sectoral WRM. Where policies and plans have been adopted, their implementation still requires institutions with conducive mandates and sufficient capacity and resources to carry out WRM programmes.

To determine the areas of water governance where greater cooperation is needed, it is useful to consider what structural and institutional factors and functions water governance involves. Various water governance frameworks have been developed that conceptualize this. For WASH particularly, the WASH systems and 'building blocks' approach has become widely adopted, with multiple iterations by different organizations (e.g., SWA, UNICEF, WaterAid, IRC, Aguaconsult), with many commonalities. While many frameworks focus on the building blocks of the WASH system, some also focus on governance, such as the framework developed by the UNDP–SIWI Water Governance Facility, which cites nine governance functions, including

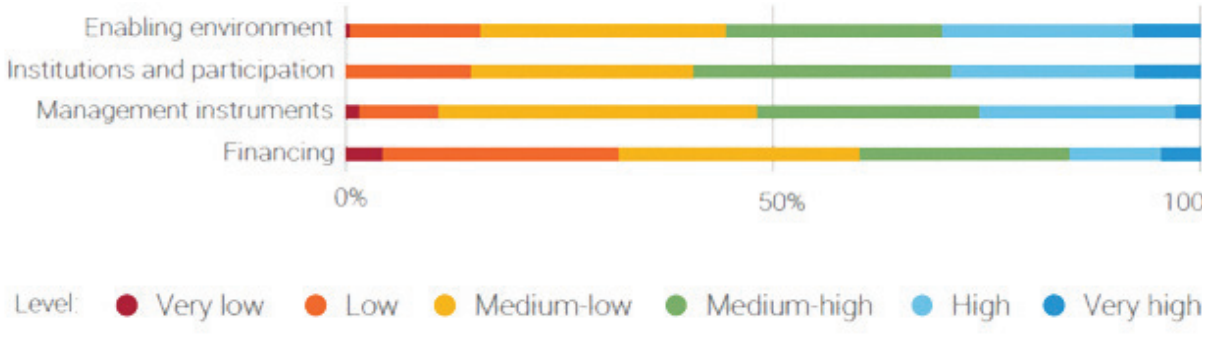

Figure 19: Level of implementation of four dimensions of IWRM (percentage of countries per level, by dimension) (UNEP, 2021)

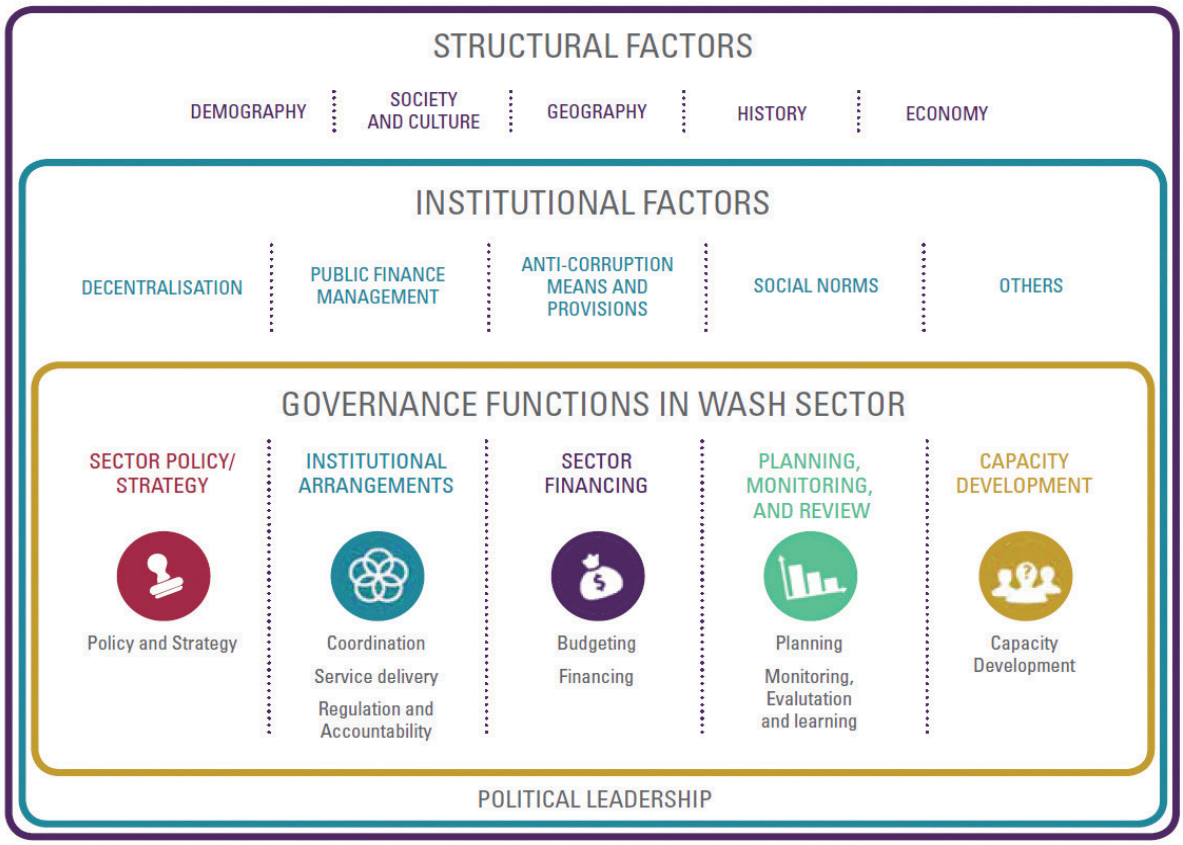

Figure 20. Enabling Environment Framework for Sustainable WASH Services (UNICEF, 2016)

coordination. This framework was adopted by UNICEF (see Figure 20)[37] and later adapted and adopted by Sanitation and Water for All.[38]

A similar but more operationally focused conceptual water governance framework (Jiménez et al., 2020) employs governance functions, attributes and outcomes and is intended for wider application across water disciplines, including both WRM and WASH (see Figure 21). Under this framework, core water governance functions are defined as 'the key processes performed, in various forms and to varying extents and quality, for the organized development and management of water resources and services'.

While the core water governance functions seen in Figure 21 are broadly relevant for both WRM and WASH, in practice, the 'sub-functions' undertaken by WRM and WASH actors under each broad core governance function differ, with some critical areas of overlap. It is these areas of overlap between

37 UNICEF, 2016. Strengthening Enabling Environment for Water, Sanitation and Hygiene (WASH) Guidance Note. url: https://washenablingenvironment.files.wordpress.com/2015/11/wash-guidance-note-draft-updated-lr1.pdf

38 Sanitation and Water for All, Five Building Blocks. url: https://www.sanitationandwaterforall.org/sites/default/files/2020-02/Five%20building%20blocks.pdf

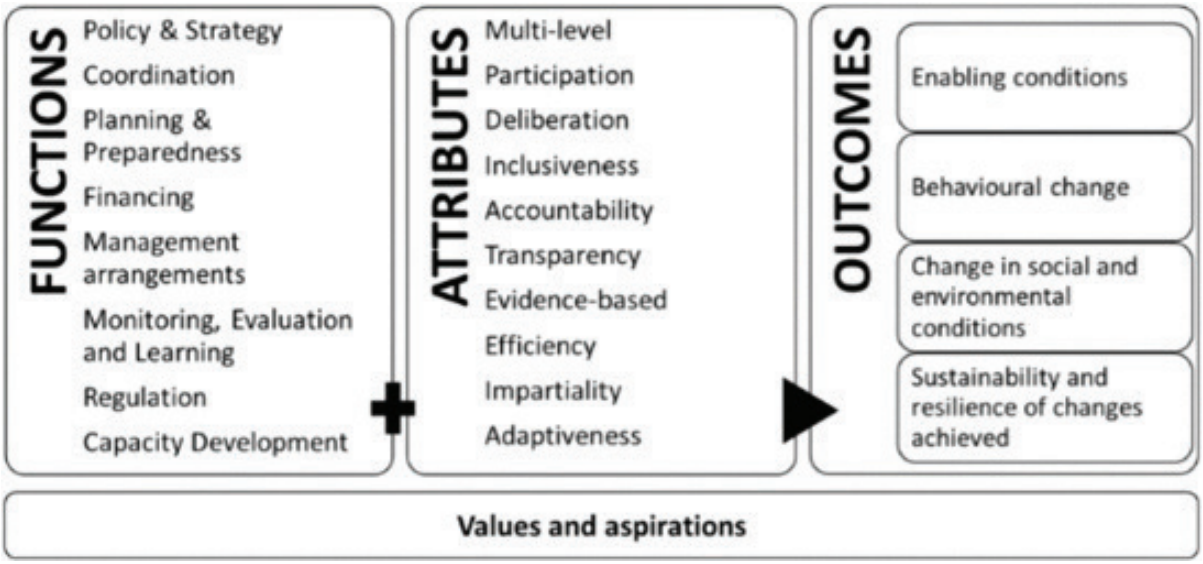

Figure 21: Operational water governance framework as a combination of functions, attributes and outcomes (Jiménez et al., 2020)

WRM and WASH 'governance sub-functions', or 'WRM–WASH Cooperation Areas' for integrated water-sector governance that are of interest.

Six key areas of WRM–WASH cooperation for water sector governance are:

- Water policy and strategy formulation
- Water sector coordination processes
- Water sector planning processes
- Water resources monitoring
- Environmental, service, and public health regulation
- Capacity development on WRM-WASH linkages

An overview of each cooperation area follows. Opportunities for IWRM are presented at the end.

While the core governance functions of 'financing' and 'management arrangements' feature in the above framework (see Figure 21), they do not feature as WRM–WASH cooperation areas under this joint outcome area, for the following reasons. Financing, where cooperation may occur, is likely to be programme- and project based (e.g., WRM–WASH Cooperation Area 12: Climate finance), rather than taking place at water-sector level. In terms of management arrangements, WRM- or WASH-specific management arrangements (e.g. management arrangements for water resources allocation and distribution, or WASH service delivery models) may be defined at water sub-sector level independently for WRM and WASH, whereas the implementation of specific aspects of the defined management arrangements requires cooperation, for example in basin, catchment and watershed management (see WRM–WASH Cooperation Area 1: Equitable water resources allocation), or in multi-purpose water infrastructure development (see WRM–WASH Cooperation Area 3: Multi-purpose water infrastructure development).

COOPERATION AREA 13: WATER POLICY AND STRATEGY FORMULATION

Why is WRM–WASH cooperation important?

Ensuring that water-, WRM- and WASH-specific laws, policies, strategies, standards and guidelines are responsive to each other, and that overarching water-sector policy and strategy are inclusive of WRM and WASH, is essential. Coherent policies and strategies provide the vision and direction for integrated water-sector governance that acts in light of the links and inter-dependencies between WRM and WASH. This coherence of policies and strategies can only be achieved through meaningful cooperation, including through inclusive and fully collaborative policy and strategy formulation processes that involve WRM and WASH actors.

Overarching national water policies and strategies should consider all uses of water resources. There are examples of where water for domestic uses is given priority over other productive uses in constitutions and policies (see South Africa,[39] Ecuador,[40] Uruguay[41] and E-Swatini[42]), with South Africa being one of the first countries to recognize the human right to water, with the Water Act[43] establishing a minimum reserve for basic needs. In Comoros, the revised Water Code, which is the overarching legislative and policy that guides all water resources use in the country, has been updated through a collaborative process of WRM–WASH cooperation. The Water Code now goes beyond its original focus on water supply to include all water usage and impacting sectors and sub-sectors, and considers IWRM at island level, placing WASH in the larger IWRM spectrum (see Case study 9).

On the other hand, WASH strategies at national and sub-national levels sometimes do not adequately consider WRM, although this is changing in some instances, presumably in part due to the adoption of the SDGs, with some newer WASH policies starting to recognize the importance of WRM for sustainable WASH service provision (e.g., Sierra Leone).[44] Some WASH policies deal with the issue of overcoming WRM–WASH fragmentation head on, such as the Liberia National Water Supply and Sanitation Policy,[45] which links to an overarching national IWRM policy and establishes institutional frameworks and arrangements between WRM and WASH actors for coherent policy implementation. Others, such as the Bangladesh National Strategy for Water Supply and Sanitation,[46] includes strategies for emerging areas in

39 Céline Dubreuil, C. 2016. The Right to Water: from concept to implementation, World Water Council. url: https://www.worldwatercouncil.org/sites/default/files/Thematics/The_Right_To_Water_English.pdf

40 Constitution of the Republic of Ecuador, 20 October 2008. National Assembly, Legislative and Oversight Committee. url: https://pdba.georgetown.edu/Constitutions/Ecuador/english08.html

41 Céline Dubreuil, C. 2016. The Right to Water: from concept to implementation, World Water Council. url: https://www.worldwatercouncil.org/sites/default/files/Thematics/The_Right_To_Water_English.pdf

42 E-Swatini Government, 2018. National Water Policy. url: http://www.gov.sz/images/MNRE_PICS/National-Water-policy----Final--Document-Aug-2018-1.pdf

43 The Republic of South Africa, National Water Act 1998. url: https://www.gov.za/sites/default/files/gcis_document/201409/a36-98.pdf

44 Sierra Leone Government, 2019. Urban WASH Roadmap 2019–2030. url: https://www.mccu-sl.gov.sl/documents/Urban%20WASH%20Roadmap%20%202019.pdf

45 The Republic of Liberia, 2009. Water Supply and Sanitation Policy. url: http://extwprlegs1.fao.org/docs/pdf/lbr180037.pdf

46 Government of Bangladesh, 2014. National Strategy for Water Supply and Sanitation 2014. url: https://www.psb.gov.bd/policies/nswsse.pdf

WASH, such as adopting IWRM and coping with disaster, adapting to climate change, and safeguarding the environment.

There are several sanitation policies that align with the SDGs and make more links with water resources planning in terms of ensuring sustainable services and also stress the importance of environmental protection throughout the sanitation chain. Notably, the South Africa National Sanitation Policy[47] recognizes the importance of conserving and protecting water resources, by using less water-intensive sanitation options and ensuring sustainable management of sanitation, not polluting downstream and reusing greywater and wastewater. Other sanitation policies, such as in India,[48,49,50] Kenya,[51] Kiribati[52] and Sierra Leone,[53] put more emphasis on the environmental protection aspects of safely managed sanitation rather than on the opportunities presented by wastewater reuse for water conservation.

Also, in specific contexts, notably in the Pacific, national WASH-related policies tend to have been developed in an integrated way. Examples include Kiribati,[54] Vanuatu[55] and the National Water Resources and Sanitation (WATSAN) Policy in Solomon Islands,[56] which strongly recognizes the critical nature of water resources for sustainable WASH services and was prepared in a very integrated way, through cooperation of WRM and WASH actors under a cabinet-appointed National Intersectoral Water Coordination Committee. The committee included government representation from health, agriculture, land, environment, forestry and water utilities. A similar integrated policy development approach was taken in Rwanda,[57] where the revision of Rwanda's WASH policies included the inclusion of WRM, and climate and environmental aspects (Malik et al., 2017).

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47 Government of South Africa, 2016. National Sanitation Policy 2016. url: https://www.gov.za/sites/default/files/gcis_document/201706/national-sanitation-policy.pdf

48 Government of India, n.d. National Urban Sanitation Policy. url: http://mohua.gov.in/cms/National-Urban-Sanitation-Policy.php

49 Government of Odisha, 2019. Odisha Rural Sanitation Policy Draft, January 2019. url: https://odishapanchayat.gov.in/English/download/Draft%20Odisha%20Rural%20Sanitation%20Policy%20for%20consultation%20Jan%202020.pdf

50 Government of Odisha, 2016. Odisha Urban Sanitation Strategy 2017. url: http://www.urbanodisha.gov.in/Handler4.ashx?ID=1115

51 Government of Kenya, 2016. Kenya Environmental Sanitation and Hygiene Policy 2016–2030. url: https://www.wsp.org/sites/wsp.org/files/publications/Kenya%20Environmental%20Sanitation%20and%20Hygiene%20Policy.pdf

52 Government of the Republic of Kiribati, 2010. National Sanitation Policy: Effective Sanitation for Healthy Communities, Environments and Sustainable Development. url: http://www.climate.gov.ki/wp-content/uploads/2013/03/Kiribati-National-Sanitation-Policy-2010.pdf

53 Government of Sierra Leone, 2010. The National Water and Sanitation Policy. url: http://extwprlegs1.fao.org/docs/pdf/sie181226.pdf

54 Government of the Republic of Kiribati, 2008. National Water Resources Policy: Water for Healthy Communities, Environments and Sustainable Development. url: https://www.sprep.org/att/IRC/eCOPIES/Countries/Kiribati/94.pdf

55 Government of Vanuatu, n.d. Vanuatu National Water Policy 2017–2030. url: https://mol.gov.vu/images/News-Photo/water/C---Vanuatu-Water-Policy-with-Annexures.pdf

56 Government of Solomon Islands, 2018. Solomon Islands National WATSAN Policy. url: https://www.mmere.gov.sb/index.php/alias-about-us/functions/water/policy-formulation.html

57 Government of Rwanda, 2017. National Water Supply Policy. url: https://www.mininfra.gov.rw/fileadmin/user_upload/new_upload/NATIONAL_WATER_SUPPLY_POLICY__DECEMBER_2016.pdf

Case study 9: Integrating WRM and WASH in the Comoros Water Code

Comoros has a small land area of only 2,612 km², consisting of steep volcanic terrain. Watersheds and aquifers are small and have little natural water storage capacity, and consequently are highly vulnerable to climate change. The rural population is reliant on rainwater harvesting, so the combination of drought, flood and sea-level rise impacts the islands' water supply, resulting in increasing water scarcity. As a result, there is a need for a participative IWRM approach to sharing scarce water resources among different water uses and making the appropriate social choices to guide green and grey infrastructure development to strengthen the resilience of Comoros citizens to climate change. Despite this need, there are significant obstacles to effective implementation of IWRM. These include: i) insufficient knowledge of the availability and dynamics of water resources; ii) weak institutional governance; iii) still very poor access to basic services for drinking water supply and sanitation; and iv) the low capacity to mobilize and exploit existing resources.

A significant bottleneck was the **outdated 1994 Comoros Water Code**, which was very much WASH focused, with inadequate consideration of other water uses and users (including through IWRM), the protection of water resources and of risk mitigation. Roles and responsibilities for different actors were unclear. Given these deficiencies, Comoros needed a new Water Code to reorganize the water sector and to be responsive to climate change in its decision-making, planning and management tools in ways that catered for CCA, resource protection and sustainable water management. The revision of the Water Code had been under way since 2014. In May 2019, the Directorate General of Energy and Water (DGEME) and the Directorate General for Environment and Forests (DGEF) jointly concluded, based on a review by UNDP, that the May 2019 version needed more input before a final version of a new Water Code could be submitted for formal adoption.

UNDP called on its Water Governance Facility to propose a roadmap, which led to a final Water Code draft that was updated to take into account the SDGs, climate change, human rights, gender, IWRM and new collaboration agreements with regard to water management in the areas of agricultural irrigation, extractive industries, tourism, ecosystems conservation and gender equity. The new code is harmonized with the other legislative documents governing water-dependent sectors and sub-sectors. In order to reach an agreed draft Water Code that addressed the gaps of the previous versions, several actions were taken by Comorian stakeholders, with support of UNDP, including:

- a participative process, with stakeholders expressing the desired socio-economic and environmental priorities and objectives
- discussion around the principles of 'good governance' for the water sector
- participative institutional mapping of stakeholders by governance functions
- agreement on sharing roles and responsibilities among stakeholders for WRM and WASH
- assessment of the roles and responsibilities of stakeholders in the water sector
- discussion and participative assessment of the institutional and legal arrangements in place
- stocktake of the objectives and strategies of water-dependent and water-impacting sectors.

The new Water Code was technically approved in September 2019 and passed Parliament in December 2020. Its adoption provides solid foundations for IWRM and the use of water for national development. However, it is important to proceed with the diligent adoption of the bylaws and enforcement procedures to operationalize the code. The commitment of national actors and the technical and financial support of the international community are essential conditions for a progressive and successful implementation of the Comoros Water Code.

COOPERATION AREA 14: WATER-SECTOR COORDINATION PROCESSES

Why is WRM–WASH cooperation important?

Coordinated interaction, information-sharing and decision-making between WRM and WASH actors at national and sub-national water-sector levels on issues of shared interest, both during normal and emergency times, are critical to ensuring alignment of efforts that are mutually reinforcing, rather than conflicting.

Cooperation for effective sector coordination processes allows decision-making to be done through consensus and helps ensure accountability between actors. Cooperation across sectors leading to alignment of efforts, particularly in water resources planning and allocation and drought and flood emergency response coordination, can bring synergies in efficiency, conflict aversion and DRR and mitigation.

A generic broad framework of coordination mechanisms for water at country level can be seen in Figure 22, which shows WRM–WASH cooperation under a national action committee or water sector development committee (sometimes called a water sector working group, or WSWG) (UN-Water, 2014). Unfortunately, the reality sometimes is that fragmentation between WRM and WASH governmental institutions, departments and actors nationally results in separate or unaligned coordination mechanisms, or simply fragmentated sub-groups under the same coordination mechanism.

Fragmentation in national level coordination can be due to fragmented institutional arrangements, with responsibilities for WRM and WASH split across multiple ministries. Recently, in line with SDG6, some countries, notably India[58] and Ghana,[59] have reformed these institutional structures and realigned WRM and WASH under one dedicated ministry.

One way of overcoming fragmentation can be through joint WRM–WASH Sector-Wide Approaches (SWAps) and coordination mechanisms that bring together WRM and WASH actors through sector and technical working groups. Ethiopia's ONEWASH National Programme SWAp, is an example of an active attempt to overcome fragmentation through the invigoration of the WRM sub-group and hosting of a Joint Technical Review (JTR) for the WRM sub-sector, with the support of UNICEF. While a SWAp could be considered good practice in coordination (especially if it involves a focus on both WRM and WASH, as in Case study 10), there are potentially less resource-intensive approaches. For example, in Zimbabwe, a coordination structure originally for WASH was expanded to encompass both WRM and WASH.[60] It is also important to ensure that cooperation exists in more informal water-sector coordination mechanisms, with United Nations inter-agency coordination mechanisms on water and representation of both WRM and WASH actors in development partner groups for water being good examples.

However, while there are some countries with sub-groups for WRM and WASH under the same arrangements (e.g., in Malawi or Tanzania),

58 May 2019 under the second Modi ministry. This was formed by merging two ministries: the Ministry of Water Resources, River Development & Ganga Rejuvenation and the Ministry of Drinking Water and Sanitation. url: https://en.wikipedia.org/wiki/Ministry_of_Jal_Shakti, https://jalshakti.gov.in/

59 In Ghana, on 11 January 2017, President Nana Addo Dankwa Akufo-Addo announced the new Ministry for Sanitation and Water Resources. url: http://mswr.gov.gh/

60 The National Coordination Unit in Zimbabwe. url: https://newfour.ncuwash.org/national-coordination-unit/

or one national WRM–WASH coordinating body (e.g., in Zimbabwe), what is less certain is the level of interaction and coordination between sub-groups, for example through an overarching sector working group. The risk is that fragmentation persists despite the involvement of both groups or an overarching coordination mechanism. Persistent fragmentation may occur if insufficient attention is paid to integrating WRM and WASH actors in the operation of the overarching coordinating mechanism, except perhaps at the highest level in the sector working group, where limited opportunities may arise for meaningful discussions on joint coordination.

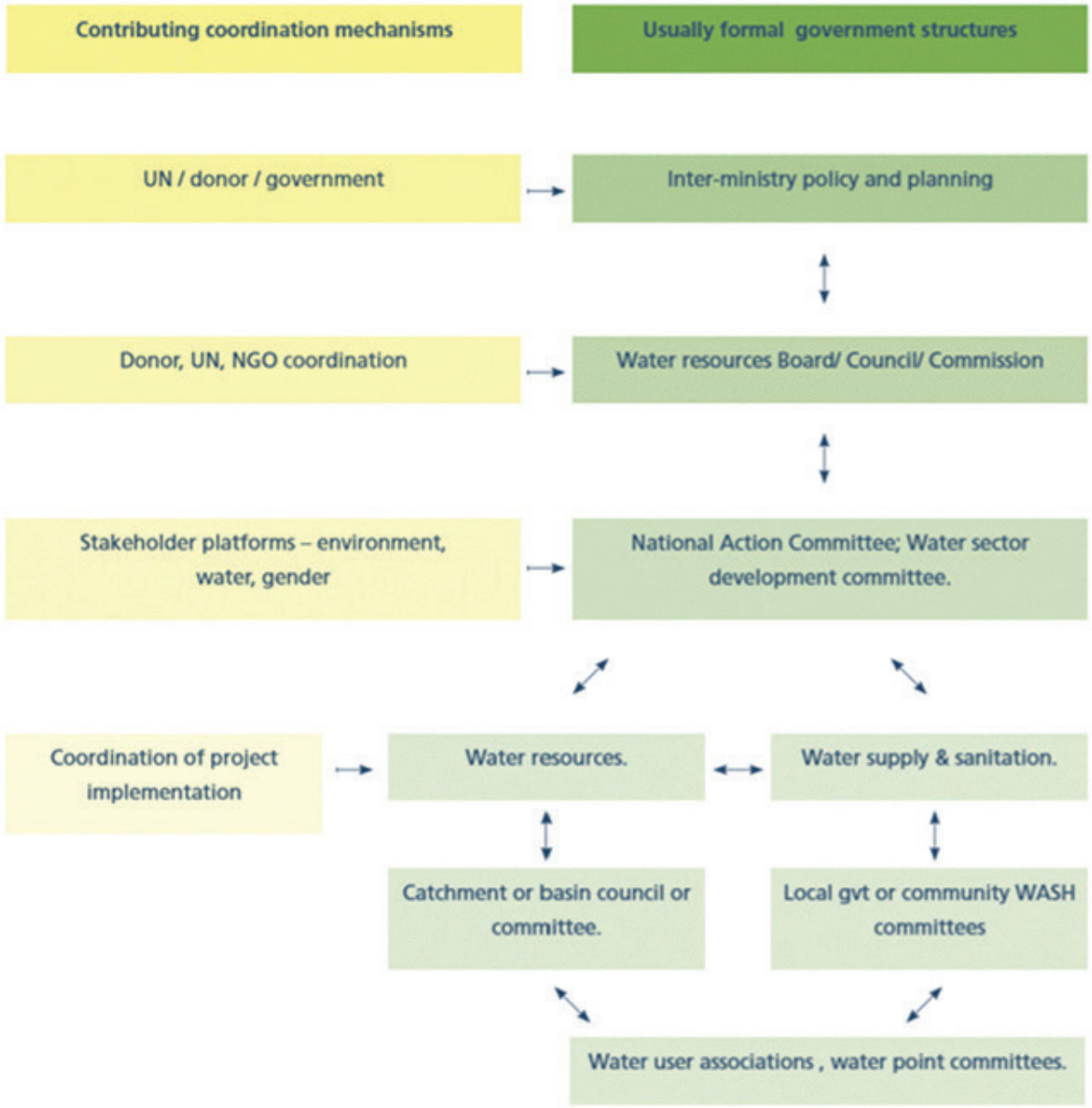

Figure 22: Broad framework of coordination mechanisms for water at country level (UN-Water, 2014)

COOPERATION AREA 15: WATER-SECTOR PLANNING PROCESSES

Why is WRM–WASH cooperation important?

Inclusive and integrated water-sector planning processes, whereby WRM and WASH actors jointly participate in planning, are important to ensure that WRM and WASH plans are aligned and mutually reinforcing. Through cooperation, synergies and efficiencies may be exploited in planning and conflicts avoided. Water-sector planning processes are closely linked to WRM-WASH Cooperation Area 14 (Water-sector coordination processes), as the same coordination mechanisms and platforms may be used.

Fragmentation between WRM and WASH government institutions, departments and actors nationally may result in separate planning processes and in missed opportunities for synergies and efficiencies. Under a SWAp, or separately, there may be cyclical annual Joint Sector Reviews (JSRs), whereby sector or sub-sector performance is assessed annually through a Multi-Stakeholder Forum (MSF) and plans (sometimes called undertakings) are made to address shortcomings. SWAps and JSRs take many different forms and approaches.

A study on the effectiveness of JSRs by the World Bank analysed the Sector Performance Report (SPR) presented at the JSR, or the JSR event report itself, for 10 countries. It found that while six out of 10 reports referred to water resources regulation, monitoring and/or pollution, only three reports (for Kenya, Malawi and Uganda) dealt with wider water resources issues (Danert et al., 2016). This suggests there is room for increasing the scope of JSRs to include more focus on WRM–WASH links.

In Ethiopia and Eritrea, WRM–WASH cooperation on water resources monitoring data and information-sharing, including through MSFs and JSRs, are seen as key to effective planning, under the SWAp and related ONEWASH National Programme in those countries (see Case study 10). Another factor for securing accountability is to ensure that all support for WRM and WASH, whether government funded or otherwise, is reported in the SPR. This has happened in Kenya, where the 2015/16 CSOs SPR reported on both WRM and WASH initiatives, including on financing and integration (KEWASNET, 2017).

Case study 10: Integrating WRM into WASH SWAps in Ethiopia and Eritrea

Ethiopia is a country endowed with substantial water resources. In order to manage these more effectively and in an integrated manner, the country has moved towards joint WRM–WASH strategic planning. Its One WASH National Programme (OWNP) has played a key role in overcoming WRM–WASH fragmentation. Based on its success, this is being replicated in Eritrea.

OWNP was launched in 2013 and is a government-driven SWAp. It aims to reduce the administrative fragmentation of WASH service delivery and transform water resources and WASH strategic planning by ensuring that IWRM becomes a pillar for sustainable development. One of the first issues that needed attention was weak coordination between the ministries responsible for WRM and WASH, including the Ministry of Health, Ministry of Education and Ministry of Water, Irrigation and Energy, as well as collaboration between development partners. The first phase of OWNP (2014/15) focused on increasing harmonization and alignment among and between WRM and WASH actors. One key area for alignment related to planning systems, so development partners (including CSOs) worked to align their targets, plans and activities with the OWNP principles of integrated WRM. Key to the

success of this phase was the establishment of a joint government–donor WSWG, with the objective of supporting integrated development and management of water resources. By empowering the WSWG and giving it visibility, it was expected that development partners and government institutions involved in the water sector would come together, creating a common platform for coordinating and aligning their efforts on various issues related to the development of the water sector in the country. A distinct feature of the WSWG was that for the first time, it brought together the technical committees on WASH and on WRM, with their respective working groups.

UNICEF and USAID started a collaboration in July 2015 to create a functioning WSWG Secretariat. This collaboration also supported the reactivation of the WRM technical committee and the organization of the first-ever JTR for WRM in Ethiopia, with the purpose of bringing various stakeholders together for ensuring the sustainable, coordinated development and management of water, land and related resources, in order to maximise the economic and social welfare of the population. This served as the basis for planning water-sector interventions in general and informed the subsequent phase of OWNP in particular. The creation of the WSWG, including the reactivation and capacitation of the WRM technical committee, and launch the JTR, have together significantly contributed to the development of a clear and common agenda for WASH and WRM in Ethiopia. The JTR inaugural meeting in April 2018 involved wide-ranging WASH and WRM participants, including development partners, basin authorities, concerned federal ministries and regional bureaus of water, environment and agriculture. Since then, the WRM technical committee has been able to bring together three ministries: Ministry of Water, Irrigation and Electricity; Ministry of Agriculture and Livestock Resources; and Ministry of Environment, Forestry and Climate Change, among other stakeholders. A MSF brings both WASH and WRM actors together periodically. November 2019 marked the second of these joint meetings. The event was held under the theme 'Accelerating integrated, inclusive, sustainable and quality WASH services and WRM for achieving the SDGs,' with areas for joint WRM–WASH initiatives identified for 2020, including: i) upscaling the implementation of Climate-Resilient WASH through equitable and inclusive water and sanitation safety planning; and ii) revising the WRM policy and strategy.

Building on the success of OWNP in Ethiopia, the Government of Eritrea, with support from UNICEF, has developed a OneWASH Strategy and Investment Plan (2019–30) that is climate-risk informed. The plan initally focuses on WASH outcomes, but acknowledges the importance of linking this to WRM to address identified climate risks. Eritrea also now needs to create mechanisms and platforms for more effective cooperation. The advances and lessons learned from Ethiopia in overcoming fragmentation will no doubt help inform the next steps of the climate-resilient OneWASH programme in Eritrea.

COOPERATION AREA 16: WATER RESOURCES MONITORING

Why is WRM–WASH cooperation important?

The generation, capture, awareness-raising, availability and sharing of water resources monitoring data (e.g., flow, demand, quality) and related water resources assessments between WRM and WASH actors is important for informed decision-making and planning by both actors, at national and sub-national sector level.

Monitoring data and assessments provided by WRM actors are important for use by WASH actors to inform planning and implementation of WASH services that are resilient and sustainable. Water resources monitoring data from the WASH sub-sector (e.g., from water utilities) can also provide an important contribution to expanding

a national water resources dataset, for use by WRM actors and other water-using and impacting sectors and sub-sectors.

Water resources monitoring data and information underpin any sound water resources plan, and sound water resources data should also underpin WASH policies and plans. It is critical to ensure the effective implementation of interventions by ensuring that such data and information comply with national standards and regulation. Unfortunately, in some countries, water resources data and assessments from monitoring may be limited, outdated, unreliable or inaccessible, with historical records sometimes poorly managed or even lost or destroyed. Perhaps the clearest illustration of this can be seen in Figure 23, which provides an example of SDG6.3.2 on ambient water quality, where a global estimate on progress is lacking due to an inadequate global baseline dataset from countries. In some countries with limited public finances, water resources monitoring and assessments may not be prioritized and where data can be collected, it may not be adequate, due to a limited water resources monitoring network or lack of resources. A lack of water resources data can hinder WRM planning as well as planning for WASH services delivery.

In Ethiopia and Kenya (USAID, 2019b) and Madagascar (Serele et al., 2020), it has been found that in order to properly plan services (primarily groundwater boreholes), WASH actors undertake water resources data collection, monitoring and assessments themselves. In these situations, WASH actors can play an important role in providing a clearer picture of water resources across the country to the wider water sector, particularly in rural areas and for groundwater. This work can aid broader WRM strategies and planning. Likewise, for water utility supplies, it is essential to have

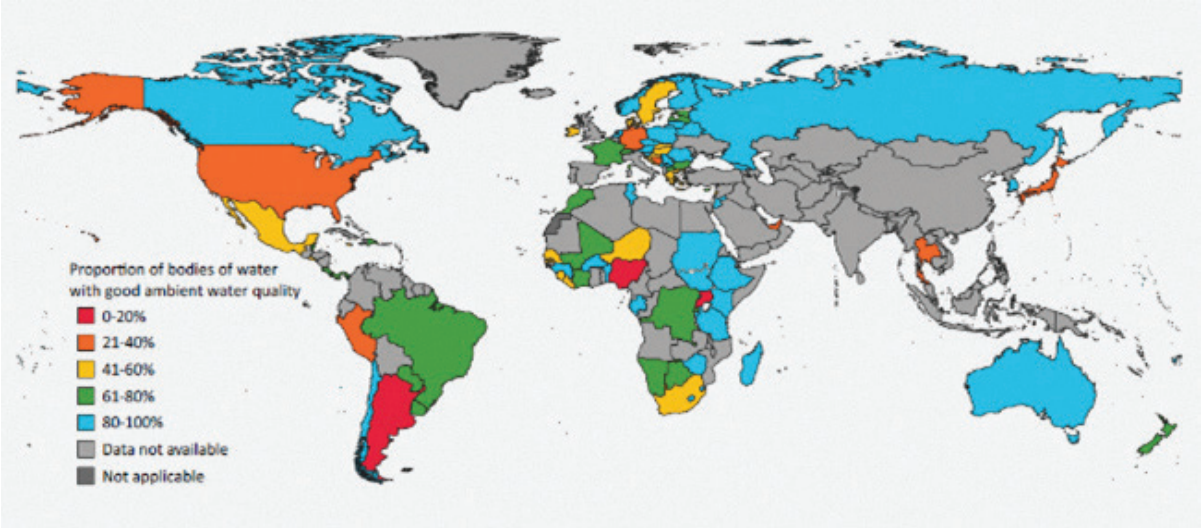

Figure 23: Proportion of bodies of water with good ambient water quality (%) (2017–20) (UN-Water, 2021b)

61 This is being addressed through the UNEP-led World Water Quality Alliance. url: https://www.unep.org/explore-topics/water/what-we-do/improving-and-assessing-world-water-quality-partnership-effort

good water resources monitoring and data for planning WASH services, and again, where data is generally lacking on water resources, a water utility could provide a good source of monitoring data from its abstraction and discharge points in its operational areas that will be of interest and use to the wider water sector.

An example of WRM–WASH cooperation on water resources data and assessments is in Sierra Leone, where a national water atlas was prepared using water resources data from multiple sources, including water-point data from water-supply boreholes (Fileccia et al., 2018). The initiative has led to the creation of a national dataset and groundwater-potential maps. Similarly, in Malawi, persistent challenges with drilling saline drinking water boreholes in one district led the WASH service providers and district authority to undertake some hydrogeological assessments for the purposes of groundwater exploration for drinking water, which has furthered the understanding of the general hydrogeology of the area (University of Strathclyde, n.d.; University of Strathclyde & Water for People, n.d.). In Ethiopia and Kenya, remote sensing and traditional hydrogeological methods are being used to map groundwater resources (USAID, 2019b). The goal is to improve the success rate of drilling productive water supply wells and to help ensure sustainable management of the resource. Training is also being provided to the water agencies affiliated with the Government of Ethiopia and the Government of Kenya, which will allow them to replicate the mapping process throughout their respective countries.

COOPERATION AREA 17: ENVIRONMENTAL, SERVICE AND PUBLIC HEALTH REGULATION

Why is WRM–WASH cooperation important?

Regular cooperation between environmental regulators and WASH service and public health regulators is of great importance for: i) cooperating on water efficiency, demand management and conservation strategy development and implementation, including in wastewater treatment reuse; ii) mitigating the impacts of wastewater and over-abstraction on the environment, including through ensuring minimum environmental flows, as well as protecting the health of those who come into contact with wastewater and sewage sludge discharges; iii) ensuring that reuse of wastewater and sewage sludge is done safely; and iv) for the joint policing of water catchments upstream of drinking water abstraction points to prevent pollution of drinking water sources and the environment by agriculture and industry. As well as proactive cooperation, reactive cooperation is essential in the event of a drought or pollution event to ensure a coordinated response for timely mitigation of the issue.

An important component of successful drinking source-water protection (see WRM–WASH Cooperation Area 4: Source-water protection), pollution prevention from wastewater and sanitation (see WRM–WASH Cooperation Area 5: Pollution prevention) and wastewater reuse (see WRM–WASH Cooperation Area 6: Wastewater use) is environmental, service and public health regulation.

Aside from routine interaction between WRM and WASH actors for regulating abstractions and discharges by WASH services providers, typically between environmental regulators and water and sewerage utilities, there is

a need for proactive cooperation between environmental regulators (i.e., WRM) and service and public health regulators (i.e., WASH) on overlapping areas of their mandates. These overlapping areas may include:

- environmental and service regulation of water efficiency, demand management and wastewater reuse
- overlapping environmental and public health regulation of wastewater treatment and end use, reuse and disposal of wastewater and sewage sludge (see Figure 24), including through cooperating on Sanitation Safety Planning (SSP), an emerging approach (WHO, 2016)
- environmental and public health regulation of catchments and zones upstream of WASH services, including through catchment management aspects of WSPs.

In terms of sanitation, which cuts across many sectors, relevant legislation and regulation are also widely scattered. Elements may be found under local government public health, occupational health and safety, environment and water resources, among other areas. WHO states that considerable effort may be needed to identify, update and align all the necessary elements, with conflicts and contradictions needing to be resolved where possible (WHO, 2018a).

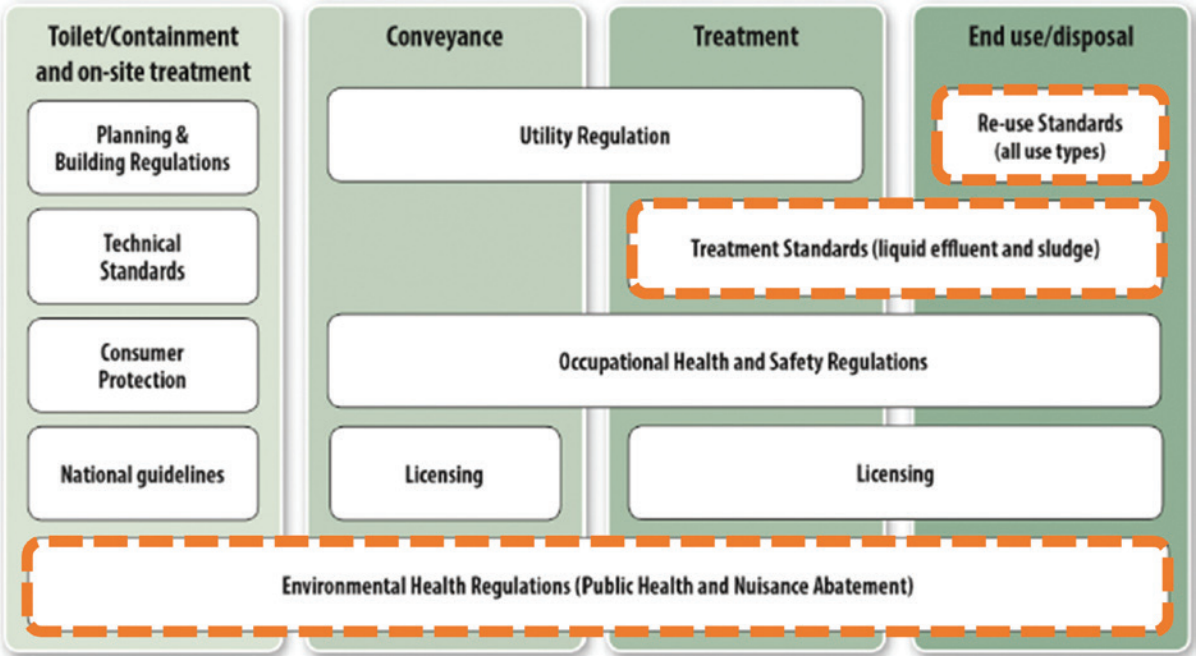

Figure 24: Sanitation service chain regulatory mechanism options, with aspects of regulation where cooperation between environmental, service and public health regulators should occur (WHO, 2018a)

One tool that may assist in helping cooperation between environmental, service and public health regulators on areas of shared interest is Sanitation Safety Planning (SSP). Although the main objective of SSP is public health protection through managing risks along the sanitation chain, there are benefits to the environment and other water resources user groups of engaging in this approach. Service regulators are also important for ensuring an effectively functioning sanitation chain. The prevention of faecal loading of the environment and water bodies through SSP also protects the environment and water bodies from the organic pollution loadings associated with wastewater and sewage sludge that cause environmental damage, including through dissolved oxygen depletion. An example of WRM–WASH cooperation on SSP for direct use of treated wastewater for irrigating green spaces is seen in Lima, Peru (WHO, 2018b). Under the SSP, the steering committee set-up included representation from the National Water Authority, the Municipality of Lima, the sanitation regulatory body, the wastewater service provider, and representatives of health, environment, agriculture and green spaces.

Cooperation on environmental, service and public health regulation in practice can include jointly setting standards for environmental water quality and wastewater and sewage sludge safety standards, and establishing related regulatory zones, such as drinking source-water protection zones. This can also include cooperation between service and environmental regulators for setting appropriate wastewater tariffs to meet the required level of wastewater treatment to enable the production of safe agricultural wastewater and sludge reuse products that meet environmental (and potentially food safety) regulatory standards. In addition, cooperation can mean assessing and policing potentially polluting agriculture and industry to ensure these are meeting regulations for storage, use and disposal of polluting substances upstream of water utility supply intakes. It can also mean sharing information and monitoring and enforcing compliance with standards for wastewater discharges and for wastewater and sewage sludge reuse. Finally, cooperation can ensure compliance with the thresholds for minimum environmental flows for watercourses linked to water and sewerage utility wastewater discharges.

COOPERATION AREA 18: CAPACITY DEVELOPMENT ON WRM–WASH LINKS

Why is WRM–WASH cooperation important?

The WRM–WASH nexus is a somewhat neglected area, with long-persisting fragmentation. The water and climate crises are worsening, which will only increase the importance of this topic. A renewed and concerted effort from both WRM and WASH disciplines is required to raise the importance of this topic. This can be achieved in part through capacity development to raise awareness and catalyse increased cooperation on integrated water sector governance and in all joint WRM–WASH outcomes.

There are many reasons why WRM–WASH fragmentation occurs, including a lack of awareness, a lack of knowledge, lack of incentives for institutional cooperation, apathy, or a lack of the capacity needed to put in place action to overcome fragmentation. This means that capacity development at all levels on WRM–WASH links and cooperation is needed, especially in the context of the SDG6 Global Acceleration Framework.

Not many examples of initiatives were found that exist largely to overcome WRM–WASH fragmentation. One is the multi-country

Watershed programme,[62] which 'delivers improvements in the governance and management of water, sanitation and hygiene services as well as of the water resources on which they draw' (KEWASNET, 2017). The programme builds the capacity of civil society to hold duty-bearers to account for ensuring good governance for the provision of sustainable WASH services in places where 'water resources are scarce or contested and where environmental management is at the core of the WASH sustainability challenge' (see Case study 11). Other notable efforts to increase capacity on WRM–WASH links come from multiple different angles, sometimes from ensuring equitable IWRM through a Human Rights-Based Approach (Cap-Net UNDP et al., 2017), from a climate-resilient WASH angle (through the GWP–UNICEF Strategic Framework for WASH Climate Resilience; UNICEF & GWP, 2014), or from the perspective of biodiversity conservation (as championed by the African Biodiversity Collaborative Group, through its Freshwater Conservation and WASH integration approach (ABCG, 2014; Walter et al., 2020), both of which have associated learning resources). Another good example of capacity development on WRM–WASH is the 'Water: Addressing the Global Crisis' training course, which covers SDG6 holistically.[63]

More structured and organized capacity development on WRM–WASH links and on practical cooperation is required to overcome fragmentation and accelerate progress towards SDG6. These efforts may be best driven through cooperation at national water sector level to then trickle down to sub-national levels.

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62 The Watershed–Empowered Citizens programme was a strategic partnership between the Dutch Ministry of Foreign Affairs (in particular the IGG department, DSO and relevant embassies) and IRC, Simavi, Wetlands International and Akvo. url: https://watershed.nl/

63 The SDG Academy and the Stockholm International Water Institute's Massive Open Online Course (MOOC) on the key role water in the achievement of the Sustainable Development Goals, not least SDG6, about sustainable water and sanitation for all. url: https://sdgacademy.org/course/water-addressing-global-crisis/

This report itself is intended to contribute to capacity development, as it has provided an overview of the topic and concretely framed entry points for cooperation. This has been done to raise awareness and build the capacity of both WRM and WASH actors in order to inspire renewed efforts to tackle this neglected area, by overcoming fragmentation and galvanizing joint action to accelerate progress towards SDG6 in the Paris Agreement and the Sendai Framework.

Case study 11: Capacity development for WRM–WASH integration

Watershed – Empowering Citizens was a strategic partnership between the Dutch Ministry of Foreign Affairs (MoFA) and four Dutch NGOs (IRC WASH, Simavi, Wetlands International and Akvo), with the long-term objective of 'improved governance for WASH and IWRM so that all citizens, including the most marginalised, can benefit from sustainable services'. The five-year programme (2016–20), operating at international and country level (Kenya, Uganda, Mali, Ghana, Bangladesh and India), aimed to strengthen the evidence-based lobbying and advocacy capacities of civil society on issues of the governance and management of WASH services as well as the water resources on which these draw.

Watershed's position paper states that despite the good intentions regarding coordinated efforts to align WRM and WASH projects, too little alignment takes place in practice. In this context, the programme proposed two aspects that need to be taken into account to identify links between IWRM and WASH in a well-defined intervention:

1. Where and how is WASH (particularly drinking water) under threat due to problematic WRM?
2. Where and how is problematic WASH (sanitation and wastewater) a threat to other water resources and ecosystems?

To raise the institutional capacity and political prioritization needed for improved WRM–WASH integration, among other issues, Watershed supported CSOs to design country-specific strategies for lobbying and advocacy. The advocacy strategies were implemented in-country and used to follow progress, identify obstacles and capture and measure success. Watershed also focused on making sure stakeholders had accurate data to support their advocacy and that the right data was available to support stakeholders' messages.

The programme identified many successful evidence-based advocacy results. Among many successes, it helped local partner organizations understand budgeting and financing for WASH and WRM and supported WRM–WASH prioritization and integration in several countries:

- In Kenya, Wetlands International and contracted partners CESPAD and NIA facilitated a meeting with various WASH and WRM stakeholders, during which the Kajiado County Minister of Water and Irrigation decided to create a committee bringing together county WASH and WRM stakeholders, including county government, to oversee matters on WASH and WRM integration.
- In Bangladesh, CSOs influenced two major political parties to adopt WASH–WRM in their election manifestos.

The Watershed evidence-based advocacy cases have shown there are several tactics and approaches that facilitate use of the data and evidence to support decision-making. These include inclusive stakeholder engagement, using thematic expertise throughout the process, increasing citizen participation, and using diverse forms of data.

Conclusion

Recognizing the complex links between WASH and WRM and the benefits of their integration for the achievement of SDG6, this report has set out the critical areas of cooperation and joint outcomes to outline the ways forward for greater cooperation across the two fields. There are four key take-home messages:

Message 1: Cooperation and alignment between WASH and WRM are necessary

The current division between WASH and WRM and the resulting policy and institutional fragmentation between levels, actors and sectors are among the greatest challenges to accelerating progress towards meeting SDG6 at a time of worsening water crisis.

A significant gap is where decisions taken in one area fail to fully consider impacts and dependence on other sectors, including links outside the water sector. Fragmentation also means that issues do not receive the necessary political attention and funding. Meanwhile, data and information too often are not shared between sectors.

Transformative action is required to accelerate progress towards achieving SDG6 in its entirety, while simultaneously tackling the worsening global water crisis that threatens the gains made. Water supply, sanitation and hygiene as well as environmental flows, agriculture, irrigation, energy and industry stand to benefit from improved cooperation across these areas.

Message 2: It is possible to overcome fragmentation through cooperation at policy and institutional levels

Rapid and more integrated action to meet the 2030 agenda for water and sanitation will require policy changes that take account of the links between WASH and WRM.

This report has presented a framework structured around five joint outcomes. Examples of cooperative actions to achieve these outcomes clearly illustrate that aligning practices for greater equity, improved sustainability, resilience and an integrated approach to water can help overcome fragmentation, for benefits in either WRM or WASH or both.

In order to move WRM–WASH cooperation to the next level, this report has a set of recommendations based on the UN-Water SDG6 Global Acceleration Framework, which, together with the examples and cooperation areas described in the body of the report, provide a 'menu' of WRM–WASH cooperation options. An important first step is to assess the existing status of cooperation in a country and plan accordingly, as there may be systems in place that can be engaged with and strengthened. The WRM–WASH Cooperation

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Framework presented in this report can assist with that assessment and help structure the decision-making process on what actions need to be taken.

Message 3: Cooperation across sectors and actors needs to be scaled up

To make a significant contribution to progress on SDG6 within the 2030 timeframe, cooperative processes need to be mainstreamed and upheld over time, while also learning from and sustaining successful initiatives. Governments, agencies and organizations need to systematically expand opportunities to engage both WASH and WRM practitioners and communities in monitoring, assessment, information-sharing, institutional mechanisms and policy development. Technologies and access to financing opportunities and approaches must be designed through and for collaboration across sectors.

Message 4: Overcoming fragmentation through cooperation requires commitment and strong leadership

Increased political will and strong leadership are needed from international and national actors, both in government and non-government, to ensure that overcoming fragmentation between WRM and WASH is given the urgent attention it requires.

The UN-Water SDG6 Global Acceleration Framework provides the momentum to catalyse this transformative shift to truly strengthen WRM–WASH cooperation. The opportunities for increasing WRM–WASH cooperation proposed in this document offer a framework to address these issues more systematically, aligned with the five 'Accelerators' proposed in the UN-Water framework: Governance, Data and Information, Capacity Development, Financing and Innovation.

Recommendations

Governance

- **Capitalize on ongoing water and WASH policy and strategy development processes to add the lens of WRM–WASH links and integration.** Include specific mention of how WRM–WASH interaction should occur under policies, for example by establishing institutional frameworks and arrangements between WRM and WASH actors for coherent policy implementation. Legislate for WRM–WASH accountabilities and define joint management arrangements for the overlaps between WRM–WASH operations. Advocate for updating policies and strategies to align around SDG6 where possible. **A cabinet-appointed national inter-ministerial committee could be convened to undertake a comprehensive assessment of the coherence of all WASH-related country policies and strategies and develop a roadmap for undertaking policy reform.** This could present an opportunity for policies and strategies to align with SDG6.

- **Reinvigorate, establish or reform water-sector working groups, inter-ministerial coordinating groups, development partner groups and United Nations inter-agency platforms, using the interconnected rationale of SDG6, and ensure that the mechanisms allow for meaningful WRM–WASH cooperation. Explore sub-national coordination groups.**

- **Establish a high-level, inter-ministerial SDG6 periodic review, similar to a JSR, to allow for more integrated WRM–WASH planning and coordination.** In addition, the participation of WRM institutions in WASH-focused JSRs for more integrated planning and coordination should be encouraged. JSRs can also help to improve accountability between WRM–WASH actors to make sure plans are implemented.

- **Integrate and align planning horizons for WASH and environment (WRM) interventions where possible.** This can be achieved by planning WASH services according to the lifecycle of the WASH service and the changing environment in which these sit. Integrating WASH activities into long-term environmental projects does not only garner community support for conservation, but also allows WASH practitioners to better track the sustainability of WASH interventions over a longer timeframe (Bonnardeaux, 2012).

- **Governments might consider institutional reform to better align WRM and WASH issues under the same departments, divisions or ministries, or to reform structures using institutional decentralization so that WRM and WASH institutions align at sub-national levels**, recognizing their dependencies and inter-connectedness through formal collaboration.

- **Harmonize the often complex and scattered sanitation legislation and regulation[64] and coordinate on regulatory approaches such as Sanitation Safety Planning for jointly managing risks to public health and the environment.**

- **Putting champions of integrated approaches in key leadership positions would assist governments to champion holistic, whole-government approaches to the challenge of WRM–WASH integration.** This entails putting the right people in charge of different water sub-sectors who are willing to speak to one another, as well as being willing to form inter-ministerial groups to champion holistic, integrated whole-government approaches.

Data and information

- **Undertake a country analysis on SDG6 progress and look at where each actor group can align efforts to accelerate off-track targets.**

- **Form a neutral and potentially inter-ministerial multi-stakeholder taskforce and undertake a country-level assessment using the WRM–WASH cooperation framework presented in this report to identify the issues that are hindering progress on SDG6, and decide on an appropriate course of action.** Consider also running it as a United Nations inter-agency assessment. This step would require a context analysis and development of an assessment methodology to be undertaken, based on this report. Build in flexibility and update the tool following in-country applications to ensure it remains useful.

- **Establish and sustain the capture of accessible WRM information from both WRM and WASH actors into one central repository.** Establish a formal agreement on procedures for sharing information on water resources between WRM and WASH actors. WRM data should be made easily available for WASH service providers to plan services.

- **Establish a WRM taskforce to be participated in by WRM and WASH actors and build capacity in this area, especially on water quality monitoring, including laboratory services** based on standard test methods and robust quality assurance programmes, **in order to rapidly scale up ambient water quality monitoring efforts. Work together to expand the country's hydrological and hydrogeological network, including through monitoring data from intakes and discharges from water utility operational sites.** Also work together to create water resources maps and models for the country that benefit everyone. Ensure such models and maps are up to date, and integrate and investigate the impacts of climate change on hydrological data and the reliability of water resources.

64 WHO, 2018. Guidelines on sanitation and health. World Health Organisation. Geneva.

- **Reliable gender-disaggregated data on WASH and water resources, both quantitative and qualitative, is needed to inform programme prioritization and planning.** Gender equality and access to water are basic human rights and the nexus between water and gender is key to achieving SDG6. The UNESCO World Water Assessment Program Toolkit and guidelines on sex-disaggregated (women, indigenous people, children and youth) Water Data[65] highlight the importance of collecting such data to better understand how water is used, managed and distributed.

- **WRM and WASH actors should hold each other to account, to ensure water resources data and information arising from one water resources user/influence group is made readily available to other water resources user/influence groups, as well as to the public, where appropriate.**

Capacity development

- **Raise awareness among WRM and WASH decision-makers and practitioners at all levels on the 'other' SDG6 targets beyond their immediate focus area and the role of water in 'other' global policy frameworks and the links with SDG6 (i.e., Paris Agreement and Sendai Framework)**. Specific, actionable opportunities are to:

  - **establish a global taskforce or expert group and related community of practice on SDG6 links** to advance knowledge and action. This could potentially be best achieved under the UN-Water banner, bringing together diverse United Nations members and partners

  - **undertake a deep-dive analysis on SDG6 links**, with analysis at country, regional and global levels. The SDG6 Synthesis Report in 2018 did not include a focus on these links, and the SDG6 report only included two pages discussing SDG6 links, with the main focus being on SDG6 links with the broader SDG framework. Exploring SDG6 links in more depth will help with more nuanced problem definitions and lead to better understanding of the degree of reinforcement or conflict each target/indicator has on others

  - **develop a short online training course on SDG6 links, focusing on how cooperation can accelerate progress**. This could potentially be under the UN-Water banner, for example through the UN-Water Integrated Monitoring Initiative for SDG6 (IMI-SDG6). Key accompanying resources could be compiled as references for participants

  - **undertake a deep-dive analysis on the role of the links between water policy and global policy frameworks, such as cross-cutting links with SDG6, the Sendai Framework and the Paris Agreement.** Look at the synergies, potential efficiency gains and means of avoiding conflicting actions.

- **Undertake a study on equitable water resources allocation in practice, in the context of the HRWS**. Is the HRWS actually being upheld, in the context of other 'big' water users. Use the report to raise awareness among WRM institutions

65 UNESCO WWAP. 2019. Guidelines on the collection of sex-disaggregated water data. url: https://unesdoc.unesco.org/ark:/48223/pf0000367973

and water resources user groups on the need to prioritize water for domestic use in the context of the HRWS. This could be achieved through the mandate of the Special Rapporteur on the HRWS.

- **Increase WRM staffing so that water resources officials have more time to spend working at district/provincial office level, where other water sub-sector and other sector officials sit (WASH, agriculture etc.) to support capacity development on practical, local integration.**

- **WRM and WASH decision-makers and practitioners need to share information, meet and raise awareness and understand each other's priorities, objectives, values, and aspirations and motivations.** It may help to sit in on each other's working groups, and to meet or present at each other's events or job shadow etc. WASH actors should step up and engage in wider water resources and SDG6 discourse, to protect interests (HRWS) and to show accountability as duty-bearers for ensuring safely managed WASH that protect the environment.

- **Develop joint education curricula and continuing professional development (CPD) courses in-country on WRM–WASH links to build a cadre of integrators and generalists.**

Financing

- **To leverage new financing streams and to stress the need to use existing resources more efficiently, develop an SDG6 costed integrated delivery plan at country level that highlights funding gaps and scenarios for how the financing gaps can be closed.**

- **Donors should champion integration** by earmarking a certain percentage of WASH ODA that should be spent on water resources

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activities, while ensuring that the HRWS is given due consideration in all WRM support (e.g., large/mega infrastructure projects) and that sustainable WASH services and environmental protection from wastewater are achieved.

- **Recipient governments should demand integrated ODA that addresses WRM–WASH-related issues.**

- **A concerted effort is required by the water sector to ensure that basic WASH for the most vulnerable people features more prominently in climate finance.** This must involve raising awareness on this gap with decision-makers, supporting evidence of the WASH contribution to adaptation and mitigation efforts, WASH actor accreditation to MLCF schemes and preparing joint WRM–WASH proposals, including those that recognize the importance of sanitation, including its potential for climate impact mitigation.

- **Financing mechanisms and implementing entities must rethink and redesign the way climate finance is delivered and allocated to the water sector**, particularly when it comes to challenging processes to access climate finance by local and grassroot groups, farmers, indigenous peoples, women and local communities. Further efforts are needed to strengthen the implementation of key resources by CSOs, e.g., Adaptation Fund: Gender Policy and Action Plan,[66] The Green Climate Fund: A CSO Guide for Engagement and Local Access with a Specific Focus on the Indonesian Context;[67] The Gender Policy and Indigenous Peoples Policy and Indigenous Peoples Advisory Group;[68] and User Guide: Indigenous Peoples and Global Environment Facility (GEF) Project Financing.[69]

Innovation

- **Recognize and stimulate the enabling environment for unconventional WRM options that provide co-benefits, especially focusing on wastewater reuse**. This may require support for the development of innovative financing and sustainable business models (Diego et al., 2020).

- **WRM–WASH cooperation on introducing a national initiative on remote sensing for productive boreholes could be beneficial for MUS approaches that have multiple development objectives.**

66 Adaptation Fund Gender Policy and Action Plan. url: https://www.adaptation-fund.org/wp-content/uploads/2016/04/OPG-ANNEX4_Gender-Policies-and-Action-Plan_approved-in-March-2016-1.pdf

67 The Green Climate Fund: A CSO Guide for Engagement and Local Access with a Specific Focus on the Indonesian Context. url: https://www.bothends.org/uploaded_files/document/1CSO-guide_on_the_GCF_November_2016.pdf

68 Notification on the Indigenous Peoples Advisory Group of the Green Climate Fund. url: https://www.greenclimate.fund/document/notification-indigenous-peoples-advisory-group-green-climate-fund

69 url: https://www.thegef.org/sites/default/files/publications/GEF_IndigenousPeople2016_CRA.pdf

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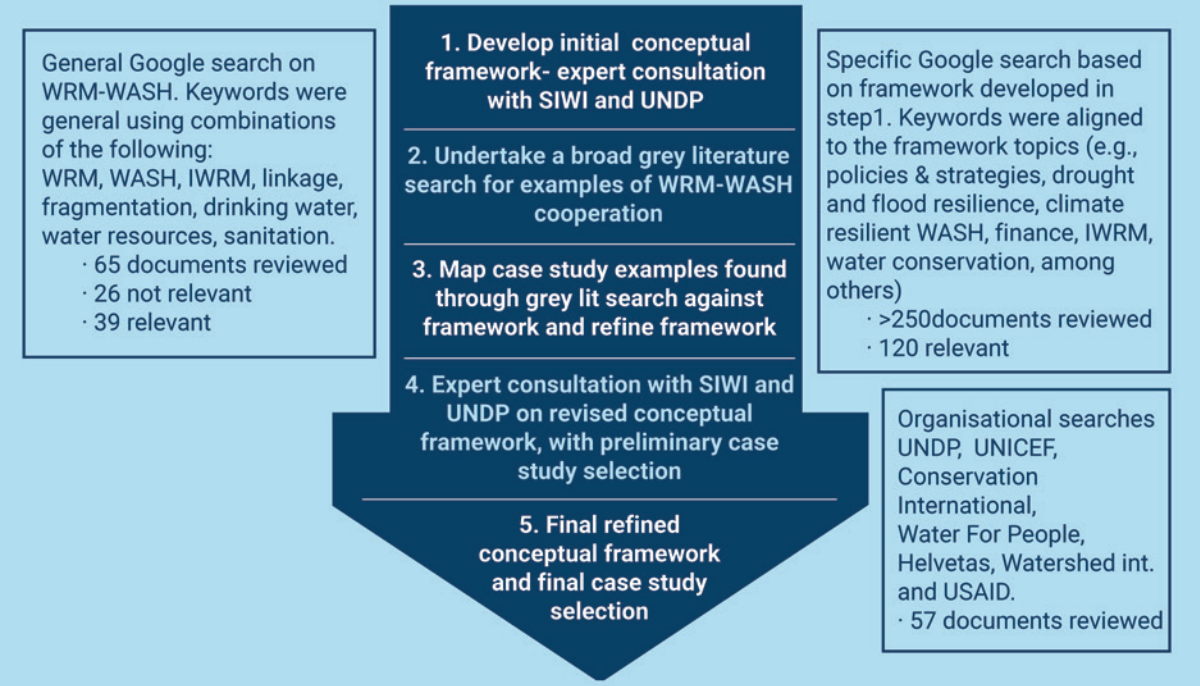
Annex A: WRM–WASH Framework: Research methodology to frame the study



JOINT WRM-WASH		WRM-WASH Cooperation Areas	
1.	Equitable water resources allocation	1. 2. 3.	Basin, catchment, and waterhshed management Inter-basin water transfers Multi-purpose water infrastructure development
2.	Sustainable water management	4. 5. 6.	Source water protection Pollution prevention Water reuse
3.	Drought and flood disaster resilience	7. 8.	Drought and flood mitigation and preparedness Drought and flood monitoring and Early Warning Systems
4.	Climate resilient WASH	9. 10. 11. 12.	Drought and flood response and recovery Climate vulnerability and adaptation assessment Climate resilient Water Safety Planning Climate finance
5.	Integrated water resources management	13. 14. 15. 16. 17. 18.	Water policy and strategy formulation Water sector coordination processes Water sector planning processes Water resources monitoring Environmental, service and public health regulation Capacity development on WRM-WASH linkages

Annex B: Case study authors and bibliography

Case study 1: Water-use master planning in Nepal

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Case study 2: Use of water tariffs in source-water protection, climate resilience and sustainability

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Case study 3: Using wetlands for wastewater assimilation in India and Laos

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Case study 4: Jordan's sanitation and water reuse roadmap 2030

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Note: this case study was written based largely on the first-hand experience of the author.

Case study 5: Building water resilience in Cape Town, South Africa

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Case study 6: Drought Early Warning Systems in Maharastra, India

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Case study 10: Integrating WRM into WASH SWAps in Ethiopia and Eritrea

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Annex C: Abbreviations

ARESEP: Autoridad Reguladora de los Servicios Públicos (Regulatory Authority of Public Services, Costa Rica)

AyA: Instituto Costarricense de Acueductos y Alcantarillados (Institute of Aqueducts and Sewers, Costa Rica)

BAT: Bottleneck Analysis Tool

CBWRM: Community Based Water Resources Management

CCA: Climate Change Adaptation

CLTS: Community Led Total Sanitation

CRWSP: Climate Resilient Water Safety Planning

CSOs: Civil Society Organizations

CWRA: City Water Resilience Approach

CWRF: City Water Resilience Framework

CBWRM: Community Based Water Resources Management

DMU: Drought Management Unit

DRR: Disaster Risk Reduction

DSS: Decision Support System

DWSSP: Drinking Water Safety and Security Planning

EWS: Early Warning Systems

EKW: East Kolkata Wetlands (Kolkata, India)

EKWMA: EKW Management Authority (Kolkata, India)

ESPH : Empresa de Servicios Públicos de Heredia (Public services in Heredia, Costa Rica)

EIA: Environmental Impact Assessment

FAO: Food and Agriculture Organization of the United Nations

HRHE: Human Right to a Healthy Environment

HRWS: Human Rights to Water and Sanitation

HRBA: Human Rights Based Approach

IBT: Inter-Basin Water Transfers

IWRM: Integrated Water Resources Management

IRC: International Rescue Committee

IUCN: International Union for Conservation of Nature

JRBO: Joint River Basin Organization

JMP: Joint Monitoring Programme

JTR: Joint Technical Review

JSR: Joint Sector Review

LAC: Latin America and Caribbean

LT-LEDS: Long-Term Low-Emissions Development Strategies

MAR: Managed Aquifer Recharge

MENA : Middle East and North Africa

MLCF: Multi-Lateral Climate Finance

MSF: Multi-Stakeholder Forum

MUS: Multiple Use Water Services

NAP: National Adaptation Plan

NBS: Nature Based Solutions

NDC: Nationally Determined Contribution

ODA: Official Development Assistance

ODF: Overseas Development Fund

OECD: Organisation for Economic Co-operation and Development

OCHA : United Nations Office for the Coordination of Humanitarian Affairs

PES: Payment for Ecosystem Services

PDNA: Post Disaster Needs Assessment

RBMP: River Basin Management Plan

RIDA: Resources, Infrastructure, Demand and Access

SDG: Sustainable Development Goal

SIWI: Stockholm International Water Institute

SPR: Sector Performance Report

SSP: Sanitation Safety Planning

SWA: Sanitation and Water for All

SWAp: Sector-Wide Approach

SWRA: Securing Water Resources Approach

TOC: Theory of Change

TLM : That Luang Marsh (Laos)

TNC: The Nature Conservancy

UN: United Nations

UNDP: United Nations Development Programme

UNICEF: United Nations Children's Fund

UNFCCC : United Nations Framework Convention on Climate Change

V&A: Vulnerability and Adaptation (assessment)

VDC: Village Development Committee

WANI: Water and Nature Initiative

WASH: Water, Sanitation and Hygiene

WCWSS: Western Cape Water Supply System (South Africa)

WDF: Water Dialogue Forum

WGF: Water Governance Facility

WHO: World Health Organization

WRM: Water Resources Management

WRUA: Water Resources Users Association

WSP: Water Safety Planning

WSUB: Water Sensitive Urban Design

WSWG: Water Sector Working Group

WUMP: Water Use Master Plan

WWF: World Wildlife Fund (US and Canada);
World Wide Fund for Nature (elsewhere)

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