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Technical Brief 11

WATER RESOURCES MANAGEMENT

USAID Water and Development
TECHNICAL SERIES

INTRODUCTION

Improving water resources management (WRM) plays a fundamental role in maintaining vibrant, resilient societies and economies and is becoming increasingly important as climate change, pollution, and rising demand increase water stress. This technical brief provides guidance on factors to consider in United States Agency for International Development (USAID) programs that aim to improve WRM and associated development outcomes.

KEY TAKEAWAYS

- **Increasing water stress, exacerbated by climate change, undermines economic growth and resilience**, as well as sustainable access to Water Sanitation and Hygiene (WASH) services, food security and nutrition, inclusive development, and peace and security. Investing in WRM is one of the best ways to address rising water stress and adapt to climate change.
- Critical objectives for WRM programming include achieving **more equitable and economically optimized water allocation within basins; improving water quality; managing water quantity; and reducing vulnerability to flooding, drought, and chronic water scarcity**.
- **WRM is fundamentally a complex governance challenge**. Durable solutions require understanding issues at multiple spatial and temporal scales, engaging a broad range of stakeholders and water users to define problems and find opportunities to address them, strong systems of policies, regulation and incentives, and building in flexibility and adaptive management informed by data.
- **Nature-based solutions** such as green infrastructure **are underutilized**, but often **offer lasting, cost-effective improvements**, with multiple co-benefits for water resources, climate change adaptation, communities, and ecosystems.
- While a holistic approach to WRM is important, **single-sector actions can still contribute to improved WRM** by expanding sustainable agricultural water management, using water more efficiently, reducing sources of pollution, and protecting critical ecosystems for the benefit of both humans and the natural environment.

September 2021

WRM is recognized as a critical cross-cutting priority area under the Agency's Environment and Natural Resources Framework (ENRM), with linkages to the Global Food Security Strategy, the Biodiversity Policy, and the Resilience Policy. WRM is also important within humanitarian assistance, including in humanitarian response and early recovery, risk reduction, and resilience (ER4) programming.

Within the context of USAID investments, advancing holistic and inclusive WRM hinges on working across multiple sectors and, often, on leveraging multiple funding directives to invest in water resources programming. WRM priorities are articulated in several key USAID policies and strategies. Priorities are identified most explicitly within USAID's contribution to the U.S. Global Water Strategy (GWS), specifically, Development Result 4 (DR4), Improved Management of Water Resources, and Development Result 1 (DR1), Sector Governance and Finance. These development results provide an overarching framework for USAID programs working to improve water resources management and governance within watersheds, countries, and transboundary regions.

WATER RESOURCES MANAGEMENT CHALLENGES AND OPPORTUNITIES

Freshwater is a limited and essential resource for human societies and ecosystems. A growing population and increasing demand for food, energy, and water for industry and domestic use has resulted in a six-fold increase in freshwater use since 1900, putting stress on global water resources.[1] Changes in land use and unchecked ground and surface water pollution are degrading ecosystems and the services they provide, further reducing the amount of water available for many uses.[2] Water is at the center of the climate crisis, and climate change will both exacerbate these existing challenges and create new ones. Climate change is already increasing water stress in many places, making water availability less predictable, with more extreme rainfall and flooding in some areas, and more protracted, severe, or frequent drought in others. Water-related disasters account for 90 percent of "natural" disasters globally and especially impact vulnerable populations.[3] By 2050, more than 5 billion people will lack sufficient water at least one month per year, up from 3.6 billion today.[4] Since women and girls are disproportionately responsible for collecting water for household uses, lack of water resources especially impacts their time, safety, health, and economic opportunity.[5]

Poor governance exacerbates water stress and amplifies the negative impacts of extreme events like flooding and drought. Lack of investment in water allocation and infrastructure, insufficient institutional and human capacity, or lack of political will to satisfy the range of demands for available water, can lead to economic water scarcity, where there is an inefficient and inequitable distribution of water resources, even if there is physical abundance of water. If mounting physical and governance-related pressures on freshwater resources are not addressed, some regions across the world could see their economic growth rates decline by around six percent of their gross domestic product by 2050,[6] with implications for national and regional security.[7] Improving water resource governance through WRM is therefore critical for building the resilience of systems and people reliant on water supplies who will see dramatic climate-related shifts over the next few decades.

A particular challenge in WRM is that water does not recognize political or administrative borders—water links land, sea, and sky; mountain, inland, coastal, and political geographies; as well as natural and built environments. Because water flows between jurisdictions and simultaneously underpins social, economic, and environmental outcomes, the process of reconciling the many and often competing demands for freshwater is

[1] Ritchie and Roser (2018). Water Use and Stress.
[2] Jacob and Kane (2019). USAID Ecosystem-based Adaptation Evidence Summaries and Case Studies, including the Water Security Ecosystem-based Adaptation Evidence Summary.
[3] UNDP (2004). Reducing Disaster Risk: A Challenge for Development. UNDP/Bureau for Crisis Prevention and Recovery.
[4] UN Water (2018). Nature-Based Solutions for Water: The United Nations World Water Development Report 2018.
[5] USAID (2020). WASH for Women and Girls Fact Sheet.
[6] The World Bank Group (2016). High and Dry: Climate Change, Water, and the Economy.
[7] World Economic Forum (2020). The Global Risks Report 2020.

a critical, if complex, challenge. Decisions about water management, which are made without an appreciation for this interconnectedness, will inherently have unintended consequences, including increased conflict and insecurity. For example, countries or localities may seek to adapt to a changing climate by building dams to increase water storage that can be used in times of scarcity. Without careful stakeholder engagement and coordination and planning, however, people and environments both upstream and downstream can be subject to more water stress, increased likelihood of flooding, and displacement, a dynamic that can increase the risk of conflicts between communities and nations. Additionally, changes in land management in upper watersheds can drastically affect the probability of flooding or can reduce availability of flows in rapidly expanding urban centers downstream. WRM, which actively engages stakeholders across all water uses within and between basins can dramatically reduce overall risks associated with flooding and drought, and improve the prospects for resilient, sustainable access to water for all.

KEY TERMS

Water Resources Management (WRM) – The process of planning, developing, and managing water resources, in terms of water quantity and quality, within and across water uses for the benefit of humans and ecosystems. WRM includes the institutions, infrastructure, incentives, and information systems that support and guide water management and uses. **Integrated Water Resources Management (IWRM)** is a process that promotes the coordinated development and management of water, land, and related resources.

Watershed – An area of land that drains or "sheds" water into a specific waterbody. Every body of water has a watershed. Watersheds channel runoff from rainfall and snowmelt into streams and rivers and ultimately into a reservoir and eventually an ocean. Watersheds or basins represent the unit of management for water resources.

Ecosystem Services – The short- and long-term benefits people obtain from ecosystems, including the provisioning of goods and services, production of basic goods, regulation of services, cultural services that provide spiritual, aesthetic, and recreational benefits, and supporting services necessary for the production of all other ecosystem services.

Nature-based Solutions (NbS) – Actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.

Green Infrastructure – Any engineered structure that uses vegetation, soils, and natural processes to manage water and create healthier built environments for people and the natural resources that sustain them.

Improving the management of water resources also has the potential to serve as a catalyst for positive change beyond water-related goals. Improved WRM can increase the efficacy of other development interventions; help to raise people out of poverty by fostering greater access to employment;[8] empower women, youth, persons with disabilities and Indigenous Peoples; and address some of the root causes of migration and social disintegration.[9] Inclusive planning enhances trust and cooperation, develops adaptive capacity to manage environmental and geo-political shocks and stresses, and creates a mechanism for dialogue and dispute resolution.[10]

[8] UN Water (2016). Water and Jobs. The United Nations World Water Development Report 2016.
[9] World Bank Group (2017). Including Persons with Disabilities in Water Sector Operations: A Guidance Note.
[10] USAID (2014). Water & Conflict: A Toolkit for Programming.

KEY ELEMENTS AND APPROACHES OF WRM PROGRAMMING

Identifying the best approaches to improve WRM will depend on the local, national, and regional context, as well as on other programming objectives. For example, managing water resources for irrigation along a large river where populations face economic water scarcity will look very different than managing water resources across an arid landscape with highly seasonal and variable rainfall. In developing programming to improve WRM, it is important to assess opportunities for interventions that span a number of key programming elements, including: reform to laws, policies and regulations; strengthening institutions, planning, and stakeholder engagement; improving data and analysis for decision-making and planning; implementing watershed interventions including green and gray infrastructure and restoration; and working to increase financing.[11] While programming contexts will determine which individual or combined elements are most strategic, *all* elements should be considered during the design and implementation of WRM activities and programs.

LAWS AND POLICIES

The enabling environment for WRM is complex because of the many sectoral laws, policies, and institutions that touch on or influence water use, quality, and availability. The ability to improve WRM holistically is strongly influenced by the degree of alignment and associated institutional coordination and enforcement of laws, policies, and regulations that address water and land use pollution, zoning, health, agriculture, and energy, among others. For example, water laws and associated designation of water rights, as well as land use and tenure laws, are critical as they may constrain or explicitly direct water allocation decisions. Similarly, in some cases, policies and regulations around areas as disparate as private property, environmental permitting, and financing of infrastructure can influence the ability to, for example, develop green water infrastructure within an urban area or a watershed.[12] In transboundary cases, legal instruments from international institutions can facilitate cooperation. Environmental, agriculture, and mining laws and policies, in addition to water quality regulations, greatly influence water pollution. Policies which reduce barriers to entry for those not traditionally included in decision-making including women, youth, persons with disabilities, and other marginalized groups, greatly influence the success of WRM programming in generating equitable and sustainable solutions. It is thus critical to look beyond water sector laws to improve the policy landscape and enabling environment for improved WRM.

Political Economy Analyses (PEAs) and water security assessments[13] can be a useful place to start in terms of understanding the policy landscape and associated constraints and potentially contentious power dynamics within the enabling environment for WRM. Assessments should identify whether policies and laws comprehensively address the variety of water resources, water uses and demands, and water challenges (e.g., pollution, availability), whether they are reflective of local contexts, and to what degree they are being implemented and enforced. Drawing on principles that guide USAID's Democracy, Human Rights, and Governance programming may also be a useful starting point for navigating the barriers to law and policy development, implementation, and enforcement from political interest group competition, corruption, and limitations of the effective rule of law.

Additional information on how to strengthen WRM governance and associated policy and regulatory landscapes can be found in USAID's Water and Development Governance Technical Brief.

For information on how to develop integrated approaches to addressing governance and natural resource management challenges, see USAID's Cross Sectoral Guide: Sustainable Landscapes & Democracy, Human Rights, and Governance.

[11] UN Water (2012). Status Report on The Application of Integrated Approaches to Water Resources Management.
[12] Clean Water America Alliance (2011). Barriers and Gateways to Green Infrastructure.
[13] USAID and Sustainable Water Partnership (2017). Toolkit #2: Water Security Assessment.

ILLUSTRATIVE INTERVENTIONS

- Conduct multi-sectoral PEA and other systems assessments to reveal policy, legal, and social inequities, constraints, and opportunities to improve WRM.
- Support governments in the coordinated development and implementation of inclusive strategies, policies, and institutional and regulatory frameworks to improve WRM at transboundary, national, and sub-national levels.
- Support cohesive integration of water into agriculture, mining, industry, energy, forestry, and land use sector policies and plans, as well as those related to national climate planning, disaster risk management, gender and youth, and Indigenous Peoples.

INSTITUTIONS, PLANNING, AND STAKEHOLDER ENGAGEMENT

Strong WRM institutions—from water and other sector ministries to basin organizations and water user groups—are the foundation for making lasting and continuous improvements to the way water is managed and allocated within communities and economies. Improving coordination, increasing accountability, building capacity, and improving performance of institutions, and if necessary, shifting power dynamics and roles in decision-making, are critical for crafting and implementing WRM plans and strategies. Improving the performance of management institutions can mean improving capacity to fulfill basic responsibilities such as water quality monitoring, permitting, and enforcement. Strengthening institutions can be a complex process, which requires political will, local and external resources, capacity, time, trust, and clearly defined objectives, roles, and responsibilities.

Basin or watershed planning is a key process through which water laws and policies are actualized and through which WRM institutions and stakeholders can identify economic, social, and ecological water demands, evaluate tradeoffs, explore future demand and supply scenarios, and prioritize water allocations and risk mitigation strategies. Planning is an iterative process and should take a holistic approach to identifying risks and incorporating solutions and interventions across the entire watershed or catchment, considering both surface and groundwater. Adaptive management principles should be well integrated into planning frameworks to ensure strategies are effective under a range of future scenarios, including a changing climate. Planning and management strategies that focus on mitigating the effects of climate change, such as managed aquifer recharge, drought, and flood management plans, are critical for improving water security and flood prevention and protection.

Stakeholder engagement is critical to ensuring effective water resources planning. In addition to including local, regional, and national government entities and institutions representing a full range of water users, the inclusion of women, youth, persons with disabilities, and Indigenous Peoples, who are often under-represented in decision-making and are also often most vulnerable to water risks, is critical to ensuring equitable water resource allocation. For example, women, particularly in indigenous communities, hold important traditional knowledge about how to best manage, allocate, and use water resources. In addition, including youth helps socialize new approaches which older adults may be less willing to adopt. Engaging non-governmental entities, including the private sector, civil society organizations, and cooperatives is also important. Additional guidance on how to approach water resources management planning can be found in USAID/Sustainable Water Partnership's Water Security Toolkit #3 on Water Security Planning.

ILLUSTRATIVE INTERVENTIONS

- Convene and build the capacity of multi-stakeholder water resource commissions and councils in order to facilitate collaborative and inclusive water resources decision-making.
- Facilitate the development of catchment and basin water management plans.
- Support capacity development for professionals in government, the private sector, and civil society who are responsible for creating and implementing inclusive WRM policies and plans. This can include training and mentoring programs and twinning arrangements.
- Support women's empowerment and engagement in WRM decision-making by recognizing gender gaps and designing interventions in outreach and recruitment, mentorship and leadership, and professional development.
- Engage authorities and the private sector responsible for disaster risk management such as monitoring flood waters, rainfall, and managing civil protection services.

ENHANCING WATERSHED MANAGEMENT IN NEPAL

Nepal faces a number of critical water-related risks, including climate-change related melting of glaciers, rapidly expanding infrastructure and roads, increased flooding and drought, degraded streams and watersheds due to shifting land use, and lack of access to reliable water for domestic and agricultural use. The USAID/Nepal Paani Program (Paani) works to conserve freshwater biodiversity and increase resilience to climate change by enhancing Nepalis' ability to manage water resources for multiple uses and users. The activity takes a whole-of-basin approach to address water insecurity—coordinating with local government, community groups, and other stakeholders to identify threats to watershed and river system health and approaches for addressing them. Key lessons learned from the Paani project include the importance of identifying discussion entry points that support the interests and priorities of stakeholders and identifying the appropriate and governance level at which to promote better coordination and planning to tackle water-related threats. A sister project, Building Climate Resilience of Watersheds in Mountain Eco-Regions, aims to revive mountain springs by improving understanding of groundwater recharge areas, sources of spring water, and residence time of water in aquifer systems.

DATA AND ANALYSIS FOR PLANNING AND DECISION-MAKING

Data on water resource availability and quality is foundational to making WRM decisions that are more resilient and inclusive. Supporting water and related weather-and-climate monitoring and information systems and developing capacity to analyze and use data for decision-making are important interventions to promote improved WRM. Information on the current and likely future availability and quality of surface and groundwater is particularly critical for water resources planning and allocation. Although groundwater is an important reservoir for climate resilience, the availability of data on groundwater levels and flows is limited. Qualitative data also provide important insights. Indigenous traditional ecological knowledge can provide unique

information such as historical baselines, impacts of changes within the ecosystem, and water management practices best suited for the context.[14]

Ensuring the maintenance and upkeep of monitoring networks and associated information systems can be daunting, and there are often sensitivities around sharing data that is collected with a wide range of stakeholders. Thus, monitoring and information systems need to be designed to consider data sharing sensitivities and the resources required to ensure that systems can be scaled up, mainstreamed, and maintained.[15] Considering a diversity of data collection methods can help, including the use of remote sensing, mobile-based tools, crowd-sourced or citizen science-based hydroclimate monitoring, and forecasts and other outputs from global weather, climate, and hydrological models.

Investing in approaches and technical capacity to utilize data for decision-making is as important as investing in the collection of data itself. Transparent and evidence-based decision-making can be facilitated by the use of data information systems, analytical tools, and associated planning approaches. Co-designing data analysis approaches and associated tools with key stakeholders increases the likelihood that data and tools are optimally targeted, tailored, and used. Appropriate data analysis approaches can thus facilitate stakeholder participation and buy-in around critical water resource decisions.

ILLUSTRATIVE DATA AND ANALYSIS TOOLS FOR WRM PLANNING AND DECISION-MAKING

- **Water Accounting** – An analytical framework and process for estimating sources, availability, and uses of water.
- **Water Risk Filter** – Online water and water risk data visualization platform.
- **Climate Risk Informed Decision Analysis** – A methodology that outlines a collaborative process for risk-informed WRM when significant uncertainty exists about future conditions.
- **River Basin Modeling** – Quantitative computer-based modeling that estimates and projects groundwater, catchment, and river levels and flows. WEAP: Water Evaluation And Planning system and the Soil & Water Assessment Tool (SWAT) are examples of models used by basin planners across many geographies and contexts.
- **Multi-criteria Analysis** – A systematic process for decision-makers to map out and prioritize vulnerabilities and adaptation options to shocks and stressors, considering criteria for success across multiple sectors and interests.

USAID's Sustainable Water Partnership's (SWP's) **Analytical Tools to Support Water Security Decision-Making** is a more in-depth resource covering analysis and planning tools for WRM.

[14] Vinyeta and Lynn (2013). Exploring the Role of Traditional Ecological Knowledge in Climate Change Initiatives. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
[15] Weilsen, K. (2015). Innovating through the 'valley of death.' World Bank Blogs.

MODELING THE MARA

The Mara River is a critical source of water for farmland, tea plantations, villages, forests, rangelands, and national reserves in Kenya and Tanzania. Climate change, population growth, funding constraints, and uncoordinated management threaten the availability of water for all uses in this transboundary basin. SWP's Sustainable Water for the Mara activity aimed to safeguard access to water for sustaining livelihoods, human well-being, socio-economic development, and the protection of ecosystem services that underpin these development objectives. SWP supported the Lake Victoria Basin Water Board (LVBWB) in Tanzania to develop a water allocation plan for the lower part of the basin, which involved improving the availability and use of hydrological data. With SWP's support, the LVBWB piloted a monitoring system for tracking water withdrawals and associated water permits and analyzed current and projected water availability and water demand for the plan. Stakeholders used a Robust Decision Support framework and a Water Evaluation And Planning (WEAP) model of the basin to co-create future scenarios of water use and explore implications for future water and broader development outcomes. For more information, see Modeling the Mara.

WATERSHED INTERVENTIONS

Watershed interventions restore or alter flows or improve water quality within watersheds. Such interventions can be nature-based solutions (including green infrastructure, which protects, sustainably manages, and restores natural or modified ecosystems) or gray infrastructure (conventionally engineered systems). Table 1 shows an illustrative list of interventions and categorizes their potential benefits. Note that the impacts of some interventions may be difficult to predict. For example, increasing vegetation does not always increase water quantity or improve biodiversity.[16] Interventions, especially nature-based solutions, can offer a wide array of possible co-benefits beyond what is shown in Table 1 including carbon sequestration, avoided greenhouse gas emissions, increased soil fertility and agricultural productivity, protection of biodiversity and ecosystem services, and the availability of building materials, fodder, and fuel. Ideally, selecting interventions should be a part of a basin planning process where appropriate financing and incentives are also identified. Cost-benefit analyses help to structure the decision-making process and mobilize necessary funds.

Nature-based solutions, including green infrastructure, are underutilized—accounting for less than 1 percent of investments in water resources infrastructure globally—but provide multiple cost-effective and lasting benefits.[17] They can offer improvements of resilience to emergent threats beyond the capabilities of gray infrastructure, although a lack of data may cause uncertainty in the calculation of the economic value of benefits.[18] Recent studies find that nature-based solutions can reduce water treatment costs by 25 percent or more, avert 45 percent or more of climate risk from storms, and provide a cost savings of more than 67 percent compared to gray infrastructure.[19] Ultimately, it is often beneficial to employ a combination of gray and green interventions that maximize desired outcomes and minimize costs and risks in both the short- and long-term.

[16] Lee and Zhang (2018). Afforestation Increases Water Supply — But Only with These Considerations. SDG Knowledge Hub, IISD.
[17] UN Water (2018). Nature-Based Solutions for Water: The United Nations World Water Development Report 2018.
[18] USAID (2017). Evidence Summary: The Economics of Ecosystem-based Adaptation.
[19] Talberth and Hanson (2018). Green vs. Gray Infrastructure: When Nature Is Better than Concrete.

TABLE 1: BENEFITS OF WATERSHED INTERVENTIONS – AN ILLUSTRATIVE LIST

	Reduced Surface Runoff, Erosion, & Increased Storage	Flood Prevention & Protection	Reduction & Treatment of Pollutants	Improved Habitat
NATURE-BASED SOLUTIONS (INCLUDING GREEN INFRASTRUCTURE)				
Revegetation (reforestation, afforestation, vegetative buffer strips, grassed waterways, streambank protection)	✓	✓	✓	✓
Wetland protection and construction	✓	✓	✓	✓
Bioremediation technologies			✓	
Forest conservation and management	✓	✓	✓	✓
Agricultural best management practices (conservation tillage, agroforestry, nutrient management, integrated pest management, grazing management, terracing)	✓	✓	✓	✓
Water harvesting (rainwater capture, sand dams, half moons, contour bunds)	✓	✓		
GRAY INFRASTRUCTURE				
Surface water reservoirs	✓	✓		
Infiltration ponds	✓			
Dikes, spurs, levees, seawalls		✓		
Water and wastewater treatment plants			✓	

WATER RETENTION IN NIGER TO IMPROVE DISASTER RESPONSE

Niger grapples with extensive land degradation, loss of biodiversity, weak governance of natural resources, and limited capacity to adapt to climate change. USAID's Bureau for Humanitarian Assistance's Protracted Relief and Recovery Intervention Program in Niger has aimed to improve disaster response capacities, food security, and strengthen the resilience of vulnerable communities through soil and water management on degraded lands. Demi-lunes (half moons) were constructed throughout pastoral and agricultural lands as a low-cost solution to help retain water in the soil to increase vegetation in pastoral areas and crop productivity in agricultural fields. The intervention resulted in a 33 percent increase in vegetation and a two to threefold increase in millet and sesame production.

FINANCING WRM

The funding needed to address identified WRM priorities is large. For example, the Food and Agriculture Organization (FAO) estimates that $960 billion will be required to ensure water for agricultural production by 2050 for 93 developing countries.[20] Water user fees represent an important source of funding for WRM, and more work is needed to increase permitting and fee collection for water abstraction. However, water resources are also in many instances considered public goods, the management of which will rarely allow for full direct cost-recovery. Work to make sure existing funds are more efficiently allocated, better targeted, and effectively spent is critical to success. WRM finance strategies, frameworks, and plans can help prioritize investments and funding sources and determine how funds can be maximized to meet national, regional, and local objectives.[21] Budget execution is often the responsibility of sub-national institutions, such as basin water management authorities and associated water user associations, which lack the necessary capacity and financial management systems, and may be dealing with inconsistent financial flows from the national level. Beyond more effectively using existing funds, working to increase and sustain public investment will be needed, potentially by allocating more domestic tax revenues to WRM through earmarks and/or increasing overall tax revenue. See the Financing Water and Sanitation Services technical brief for more information.

A promising way to incentivize beneficial watershed management practices and generate additional resources for WRM is through payment for ecosystem services (PES) schemes. PES works by harnessing payments from downstream water users to reduce pollution or change practices of upstream landowners in order to improve water security. PES schemes for water have been implemented in diverse settings ranging from Indonesia to El Salvador to Nairobi, and require clear regulatory and/or accountability mechanisms to be effective. For more information, see the Natural Infrastructure for Urban Water Security Case Study example in the ENRM Essentials Water Examples. This example highlights both the promise of PES, but also some of the ongoing challenges—in this case, even after money was available for green infrastructure there have been ongoing challenges in effectively using the funds due to public spending and procurement processes, in addition to a lack of shovel-ready projects to absorb the increased funding.

Private sector resources can also be leveraged through public-private partnerships to develop voluntary pledges associated with water stewardship goals aligned with a given business' bottom line. These goals often help companies reduce water risks to their operations and profits, contribute to human rights, and have ancillary public relations benefits. An additional resource on funding water resources managements is USAID/Sustainable Water Partnership's Toolkit #4 - Funding Water Security.

[24] Sachwani, K. (2020). Financing the Water Sector—An Alternate Approach.
[25] Pories, L. et al. (2019). Mobilising Finance for WASH: Getting the Foundations Right. Water 11(11), 2425.

ILLUSTRATIVE INTERVENTIONS

- Establish water funds that link downstream water users with upstream landowners to help pay for management, conservation, and restoration efforts, including through techniques such as payment for ecosystem services.
- Improve the collection of water abstraction and user fees and work to reserve revenue for watershed planning and management.
- Build the capacity of water management institutions such as basin water authorities to enhance financial planning and budget execution.
- Mobilize domestic tax resources for basin planning and management.
- Establish water markets to create price incentives for conservation and other opportunities to ensure payment for environmental services.
- Engage financial institutions and insurance providers to develop weather-indexed insurance in areas prone to droughts and floods.

PUTTING IT INTO PRACTICE

In addition to all sectors collaboratively contributing to progress on sustainable water governance, planning, and allocation, there are sector-specific approaches and entry points to WRM that should also be considered as part of programs focused on agriculture and food security; biodiversity, forestry, and ecosystem health; climate change adaptation and mitigation; WASH; and energy.

FUNDING WRM AT USAID

There are a number of funding streams available to support WRM programming at USAID:

- Water directive funds can be used when programming links to environmental resilience of drinking water supplies, including increased water quality or quantity, or other drinking water or sanitation outcomes.
- Biodiversity funding can be used for WRM programming when the activity has an explicit biodiversity objective, has the intent to positively impact biodiversity in biologically significant areas, and meets the other requirements of the biodiversity code (see page 21 of the Biodiversity Policy).
- Feed the Future funding can be used for programming to ensure effective agricultural water management, and for supporting the enabling environment for WRM and other on-the-ground activities that conserve the natural resources that underpin food systems.
- Climate adaptation funds can be used for WRM programming that enhances resilience and reduces the vulnerability of people, places, or livelihoods to climate variability and change.

Agriculture – The agriculture sector is by far the largest user of freshwater globally, with 70 percent of freshwater withdrawals attributable to agriculture.[22] Agriculture thus has a critical role to play in supporting more resilient and efficient WRM and will also be highly sensitive to changes in water availability or conflicts over water that are not proactively addressed through improved WRM. One entry point into WRM for agricultural programs is working to improve agricultural water management—from on-farm interventions to policy and planning. This means expanding access to and incentivizing efficient irrigation practices and technologies; soil, land, and water conservation; and working on water allocation that supports food security from a holistic perspective, does not privilege one sector over another, and creates equitable access to resources. For more guidance on water management for agriculture and food security, see USAID's Agricultural Water Management Water and Development Strategy Implementation Brief and USAID and Pro-WASH's Integrated Water Resources Management (IWRM): What it is and What Does It Mean for Resilience Food Security Activities? Brief.

Biodiversity, Forestry, and Ecosystem Health – WRM programming, which protects critical watersheds, ensures allocation for environmental flows, and reduces sources of pollution, can greatly benefit aquatic and other biodiversity. Conversely, investments in natural ecosystems like forests and wetlands can enhance water storage and regulate flow, while removing contaminants and replenishing groundwater. In the context of a changing climate, well managed forests can protect or even increase the quantity of water supplies, while coastal wetlands can protect against storm surges and sea level rise. Priority interventions include protection and restoration of upper watersheds and supporting strong natural resources governance for equitable allocation and flow regulation.[23]

Climate Adaptation and Mitigation – WRM is one of the most cost-effective and important ways for communities to adapt and build resilience to changing weather and climate patterns and is thus an essential tool for addressing the impacts of the climate crisis as the likelihood of water-related extreme events like flooding and drought increases.[24] WRM interventions, which prevent or mitigate flooding, increase water storage (especially through groundwater recharge), strengthen early warning systems, and reduce or avoid carbon emissions, are fundamental to climate change adaptation and mitigation.

WASH – The sustainable provision of drinking water is dependent on the availability of water resources and their resilience. WASH-related entry points to water resources management include protecting source waters; ensuring water allocation plans account for growing demands for bulk water supply; conserving, restoring, and changing land use practices in source watersheds (such as through the establishment of a PES scheme or water fund); and expanding sanitation to reduce pollution.

Energy – Since most power generation methods require significant water demand, the energy sector plays a central role in successful agreements on water allocation.[25] The operation of large hydroelectric dams in particular is a constant tradeoff between storing water for agriculture and municipal use, controlling flows for flood prevention, generating electricity, and ensuring adequate river flows to protect ecosystems. To ensure equitable access to water, climate adaptation strategies in regions experiencing heightened volatility in water supply should consider non-water intensive energy alternatives that have minimal impact(s) on arable land, while also considering resilience and ability to respond to climate and other shocks.

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[22] UNESCO World Water Assessment Programme (2009). Water in a changing world: the United Nations world water development report 3.
[23] USAID (2018). Biodiversity Integration in Practice: A Case Study of USAID in Western Honduras.
[24] The World Bank Group (2016). High and Dry: Climate Change, Water, and the Economy.
[25] Union of Concerned Scientists (2010). The Energy-Water Collision: 10 Things You Should Know.

MONITORING AND LEARNING

For monitoring progress in complex programs that seek to improve WRM, it is important to select a mix of standard and custom indicators that measure how the activity is working and ensure the program is learning from its experiences. Although it is useful to measure physical changes in hydrology and watershed health, affecting change in watershed conditions can take longer than typical activity timescales. A good approach is to measure progress towards outcomes over time as well as tracking changes in relevant water and land use practices, the development of water resource plans and their implementation, and changes in the enabling environment for WRM, disaggregated by gender and age.[26]

Selection of USAIDs Standard Indicators for measuring progress on WRM:

- HL.8.5: Number of people benefiting from the adoption and implementation of measures to improve water resources management as a result of USG assistance.[27]
- HL.8.4-1: Value of new funding mobilized to the water and sanitation sectors as a result of USG assistance
- HL.8.3-3: Number of water and sanitation sector institutions strengthened to manage water resources or improve water supply and sanitation services as a result of USG assistance. This includes Water User Associations and WRM authorities.
- EG.10.2-1: Number of hectares of biologically significant areas showing improved biophysical conditions as a result of USG assistance.
- EG.3.2-28: Number of hectares under improved management practices or technologies that promote improved climate risk reduction and/or natural resources management with USG assistance.
- RESIL-1: Number of host government or community-derived risk management plans formally proposed, adopted, implemented, or institutionalized with USG assistance.

Example custom indicators for monitoring and tracking progress on WRM:

- Number of individuals who have applied improved use of tools, approaches, and/or methods for water security, integrated water resources management, and/or water source protection.
- Number of basins or watersheds with stakeholder engagement platforms or strategies.
- Number of new partnerships created that make linkages among organizations or institutions from different sectors.

Learning and Adapting

Many evidence gaps exist in terms of the most effective approaches for improving WRM and associated outcomes. USAID has identified the following key sector learning questions on water resources that, if answered, will help further refine aforementioned approaches into practice:[28]

- What are the priority obstacles to address in order to implement holistic water resources planning at scales relevant to rural water service authorities in low- and middle-income countries, and how can these obstacles be overcome?
- What are the enabling factors and constraints most important to establishing successful schemes for domestic source water protection, such as PES or the establishment of other environmental taxes or fees, especially in low-income contexts?

[26] Bertule, M. et al. (2017). Using indicators for improved water resources management - guide for basin managers and practitioners.
[27] USAID (2020). Water and Development Indicator Handbook.
[28] USAID (2020). Water Security, Sanitation and Hygiene Implementation Research Agenda.

CONCLUSION

Investing in holistic, inclusive WRM is critical for optimizing water allocation within basins, improving water quality, managing water quantity, and reducing vulnerability to flooding, drought, and chronic water scarcity that is exacerbated by climate change. Effective WRM is underpinned by strong governance and institutions and by robust planning informed by data, analysis, and stakeholder knowledge and priorities. Restoring or altering flows through watershed interventions is critical for achieving WRM and associated development goals, with actions ideally identified and prioritized in planning processes that consider costs and benefits, the unique potential of nature-based solutions, and innovative financing approaches. While a holistic approach to WRM is important, single-sector actions can also significantly contribute to more efficient water use, reduction of pollution, and protection of critical ecosystems.

SELECTED RESOURCES

Jacob and Kane (2019). USAID Ecosystem-based Adaptation Evidence Summaries and Case Studies, including the Water Security Ecosystem-based Adaptation Evidence Summary.

USAID and Sustainable Water Partnership (2018). Water Security Toolkit Series.

USAID (2021). ENRM Essentials: Water Examples.

Global Water Partnership (2018). IWRM ToolBox.

USAID (2021). A Guide to Online and Accessible Resources on Groundwater.