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Evaluation of the GEF's Approach to and Interventions in Water Security

An Evaluation Report by the GEF IEO

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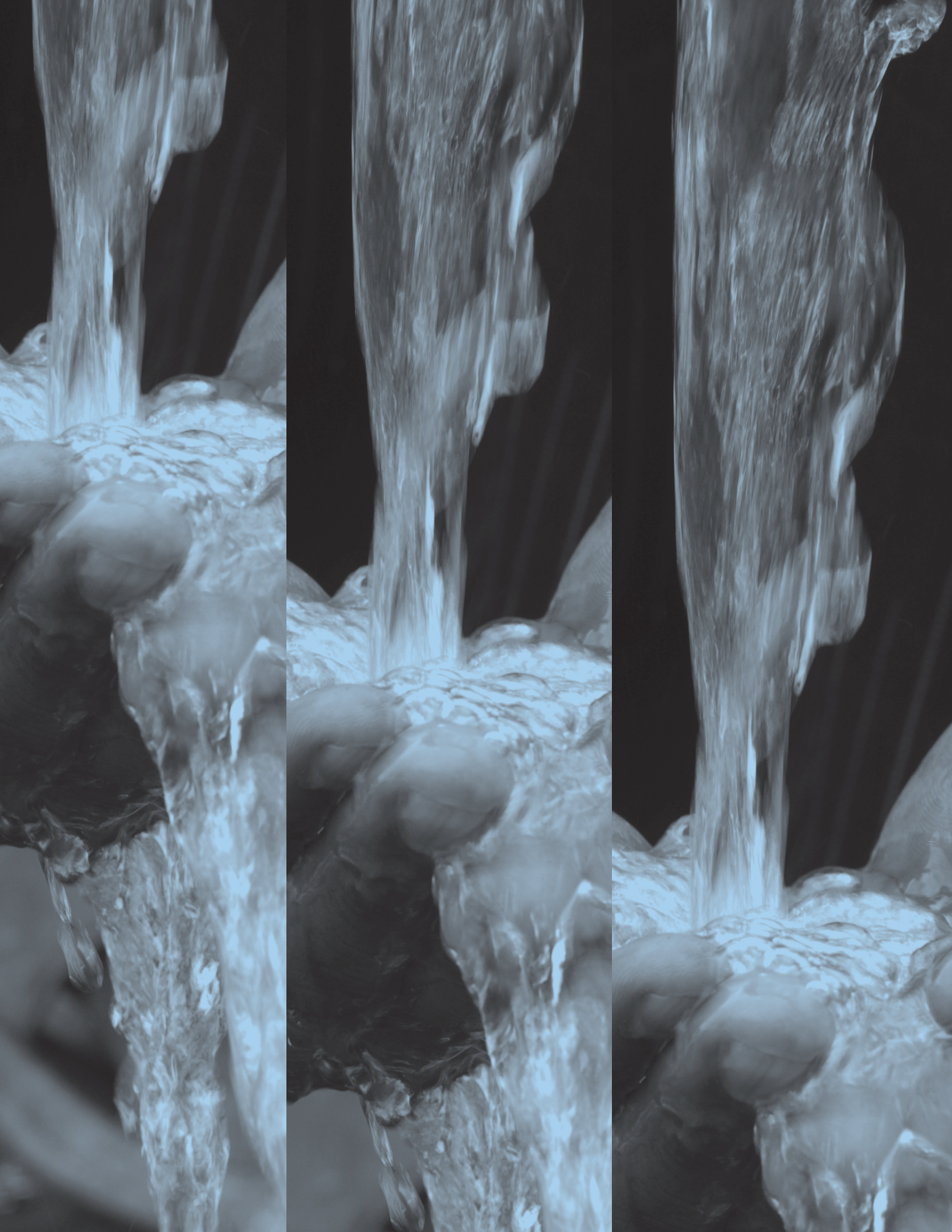

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Foreword

Access to sufficient clean water and resilience to water-related disasters are imperative for the communities and ecosystems the Global Environment Facility (GEF) supports around the world. It follows that water security, a term that encompasses these goals, permeates all of the GEF's focal areas and is both a precondition for success and a goal of many GEF interventions. Biodiverse ecosystems cannot thrive without sufficient water, land degradation occurs largely in water-scarce regions, chemicals and waste contaminate water systems, water is the main way in which societies will feel the impacts of climate change, and access to water is the basis for which the GEF international waters focal area brings countries together to manage this precious resource. However, water resources continue to face the growing threats of climate change and ever-increasing demand, requiring further attention from development organizations. With its importance in mind, the GEF cannot ignore water security while it aims to improve the global environment.

This evaluation represents the first comprehensive effort by the GEF Independent Evaluation Office (IEO) to understand how GEF-managed funds integrate water security into their strategies and improve water security through their projects. It uses a variety of methods including strategy document review, comparison against an original theory of change, a portfolio review of projects integrating aspects of water security, country-level and transboundary case studies, geospatial analysis, and interviews with hundreds of stakeholders around the world.

The study was presented to the GEF Council in June 2023. The Council took note of its conclusions and endorsed the management response to its recommendations. Through this report, the GEF IEO intends to share the lessons from the evaluation with a wider audience.

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Director, GEF Independent Evaluation Office

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Abbreviations

ADB	Asian Development Bank
AfDB	African Development Bank
AIDA	Artificial Intelligence for Development Analytics
CBD	Convention on Biological Diversity
COP	conference of the parties
DIKTAS	Dinaric-Karst Aquifer System
EVAs	Andean Vertical Ecosystems project
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
IDB	Inter-American Development Bank
IEO	Independent Evaluation Office
IFAD	International Fund for Agricultural Development
IHP	Intergovernmental Hydrological Programme
IUCN	International Union for the Conservation of Nature
IW:LEARN	International Waters Learning Exchange and Resource Network
IWRM	integrated water resource management
LDCF	Least Developed Countries Fund
NAPA	national adaptation program of action
NGO	nongovernmental organization
SAP	strategic action program
SCCF	Special Climate Change Fund
SDG	Sustainable Development Goal
SIDS	small island developing states
STAP	Scientific and Technical Advisory Panel
TDA	transboundary diagnostic assessment
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
WASH	water, sanitation, and hygiene
WWF	World Wildlife Fund

Executive summary

The term "water security" encompasses access to freshwater resources and protection from water-related disasters. Freshwater resources are essential to humans and ecosystems, making protection of those resources a top priority for both human development and environmental conservation. Water security captures four dimensions of how society and ecosystems depend on water: (1) drinking water and water for human well-being, (2) water for economic activities and development, (3) water for ecosystems, and (4) protection from water-related hazards and climate change.

Water resources—and therefore water security—are under threat. Poor water management combined with growing demand and exacerbated by more common and intense water-related hazards (namely floods and droughts) in many parts of the world put increasing pressure on water resources. The links between water security and sustainable development are well integrated into the Sustainable Development Goals—especially through Goal 6 to ensure the availability and sustainable management of water and sanitation, but also through links with other goals including life on land, sustainable cities and communities, and good health and well-being.

As water security intersects with much of the work of the Global Environment Facility (GEF), this evaluation serves to fill a gap in evaluative evidence as the first comprehensive evaluation on water security. It employs a mixed-methods approach to assessing how the GEF's approach and interventions address water security across all the focal areas and to understanding how and to what extent GEF interventions improve water security. Methods used include a portfolio review of completed and ongoing GEF projects that have an explicit focus on water security; five case studies focused on both transboundary waterbodies and specific countries; an analysis of grievance cases dealing with unintended decreases in water security caused by projects; and interviews with stakeholders from communities, government, the private sector, civil society, GEF Agencies, and the GEF Secretariat.

To better understand and evaluate the ways in which the GEF could achieve water security outcomes, a theory of change was developed as part of this evaluation. In the absence of a specific GEF water security strategy, the evaluation developed a theory of change to evaluate how elements related to water security in the programming directions and water security–related activities within interventions could come together to improve water security in the areas in which the GEF works.

The theory of change illustrates the factors undermining water security, the interventions through which the GEF could address these factors, and the potential outcomes that could improve water security directly or indirectly. The outcomes relate to improving the enabling environment for actors to improve water security, or lead directly to water security through increasing access to clean and sufficient water, or improve resilience to water-related hazards. Water security improvement often requires a physical change

(although behavioral changes can also improve water security in certain cases). People or ecosystems must be given access to more water, cleaner water, or have improved means to mitigate water hazards. However, such physical capacity improvement cannot be achieved in isolation. Many factors are needed in the enabling environment to ensure that physical capacity improvements are placed in the most optimized location, are adequate for a wide range of stakeholder groups, and managed well to ensure their sustainability and provide the funding to make further adaptations and improvements in the future.

Conclusions

Water security and its dimensions are critical to the environmental goals of all the GEF's focal areas. Fresh water is an essential resource for all life on Earth and thus water security is a cross-cutting theme in all development and environment work—from securing access to clean water for humans, their livelihoods, and ecosystems to mitigating water-based natural hazards. This includes the GEF's work in achieving global environmental benefits, almost all of which rely on water security. Biodiverse ecosystems depend on fresh water (and some exist in fresh water); water resources are needed for farmers to help prevent land degradation; dangerous chemicals often reach populations through contaminated water supplies; many climate change mitigation actions are water intensive, and most climate change adaptation efforts involve water and mitigating water-based hazards; and many transboundary freshwater resources often cause disagreement among neighboring countries. Even though water security is not an explicit goal of the GEF, these connections to its programming mean it cannot be ignored.

The GEF's focal area strategies, results framework, Agencies, and the conventions it supports address water security through the lens of their particular environmental focus instead of taking a holistic approach to the issue. The scientific literature on improving water security through development interventions points to the need for an integrated approach that addresses the multiple uses of water in an area and brings together stakeholders including all significant users and actors. However, the GEF and its major stakeholders generally address the specific aspects of water security that directly relate to their area of interest.

The GEF-8 Results Measurement Framework reflects how water security is approached by the focal areas—the international waters indicator addresses water governance in transboundary situations, and the land degradation indicators include water resources as they relate to land management and restoration. The biodiversity, climate change, and chemicals and waste indicators do not explicitly address fresh water, which makes it difficult to track the GEF's performance on, for example, protecting inland water ecosystems specifically. The land degradation focal area strategies, the UNCCD, and the GEF Agencies with an expertise in agriculture tend to view water from the standpoint of providing access for agriculture and sustainable land management.

The biodiversity focal area strategies, the CBD, and the international environmental NGO GEF Agencies focus on water because it supports ecosystems and provides ecosystem services. The LDCF and the SCCF projects and the GEF adaptation strategy, along with the UNFCCC, consider water security in the context of climate change. The international waters focal area strategies deal comprehensively with all dimensions of water security, but mainly in the context of transboundary watersheds and aquifers. This piecemeal approach to water security also applies to national government ministries, which rarely have a mandate to look at water in a holistic way. Normally, they address water from the standpoint of their focal sector: energy, agriculture, or the environment, for example.

A higher percentage of GEF projects with a prominent and explicit focus on water security are implemented in Africa; these are mainly through the international waters and climate change adaptation focal areas or are multifocal. Multifocal

area projects had the highest share of the portfolio of projects found to have a significant focus on water security, followed closely by international waters and climate change adaptation projects through the LDCF and the SCCF. Geographically, Africa was the most represented region in the portfolio. GEF projects with a significant focus on water security were found in many of the least water–secure regions of the world, especially the Sahel, but had less coverage of some highly water-insecure countries in South Asia. On the other hand, some relatively more water-secure areas, such as the Balkans and South America, had many such projects.

GEF projects with a significant focus on water security include activities that address stakeholders' water security priorities. Water security was a key development priority in almost all case study countries, including in local communities where a lack of water or water-based hazards affected daily life and livelihoods. Stakeholders were generally pleased with GEF projects' relevance to their priorities, especially with projects that increased water access and storage, improved water resource monitoring, and improved coordination between neighboring countries. International waters was recognized as one of the few funding sources for improving transboundary watershed management, but many stakeholders highlighted the need for international waters projects to include more on-the-ground, local activities. International waters projects, which tend to focus on the regional level, were less likely to involve local stakeholders in their design phase—which meant local stakeholders had limited knowledge of the projects before implementation.

Coherence between GEF projects and other actors' water security activities was found to be difficult to achieve unless coordinated by national governments. Completed evaluation case study projects often built on, or had other donor initiatives later build on, their work in project areas and countries. However, close coordination with other initiatives during implementation was rare, except among projects of the same program. Recently designed projects identified other water security–related donor activities in their geographical area, but did not often have detailed implementation coordination. Project and national government staff noted that coordinating ongoing projects to ensure collaboration is difficult, given the differing timelines and goals of funding organizations if there is no single entity charged with overseeing this coordination. This limited engagement extended to work with the private sector. Within the evaluation portfolio, only 18 percent of completed projects were found to have involved the private sector in implementation of water security activities; among ongoing projects, 14 percent involved the private sector in the design phase.

GEF projects are increasingly addressing gender aspects of water security, but do not often address the water security of other vulnerable groups. Completed projects reviewed by the evaluation had little focus on the ways in which water security differs for different genders—mostly gender was reflected as ensuring a certain percentage of women participated in project activities. However, women in communities benefited directly from some completed projects that improved water security through improved access to water and water storage capacity. Ongoing projects planned to integrate gender much more thoroughly into their activities, through inclusion of women in water decision-making groups, targeting them for microloan programs, and reflecting gender within water policy and governance. This last aspect of how gender should be integrated into water policy, however, was less well understood and explained. Vulnerable groups such as indigenous peoples, refugees, and ethnic groups with less water security than other groups were not often a focus of GEF projects (unless they represented a majority of the population in the project areas).

The GEF's multifocal area and integrated programs have primarily integrated water security through coastal marine protection, food security, and cities programs. The

integrated programs also tended to view water through specific lenses—food systems–focused projects tend to approach water security, as do those in the land degradation focal area, through the lens of water for agriculture and resilience to drought; sustainable cities program projects deal mostly with wastewater and hazard mitigation. Stakeholders noted that water security is often treated as a secondary focus within these programs, which some felt was a missed opportunity. For example, Food Systems Integrated Program projects could mainstream themes such as upper watershed ecosystem service protection, control of pesticide and fertilizer runoff into aquatic ecosystems, and multiple-use water systems. The GEF-8 Ecosystem Restoration Integrated Program is more focused on drought resilience and plans payment for environmental services schemes.

GEF projects with a focus on water security achieved improved water security either directly at the community level through physical investments in infrastructure or indirectly through designing water policies, knowledge, and stakeholder engagement activities. Land degradation and climate change adaptation projects focused on local interventions that improved the physical capacity of water systems, including through nature-based solutions. Such activities directly improved water access in local communities by providing solar water pumps or constructing small-scale irrigation systems. These activities increased community access to water during times when communities had previously had little access to water and led to socioeconomic co-benefits of increased income (through increased agricultural production), improved nutrition (through diversified production), and resilience to climate change (through improved protection from soil erosion during floods and access to more reliable water sources during drought).

In contrast, freshwater projects in international waters focused heavily on strengthening transboundary governance mechanisms and knowledge of water resources through the TDA-SAP process, which involves improving stakeholder capacity and raising awareness at the national and transboundary levels. Some of these activities led to policy reform, such as laws to improve environmental impact assessments; but these political processes were often too long to be completed during project implementation. A few also tried to improve the coherence of water policy across ministries through the creation of interministerial committees. These interventions helped create a conducive enabling environment for future activities that would lead to improved water security, many of which are identified in SAP documents. Observed cases of GEF projects causing a decrease in water security were rare.

Local activities to improve water security were found to be well sustained in postcompletion assessment, while knowledge products and governance interventions were more likely to be sustained through subsequent donor interventions. Once communities benefited directly from activities that improved their water infrastructure, they were committed to maintaining the infrastructure well past project completion. Solar pumps, irrigation systems, and coffee-washing treatment facilities were, for the most part, found to be well maintained and functioning years after project completion as long as communities could perform maintenance cheaply and with local materials. This type of activity was often replicated within communities through demonstration effects as neighbors noticed their positive impact. Knowledge products such as technical reports, governance reforms, and capacity-building activities had mixed sustainability and relied more on follow-on projects. Freshwater transboundary basins often receive multiple international waters projects in phases. Such continued support, when given without major delays between phases, maintains the momentum on these outcomes. Other donors were found to be active in areas of completed projects and, in many cases, continued working on similar water security–related topics.

Scaling-up of GEF project activities is yet to be achieved at the level necessary to meet the water security

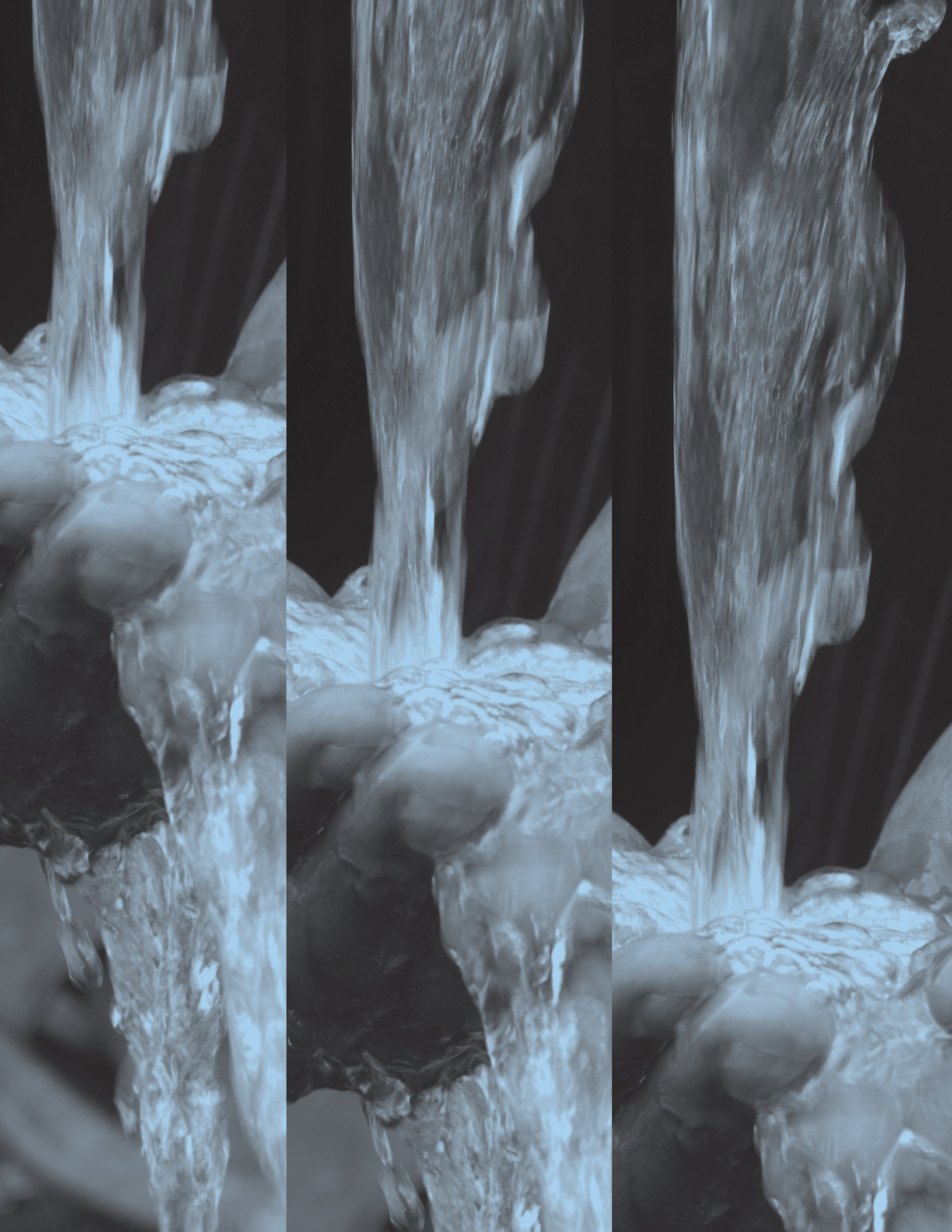
challenges of recipient countries. Though replication was observed in some cases, scaling-up and broader adoption at a watershed or country level were not common. Communities and governments noted that the scale of water security problems such as insufficient access to water, water pollution, and floods and droughts exceeds the ability of GEF projects to address or catalyze solutions to meet. Evidence shows that several factors are key to scaling-up, such as mainstreaming good practices through policy formation, disseminating knowledge and information, and prioritizing activities that create sustainable financial mechanisms beyond the lifetime of project interventions (GEF IEO 2020). GEF projects with a significant focus on water security achieve many of these factors to varying degrees. However, such projects do not often include activities to establish postproject financial mechanisms or improve access to finance.

Recommendations

Water security is integral to all of the GEF's focal areas, given the essentiality of water to human life and ecosystem health. This evaluation highlights several diverse GEF outcomes that have improved water security or improved the enabling environment for achieving water security. Based on the findings and conclusions, this evaluation makes the following recommendations.

Recommendation 1: The GEF Secretariat should ensure that aspects of water security that are key to each GEF focal area are represented in the results measurement framework and project and program design. Explicit language related to freshwater resources should be added to some of the focal area indicators in the GEF-8 Results Measurement Framework to better highlight linkages with water security. This would encourage countries and Agencies to design projects across all focal areas that better consider the importance of water security and freshwater resources. Furthermore, design and theories of change for projects and programs with strong links to freshwater resources should integrate elements of water security to help improve holistic integration of water security across the GEF portfolio. Consideration could also be given to integrating water security as a cross-cutting theme in relevant integrated programs.

Recommendation 2: The GEF Secretariat and the GEF Agencies should prioritize creation of sustainable financing mechanisms and other activities for scaling up interventions that successfully improve water security. Many GEF projects incorporate some factors into project implementation that encourage scaling up of water security activities, such as international waters projects that develop water policy. However, more ambition for scaling-up is needed to meet the water security needs of people and ecosystems. All projects that deal with water security should include sustainable financing and other activities to support scaling-up efforts, including projects that improve water security at the community level. International waters projects, in particular, should offer guidance that sustainable financing must be considered part of the preparation for the SAP implementation phase of the TDA-SAP process. Activities could include creating novel and innovative financial mechanisms in watersheds or aquifer areas, enhancing existing mechanisms, or partnering with the private sector and entities with expertise in financial inclusion. Addressing the issue of sustainable financing in the framework of SAP implementation in various geographies of the world would also increase the likelihood of scaling up water security outcomes.



1 Introduction

1.1 The importance of water security for society and the environment

Fresh water is essential to all life on earth—humans, animals, and plants—and their surrounding societies and ecosystems. Access to water and sanitation is a United Nations (UN)–recognized basic human right and a necessity for well-being (UN-Water 2013). Poverty cannot be alleviated nor wealth generated without the management of freshwater resources (Grey and Sadoff 2007). Ecosystems also depend on fresh water: to live and thrive, plants and animals rely on a clean and available source of fresh water that also provides water-based ecosystem services to society.

The term "water security" encompasses access to freshwater resources and protection from water-related disasters. The term has various definitions; this report uses one established by UN-Water:

> ...the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability. (UN-Water 2013, vi)

This definition covers four main dimensions of water security:

- **Drinking water and human well-being—**ensuring an adequate supply of clean drinking water to meet basic human needs and well-being
- **Economic activities and development—**ensuring an adequate water supply for human livelihood activities including food and energy production
- **Ecosystems—**ensuring an adequate water supply for plants and animals and underlying ecosystem services
- **Water-related hazards and climate change—**protecting society and ecosystems from disasters, namely flood and drought.

These dimensions are underpinned by four characteristics of a high level of water security: good governance and decision-making, transboundary cooperation, peace and political stability, and financing. These characteristics underscore the challenge of achieving water security and the need for its emphasis in national and international agendas. The complexities associated with addressing water security—combined with the fact that water is seldom a priority item on national agendas over the long term—mean that water security has been difficult to achieve in nearly all countries (Biswas and Tortajada 2022).

Access to freshwater resources is under threat. For the past 10 years, water-related risks have led the World Economic Forum's global risk assessments for both likelihood and severity of impact (Cassin 2021). About half of the world's population is currently subject to severe water scarcity for at least one month a year due to both environmental and societal barriers; at least 2.2 billion people lacked access to safe drinking water, and 4.2 billion did not have safe sanitation systems as of 2017. Water, or lack thereof, can be a killer too: for example, although droughts accounted for only 7 percent of disaster events worldwide between 1970 and 2019, they contributed to 34 percent of disaster-related deaths (Caretta et al. 2022); floods also take lives and cause economic losses.

The water cycle is being changed by multiple human activities, including population growth, agriculture, economic development, urbanization, and deforestation (UNEP 2019). These activities all compete for finite freshwater resources and, together with climate change, will cause an expected increase in global water demand of more than 50 percent by 2050 to meet all the needs of people, agriculture, and energy production (Cassin 2021).

Unsurprisingly, access to fresh water is also related to conflict, especially in areas that have natural water scarcity. This is true at multiple scales, from local conflicts between herders and farmers over water resources to international conflicts over dam building, for example. Secure access to water and the services it provides is often a prerequisite for solving conflicts in such areas (UN-Water 2013).

Water is the means through which most people will experience the impacts of climate change (Cassin 2021; UN-Water 2013). Climate change will intensify the hydrological cycle, bringing more severe rainfall events, which will likely cause more severe flooding; and longer dry spells, leading to more intense droughts. Higher temperatures are also leading to glacial melt, which may increase water resources temporarily but then diminish them in areas that have long relied on them for water supplies (Caretta et al. 2022). Less predictable precipitation caused by climate change along with increased water use is resulting in an emerging water storage crisis (Burke et al. 2023). In a future of 2°C warming, between 0.9 and 3.9 billion people will be at increased exposure to water stress (Caretta et al. 2022).

As recognition of their importance to development goals in general, freshwater resources play a key role in the UN Sustainable Development Goals (SDGs). SDG 6 is to "ensure availability and sustainable management of water and sanitation for all"; its targets include ensuring access to safe and affordable drinking water (6.1), adequate sanitation and hygiene (6.2), improved water quality by reducing pollution (6.3), increased water use efficiency across sectors (6.4), integrated water resource management (IWRM) including in transboundary settings (6.5), and protecting water-related ecosystems (6.6).[1]

Water's pervasiveness means it also connects to many of the other SDGs. The High Level Panel on Water found that five other SDGs were strongly related to water resources, nine were related, and three were indirectly related (HLPW 2018). For example, life on land (SDG 15), sustainable cities and communities (SDG 11), good health and well-being (SDG 3), and ending hunger

[1] Source: UN, SDG Goal 6 Targets and Indicators.

(SDG 2) and poverty (SDG 1) all rely heavily on access to freshwater resources.

Despite the underlying and cross-cutting necessity of water, achieving SDG 6 has not been easy. As of 2021, the SDG was not on target to be met by 2030 and had the greatest capacity gap of all 17 SDGs. Target 6.3 was especially underevaluated, and the UN found stakeholders had difficulty measuring the complex indicators used across all the goal's targets (UNEP 2021). Furthermore, certain indicators from the earlier Millennium Development Goal related to access to safe drinking water may have been overestimated, because access to "improved" drinking water sources does not always correlate to access to high-quality water (Bain et al. 2012).

Water security depends on individual and community perceptions. Although progress on improved water security is often measured at the regional or national scale, measuring household or individual perceptions of water security gives a more accurate picture of how it can vary among individuals in the same communities and between different socioeconomic and demographic groups (Young et al. 2019). Because water is so interconnected with well-being and a human's sense of security, individuals living in close quarters may have different perceptions of their water security—such as between men and women or between vulnerable and privileged groups. This perceived water security by individuals might not match objective measures of water security using more technical indicators, making water security particularly difficult to measure at scale.

Nevertheless, the hydrological cycle is inherently global: ocean and air currents mean impacts in one region can have hydrological impacts elsewhere, thus affecting water security (Ellison et al. 2017). For example, large-scale deforestation of tropical forests could change precipitation patterns in other regions of the world (Lawrence and Vandecar 2015).

A common good practice noted across the water security literature is that water security is best addressed in a holistic, integrated fashion across its dimensions. The literature clearly recognizes fresh water as a cross-cutting theme that integrates several environmental themes, economic sectors and societies, and ecosystems. Indeed, water security is influenced by many factors, including population dynamics, urbanization, climate, soils, land use, institutions and governance, economic and behavioral aspects of water use, and technological advances and their adoption (Biswas and Tortajada 2022). Therefore, holistic and cross-sectoral approaches and systems perspectives that cut across social, economic, and environmental dimensions are preferred for water management over interventions that focus on only one sector or dimension (Burke et al. 2023; Miralles-Wilhelm, Sanchez-Maldonado, and Munoz-Castillo 2022; Mishra et al. 2021).

An evaluation of water supply and sanitation projects of the African Development Bank (AfDB) found that project sustainability can be improved by "considering large-scale, multipurpose and integrated water projects," including integrating health, water supply, and sanitation into projects (AfDB IDEV 2015). An evaluation of the work of the International Fund for Agricultural Development (IFAD) in water conservation and management similarly noted that water projects must work beyond water supply itself to ensure an enabling legal framework, farm-to-market value chains, land tenure, nonfarm sector promotion, and market development—all of which affect the sustainability of outcomes from water investments (IFAD IOE 2014). The Food and Agriculture Organization of the United Nations (FAO) points out in its strategy on integrating water, sanitation, and hygiene (WASH) and irrigation interventions that—especially after the COVID-19 pandemic highlighted the importance of clean water in providing sanitation—interdisciplinary solutions to multiple-use water systems are needed (Salman, Pek, and Ahmad 2020).

1.2 The importance of water security in the GEF

Given the indispensability of water throughout society and ecosystems, aspects of water security play an integral role in all the Global Environment Facility's (GEF's) focal areas, but are most directly addressed through the international waters focal area and the climate change adaptation funds. The international waters focal area has the clearest links with water security, given that a significant proportion of its work is focused on improving management of transboundary freshwater bodies and their associated watersheds. The focal area works across all four dimensions of water security and the management level, particularly if the area of concern is for a transboundary watershed. Such watersheds are common throughout the world. At least 150 countries include territory within one or more transboundary river basins, and 592 transboundary aquifers have been identified (UNESCO 2021).

The GEF-managed climate change adaptation funds—the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF)—also have important water security linkages. Given that some of the most significant impacts on climate change are the increase in propensity and severity of extreme events related to either a lack of water or too much water, an estimated 60 percent of adaptation activities are related to water—such as irrigation, rainwater harvesting, and soil moisture conservation (Caretta et al. 2022).

Other focal areas intersect with water security to achieve their global environmental benefits (table 1.1). The **land degradation focal area** has a large focus on drought as it relates to desertification, which is often caused by poor agricultural practices in semiarid and arid regions and exacerbated by climate change. Globally, agriculture accounts for 60–70 percent of water withdrawals (Biswas and Tortajada 2022; Caretta et al. 2022). The focal area seeks to reduce and reverse land degradation, which aggravates water scarcity, ecosystem degradation, and food insecurity, among others.

In the **biodiversity focal area**, safeguarding waterbodies is critical to maintaining biodiverse ecosystems, especially aquatic and riparian ecosystems. Much of the work of the **chemicals and waste focal area** aims to reduce the number of contaminants that find their way into the environment, including into waterbodies and aquifers used by society for drinking water and other purposes.

The **climate change focal area** focuses on mitigation; and many mitigation techniques, including carbon capture and storage, afforestation/reforestation, and biofuels require significant input of freshwater resources (Caretta et al. 2022; Miralles-Wilhelm 2022). One of the key goals of the climate change focal area is to promote nature-based solutions, particularly high-carbon ecosystems such as wetlands and forests.

Many of the **GEF-6 integrated approach pilots, GEF-7 impact programs, and GEF-8 integrated programs**, which integrate the various focal areas, relate to water security as well, especially those focusing on food security (because water is integral for agriculture) and sustainable cities (safeguarding urban water supply and protecting against extreme events).

The GEF Independent Evaluation Office (IEO) has touched upon water themes in various evaluations to date, including through its focal area (GEF IEO 2018a, 2018b) and regional studies (GEF IEO 2013), but has not conducted a comprehensive evaluation of water security across the entire GEF portfolio. This evaluation serves to fill that gap with the objectives of assessing how the GEF's approach and interventions address water security across all the focal areas, and understanding how and to what extent GEF interventions improve water security.

1.3 Evaluation methodology

The evaluation applied a mixed-methods approach to answer the following questions:

Table 1.1 Most-prominent logical intersections between GEF focal areas and the dimensions of water security

Focal/ program area	Dimensions of water security				Notes
	Drinking, sanitation, and hygiene	Economic activity	Ecosystems	Hazards and climate change	
Biodiversity			■		Biodiversity projects seek to safeguard the flow of water to biodiverse ecosystems and water-based ecosystem services provided to communities
Climate change mitigation		■	■		Many mitigation strategies, such as carbon capture and afforestation, require water resources
Climate change adaptation	■	■		■	The LDCF and SCCF fund projects to reduce the impact of floods and droughts on both livelihoods and water supply systems
International waters	■	■	■	■	One of the main objectives of international waters projects is managing transboundary freshwater resources for all uses, and protecting these watersheds from water-based hazards
Land degradation		■	■	■	Land degradation projects are directly linked with reducing the impacts of drought and managing the use of water in agriculture, a critical rural livelihood
Chemicals and waste	■	■	■		Many chemicals and waste projects aim to prevent contaminants from entering waterbodies
Integrated approach pilots and impact programs	■	■	■	■	Water plays a key role in the food security and cities impact programs/integrated approach pilots, with several child projects aiming to protect populations from floods and other disasters and safeguard clean water supplies

Source: Policy documents.

- To what extent have GEF interventions with an explicit focus on water security responded to the needs, policies, and priorities of beneficiaries (communities, resource users, governments, river basin organizations, etc.) relating to fresh water?
- In what ways and using what frameworks and strategies has the GEF addressed water security?
- How do the GEF's approach and activities related to water security interact with similar activities and initiatives at the country level?
- How do the GEF's approach and activities compare to a theory of change for improving water security derived from good practices among peer organizations and the larger international water community of practice?

- To what extent have GEF interventions been effective in improving water security within the global environmental benefits framework and as co-benefits while avoiding negative trade-offs?
- Have GEF projects focused on water security considered impacts on gender and all stakeholder groups, including the most vulnerable?
- To what extent are water security–related GEF outcomes sustained or continued beyond the end of the implementation period?

A variety of quantitative and qualitative methods were used to evaluate the GEF's interventions in water security, as described in the evaluation's approach paper. To better understand the GEF's strategy in dealing with this issue, a **document review** was performed, including the programming directions and adaptation strategies laying out the overarching strategy of the GEF's approach to each replenishment, starting in GEF-4, and other focal area and Scientific and Technical Advisory Panel (STAP) documents relating to water security (GEF 2007, 2010, 2014, 2018a, 2018b, 2022a, 2022b; Granit et al. 2017; Henshaw 2021; Ratner 2018).

Other guidance related to freshwater resources was reviewed as well, including IW:LEARN (International Waters Learning Exchange and Resource Network) documentation. GEF Agency strategies relating to water were also reviewed. Additionally, 18 interviews were carried out with GEF Secretariat and GEF Agency staff who work on such strategic documents.

A **theory of change** (figure 2.5) was constructed to understand the pathways through which the GEF addresses water security through its interventions, accompanied by a literature review of good practices and lessons learned from the water security international development community. The theory of change was vetted through several interviews with water security experts in academia and shared with the GEF Secretariat and GEF Agency members prior to interviews.

To better understand the integration of water security themes in GEF projects, a **portfolio review** was carried out. This first involved defining the portfolio, because the GEF does not designate projects as having a significant focus on water security. Given the pervasiveness of freshwater resources in all the GEF's focal areas, water security is integrated at different levels in several GEF projects. However, because water security has been addressed to varying degrees in several GEF IEO thematic evaluations (GEF IEO 2022a, 2024a, 2024c), this evaluation is focused on a targeted review of projects, identifying those with the greatest focus on water security.

To define the evaluation portfolio, a **keyword search** of terms related to water security was done on project titles, objectives, and component titles for all GEF, LDCF, and SCCF projects from GEF-4 onwards.[2] Projects found to include such keywords were checked for relevance to at least one of the four water security dimensions presented above. The resulting projects were deemed to have an explicit focus on water security, because they included keywords or concepts related to water security or its dimensions in their project title, project objective, or component title.

The portfolio review was performed on a subset of projects, concentrating on GEF-4 and GEF-5 projects with terminal evaluations reviewed by the GEF IEO (to evaluate water security results and outcomes). In addition, ongoing GEF-6 and GEF-7 projects were reviewed to evaluate the integration of water security in the design of the most recent projects. Projects identified using the United Nations Development Programme's (UNDP's)

[2] Keywords included "water," "flood," "drought," "disaster," "watershed," "aquifer," and "basin." A manual review of the results was performed to further refine the portfolio. Additional GEF-7 projects were added that included funding from the water security–focused international waters focal area objective from that GEF replenishment. Dropped, canceled, and project implementation review–rejected projects were removed.

Artificial Intelligence for Development Analytics (AIDA) were also included in the sample.[3]

Keyword searches were also performed on food security and cities-related impact program project documents to better understand how integrated programs specifically integrate water security themes.

In addition to the portfolio review, five **case studies** were carried out to provide detailed evidence of how projects have integrated water security into their designs and achieved results. Case study selection was based on several criteria, including (1) a mix of transboundary basins or aquifers and country-level cases; (2) areas with more GEF projects in the evaluation's portfolio, especially areas with more completed projects but also a mix of completed and ongoing projects; and (3) geographical, focal area, and trust fund (GEF Trust Fund, LDCF, and SCCF) diversity.

The five selected case studies included three country-level— Bolivia, Burundi, and Sudan—and two transboundary case studies—the Dinaric-Karst Aquifer System (DIKTAS) in Albania, Bosnia-Herzegovina, and Montenegro; and the Mediterranean sea coast in Morocco and Tunisia. In all, the case studies covered 22 GEF projects. A transboundary river basin in Asia was covered in a parallel GEF IEO evaluation, the Strategic Country Cluster Evaluation of GEF Support to the Lower Mekong River Basin Ecosystem (GEF IEO 2024d). Relevant findings from the Mekong evaluation are included in this report.

Within each case study, evaluators reviewed project documents for all projects within the evaluation portfolio in the case study area, along with any project publications available (a full list of case study projects is shown in annex A). Case study visits to project sites were carried out in four of the five case studies,[4] which also included virtual and in-person interviews with stakeholders: national and local government staff, GEF Agency and project staff, community organizations and members, private sector actors, civil society organizations such as nongovernmental organizations (NGOs), transboundary basin committee officials, and staff of other donor water security–related activities in the case study areas. Reports were written for all the case studies and shared with stakeholders in each case study area; these are included in volume 2 of this evaluation. A full list of stakeholders interviewed for this evaluation is provided in annex B.

To help determine whether any projects have inadvertently decreased water security in the areas where they had impact, **grievance cases** were analyzed that have been reported to the GEF Secretariat through GEF Agency grievance mechanisms. Evidence of decreased water security was also gathered through case study interviews and the portfolio review.

Geospatial tools were used for this evaluation to analyze whether GEF projects with an explicit focus on water security are located in areas with the most severe water security challenges. A global data set on water security was used for this analysis (Gain, Giupponi, and Wada 2016) and was compared against the locations of GEF projects in the evaluation portfolio. Additionally, global data sets on the normalized difference vegetation index (NDVI) from the Sentinel-2 multispectral instrument were used to determine changes in vegetation cover following GEF project interventions in Bolivia.

[3] The UNDP AIDA tool allows for a keyword search of entire midterm review and terminal evaluation documents of all GEF projects implemented by UNDP to date, rather than just searches of project titles, objectives, and component titles. Additional projects found using AIDA were not included in the portfolio review.

[4] No site visits or interviews were carried out for the Sudan case study due to a World Bank operational pause in the country during the evaluation data collection period. This prevented GEF IEO staff and consultants from traveling within Sudan or interviewing stakeholders involved in World Bank–implemented GEF projects in the evaluation portfolio.

A **review process** was implemented from the start of the evaluation, including internal and external review of the approach paper and the evaluation report. A reference group was formed, with representatives from the GEF Secretariat, GEF Agencies, the GEF–Civil Society Organization Network, and the STAP participating.[5]

At the end of the data collection phase, a triangulation process was carried out in which the evidence collected from each method was mapped to each of the evaluation questions, to develop the findings, conclusions, and recommendations.

1.4 Limitations

The evaluation encountered certain limitations. First, the process of identifying GEF projects in the GEF Portal containing elements of water security proved to be difficult. The evaluation team focused on projects that highlight water security in their project titles, objectives, or component titles, thus concentrating on projects with a prominent and explicit focus on water security. The UNDP AIDA tool helped broaden the document search. The evaluation team also looked for cases of adverse effects on water security in other ways, through examination of grievance cases, the portfolio review, and inquiry with country-level stakeholders.

Second, the evaluation's case studies were affected by security-related travel limitations. These delayed the Bolivia case study but were especially detrimental for the Sudan case study, where a World Bank operational pause prohibited the evaluation team from traveling outside Khartoum and interviewing stakeholders on the ground about World Bank–implemented projects. The team mitigated this issue by focusing the case study on UNDP-implemented projects and then conducting remote interviews via telephone with rural stakeholders.

[5] Notes from the reference group meetings are available at the GEF IEO webpage for this evaluation.

2 GEF portfolio and strategy related to water security

2.1 The evaluation portfolio

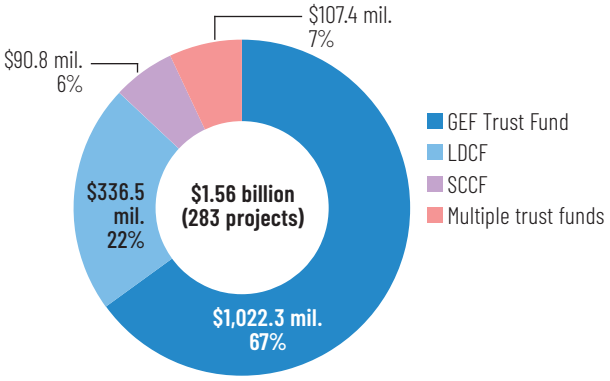
Most of the GEF projects with a focus on water security were funded through international waters, climate change adaptation, or multifocal area interventions. The evaluation portfolio of projects with a prominent and explicit focus on water security totaled 283 projects—165 ongoing and 118 closed—of which 83 had reviewed terminal evaluations. The projects had total GEF funding of $1.56 billion from the start of GEF-4, representing almost 10 percent of total GEF funding from GEF-4 to GEF-7, with cofinancing of $13.42 billion.[1]

Of these 283 projects, two-thirds (67 percent) of GEF funding was from the GEF Trust Fund and 27 percent was from the two climate change adaptation trust funds (figure 2.1); the remainder were multitrust fund projects. This shows that a significant portion of the water security focus in the GEF has been related to climate change adaptation. Multifocal area projects had the largest share of GEF funding in the portfolio, accounting for almost one-third of total funding (figure 2.2); but the international waters focal area had a larger total number of projects (85) and almost as much funding (29 percent).

The most represented region in the evaluation portfolio was Africa. Projects in Africa accounted for almost half of all GEF funding (44 percent) and totaled 115 of the 283 projects (figure 2.3). Asia and Latin America and the Caribbean had similar shares of funding, at 21 percent and 17 percent, respectively; followed by Eastern Europe at 8 percent. Among Agencies (figure 2.4), the three original GEF Agencies received the most

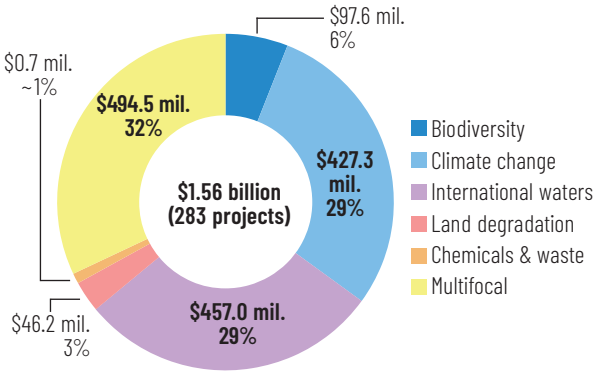
[1] The GEF projects were selected for inclusion in the evaluation portfolio during the approach paper phase in December 2021. The completed projects included must have had a verified terminal evaluation in the most recent terminal evaluation data set from October 2021. All references to the evaluation portfolio are as of these dates and do not include ongoing projects or terminal evaluations of completed projects added to the GEF Portal afterwards.

Figure 2.1 Share of portfolio value by funding source



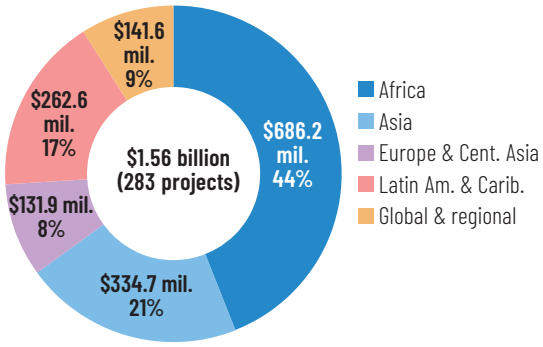
Source: GEF Portal.

Figure 2.2 Share of portfolio value by focal area



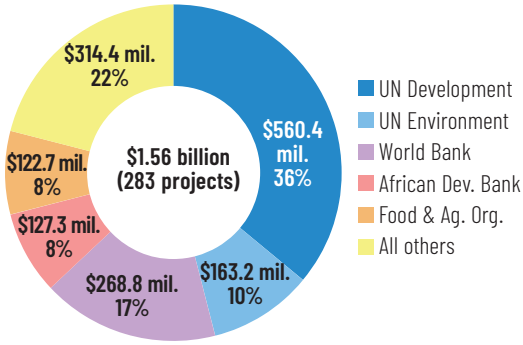
Source: GEF Portal.

Figure 2.3 Share of portfolio value by geographic region



Source: GEF Portal.

Figure 2.4 Share of portfolio value by GEF Agency



Source: GEF Portal.

GEF funding, with UNDP leading at almost 36 percent,[2] the World Bank at 17 percent, and the United Nations Environment Programme (UNEP) at 11 percent. AfDB was fourth, highlighting the focus on Africa as a region with 8 percent, followed by FAO at nearly 8 percent.

[2] UNDP's portfolio share is likely slightly overestimated due to the inclusion of additional projects found using the UNDP AIDA tool.

2.2 Theory of change to evaluate GEF interventions and outcomes related to water security

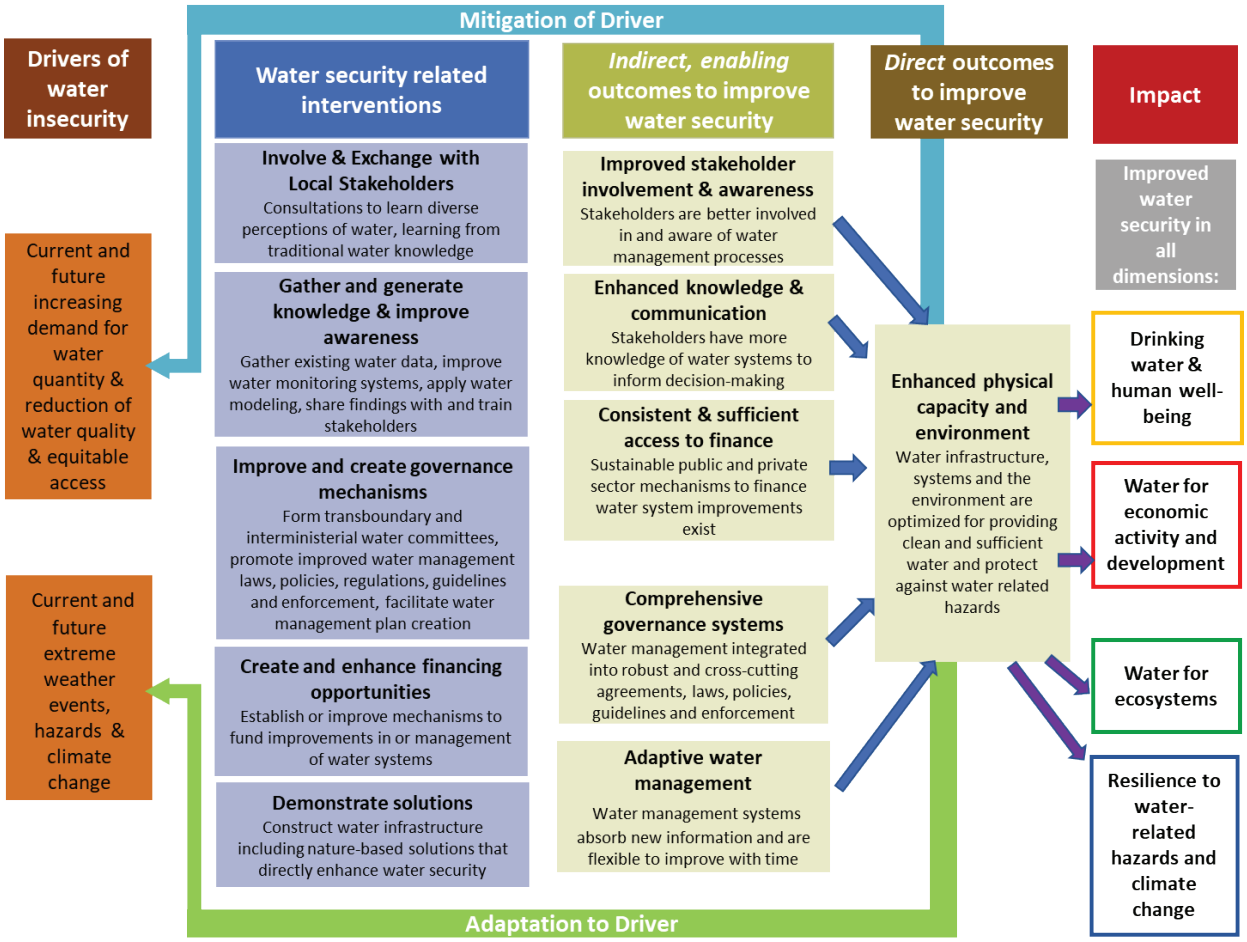
To better understand and evaluate the ways in which the GEF could achieve water security outcomes, a theory of change was developed as part of this evaluation. In the absence of a specific mandate to improve water security, the GEF's strategy for addressing water security has been integrated into its separate focal areas and their strategies,

which are communicated mainly through the GEF programming directions.

To evaluate how elements of water security strategy in the programming directions and water security–related activities within interventions come together to improve water security in the areas in which the GEF works, the evaluation developed a theory of change. Based on the literature, expert views, and an analysis of GEF project activities linked to water security, the theory of change shows the different ways in which GEF interventions could potentially lead to water security benefits (figure 2.5). The theory of change illustrates the factors undermining water security, the interventions through which the GEF could address these factors, and the potential outcomes that could improve water security directly or indirectly through improving the enabling environment for water management and systems.

The theory of change is designed as a circular process to account for feedback loops in which interventions can build upon outcomes from past work, make incremental improvements, scale up, or achieve outcomes in other geographical areas. Previous evaluations have noted that the GEF has a comparative advantage in not only supporting pilot projects but also in establishing enabling conditions for scaling up (GEF IEO 2020).

Figure 2.5 Simplified theory of change constructed for the water security evaluation



The theory of change highlights two major drivers of water insecurity: natural hazards and human use of water resources. The factors that undermine water security relate to the limitation or uncertainty in the capacity to absorb, adapt, or transform to future changes to ensure access to sufficient water of adequate quality to meet environmental and human needs at the appropriate time.

The **first factor** is focused on direct human intervention in water resources and relates to the other three dimensions of water insecurity—the current and future increasing demand for water (leading to overextraction), the reduction of water quality, and insufficient access to water. These are primarily due to the effect of population growth and urbanization (domestic consumption and sanitation), industry, agriculture, and power generation, among others. They are compounded by poor management of water resources between competing users, particularly in water-stressed areas (He et al. 2021). Specific issues undermining water security related to poor management include the following:

- Limited funding to manage and improve water infrastructure (including natural infrastructure and nature-based solutions) (D'Arras 2022; World Bank 2020)
- Poor water management, including lack of capacity to manage (Montalvo and Alaerts 2013)
- Lack of policies and policy coherence across all the sectors that use water resources (Beekma et al. 2021; Benson, Gain, and Rouillard 2015)
- Lack of technical knowledge (Viola, Modak, and Ferguson 2020)
- Limited involvement of local and vulnerable stakeholders and limited use of their knowledge (Akhmouch and Clavreul 2017; Voogd, de Vries, and Beunen 2021; Walker, Loucks, and Carr 2015)
- Limited physical solutions for dealing with changing water needs (Anderson 2015).

The second factor relates to water-related hazards: mainly current and future extreme weather events, along with changes in rainfall patterns exacerbated by climate change and their resulting impacts in flooding and drought. These drivers cause many of the same environmental stresses that the GEF directly addresses—urbanization, deforestation, and other land use changes that cause land degradation, exacerbate climate change, threaten biodiverse habitats, and generate pollution detrimental to human health.

The types of interventions the GEF can carry out to improve water security are often those it undertakes to achieve global environmental benefits. The interventions through which the GEF could achieve water security would address some of the main challenges to improving water security. These could include engaging local stakeholders around water use, generating and sharing knowledge on how water resources are used and on monitoring natural systems, facilitating cross-sectoral cooperation on water and land use planning, improving water governance, improving financial mechanisms and opportunities to improve water infrastructure (both gray and green), and promoting change by demonstrating innovative solutions and technologies. These interventions are not outside the realm of GEF activities to address drivers of environmental degradation and achieve global environmental benefits. For example, local stakeholders are engaged around the use of ecosystem services and protecting biodiversity; land use planning is necessary to prevent deforestation and land degradation; and cross-sectoral cooperation is critical for transboundary water management both in freshwater and marine areas.

The theory of change highlights six major outcome groups for improving water security through GEF interventions. The outcomes highlighted in the theory of change relate to improving the enabling environment for actors to improve water security, or lead directly to water security through increasing access to clean and sufficient water, or improve resilience to water-related hazards. Water security improvement often requires a physical change (although behavioral changes can also improve

water security in certain cases)—people or ecosystems must be given access to more water, cleaner water, or have improved means to mitigate water hazards.

Such physical capacity improvement cannot be achieved in isolation. Many factors are needed in the enabling environment to ensure that physical capacity improvements are placed in the most optimized location, adequate for a wide range of stakeholder groups, managed well to ensure their sustainability and provide the funding to make further adaptations and improvements in the future. The intervention areas included in the theory of change to address the drivers of water insecurity consider the scope and mission of the GEF to achieve global economic benefits. For example, the GEF would be unlikely to construct a large dam as part of one of its projects even if such a dam could improve water security for a certain population; rather, it would be more likely to finance tree planting or natural rehabilitation of riparian areas to mitigate flooding potential.

The main outcomes observed in the GEF portfolio include the following.

- **Improved stakeholder involvement and awareness.** This outcome ensures that representatives of all water users (especially the most vulnerable) are adequately involved in and aware of discussions on management and interventions that improve water security, and that their needs and cultural and spiritual connection with water resources are considered. This involvement enhances stakeholder knowledge and ownership of water issues, improves communication, alleviates conflict, and helps determine the value of water in particular areas (Wehn et al. 2020). It also ensures that water security is not improved for one group at the expense of others and shields against safeguard issues. More involved local stakeholders promote better local management of water systems, as such management is critical at the local level.
- **Enhanced knowledge and communication.** Improved knowledge of water resources (including local and traditional knowledge), hydrology, and the perceptions and use patterns of water in project areas underpins any intervention to improve water security. This involves gathering hydrometeorological data for improved early warning systems and climate preparedness as well as improved water quality, quantity, and use monitoring to ensure better water resource management. Ultimately, knowledge must be shared broadly across sectors so it becomes useful for decision-making, connecting it to the outcome on improved awareness. Without good knowledge of water resources across all key stakeholder groups, decisions and actions taken to improve water security can often be misguided or even harmful to water security. Local communities are also essential for water monitoring, which must be done on site in many cases, including Hydromet and citizen science monitoring (Mishra et al. 2021).
- **Consistent and sufficient access to finance.** Financial investment in solutions to improve water security is necessary from the private and public sectors. Such solutions can take a variety of forms, such as new financial instruments with traditional lenders specific for water-related projects or disaster relief, funds to be used for specific water security–related projects, certification schemes that allow products to be sold at a premium if good water practices are followed, and business plans for the private sector that are profitable and provide water security solutions. Examples include establishing watershed protection funds (including payment for ecosystem services), environmental bonds, and investment risk reduction mechanisms through nature trust funds, among others. This outcome is particularly important for sustaining water security improvements beyond interventions.
- **Comprehensive governance systems.** Good water management, which is essential for water security, begins with sound water governance (OECD 2022). This includes laws that protect and balance the

rights and needs of different water users (especially the most-vulnerable groups, but also the environment), guidelines that lay out responsibilities for key management actions and oversight, and trained and financed government agencies that manage water and enforce the law. Strong water governance is also transparent, addresses multisectoral interests (such as recognizing the water-food-energy nexus), and is harmonized with neighboring jurisdictions that share water resources. Water governance systems are a critical part of the enabling environment for ensuring that activities that improve water security are done in priority areas and are responsive to populations that need improved water security.

- **Adaptive water management.** Adaptive and flexible water management allows for changes in systems to respond to the constantly changing nature of climate change and to societal issues that have effects on water resources (Claassen 2022). Adaptive laws and integrated sectoral decision structures can integrate new knowledge and information; updating and evolving are challenging, but necessary, for ensuring resilient water security.
- **Enhanced physical capacity and the environment.** Ultimately, knowledge, improved governance, and financing should result in physical improvements in infrastructure or environmental conditions that improve the delivery of water services to allow people and ecosystems better access to clean water and to mitigate water-related hazards. These could include both "gray" infrastructure, such as built structures; and "green" infrastructure, which utilizes nature and vegetation to improve water management. In many cases, local improvements in infrastructure are the main activities that directly improve water security and have a noticeable impact on communities. These activities could involve large-scale construction which is outside the GEF's purview but could also include nature-based solutions, small-scale community water storage and sustainable land management solutions to better manage water on agricultural land, early warning systems to alert communities to hazards (intersecting with the knowledge and communications outcome), and the introduction of new technologies and solutions for water efficiency.

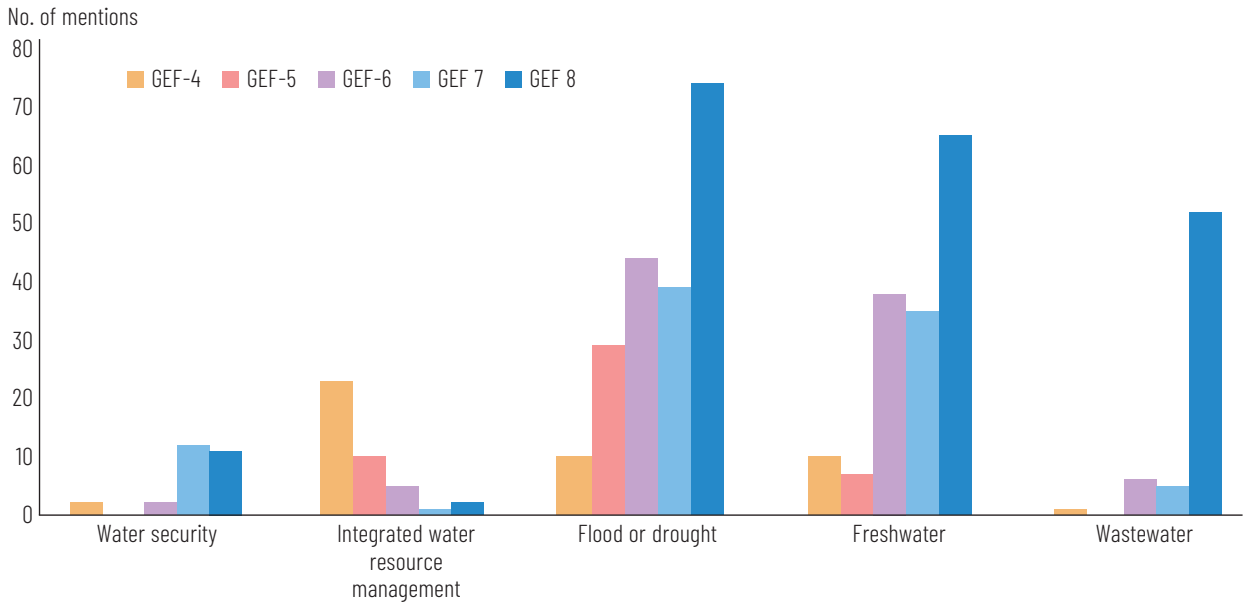
This theory of change serves as a framework for better understanding how the GEF is improving water security through its interventions. The outcomes from such interventions contribute directly or indirectly to enhanced water security. The following sections assess how well the GEF's strategies and interventions related to water security integrate and achieve the potential outcomes detailed in the theory of change.

2.3 Water security in GEF strategy documents

Use of "water security" and related terms has increased in GEF programming directions over time. GEF programming directions lay out the GEF's strategy at the beginning of each of its four-year replenishments. Through a text analytics search for water security and other terms that suggest a discussion of specific dimensions of water security in the programming directions going back to GEF-4, it is clear that water security has been gaining importance in the GEF (figure 2.6).

Use of the term water security increases from being almost absent in GEF-4 through GEF-6 to more than 10 mentions in the programming directions for both GEF-7 and GEF-8. Mentions of the most common water-related hazards—flood and drought—have steadily increased over time, as has use of the broad term freshwater, which can often refer to a focus on freshwater ecosystems or management. The term wastewater is used often in GEF-8, showing its importance in the upcoming Clean and Healthy Ocean Integrated Program (although this program is mostly concerned with the impact of wastewater on marine ecosystems rather than freshwater resources).

Figure 2.6 **Mentions of water security and related terms in GEF programming directions by GEF replenishment period**



Source: Policy documents.

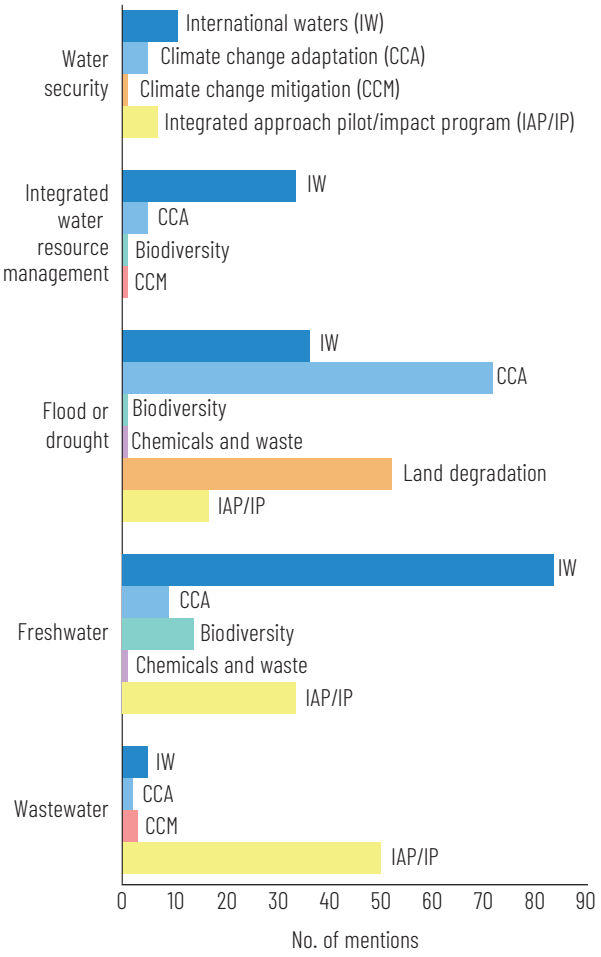
The only exception to the increasing mentions of water security–related terms is integrated water resource management, which has steadily declined in use in programming directions. This could reflect replacement of the term with water security or management of freshwater resources.

International waters is the focal area that integrates water security into its strategy most holistically; other focal areas generally concentrate on specific dimensions of water security. Across the programming directions of different GEF replenishment periods, the international waters focal area sections most often use the term water security and related terms such as IWRM and freshwater, while also mentioning terms related to specific dimensions of water security, including flood and drought (figure 2.7). Starting in GEF-7 and continuing into GEF-8, the work of this focal area in freshwater systems has been framed using water security as one of its objectives, specifically "enhancing water security in freshwater ecosystems" (GEF 2018a, 2022a).

International waters freshwater projects tend to focus on improving governance, building knowledge, and improving communication and collaboration between countries to enhance transboundary management of water resources. As with marine projects, international waters has used a standard methodology across most of its freshwater projects since the beginning of the GEF: the transboundary diagnostic assessment–strategic action program (TDA-SAP) process. However, previous GEF IEO evaluations have found marine areas tend to receive more funding than fresh water in international waters; this is also the perception of GEF Agencies (GEF IEO 2018a).

As the GEF-8 Programming Directions point out for the international waters focal area, setting transboundary priorities and SAPs are "vital in the process of identifying key issues that affect national water related stress and how to deal with these stressors through actions in multiple countries at the same time" (GEF 2022a, 169). The programming directions also highlight the need

Figure 2.7 Mentions of water security and related terms in focal area sections of GEF programming directions from GEF-4 and later



Source: GEF programming directions.

to integrate water security across other focal areas as "transboundary environmental and water security starts by strengthening management capacity at the most local level, which include land degradation management strategies, climate change impacts, adaptation, and generally increasing the land-based activities" (GEF 2022a, 169).

The GEF-8 Programming Directions demonstrate the many ways in which water security is addressed by GEF focal areas and integrated programs. The issue of water security cuts across all the GEF focal areas, as demonstrated by the entry points through which it integrates into GEF-8 Programming Directions for every focal area and integrated program (table 2.1). Water security is not always discussed explicitly in the programming directions, but is often implicit in the interventions and actions envisioned. For example, ecosystem restoration, an objective for several focal areas and integrated programs, needs water inputs and provides water-based ecosystem services as benefits through flood mitigation and soil retention. Additionally, the GEF, with its expanded focus on integrated programs, is increasingly taking a landscape approach to environmental degradation; this makes integrating cross-cutting topics such as water security easier.

The international waters focal area integrates all four dimensions of water security, mainly through the lens of transboundary watershed management. The GEF is the largest mechanism for multicountry collaboration on freshwater resources and thus fills a critical gap in international funding. Many stakeholders in international organizations and national governments highlighted the GEF's additionality and importance in this realm, because few other donors focus on improving transboundary governance of freshwater systems.

As clarified in its programming directions, international waters focuses on this high level of transboundary governance, seeking to improve collaboration and coordination between countries to better manage shared water resources and reduce conflicts related to the four dimensions of water security: water use for humans and for livelihoods, while managing ecosystems and water-related disasters that are not confined to political boundaries (box 2.1). Thus, the GEF's water security-related work in the international waters focal area is framed as a global or transboundary environmental issue, whereas water security work done at the community or domestic level (such as that focused on community potable water or wastewater systems or protection of watersheds entirely within one country) is viewed as achieving local benefits. This latter

Table 2.1 Potential entry points and connections between GEF-8 focal area and integrated program programming directions

Programming area	GEF-8 entry points for water security (human well-being, ecosystems, economic, hazards)
Focal area	
Biodiversity	Ecosystem services, water for ecosystems, payment for ecosystem services, freshwater and riparian ecosystems and protected areas, ecosystem preservation, wetland protection
Climate change adaptation	Flood and drought mitigation, disaster risk reduction and management, water sector improvement, water efficiency, early warning systems, water storage, water harvesting, irrigation
Climate change mitigation	Hydropower, water efficiency, water-food-energy nexus, afforestation/reforestation, nature-based solutions
International waters	Water security, transboundary watershed, river basin and aquifer management and governance, knowledge management of water resources, integrated water resource management, flood early warning systems, wastewater treatment, nonpoint source pollution prevention, freshwater fisheries, freshwater ecosystems, ecosystem services, water conflict, ridge to reef/source to sea, water-food-energy nexus, nature-based solutions
Land degradation	Water scarcity, drought, desertification, drylands, ecosystem degradation, sustainable land management, watershed management, soil erosion and management, groundwater recharge, irrigation, water storage, water harvesting, water efficiency, water for agriculture, food security
Chemicals and waste	Chemical releases to waterbodies, water pollution, water quality
Integrated programming	
Food systems	Watershed management, soil management, ecosystem services, water regulation, protection of source water, groundwater recharge, water for agriculture
Ecosystem restoration	Wetland and peatland protection, watershed protection, riverine forest protection, freshwater ecosystems
Sustainable cities	Flood management and mitigation, wastewater treatment, stormwater drainage management, nature-based solutions
Critical forests	Water and nutrient cycling, freshwater ecosystems
Circular solutions to plastic pollution	Wastewater, contamination control, water quality, source to sea
Blue and green islands	Water scarcity and stress, water pollution, water sector efficiency and improvement
Clean and healthy oceans	Wastewater treatment, source to sea, point and nonpoint source water pollution
Net-zero accelerator	Nature-based solutions, wetlands, water-food-energy nexus
Wildlife conservation	Protection of aquatic ecosystems, ecosystem services, water for ecosystems
Elimination of hazardous chemicals	Wastewater treatment, water pollution
Greening transportation infrastructure	Ecosystem protection, free-flowing rivers, nonpoint source pollution control

Source: GEF 2022a.

Note: List is not exhaustive.

is ostensibly outside the purview of the international waters focal area, save for the use of demonstration projects at the local level in areas of transboundary significance.

Efforts by the international waters focal area to involve other GEF focal areas in SAP implementation work have met with limited success. The end of the TDA-SAP process, which is the flagship of the international waters focal area, involves implementing the strategic actions of the SAP. Often, these actions—although they support transboundary management—are implemented at the national level and are typically beyond the general purview of international waters project activities, which focus on governance and collaboration. A recurring goal of SAP implementation projects in international waters is thus to encourage other donors and national governments to fund SAP activities—or even involve other GEF focal area funding. However, the GEF IEO noted at the end of GEF-6 that

> [A]ttempts to capture and fully develop the huge potential for… joining forces of the GEF focal areas towards common objectives have been limited by obstacles on the road to integration such as the focal area silos, sectoral conventions and difficulties in aligning country priorities with regional objectives. (GEF IEO 2018a, x)

Agency and national stakeholders noted these issues still exist today and, so far, the impact programs have not integrated SAP activities in nearby transboundary watersheds into their programming. The closest the GEF has come to creating an integrated program centered around water security was the dropped initiative for an environmental security impact program proposed at the beginning of the GEF-7 replenishment (box 2.1).

The land degradation focal area programming directions highlight two main aspects of water security: drought mitigation and water management in agriculture or restoration. The most recent GEF IEO land degradation focal area evaluation notes that the focal area had shifted away from projects focused on waterbodies toward "contextual factors" such as drought (GEF IEO 2018b). Discussion of sustainable land management in the programming directions notes the importance of water management and preventing soil erosion, all of which are key for on-the-ground activities and integration into land and water management plans done under the focal area; in some projects, such activities are even called sustainable land and water management.

The GEF-6 Programming Directions notes that watershed management is critical where "SLM [sustainable land management] interventions can improve hydrological functions and services for agro-ecosystem productivity" (GEF 2014, 143). In the GEF-8 Programming Directions, "drought-smart land management" is highlighted through water efficiency in agriculture and provision of drought-resistant seeds and plants. However, some GEF Agencies and executing organizations noted that even though the land degradation focal area has clear links to water security, it can be restrictive when trying to plan a project around water resource management: if the projects do not have a strong drought or land degradation component, they cannot fit under this focal area.

Other GEF Trust Fund focal areas also tend to address water security more narrowly, integrating some water security dimensions into their strategies. Programming directions for all the GEF focal areas except chemicals and waste discuss aspects of water security as important in achieving their global environmental benefits. The GEF-6 Programming Directions for the biodiversity focal area note the importance of protecting biodiverse natural ecosystems, given their importance in supplying ecosystem services such as regulating and purifying water supply, and that they will aim to create new protected areas to improve "inland water ecosystem representation within protected area systems" (GEF 2014, 23). Payment for ecosystem service schemes and water bonds are cited as potential financial mechanisms for protecting biodiversity.

Box 2.1 How water security links with environmental security and conflict reduction in the GEF

The GEF's Scientific and Technical Advisory Panel has noted that not only does the environment underpin human well-being and security, but environmental protection is more easily accomplished and sustainable if humans feel secure and conflict is reduced (Ratner 2018). Environmental security, as defined by the STAP, is "the role that the environment and natural resources can play in peace and security," and provision of water as an ecosystem service forms a critical component of environmental security. Environmental degradation and climate change that have further limited access to water resources that are critical to human security are seen as a risk multiplier—making underlying conflicts between neighbors, local groups, and countries more likely to flare up.

Both the STAP and the GEF IEO have noted that international waters is the GEF focal area most focused on reducing water-related conflict at the transboundary level (GEF IEO 2024b; Ratner 2018). Through 2019, 29 percent of country-level international waters projects were in countries affected by major armed conflicts, and 83 percent were in fragile areas. Examples include projects aimed to enhance transboundary coordination in the Jordan, Nile, and Sava Rivers.

GEF corporate and Agency stakeholders recognize this conflict reduction as a major socioeconomic co-benefit of the focal area that is not considered by most other financing mechanisms. However, stakeholders noted that working in such difficult areas can slow down international waters projects, because delicate political processes can be cumbersome and drawn-out.

As freshwater resources are more connected to human security, this makes for more issues in freshwater projects than in marine projects. Additionally, the TDA-SAP process requires all riparian countries to show clear willingness to cooperate before receiving funding (although some international waters projects work on subbasin approaches). Stakeholders noted that this means that projects in particularly needy but conflicted areas are almost impossible to implement, as exemplified by planned GEF projects that were ultimately abandoned in transboundary freshwater management between, respectively, Afghanistan and Pakistan and China and India.

Beyond the international waters focal area, the GEF does not address environmental security in an integrated manner (Ratner 2018). At the beginning of GEF-7, an environmental security impact program was proposed that would perform "preventative action that enhances environmental and water security at both national and regional levels," focusing on enhancing global environmental benefits in areas where conflict could be exacerbated by natural resource scarcity (GEF 2017a). The program was eventually dropped from the final programming directions, likely due to having too strong a focus on political dimensions and a perception that it fell outside the GEF's environmental focus. However, the GEF-7 Programming Directions do mention environmental security in many places, linked to the water-food-energy nexus highlighted in the international waters and climate change focal areas.

In the GEF-8 Programming Directions, the section on the climate change focal area discusses using renewable energy to power energy efficiency for water purification. It also notes the importance, starting in GEF-6, of the water-energy-food nexus as a cross-cutting framework. It does not, however, mention the need to manage water use in certain water-intensive mitigation activities such as afforestation/reforestation.

LDCF and SCCF work on climate change adaptation is closely aligned with the water security dimension of mitigating the impacts of natural hazards. As discussed earlier, a large portion of climate change adaptation work relates to mitigating the impact of water-related extreme events, especially flood and drought. The LDCF and SCCF strategies, written in the GEF programming strategies on

adaptation which align with the GEF replenishments, reflect this importance (GEF 2018b, 2022b).

The latest adaptation strategy points out that 55 percent of LDCF funding in least developed countries has supported the water sector, and 43 percent of funding has done so in the SCCF (GEF 2022b). Water is one of the major themes of the strategy, noting that "freshwater quality and quantity will be an important aspect of the GEF's adaptation program via integrated water resources management interventions" (GEF 2022b, 20) including support for water storage, conservation, and access. Supporting national adaptation plans and national adaptation programs of action (NAPAs) are critical for the LDCF and the SCCF; and these plans often prioritize water through disaster risk management, climate information systems, and early warning systems (GEF 2018b).

Within the GEF-8 Results Measurement Framework, water security is most represented through the global environmental benefit indicators linked with international waters and land degradation. As with the programming directions, the clearest connection with water security themes in the GEF-8 GEF Results Measurement Framework is through the global environmental benefit most often achieved through international waters projects, strengthening transboundary water management" (GEF 2022c). The core indicator "shared water ecosystems under new or improved cooperative management" makes clear reference to freshwater systems and projects.

In the land degradation focal area, discussion of sustainably managing and restoring land—and its indicator area of land and ecosystems under restoration—references restoration practices on agricultural lands that "enhance soil and water conservation, erosion control and groundwater recharge" (GEF 2022c, 16); all of these relate to water security dimensions within the scope of their connection to agriculture. Restoration of wetlands, some of which are fresh water, is included as a subindicator in the framework. Additionally, the indicator area of landscapes under sustainable land management in production systems aims for managing soil, water, and air in a sustainable manner.

The framework contains no language related to protection of aquatic ecosystems within the biodiversity global environmental benefits or to water contamination in the chemicals and waste global environmental benefits. The global environmental benefit most often achieved through the biodiversity focal area, conserving and sustainably using biodiversity, focuses on terrestrial and marine protected areas with no specific reference to inland water, riparian, or aquatic ecosystems. Additionally, although the GEF does have projects that address freshwater fisheries, mentions of fisheries within the results framework are all nested within indicators specifically addressing marine protected areas. Some GEF Agencies reported receiving funding for freshwater or aquatic ecosystem work with biodiversity funding, although they also noted that it can be difficult to align such projects to the indicators needed. Research has shown that freshwater ecosystems are commonly secondary or unaddressed components of terrestrial protection work and that terrestrial protection frameworks can be inadequate for addressing freshwater ecosystem processes (Higgins et al. 2021).

Moreover, as freshwater ecosystems depend on quality, quantity, and timing of water often governed by distant activities in the watershed, they are very difficult to protect and conserve. Consequently, even though some 15 percent of global inland waters are covered by protected areas (Bastin et al. 2019), they remain underrepresented in conservation (van Rees et al. 2020).

The global environmental benefits most often achieved through the chemicals and waste focal area include indicators to measure reductions in persistent organic pollutants in the air, but do not include any indicators explicitly measuring the release of chemicals of concern into water.

The GEF adaptation results framework includes several indicators that directly mention aspects of water security.

Within the subindicators included in the GEF-8 adaptation results framework, it is clear that water security plays a big role in the LDCF's and the SCCF's approach to climate change adaptation (GEF 2022b). Subindicators linked to water security include number of direct beneficiaries from new or improved climate information services, including early warning systems (which include water-based shocks such as flood and drought); area of fresh water, length of riverbank and stormwater drainage, number of irrigation or water structures and fishery or aquaculture ponds managed for climate resilience; and number of people trained or with awareness raised on Hydromet and disaster risk management agencies. Of the nine main sectors adaptation projects can cover, one is water resource management.

Stakeholders note a gap in the GEF's ability to improve domestic water security holistically, given the specific dimensions of the focal areas. As noted earlier in this chapter, international waters is the only focal area with a strategy that addresses water security holistically, but it does so only at the transboundary level. Other focal areas address specific dimensions of water security but rarely deal with all dimensions within interventions. Stakeholders noted that this can lead to difficulties in obtaining GEF funding for water security–focused interventions that are not part of a transboundary watershed or aquifer, such as protection of biodiversity for inland aquatic ecosystems, wastewater projects, or watershed protection (when not focused on mitigating the impacts of climate change).

However, many note that other funders, such as multilateral banks or bilateral development agencies, do fund such interventions. Multifocal area, multitrust fund, and integrated programs are other potential ways in which countries could address water security in a more holistic manner.

Overall, the GEF-8 focal area strategies promote key opportunities to improve water security as identified in the evaluation's theory of change, although some are more emphasized than others. In general, the policy documents for GEF-8 address and promote the key opportunities identified for the GEF to improve water security through the theory of change (table 2.2). Although the discussions of such opportunities in the programming directions do not always mention their application in relation to water security, they still provide an indication of the types of opportunities on which each focal area focuses.

The GEF-8 Programming Directions include detailed discussions on activities to improve knowledge and build awareness, develop human capacity, demonstrate new solutions, and include women in activities (with less discussion of including other groups such as civil society, academia, and indigenous peoples). Improving governance and decision-making is also a key activity discussed in the programming directions, though there is not much discussion of including a wider range of stakeholders in decision-making processes. Mentions of improving financing opportunities are discussed in relation to the private sector strategy.

2.4 Water security in the integrated programs

The GEF's multifocal area and integrated programs have primarily integrated water security through coastal marine protection, food security, and cities programs. The GEF has moved toward more integrated programming across its focal areas, allocating increasing funding to programs that use an integrated approach, from the GEF-6 integrated approach pilots to the GEF-7 impact programs and the GEF-8 integrated programs.

The GEF-5 Ridge-to-Reef program implemented in small island developing states (SIDS) integrated biodiversity, international waters, and land degradation (and, to a lesser extent, climate change) funding. This multifocal area program integrated freshwater security themes with marine water protection by considering the connection between watershed management in upland watersheds of freshwater bodies and coastal marine ecosystems. This type of work—mostly focused

Table 2.2 Opportunities for improving water security as captured in the theory of change and addressed in the GEF-8 Programming Directions and LDCF/SCCF adaptation strategy

Intervention	Discussion in the GEF-8 Programming Directions and adaptation strategy
Involve and exchange with local stakeholders	• The GEF-8 Programming Directions emphasize the importance of including women, identifying gender needs, and promoting gender mainstreaming in projects. It also promotes private sector involvement. • Some focal areas and integrated programs specify involvement with stakeholders within their area of activities. For example, biodiversity highlights indigenous communities, and the climate adaptation strategy includes youth, civil society organizations, and indigenous peoples and local communities.
Gather and generate knowledge and improve awareness	• All focal areas and integrated programming policies capture and promote an improved knowledge base and building awareness; virtually all underscore the need for filling information gaps. • Biodiversity and climate change also incorporate wording to improve knowledge and awareness. • The international waters program has supported IW:LEARN (the International Waters Learning Exchange and Resource Network) specifically for water projects. • The climate adaptation strategy particularly highlights early warning and climate information systems.
Improve and create governance mechanisms	• All the focal areas address governance and decision-making around their specific area of focus. • International waters policies address the promotion of improved governance and decision-making in transboundary waters, although the wording does not explicitly promote stakeholder involvement in that area. • Other focal areas also significantly address governance and decision-making.
Create and enhance financing opportunities	• All focal areas promote development of financial instruments, including leveraging national-level funding and private capital through the promotion of natural capital accounting, green procurement practices, financing tools, and blended finance to reduce risk for private sector investment. • Focal areas and integrated programs tend to identify specific areas of financing that may be useful for their targeted approaches that involve the private sector. • Climate change also highlights climate financing for women's organizations and indigenous peoples and local communities. The climate adaptation strategy targets nature funds for support.
Demonstrate solutions	• Focal areas promote new solutions and technologies that can be applied to their specific area of focus, but these will not always have an impact on water security. • International waters policies significantly address the demonstration of new solutions and new technologies, as does the food systems impact program for water conservation. • Climate change and the climate adaptation strategy highlight nature-based solutions, and climate change adaptation support flood protection and irrigation infrastructure. • Biodiversity promotes new production mechanisms that benefit ecosystems. • All impact programs encourage innovation and cost-effective technologies that deliver multiple benefits.

Sources: GEF 2022a, 2022b.

on wastewater treatment to protect coastal marine ecosystems—is common in the international waters focal area as well.

Since the integrated approach pilots and impact programs began in GEF-6, initiatives related to environmental management of cities and food security have most integrated water security themes. Sustainable Cities Impact Program projects have focused on water security through flood prevention and wastewater treatment; Impact Program for Food Systems, Land Use and Restoration projects deal with water security as the land degradation focal area does—through the lens of agriculture and resilience to drought. The GEF-7

Sustainable Forest Management Impact Program on Dryland Sustainable Landscapes also deals with water security from the standpoint of drought resilience for agriculture and focuses on biodiversity protection in arid landscapes.

Within the GEF-6 and GEF-7 cities and food security impact programs, some child projects integrate water security topics more than others. In the Sustainable Cities Impact Program, the Senegal child project (GEF ID 9123) implemented by the World Bank and the United Nations Industrial Development Organization (UNIDO) aims to reduce flood risks in periurban regions of Dakar by mainstreaming flood risk in urban planning. The World Bank is cofinancing investments in stormwater drainage infrastructure. No other child project documents from the GEF-6 cities integrated approach pilots discuss water security themes as a focus.

Water security themes are much more common in the GEF-7 cities impact program child projects. Project documents for at least 8 of the 10 child projects mention wastewater treatment or flood prevention. The India child project is one clear example (GEF ID 10484). Implemented by UNEP and the Asian Development Bank (ADB), it focuses on nature-based solutions, including restoration of a lake with riparian vegetation to increase its ability to soak up flood waters, sparing nearby urban areas inundation. ADB is cofinancing stormwater drainage infrastructure. The GEF-8 Sustainable Cities Integrated Program plans similar water-related activities to improve water and urban food systems, primarily through multistakeholder land use planning and governance.

In the GEF-6 Integrated Approach Program on Food Security, drought and water for agriculture are key topics. For example, the Kenya child project (GEF ID 9139) implemented by IFAD aims to set up a water fund to obtain funding from public and private sources as a payment for ecosystem services scheme to perform agricultural watershed protection/sustainable land management activities in the watershed where the city of Nairobi receives its water supply. Under the GEF-7 Impact Program for Food Systems, Land Use and Restoration, the Uzbekistan child project (GEF ID 10601) implemented by FAO focuses on planting heat- and drought-tolerant winter wheat varieties. The Vietnam child project (GEF ID 10245), also implemented by FAO, supports watershed planning to bring fishers and upstream aquaculture farmers together to discuss fertilizer runoff control. Agency stakeholders note that water security is a secondary focus of many projects in these programs; the primary focus is on food security and land degradation–related global environmental benefits, so any water activities must be couched in those terms.

The GEF-8 Food Systems Integrated Program has a similar focus, planning to ensure access to clean water supplies, build sustainable farming systems by improving watershed management, and develop payment for environmental services schemes. The Ecosystem Restoration Integrated Program, which has similar themes, is more focused on drought resilience and plans payment for environmental services schemes.

Some stakeholders believe the lack of a primary focus on water security in these food security programs is a missed opportunity to address the topic more holistically rather than conceiving it narrowly as an input for agriculture. For example, themes such as upper watershed ecosystem service protection, control of pesticide and fertilizer runoff into aquatic ecosystems, and multiple-use water systems could be mainstreamed across the programs.

2.5 GEF Agency water security strategies

GEF Agencies tend to view water security through the lens of their specific mandates and expertise. Multilateral development banks generally approach the water agenda from a developmental perspective, emphasizing human

well-being through WASH, economic development (irrigation, power, transport, etc.), and hazards and climate change (mitigating effects of extreme events). The environment is generally integrated from the perspective of how ecosystem services can be sustained to assist development objectives.

Increasingly, however, strategies of the multilateral development banks are promoting environmental protection and conservation of ecosystems for environmental needs and objectives (table 3.3). For example, ADB's "Strategy 2030 Water Sector Directional Guide" is intended to "address water security challenges in the region" and includes the "water needs of the environment" alongside development objectives (ADB 2022 viii, ix). It also assesses "environmental security" as part of its water security diagnostic. However, a recent evaluation of ADB's water sector work found that it is implemented in a "fragmented manner rather than the integrated fashion needed" to support member countries' needs (ADB Independent Evaluation 2022, xiv).

The World Bank, which administers the multidonor Global Water Security and Sanitation Partnership, trust fund, covers a broad range of water security topics through its global practices. The Water Global Practice and the Global Water Security and Sanitation Partnership have created a comprehensive water security diagnostic framework and have conducted deep-dive diagnostics on water security in specific countries and regions—albeit with a focus on ensuring sufficient water for development needs. Other Bank global practices focus on hydropower, wastewater, drought, and climate change adaptation.

AfDB and the Inter-American Development Bank (IDB) similarly deal with water security from a development perspective, through water and sanitation, drought and flood resilience, water supply and storage, and financial mechanisms for water infrastructure funding.

UN Agencies, like the GEF focal areas, have guidance and strategies in relation to specific dimensions and topics of water security that relate to their environmental focus or areas of expertise. For example, FAO and IFAD tend to focus on water security as it relates to agriculture, as do the GEF land degradation focal area and food systems–related programs. They focus on water efficiency in agriculture and irrigation in rural areas, which tend to be in great demand from beneficiary countries (FAO 2023; IFAD IOE 2014).

The FAO evaluation office found that FAO lacks a coherent approach to water resource management, which is detrimental to its role as the custodian of SDG 6.4 (FAO 2023). UNDP, through its Water and Ocean Governance Programme, primarily addresses sanitation and water supply, wastewater, flooding, and water scarcity. UNIDO focuses on wastewater and water efficiency and quality in industry.

UNEP, in its Freshwater Strategy 2017–2021, emphasizes "protecting, managing and restoring freshwater in support of human well-being and sustainable development" (UNEP 2021, 2). However, UNEP created a more holistic definition of water security and targets WASH, water quality, and pollution control as well as IWRM.

Conservation International, the International Union for the Conservation of Nature (IUCN), and the World Wildlife Fund (WWF) tend to focus on water security in relation to conservation and protection of freshwater ecosystems; like the GEF biodiversity focal area, they incorporate the approach that healthy ecosystems provide services upon which many of the most marginalized and vulnerable communities depend. WWF lists "water scarcity" as a key threat and notes that freshwater habitats are in worse condition globally than forests, grasslands, or coastal systems. WWF has been very active in advancing Corporate Water Stewardship to bring the private sector into IWRM. IUCN identifies freshwater and water security as a key theme and, under its IUCN Nature 2030 Programme, cites the objective of ensuring that freshwater systems support and sustain biodiversity and human needs around the

Table 3.3 Overview of GEF Agency water security–related strategies and priorities

GEF Agency	Agency documents relating to water security	Main water security-related areas of focus	Notes
Development banks			
AfDB	Water Strategy 2021–2025: Towards a Water Secure Africa	Water and sanitation, agriculture, fisheries, ecosystems	Emphasis and focus on overall poverty reduction
ADB	• Strategy 2030 Water Sector Directional Guide • Pacific Water Resilience Hub	Water sector improvement, water and sanitation services, climate change adaptation, water for agriculture	Asian Water Development Outlook 2020 quantifies water security at a country level
Inter-American Development Bank	• Water Security in Latin America and the Caribbean Strategy and World Plan • Water, Sanitation and Solid Waste Sector Framework Document	Water and sanitation, climate change adaptation, financial instruments, wastewater	Includes a focus on financial mechanisms such as AquaFund and water funds
World Bank	• Water Security Diagnostic Framework • A New Paradigm for Water Storage • Uncharted Waters: The New Economics of Water Scarcity and Variability • Sink or Swim: Water Security for All • Internal position paper on transboundary waters	Various, including country-level diagnostics, climate change adaptation, water storage/hydropower, supply, agriculture, wastewater	The Global Water Security and Sanitation Partnership trust fund ($22 billion portfolio) carries out analytical work related to water security
UN agency			
FAO	• Strategic Framework 2022–2031 • Coping with Water Scarcity: An Action Framework for Agriculture and Food Security	Agriculture, monitoring, fisheries	Custodian of SDG 6.4; manages AQUASTAT global water information system
IFAD	• Scaling Irrigation Systems • Water Harvesting Systems for Smallholder Producers: Tips for Selection and Design	Agriculture, especially irrigation, rural water supply	Decided against a separate water strategy but has integrated it into broader strategic documents
UNDP	• Community Water Security • Water and Ocean Governance Programme	Transboundary watershed management, water and sanitation at the community level	Manages GoAL WaSH (Governance, Advocacy and Leadership in Water, Sanitation and Hygiene) programme and UNDP-SIWI (Stockholm International Water Institute) Water Governance Facility
UNEP	UN Environment's Freshwater Strategy 2017-2021	Freshwater ecosystems, water quality and pollution, climate change adaptation	Created widely used water security definition
UNIDO		Wastewater, industry water efficiency and quality	Directly addresses water consumption and water pollution
Environmental NGO			
Conservation International	• Corporate Water Stewardship and the Case for Green Infrastructure • Implementing Green-Gray Infrastructure • WASH in Watersheds Program	Nature-based solutions/green infrastructure, freshwater ecosystems; integrating ecosystem health with local community WASH	

Note: GEF Agencies with at least 2 percent of water security evaluation portfolio are shown.

globe by 2030, and has a specific focus on transboundary water diplomacy.

2.6 Water security in multilateral environmental conventions

The main GEF-supported environmental conventions mostly address water security narrowly through their specific focuses, analogous to the approach taken by the respective GEF focal areas. The **United Nations Framework Convention on Climate Change** (UNFCCC) acknowledges that water and climate change are inextricably linked; and in general, the convention approaches water security from the standpoint of adaptation and loss and damages due to extreme events (including through the breakthrough agreement to establish a loss and damage fund; UNFCCC 2022). It supports the development of national adaptation plans that address water scarcity, flooding, and drought resilience.

The report of the UNFCCC's 27th Conference of the Parties (COP) notes that, of the nine reporting sectors, water and agriculture lead adaptation needs, with water distribution infrastructure, water harvesting, and irrigation being priorities (UNFCCC 2021). The report further calls for international development assistance to promote risk reduction and foster climate resilience. Additionally, the Early Warnings for All (EW4All) initiative was advanced at COP27 with the intent of increasing early warning services globally and better responding to disasters, including water-related disasters. More recently, at the UN 2023 Water Conference, the UNFCCC promoted collaboration to address the water-climate nexus, and hosted the Enhancing collaborative efforts toward knowledge and innovation for action in the water-climate nexus side event.

The **Convention on Biological Diversity** (CBD) acknowledges the link to water through sustaining water-related ecosystem services from rivers, lakes, and wetlands. The convention has strengthened its relevance to water security objectives through the goals and targets of the Kunming-Montreal Global Biodiversity Framework as agreed upon at COP15 (CBD 2022). Several targets of the framework address biodiversity of freshwater ecosystems explicitly. Notably, target 2 aims to have 30 percent of degraded terrestrial, inland water, and marine and coastal ecosystems under effective restoration by 2030; and target 3 aims to effectively conserve the same percentage of the same areas, also by 2030. Target 11 looks to restore ecosystem functions and services "such as the regulation of air, water and climate, soil health…protection from natural hazards and disasters…" (CBD 2022).

The **United Nations Convention to Combat Desertificatio**n (UNCCD) directly addresses water security through its focus on reducing land degradation and the effects of drought. In particular, strategic objective 3 seeks "to mitigate, adapt to, and manage the effects of drought in order to enhance resilience of vulnerable populations and ecosystems" (UNCCD 2017, 8). This was emphasized in the most recent decisions of COP15, with the Results Framework for 2022–25 promoting actions to reduce the effects of drought, improve preparedness and resilience to droughts, and respond to the needs of vulnerable communities (UNCCD 2017). Following COP14, the UNCCD developed a Drought Toolbox to help countries develop their drought mitigation plans; it emphasizes monitoring and early warning, vulnerability and risk assessment, and developing risk mitigation measures.

The **Stockholm Convention on Persistent Organic Pollutants** was created to reduce "POPs [persistent organic pollutants] which are transported through air, water and migratory species and accumulate in terrestrial and aquatic ecosystems"; it is therefore fundamentally linked to water security objectives for improving water quality for humans and the aquatic ecosystem. Stockholm Convention COPs have noted that the management of chemicals and waste is inextricably linked

to attainment of the 2030 Agenda for Sustainable Development and its objectives of cleaner air, water, and soil (Stockholm Convention on Persistent Organic Pollutants 2017). They also have underscored the importance of safe drinking water—especially for children, who are particularly vulnerable to toxins (Stockholm Convention on Persistent Organic Pollutants 2017). In recent COPs, increasing attention has been given to monitoring sulfluramid and perfluorooctane sulfonic acid in soil, groundwater, and surface water. COP9 also specifically noted the alignment between strategies for the international waters and chemicals and waste focal areas in relation to marine plastics and microplastics, but did not highlight the relation to freshwater pollutants (Stockholm Convention on Persistent Organic Pollutants 2019).

The **Minamata Convention on Mercury** was created to protect human health and the environment from emissions and releases of mercury and mercury compounds. It promotes the most effective techniques to prevent or reduce emissions of mercury to air, water, and land. The decisions of the COP do not specifically address water or the aquatic environment; however, they are related to mitigating releases of mercury into the environment, which would result in improved water quality, a water security objective.

Other multilateral and regional frameworks and agreements supported by the GEF include elements of water security. The Sendai Framework for Disaster Risk Reduction contains a significant discussion on mitigating water-related natural disasters (UNDRR 2015). As Merla (2002) notes, the international waters focal area contributes to several fresh water–related frameworks and agreements through its programming as well, including the Convention on Non-Navigational Uses of International Watercourses, the Ramsar Convention on Wetlands of International Importance, and many regional agreements between countries to manage transboundary watersheds and aquifers.

3 Findings

3.1 Relevance: meeting stakeholders' water security priorities

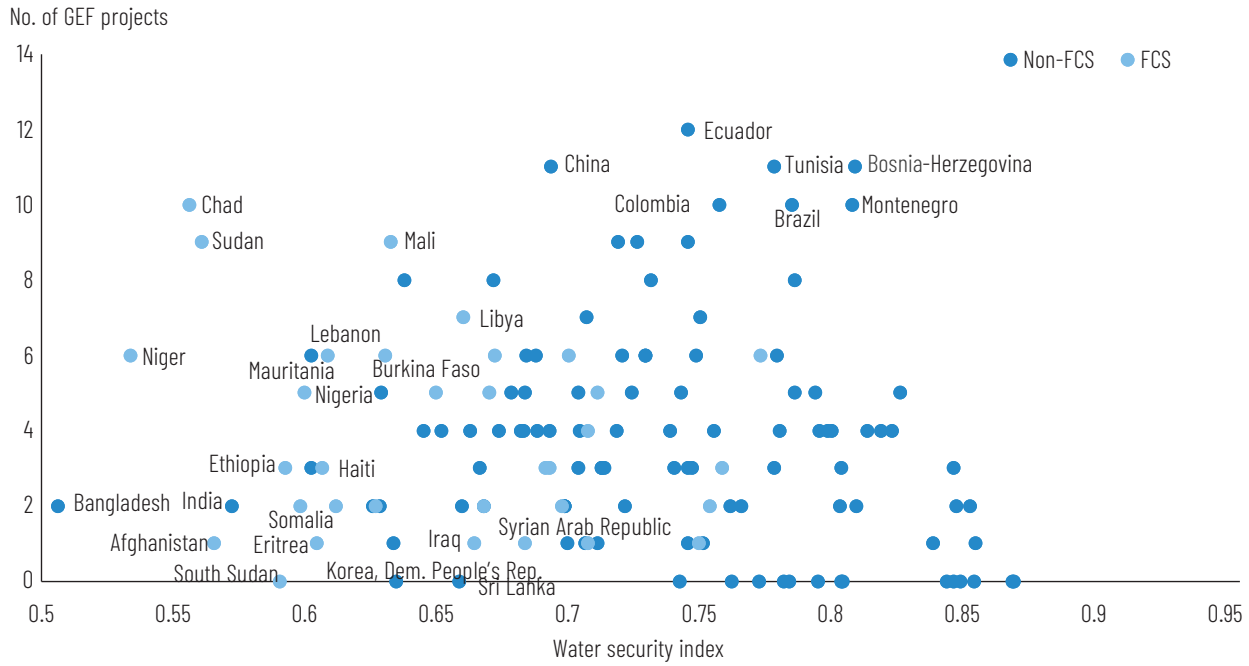
The GEF has more projects with a water security focus in some areas with especially low water security (Sahel region of Africa) than others (South Asia). A comparison of the locations of GEF projects included in this evaluation's portfolio against a global index of water security (Gain, Giupponi, and Wada 2016)[1] finds that the GEF has projects in almost all countries where water security is low and the need is the greatest (figure 3.1).

The two regions that stand out for having the lowest water security are the Sahel region of Africa and South Asia. The GEF has many projects with a water security focus in Sahel countries and other dry eastern African countries with low water security, such as Burkina Faso, Chad, Libya, Mali, Niger, and Sudan. However, it is less well represented in South Asian countries with low water security, such as Afghanistan, Bangladesh, and India.

The GEF has a large number of water security–focused projects in the comparatively more water-secure regions of the Balkans and South America; these regions do have some subnational areas that are more water insecure than others. Countries affected by fragile and conflict situations tend to be more water insecure, which in some cases can affect the GEF's ability to design and implement projects. In some cases, scarce natural resources, including water, can exacerbate conflict.

[1] Gain, Giupponi, and Wada include four indicators for their water security index: availability, accessibility to services, safety and quality, and management. Some countries had no data availability for certain indicators; for these, Gain, Giupponi, and Wada used hot-deck imputation to replace values using a similar unit. The GEF IEO evaluation team used zonal statistics to calculate an average water security index value for each country.

Figure 3.1 Comparison of GEF-eligible countries' water security index with locations of GEF projects included in the evaluation portfolio



Note: FCS = fragile and conflict-affected situations. A lower water security index implies worse water security. GEF projects in the evaluation portfolio were implemented in South Sudan before the country gained independence.

Sources: Gain, Giupponi and Wada 2016; and project documents.

GEF projects that focused on water security met many of the water security needs of stakeholders. The portfolio review of completed GEF projects found that 44 percent of projects discussed host country water security strategies, plans, or laws in their project design documents. In contrast, 81 percent of ongoing projects discussed water strategies, with an increase in consideration between closed projects from GEF-4 and GEF-5 to ongoing projects in GEF-6 and GEF-7. Of the ongoing projects that discussed host country water strategies, almost half (48 percent) specifically described how their projects would address those strategies. In the countries where case studies were carried out, national government officials with knowledge of the projects generally agreed that the projects supported their strategies.

Bolivia has a National Watershed Plan, which demonstrates national prioritization of watershed-level planning, a priority that dovetails with the international waters projects in the country focusing on management of three major watersheds: Amazon, Plata, and the Titicaca-Desaguadero-Poopó-Salar de Coipasa highlands lakes system. In **Morocco**, the MedProgramme Water Security child project's work on integrated coastal zone planning, including an assessment of coastal aquifers, will support the country's Coastal Law, which requires coastal management plans. **Burundi**'s Water Strategy and Action Plan includes measures on improving water quality and erosion control in key basins, including Lake Tanganyika, a major component of several ongoing case study projects in the country.

As European Union candidate countries, **Albania**, **Bosnia-Herzegovina**, and **Montenegro** prioritize the alignment of their water laws to the European Union's Water Framework Directive. The Implementation of the SAP of the Dinaric Karst Aquifer System: Improving Groundwater Governance and Sustainability of Related Ecosystems project (DIKTAS II; GEF ID 9919), implemented by UNDP, aims to support such alignment as a co-benefit of managing the transboundary aquifer system.

At the country and local levels, water security has often been perceived as a major concern for society and ecosystems. Water was at the top of the development agenda for all stakeholders in most of the countries visited for the case studies, from representatives of national governments down to community members. Communities, especially in arid or semiarid areas such as Sudan, Morocco, and the Bolivian highlands, drew a stark connection between water availability and their ability to live and eat. They prioritized access to water for drinking and well-being as well as for agriculture.

More humid (as well as semiarid) countries, such as Burundi, prioritized preventing erosion and sedimentation which causes dangerous flooding and has affected agricultural productivity. At the local and national scales, governments prioritized management of these same concerns. In many countries—including Albania, Bosnia-Herzegovina, Montenegro, Morocco, and Tunisia—monitoring, especially of groundwater, was a key concern, given the scarcity of data on aquifers. Local organizations, NGOs, and civil society, mentioned preservation of riparian and freshwater aquatic ecosystems as a priority in many case study areas.

Transboundary management and data sharing were also noted by governments as critical, especially in the DIKTAS countries, which share many watersheds and aquifers with their neighbors; and in Sudan, which shares the Nile River and transboundary aquifers with several neighbors in an arid region.

Within communities, stakeholders greatly appreciated any projects that increased their access to and ability to store fresh water. In Bolivia, community members were especially grateful for small-scale irrigation networks and water harvesting infrastructure installed by the IDB-implemented Conservation and Sustainable Use of Biodiversity and Land in Andean Vertical Ecosystems project (EVAs; GEF ID 3831). In Sudan, rural communities were most appreciative of solar water pumps installed by the Implementing NAPA Priority Interventions to Build Resilience in the Agriculture and Water Sectors to the Adverse Impacts of Climate Change project (GEF ID 3430) implemented by UNDP, which allowed them to irrigate in dry periods and cost less than diesel pumps (the project did install some diesel pumps as well).

Stakeholders expressed a desire for more concrete, on-the-ground activities by international waters projects. In the countries visited, stakeholders at all levels noted the importance of international waters projects' work to improve transboundary collaboration, data sharing, and management. However, stakeholders frequently mentioned that they hoped for more concrete activities to follow up on the strategy and governance–heavy TDA-SAP process. This was especially true in transboundary areas that have already had several international waters projects, such as Bosnia-Herzegovina, Montenegro (two projects on DIKTAS and others on transboundary rivers), Bolivia (in the Plata River basin), Morocco, and Tunisia (several Mediterranean Sea programs). Climate change adaptation and land degradation case study projects were more well known at the local level, in part because they involved more on-the-ground activities.

GEF projects often raise awareness on emerging water security issues, shifting government priorities. The case studies highlighted that GEF projects raised awareness for water security–related issues that stakeholders had not previously prioritized. This was the case in Burundi and Sudan, where the UNDP-implemented Mainstreaming Groundwater Considerations into the Integrated

Management of the Nile River Basin project (GEF ID 3321) introduced many stakeholders to the importance of monitoring groundwater resources and their effect on surface water availability. Surface water was a much greater priority at the time of the project's implementation for key water stakeholders such as the Nile Basin Initiative; today, the idea of conjunctive groundwater-surface water management is a priority theme.

The UNDP-implemented Protection and Sustainable Use of the Dinaric Karst Aquifer System project (DIKTAS I; GEF ID 3690) also focused government attention on the importance of the karstic groundwater ecosystem, as water pollution infiltrating into groundwater in one country can contaminate springs used for drinking water in another. Similarly, in Burundi, the World Bank's Watershed Approach to Sustainable Coffee Production in Burundi (GEF ID 4631) highlighted the importance of treating water used in coffee washing, leading to broader adoption of the process in the country's coffee sector.

International waters projects' focus on monitoring and data sharing was appreciated in almost all case study countries, especially with regard to data-poor subjects such as groundwater or areas where disagreements can occur. In the DIKTAS region, governments noted that data on groundwater were usually outdated and scarce, so pilot monitoring networks proposed in the upcoming DIKTAS II project were especially anticipated. Similarly, the UNEP-implemented pilots of the Med-Programme's Mediterranean Coastal Zones: Managing the Water-Food-Energy and Ecosystems Nexus project (GEF ID 9685) were designed to demonstrate technology such as minimizing water use in renewable energy, water flow-predicting artificial intelligence and sensors, and other tools for water monitoring.

Within national governments, water is often split among the jurisdictions of several ministries, many of which have limited knowledge of the GEF. Based on findings from the case studies, GEF focal points tend to be in environmental ministries or departments.[2] Such entities generally do not have major jurisdiction over water other than its intersections with the environment and sometimes struggled to involve water ministries in GEF projects. On the other hand, ministries with greater jurisdiction over water tend to take a sectoral view—focusing, for example, on hydropower and energy production (especially in the DIKTAS countries), agriculture, or potable water and water treatment—rather than prioritizing environmental flows and water for ecosystems. They tended to look for large water infrastructure support from development partners, such as improving hydropower, wastewater treatment, or large-scale irrigation.

3.2 Coherence of GEF projects with related initiatives

Beyond supporting transboundary water policy coherence, some international waters projects aim to improve water policy coherence across ministries within countries. One of the main goals of the international waters focal area is to align water policy across countries to improve transboundary management. Some projects go further and try to improve water policy coherence among ministries and levels of government within countries.

The most prominent example within the case studies is the DIKTAS project. The DIKTAS I project set up national interministerial committees that included several members of different ministries to help align water policies within as well as between countries. The project's terminal evaluation noted that these committees were one of the success stories of the project—although they were vulnerable to government staff turnover (a common issue cited across case study meetings as

[2] Exceptions existed in Bolivia, which recently named the Ministry of Development Planning as the GEF focal point; and Morocco, where the focal point is within the Sustainable Development Secretariat.

leading to poor institutional memory of GEF knowledge products) and delays in meetings. These factors, combined with a long gap in GEF project funding, has meant that the national interministerial committees have mostly stopped meeting. Albania, however, created a Water Resources Management Agency in the interim to lead cross-cutting water management in the country. DIKTAS II plans to coordinate and work with the national interministerial committees again.

Projects in the evaluation portfolio successfully identified other water security–related initiatives at project design but rarely had close collaboration with such initiatives during implementation. In the portfolio review of completed projects with a prominent focus on water security, 17 percent of projects were found to have interacted with another donor-funded initiative. Sixty-three percent of ongoing projects discussed or listed other initiatives in the region dealing with water security; of those, 39 percent described specific plans for collaboration. As mentioned previously, completed case study projects often built on or had other donor initiatives later build on their work in project areas and countries. Close coordination with other initiatives during implementation was nevertheless rare, except among projects of the same program.

In Sudan, Sudanese research institutes noted they had water-related initiatives going on at the same time and in the same areas as the NAPA project but were unaware of the project and did not collaborate with it. Similarly, UNICEF has work in the same areas as the GEF's ongoing Nile groundwater case study project but reported no collaboration.

The GEF's Bolivia EVAs project planned to coordinate closely with the IDB-funded Direct Support for the Creation of Rural Agricultural Initiatives project, which was working on similar issues and geographies but focused directly on agricultural production (IDB implemented the EVAs project too). However, the terminal evaluation notes that such collaboration ultimately did not occur.

In contrast, the MedProgramme child projects have clear plans for collaboration. The Water Security and Nexus child projects are both just beginning implementation in the Tangiers-Tetouan-Al Hoceima coastal region; they are already coordinating stakeholder engagement activities and activity planning.

National government officials and GEF focal points were found to be best placed to perform the difficult task of coordinating water security–related activities within their countries. Project and national government staff noted that coordinating ongoing projects to ensure collaboration is difficult, given the differing timelines and goals of funding organizations if there is no entity charged with overseeing this coordination. Case study countries where national governments, rather than the projects themselves, took the lead on this task resulted in the best coordination.

In Bolivia, the Ministry of Development Planning has become the GEF focal point; it sees its mandate as coordinating development projects across all sectors and ensuring they support the country's Economic and Social Development Plan. It monitors development projects across several ministries, including the Ministry of Environment and Water and the Ministry of Foreign Relations, which lead most GEF projects.

In Morocco, the Ministry of Water requested that the UNESCO Intergovernmental Hydrological Programme (UNESCO-IHP)—the executing agency for the Water Security MedProgramme child project—revise the planned assessment of the Rkhiss-Nekor aquifer to exclude a hydrogeological characterization, as this had already been done under the auspices of a project funded by the Agence Française de Développement. Montenegrin officials similarly noted that a previous GEF program—the Strategic Partnership for the Mediterranean Large Marine Ecosystem: Regional Component (GEF ID 2600), jointly implemented by UNEP and UNIDO—had created a management plan for the Buna-Bojana River area, and thus that the Water

Security project should not replicate this plan as part of its work on the coastal aquifer in the same geography.

3.3 Stakeholder engagement: women, indigenous peoples, and other vulnerable groups

Vulnerable and marginalized groups, including women, often have low water security. Cultural norms in many parts of the world mean that different genders interact differently with water. In many countries, women take on the task of collecting water, making often long trips (especially in water-scarce areas) to obtain water for household activities. Studies have shown that assumption of this role makes women more at risk not only from a personal safety standpoint but also in terms of exposure to contaminated water and of sustaining musculoskeletal trauma (Pouramin, Nagabhatia, and Miletto 2020).

Vulnerable groups—including women and indigenous peoples in some areas—are often the most water insecure due to limited access to water resources and thus the first to face the water-related consequences of climate change (UNDP 2021). This can be due to poverty in general and its manifestations—living in flood-prone areas or near contaminated water, and having less access to a secure and clean water supply. Indigenous peoples often have traditional and long-term knowledge of the water resources in their area, making them key to a better understanding of water security in their local areas, as recognized in this evaluation's theory of change.

International waters projects generally limit stakeholder engagement in project design to one or two national government representatives per country. The evaluation portfolio review showed that 59 percent of ongoing projects with a focus on water security discussed how stakeholders were engaged in project design, usually through stakeholder workshops, interviews, or focus groups, to discuss potential project activities. The local stakeholders most commonly included in the design phase were local authorities/government (47 percent), local communities (27 percent), and NGOs (23 percent).

Most international waters projects included in the case studies—in contrast to projects in the System for Transparent Allocation of Resources (STAR) focal areas of biodiversity, climate change, and land degradation—were prepared by GEF Agencies rather than national governments. Once Agencies had an idea for a project, they approached national government entities for review and approval. The design processes were led by Agencies, which sent drafts of design documents to national government stakeholders in one or two ministries (usually the foreign affairs ministries or ministries housing GEF focal points) and invited them to workshops to prepare the project. Local stakeholders were rarely involved in design, and most local stakeholders interviewed for case studies were unaware of upcoming international waters projects, even when pilot projects were focused on their region—such as the Buna-Bojana delta region on the border of Albania-Montenegro, a focus of the UNEP-implemented MedProgramme child project Mediterranean Coastal Zones Climate Resilience Water Security and Habitat Protection (GEF ID 9687) or the DIKTAS II project. International waters projects in case studies that did include local pilot activities generally involved local stakeholders once implementation began, however.

Local communities were found to be more involved in the design of land degradation and climate change adaptation projects. The upcoming UNDP-implemented Landscape Restoration for Increased Resilience in Urban and Peri-urban Areas of Bujumbura project (GEF ID 10099), a climate change initiative funded by the LDCF, held community meetings in the design phase. Similarly, the FAO-implemented Programme to Sustainably Manage and Restore Land and Biodiversity in the Guadalquivir Basin (GEF ID 10627), a land degradation initiative,

contracted with a local NGO (PROMETA) in the design phase to carry out focus group discussions with local communities to learn their priorities related to water access and agriculture. These projects are much more focused on water security issues at the local level, and geographical areas of focus tend to be identified during design, making the necessity to involve local actors early on greater than in international waters projects.

Gender considerations were not commonly addressed in completed projects that focused on water security, but they are much more prominent in ongoing projects. Within the evaluation portfolio, 49 percent of completed projects were found to have included women's groups or women individually. Inclusion varied from ensuring that women represented a certain percentage of the beneficiaries, or stakeholders capacitated to working specifically with women's groups.

For example, the Mainstreaming Sustainable Land and Water Management Practices project implemented by IFAD in Jordan (GEF ID 2631) supported women's savings and credit groups through training sessions on sustainable land management activities. However, activities specifically targeting women or considering how water security differed according to gender were rare in completed case study projects. The TDA and SAP documents created by DIKTAS I, for example, do not address gender aspects of water management in the region.

The Bolivia EVAs project, Burundi's sustainable coffee production project, and Sudan's NAPA project were shown to be highly beneficial to women in the communities in which they worked—women interviewed in these communities reported benefiting through improved diet and more consistent food supply from improved water access. The Bolivia and Burundi projects did not target women specifically through their interventions, however. In Sudan, women benefited from targeted microfinance schemes from the NAPA project; these were highly appreciated by interviewees. These completed projects were designed prior to implementation of the GEF's latest Policy on Gender Equality (GEF 2017b), which mandates that all GEF projects elaborate a gender analysis and action plan or equivalent prior to endorsement by the Chief Executive Officer (CEO), although the 2011 Gender Mainstreaming Policy was in effect.

In ongoing projects (many of which were designed after the new policy came into effective), 56 percent conducted a gender analysis in the design phase and 38 percent planned one for implementation; 56 percent had a gender action plan in design and 27 percent planned one for implementation. Thirty-seven percent of ongoing projects mentioned how water security interacted with gender in their project areas in design documents. In ongoing case study projects, common ways of integrating gender included ensuring a certain percentage of beneficiaries were women (sex-disaggregated indicators), ensuring inclusion of women in water decision-making bodies (at the national and local levels), training on gender dimensions of water issues, and targeting women for microfinance opportunities.

For example, UNDP's Enabling Implementation of the Regional SAP for the Rational and Equitable Management of the Nubian Sandstone Aquifer System project (GEF ID 9165) plans a water and gender training course in all involved countries to strengthen local capacity in gender analysis and sex-disaggregated data collection; the Nubian aquifer area includes the Darfur region of Sudan, where water is scarce and women walk long distances to obtain it. The MedProgramme Water Security project will ensure a gender balance in consultation workshops, and the Bolivia Guadalquivir Basin project plans to target women specifically for a small agrobusiness loan competition.

Several ongoing projects struggled to articulate exactly how gender would be integrated into water policy. Most project staff interviewed during the case studies were very aware of the gender inclusion plans their projects would perform generally, noting the existence or plan

for gender analyses and action plans, but had trouble describing exactly what actions the projects would take to incorporate gender into specific activities and policies. Similarly, design documents did not include many details as to how gender would be integrated into planned policy improvements.

Some projects aimed to hire specific consultants or project staff to ensure gender integration across the projects. According to its project documents, DIKTAS II plans to develop "supportive policy and legislative frameworks" to "ensure that the gender perspective is successfully incorporated into national and international water governance, policy and activities" but does not mention exactly what a gender perspective in water policy would look like, focusing instead on ensuring gender representation in activities. In the MedProgramme, a methodology for a coastal climate risk assessment is planned to be conducted with gender aspects, which will then lead to mainstreaming of gender into coastal zone management plans as part of the Water Security child project. It was not clear, however, exactly what aspects of gender will be included in the assessments and how such aspects would then become part of the management plans.

Water security of vulnerable populations was not a common theme, although there were some notable exceptions. Only 4 percent of completed projects were found to include indigenous groups in implementation (generally as beneficiaries), while 11 percent involved youth or youth groups. In ongoing projects, 2 percent of projects involved indigenous groups in project design.

In the completed Adaptation of Nicaragua's Water Supplies to Climate Change project in Nicaragua (GEF ID 4492) implemented by the World Bank, members of the Chorotega ethnic community were included in the group that received compensation under a payment for ecosystem services program for water source protection. The UNDP-implemented Enhancing Conjunctive Management of Surface and Groundwater Resources in Selected Transboundary Aquifers: Case Study for Selected Shared Groundwater Bodies in the Nile Basin project (GEF ID 9912) has engaged with multiple Batwa communities to potentially perform pilot activities in their region. The Bolivia EVAs project worked entirely in the Quechua and Aymara communities, helping to draft land use management bylaws for the local *ayllus*, or traditional government structures.

Most other projects did not specifically focus on indigenous peoples or other groups with the lowest water security. Local stakeholders in Albania and Montenegro noted that Roma migrant communities tend to live in flood-prone regions and have lower water security than other groups, but they are not specifically targeted by the DIKTAS projects. In Sudan, refugees from regional conflict were highly water insecure, but GEF projects do not work specifically with refugees. The Implementation of the Strategic Action Programme to Ensure Integrated and Sustainable Management of the Transboundary Water Resources of the Amazon River Basin Considering Climate Variability and Change project (GEF ID 9770) implemented by UNEP notes that it "doesn't directly target indigenous peoples," despite the large presence of such groups in the Amazon basin, but that they will still benefit from educational, cultural, and early warning system activities.

Limited private sector engagement was seen in the project portfolio. As a public good, water offers limited possibilities for involving private sector actors in development projects to improve water security (ADB Independent Evaluation 2022). However, the private sector is a major water user and there is a clear role for it in enhancing water security through improving resilience against water risks, providing water services, and involvement in multistakeholder water management (Winrock International 2017). Within the evaluation portfolio, only 18 percent of completed projects were found to have involved the private sector in implementation of water security activities. Among ongoing projects, 14 percent involved the private sector in the design phase.

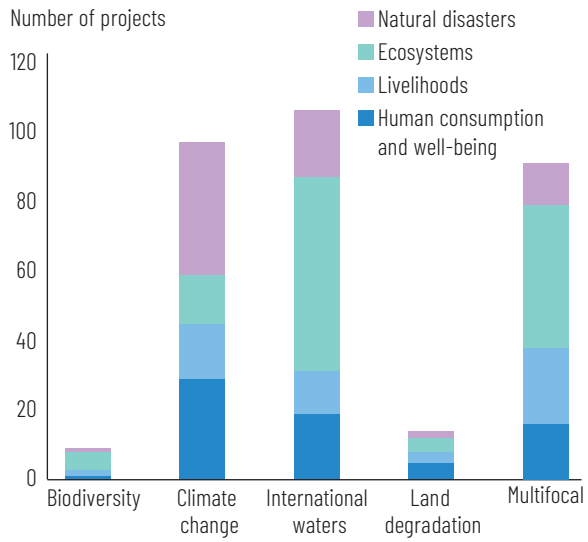
A common way of involving the private sector during implementation was inviting representatives to workshops on integrated water management or other water management topics. A more involved approach was to include companies that created water infrastructure as suppliers; the Implementing Integrated Water Resource and Wastewater Management in Atlantic and Indian Ocean SIDS project (GEF ID 2706), jointly implemented by UNEP and UNDP, engaged companies to import and construct water efficiency equipment such as sensor tap systems and dual-flush valves for rainwater harvesting systems. The Sudan NAPA project engaged a company to provide solar water pumps to communities. Projects dealing with wastewater treatment often involved private sector waste operators too, such as in the World Bank–implemented Shanghai Agricultural and Non-Point Pollution Reduction project (GEF ID 3223).

3.4 Impacts of GEF interventions on water security

Across the portfolio of GEF projects with a focus on water security, the most commonly addressed dimension of water security was that for ecosystems. Across all reviewed completed and ongoing projects, 68 percent included language in their design documents addressing water for ecosystems, while about 40 percent addressed water-related natural hazards and water for human consumption or well-being. Results varied by focal area: the climate change focal area (including projects funded by the LDCF and the SCCF) addressed hazards the most, and biodiversity and international waters addressed ecosystems the most (figure 3.2).

The most common intended outcomes were those related to improved knowledge and communication, increased physical capacity, and increased stakeholder engagement and awareness. Of the GEF-4 and GEF-5 completed projects and the GEF-6 and GEF-7 projects included in the evaluation's portfolio review, the most common water security outcomes targeted were within the knowledge and communication (96 percent of projects included outcomes in this group), optimized physical capacity of water systems and environment (76 percent), and greater stakeholder involvement and awareness building" (68 percent) outcome areas of the theory of change presented earlier in the evaluation (figure 3.3a). The least considered outcomes were active adaptive management (3 percent) and consistent and sufficient access to finance (21 percent). Ongoing projects were more balanced in terms of the types of water security outcomes they included: 31 percent of ongoing projects included water security outcomes related to access to financing versus 7 percent of completed projects and inclusion of expected governance outcomes rose from 43 percent to 58 percent between completed and ongoing projects.

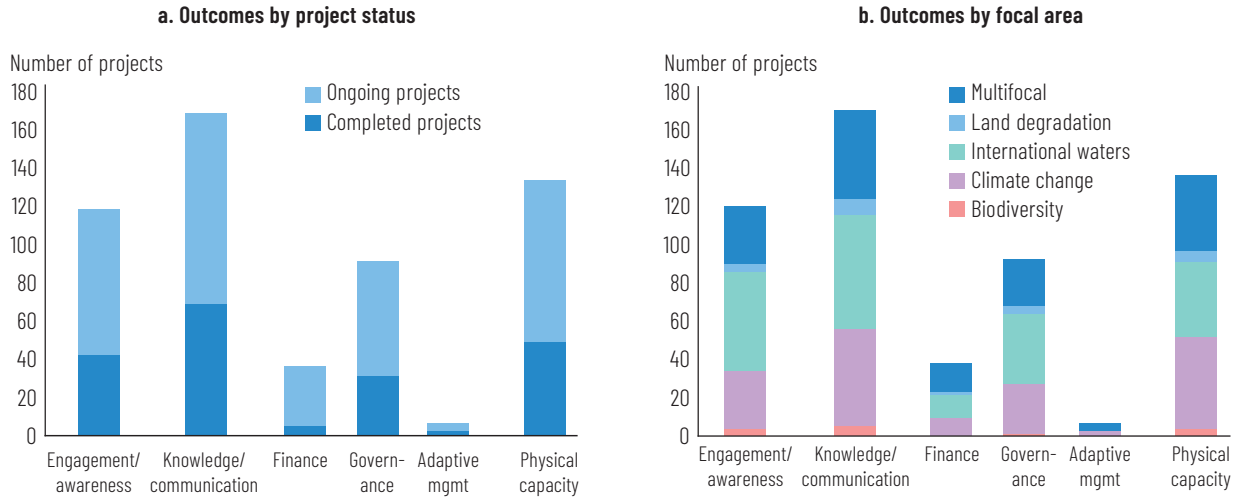
Figure 3.2 Number of reviewed projects with a significant focus on water security that addressed each water security dimension



Source: Project documents.

Climate change, land degradation, and multifocal area projects with significant water security focus include more on-the-ground activities to improve the physical capacity of water

Figure 3.3 Number of reviewed projects targeting the various outcome areas delineated by the evaluation theory of change, by project status and focal area



Source: Project documents.

Note: *n* = 176 projects: 104 ongoing and 72 completed.

systems and the environment (figure 3.3b), and directly improved the water security of community members. Within the portfolio review, 92 percent of climate change projects (most of which were climate change adaptation) led to improved physical capacity of water systems or the environment's capacity to support water security, the most of any focal area. Examples of common activities in climate change adaptation projects include introduction of agricultural technologies with improved water efficiency, installation of groundwater pumps, water harvesting infrastructure installed, and revegetation of wetland or riverbanks. This was likely driven by the high number of LDCF and SCCF adaptation projects that have a local focus.

Multifocal and land degradation projects also had a high number of outcomes focused on increased physical capacity (76 percent and 75 percent). Such activities in land degradation are generally related to sustainable land management activities such as small-scale irrigation technology, agroforestry, and improved soil management to reduce erosion and flooding. Multifocal projects tend to have a mixture of the types of activities found in all focal areas.

Direct water security improvements were observed in several communities. For example, in the Sudan NAPA project, community members noted that solar water pumps increased their access to water, especially during dry months, thus increasing their agricultural production and improving their food security. Similar outcomes were seen in the Bolivia EVAs project, where installation of small-scale irrigation and water harvesting activities led to increased agricultural yield during periods of drought.

In the Burundi sustainable coffee production project, water security improvements were less verifiable due to a lack of water quality monitoring data, but anecdotal evidence from community members suggested that treatment of coffee-washing water was more common (although not all treatment processes continued to be done) after the project and that downstream water quality was improved. Community members,

including women, were very positive about these local activities designed to increase the physical capacity of water systems and storage, noting tangible improvements in their access to water and ability to use it for their livelihoods. GEF Agency evaluations of support of irrigation and water storage activities also showed that such activities were highly regarded by communities (FAO 2023).

Other activities, such as tree planting, were similarly appreciated by communities, but their water security benefits were less clear. Communities benefiting from the Bolivia EVAs project noted that the tree plantations should help reduce mudslides and erosion and increase groundwater recharge, but lack of water and erosion monitoring makes these benefits difficult to verify. Other projects that were able to achieve community-level water security improvements were a multifocal area project implemented by UNDP in Iran, Institutional Strengthening and Coherence for Integrated Natural Resources Management (GEF ID 2732), which installed solar water heaters and constructed a community irrigation system; and an ADB-cofunded biodiversity effort in China, Integrated Ecosystem and Water Resources Management in the Baiyangdian Basin (GEF ID 2766), which increased wastewater treatment capacity and improved domestic water supply through pipe installation and maintenance.

Direct improvements in water security led to socioeconomic co-benefits in some cases. For both the Sudan NAPA and Bolivia EVAs projects, community members noted increased incomes from being able to sell higher volumes of their more diversified and larger agricultural harvest at market; better health through a more nutritious, diversified vegetable diet; and resilience to increased drought because better water storage and access allowed water supply during times of scarcity. An earlier GEF IEO land degradation focal area study found that community-level water security improvements led to socioeconomic co-benefits. For example, the Sustainable Land Water and Biodiversity Conservation and Management for Improved Livelihoods in Uttarakhand Watershed Sector project (GEF ID 3471) implemented by the World Bank installed gravity sprinklers and check dams to improve water availability and prevent erosion. The IEO evaluation found that project beneficiaries were less likely to migrate to urban areas because they had more income-generating activities and access to water resources (GEF IEO 2018b). Other projects (including many international waters projects) focused on conflict mitigation as a co-benefit, including the UNDP-implemented Promoting Climate-Resilient Water Management and Agricultural Practices project in Cambodia (GEF ID 3404), which had an outcome to reduce conflict risks related to water shortages through the use of "mediative mechanisms."

Findings on sustainability were similar to the overall GEF portfolio and higher when direct water security was improved for communities. Across the entire evaluation portfolio of completed projects, the average likelihood of sustainability ratings from terminal evaluations was not significantly different from the overall GEF portfolio average. Site visits and community member interviews found that GEF project activities that increased access to and storage of water for communities were well sustained (figure 3.4).

In the Burundi sustainable coffee production project, the Batwa community that was displaced from a protected area during the project indicated they were pleased with their community water tap installed by the project. The water system was still functioning well after five years—albeit with a small leak repaired with tire inner tubes (constructed houses, however, were found to have significant cracks that the community had attempted to repair). Coffee-washing settling basins used for water treatment were still functioning and used, although lime was not always added to the treatment as recommended, due to the expense. In communities involved in the Sudan NAPA project, community members given solar water pumps reported that they were still functioning, while communities given

Figure 3.4 Examples of sustainability of GEF project activities relating to water security

a. Intact geomembrane installed by the Bolivia EVAs project in Walkeri community, 2016–17

b. Tree plantation by Bolivia EVAs project in Chekene community, 2016–17

c. Coffee-washing infiltration ditch installed by the Burundi sustainable coffee project in Mwkiro community, 2015–17

d. Treatment tanks installed by the Burundi sustainable coffee project in Burunga community, 2015–17

Photos: Gabriel Sidman (Bolivia); Glen Hearns (Burundi).

diesel pumps reported that high diesel prices had prevented their use for at least the past two years.

Visits to Bolivia EVAs project communities found that small-scale irrigation schemes universally remained in good condition, with communities working to maintain them with local supplies and skills. Most of the communities have established irrigation system groups to manage the systems and to repair them if needed. However, an ongoing drought meant that some systems were temporarily out of operation or operating at limited capacity.

Tree planting was less sustainable. In Sudan, trees were planted that need large water inputs; for this reason, communities have not been able to maintain them. In Bolivia, trees planted in generally poor, steep, and arid soils above communities had grown in some cases; in

others, they were still the size of saplings or had been damaged by livestock grazing or fire.

Activities that improved water security at the community level were replicated after project completion, but not enough to meet the vast scale of water security issues. The Sudan NAPA project introduced a system in which community members paid in monthly installments for the pumps provided by the project. These installments were then used to purchase more pumps for other families—leading to a continual increase in the number of pumps in the communities. Witnessing the impact of the geomembrane-lined ponds used for small-scale irrigation by the EVAs project in Bolivia, some neighboring communities purchased and constructed similar ponds with the help of a local NGO (PRODII) after the project's completion. Other communities continued planting trees in upper watershed locations using seedlings provided by nurseries which were scaled up or established by the project and which continued to function after project completion. In Burundi, treatment of water from coffee-washing stations supported by the sustainable coffee production project has been subsequently supported by other donors and programs; such treatment is now a requirement in order to receive an environmental certificate for coffee operations.

But in most case study countries, communities and local governments noted that the vast scale of water security issues overwhelmed the comparably small interventions implemented by the GEF and other donors. This was especially true at the watershed scale. For example, in Bolivia, tree planting interventions done by the EVAs project and on a limited pilot scale by the UNEP-implemented Sustainable Management of the Water Resources of the La Plata Basin with Respect to the Effects of Climate Variability and Change project (the Foundational La Plata Basin project; GEF ID 2095) were at most 5 hectares. Such small plantings are likely to have little impact in preventing erosion, flood, and mudslide damage during extreme events in large semi-arid watersheds.

Similarly, in Burundi, GEF interventions to control erosion have been shown to be effective—as in the UNDP-implemented Community Disaster Risk Management project (GEF ID 4990)—but they are conducted on relatively small plots in large basins with high densities of agriculture—as is true for the UNEP-implemented Biodiversity Conservation, Sustainable Land Management and Enhanced Water Security in the Lake Tanganyika Basin (GEF ID 10388), the Bujumbura landscape restoration project, and the AfDB-implemented Lake Kivu and Rusizi River Basin Water Quality Management Project (GEF ID 10566).

In Sudan and Bolivia, community members involved in the NAPA and EVAs projects expressed great interest in more interventions that scaled up the water access and storage activities carried out by those projects. They noted that many neighbors and many more communities around them had not received benefits from the projects and were just as water insecure, if not more so.

International waters projects promote water security through activities that lead to improved water governance, increased knowledge and communications, and capacity development. This focal area had the highest percentage of projects focused on enhancing stakeholder engagement and awareness (60 projects, or 85 percent of the reviewed international waters projects) and improved governance (60 percent); in contrast, multifocal projects were focused most on improving access to finance (27 percent). International waters completed projects focused heavily on activities to improve governance, coordination, and communication between riparian countries of transboundary watersheds and aquifers; enhance knowledge through increased monitoring or information-gathering exercises; and develop the capacity of governments to address water issues. The knowledge gathering was usually summarized in TDA documents which form the basis of transboundary agreements to address regional water challenges.

None of the four entirely international waters–funded completed case study projects undertook

on-the-ground activities to directly improve communities' water security. One of the two multifocal completed projects that included some international waters funding did—the Foundational La Plata Basin project. Of the 21 international waters projects in the completed project portfolio review, 10 were found to have activities that increased the physical capacity of water systems. DIKTAS I, for example, focused on gathering and harmonizing preexisting data from different countries on the aquifer system and bringing technical officials from the different countries together to discuss and share data. It completed a TDA and abbreviated SAP document, but did not carry out any local pilot activities.

The World Bank's Regional Coordination on Improved Water Resources Management and Capacity Building Horizontal Adaptable Programmatic Programme (GEF ID 3978) created operating procedures for regional environmental and sustainable development observatories to perform environmental and water monitoring; its fellow child project under the Sustainable MED Program—Sustainable Governance and Knowledge Generation (GEF ID 4001), also implemented by the World Bank—carried out climate change modeling and flood forecasting along with capacity-building workshops. The now-completed Nile groundwater management project conducted capacity-building work in Burundi and Sudan that raised the knowledge and awareness of groundwater issues in those two countries.

The multifocal Foundational La Plata Basin project, while mostly centered on knowledge building and governance issues, included a pilot activity in the Pilcomayo subwatershed shared by Bolivia, Argentina, and Paraguay. This pilot activity aimed to reduce sedimentation and improve management of mine tailings in the Bolivian upper watershed. Ultimately, it focused on monitoring and management at the local level, and designing a water quality monitoring network and priority activities to improve water quality for the Cotagaita river watershed, a tributary of the Pilcomayo River.

Ongoing international waters projects—while more diverse in their activities—also focus on improving water governance and knowledge and capacity building at the local level. The Nubian aquifer project plans to support SAP implementation, the phase of the TDA-SAP process that requires on-the-ground investments to achieve prioritized actions for transboundary watershed management. The plan is to do so through legal, policy, and institutional reforms. Similarly, DIKTAS II focuses on measures to harmonize country laws and regulations around groundwater measurement and use. Its local activities are intended to set up pilot monitoring networks in transboundary aquifers. UNDP's Advancing IWRM Across the Kura River Basin through Implementation of the Transboundary Agreed Actions and National Plans project (GEF ID 6962) plans to enhance knowledge of water resources through capacity building of government officials to implement river basin management plans and enforcement of laws and regulations for water resource protection.

Multifocal projects that address SAP implementation with funding from international waters and other focal areas tend to mix local and higher-level activities. For example, the ongoing Lake Tanganyika project—which includes international waters, biodiversity, and land degradation funding—plans to assist in the establishment of community-based fisheries co-management areas and encourage more sustainable land management activities (including soil erosion control and drip irrigation systems) along with activities to improve coordination and information sharing at the transnational government level.

Stakeholders greatly appreciate the results of international waters in achieving transboundary cooperation and governance, which can take a long time to be realized. Agency and national government stakeholders cite this focal area as one of the only funding mechanisms for addressing management of transboundary freshwater resources. In many cases, they note that cooperation was improved significantly by international waters projects—even if

such achievements did not occur during the lifetimes of the projects themselves. Indeed, political processes for approving TDAs and SAPs are long and often difficult to fit into the timelines of GEF projects—which, in retrospect, can make these international waters projects overambitious.

Often, GEF projects do not include activities related to political advocacy for passing laws they helped draft or for approving TDAs and SAPs. In DIKTAS I, the SAP document was completed by the end of the project, but it was not approved by the country governments as originally targeted. UNESCO-IHP, the executing agency for the project, made concerted efforts after project completion to lobby governments to approve the document—a necessary step to unlock further GEF financing for a follow-on project.

In Morocco, the World Bank's regional coordination project developed a still operational environmental and water information platform that was not completed until after the project's end. As part of the same project, a decree drafted for institutionalization of an environmental observatory in Tunisia was not approved by the government during implementation; it remains unapproved, although it is being negotiated.

Specific knowledge products created by international waters projects were not always sustained, but follow-on projects and other donor projects sustained momentum for improved watershed management. Some project products that used water data to help decision-making processes or inform stakeholders were not well used after project completion. In the completed Nile groundwater management project, it was found that the Nile Basin Initiative had no knowledge of the project's modeling outputs, and that Sudanese officials did not have the software license to run the models on which the project had trained stakeholders.

In Burundi, officials noted the outputs were not translated into French and were thus of limited use to them. The Bolivian government and the local Cotagaita government had little awareness of many of the knowledge products and reports generated by the Foundational La Plata Basin project, including an integrated water balance study, a management plan for the Yrenda–Toba–Tarijeño Aquifer System, a database and strategy for land degradation actions, and a water quality management plan for the Cotagaita watershed. The data-gathering and harmonization exercise done by DIKTAS I was originally available publicly in a geospatial platform on the project's website, but that website is no longer functioning. However, individuals in technical institutions in all three case study countries do continue to use and benefit from the data.

Despite the limited sustainability of knowledge products, follow-on projects have carried momentum forward in many cases. In Bolivia's Cotagaita watershed, the Integrated Watershed Management project of the Swiss development organization Helvetas carried out erosion control, water quality monitoring, and water governance activities until 2022—ensuring that the work of the Foundational La Plata Basin project to reduce sedimentation and improve water quality in the region was sustained until its closure.[3] Also, Tasna, a local mining cooperative, self-financed a tailings treatment plant with Helvetas assistance on the technical design.

In the DIKTAS region, GEF projects—especially UNDP's Extended Drin River Basin project (GEF ID 4483)—utilized data from DIKTAS I to continue to implement groundwater quality monitoring stations; the upcoming DIKTAS II will further sustain its predecessor's outcomes. And drought indicators developed by the Sustainable MED regional coordination project were integrated into a drought composite index through a later project funded by the United States Agency for International Development (USAID).

[3] Cotagaita officials noted, however, that they now have no assistance from donors on these issues.

The dependence on follow-on projects for sustainability can lead to lost momentum if there is a large gap in GEF funding or if funding is slow to be approved. When DIKTAS I was completed in 2015, country stakeholders noted significant momentum and excitement for the project's next phase. However, due to the delay in SAP approval combined with delayed GEF and GEF Agency approval and design processes (partially due to the COVID-19 pandemic and enhanced auditing procedures), DIKTAS II has yet to begin. Stakeholders noted that some of the momentum generated by the first phase in terms of intergovernmental collaboration and communication has been lost in the interim. Further, many of the professionals involved in the first phase have retired or left their positions.

Another transboundary aquifer that encountered delays between international waters project phases is the Nubian aquifer. The UNDP-implemented Formulation of an Action Programme for the Integrated Management of the Shared Nubian Aquifer (GEF ID 2020) was completed in 2012; the follow-on project examined in the case study is still in the design phase. In fact, this project has had major delays and might be dropped by its original lead Agency (UNDP), in which case project stakeholders are hoping to find another GEF Agency to implement it.

Scaling up successful water security outcomes was limited by a lack of activities to improve access to finance or create financial mechanisms. As noted earlier in this section, GEF projects with a focus on water security did not achieve improved access to finance or financial mechanisms for funding activities to improve water security. Previous GEF IEO evaluations have also found that developing sustainable financing mechanisms has been a limitation (GEF IEO 2020). This was confirmed by site visits, where only a few projects showed clear examples of activities designed to create mechanisms for continuing the funding of water access and storage activities.

The Bolivia EVAs project, for example, did not contribute to developing any financial mechanism to ensure continued building of small-scale irrigation or other sustainable land management activities in its communities; similar government programs were struggling to meet the needs of their population. The Sudan NAPA project and the Burundi sustainable coffee production projects did include some financing activities—specifically, a rotating cycle of saving and paying for solar pumps in Sudan and limited access to a coffee premium through improved treatment of coffee-washing wastewater. However, these were confined to particular villages and did not scale up beyond the village level.

One exception is the new Guadalquivir Basin project in southern Bolivia. A key project component is to scale up a nascent water fund in the city of Tarija, funded by the region's water utility and an NGO—with aspirations to diversify its funding base to private companies such as wine producers and municipal governments. The fund, similar to other water funds championed by The Nature Conservancy around the world (Calvache, Benítez, and Ramos 2012) and included in other GEF projects (such as the Kenya child project of the GEF-6 food security integrated approach pilot), will invest in watershed management activities to protect against erosion and provide irrigation to small-scale farmers.

Financial mechanisms were not observed to be a major component in international waters projects, although some exceptions were observed, such as the UNEP-implemented MedProgramme's Mediterranean Pollution Hot Spots Investment Project (GEF ID 9717), which plans to develop technical and financial studies for wastewater treatment plant investment in Tunisia.

International waters projects were not found to have many activities focused on creating financial mechanisms to carry out SAP activities. The World Bank's Mediterranean regional coordination project originally had plans to identify investment opportunities for priority environmental actions, but this activity was not carried out; instead, it was changed to knowledge dissemination activities. The Foundational La Plata Basin project also did not achieve any sustainable financing

outcomes, nor has its follow-on project implemented by the Development Bank of Latin America (CAF), Preparing the Ground for the Implementation of the La Plata Basin Strategic Action Program (GEF ID 10035), which is close to being completed. Stakeholders expressed hope that future GEF projects focusing on the La Plata River would help identify and create financial mechanisms to address water security issues beyond further international waters projects.

Some ongoing projects do have elements of financial mechanisms. For example, the Amazon River Basin project looks to develop incentive-based financing mechanisms and the Transboundary Cooperation for the Conservation, Sustainable Development, and Integrated Management of the Pantanal—Upper Paraguay River Basin project (GEF ID 10554) jointly implemented by IDB and UNEP aims to create a sustainable financing strategy to support SAP implementation. The multifocal Lake Tanganyika project (which includes international waters funding) has an activity to establish a conservation trust fund to mobilize funding for SAP implementation. Additionally, international waters projects are increasingly addressing SAP-related processes, which generally consist of investments that require financing: in GEF-7, 81 percent of the projects financed entirely by international waters and included in the GEF database at the time of this evaluation included activities related to creating, approving, or implementing SAPs, compared to 70 percent in GEF-4.

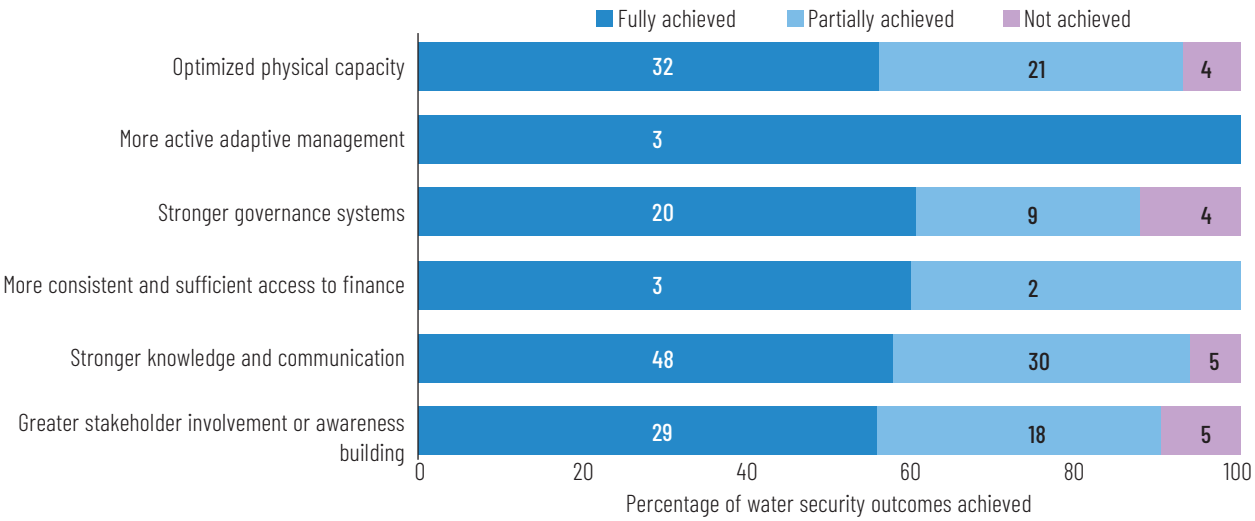
Given that international waters focuses on transboundary governance processes, knowledge, and communication, stakeholders noted that countries generally must look for financing from other GEF focal areas or other sources to carry out activities prioritized in the SAP. Sometimes projects can combine GEF funding to do "soft" water resource management, governance, or stakeholder engagement work with "hard" funding or loans from multilateral or regional development banks (most of which are GEF Agencies) to construct water infrastructure. The GEF cities integrated initiatives yield examples of this model, such as the World Bank–implemented GEF-6 Sustainable Cities Integrated Approach Pilot in Senegal (GEF ID 9077) and the ADB–implemented GEF-7 Sustainable Cities Impact Program's India projects (GEF ID 10391), which both have significant cofinancing from the development banks to construct stormwater drainage. Earlier GEF IEO evaluations have found that this type of partnership between GEF and financial Agencies can be a mechanism for scaling-up activities (GEF IEO 2020).

Among reviewed completed projects with a focus on water security, more than half of all outcomes linked to achieving water security were fully achieved. Across all intended project outcomes related to water security in the evaluation portfolio, 58 percent were fully achieved and only 8 percent were not achieved at all. Intended outcomes that aimed to improve knowledge and communication, optimize physical capacity and build awareness and stakeholder involvement were the most common project outcome types (figure 3.5). Among the most common outcome types (those with more than 10 intended outcomes across the evaluation portfolio), intended outcomes that created stronger governance systems were the most likely to be fully achieved (61 percent) and those aimed at greater stakeholder engagement were the least likely (56 percent).

3.5 Unintended adverse impacts of GEF interventions in water security

There are a few instances where GEF project activities have resulted in a decrease in water security. Of the reviewed completed projects with a significant focus on water security, 4 percent (three projects) were found to have caused a potential decrease in water security for a certain population due to their activities. Of the 16 reviewed safeguards-related grievance cases that have been reported to the GEF's Conflict Resolution

Figure 3.5 Evaluation portfolio's achievement of water security–related outcomes (%)



Source: Terminal evaluations.

Note: *n* = 233 water security–related outcomes across 72 completed projects. Number of outcomes shown in bars.

Commissioner,[4] two were related to water security. And the GEF IEO noted a further instance of decreased water security in case of was noted in the Seventh Comprehensive Evaluation of the GEF (OPS7).

Cases of adverse impact on water security were mostly related to a reduction in water availability, reactions to new water-related policies, and displacement of people and property. For the IFAD-implemented Sustainable Land Management for Increased Productivity in Armenia project (GEF ID 8005), a complaint was filed claiming that water infrastructure (either improvement of existing irrigation schemes or construction of a rural water supply project) constructed using non-GEF resources (from a cofinancer) resulted in reduction of a neighboring community's access to water. The project had recognized the risk of "environmental impact of works and activities in the programme area" and had sought to minimize it by carrying out environmental impact assessments. The investigation into the complaint found no evidence that the project had caused a decrease in water availability. The GEF IEO (2022b) noted a water supply issue in the World Bank–implemented Community-based Land Management (GEF ID 1877) project in Guinea, where a community was displaced due to forest degradation in a protected area. Once the community was established in its new location, it became clear there was less water availability, and agriculture could only be carried out six months of the year. It appeared that the project had not conducted any studies on water availability in the new location prior to the community displacement (GEF IEO 2022b).

Other Agency and project stakeholders noted that the difficulty and expense of hydrological monitoring can limit understanding of how project activities such as small-scale irrigation and planting of water-intensive crops affect water availability in nearby areas. At least two case study projects discussed the potential for this type of impact in their design documents. The Med-Programme Water Security child project notes that its

[4] Cases reported to the GEF Conflict Resolution Commissioner are available for review on the GEF website.

IWRM and coastal aquifer work could alter water quantity, but expects these alterations to be positive for surrounding populations, not negative. The Guadalquivir Basin project in Bolivia recognized that irrigation systems installed or restored by the project could have "adverse effects" in other parts of the basin, which are to be mitigated through water availability "tracking" throughout the basin.

GEF projects involving afforestation or reforestation could have such impacts as well, especially if nonnative trees are planted. Such water demand is recognized as a potential limiting factor for climate change mitigation (Cassin 2021; Hoek van Dijke et al. 2022). In the Bolivia EVAs project, stakeholders noted that they encouraged planting of native species, but water-intensive, nonnative eucalyptus plantations were observed. As mentioned previously, the green belt of trees planted by the Sudan NAPA project was not well sustained due to a lack of water to irrigate the trees. In other projects, stakeholders observed that the introduction of water-intensive crop species such as avocado could have detrimental impacts on water availability, but that a lack of detailed hydrological monitoring prevents verification.

Two other grievances were related to water policy introduced or supported by GEF projects. For the AfDB-implemented Lakes Edward and Albert Integrated Fisheries and Water Resources Management project (GEF ID 5674), a complaint was filed stating that project-supported enforcement of fishing regulations in freshwater lakes has led to "heavy-handed attacks on fisherfolk (including shootings to death)." Investigation into this issue is ongoing. The project's design documents do mention that the area has a lot of conflict and that a "conflict-sensitive" approach is planned, but only political conflict is listed as a major risk for the project. In the Adapting Water Resource Management in Comoros to Increase Capacity to Cope with Climate Change project (GEF ID 3857) jointly implemented by UNDP and UNEP, the terminal evaluation noted that poorer residents might have difficulty paying for the increased price of water tariffs that was supported by the project, although subsidies are planned.

Other water security issues noted included displacement of business infrastructure by a newly created wetland during the course of the World Bank's Huai River Basin Marine Pollution Reduction project in China (GEF ID 4092) and the failure of a project-promoted irrigation technology in the local context of IFAD's Irrigation Technology Pilot Project to Face Climate Change Impact in Jordan (GEF ID 4036). The terminal evaluation for the China project states that the "construction of the wetlands required a change in land use," and that this "land use change entailed relocation of seven small-sized enterprises that leased the land for their businesses, and also affected some power lines and fish ponds (World Bank 2016)." In Jordan, the technology had to be replaced by a suite of other technologies identified by local stakeholders, delaying implementation by two years.

4 Conclusions and recommendations

4.1 Conclusions

Water security and its dimensions are critical to the environmental goals of all the GEF's focal areas. Fresh water is an essential resource for all life on Earth and thus water security is a cross-cutting theme in all development and environment work—from securing access to clean water for humans, their livelihoods, and ecosystems to mitigating water-based natural hazards. This includes the GEF's work in achieving global environmental benefits, almost all of which rely on water security. Biodiverse ecosystems depend on fresh water (and some exist in fresh water); water resources are needed for farmers to help prevent land degradation; dangerous chemicals often reach populations through contaminated water supplies; many climate change mitigation actions are water intensive, and most climate change adaptation efforts involve water and mitigating water-based hazards; and many transboundary freshwater resources often cause disagreement among neighboring countries. Even though water security is not an explicit goal of the GEF, these connections to its programming mean it cannot be ignored.

The GEF's focal area strategies, results framework, Agencies, and the conventions it supports address water security through the lens of their particular environmental focus instead of taking a holistic approach to the issue. The scientific literature on improving water security through development interventions points to the need for an integrated approach that addresses the multiple uses of water in an area and brings together stakeholders including all significant users and actors. However, the GEF and its major stakeholders generally address the specific aspects of water security that directly relate to their area of interest.

The GEF-8 Results Measurement Framework reflects how water security is approached by the focal areas—the international waters indicator addresses water governance in transboundary situations, and the land degradation indicators include water resources

as they relate to land management and restoration. The biodiversity, climate change, and chemicals and waste indicators do not explicitly address fresh water, which makes it difficult to track the GEF's performance on, for example, protecting inland water ecosystems specifically. The land degradation focal area strategies, the UNCCD, and the GEF Agencies with an expertise in agriculture tend to view water from the standpoint of providing access for agriculture and sustainable land management.

The biodiversity focal area strategies, the CBD, and the international environmental NGO GEF Agencies focus on water because it supports ecosystems and provides ecosystem services. The LDCF and the SCCF projects and the GEF adaptation strategy, along with the UNFCCC, consider water security in the context of climate change. The international waters focal area strategies deal comprehensively with all dimensions of water security, but mainly in the context of transboundary watersheds and aquifers. This piecemeal approach to water security also applies to national government ministries, which rarely have a mandate to look at water in a holistic way. Normally, they address water from the standpoint of their focal sector: energy, agriculture, or the environment, for example.

A higher percentage of GEF projects with a prominent and explicit focus on water security are implemented in Africa; these are mainly through the international waters and climate change adaptation focal areas or are multifocal. Multifocal area projects had the highest share of the portfolio of projects found to have a significant focus on water security, followed closely by international waters and climate change adaptation projects through the LDCF and the SCCF. Geographically, Africa was the most represented region in the portfolio. GEF projects with a significant focus on water security were found in many of the least water–secure regions of the world, especially the Sahel, but had less coverage of some highly water-insecure countries in South Asia. On the other hand, some relatively more water-secure areas, such as the Balkans and South America, had many such projects.

GEF projects with a significant focus on water security include activities that address stakeholders' water security priorities. Water security was a key development priority in almost all case study countries, including in local communities where a lack of water or water-based hazards affected daily life and livelihoods. Stakeholders were generally pleased with GEF projects' relevance to their priorities, especially with projects that increased water access and storage, improved water resource monitoring, and improved coordination between neighboring countries. International waters was recognized as one of the few funding sources for improving transboundary watershed management, but many stakeholders highlighted the need for international waters projects to include more on-the-ground, local activities. International waters projects, which tend to focus on the regional level, were less likely to involve local stakeholders in their design phase—which meant local stakeholders had limited knowledge of the projects before implementation.

Coherence between GEF projects and other actors' water security activities was found to be difficult to achieve unless coordinated by national governments. Completed evaluation case study projects often built on, or had other donor initiatives later build on, their work in project areas and countries. However, close coordination with other initiatives during implementation was rare, except among projects of the same program. Recently designed projects identified other water security–related donor activities in their geographical area, but did not often have detailed implementation coordination. Project and national government staff noted that coordinating ongoing projects to ensure collaboration is difficult, given the differing timelines and goals of funding organizations if there is no single entity charged with overseeing this coordination. This limited engagement extended to work with the private sector. Within the evaluation portfolio, only 18 percent of completed

projects were found to have involved the private sector in implementation of water security activities; among ongoing projects, 14 percent involved the private sector in the design phase.

GEF projects are increasingly addressing gender aspects of water security, but do not often address the water security of other vulnerable groups. Completed projects reviewed by the evaluation had little focus on the ways in which water security differs for different genders—mostly gender was reflected as ensuring a certain percentage of women participated in project activities. However, women in communities benefited directly from some completed projects that improved water security through improved access to water and water storage capacity. Ongoing projects planned to integrate gender much more thoroughly into their activities, through inclusion of women in water decision-making groups, targeting them for microloan programs, and reflecting gender within water policy and governance. This last aspect of how gender should be integrated into water policy, however, was less well understood and explained. Vulnerable groups such as indigenous peoples, refugees, and ethnic groups with less water security than other groups were not often a focus of GEF projects (unless they represented a majority of the population in the project areas).

The GEF's multifocal area and integrated programs have primarily integrated water security through coastal marine protection, food security, and cities programs. The integrated programs also tended to view water through specific lenses—food systems–focused projects tend to approach water security, as do those in the land degradation focal area, through the lens of water for agriculture and resilience to drought; sustainable cities program projects deal mostly with wastewater and hazard mitigation. Stakeholders noted that water security is often treated as a secondary focus within these programs, which some felt was a missed opportunity. For example, Food Systems Integrated Program projects could mainstream themes such as upper watershed ecosystem service protection, control of pesticide and fertilizer runoff into aquatic ecosystems, and multiple-use water systems. The GEF-8 Ecosystem Restoration Integrated Program is more focused on drought resilience and plans payment for environmental services schemes.

GEF projects with a focus on water security achieved improved water security either directly at the community level through physical investments in infrastructure or indirectly through designing water policies, knowledge, and stakeholder engagement activities. Land degradation and climate change adaptation projects focused on local interventions that improved the physical capacity of water systems, including through nature-based solutions. Such activities directly improved water access in local communities by providing solar water pumps or constructing small-scale irrigation systems. These activities increased community access to water during times when communities had previously had little access to water and led to socioeconomic co-benefits of increased income (through increased agricultural production), improved nutrition (through diversified production), and resilience to climate change (through improved protection from soil erosion during floods and access to more reliable water sources during drought).

In contrast, freshwater projects in international waters focused heavily on strengthening transboundary governance mechanisms and knowledge of water resources through the TDA-SAP process, which involves improving stakeholder capacity and raising awareness at the national and transboundary levels. Some of these activities led to policy reform, such as laws to improve environmental impact assessments; but these political processes were often too long to be completed during project implementation. A few also tried to improve the coherence of water policy across ministries through the creation of interministerial committees. These interventions helped create a conducive enabling environment for future activities that would lead to improved water security, many of which are identified

in SAP documents. Observed cases of GEF projects causing a decrease in water security were rare.

Local activities to improve water security were found to be well sustained in postcompletion assessment, while knowledge products and governance interventions were more likely to be sustained through subsequent donor interventions. Once communities benefited directly from activities that improved their water infrastructure, they were committed to maintaining the infrastructure well past project completion. Solar pumps, irrigation systems, and coffee-washing treatment facilities were, for the most part, found to be well maintained and functioning years after project completion as long as communities could perform maintenance cheaply and with local materials. This type of activity was often replicated within communities through demonstration effects as neighbors noticed their positive impact. Knowledge products such as technical reports, governance reforms, and capacity-building activities had mixed sustainability and relied more on follow-on projects. Freshwater transboundary basins often receive multiple international waters projects in phases. Such continued support, when given without major delays between phases, maintains the momentum on these outcomes. Other donors were found to be active in areas of completed projects and, in many cases, continued working on similar water security–related topics.

Scaling-up of GEF project activities is yet to be achieved at the level necessary to meet the water security challenges of recipient countries. Though replication was observed in some cases, scaling-up and broader adoption at a watershed or country level were not common. Communities and governments noted that the scale of water security problems such as insufficient access to water, water pollution, and floods and droughts exceeds the ability of GEF projects to address or catalyze solutions to meet. Evidence shows that several factors are key to scaling-up, such as mainstreaming good practices through policy formation, disseminating knowledge and information, and prioritizing activities that create sustainable financial mechanisms beyond the lifetime of project interventions (GEF IEO 2020). GEF projects with a significant focus on water security achieve many of these factors to varying degrees. However, such projects do not often include activities to establish postproject financial mechanisms or improve access to finance.

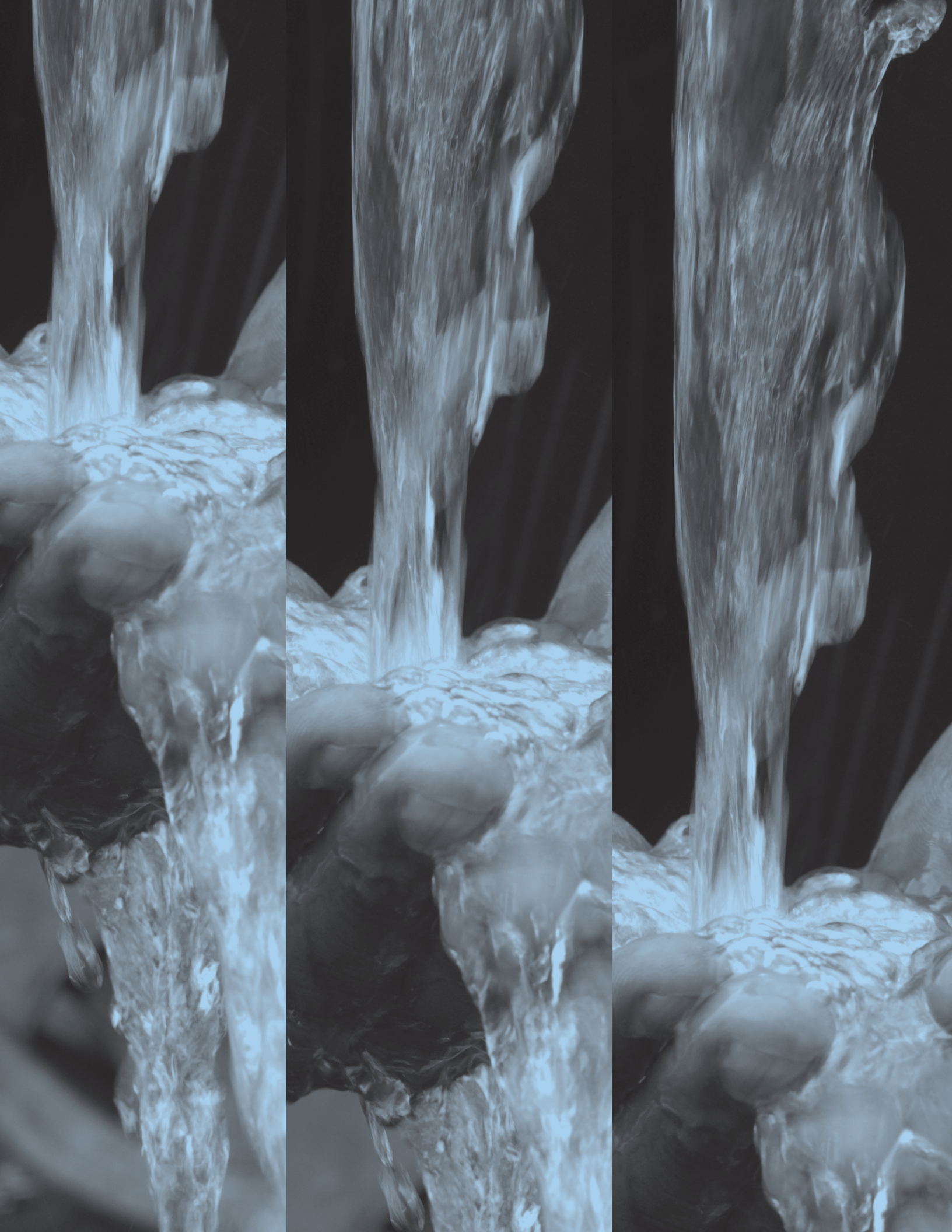
4.2 Recommendations

Water security is integral to all of the GEF's focal areas, given the essentiality of water to human life and ecosystem health. This evaluation highlights several diverse GEF outcomes that have improved water security or improved the enabling environment for achieving water security. Based on the findings and conclusions, this evaluation makes the following recommendations.

Recommendation 1: The GEF Secretariat should ensure that aspects of water security that are key to each GEF focal area are represented in the results measurement framework and project and program design. Explicit language related to freshwater resources should be added to some of the focal area indicators in the GEF-8 Results Measurement Framework to better highlight linkages with water security. This would encourage countries and Agencies to design projects across all focal areas that better consider the importance of water security and freshwater resources. Furthermore, design and theories of change for projects and programs with strong links to freshwater resources should integrate elements of water security to help improve holistic integration of water security across the GEF portfolio. Consideration could also be given to integrating water security as a cross-cutting theme in relevant integrated programs.

Recommendation 2: The GEF Secretariat and the GEF Agencies should prioritize creation of sustainable financing mechanisms and other activities for scaling up interventions that successfully improve water security. Many GEF projects incorporate some factors into project implementation that encourage scaling up of water security activities,

such as international waters projects that develop water policy. However, more ambition for scaling-up is needed to meet the water security needs of people and ecosystems. All projects that deal with water security should include sustainable financing and other activities to support scaling-up efforts, including projects that improve water security at the community level. International waters projects, in particular, should offer guidance that sustainable financing must be considered part of the preparation for the SAP implementation phase of the TDA-SAP process. Activities could include creating novel and innovative financial mechanisms in watersheds or aquifer areas, enhancing existing mechanisms, or partnering with the private sector and entities with expertise in financial inclusion. Addressing the issue of sustainable financing in the framework of SAP implementation in various geographies of the world would also increase the likelihood of scaling up water security outcomes.



Annex A

Case study projects

GEF ID	GEF period	Status	Title	Lead Agency	Country	Focal area	Fund	Modal-ity	Funding (mil. $)	
									GEF	Cofi-nance
Bolivia										
2095	GEF-4	C	Sustainable Management of the Water Resources of the la Plata Basin with Respect to the Effects of Climate Variability and Change	UNEP	Regional: Argentina, Bolivia, Brazil, Paraguay, Uruguay	MF	GET	FSP	10.73	51.03
3831	GEF-4	C	Conservation and Sustainable use of Biodiversity and Land in Andean Vertical Ecosystems	IDB	Bolivia	MF	GET	FSP	6.00	8.05
9770	GEF-6	UI	Implementation of the Strategic Action Programme to Ensure Integrated and Sustainable Management of the Transboundary Water Resources of the Amazon River Basin Considering Climate Variability and Change	UNEP	Regional: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela, RB	MF	GET	FSP	11.74	144.36
10035	GEF-6	UI	Preparing the Ground for the Implementation of the La Plata Basin Strategic Action Program	CAF	Regional: Argentina, Bolivia, Brazil, Paraguay, Uruguay	IW	GET	MSP	2.00	2.95
10554	GEF-7	UI	Transboundary cooperation for the conservation, sustainable development and integrated management of the Pantanal - Upper Paraguay River Basin	IDB	Regional: Bolivia, Brazil, Paraguay	IW	GET	FSP	8.19	128.57
10627	GEF-7	UI	Programme to sustainably manage and restore land and biodiversity in the Guadalquivir Basin	FAO	Bolivia	LD	GET	MSP	1.56	21.55

GEF ID	GEF period	Status	Title	Lead Agency	Country	Focal area	Fund	Modality	Funding (mil. $)	
									GEF	Cofinance
Burundi										
3321[a]	GEF-4	C	Mainstreaming Groundwater Considerations into the Integrated Management of the Nile River Basin	UNDP	Regional: Burundi, Congo, Dem. Rep., Egypt, Arab Rep., Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda	IW	GET	MSP	1.00	2.89
4631	GEF-5	C	Watershed Approach to Sustainable Coffee Production in Burundi	WB	Burundi	MF	GET	FSP	4.20	20.80
9912[a]	GEF-6	UI	Enhancing Conjunctive Management of Surface and Groundwater Resources in Selected Transboundary Aquifers: Case Study for Selected Shared Groundwater Bodies in the Nile Basin	UNDP	Regional: Burundi, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda	IW	GET	FSP	5.33	25.85
10099	GEF-7	UI	Landscape restoration for increase resilience in urban and peri-urban areas of Bujumbura	UNDP	Burundi	CC	LDCF	FSP	8.93	16.02
10388	GEF-7	UI	Biodiversity conservation, sustainable land management and enhanced water security in Lake Tanganyika basin	UNEP	Regional: Burundi, Congo, Dem. Rep., Tanzania, Zambia	MF	GET	FSP	14.60	60.77
10566	GEF-7	UI	Lake Kivu and Rusizi River Basin Water Quality Management Project	AfDB	Regional: Burundi, Congo, Dem. Rep., Rwanda	IW	GET	FSP	5.74	26.15
Dinaric-Karst Aquifer System										
3690	GEF-4	C	Protection and Sustainable Use of the Dinaric Karst Aquifer System	UNDP	Regional: Albania, Bosnia-Herzegovina, Croatia, Montenegro	IW	GET	FSP	2.16	3.40
9687[b]	GEF-6	UI	Mediterranean Coastal Zones Climate Resilience Water Security and Habitat Protection	UNEP	Regional: Albania, Algeria, Bosnia-Herzegovina, Egypt, Arab Rep., Lebanon, Libya, Montenegro, Morocco, Tunisia	IW	GET	FSP	7.00	143.27

GEF ID	GEF period	Status	Title	Lead Agency	Country	Focal area	Fund	Modality	Funding (mil. $)	
									GEF	Cofinance
9919	GEF-6	UI	Implementation of the SAP of the Dinaric Karst Aquifer System: Improving Groundwater Governance and Sustainability of Related Ecosystems	UNDP	Regional: Albania, Bosnia-Herzegovina, Croatia, Montenegro	IW	GET	FSP	5.15	15.05
Mediterranean sea coast										
3978	GEF-4	C	MED: Regional Coordination on Improved Water Resources Management and Capacity Building Horizontal Adaptable Programmatic Programme	WB	Regional: Jordan, Lebanon, Morocco, Tunisia	IW	GET	FSP	5.64	13.87
4001	GEF-4	C	MED: Sustainable Governance and Knowledge Generation	WB	Albania, Algeria, Bosnia-Herzegovina, Egypt, Arab Rep., Lebanon, Libya, Montenegro, Morocco, North Macedonia, Serbia, Syria, Tunisia, Turkey, Global	IW	GET	FSP	3.00	4.40
9685	GEF-6	UI	Mediterranean Coastal Zones: Managing the Water-Food-Energy and Ecosystems NEXUS	UNEP	Regional: Albania, Bosnia-Herzegovina, Egypt, Arab Rep., Lebanon, Libya, Montenegro, Morocco, Tunisia	IW	GET	FSP	3.50	11.31
9691	GEF-6	UI	Financing Advanced Environmental Technologies in the Mediterranean Sea Region for Water Systems and Clean Coasts	EBRD	Regional: Albania, Bosnia-Herzegovina, Egypt, Arab Rep., Lebanon, Montenegro, Morocco, Tunisia, Turkey	MF	GET	FSP	8.75	90.00
9717	GEF-6	UI	Mediterranean Pollution Hot Spots Investment Project	UNEP	Regional: Albania, Algeria, Bosnia-Herzegovina, Egypt, Arab Rep., Lebanon, Libya, Montenegro, Morocco, Tunisia	IW	GET	FSP	5.00	546.45

GEF ID	GEF period	Status	Title	Lead Agency	Country	Focal area	Fund	Modality	Funding (mil. $)	
									GEF	Cofinance
Sudan										
3398	GEF-4	C	SIP: Eastern Nile Transboundary Watershed Management in Support of ENSAP Implementation	WB	Regional: Egypt, Arab Rep., Ethiopia, Sudan	MF	GET	FSP	8.70	26.70
3430	GEF-4	C	Implementing NAPA Priority Interventions to Build Resilience in the Agriculture and Water Sectors to the Adverse Impacts of Climate Change	UNDP	Sudan	CC	LDCF	FSP	3.30	3.50
9165	GEF-6	UI	Enabling Implementation of the Regional SAP for the Rational and Equitable Management of the Nubian Sandstone Aquifer System	UNDP	Regional: Chad, Egypt, Arab Rep., Libya, Sudan	IW	GET	FSP	3.99	17.73
9575	GEF-6	UI	Sudan Sustainable Natural Resources Management Project- Additional Financing	WB	Sudan	MF	GET	FSP	5.50	27.50
10083	GEF-7	UI	Sustainable Natural Resources Management Project -AF	WB	Sudan	MF	GET, LDCF, MTF	FSP	5.94	17.60

Source: GEF Portal.

Note: **Status:** C = completed, UI = under implementation; **Lead Agency:** AfDB = African Development Bank, CAF = Development Bank of Latin America and the Caribbean, EBRD = European Bank for Reconstruction and Development, FAO = Food and Agriculture Organization of the United Nations, IDB = Inter-American Development Bank, UNDP = United Nations Development Programme, UNEP = United Nations Environment Programme, WB = World Bank; **focal area:** CC = climate change, IW = international waters, LD = land degradation, MF = multifocal; **funding source:** GET = GEF Trust Fund, LDCF = Least Developed Countries Fund, MTF = multiple trust funds; **modality:** FSP = full-size project, MSP = medium-size project.

a. Also included in the Sudan case study.

b. Also included in the Mediterranean case study.

Annex B

Interviewees

Global/regional

Astrid Hillers, GEF Secretariat

Aloke Barnwall, GEF Secretariat

Taylor Henshaw, GEF Secretariat

Juliana Marcal, University of Bath, United Kingdom

Thanti Octavianti, University of West England, United Kingdom

Aaron Wolf, University of Oregon

Carl Bruch, Environmental Law Institute

Elizabeth Koch, Environmental Law Institute

Andrew Hudson, United Nations Development Programme

Lorenzo Galbiati, Food and Agriculture Organization of the United Nations, Italy

Louise Whiting, Food and Agriculture Organization of the United Nations, Thailand

Sinikinesh Beyene Jimma, United Nations Environment Programme, Kenya

Alessio Giardino, Asian Development Bank, Philippines

Tarek Kotb, International Fund for Agricultural Development, Italy

Christina Leb, World Bank

Eileen Burke, World Bank

Virginia Gorsevski, Scientific and Technical Advisory Panel

Blake Ratner, Scientific and Technical Advisory Panel

Julie Bourns, Nature Conservancy

Silvia Benitez, Nature Conservancy, Ecuador

Allison Aldous, Nature Conservancy

Sui Chian Phang, Nature Conservancy

Fred Kihara, Nature Conservancy, Kenya

Colin Apse, Nature Conservancy

Andres Sanchez, Organization of American States

Sarah Davidson, World Wildlife Fund–US

Alice Aureli, UNESCO, France

Jose Martin Bourdes, UNESCO, France

Aurelien Dumont, UNESCO, France

Olfat Hamdan, United Nations Environment Programme, Greece

Neno Kukuric, UN IHP IGRAC, Netherlands

Vladimir Mamaev, United Nations Development Programme, Turkey

Juan Carlos Alurralde, CIC Plata, Argentina

Silvia Rafaeli, CIC Plata, Argentina

Fernando Cisneros, OTCA, Argentina

Juan Manuel Murguia, Inter-American Development Bank, Costa Rica

Mauricio Velasquez, Development Bank of Latin America, Ecuador

Hernan Gonzalez, Food and Agriculture Organization of the United Nations, Italy

Maria Apostolova, OTCA, Norway

Ana Clerici, Universidad Nacional de Asuncion, Paraguay

Rene Gomez, Development Bank of Latin America, Uruguay

Isabelle Vanderbeck, United Nations Environment Programme

Maha Abdelraheem Ismail, GEF Project Coordinator, Nile Basin Initiative, Entebbe, Uganda

Olfat Hamdane, UNEP-MAP, Greece

Alessandro Candeloro, UNEP-MAP, Greece

Lina Tode, Blue Plan, France

Dimitris Faloutsos, GWP-Med, Greece

Lucilla Minelli, GWP-Med, Greece

Barbara Tomassini, GWP-Med, Greece

Veronique Evers, PAP/RAC

Michael Karner, Blue Plan, France

José Luis Martin Bordes, UNESCO-IHP, France

Maria Diamanti, European Investment Bank, Luxembourg

Josep Oriol Bellot Miana, European Investment Bank, Luxembourg

Camilla Gino, European Investment Bank, Luxembourg

Muna Musnad, UNESCO Chair in Water Resources, Austria

Altigani Khalifa, International Fund for Agricultural Development, Uganda

Maha Abdelrahim, Nile Basin Initiative, Uganda

Modathir Zaroug, Nile Basin Initiative Secretariat, Ethiopia

Azeb Marsha, Eastern Nile Technical Regional Office of the Nile Basin Initiative, Kuwait

Albania

Ajet Zaga, Ulqin Municipal Water Supply and Sewerage Enterprise

Alba Zhori, Albania Water Resources Management Authority

Arben Pambuku, Freelance consultant

Arben Musai, Albania Agency of Water Supply, Sewerage and Waste Management

Arduen Karagjozi, Albania Water Resources Management Authority

Armand Lamaj, Albania Agency of Water Supply, Sewerage and Waste Management

Arta Dollani, Albania National Environmental Agency

Aurora Dibra, Shkoder University

Elvir Zecevic, Ulqin Buisiness Association NGO

Enkeleda Shkurta, Albania National Environmental Agency

Erand Cmicija, Shkoder University

Etleva Demiri, Albania Water Regulatory Authority

Fuad Haxhibeti, Ulqin Municipal Water Supply and Sewerage Enterprise

Jula Simoni, Albania National Agency of Protected Areas

Majlinda Konci, Albania Water Regulatory Authority

Naim Hoxha, Ulqin Municipal Water Supply and Sewerage Enterprise

Nermin Shkurta, VIS Albania NGO

Pavlin Polia, Theth Tourist Operators Association

Rajmonda Decina, Shkoder University

Rovena Metoja, Albania Water Resources Management Authority

Sead Sadiku, Regional Water Administrative Office

Sofjan Jaupaj, Ministry of Tourism and Environment

Sonila Marku, Albania Geological Survey

Suzana Golemi, Shkoder University

Vehbi Gruda, Shkoder Prefecture

Xhelal Hoxha, Hapi I Gjelber NGO

Bolivia

Grover Monasterio, Ministry of Defense

Eduardo Duran, Ministry of Environment and Water

Gustavo Rey Ortiz, Ministry of Environment and Water

Rafael Murillo, Ministry of Environment and Water

Marissa Castro, Ministry of Foreign Relations, Directorate of International Waters

Pancovro Aguilar, Ahusellos

Rivarda Mamami, Ahusellos

Maxmo Cuizaya Marcani, Allu Sicoya

Raul Charque Copa, Allu Sicoya

Epifaria Gaspar Nina, Allyu Chayantana

Elizabeth Colquechuima, Allyu Chullpa

Josefina Ticona, Allyu Chullpa

Maximo Quisara, Allyu Chullpa

Adalid Cahon, Allyu Chulpa

Benedicta Yergocaracara, Allyu Chulpa

Bocilio Challoga, Allyu Chulpa

Daniel Condori Vasquez, Allyu Chulpa

Edgar Navarro Cavcava, Allyu Chulpa

Edson Ticona Mitma, Allyu Chulpa

Elizabeth Urquieta Mitma, Allyu Chulpa

Emeliana Policarpio, Allyu Chulpa

Felicio Oponto Leyua, Allyu Chulpa

Jutona Cepeda, Allyu Chulpa

Leoncio Mitma Alejo, Allyu Chulpa

Limber Ticona Bernal, Allyu Chulpa

Lorenzo Ticona, Allyu Chulpa

Maxima Mitma Jorge, Allyu Chulpa
Migelona Choque, Allyu Chulpa
Nieves Choque, Allyu Chulpa
Orlando Zicona, Allyu Chulpa
Oscar Ticona, Allyu Chulpa
Paulina Jachallo Mitma, Allyu Chulpa
Raul Monaleo, Allyu Chulpa
Silvia Choque Maraza, Allyu Chulpa
Sumersindo Condori, Allyu Chulpa
Eleuterio Guarachi, Allyu Jucumani
Reina Patty, Allyu Jucumani
Sofia Guarachi, Allyu Jucumani
Adrian Fiesta Pascual, Allyu Layme
Isidro Fiesta Cuellar, Allyu Layme
Remigio Fiesta, Allyu Layme
Vicente Berrios Quispe, Allyu Panacachi
Wilfredo Camacho, Allyu Panacachi
Zeofila Mejia Cola, Allyu Panacachi
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Ramiro Cucho, Allyus Authority
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Leandro Condori Cdquechuima, Ayllu Chullpa
Roberto Ticona, Ayllu Chullpa
Rosendo Mamani Copali, Ayllu Chullpa
Roxana Mitma, Ayllu Chullpa
Edwin Mitma, Ayllu Jelauko
Olga Apaja Chaubi, Ayllu Jelauko
Constancio Negretti, Ayllu Karacha
Juan Carlos Villca, Ayllu Karacha
Julio Chiri, Ayllu Karacha
Neisa Torrejon, Ayllu Karacha
Cumercinda Pedra Gomez, Ayllu Phanacachi
Erasmo Conde Colque, Ayllu Phanacachi
Leonarda Melchor, Ayllu Phanacachi
Mario Conde, Ayllu Phanacachi
Pedro Chambi, Ayllu Phanacachi
Vicente Barrios, Ayllu Phanacachi

Crispin Lopez, Ayllu Pocoata
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Pablo Chambi Vega, Chayanta Municipality
Prudencio Choque, Chayanta municipality
Prudencio Choque, Chayanta Municipality
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David Paita, Cotagaita municipal government
Juan Celso Rivera, Cotagaita municipal government
Lia Vargas Villca, Cotagaita municipal government
Marco Antonio Pinto, Cotagaita municipal government
Ramiro Condori, Cotagaita municipal government
Gladis Ortega, Cotagaitilla town
Herminia Yupanqui Montero, Cotagaitilla town
Bartolome Lopez, Directive of Tarija Municipalities
Armando Ticona, EVAs project field staff
Claudio Condoria, EVAs project field staff
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Padmy Cehuena, Pocoata municipality

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Burundi

Emanuelle Ndorimana, Permanent Secretary, Ministry of Environment, Agriculture and Livestock; GEF Operational Focal Point

Deo-Guide Rurema, Advisor to Permanent Secretary, Ministry of Environment, Agriculture and Livestock

Baragurana Bonith, Burundi Landscape Restoration and Resilience project

Gabriel Hakizimana, former Director of Lake Tanganyka Authority

Jeremy Nikinahatemba, Water Resources Department, Ministry of Environment, Agriculture and Livestock, recently appointed Burundi representative to Lake Tanganyika Authority, technical focal point for Lake Kivu

Joseph Nimfasha, Director of Water Resources, Ministry of Environment, Agriculture and Livestock

Armel Jerode Ndikumana, technician in charge of the Lake Tanganyika Water Analysis and Research Laboratory

Nestor Nizigiye, Quality Control Chief, ODECA, Head of OBPE laboratory

Emmanuel Niyungeko, Director of ODECA Coffee Development Office, Ministry of Environment, Agriculture and Livestock

Jean-Marie Nikariza, UNIPROBA, Association for BATWA people

Gilbert Nduwayo, ISABU, Institut des Sciences Agrononomiques du Burundi

Gérar Ntugumburanye, Regional Groundwater Specialist, IGEBU

Désiré Miburo, Pump test supervisor, IGEBU

Désiré Baramyikwa, Chief of Hydrologic Service, IGEBU, GEF project Country Coordinator

Jean Pierre, formerly CNAC, now with Coffee Growers Association of the state of Muyenga

Bakambone Melchoir, Local coffee cultivator and president of the Association Alcanoverakikawa (Tasty Coffee Association), Mwakiro Community

Ndayishimye Dievdonne, local cultivator and part-time operator at Kagombi coffee-washing station in Mwakiro community

Hercule Ngendakuriyo, President of Cooperative Dukorere Ikawa, Burunga Community

Jonas Ntirampeba, coffee-washing station manager, Coffee Cooperative member

Polycarpe Naikumwenayo, Cooperative member, and teacher

Niyonkuru Patrick and Nkurikiye Odetta, BATWA community, Kiganda, Bururi

Ndabazaniye, Lambert, Govt Administrator for ISARE community

Gaspard KABUNDEGE, Consultant working on Munezero Aimé Pacifique, CDT Administrator for Kanyosha

Ladislas Bazirutwabo, Community Advisor to the Administrator, Guyaga, Kanyosha

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Dionese Basekakariyo, President of Coffee Cooperative Babiribarutumwe, Gatere, Kivyuka, Makengo Coffee Station

Sahinkuye Egide, Secretary for Coffee Cooperative Babiribarutumwe

Ferdiane Ndikumana, Senior Cooperative member

Sinzinkayo, President of Coffee Cooperative Kundudutezimbere, Kayange, Bobabza, Musigati Coffee Station

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Ante Ivcevi, PAP/RAC

Daria Povh, PAP/RAC

Petra Remeta, World Wildlife Fund

Zoran Mateljak, World Wildlife Fund (former)

Montenegro

Azra Vukovic, Green Home NGO

Dragan Radojevic, Head of Department, Hydrogeology and Geotechnics, Geological Survey

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Ismete Gjoka, Tuzi Municipality

Ivana Stojanovic, Ministry of Ecology, Spatial Planning and Urbanism

Ljubisa Pavicevic, Ministry of Ecology, Spatial Planning and Urbanism

Momcilo Blagojevic, former Acting General Director in Water Management Directorate

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Novak Cadjenovic, GWP Med

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Taha El Ghazlani, Department of Hydraulics, Ministry of Equipment & Water

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Khaoula Lagrini, Multilateral Cooperation Unit, Department of Partnership, Communication and Cooperation Ministry of Energy Transition and Sustainable Development

Hana Habachy, Regional Directorate of Agriculture of Tangiers-Tetouan-Al Hoceima

Hicham Bouziane, Council of the Region Tangiers, Tetouan-Al Hoceima

Asmaa Elkhou, Wilaya of Tangiers

Lotfi Chraibi, NGO Marocaine pour un Développement Durable, National School for Applied Sciences, Abdelmalek Essaadi University

Mohamed Abdallah Ezzaouini, Hydraulic Basin Agency of Loukkos

Abdelhakimm Mesmoudi, Hydraulic Basin Agency of Loukkos

Anass Boukholla, Hydraulic Basin Agency of Loukkos

Said Louzie, Al Hoceima Delegation, Hydraulic Basin Agency of Loukkos

Said El Sabri, Al Hoceima Antenna of the Regional Environment Department

Houcine Nibani, AGIR

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Sudan

Andy Garner, International Atomic Energy Agency

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Alharith Mustafa, Nile Tag for Nile Basin Initiative/Ministry of Irrigation and Water Resources

Seif Hamad, former minister, former director of NBI, former Director of Egypt, Sudan Permanent Joint Technical Commission for Nile Waters, former Director of Water Resources Technical Organ, Ministry of Irrigation and Water Resources

Moahiedlien Ahmed, former Director at Groundwater and Wadis Directorate, Ministry of Irrigation and Water Resources

Magzoob Taha Permanent Joint Technical Commission for Nile Waters, Ministry of Irrigation and Water Resources

Hassan Abo Elbishir, Water Resources Technical Organ, Ministry of Irrigation and Water Resources

Osman Mustafa,, Executive Office of the Ministry of Irrigation and Water Resources

Redwan Abdelrahman, Nile Water Directorate, Ministry of Irrigation and Water Resources

Asma Alzein, Dams Implementation unit, Ministry of Irrigation and Water Resources

Aisha Ahmed, Flood Forecasting Department, Nile Water Directorate, Ministry of Irrigation and Water Resources

Tarig Edlegial, Groundwater and Wadis Directorate, Ministry of Irrigation and Water Resources

Ahmed Abdalla, Capacity Building Directorate, Ministry of Irrigation and Water Resources

Adil Mohamed, Higher Council for Environment and Natural Resources

Ibrahim Doka, Higher Council for Environment and Natural Resources

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Rasheed Alamgrabi, National Forestry Corporation

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Lubna Fadul, Ministry of Agriculture, River Nile State

Omer Badwai, Drinking Water Corporation, Gedarif State

Abdelrahman Tahir, Agriculture Research Corporation, Ministry of Agriculture, South Darfur State

Targi Algamri, National Center for Research

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Abdalla Shigidi, SES Company

Omer Habiballa, Solarman Company

Hillal Elfadil, Newtech consulting company

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Eltayeb Gafar, Peaceful Coexistence community organization

Mohamed Alkhalifa, Alsataa Villages, Gedarif Community

Babiker Ibrahim, Jarsi Village, River Nile Community

Magzoob Mohamed, Marzoga Village, River Nile Community

Badoor Yaseen, Marzoga Village, River Nile Community

Sheikh Alata, Goz Alhalag Village, River Nile community

Omiama, Goz Alhalag Village, River Nile community

Sahmbol, Mahaga Alagooz Village, North Kordofan Community

Manahel, Mahaga Alagooz Village, North Kordofan Community

Tag Elsir, Altarifia Village, North Kordofan Community

Hosna, Altarifia Village, North Kordofan Community

Osman Jido, Om Doom Village, South Darfur Community

Buthina Abdelrazig, Wad Alhabob Village, South Darfur Community

Hanna Hamadanalla, Higher Council for Environment and Natural Resources

Galal Ahmed, GEF focal point, Ministry of Finance

Mayson Ali, Ministry of Finance

Nadia Ahmed, Ministry of Finance

Gareeb Alla, Ministry of Finance

Mohamed Hafiz, Ministry of Finance

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Intisar Salih, United Nations Development Programme Sudan Office

Hanan Motwakil, United Nations Development Programme Sudan Office

Nouralla Ahmed, United Nations Development Programme Sudan Office, France

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Abdelgadir Abdeen, UNESCO Khartoum Office

Hatim Albadry, UNESCO Category II Regional Center for Water Harvesting

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Raïda El Elj

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Thouraya Sahli, National Mapping and Remote Sensing Center

Imed Guesmi, National Institute of Meteorology

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Faouzi Amri, Water Resources Department, Ministry of Agriculture, Water Resources and Fishery

Maroua Khalfallah, Regional Department of Agriculture in the Governorate of Bizerte (CRDA Bizerte), Water Resources Division

Bader Essalem Ben Letaief, National Sanitation Office

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