MAINSTREAMING WATER RESILIENCE IN ASIA AND THE PACIFIC

GUIDANCE NOTE

JULY 2022

ASIAN DEVELOPMENT BANK

ADB

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In this publication, "$" refers to United States dollar.
ADB recognizes "China" as the People's Republic of China; and "Hong Kong" as Hong Kong, China.

On the cover: **Mainstreaming resilience.** Resilient water management is vital to help communities adapt to climate change, better prepare for natural and public health threats, and address water scarcity issues (photos by Sara Farid/ADB, Chor Sokunthea/ADB, Amit Verma/ADB, Amir Abdullah/ADB, Luis Ascui/ADB, Lu Guang/ADB, and Narendra Shrestha/ADB).

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FOREWORD

Water resilience is an unsurpassed challenge and opportunity in establishing a prosperous, inclusive, and sustainable Asia and the Pacific. It determines each country's ability to prepare for, withstand, and thrive in the wake of grave water stresses brought on by disasters triggered by natural hazards and climate change.

Water is the primary medium through which the impacts of climate change are felt. Over the past 50 years, natural hazards in Asia and the Pacific have affected 6.9 billion people and killed more than 2 million. Many of these were water-related disasters, such as floods and droughts.* The emergence of the coronavirus disease (COVID-19) pandemic has also underscored the importance of water and sanitation provision and demonstrated how calamities compound the impacts on those without access to these services.

Water solutions, therefore, are climate solutions. Resilient water management is central to achieving climate adaptation, managing and better preparing for natural and public health threats, and addressing water scarcity issues amid rapid population and economic growth in the region. This can be achieved through investments in policies, systems, infrastructure, people, and technology.

This Asian Development Bank (ADB) guidance note provides specific actions and tools to scale up and mainstream resilience in ADB's water sector operations based on six mutually reinforcing pillars: (i) accelerating upstream engagement and building developing member country demand; (ii) adopting a water community approach to developing member country water resilience capacity; (iii) strengthening ADB staff capacity to mainstream and deliver resilient projects; (iv) fostering knowledge, innovation, and partnerships; (v) mobilizing finance for water resilience; and (vi) spearheading digitalization for water security and resilience.

The guidance note builds on ADB's extensive development experience and expertise in embedding and increasing water resilience in operations, policies, and institutions. It also incorporates learning from ADB's guidance note on the COVID-19 pandemic and its impacts on water—further clarifying ADB's role in supporting water sector recovery, rejuvenation, and resilience. Furthermore, it draws on lessons learned and best practices on disaster preparedness and response from the High-Level Expert Panel on Water and Disaster (HELP).

The guidance note supports ADB's wider commitment to upscaling its climate finance target, in line with ADB's Strategy 2030 to build climate and disaster resilience as one of its seven operational priorities. Recognizing climate change is an issue affecting everyone on our planet, it also aligns with the global goals under the Paris Agreement to keep global temperature increases to well below 2°C compared

* ESCAP. 2021. *Resilience in a Riskier World. Managing Systemic Risks from Biological and Other Natural Hazards*. https://www.unescap.org/kp/2021/asia-pacific-disaster-report-2021.

to pre-industrial levels, the Sustainable Development Goals, and the Sendai Framework for Disaster Risk Reduction.

ADB's Water Sector Group, guided by an expert panel through the Water Advisory Group, remains committed to being a trusted knowledge partner of our developing member countries, partners, and clients—and providing them with the tools, capacities, resources, and information needed to enable transformational change toward a water-secure, green, resilient, inclusive, and sustainable Asia and the Pacific. Primarily designed as a strategic document for water professionals and policy makers supporting or working in ADB's developing member countries, the guidance note describes enablers and best practices that have broad application for fostering climate resilience in the water sector.

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ABBREVIATIONS

ADB	Asian Development Bank
COVID-19	coronavirus disease
CPS	country partnership strategy
CRA	climate risk and adaptation assessment
CWRD	Central and West Asia Department
DMC	developing member country
DRM	disaster risk management
GDP	gross domestic product
ICT	information and communication technology
IED	Independent Evaluation Department
IPCC	Intergovernmental Panel on Climate Change
IWRM	integrated water resources management
m	meter
NAP	national action plan
NDC	nationally determined contribution
NWSI	National Water Security Index
PARD	Pacific Department
SDG	Sustainable Development Goal
SSP	shared socioeconomic pathway
TA	technical assistance
UNFCCC	United Nations Framework Convention on Climate Change
WSDG2030	Water Sector Directional Guide of ADB 2021–2030
WSG	Water Sector Group

EXECUTIVE SUMMARY

Urgency for Increasing Resilience in Asia and the Pacific

Over the past 50 years, natural hazards in Asia and the Pacific have affected 6.9 billion people and killed more than 2 million; many of those affected or killed were victims of water-related disasters, such as floods and droughts (ESCAP 2021). Although the number of yearly casualties has been declining over the past 2 decades because of resilience measures implemented by several countries, recent calamities such as the coronavirus disease (COVID-19) pandemic has shown the fragilities of most countries (ADB 2021). In addition, climate change is likely to amplify and intensify the impacts of disasters with unprecedented effects on local economies, population, and the environment (Swiss Re Institute 2021).

Climate change does not affect everyone equally, but rather disproportionately affects poor countries and poor individuals within countries (World Bank 2020a). A rapid, inclusive, and resilient development is, therefore, necessary to reduce these vulnerabilities with water management being central to the growing emphasis on climate adaptation and resilience (GCA 2019).

Climate change is likely to amplify and intensify the impacts of disasters with unprecedented effects on local economies, population, and the environment.

Objectives of the Guidance Note

Given the challenging context, this guidance note provides specific actions and tools for scaling up and mainstreaming resilience in the water sector operations of the Asian Development Bank (ADB) based on six mutually reinforcing pillars.

This guidance note defines full resilience in the water sector as the capacity of an investment, system, community, or policy to respond to realized or potential climate change or other hazards. Building resilience, broadly and within the water sector, will require shifting perspective, from neutralizing risks in business-as-usual to enabling transformational change.

Water cuts across all seven of the operational priorities of Strategy 2030 (ADB 2018), ADB's overarching framework for achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific. The guidance note aims to spearhead ADB's efforts in building water resilience in its developing member countries (DMCs), particularly those most vulnerable to climate change and stresses such as rapid demographic and land-use change. The guidance note directly builds on ADB's forthcoming Water Sector Directional

Worsening impacts of climate change. Water-related disasters such as floods and droughts are the major sources of damages across Asia and the Pacific (photo by Eric Sales/ADB).

Guide 2030 (WSDG2030). WSDG2030 provides a comprehensive framework, through its five guiding principles, to address water security in the region over the next decade. WSDG2030 guiding principles are: (i) building resilience and adaptive capacity; (ii) promoting inclusiveness and gender equality; (iii) embracing environmental sustainability and the circular economy; (iv) improving governance and catalyzing finance; and (v) fostering innovation and technological advancement. *Mainstreaming Water Resilience in Asia and the Pacific* specifically builds on the first principle—building resilience and adaptive capacity—by providing technical advice on how to operationalize this principle, while being mindful of the strong interrelation among all the principles.

The guidance note aims to help ADB reach its 2019–2030 climate finance target of $80 billion cumulatively from own resources (ADB 2018). The target was elevated in October 2021 to the ambition of delivering $100 billion in cumulative climate finance during the same period, including $34 billion on adaptation finance.

The water sector is crucial in achieving these targets and ambitions, as water is the primary medium through which the impacts of climate change will be felt. This is confirmed by ADB's water sector portfolio: from 2018 to 2021, committed water sector projects contributed $1.9 billion to ADB's climate adaptation financing, which is expected to be 38% of ADB's total climate adaptation financing. With a growing portfolio, expected to be about $4 billion annually based on the 2021–2023 pipeline, the water sector will continue to play a critical role in meetings ADB's adaptation finance targets.

The guidance note itself is resilient: it is flexible, acknowledging it will require periodic evolution as new knowledge and experience become available and robust, being able to respond to a wide range of needs.

The Pillars

The guidance note describes six separate, but mutually reinforcing pillars:

(i) accelerate upstream engagement in building DMC demand for resilient water investments and policies;
(ii) adopt a water community approach to DMC water resilience capacity;
(iii) strengthen ADB staff capacity;
(iv) foster knowledge, innovation, and partnerships;
(v) mobilize finance for water resilience; and
(vi) spearhead digitalization for water resilience.

The six pillars provide the framework to gradually shift to a more transformative and inclusive approach to resilience, which is integrated, that focuses on long-term outcomes through upscaling financing and building capacity, and starts from upstream engagement with the DMCs. This goes beyond flood protection to include access to water, sanitation, and hygiene services, which are crucial for building resilience to economic, public health, environmental, and other shocks.

Methodology and Lessons Incorporated

The guidance note builds on lessons from ADB's development experience to date—portfolio analysis, recommendations and findings from several of ADB's operational departments designing and implementing water projects, and feedback from ADB's water sector clients and partners—as well as international best practices in embedding and increasing water resilience in water sector operations and policies.

It also responds to the thematic evaluation of *ADB Support for Action on Climate Change, 2011–2020* (Independent Evaluation Department [IED] 2021). This evaluation identifies progress made and deficiencies in ADB's climate actions and outlines recommended areas for improvement. Key recommendations include the following:

Strategic

(i) Raise corporate ambitions, clarify climate objectives of Strategy 2030 (ADB 2018), and develop a Board-endorsed climate action framework to supplement Operational Priority 3: tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability.
(ii) Inform country partnership strategies and associated programming through diagnostic assessments, and clearly specify the path of engagement and results through both public and private sector operations.

Operational

(iii) Increase focus on climate outcomes, strengthen the climate relevance of project designs, clarify climate finance and greenhouse gas accounting, improve climate risk and adaptation assessment methodologies, enhance monitoring of climate actions and outcomes, and review the approach for the use of social cost of carbon.
(iv) Leverage ADB financial resources by deploying the full breadth of available lending and guarantee instruments to scale up climate action.
(v) Enhance assistance to DMCs for policy development and capacity building to support delivery of climate outcomes such as their nationally determined contributions and long-term strategies, and provide greater resources to help DMCs meet their adaptation objectives.

Institutional

(vi) Develop a "One ADB" approach to deliver the proposed climate action framework and align ADB operations with the Paris Agreement by strengthening the Climate Change and Disaster Risk Management Thematic Group to engage all operational staff working on climate issues.

Similarly, the guidance note builds on lessons learned from the survey and analysis carried out for the *Guidance Note on COVID-19 and Water in Asia and the Pacific* by ADB's Water Sector Group (WSG), which looked at the impacts of COVID-19 on the water sector from March to December 2020, the actions water service providers have taken in response to the challenges, the potential pathways to post-pandemic recovery, and ADB's role in supporting water sector recovery, rejuvenation, and resilience (ADB 2021).

Parallel Supporting Initiatives

As of April 2022, WSG had introduced the following initiatives to spearhead the actions identified in the guidance note:

(i) Approval and operationalization of the cluster technical assistance (TA) *Mainstreaming Water Resilience in Asia and the Pacific*, which will support (a) climate resilience in the water sector by facilitating a shift toward climate-resilient and low-carbon development; and (b) integration of information and communication technology (ICT), digital, and remote sensing tools for resilient, inclusive, and sustainable water security.
(ii) Establishment of the Asia and the Pacific Water Resilience Hub.
(iii) Creation of the "RUWR: aRe yoU Water Resilient?" initiative. The initiative is based on the dedicated TA platform, the cluster TA, to support ADB's DMCs to become more water-secure and resilient. The initiative plans to leverage financing, physical and human resources, governance, partnerships, and knowledge skills at the local level while aligning with national, regional, and global water security and resilience goals.

While this guidance note includes broad principles that will be adopted by ADB's water sector operations to align with the 2015 Paris Agreement, a tailored and separate guidance note for all subsectors of ADB's operations is being prepared to assist most of ADB's operations to align by July 2023. The tailored Paris Agreement alignment guidance note will articulate ADB's approach for all key sectors, closely synergizing with the approach of other multilateral development banks. The Paris Agreement alignment guidance note will include a specific section for the water sector.

Partnerships and Cooperation

To accomplish the aims of this guidance note, WSG will work closely with all ADB regional departments, other sector and thematic groups including the Climate Change and Disaster Risk Management thematic group, resident missions, water entities—primarily the executing and implementing agencies—and key water sector stakeholders in DMCs. Close cooperation is envisioned with knowledge and finance partners, including centers of excellence within and outside the region.

Flooding in Pakistan. People displacement is one of the consequences of major natural hazards and climate change (photo by Gerhard Joren/ADB).

1 Rationale for Mainstreaming Water Resilience in Asia and the Pacific

Water Stresses in Asia and the Pacific

Asia and the Pacific is the most disaster-prone region in the world. Over the past 50 years, natural hazards in Asia and the Pacific have affected 6.9 billion people[1] and killed more than 2 million. Many of those affected or killed were victims of water-related disasters, such as floods and droughts (ESCAP 2021, based on the Emergency Events Database). Economic losses from disasters triggered by natural hazard as a proportion of annual gross domestic product (GDP) have been rising over time from about 0.1% in the 1970s to about 0.3% in recent decades (ESCAP 2019). This rising trend is expected to further increase in the future as a result of climate change. Experts estimate that damages will comprise up to nearly 15% of the region's GDP with a 2.0°C temperature increase (Swiss Re Institute 2021).

Climate change does not affect everyone equally: the poor, women, children, and the elderly are disproportionately affected (World Bank 2020a). Many developing countries in Asia and the Pacific are extremely susceptible to the impacts of climate change, yet have limited resources, causing underinvestment and a lack of policy development to address climate change adaptation and mitigation.

[1] The same person can be affected several times by different events.

Water is the primary medium through which the effects of climate change will be felt. The effects may include increased and more intense and frequent coastal flooding, more pronounced rain and river flooding, and increased and prolonged droughts. Climate change will also reduce ecosystem services' benefits, have detrimental health impacts, stimulate migration, and possibly lead to conflicts (World Bank 2021c).

In addition, climate change is likely to aggravate the chance of water-related disasters striking during pandemics and epidemics, or other shocks, compounding impacts. The current pandemic of COVID-19 has raised awareness of the links between water, sanitation and hygiene, climate resilience, and health impacts, and has revealed the vulnerabilities of the region in dealing with similar shocks.

Aligning ADB's Water Operations with Strategy 2030

Through Strategy 2030, ADB has committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific (ADB 2018). These outcomes depend on substantial regional progress toward meeting global commitments, including the Sustainable Development Goals and the Financing for Development agenda, the Paris Agreement on Climate Change, and the Sendai Framework for Disaster Risk Reduction.

Resilience is a recurring theme in Strategy 2030, reflecting the growing importance of resilience thinking and practice in ADB's corporate philosophy, operations, and professional culture. Resilience will play an important role in "future proofing" the region's development against challenging, but fundamentally uncertain future conditions, in particular, climate change. Development gains made today should endure, persist, and even expand into the future in spite of ongoing climate impacts.

Water and wastewater management activities globally are the biggest contributor to climate adaptation financing.

The third operational priority under Strategy 2030 is tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability. Strategy 2030 states that "ADB will scale up support in these areas. ADB will ensure that 75% of the number of its committed operations will be supporting climate change mitigation and adaptation by 2030. Climate finance from ADB's own resources will reach $80 billion cumulatively from 2019 to 2030." The target was elevated in October 2021 to the ambition of delivering $100 billion in cumulative climate finance from 2019 to 2030, including $34 billion on adaptation finance.

The water sector is crucial in achieving these targets and ambitions. Climate Policy Initiative (2021) indicated that water and wastewater management activities globally are the biggest contributor to climate adaptation financing, with a share of 37%. Therefore, the water sector is an important entry point globally as well as at ADB to scale up commitments to adaptation finance and to reduce the impacts of climate change on the most vulnerable countries and individuals. This is confirmed by ADB's water sector portfolio: from 2018 to 2021, committed water sector projects contributed $1.9 billion to ADB's climate adaptation financing, which is expected to be 38% of ADB's total climate adaptation financing.

Water projects have also contributed significantly to meeting ADB's gender targets. In 2021, 89% of newly committed water projects were categorized as gender sensitive. With a growing portfolio, expected to be about $4 billion annually based on the 2021–2023 water sector pipeline, the water sector will continue to play a critical role in meeting ADB's adaptation finance targets. Proactively targeting

Scaling up commitments to protect the vulnerable. Well-planned investments in urban water supply and wastewater management systems ensure sustainable urban growth and improved public health (photo by Eric Sales/ADB).

climate resilience through adaptation-focused water interventions and engagement with ADB clients offer the greatest opportunity to develop more robust, sustainable, and "nature-positive" economic development pathways and improved social well-being.

ADB needs to ensure that DMC counterparts have access to the required knowledge, capacity, and tools to conceptualize, design, and implement climate change adaptation and resilient water sector policies and projects. Additional efforts starting as far upstream as possible are required at the country level to integrate water-related policies, plans, and projects with national adaptation plans, nationally determined contributions (NDCs), and long-term strategies. This will help ensure that investment projects and policies are planned with an adaptation focus, as opposed to simply climate-proofing them. Integration of ICTs, digital and remote sensing tools, and other technologies has become an important and necessary aspect of water resilience that is increasingly cost-effective. The COVID-19 pandemic has highlighted the glaring need to adopt digital technologies for water and sanitation service providers for a resilient and more inclusive development. The adoption of digital technology has been slow in the water sector and a "digital divide" favoring men over women is particularly evident.

Independent Evaluation of ADB's Support for Climate Actions

It can be argued that no ADB sector of operation will face challenges and uncertainties as great as those facing the water sector. These encompass water supply, sewerage and sanitation, irrigation and drainage, flood and drought risk management, hydropower, and water resources management. Gaps are well-documented in the Independent Evaluation Department's (IED's) thematic evaluation of *ADB Support for Action on Climate Change, 2011–2020* (IED 2021). The evaluation highlights both significant progress and evident deficiencies in ADB's climate change operations across all ADB operations, not only the water sector. While the evaluation references 2011–2020, it is important to note significant progress has been made to address some

of the deficiencies identified. Strategic findings stated in the IED evaluation report include the following:

(i) ADB's strategic approach for climate change mitigation and adaptation has followed a long evolution and has strengthened over the evaluation period.
(ii) ADB's country partnership strategies (CPSs) are placing greater emphasis on climate change, yet they lack the supporting diagnostic assessments and staffing to guide a tailored response.
(iii) ADB has acknowledged the importance of the private sector in various strategies and has established tailored funds. Still, there was no dedicated strategic guidance for private sector engagement on climate action.

Critical gaps identified in the IED evaluation include the following requirements to:

(i) step up country engagement with respect to key policy reforms;
(ii) enhance DMC institutional capacity;
(iii) strengthen both technical design and community engagement;
(iv) implement nature-based solutions alongside structural approaches;
(v) increase staff capacity, training, and guidance; and
(vi) focus on transformational, rather than incremental, change.

The IED evaluation made the following recommendations for ADB:

Strategic

(i) Raise corporate ambitions, clarify climate objectives of Strategy 2030 (ADB 2018), and develop a Board-endorsed climate action framework to supplement Operational Priority 3: tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability.
(ii) Inform CPSs and associated programming through diagnostic assessments, and clearly specify the path of engagement and results through both public and private sector operations.

Operational

(iii) Increase focus on climate outcomes, strengthen the climate relevance of project designs, clarify climate finance and greenhouse gas accounting, improve climate risk and adaptation assessment methodologies, enhance monitoring of climate actions and outcomes, and review the approach for the use of social cost of carbon.
(iv) Leverage ADB financial resources by deploying the full breadth of available lending and guarantee instruments to scale up climate action.
(v) Enhance assistance to DMCs for policy development and capacity building to support delivery of climate outcomes such as their NDCs and long-term strategies, and provide greater resources to help DMCs meet their adaptation objectives.

Institutional

(vi) Develop a "One ADB" approach to deliver the proposed climate action framework and align ADB operations with the Paris Agreement by strengthening the Climate Change and Disaster Risk Management Thematic Group to engage all operational staff working on climate issues.

Learning from the COVID-19 Pandemic for the Water Sector

ADB estimated that the global impact of COVID-19 ranged from $4.8 trillion to $7.4 trillion (5.5% to 8.7% of GDP) in 2020, with an additional $3.1 trillion to $5.4 trillion (3.6% to 6.3% of GDP) in 2021 (ADB 2020b). About 28% of these losses were incurred by developing Asia, with South Asia absorbing substantial losses relative to GDP. This is likely to have produced a severe fiscal crunch that could undermine already deficient financing for and sustainability of the water sector in the region.

The WSG's *COVID-19 and Water in Asia and the Pacific: Guidance Note* (ADB 2021) found that the COVID-19 pandemic has highlighted persistent inequalities in water and sanitation access, especially in Asia and the Pacific. Climate change could further

enhance these inequalities in the future. Water sector response has been particularly difficult for urban slums; most responses were temporary measures that do not guarantee sustainable access. The guidance note recommended various measures for recovery and rejuvenation of the sector to foster resilience.

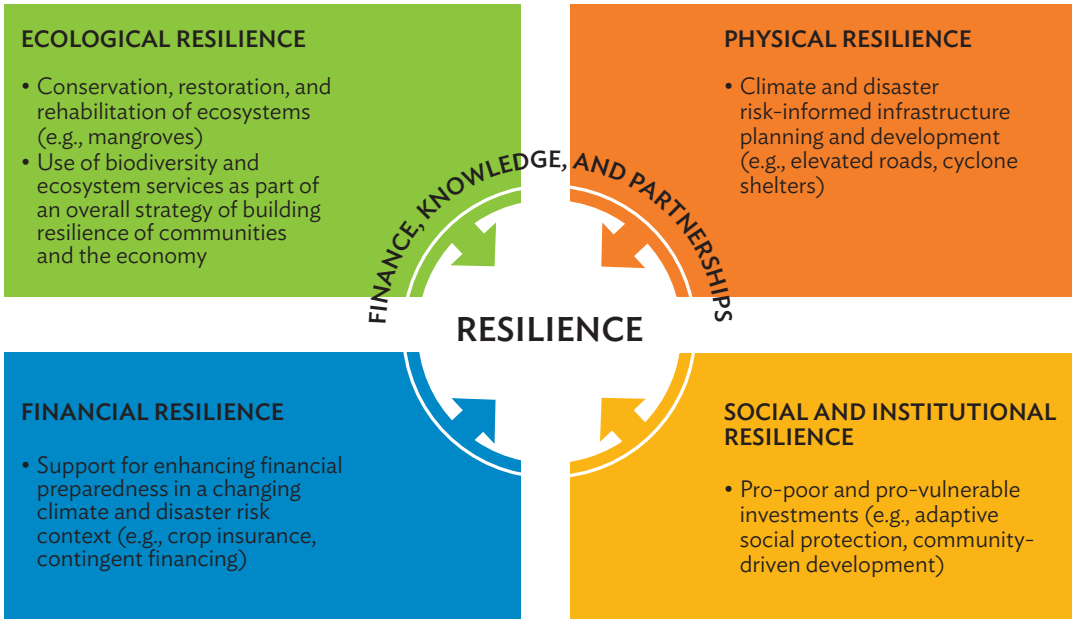
Understanding Resilience in the Water Sector

The Intergovernmental Panel on Climate Change (IPCC) provides one of the most widely used definitions of resilience: "the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation" (IPCC 2014). The core element here is the capacity to provide essential function or service in the face of short-term shocks and long-term change.

The ADB Climate Change and Disaster Risk Management Thematic Group highlights four perspectives on resilience: ecological, physical, financial, and social and institutional. Together, they contribute to a holistic resilience approach (ADB 2019) (Figure 1).

This guidance note defines full resilience in the water sector as the capacity of an investment, system, community, or policy to respond to realized or potential climate or other hazards through the following modes, as warranted in context: (i) to resist or withstand short-term shocks, (ii) to maintain essential function through shocks and stresses, (iii) to recover from short-term shocks, (iv) to track stressors over time, and (v) to anticipate and implement adaptation to major system-level transformations with integrity.

Figure 1: Asian Development Bank's Holistic Approach to Resilience



Source: ADB. 2019. *Building Resilient Infrastructure for the Future: Background paper for the G20 Climate Sustainability Working Group.* ADB Sustainable Development Working Paper Series.

Mainstreaming and scaling up resilience is not a new idea and not unique to the water sector. ADB's Strategy 2030 (ADB 2018) emphasizes resilience within and beyond the water sector in particular through its Operational Priority 3: tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability.

Resilience is given priority in water sector documents, including *Asian Water Development Outlook 2020: Advancing Water Security across Asia and the Pacific* (ADB 2020a) and the forthcoming *Water Sector Directional Guide 2021–2030: Water-Secure and Resilient Asia Pacific*. The directional guide includes a guiding principle, "building resilience and adaptive capacity," which this guidance note operationalizes. Most recently, the need to align investment with the Paris Agreement has dramatically increased the visibility and priority of resilience to climate change.

Systematic integration of resilience into the ADB water sector requires a strategic reconsideration of many processes, such as how and when risks are identified, how adaptation options are weighed and selected, and how projects are monitored and managed over time. Interviews with dozens of ADB staff across regional and sector and thematic departments make clear that ADB needs to maximize opportunities to fully incorporate resilience features into project design, particularly during concept and preparation.

Paris Alignment and the Water Sector

In 2015 at the Conference of the Parties 21 hosted in Paris, the United Nations Framework Convention on Climate Change (UNFCCC) negotiators reached the Paris Agreement, sometimes also called the Paris Accord. The agreement represented the first global climate policy statement, with some 190 signatories, and created national climate commitments or NDCs—5-year plans that describe priorities and targets for each country. The first generation of NDCs became active in 2021 with the 26th session of the Conference of the Parties in Glasgow.

The water sector must transition to become a less carbon-intensive sector and a source of net-positive renewable water and energy. The sector needs to find ways to decarbonize, in environmentally sustainable ways, activities related to extracting, storing, conveying, delivering, using, treating, and reusing water. By investing in the resilience of our water resources, services, and systems, climate risks to people, ecosystems, and economies can be reduced.

Accelerated action on water-related solutions on climate change mitigation and adaptation or resilience is necessary to fulfill ADB's Paris Alignment (see below) commitments. ADB needs to provide support to developing countries in Asia and the Pacific that is consistent with pathways toward low-carbon and climate-resilient development. The bank and its partners need to develop water infrastructure projects and programs that are resilient, reliable, tailored to local capacities and needs, water and energy-efficient, and sustainable.

In December 2017, ADB and other multilateral development banks committed to aligning their financial flows with the objectives of the Paris Agreement, a process identified as Paris Alignment.[2] Paris Alignment is based on six building blocks, of which the first and the second are most relevant to water sector resilience:

"**Building Block 1:** *Alignment with mitigation goals.* Our operations will be consistent with the different countries' low-emissions development pathways and compatible with the overall climate change mitigation objectives of the Paris Agreement...we will assess our operations against transition risks and opportunities related to climate change.

[2] For more information, see https://www.ebrd.com/documents/comms-and-bis/the-mdbs-alignment-approach-to-the-objectives-of-the-paris-agreement-working-together-to-catalyse-lowemissions-and-climateresilient-development.pdf.

"**Building Block 2:** *Adaptation and climate-resilient operations.* Similarly...we will be active in managing physical climate change risks, in a manner consistent with climate-resilient development, and in identifying opportunities to make our operations more climate-resilient. In addition, we will seek to support a significant increase in our clients' and their communities' ability to adapt to the adverse impacts of climate change."[3]

Paris Alignment guidance for all ADB sectors, including the water sector, is being developed, against which each ADB-financed project will be evaluated. ADB will achieve full alignment of its sovereign operations by 1 July 2023. Alignment of its nonsovereign operations will reach 85% by 1 July 2023 and 100% by 1 July 2025. A fast-track review of water projects in the 2021–2023 pipeline has already been conducted, indicating that water sector projects are generally aligned with the Paris Agreement. An important finding of that review is that all water sector projects have an element of climate risk that is "material," meaning significant or important, and for which adaptation is therefore required. In addition, criteria for Paris Alignment go beyond management of climate-related risks at the project level. Investments must also be certified to "do no significant harm," including even inadvertent promotion of maladaptation. Paris Alignment will require a broader and more robust framework of climate risk assessment, underscoring the need for a well-articulated water sector resilience strategy.

Climate and Water in the Contemporary Asia and Pacific Context

The most significant hydrological features of continental Asia are the large, perennial river systems originating in the glaciers and snowfields of the Himalayas, Hindu Kush, Karakoram, Pamir Alai, Kunlun Shan, and Tian Shan mountains.

Many Asian countries are highly dependent on groundwater resources for both irrigated agriculture and domestic consumption.

Several billion people in East, Southeast, South, and Central and West Asia depend on these rivers for water supply, irrigation, navigation, fisheries, and other purposes.

The rivers arising out these mountainous regions in turn recharge alluvial groundwater formations in Asia's major river deltas, which include the Indus, Ganges–Brahmaputra, Iyeyarwady, Mekong, Changjiang (Yangtze), and Huanghe (Yellow). Many of the river deltas at the ends of these and other Asian rivers are among the most productive rice-growing regions in the world due to their highly fertile soils and relatively abundant water supply, allowing cultivation of up to three crops per year. A significant share of Asia's (and the world's) rice is grown on the region's deltas. Of the 12 major river deltas described in a recent survey of Asia's large deltas (Schneider and Asch 2020), four were determined to be at medium risk from sea-level rise (Indus, Chao Phraya, Mahakam, Song Hong), two (Godavari, Changjiang) are at high-risk, and two (Ganges–Brahmaputra, Mekong) at extreme risk.

Many Asian countries are highly dependent on groundwater resources for both irrigated agriculture and domestic consumption, and excess demand, enabled by technological advances and weak or nonexistent regulation, has often resulted in over-extraction of groundwater resources.

Although precipitation and water resources are generally abundant throughout much of Asia, many regions are currently water-stressed, either chronically or periodically, reflecting growing populations and demand for water to support

[3] For more information, see https://www.worldbank.org/en/news/press-release/2018/12/03/multilateral-development-banks-mdbs-announced-a-joint-framework-for-aligning-their-activities-with-the-goals-of-the-paris-agreement.

A challenge to meet the demand for groundwater. Many Asian countries are highly dependent on groundwater resources for both irrigated agriculture and domestic consumption (photo by Al Benavente/ADB).

irrigation, industry, and urbanization. In addition, impairment of water quality in many locations renders much surface and groundwater unfit for many critical uses, including domestic consumption. Data indicate that of 28 ADB DMCs included in the Aqueduct 3.0 database (World Resources Institute 2019), three countries are assessed as "extremely high" for baseline water stress[4] and five are assessed as "high."

The general expectation for glaciated river basins is that increasing temperatures, often coupled with increasing precipitation, will initially result in greater discharge, leading to additional water supply, but potentially also to larger floods and changes in seasonality, decreasing water availability during the dry season. Once glaciers have retreated, discharge will become rainfall-dominated, with a shift in seasonal meltwater and higher sensitivity to precipitation. Communities sourcing their water requirements from snow- and glacier-melt-dominated rivers will experience a decline in water security, i.e., in water quantity, quality, and timeliness, and flooding. As glaciers recede, the reduced capacity of these natural reservoirs will necessarily lead to greater dependence on precipitation, often seasonal, to sustain river flows and require different storage or entirely different production systems to compensate losses of glacial storage. Glaciers and large coverings of snow and ice are natural buffering mechanisms against flooding. Once glaciers have retreated, floods will increase. Mountainsides, no longer

Glaciers and large coverings of snow and ice are natural buffering mechanisms against flooding.

4 Baseline water stress measures the ratio of total annual water withdrawals to total available annual renewable supply, accounting for upstream consumptive use. Higher values indicate more competition among users. Many of ADB's small island developing state members are not included in the Aqueduct 3.0 analysis.

Rapid shrinking of glaciers. Glaciers act as natural buffer mechanisms against flooding and provide a storage of freshwater (photo by Eric Sales).

protected by this layer, will erode. The exposed slopes, combined with more extreme floods, will mobilize more sediment.

Similarly, most Pacific countries face significant water-related stresses. With their limited space and populations living close to coastal areas, extreme events and sea-level rise will have catastrophic impacts. In addition, many island countries rely on groundwater replenished by rainfall. Changes in rainfall patterns and severe droughts have recently shrunk freshwater reserves in some Pacific countries, reducing agriculture and drinking water supplies.

Asia's vulnerability to sea-level rise is particularly high given that a large share of its population and urban centers are located in low-elevation coastal zones. Global mean sea level is rising at an accelerating rate, increasing from 1.4 millimeters (mm) per year during 1901–1990 to 3.6 mm/year during 2006–2015. Future rise in global mean sea level is strongly dependent on the shared socioeconomic pathway (SSP) that drives the emission scenarios used in the global climate models. Global mean sea-level rise at the end of the century is projected to be faster under all scenarios, including those compatible with achieving the long-term temperature goal set out in the Paris Agreement.

These findings are echoed in ADB's *Asian Water Development Outlook 2020* (ADB 2020a). The outlook evaluates water security along five dimensions: (i) rural household, (ii) economic, (iii) urban, (iv) environmental, and (v) water-related disasters. These are aggregated and categorized in a National Water Security Index (NWSI), including the following development stages (from low to high): nascent, engaged, capable, effective, and model. Of the 49 ADB members included in the outlook, one is rated as nascent (NWSI of 1) and 21 are rated as engaged (NWSI of 2). In addition, 27 ADB members face serious water constraints on economic development, and 18 are yet to sufficiently protect their inhabitants against water-related disasters.

Intergovernmental Panel on Climate Change Findings on Water and Climate for the Asia and Pacific Region

The IPCC prepares comprehensive reports summarizing new scientific research on climate change at roughly 7-year intervals. The Sixth Assessment Report of the IPCC (AR6) is being released during 2021–2022, with Working Group 1 covering climate science released on 9 August 2021. This working group discusses empirical observations and the results of global and regional simulation models, while Working Group 2 (February 2022 release) addresses impacts and adaptation, and Working Group 3 (March 2022) covers mitigation, and energy- and other emissions-related issues.

Working Group 1 has prepared regional fact sheets summarizing observational and model simulation study results (IPCC 2021). For Asia, common regional changes with implications for water management, along with the assessed degree of confidence, include the following:

(i) The observed mean surface temperature increase has clearly emerged out of the range of internal variability as compared to 1850–1900. Heat extremes have increased while cold extremes have decreased, and these trends will continue over the coming decades (*high confidence*).
(ii) Average and heavy precipitation will increase over much of Asia (*high to medium confidence*).
(iii) Glaciers are thawing and permafrost is declining in most regions. Seasonal snow duration, glacial mass, and permafrost area will decline further by the mid-21st century (*high confidence*).
(iv) Glacial runoff in the Asian high mountains will increase up to mid-21st century and, subsequently, runoff may decrease due to the loss of glacier storage (*medium confidence*) .
(v) Relative sea-level rise around Asia has increased faster than global average, with coastal area loss and shoreline retreat. Regional mean sea level will continue to increase (*high confidence*).

A regional fact sheet is also available for small islands (including the Pacific). Regional changes for the Pacific include the following:

(i) Trends vary spatially and seasonally over small island regions in the Pacific. Precipitation has decreased in parts of the Pacific islands poleward of 20° latitude in both hemispheres. This drying trend will continue in the coming decades, except in parts of western and equatorial Pacific.
(ii) Heavy rainfall events will increase in the western tropical Pacific (*high confidence* at 2°C global warming and above).
(iii) Higher evapotranspiration under a warming climate either amplifies or partially offsets respectively the effect of decreases or increases in rainfall, resulting in increased aridity in parts of the Pacific (*medium confidence* at 2°C global warming and above).
(iv) Sea levels will very likely continue to rise around small islands, more so with higher emissions and over longer time periods (*high confidence*).
(v) Sea-level rise coupled with storm surges and waves will exacerbate coastal inundation and the potential for increased saltwater intrusion into aquifers (*high confidence*).
(vi) Sea-level rise will cause shorelines to retreat along sandy coasts.
(vii) More intense, but generally fewer cyclones, will impact these countries, except in the central north Pacific, where frequency will increase overall (*medium confidence* at a global warming level of 2°C and above).

According to the Working Group 1 report, relative to 1995–2015, the *likely* global mean sea-level rise by 2100 is 0.28–0.55 meters (m) under the very low greenhouse gas emissions scenario (SSP1–1.9), 0.32–0.62 m under the low emissions scenario (SSP1–2.6), 0.44–0.76 m under the intermediate

emissions scenario (SSP2–4.5), and 0.63–1.01 m under the very high emissions scenario (SSP5–8.5). Beyond 2100, the sea level will continue to rise for centuries to millennia and will remain elevated for thousands of years (*high confidence*). Global mean sea-level rise above the *likely* range and approaching 2 m by 2100 and 5 m by 2150 under a very high greenhouse gas emissions scenario (SSP5–8.5) (*low confidence*) cannot be ruled out due to deep uncertainty in ice sheet processes. Over the next 2,000 years, global mean sea level will rise by about 2–3 m if warming is limited to 1.5°C, 2–6 m if limited to 2°C, and 19–22 m with 5°C (*low confidence*).
In particular, observations have shown that the sea level, especially in the Western Pacific, has been rising at rates much higher than the global average. Many of the smallest and most vulnerable DMCs are located in the Pacific (Storlazzi et al. 2018).

Sea-level rise will also translate into an increase in frequency of more extreme storm surge and wave events leading to flooding or, in other words, extreme flooding events today will become more common in the future (Vousdoukas et al. 2018). This means the available time to recover between events will also decrease.

Besides sea-level rise, subsidence is also a major threat to many megacities as a result of excessive groundwater pumping and sediment compaction. Cities like Jakarta, Dhaka, Bangkok, Ho Chi Minh City, and Manila exhibit subsidence rates in the range of 6–100 mm/year (i.e., more than 10-fold the global mean sea-level rise) (e.g., Esteban et al. 2020). The combination of sea-level rise and subsidence will increase the occurrence and magnitude of saltwater intrusion, which affects agricultural productivity and food security (e.g., Winterwerp and Giardino 2012).

In addition, the percentage of people living in flood risk areas has been increasing during recent decades due to rapid urbanization in flood-prone areas (Tellman et al. 2021).

On the Impact of Climate Change on Socioeconomics and Natural Ecosystems

Agriculture. Climate change impacts agriculture and food security through changing climatic conditions, seasonal change in water availability and glacial melt, rising sea levels, more frequent and severe droughts and floods, more intense tropical cyclones, and greater saline intrusion of coastal aquifers, especially in deltaic regions and atoll islands. Many of these changes will hurt food production and food security. As an example, rice yields in Southeast Asia could decrease by 10% for every 1°C increase in temperature (ADB 2009).

Poverty. Resource scarcity, the loss of or reduction in crop yields, and damaged infrastructure are most likely to affect those already economically deprived, such as women, children, and the elderly. Overall, the poor have very limited resources to adapt to changes in their environments and often work in the agriculture sector. People whose livelihoods depend on agriculture will be immediately affected by changes in the natural environment. Climate change stresses may tip people closer to the poverty line and into poverty (Jafino et al. 2020). Droughts increase the likelihood of conflicts for agriculture-dependent groups and those who are politically marginalized in countries with high poverty levels.

Health. While climate change will likely have some positive health impacts, the negative impacts will heavily outweigh them, including increases in malnutrition and vector- and water-borne illnesses (IPCC 2021). Although these impacts are expected to be significant, the exact magnitude is near impossible to accurately estimate, as many complex factors are involved. However, the impacts can be expected to be greater in countries with lower water security, particularly in the Pacific.

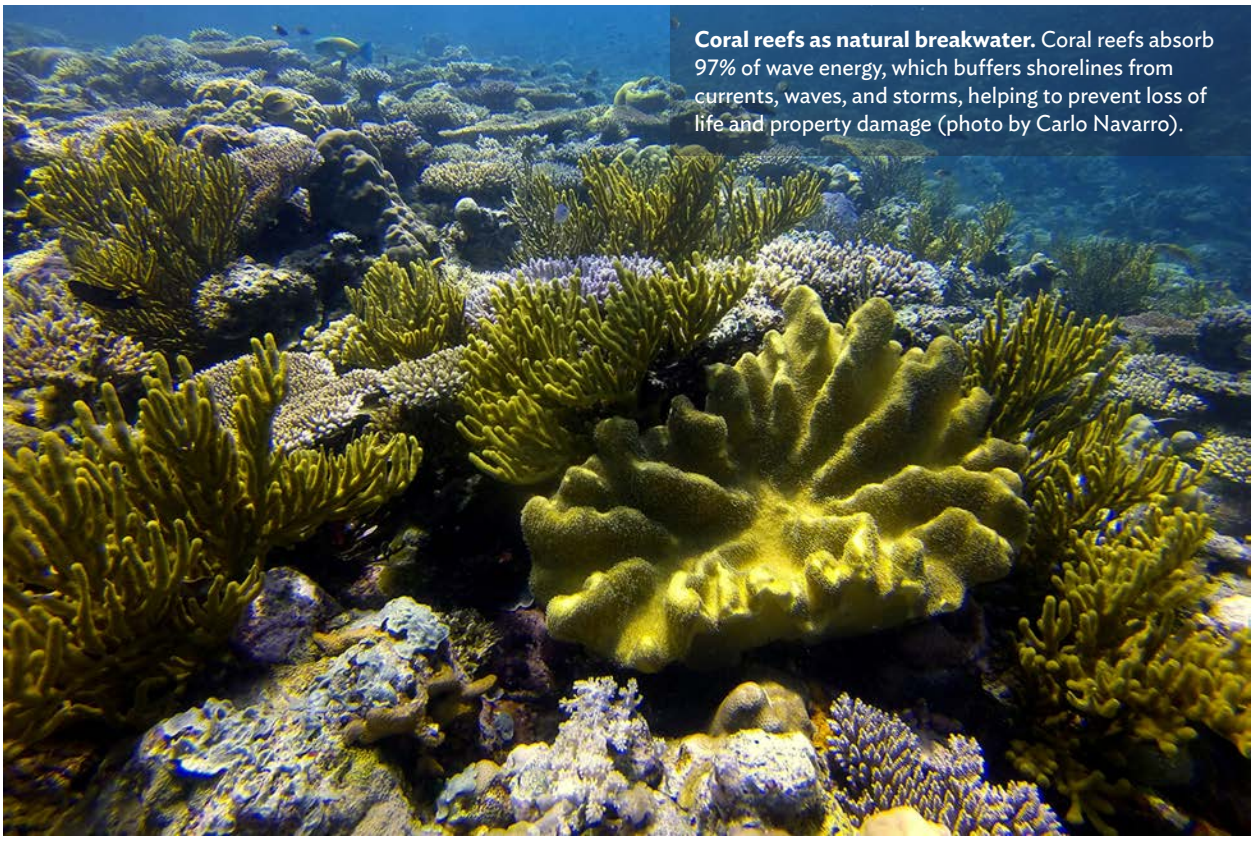
Transboundary water management. Industries in this region are highly interlinked: the economic impacts of local extreme events are not confined to

national boundaries and might have repercussions across the Asia and Pacific region and around the globe. The 2011 floods in Thailand's heavily industrialized areas in and around Bangkok, for example, interrupted global supply chains for specific goods (e.g., computer hard drives). A higher occurrence of water stress in regions reliant on glacial meltwater and transnational freshwater resources may exacerbate intrastate and interstate conflicts. Furthermore, the diversion of basin water upstream could aggravate the situation unless effective transboundary river management is implemented.

The increase in storminess and extreme events could also hamper communication and interconnection between ports and coastal cities, crucial for example to the survival of small Pacific island countries.

Ecosystems. Aquatic ecosystems, and consequently, environmental water security, are predicted to face escalating impacts on many levels because of climate change. Rising temperature trends will likely disrupt natural flow regimes and riverine connectivity, decrease water volume and quality, and exacerbate direct pressures already faced by instream organisms and riparian vegetation. Shifting rainfall patterns are effectively a form of long-term flow alteration transforming the fundamental hydrology of aquatic systems and leading to decreases in the abundance and diversity of native aquatic organisms. This then impacts aquatic ecosystem health. Reduced aquatic biodiversity will also reduce food security, particularly where inland fisheries provide an important source of protein.

Sea water temperature increases and acidification have already degraded coral reefs. Healthy coral reefs absorb 97% of waves' energy, which buffers shorelines from currents, waves, and storms, helping to prevent loss of life and property damage. Coastlines protected by coral reefs are also more stable in terms of erosion than those without



Coral reefs as natural breakwater. Coral reefs absorb 97% of wave energy, which buffers shorelines from currents, waves, and storms, helping to prevent loss of life and property damage (photo by Carlo Navarro).

(Ferrario et al. 2014). Reef degradation will lead to major increases in coastal flooding, erosion, and consequent damages.

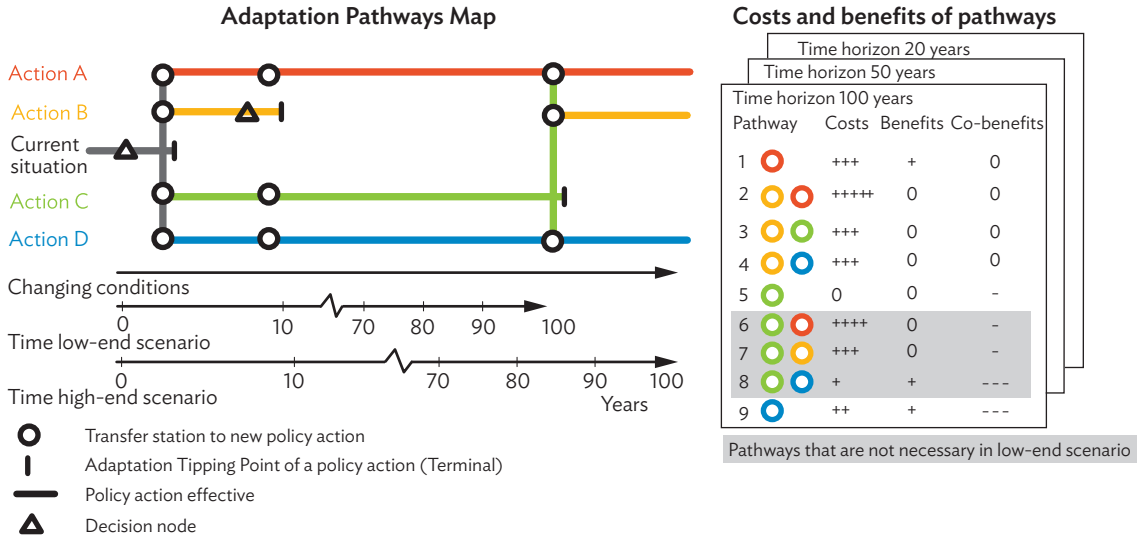
Climate Change and the Need for Adaptive Planning

Climate change introduces a new and distinct set of risks that requires significant adjustments in the planning, design, governance, and operation of water investments. In the past, investments could be designed to accommodate a wide range of plausible future events with reasonable confidence. However, climate change and the deep uncertainties associated with its impacts now suggest that well-established approaches to water resources management are likely to prove inadequate. The efficacy of even recent water sector investments, developed using traditional methodologies, is being undermined in many regions. New extremes, seasonality shifts, and transformational challenges have emerged that lie outside of historical experience. The ability of new investments to secure desired development outcomes and ensure growth has been thrown into doubt. How do we invest in a future we cannot clearly see?

New, flexible, and transformative measures are required to deal with these new challenges, which require a paradigm shift in adaptation to achieve resilience, focusing not only on addressing the physical risks, but also considering ecological, socioeconomic, and governance aspects.

At the same time, scientific understanding of the dynamics of water and climate has grown, and the range of options and solutions are now broader and represent a richer palette of choices. New methodologies have become available to support robust decision-making and accounting for deep uncertainties (Haasnoot et al. 2013; Haasnoot, Warren, and Kwakkel 2019) (Figure 2). Robust solutions are solutions that deliver benefits in a large range of possible futures and are flexible enough to be adjusted when new information is available (World Bank 2020b). However, the application

Figure 2: Dynamic Adaptive Policy Pathways



Source: M. Haasnoot, A. Warren, and J.H. Kwakkel. 2019. Dynamic Adaptive Policy Pathways (DAPP). In V. Marchau et al., eds. *Decision Making Under Deep Uncertainty: From Theory to Practice*. Springer, Cham. https://doi.org/10.1007/978-3-030-05252-2_4.

of these methodologies in projects is still limited because of constraints associated with due diligence required for project preparation and available resources and capacity (Pillar 3 in Chapter 3). It is also understood that climate change will often require significant shifts in how investments in the management and governance of water resources are made to support economic growth, development, and poverty alleviation (Hallegatte et al. 2012).

Stakeholder Observations on Capacity Gaps for Building Resilience

Discussions with staff, while preparing the guidance note, reveal many encouraging observations. First, awareness and interest in climate adaptation and mitigation at ADB is high, from senior management across many sectors and programs through to project-level staff. Climate change is widely accepted as an institutional priority. Similarly, many DMCs now identify climate risks as a motivation for investment and are seeking ADB expertise and guidance. While this DMC appetite for additional borrowing to enable climate-proofing is still uncertain, understanding is widespread among such countries of the necessity to develop climate-resilient projects.

Second, it is widely understood that water dominates the climate impact chain, particularly for agriculture and natural resources projects, and that freshwater (including extreme events) is a critical focus for a lot of adaptation work. Coastal adaptation (to extreme events and sea-level rise) is also crucial in many countries (e.g., in the Pacific).

Third, targeted climate finance has become more widely available and accessible, and these new instruments and funds are enabling a larger pipeline of adaptation projects.

Fourth, since all projects will need to fulfill ADB's Paris Alignment (Chapter 1), they will need to be screened both from an adaptation and mitigation perspective.

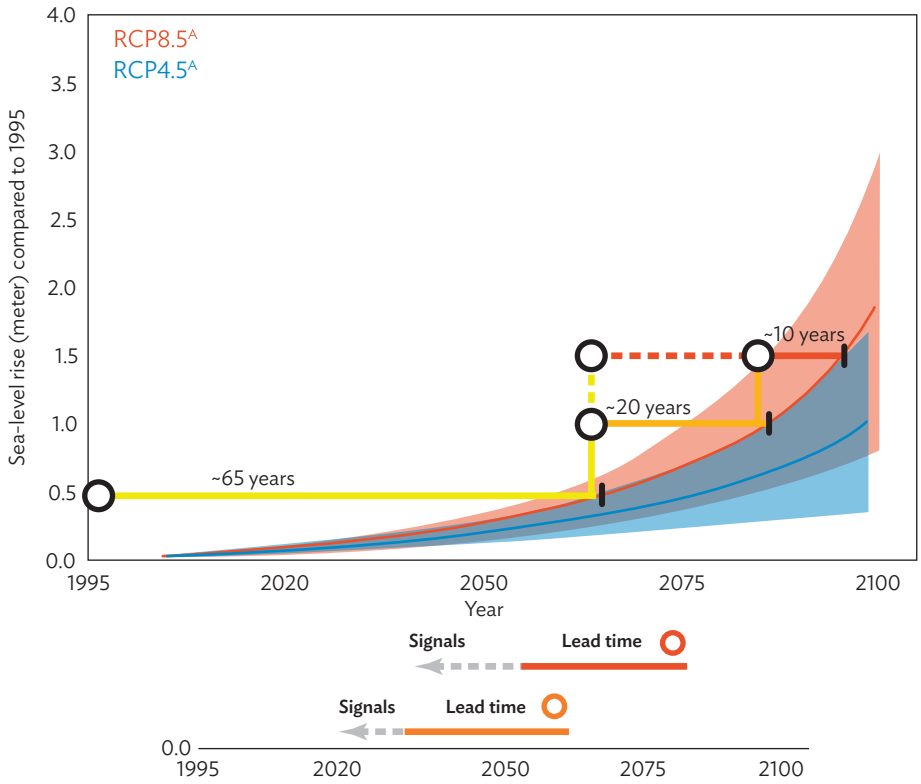
Finally, operational interest within ADB is very strong, and experimentation around climate adaptation generally and water resilience, in particular, is active. Regional climate change support staff are developing localized solutions and workarounds for technical issues. Regional departments are moving past routine project screening to more detailed and regionally relevant approaches—e.g., those developed by the Pacific Department (PARD) and Central and West Asia Department (CWRD). A great deal of experimentation is ongoing, and lessons can be transferred and scaled up.

Discussions with staff also highlighted the challenges for mainstreaming resilience in the water sector. These challenges can be categorized broadly as follows.

(i) **Challenges in conceptualizing and implementing resilience strategies.** This concerns the planning of robust, flexible interventions for an uncertain future, given the available knowledge on current climate conditions. Resilience requires longer-term thinking in project design and implementation, but these insights take time to establish and become institutionalized, which could become critical in case of rapid changes to the physical system (e.g., Figure 3).

(ii) **Challenges in project concept.** Incorporating resilience and long-term adaptive planning into projects must happen as far upstream in the project cycle as possible. Once a project concept has been approved, opportunities to incorporate resilience are far more limited. Getting buy-in for water and resilience from DMC counterparts can be problematic since DMCs may not be convinced that the anticipated additional benefits will exceed the additional costs. Resilience should be a theme in all water sector assessments, sector operational plans, and CPS to ensure support for a robust pipeline of adaptation and resilience projects or project components.

Figure 3: Sea-Level Rise Including Accelerated Mass-Loss from Antarctica



RCP = Representative Concentration Pathway.

Note: Global mean sea-level rise including accelerated mass-loss from Antarctica for RCP 4.5 (blue) and RCP 8.5 (red) scenarios and the potential consequences in terms of lead time for coastal adaptation. The bandwidth shows the 5th – 95th percentile. The colored horizontal bars present an adaptation pathway existing of a sequence of measures for 0.5 m sea-level rise (from yellow to orange to red) and the functional lifetime of these adaptation measures in the event of an accelerating sea-level rise according to the median value for RCP8.5 or the 95th percentile for RCP4.5. The available time to adapt to a higher sea level decreases with increasing sea-level rise.

Source: M. Haasnoot et al. 2020. Adaptation to Uncertain Sea-Level Rise; How Uncertainty in Antarctic Mass-Loss Impacts the Coastal Adaptation Strategy of the Netherlands. *Journal of Environmental Research Letters*. 15 034007. https://doi.org/10.1088/1748-9326/ab666c.

(iii) **Challenges in project preparation.** Emphasis on resilience exposes limitations in conventional project preparation processes, in particular, advance economic analysis. Many adaptation and resilience interventions such as nature-based solutions are typically slow in generating intended benefits (e.g., trees take time to grow). When resilience benefits, which may be substantial, are discounted over long time frames their significance reduces. This will affect the internal rate of return to the point where projects embodying long-term resilience strategies may not meet a minimum threshold. Not only does discounting create a strong bias that inflates short-term costs relative to long-term benefits, but many of the assumptions underlying the use of discounting are increasingly questionable in a world experiencing climate change.

As a closely related issue, many resilience strategies, in particular nature-based solutions, generate significant co-benefits (positive externalities), although current project economic accounting approaches may not fully capture them (Dasgupta 2021).

The use of multicriteria analysis could be more appropriate.

As of April 2022, ADB distinguishes between two types of adaptation: Type 1, climate-proofing of project outputs for supporting development outcomes; and Type 2, projects supporting climate-resilient outcomes (Box 1).

Many departments are seeking opportunities to shift to Type 2 projects in the water sector. The availability of climate resource staff as well as technical data to incorporate and assess the effectiveness of resilient measures in project design are challenges to be considered.

(iv) **Challenges in project implementation.** As DMCs manage implementation, adaptation components introduced during project preparation need to be included in the detailed design by the borrower. Many factors will affect follow-through, including DMC buy-in, budget constraints, limited DMC capacity, or a poorly articulated case for the added value of resilience interventions.

(v) **Challenges arising from ADB structure and organization.** ADB operations are structured under regions, sectors, and cross-cutting themes. While mainstreaming of climate adaptation and resilience might benefit from

BOX 1

Differentiating Types of Adaptation Projects

As of April 2022, for the purposes of adaptation finance calculation, Asian Development Bank (ADB) projects are divided into two categories: Type 1 (climate-proofing) and Type 2 (adaptation). At least in part, the distinction is intended to streamline workload and priorities for ADB and developing member country staff.

Type 1 projects are focused on climate-proofing of project outputs for supporting development outcomes, i.e., where adaptation is a secondary objective, such as enhancing resilience in a planned road project. Adaptation activities are integrated in the design of project outputs to manage potential climate risks faced by ADB-financed development projects and ensure primary development objectives are not compromised. Most ADB projects are currently Type 1 projects.

In contrast, Type 2 projects support climate-resilient outcomes. Based on ongoing discussions with the Joint Report on Mulilateral Development Bank's Climate Finance working group, it is being proposed to further divide Type 2 projects into Type 2A and Type 2B projects. Type 2A projects are those that may be justified even in the absence of climate change, though the approach to project design may be different than if there was no climate change. In this case, not only are the project outputs resilient, but the project outcome explicitly steers development toward long-term resilience of the wider system in which the project is located. Type 2B projects support activities designed and predicated solely on the need to address climate change risks and would not take place in the absence of global climate change. Although not currently a large percentage of ADB finance, Type 2 projects are expected to be an increasing component. A guidance note is being developed under ADB's Climate Change and Disaster Risk Management Division to support project officers in the development of adaptive projects with resilience outcomes.

Source: Asian Development Bank.

a stronger, unified One ADB approach,[5] there are important differences in how resilience is conceptualized and practiced across sectors and regions.

(vi) **Challenges in shared understanding of adaptation and resilience.** Different stakeholders may have different ideas of what constitutes adaptation and what resilient water management looks like, both within ADB and within DMC government partners. A recent example that provides guidance in better monitoring adaptation and resilience-related actions in projects is the World Bank "Resilience Rating System" (World Bank 2021a).

5 A One ADB approach is defined as "bringing together expertise and knowledge in a range of areas across the institution."

Capacity building for resilience. Enhancing knowledge and skills is key to face short-term shocks and long-term climate-related changes in the water sector (photo by Eric Sales).

2 Creating an Enabling Environment for Resilience in the Water Sector

This chapter describes a pathway that may be followed to create an enabling environment for resilience. To fully integrate, mainstream, and scale up resilience into water investments and operations, it is necessary to create an environment with the following attributes:

(i) a shared definition and vision of water resilience;
(ii) clarity on climate finance accounting;
(iii) a water-sensitive climate risk and adaptation assessment (CRA) tool;
(iv) links between water resilience, climate adaptation, and climate mitigation; and
(v) promotion of a systems view for project design with an understanding that water is a shared resource for resilience.

Developing a Shared Definition and Vision of Water Resilience

Common and widely accepted definitions are needed to foster a shared understanding of what adaptation and resilience mean if the terms are to remain useful in conceptualizing, designing, and implementing adaptation and resilience activities. Definitions matter because they can delimit the scope of problems and the range of potential solutions, for better or worse.

Different stakeholders—both across ADB departments, between DMC government partners, and within the wider water community—hold different concepts of what constitutes adaptation

and what resilient water management looks like. Terminology can be adopted from definitions and indicators emerging both within ADB (e.g., ADB 2019) and externally (e.g., Smith et al. 2019 and World Bank 2021a). In this guidance note, a clear distinction between the terms adaptation and resilience is emphasized. Resilience refers to the capacity of an investment, system, community, or policy to respond to realized or potential climate or other hazards. Adaptation refers to the specific actions and measures put in place to achieve resilience.

Within ADB, the concept of resilience will be applied to four perspectives identified by the ADB Climate Change and Disaster Risk Management Thematic Group: ecological, physical, financial, and social and institutional (ADB 2019). It is important to note that the core element in the definition of resilience by IPCC is the capacity to provide essential function or service in the face of both short-term shocks and long-term changes.

Ensuring Clarity on Climate Finance Accounting

ADB discloses financing from its own resources for climate mitigation and climate adaptation, by sector, through the *Joint Report on Multilateral Development Banks' Climate Finance*, issued annually since 2012.[6] Since 2015, ADB has also reported climate finance against corporate targets, using the joint multilateral development bank climate finance accounting framework. While climate mitigation finance is relatively easy to estimate, climate adaptation finance estimates can be more subjective.[7]

Water reservoir in mountain ecoregions. By investing in the resilience of water resources, services, and systems, climate risks to people, ecosystems, and economies can be reduced (photo by Gerhard Joren).

6 Each annual report summarizes the previous year's climate finance; for example, the 2020 report captures finance for projects board-approved in 2019.

7 Mitigation finance estimates are based on lists of agreed-upon sectors and activities that prequalify as climate mitigation, while adaptation finance calculation is more context-specific with no prequalification.

There are three essential preconditions for climate adaptation finance to be reported for a project in ADB: (i) context of climate risk and project vulnerability, (ii) statement of intent to address climate change in the project, and (iii) logical connection between proposed adaptation interventions and the context of risk. If a project qualifies, the basis for the adaptation finance estimate is, ideally, the additional costs associated with the adaptation interventions.[8] The joint multilateral development bank adaptation finance tracking methodology is undergoing revisions that are expected to be finalized in 2022 and will potentially affect some of the issues discussed here.

The appeal to additional cost logic has often made it difficult to develop credible estimates of climate adaptation finance for water sector projects. This is because there are very few water sector adaptation and/or resilience interventions that are not also logical responses to common and ongoing situations, such as shortage in supply relative to demand and high variability in supply. As a result, in the water sector, it may often be difficult to identify project elements that are justified only as a consequence of climate change.

This has led to controversy around climate adaptation finance reports, due in part to increasing pressure on project officers to report substantial adaptation finance. This controversy is also due to perceived inconsistencies in accounting across sectors, regions, and even across multilateral development banks. The basis for additionality calculations can differ across sectors and projects, and although the conceptual basis has been agreed upon, there is no purely objective method of calculation when line-item budgets are not available, and often even when they are.

Clear guidance is needed on how to calculate climate adaptation finance for water projects, as many appropriate and effective adaptation interventions may have little or no trackable

Clear guidance is needed on how to calculate climate adaptation finance for water projects.

additionality due to the nature of their design. While further guidance on calculating additionality or alternative approaches is required, any guidance must be sector specific to encapsulate specific sector needs.

Issues of additionality are also bound up with the ADB designation of Type 1 versus Type 2 investments. Current guidelines to differentiate Type 1 (climate-proofing) and Type 2 (adaptation-focused) projects may be challenging from a water perspective. ADB seeks to increase the volume of Type 2 investments to elevate total adaptation finance reported.

There is a general movement away from strict additionality-based estimation of climate adaptation finance, both within ADB and across the multilateral development banks. This is driven in part by the reality that developing counter-factual budgets is time- and resource-consuming and ultimately difficult to justify when project processing timelines are already highly compressed. The joint multilateral development bank climate finance accounting framework does make allowance for alternative approaches of estimating climate adaptation finance when application of additional cost logic is not feasible:

> Incremental cost of adaptation measures may not be available or possible to estimate. In such cases, adaptation finance is estimated as a proportion of the total financing of a project or project element which incorporates adaptation measures (proportional approach). This can be accomplished by prorating the project financing based on the ratio of

[8] The Green Climate Fund, Global Environment Facility climate funds, and other targeted sources also require additional cost logic.

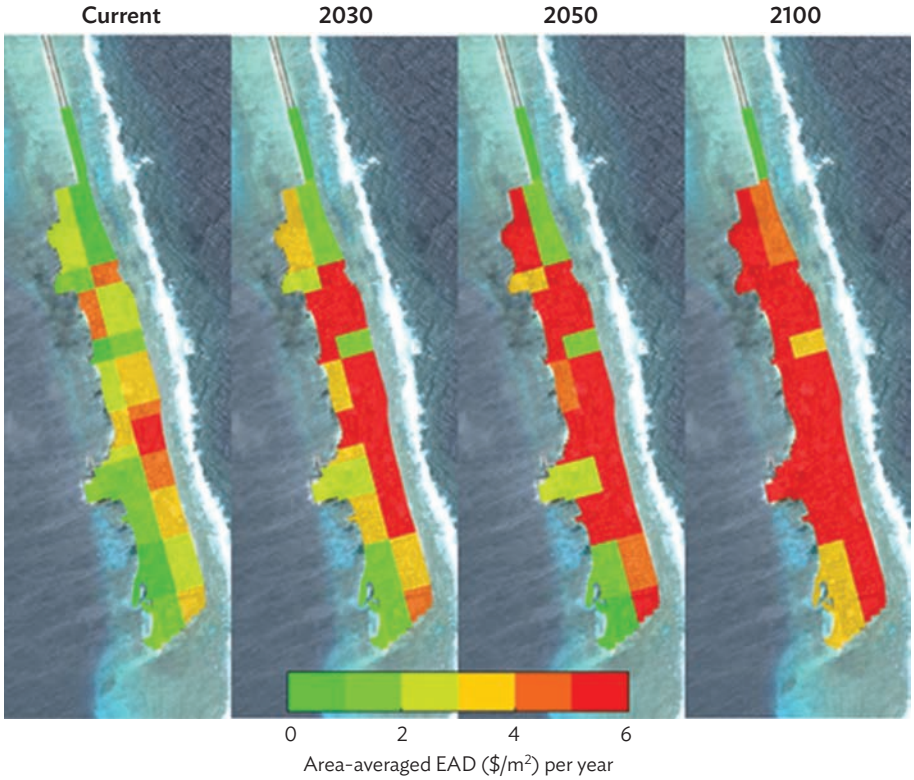
adaptation-related outputs/performance indicators to the total number of outputs/performance indicators (ADB 2016).

Proportionality provides a promising alternative basis on which water sector climate adaptation finance can be estimated.

Supporting a Water-Sensitive Climate Risk and Adaptation Assessment Tool

One of the most important insights emerging from the water and climate communities since the late 2000s has been that the uncertainties in climate models are particularly significant for water investments. In the past, most CRA methodologies began by characterizing climate model outputs, then translated these into variables of interest to the project (e.g., mean annual precipitation and discharge patterns, flood cycles). These variables were next substituted for historical (measured) data to guide project design. Unfortunately, such top–down approaches can amplify or obscure uncertainties in climate projections and/or lead to unwarranted over-interpretation of climate projection scenarios. Variations across general circulation models and climate scenarios are especially high for variables relating to the water cycle, such as precipitation, discharge, evapotranspiration, and seasonality, as well as sea-level rise (Figure 4). Climate extremes, which

Figure 4: Changes in Expected Annual Damages for Different Sea-Level Rise Scenarios at the Island of Ebeye, Republic of the Marshall Islands



EAD = expected annual damage, m^2 = square meter.

Source: A. Giardino, K. Nederhoff, and M. Vousdoukas. 2018. Coastal Hazard Risk Assessment for Small Islands: Assessing the Impact of Climate Change and Disaster Reduction Measures on Ebeye (Marshall Islands). *Journal of Regional Environmental Change* 18: pp. 2237–2248. https://doi.org/10.1007/s10113-018-1353-3.

are often used to bound the operational limits of infrastructure, are not well-modeled by general circulation models. Organizations such as the World Bank have referred to these issues as managing for resilience under conditions of "deep uncertainty" when decision-makers may have little or no evidence to distinguish between widely divergent alternative futures (Hallegatte et al. 2012; Garcia et al. 2014; Brown et al. 2020).

In response, several experts have shifted focus to emphasize understanding the context in which an investment is designed to operate and where inherent limits may exist, such as restrictions in flow, capacity, or delivery, or thresholds for characteristics such as reliability. This is also known as a "tipping points" approach (see Kwadijk et al. 2010). These bottom–up risk assessment approaches then examine the consequences of violating critical limits and consider alternatives (such as introducing redundancy, diversity of function, buffers, modularity, distributed or decentralized systems, and information use). Such water-sensitive risk methodologies reflect a strong convergence in method from landscape architecture and urban design with civil and natural resource engineering, falling under the more general term of "systems resilience." Bottom–up approaches are quite compliant with the types of resilience insights and interventions described from ecology and engineering.

Current ADB climate risk assessment begins with a preliminary screening (checklist), and, when risks are not negligible, the AWARE for Projects tool is used. AWARE for Projects is an online resource used by ADB project teams to screen project risks for an overall climate risk ranking of low, medium, or high and to generate narratives on potential impacts and adaptation measures. Medium and high-risk projects are then required to conduct more detailed CRA and/or disaster risk management (DRM) procedures.

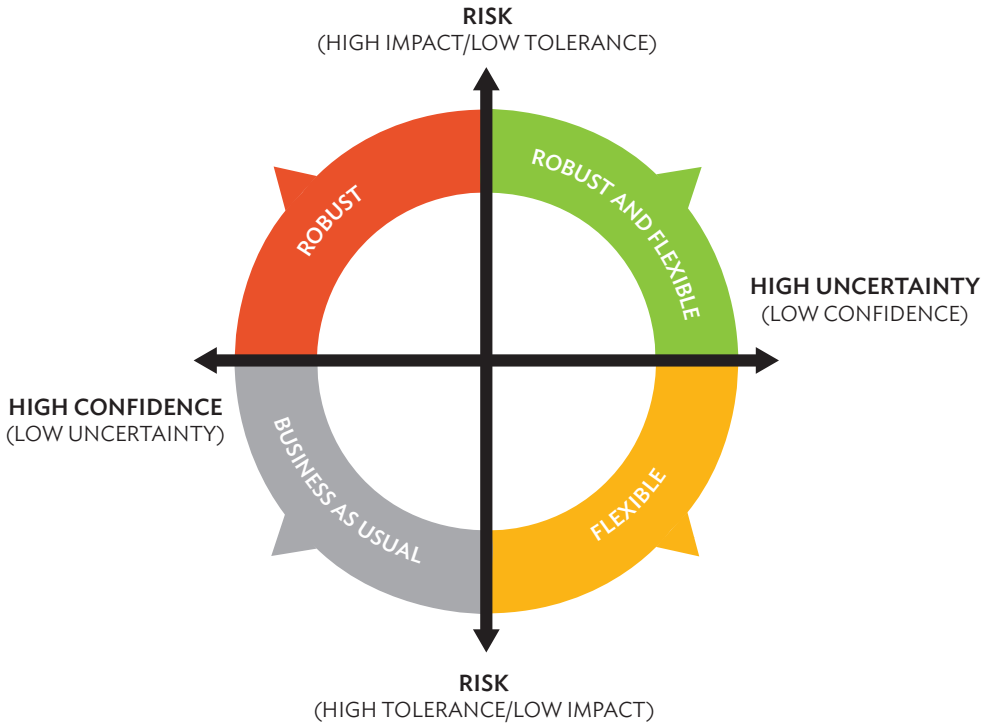
Screening tools are used most consistently for top–down CRA and evaluate projected changes relevant to the operational limits of the project. Top–down risk assessment, by amplifying and obscuring many aspects of climate uncertainty such as disagreement between climate models and scenarios, may promote a sense of false confidence in the project's resilience. Many practice leaders in water management have shifted to bottom–up climate risk assessment procedures or a combination of top–down and bottom–up methods. One well-documented approach is the World Bank Decision Tree Framework (Ray and Brown 2015). Other methods are emerging (e.g., Mendoza et al. 2018).

A more water-sensitive risk assessment methodology is required for both screening and full project risk assessments. ADB's Climate Change and Disaster Risk Management Division is currently leading the development of a new Climate and Disaster Risk Screening and Assessment Tool to address some of these needs and align with ADB's Strategy 2030. An assessment of climate risks is also explicitly part of Paris Alignment methodology under Building Block 2 (Chapter 1).

As described by groups such as the Global Commission on Adaptation (Hall et al. 2019; Smith et al. 2019), the emerging consensus is that water system resilience in operational terms combines robustness (i.e., accommodating a specified range of potential conditions) and flexibility (i.e., coping with residual uncertainty) (Figure 5). Functionally, robustness methodologies are closer to the approaches used for CRAs and are more familiar to ADB and DMC staff. Flexibility is an emerging approach to decision-making, planning, and design, and one that will require specific guidance. Residual uncertainties can be very significant for water investments and incorporating flexibility into projects is an important element in resilient planning and design.

Over the past decade, several major global climate and water funding and management agencies have shifted their climate risk management approaches to bottom–up or water-sensitive methodologies that embrace robustness and flexibility as key

Figure 5: Robustness and Flexibility—Two Broad Strategies for Coping with Climate Change Impacts



Four potential pathways. A recent guidance on resilient water resources management suggests four potential pathways, depending on the level of risk and uncertainty (robust and flexible, flexible, business as usual, and robust).

Source: J. Matthews et al. 2019. *Wellspring: Source Water Resilience and Climate Adaptation*. Arlington, VA: The Nature Conservancy. Adapted from: G. Mendoza et al. 2018. *Climate Risk Informed Decision Analysis (CRIDA): Collaborative Water Resources Planning for an Uncertain Future*. Paris: UNESCO.

elements of water resilience. These include the Dutch Infrastructure and Water Ministry in close cooperation with Deltares (Dynamic Adaptation Pathway Policies) (Haasnoot et al. 2013), the World Bank Water Global Practice (Decision Tree Methodology) (Ray and Brown 2015; World Bank 2021b), and United Nations Educational, Scientific and Cultural Organization (UNESCO) Water Sciences Division (Climate Risk Informed Decision Analysis) (Mendoza et al. 2018).

A water-sensitive approach to CRA should incorporate the following issues at a minimum:

(i) operational and analytical uncertainties in climate projections;
(ii) inherent "bottom–up" system vulnerabilities (e.g., risks associated with loss of function from energy supply bottlenecks) as well as external "top–down" risks (e.g., climate change, demographic shifts, and urbanization);
(iii) for long-lived and/or investments in regions with high climate uncertainties, a strong flexibility component; and
(iv) calibration of assessment intensity and resource mobilization following risk screening in consideration of investment size, risk exposure, and alignment with Type 1 and Type 2 projects.

Links between Water Resilience and Climate Mitigation

In water sector operations, climate mitigation primarily involves energy efficiency and energy sourcing (renewable versus fossil fuel-based) with little emphasis on carbon sequestration (e.g., storing carbon for long periods in soils, wetlands, peat, and forests). Investments in irrigation; flood control measures that include water pumping, water utilities, and water conveyance; and wastewater treatment are all areas that can benefit from climate mitigation efforts. Development of a checklist or decision tree to guide project officers in identifying potential climate mitigation opportunities in projects would be a useful contribution to project screening. Potential opportunities for climate mitigation and adaptation are currently being developed as part of ADB's Paris Alignment guidance note (Chapter 1).

In some cases, synergies between energy consumption and/or production may also be relevant to water and climate impact risks, such as pumped storage for energy production. A relatively new area of work in water and climate mitigation is ensuring that water-intensive clean energy projects are fully climate proofed. Methods for designing hydropower facilities to operate in tandem with intermittent renewables like solar and wind generation have only emerged in the past few years. Nature-based solutions such as mangrove planting also offer opportunities to achieve both adaptation (e.g., through flood reduction) and mitigation (e.g., through carbon sequestration).

Climate mitigation remains the primary focus of most global and national climate policies and investments, and although climate adaptation and

Nature-based solutions such as mangrove planting also offer opportunities to achieve both adaptation (e.g., through flood reduction) and mitigation (e.g., through carbon sequestration)

Nature-based solutions. Mangrove reforestation provides co-benefits to the community such as the enrichment of coastal habitats and local flora and fauna (photo by Eric Sales).

resilience are becoming more visible, clean energy and carbon sequestration will continue to be critical priorities both for ADB and Asia and the Pacific developing countries. The water–carbon–energy and water–carbon–sequestration linkages are still relatively unexplored, however, and ADB operations need to capture synergies between energy efficiency and water-intensive investments, and securing stored carbon resources such as tropical and high-altitude carbon reservoirs.

Systems View of Water as a Shared Resource

The water cycle, including human interventions, is a system that transcends physical, sector, institutional, and political boundaries. In this system, water is shared by users and uses (including the functioning of the natural environment), but never confined to a particular location or use. A given project is always upstream from one set of prospective users and downstream from another. The system is also characterized by varying and increasing degrees of uncertainty.

In recent decades, good practice has emphasized the rational use of water resources across sectors at a national level through integrated water resources management (IWRM), and many methodologies have been developed for implementing IWRM through, for example, water accounting approaches. Similarly, for coastal zones, integrated coastal zone management approaches are available. The water–food–energy nexus view has been promoted widely since 2011 as a way to more explicitly account for potential water tradeoffs between agriculture and energy. These are often significant sources of tension in middle- and lower-income countries and the largest water-using sectors. Methodologies have limitations in determining climate risk.

To utilize and manage water as a strategic adaptation and resilience asset by taking a system view, three levels of ADB engagement are important:

(i) Project-level risk assessments should take explicit account of key allocation and governance arrangements, especially for shared water resources. Shared aquifer, catchment, and basin relationships may be most important, as well as projects that depend on bulk water transport and transfers. The longevity of assets will also be important in areas in which climate uncertainties are significant, requiring more robust and/or flexible planning and design. Bottom–up analyses can help define a system-level set of connections and acceptable performance limits.

(ii) National level cross-sector integration and planning are missing in many countries, especially those in which water resources are strongly siloed by sector. Even established cross-sector water integration methodologies such as IWRM and the water–food–energy nexus remain weak and insufficient given that climate is changing. The relatively new role of water as a strategic adaptation and resilience asset is not widely recognized. These issues are especially important in accounting for water's role in food, data, energy, and DRM systems, in which vulnerabilities can be hidden. The ADB can play an important role in expanding water resilience awareness by encouraging finance ministries and planning divisions to build capacity for a systems approach to risk and vulnerability and to anticipate new and emerging risks.

(iii) Transboundary relationships present special challenges for ADB and many countries in Asia and the Pacific. Bangladesh is downstream in more than 60 shared river basins, for example, and such countries are highly vulnerable. Downstream countries are all sensitive to water-climate shifts for energy, DRM, health, agriculture, and water, sanitation, and hygiene. ADB engagement in transboundary issues can work through regional economic cooperation programs and international river basin organizations.

BOX 2

Case Study: Systems View of Project Development in Tongatapu, Tonga

The Multi-Hazard Disaster Risk Assessment is the promising centerpiece of a detailed assessment of hazards, exposures, and risks facing the Tongan island of Tongatapu, home of the capital, Nuku'alofa. This assessment approach, in which the Asian Development Bank (ADB) and the Government of Tonga are seeking to address risk and resilience to multiple natural hazards, could help change the way ADB plans investments in vulnerable countries.

At just over 2 meters above sea level, most of Nuku'alofa is vulnerable to surface flooding when rains are heavy or coasts flood from extreme sea levels, cyclone-induced storm surges, and tsunamis. Rising seas are expected to increase this vulnerability. Higher elevations on the other side of Fanga'uta Lagoon, opposite the capital, offer a potential long-term adaptation strategy—a phased move to less vulnerable locations.

The findings of the Multi-Hazard Disaster Risk Assessment in August 2021, which Tonga's cabinet approved the same month, will inform development of a Climate and Disaster Resilient Urban Development Strategy and Investment Plan. This will include a long-term adaptation pathway for Tongatapu. This systems approach could start with "no- and low-regret" options, and investments could then be sequenced over time to make the island more resilient to natural hazards, including through location decisions.

Initiatives like the Multi-Hazard Disaster Risk Assessment also allow ADB to change how it approaches project pipelines and design projects. A more risk-based and holistic approach will help ensure investments do not lock-in maladaptive pathways that are difficult and costly to change. For instance, the assessment is already being used as the basis for a climate risk assessment for a bridge project over Fanga'uta. It is not only looking at the resilience of the proposed bridge to various climate hazards, but also at the broader vulnerability of the road network and communities that the bridge would serve.

With assistance from partners like ADB, Tongatapu and other Pacific islands have great potential to address climate change in the long-term. Combining targeted short-term infrastructure improvements with spatial planning, land reform, and relocation would ensure Tongatapu can continue to prosper beyond 2100. The Multi-Hazard Disaster Risk Assessment is a step in the right direction.

Source: Asian Development Bank.

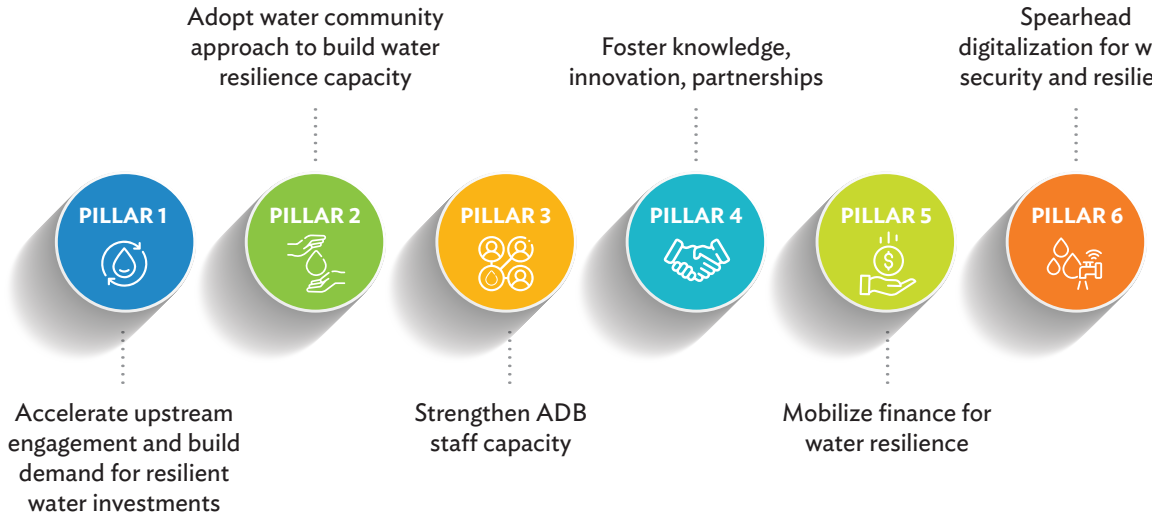
Stronger together. Adopting a community approach to water management promotes an enabling environment that will help support resilience at the local, national, and regional levels (photo by Eric Sales).

3 A Framework for Resilience in ADB Water Operations

A coherent approach to water resilience is needed to ensure that ADB can effectively support and enable resilient water projects and investments in Asia and the Pacific. Following the rationale for mainstreaming water resilience in Asia and the Pacific, as captured in Chapter 1, and to respond to the needs for creating an enabling environment for resilience identified in Chapter 2, in this chapter, six mutually reinforcing pillars are proposed as a framework to gradually shift to a more transformative approach to resilience (Figure 6). The proposed approach is integrated, inclusive, focuses on long-term outcomes through upscaling financing and building capacity, and starts from upstream engagement with DMCs. Basing an approach using the pillars would assist ADB in developing a portfolio of water-resilient projects and programs, and support DMCs in mainstreaming water resilience in Asia and the Pacific. The pillars would see ADB:

(i) accelerating upstream engagement and building DMC demand;
(ii) adopting a water community approach to DMC water resilience capacity;
(iii) strengthening ADB staff capacity;
(iv) fostering knowledge, innovation, and partnerships, primarily through leveraging the bank's strategic position as a center for thought and practice leadership on water resilience within Asia and the Pacific;
(v) mobilizing finance for water resilience; and
(vi) spearheading digitalization for water security and resilience.

Figure 6: Six Pillars Forming the Basis of This Guidance Note



Source: Asian Development Bank.

Pillar 1: Accelerate Upstream Engagement and Build Developing Member Countries' Demand for Resilient Water Investments

To strengthen the resilience of water investments and to integrate resilience principles into ADB's project and program pipeline, resilience objectives need to be introduced as early as possible in the project cycle (see Chapter 1). The Indicative Country Pipeline and Monitoring (ICPM), listing the project pipeline for the next years, should reflect broad commitment to resilience through inclusion of development projects designed using climate resilience principles. It should increasingly reflect projects designed specifically to address adaptation and resilience needs of communities, regions, and economic sectors in a wide range of potential climate, economic, health, social, and environment-related shocks.

Policy and regulation at the local, national, and international levels have a key role to play in the protection of water resources and freshwater ecosystems, particularly wetlands. ADB will work with the region's countries to prioritize water governance at the highest levels, with adequate and effective cross-sector institutional, legal, and regulatory frameworks, and resources to implement and promote sustainable and resilient water management; sustainable and resilient water provision and allocation; and protection of people and places. Wise water governance needs to build an enabling environment that encourages system-scale planning; actively plans for sustainable and resilient renewable energy options; and prevents, prepares for, and responds to water-related disasters.

A logical starting point for building the pipeline of resilient water sector programs is to influence project design as far upstream in the process as possible, beginning with sector assessments and road maps, and their associated documents, which

are prepared for sectors, regions, and DMCs, and are designed to inform the CPS. Utilization of strategies and approaches described in this note, including a systems view of water resources and integration of climate mitigation and adaptation objectives, can ensure that sector documents point toward application of resilience interventions. Corporate climate financing targets and Paris Alignment (Chapter 1) provide additional impetus for such an approach.

The CPS remains the most important mechanism for introducing water sector resilience as a priority, increasing upstream engagement and developing a robust pipeline of resilient projects. The CPS can be negotiated to emphasize both established approaches to resilience, including IWRM, and systems approaches, including water–food–energy nexus analyses, nature-based solutions, and pandemic preparedness and response strategies. New approaches to finance and new financial instruments can be emphasized (Pillar 5). Important mitigation and adaptation issues and themes such as clean energy transitions, land-use management concerns (e.g., deforestation and shifting to high value agricultural commodities), and climate adaptation can also be included in these discussions. Once priorities and modalities are defined and agreed, the CPS can then be used as the basis for joint development of a pipeline of resilience-oriented projects.

Integrating resilience perspectives for water and related investments may change the scope, focus, and possibly the cost relative to traditional investments. Assembling high-quality documentation of the performance, benefits, and costs of resilience interventions will be important to facilitate engagement with DMC counterparts. Experience has shown that lack of information, uncertainty, or concerns about the physical efficacy and economic performance of resilience interventions (particularly ecosystem-based adaptation) can serve as disincentives to adoption. These issues are thus best addressed early and transparently. Emphasizing the availability of ADB support for securing third party cofinancing—e.g., from the Green Climate Fund—for qualifying adaptation activities can build confidence among DMCs that resilience does not have to involve unreasonable additional costs. ADB now has a highly credible track record in securing adaptation cofinance, much of it grant-based.

Actions and approaches: ADB projects are driven by DMC demand. To increase demand, shared understanding is needed with DMCs on the need for adaptation and resilience projects, especially the conditions conducive for finance eligibility. This can be done through workshops and training by ADB, by ensuring this topic is on the agenda at every annual country programming mission, and through a sustained outreach program. Where demand has been generated, support can be enhanced through provision of technical assistance for project preparation. These actions can be implemented through the development of the Asia and the Pacific Water Resilience Hub (Pillar 4).

At a strategic policy level, coordination between ADB and water issues represented in climate planning and climate policy documents can be initiated in the near term. DMCs submit NDCs to the UNFCCC as a responsibility under the Paris Agreement. NDCs represent country-level commitments to global climate goals in 5-year increments, beginning in 2021. A DMC's NDCs and national adaptation plans are natural points of entry for introducing resilience of the water sector in the CPS negotiation, as they both include a list of priorities that can be converted into investment plans. However, these documents are often high-level, and upstream engagement and guidance is required to translate them to investment plans. As a short-term priority, ADB will strengthen the capacity of operations staff for encompassing resilience approaches to water investments in the CPS that are focused on NDCs and national action plans (NAPs) (among others). This is to ensure that water and resilience issues flow from finance to line ministries and into individual projects.

ADB will work with DMCs to ensure NDCs and NAPs are updated to include resilient water management approaches and tools for greenhouse gases mitigation. These include low-carbon urban water supply and wastewater management, and carbon sequestration through freshwater ecosystems such as wetlands, peatlands, and mangroves. Further assistance can be provided to ensure all NDCs and NAPs are accompanied by a specific water plan and budget that addresses the climate water interactions across all water-related sectors. These include energy and industry, agriculture and livestock, forestry and land-use, public health, ecosystems and biodiversity, urban wastewater management, and urban regional planning and infrastructure.

The resilience of communities, livelihoods, and water infrastructure and management systems to shocks arising from economic downturns, commodity price escalation, health pandemics, and environmental deterioration will be country and sector specific. Similarly, they will require analysis and response mechanisms to be included in CPS discussions. Foresight analysis undertaken for the water sector at the country level will provide a basis for incorporating appropriate resilience measures.

Pillar 2: Adopt a Water Community Approach to Developing Member Countries' Water Resilience Capacities

As sovereign borrowers are ultimately responsible for implementing ADB-financed projects and programs, the awareness and capacity of DMCs are essential preconditions for the successful integration of water resilience. Even with significant ADB and other expert inputs, successful implementation requires understanding of national and local contexts to ensure buy-in. National and local capacity development will also create more effective, responsive, and resilient national, sector, and community institutions that will develop the enabling environment. Sustainability of efforts will be ensured through integration over time of appropriate technology and effective information management systems.

Resilience is for many professionals a novel perspective on how water resources and investments are planned and managed. Given the importance of water to almost all economic sectors and beyond to ecosystems and natural capital, achieving resilience in water systems and investments poses challenges to conventional approaches toward risk management—from national development strategies to the design and operation of individual investments. Relatively few institutions within Asia and the Pacific have fully adopted the resilience perspective, although a number of countries in the region have been moving in this direction, including Bangladesh, the People's Republic of China, Fiji, Indonesia, Singapore, and Vanuatu.

In Bangladesh and Indonesia, adoption of resilience perspectives has been catalyzed through partnerships with specific development partners, including Germany and the Netherlands, and via technical organizations involved in capacity building, such as Wetlands International and Deltares. The NDCs of each country provide globally applicable models of how to articulate water as a strategic asset and to embed water as a resource into national development strategies. Recent constitutional changes in the People's Republic of China have resulted in the restructuring and consolidation of water resources management from across a range of ministries and sectors into a more coherent and unified approach. Enhanced and expanded capacity in DMC counterparties to conceive, design, and implement resilience dimensions into water investments is an important step for an effective ADB water resilience strategy, as reflected in these and other emerging examples of good practice.

Actions and approaches: Capacity within ADB to conceptualize and implement resilient water sector policies, plans, and projects can serve as an anchor

for an outreach program to build DMC capacity, in partnership with other organizations embodying the required expertise. A quick-start approach for ADB to conduct DMC outreach and capacity building will include the bank:

(i) Supporting and facilitating a regional water resilience hub through existing institutions and programs (Pillar 4).

(ii) Setting up a program to reach out to institutions in Asia and the Pacific (and in some cases, globally) that have been innovators in this area to develop working relationships and a coordinated agenda. The relationships should reflect respective partner expertise in water sector resilience issues, including national level climate planning, urban resilience, adaptation for water utilities, water security during pandemics, nature-based solutions for adaptation applications, and resilience in DRM. Relationships with regional entities may be useful to develop as well. This includes regions such as Central Asia, small island developing states, archipelagic nations such as the Philippines and Indonesia, regions experiencing risks to coastal and delta areas (e.g., Indian and Bangladeshi Sundarbans and Yangtze and Mekong River deltas), high mountain Asia (e.g., Himalaya and Central Asia water towers), and regions highly dependent on groundwater (e.g., Pakistan and India).

(iii) Establishing water-centered adaptation partnerships with key development and climate finance organizations, bilaterals, nongovernment organizations, and knowledge institutes. Many funding agencies may offer joint capacity building opportunities in water sector resilience. Existing relationships with the joint multilateral development banks around climate finance accounting and Paris Alignment may provide openings for collaboration. Exploring resilience-targeted relationships with the United Nations and other organizations already working in this area is another possibility.

(iv) Showcasing resilience in water sector investments at international forums such as the annual Conference of Parties and regional UNFCCC Asia Pacific Climate Week, the Asia-Pacific Climate Change Adaptation Forum, International Adaptation Futures Conferences, and water events, such as the Asia-Pacific Water Forum and Stockholm and Singapore Water Weeks. Side events and training workshops targeting DMCs in collaboration with partner organizations can be tailored to audiences and focus on research and technical, operational and design, or finance aspects.

(v) Providing resources and support to DMC counterparts and organizations, including the private sector, to rapidly build their capacity for planning resilient projects and programs, and implementing projects with resilient approaches and outcomes.

Pillar 3: Strengthen ADB Staff Capacity

The considerable experience and insight into resilient water systems that already exists within ADB can be used as a basis for discussions with DMC counterparts, to build pipelines of resilient water investments. This experience and insight will evolve as new knowledge is acquired.

Successful implementation of Pillar 1 (accelerate upstream engagement and build DMC demand for resilient water investments) and Pillar 2 (adopt a water community approach to DMC water resilience capacity) will each require the strengthening of ADB's in-house capacity in the area of systems resilience with specific application to water investments. ADB's in-house capacity can be strengthened by both training and mentoring ADB staff and long-term consultants, and employing skilled specialists.

ADB has extensive experience in training staff on specialized and emerging topics. For example, it

Building management capacity. Professional development through workshops and training can raise awareness and support the development of resilient water systems (photo by Eric Sales).

organized and conducted a workshop and clinic on ecosystem-based adaptation and nature-based solutions approaches to climate and DRM in 2017, which at that point was a novel area of practice for ADB. The workshop was facilitated by both international experts and experienced ADB staff and consultants and built around existing and planned ADB investment projects as case studies. Within 3 years, several new knowledge products had been produced and a range of nature-based solutions activities piloted within ADB, underscoring the appetite and capacity of ADB staff to expand their skill set into promising, but technically challenging new areas of professional practice.

Professional development in resilient water systems will have many dimensions as identified in Chapter 2, including new approaches to the economic analyses of resilience projects, innovation in climate finance, application of adaptive planning methodologies to projects, and the requirements of Paris Alignment.

New approaches to the economic analyses of resilience projects may include accounting for significant uncertainties in a project's economic evaluations, estimating benefits of resilient and flexible solutions (e.g., nature-based solutions), and accounting for income distribution and social welfare in the cost–benefit analysis (Kind, Botzen, and Aerts 2017).

These are in addition to a range of technical tasks encompassing hydro-climatology and system-level risk assessment and social and community resilience to other shocks. This is an open-ended process as evolution around resilient projects and systems design is ongoing.

Actions and approaches: The most rapid and efficient way to expand ADB's internal resources is via direct engagement of experts in the requisite area. An example is the recent engagement by WSG of a senior expert on water and climate

change through the Experts Pool initiative.[9] The water and climate expert will support water resilience initiatives and provide technical advice to operations departments through ongoing advisory services, document reviews, contribution-oriented knowledge products, and mission support.

A closely related mechanism was pilot tested through the recent ADB technical assistance project, *Supporting Adaptation Decision-Making for Climate-Resilient Investments*. Through it, a panel of 10 climate change adaptation specialists was recruited—two each for five sectors: agriculture, natural resources, and rural development; energy; transport; water; and urban development. This was done through a framework agreement contracting approach to provide support to an operations team for undertaking CRA and related activities during project preparation. This arrangement creates flexibility as it allows experts to consult with project teams at the concept stage, during CRA preparation, and on an ongoing basis to support implementation of recommended climate risk management activities. This modality can be extended and sharpened thematically to provide strategic support to operations in introducing and implementing resilience strategies in water investments.

A TA cluster *Mainstreaming Water Resilience in Asia and the Pacific*, supported and funded by the Climate Change Fund, was approved in 2021. It includes as an output the integration of climate resilience into water sector investment projects and programs. A subproject will help DMCs strengthen climate actions in the water sector, particularly adaptation, through all phases of investment planning, policy making, and project preparation. Support will be provided for sector assessments for the CPS and upstream diagnostic work related to water and climate resilience and/or DMC water sector or subsector programs that mainstream climate resilience, i.e., Paris-aligned country development plans, NDCs, long-term strategies, and sector/national policies. The TA cluster will engage individual consultants and firms for operations departments to access depending on their specific needs. Similar to the ADB regional project on *Supporting Adaptation Decision-Making for Climate Resilient Investments* (TA-9414-REG),[10] this will include developing panels of technical specialist on framework contracts to advise on, for instance, climate-resilient water sector project design, climate adaptation economics, and climate adaptation finance.

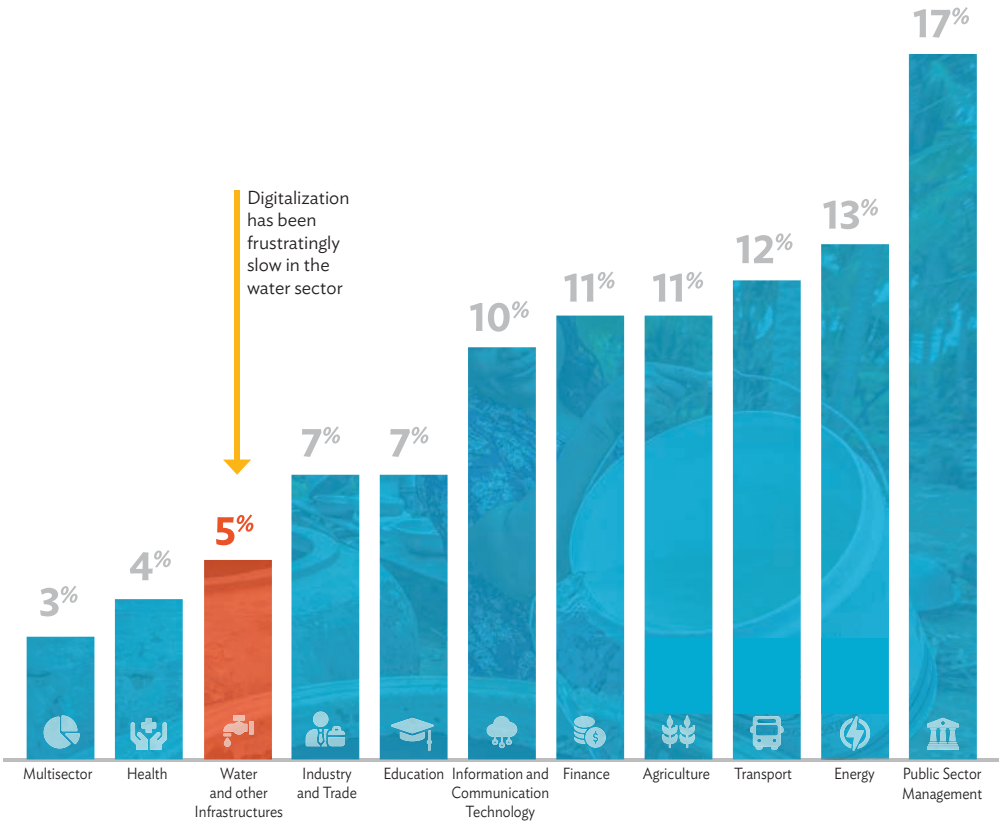
The TA cluster also includes building awareness, capacity, and knowledge for resilience investment planning and policies in the water sector. It provides support to integrate digital resilience into water sector investment projects and programs (Figure 7).

An additional action will aim at increasing technical resources and assistance for project officers. The Climate Change and Disaster Risk Management division within the Sustainable Development and Climate Change Department is the primary source of adaptation expertise and resources, including a wide range of guidance documents and technical publications on climate resilience. A climate specialist (known as a "focal") also sits within each regional department and acts as a climate focal point. Many regional focals have proven to be innovators, developing region-specific approaches and solutions. They have produced interim guidance documents on scientific topics in the PARD (e.g., sea-level rise, intense precipitation events) and country- and location-specific climate profiles (to inform project preparation and implementation) in the CWRD. Similarly, each water-related operational division of ADB also has a WSG focal. WSG will support these efforts as appropriate and co-develop for other regions as relevant.

9 Expert pool members are fixed-term (3 year) international staff with demonstrated skill and experience in specialized areas of technical practice in high demand by ADB.

10 The TA aims to improve the understanding by DMCs on how to make effective use of climate information and services to facilitate planning and decision-making under climate uncertainty.

Figure 7: Digital Projects by Sector



Source: ADB, Digital Technology for Development Unit database.

Providing technical support to regional climate and WSG focals of all operational divisions on water resilience will amplify the larger pool of project officers. Specific suggestions include:

(i) Circulating lessons on all aspects of water resilience via focal-to-focal sharing. Some regional innovations, such as those by PARD and CWRD above, are highly relevant to water resilience and can be developed for other regions. Interdepartmental sharing should be encouraged, potentially by introducing a formal mechanism (e.g., an annual ADB water resilience workshop and conference).[11] Identifying "water resilience champions" may also be useful in introducing ADB thought leaders and their ideas to a wider audience.

(ii) Using regional climate and WSG focals of the operational departments as water resilience champions. Focals can be effective in helping operational divisions answer questions such as: Are there tools and technologies to assess and add resilience in a particular project or program? Is the tool benefit-workload footprint appropriate? Do new ideas seem credible with DMC partners? Can lessons from other cross-sector or cross-thematic projects be used in the case in hand? Hiring resilience specialists that can be housed in operations and resident

[11] Experience at the European Investment Bank and World Bank suggests that including trusted consultants and key DMC partners in such workshops could effectively reach the larger ADB water resilience community.

missions would be powerful connectors, as well as increasing the connectivity of Sustainable Development and Climate Change Department staff with water operations.

(iii) Developing and sharing a pool of effective water resilience consultants. This allows increased technical capacity across many projects without a significant increase in new personnel. It also facilitates the natural sharing of information and knowledge across projects.

Furthermore, the implementation of DMC counterpart capacity development through the Asia and the Pacific Water Resilience Hub, the primary component of Pillar 4, will provide a resilience knowledge and skills trickle-down effect to ADB staff.

Pillar 4: Foster Knowledge, Innovation, and Partnerships

To some degree, ADB already occupies a unique position in the water resilience space as a facilitator of knowledge. The pillars of the water resilience guidance note that emanate from the focus on resilience in both Strategy 2030 and WSDG2030 are founded upon the strategic recognition of ADB as a thought leader and facilitator of expertise on water resilience within Asia and the Pacific and beyond.

Furthermore, ADB already provides a framework and set of transparent protocols for distributing grant financing in accordance with predefined sectors and/or themes of individual funds.

Actions and approaches: ADB will take advantage of its strategic position and access to grant financing to create the Asia and the Pacific Water Resilience Hub, the primary purpose of which will be to upskill and build the capacity of ADB's water sector clients to reinforce water resilience outcomes (Figure 8).

The hub will be a vehicle for strengthening water resilience through training. The recipients of resilience training will include, but not be limited to, DMC executing and implementing agencies of ADB water projects and programs, water service providers, utilities and resource managers (at various levels), and community leaders. Interested DMC clients will be screened to determine resilience demand and gaps. Resilience training will create an enabling environment and increase absorptive capacity for scaling up.

Water resilience training will be demand-driven and encompass the four perspectives on resilience highlighted by the Climate Change and Disaster Risk Management Thematic Group—ecological, physical, financial, and social and institutional resilience—that together contribute to a holistic resilience approach (ADB 2019).

Figure 8: Asia and the Pacific Water Resilience Hub

Source: Asian Development Bank.

Technology and innovation generators are needed to deliver and scale resilience. Advances in digital technologies, earth observation, and real-time sensors focused on the water–climate nexus, alongside widescale use of virtual and augmented reality concepts for demand-side stakeholders, may help stimulate overall industry and consumer demand and inform decision-making.

Building resilience for any water service provider will need to be tailor-made, since each will have their own unique resilience profile. Skills mapping of selected DMC water clients will be conducted and combined with demand from operational departments. A wide range of learning modules will be prepared and disseminated through the hub. Tailored training courses will be developed and provided to selected water partners in DMCs for implementing the specific resilience building interventions. The courses will be certified by ADB and the partner organization.

The hub established within the Water Sector Group Secretariat, Sustainable Development Service Cluster will provide virtual and physical training and capacity building programs. It will do this in partnership with academia and organizations already working on resilience in water systems based on the needs identified by recipients. The partners will prepare and implement training on planning, implementing, and sustaining water resilience. Partner organizations may include universities, research institutes, think tanks, and civil society organizations, among others. Partner organizations may be chosen based on ADB's existing partnerships with them and on a competitive tender and evaluated for relevance, effectiveness, efficiency, and sustainability.

The hub will primarily be for water resilience training, policy support, and capacity building. It will also be important for (i) developing strategic partnerships with international and regional water resilience players, (ii) engaging a wide range of stakeholders, (iii) providing space for policy engagement, and (iv) sharing information, knowledge, and guidance. The hub will promote water resilience through networks such as social media, multilateral development bank peers, the UN family, and technical and scientific groups.

WSG is scoping out the details of the hub for maximum impact and sustainability, which will be based on needs and skills mapping to establish its demand and resources requirement. It is expected that the hub will be established by the second quarter of 2022.

WSG will also actively partner with internal and external organizations, through the hub and other mediums, to increase the knowledge base on water resilience in Asia and the Pacific. It will support a range of dissemination materials and modalities. Dissemination materials will include guidance notes to support resilient development in the water sector and knowledge products to promote resilience tools and technologies.

A detailed review of ADB water sector projects will be carried out to analyze the data sources, tools, and approaches used, adaptation and resilience components incorporated, and lessons learned to improve and standardize approaches. This will be combined with a comparative review of international best practices. A knowledge framework will be developed for the water sector on issues such as:

(i) collation and incorporation of latest climate information and projected medium- to long-term climate change impacts;
(ii) assessment tools and best practices for climate risks and vulnerability screening;
(iii) robust evaluation approaches for incorporating climate uncertainty in project design;
(iv) tools for conceptualizing and incorporating hard and soft climate resilience components into project design;
(v) detailed guidance and tools for aligning water sector investment projects and programs to the Paris Agreement;

(vi) tools for estimating the adaptation "additionality" attributable to climate change and resilience interventions both from a financial and an impact perspective;
(vii) cost–benefit considerations and return on investment estimates;
(viii) strategies for transforming projects with adaptation attributes to full adaptation projects;
(ix) climate adaptation finance scaling up for institutional and/or intersectoral incentives; and
(x) understanding the opportunities for climate financing through internal or cofinancing sources.

WSG has also created the "RUWR: aRe yoU Water Resilient?" initiative. The initiative is a dedicated assistance platform to support ADB's DMCs to become more water-secure and resilient. The initiative plans to leverage financing, physical and human resources, governance, partnerships, and knowledge skills at the local level while aligning with national, regional and global water security and resilience goals.

Pillar 5: Mobilize Finance for Water Resilience

Financing in this chapter refers to unlocking the potential of water resilience to meet the goals of developing countries in Asia and the Pacific. It will do this through a wide range of options, including concessional finance, private sector investment (businesses, pension funds, commercial banks, investor groups), grants, alternative financing instruments such as bonds and blended finance, and revenue generating services. Financing water resilience is a critical bridge in financial decision-making to reallocate capital from carbon-intensive, fixed climate water-intensive assets, products, and services. This can move the region toward a resilient, low-carbon future and help it endure climate change. In addition, different financing instruments (e.g., policy-based loans and results-based loans) can provide opportunities to stimulate reforms, providing the incentives to strengthen resilience.

A recent comprehensive study of climate finance for the water sector suggests that most resources are domestic (e.g., national ministries, agencies, and cities), followed by multilateral development banks and green and climate bonds (Water Aid 2020). Groups such as the Global Environment Facility and Green Climate Fund represent relatively small parts of the water investment landscape. As of early 2020, only green and climate bonds seemed to be increasing significantly across these categories; water resilience as a concept is not widely or consistently applied by any of them. Green and climate bonds are intriguing as an additional source of funding because they represent largely new pools, as well as a new vehicle for communicating to infrastructure developers and to investors and decision-makers that water resilience is "bankable" —a significant quality for investment (Box 3).

Actions and approaches: ADB will encourage creative approaches to aligning water resilience with the investment and partnership process. Blended and cofinancing has been successful for groups such as the Green Climate Fund. In many cases, civil society and business interests can partner with governments to accelerate and, if necessary, supplement new financing. The flexibility of nongovernment groups, working with the support and encouragement of ADB, holds much promise in creating a transformation in finance as a mechanism to increase the volume and reach of water resilience.

To further the water resilience agenda, ADB approved in 2021 a cluster technical assistance (TA) project *Mainstreaming Water Resilience in Asia and the Pacific*.[12] This project will help ADB intensify upstream and focused support to increase

[12] The Technical Assistance *Mainstreaming Water Resilience in Asia and the Pacific* (project number 55064–001) is supported by ADB Climate Change Fund and cofinanced by the Japan Fund for Poverty Reduction and the Republic of Korea e-Asia and Knowledge Partnership Fund.

BOX 3

Green and Climate Bonds for Water Resilience

New, innovative sources of finance are required to help address environmental and climate change challenges, such as reducing water pollution and building resilience to droughts, floods, and long-term climate shifts. Green and climate bonds mobilize private capital for climate-relevant investments. The Asian Development Bank (ADB) has issued climate bonds for a few years, primarily for climate mitigation projects.

As a class of financial instruments, green and climate bonds are loans intended to apply to climate adaptation and mitigation projects. They access private investment pools. Issuing entities go well beyond multilateral development banks and include finance ministries, businesses, commercial banks, and cities and other non-national public entities. Many tend to emphasize either national or international investors. In practice, they are largely restricted to upper- and middle-income countries.

Expansion of water resilience projects and of finance instruments via climate bonds may be an additional way to increase the pools of water investment available in ADB developing member countries and cultivate a more climate-aware market for both issuers and investors. Regulatory frameworks such as the European Union Sustainable Finance Initiative and the Climate Bonds Initiative have introduced stricter definitions and criteria for resilience, notably for water investments, ranging from utilities, coastal adaptation and erosion, disaster risk management, hydropower, and desalination facilities. Bonds issued with or through multilateral development banks tend to be open to international investors, applying the reputation of the finance institution as a sign of the credibility of the investment.

To ensure that investor credibility in the green and climate bonds market remained high, the Climate Bonds Initiative began developing overarching and sector criteria. Water was an early target for sector criteria. Beginning in 2016, the Climate Bonds Initiative and a partnership of nongovernment organizations developed water infrastructure resilience criteria to communicate international standards to bond issuers and relative resilience quality to investors. The Water Infrastructure Criteria for the Green Bonds Standard has certified more than $12 billion globally since 2017. Additions to the criteria have included nature-based solutions, desalinization, and sustainable hydropower.

In Asia, green and climate bonds have the strongest presence in the People's Republic of China (PRC), which holds the second-highest annual sales after the United States, a remarkable status given that the PRC had no green and climate bonds market before 2016. The PRC is working to leverage new sources of investment to develop more climate resilience water infrastructure. Total green bonds sales from January through June 2021 are roughly $23 billion across all sectors, though most are uncertified, and use of proceeds may be difficult to verify, so many observers are skeptical that all projects meet international standards of quality. However, in scale, the Green Climate Fund aims for $100 billion in total funding worldwide for both climate mitigation and climate adaptation. The promise of bringing new and additional investment, without the burden of calculating additionality, is a significant advance if project standards increase.

The PRC's use of green and climate bonds also suggests that middle-income countries in Asia and the Pacific may be a new market and opportunity for ADB to partner with national and subnational actors and to stimulate both domestic and international private investor interest in water resilience.

Source: Authors.

water adaptation and achieve the adaptation targets set for the region through resilient and bankable projects. ADB will continue to work with DMCs (nationally and locally), other multilateral organizations, bilateral aid groups, and civil society organizations—e.g., the Water Financing Trust Fund, Urban Climate Change Resilience Trust Fund, Japan Fund for Poverty Reduction—to unlock resilience finance from ADB-managed funds. ADB will also work with external funds such as the Green Climate Fund and the Bill & Melinda Gates Foundation.

This funding will go toward integrating resilience activities at national, subnational, and community levels for the avoidance, preparedness, and response mechanisms for economic, social, health, and environmental shocks. This is in addition to the existing Water Financing Partnership Facility and other multiple trust funds and technical assistance or grants in ADB which fund cross-sector resilience initiatives.

Pillar 6: Spearhead Digitalization for Water Security and Resilience

The adoption of technology has been frustratingly slow in the water sector, despite evidence of the success of digital solutions across a wide range of applications. Information from ADB's Digital Technology Unit on digitalization projects or project components approved from 2010 to 2020 shows the water sector ranked one of the lowest in digitalization uptake.

Actions and approaches: To spearhead digitalization for water resilience in DMCs, ADB will foster collaboration with public and private development partners and solution providers. In March 2021 and October 2021, ADB organized its first two e-marketplaces for water management, bringing together providers of information and communication technology (ICT), digital and remote sensing tools, and technologies applicable to all subsectors of water management in its DMCs. WSG plans to continue such e-marketplaces to connect ADB's water sector staff and DMC clients and stakeholders with innovative technological solutions from the market. It will also support production of knowledge products that promote digital solution providers and tools and technologies on water resilience and efficiency.

WSG will support digitalization initiatives and help its DMCs create an enabling environment, including via human resources and capacity, to upscale and mainstream digitalization for building resilience in water systems and stakeholders and help countries to better respond to uncertainties. ADB will support integration of ICT, digital, and remote sensing technologies in two ways:

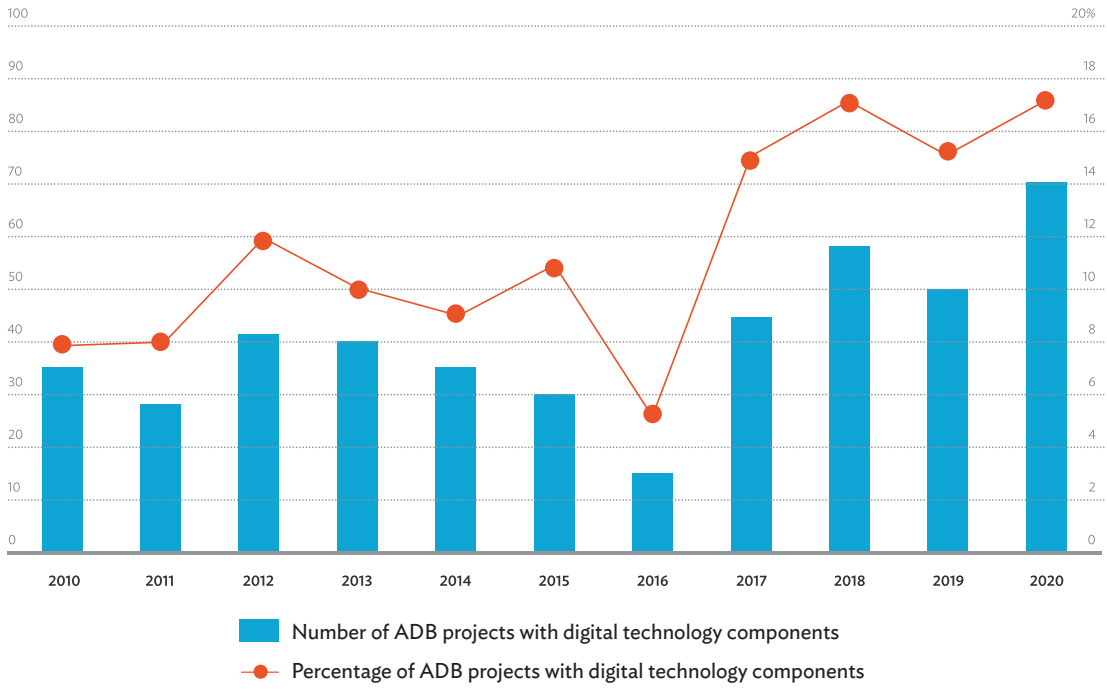
(i) Support to operations departments on project preparation and implementation by providing assistance to selected municipal and village governing bodies, utilities, or water resource management entities in DMCs on utilizing ICT, digital, and remote sensing tools and technologies to improve operations. This includes things such as supervisory control and data acquisition (SCADA)[13] (traditional and cloud-based), asset mapping and management tools, internet of things and internet of people (mobile-based). It also includes a combination of earth observation, remote sensing, drone technologies, geographic information system (GIS),[14] and digital integration to (a) improve water resources management, including flood risk management; (b) enhance food security through increased agricultural production, energy efficiency, crop efficiency, irrigation scheduling; (c) enhance water quantity and

[13] Supervisory control and data acquisition (SCADA) is a control system architecture comprising computers, networked data communications, and graphical user interfaces for high-level supervision of machines and processes.
[14] A geographic information system (GIS) is a type of database containing geographic data, combined with software tools for managing, analyzing, and visualizing those data.

quality monitoring, biodiversity monitoring, tracking of pollution load or illegal dumping of pollutants into the rivers; and (d) support to dams and canals management optimization. The private sector, in particular, is expected to play a central role in bringing in its expertise and innovation. Support may also be provided during upstream work of operations departments in pipeline development. Investment projects supported will have high readiness, demonstration value, and scalability.

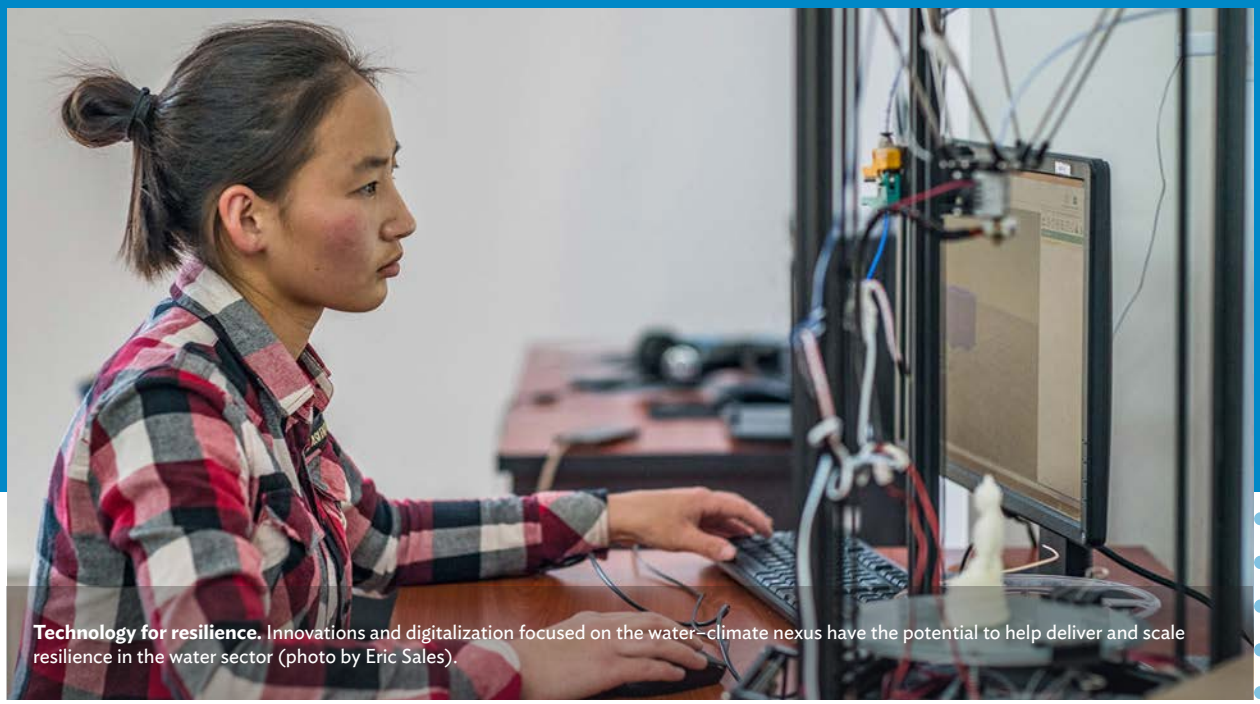
(ii) Support to operations departments in selecting water supply and sanitation service providers and water resource management organizations to improve operations, efficiency, and resilience through digitalization. Selected entities will be provided with deep-dive strategic support and thus will undergo a process of gap identification or diagnostic study, and a needs and readiness assessment. Support will include ICT, digital and remote sensing tools, and technologies to improve resilience and efficiency through implementing pilot demonstration activities. The support will specifically consider inclusiveness principles to increase the resilience of the most vulnerable groups to the effects of climate change. Support will be provided in preparing improvement and scaling up plans so gains are sustained and scaled up.[15]

Figure 9: Number and Percentage of Asian Development Bank's Digital Technology Projects



ADB = Asian Development Bank.
Source: ADB, Digital Technology for Development Unit database.

[15] In March 2022, ADB's WSG published a compilation of its recent initiatives, support to DMCs, and findings on spearheading digitalization in the water sector in Asia and the Pacific in the form of an eMagazine: *Digitalizing H2O* (https://www.adb.org/publications/digitalizing-h20-water-security-resilience).



Technology for resilience. Innovations and digitalization focused on the water–climate nexus have the potential to help deliver and scale resilience in the water sector (photo by Eric Sales).

4 Conclusions and Recommendations

This guidance note provides specific actions and tools for scaling up and mainstreaming resilience in ADB's water sector operations, following a water community approach. The guidance note is based on six mutually reinforcing pillars, created following many discussions with staff across ADB, review of dozens of ADB strategic documents and relevant international publications, and assessment of best practices within ADB as well as at other multilateral development banks.

The note specifically aligns with the operational priorities of Strategy 2030 (ADB 2018), ADB's overarching framework for achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, and builds on ADB's forthcoming WSDG2030. Through the six pillars described in Chapter 3, the guidance note provides a way forward to operationalize the concept of water resilience in projects within ADB.

Building water resilience is a journey. WSG will work closely in this journey with all ADB regional departments, other sector and thematic groups including the Climate Change and Disaster Risk Management Thematic Group, and resident missions. Close cooperation is envisioned with knowledge and finance partners, including centers of excellence within and outside the region, and with DMC counterparts, primarily executing and implementing agencies.

This cooperation will be crucial, in particular, for the creation and success of the virtual Asia and the Pacific Water Resilience Hub (Pillar 4). The hub will be a vehicle for strengthening water resilience through training. Resilience training will create an enabling environment and increase absorptive capacity for scaling up. Addressing new challenges and building resilience also means making use of state-of-the-art tools, knowledge, and solutions.

Through Pillar 6, WSG will support digitalization initiatives and help DMCs create an enabling environment, including human resources and capacity, to upscale and mainstream digitalization for building resilience in water systems and stakeholders. The journey will require upstream engagement (Pillar 1) to make sure resilience objectives are introduced as early as possible in a project cycle and, at the same time, the adoption of a water community approach to increase awareness and capacity of DMC counterparts (Pillar 2).

Mobilization of financing will be a prerequisite to building resilience and meet the goals of DMCs (Pillar 5). Building resilience is part of everyday operation in any ADB activity across all seven operational priorities of Strategy 2030. This will require building capacity of ADB staff (Pillar 3) and working together following a One ADB Approach.

Working on water resilience is expected to deliver benefits that will go far beyond the water sector. As an example, the water–food–energy nexus will require a cross-sector approach to resilience with mutual benefits for different sectors.

This guidance note will evolve as new knowledge and experience become available. Building resilience means focusing on the future through transformation changes required to address new challenges lying ahead. It also means taking steps to ensure that we will move forward quickly today on incremental steps to take that future into account in a flexible manner, also accounting for unexpected shocks such as the COVID-19 pandemic.

As Nobel Prize climatologist Syukuro Manabe said: "Making climate policy is a thousand times more difficult than making climate predictions." We hope this guidance note will help bridge the gap between theory and practice in fostering resilience in Asia and the Pacific.

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Mainstreaming Water Resilience in Asia and the Pacific
Guidance Note

Asia and the Pacific is the most disaster-prone region in the world. The guidance note on *Mainstreaming Water Resilience in Asia and the Pacific* provides specific actions and tools for scaling-up and mainstreaming resilience in the water sector operations of the Asian Development Bank (ADB) based on six mutually reinforcing pillars. The guidance note will help ADB reach its overarching climate finance targets and ambitions. The water sector is crucial in achieving these targets and ambitions, as water is the primary medium through which the impacts of climate change will be felt.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members —49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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