

# Integrating climate resilience in the water sector in the Caribbean: moving from regional to national action

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## Abstract

Climate-sensitive sectors such as water are central to sustainable development in the Caribbean. Strengthening regional and national capacity to respond to climate change, to mainstream climate resilience, and to design transformative sector-wide interventions is therefore a key priority under the African Caribbean Pacific – European Union – Caribbean Development Bank Natural Disaster Risk Management (ACP-EU-CDB NDRM) in CARIFORUM Countries Programme.

As part of this initiative, Phase I of the “Planning for the Integration of Climate Resilience in the Water Sector in the Caribbean project” (The Project) produced a package of training materials, tools, guidelines and technical notes to help water professionals and other practitioners mainstream climate resilience in the water sector. The training materials provide a framework to strengthen water sector resilience across multiple facets including assets and infrastructure, policies, plans, strategies and institutions. The training materials were developed and refined through pilot country applications in Grenada and St. Kitts & Nevis. A regional Training of Trainers event, bringing together representatives from the borrowing member countries (BMCs) of the Caribbean Development Bank (CDB), was subsequently held to improve the capacity of national professionals and practitioners to identify, plan and implement climate resilient development pathways in the water sector. Phase II of The Project subsequently applied the training materials, tools, guidelines and technical notes to two new pilot study countries: Dominica and Antigua & Barbuda. These additional pilot applications further demonstrated the applicability of the approaches in countries where the water supply and services were severely affected by Hurricanes Maria (Dominica) and Irma (Antigua & Barbuda) in September 2017.

This paper showcases the outcomes and deliverables of The Project, highlights lessons learned during the pilot country applications and takes a critical look at actions required to support the shift from regional to national actions to accelerate the integration of climate resilience across CDB’s BMCs.

## 1. Background

The provision of resilient and sustainable water services and water resources management underpins social and economic development in Caribbean states. This is undermined by the continual impacts of climate-related hazard events. For instance, in September 2017, Hurricane Maria caused damage and loss

estimated at \$ US 45.3 million to the water supply in Dominica<sup>1</sup>. Investment to increase the resilience of the water sector is therefore essential to manage these risks and safeguard development objectives.

The *Planning for the Integration of Climate Resilience in the Water Sector in the Caribbean project* (The Project) responded to this need by producing a package of training materials (guidelines and technical notes) to help mainstream climate resilience in the water sector. The training materials present a systematic framework to strengthen water sector resilience including assets and infrastructure, policies, plans, strategies and institutions in the Caribbean context.

The project was funded by the Caribbean Development Bank (CDB) as part of the African Caribbean Pacific – European Union – Caribbean Development Bank Natural Disaster Risk Management (ACP-EU-CDB NDRM) in CARIFORUM Countries Programme with technical assistance provided by HR Wallingford in association with JF Clarke Consulting Inc. The Project started in 2017 and was completed in 2019.

## 2. Project purpose and objectives

The purpose was to establish robust and implementable climate resilient policies and investment plans in the water sector, and to identify potential financing for their effective implementation. The specific objectives of The Project were to:

- Demonstrate how gender-sensitive climate and disaster resilience measures could be integrated into the water sector and, in so doing;

Develop a package of materials that would provide guidance, lessons learned and technical notes to help practitioners in the region implement the approach.

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<sup>1</sup> Government of the Commonwealth of Dominica (2017) : Post-Disaster Needs Assessment ; Hurricane Maria, September 18, 2017.

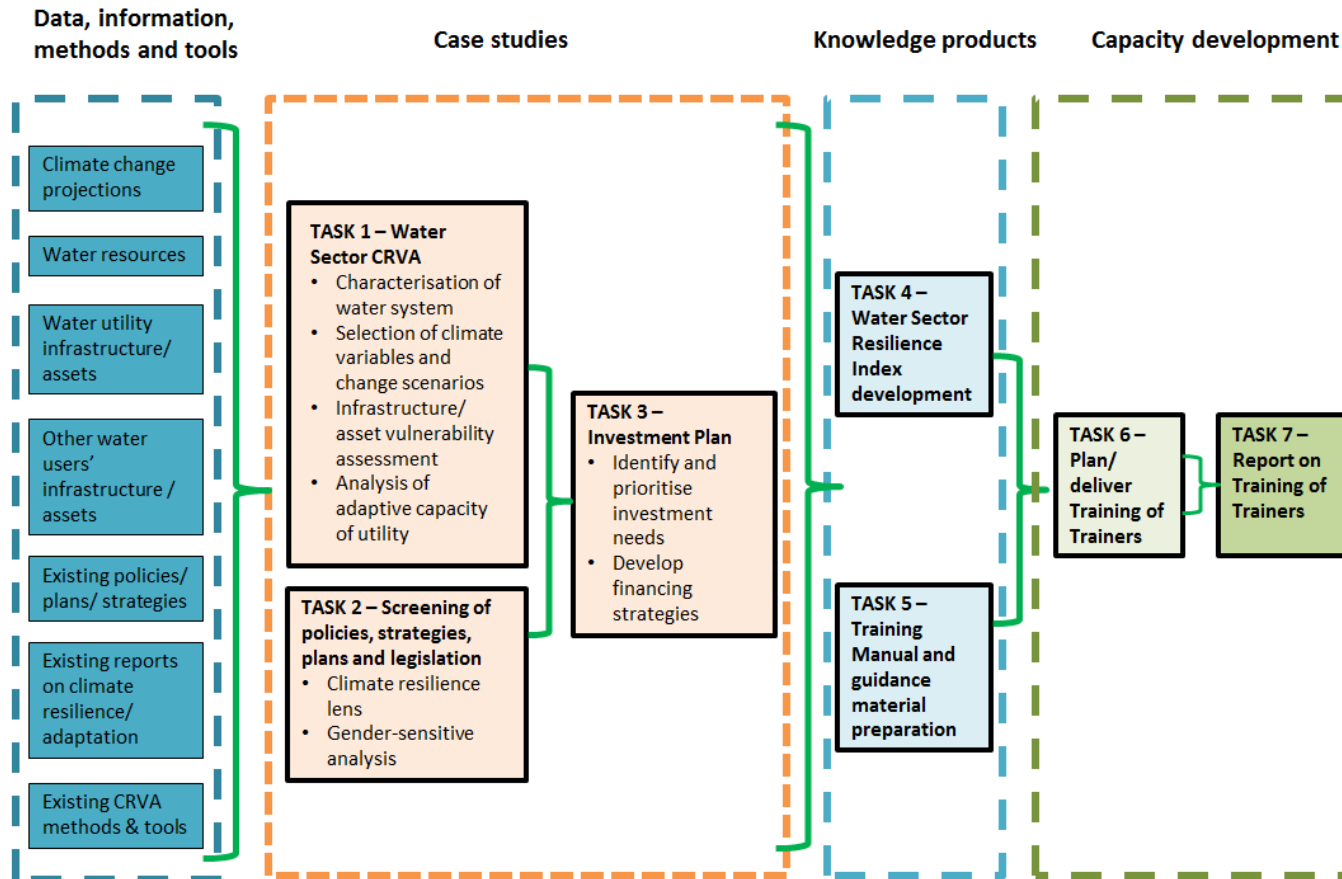


Figure 1: Project implementation process

The Project outcomes improved capacity to manage disaster risks and to identify, plan and implement climate resilient measures in the water sector in the Caribbean.

The sequencing of The Project tasks is shown in Figure 1. The Project developed and piloted approaches for mainstreaming gender-sensitive climate resilience in four countries – Grenada, St Kitts & Nevis, Dominica and Antigua & Barbuda. Country activities included: assessing climate risks and vulnerabilities; screening policies, strategies plans and legislation; identifying options to address these vulnerabilities; and preparing investment programmes to implement priority measures.

In order to strengthen regional and national capacity to respond to climate change, The Project then used lessons learned from the country experiences to develop a training manual that could be used by country practitioners to mainstream climate resilience in the water sector across the region. Focal points from countries across the region were subsequently trained (Training of Trainers) in the implementation of the concepts and approaches contained in the training manual.

## 3. Regional capacity development

### 3.1. Training manual

The training manual supports the integration of climate resilience in the water supply services sector in the Caribbean. Its use aims to internalise and institutionalise good practices and to strengthen the capacity of national professionals and practitioners responsible for the establishment of robust and implementable climate resilient policies, investment plans and financing strategies.

A clear sequential structure is adopted for the training manual which maps onto a generic framework for a country-level process for the integration of climate resilience; see Section 3.2. Each of the nine sections in the training manual (Figure 2) deals with an analytical step within the overall process; see also Figure 3.

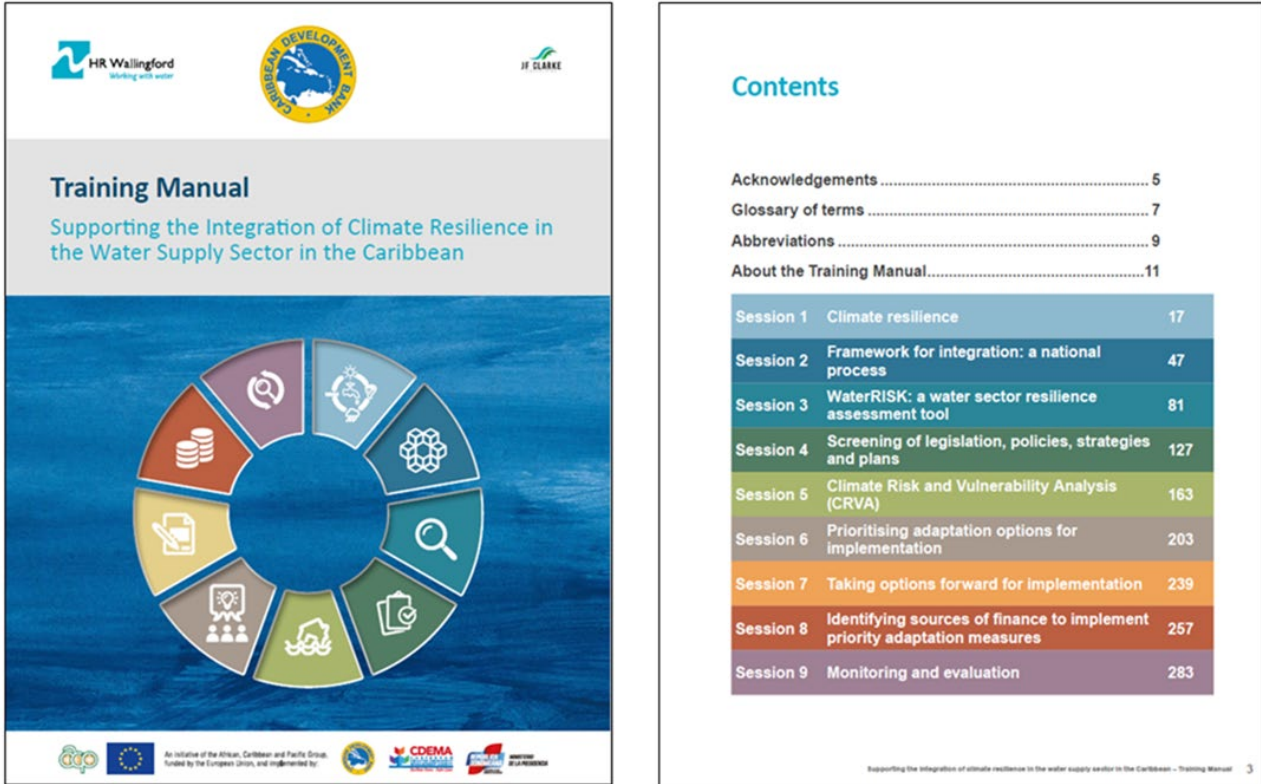


Figure 2: Training manual and contents

Source: Caribbean Development Bank (2018) *Training Manual: Supporting the Integration of Climate Resilience in the Water Supply Sector in the Caribbean - Prepared by HR Wallingford*

Each section includes a common set of contents including: Overview, Things to know; Guidance materials; Technical notes; Step-by-step guides; Case examples; Handouts and proformas; Key references and other sources; Notes for the trainer/facilitator; Group exercises and discussion topics; and PowerPoint slide sets. The content presented in the training manual is designed to be readily modified and adapted to meet individual country contexts and needs.

The training manual is available on CDB’s Natural Disaster Risk Management (NDRM) website pages at: [https://www.caribank.org/sites/default/files/publication-resources/Task%205\\_Training%20Manual.pdf](https://www.caribank.org/sites/default/files/publication-resources/Task%205_Training%20Manual.pdf)

### 3.2. A Framework for the integration of climate resilience

A Framework for the integration of climate resilience is suggested in the training manual and is shown schematically in Figure 3. The Framework evolved from processes applied during the pilot applications and refined based on lessons learned from these. The Framework includes four key stages namely:

- Engaging stakeholders and setting objectives;
- Assessing risks and identifying solutions;
- Prioritising options and planning for implementation; and
- Monitoring and evaluation.

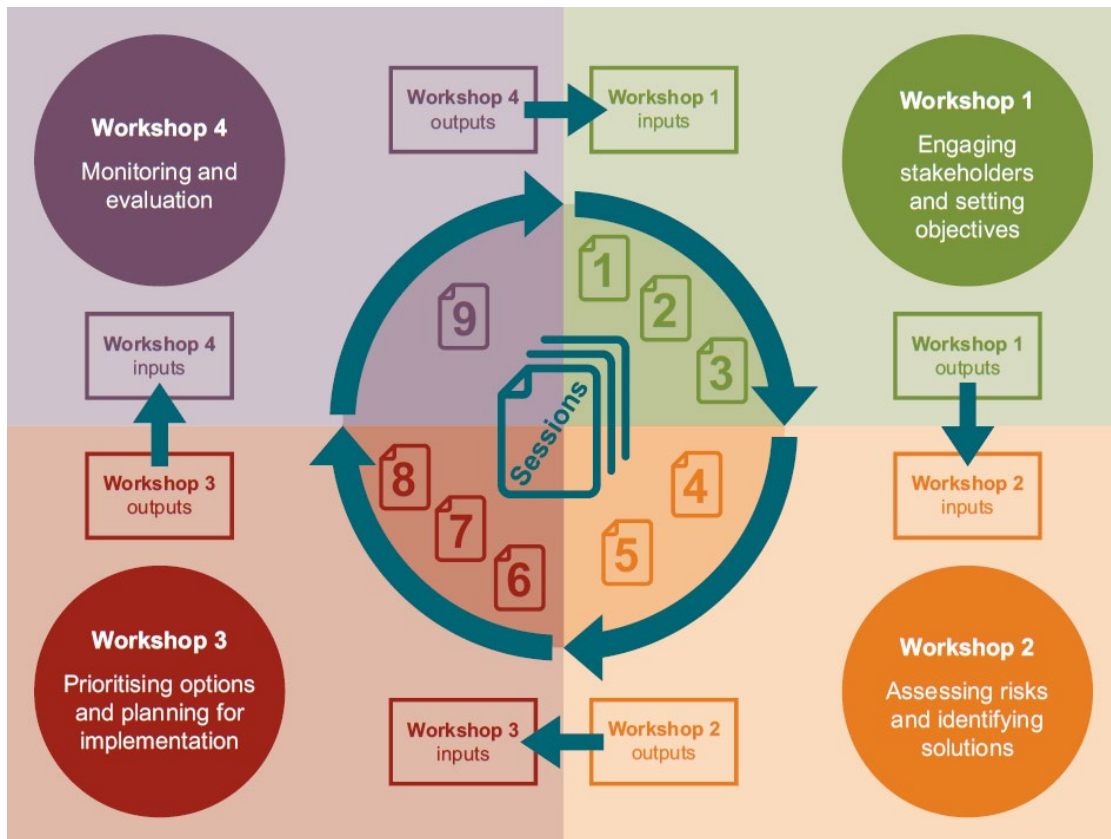


Figure 3: A Framework to guide national processes

Source: Caribbean Development Bank (2018) – Prepared by HR Wallingford

Within the Framework process, a series of national workshops are recommended with associated preparatory and follow-up activities. The training manual content supports the overall process with one or more of the training manual sections providing guidance and other resources to achieve the desired outcomes during each of the four stages, whilst also building knowledge and capacity among national stakeholders along the way.



### 3.3. WaterRiSK Country Report Cards

In addition to the training manual, specific tools and resources were also developed to strengthen capacity. WaterRiSK provides a structured framework and systematic approach for assessing baseline status and future needs for the integration of climate resilience in the water supply services sector in the Caribbean. The WaterRiSK tool helps to highlight the strengths and weaknesses of current practice and to identify opportunities and priorities to enhance the integration of climate resilience. WaterRiSK can be used as a more in-depth assessment tool drawing on detailed climate risk and vulnerability studies and associated screenings of policies, plans and legislation using a climate resilience lens. For use by national teams comprising representatives with interests in (and influences on) the safe and secure provision of water supply services, WaterRiSK is a participatory self-assessment approach which aims to strengthen capacity to identify and prioritise climate action.

The application and use of WaterRiSK brings a range of benefits to national stakeholders engaged in the processes to integrate climate resilience. It serves to highlight the diverse characteristics and multi-disciplinary nature of a climate resilient water supply services sector and encourages a questioning mode of analysis to identify gaps and needs with respect to strengthening the enabling environment, watershed and water resources management and water supply systems themselves. WaterRiSK can help to facilitate common agreement among stakeholders on priority actions to strengthen climate resilience and provides a starting point for the preparation of roadmaps and investment plans to catalyse change.

WaterRiSK presents findings in an easily digestible format that communicates climate resilience needs to technical and non-technical stakeholders alike; see the example WaterRiSK Country Report Card shown in Figure 4.

The application of WaterRiSK stimulates the sharing of knowledge and information and the establishment of a collective evidence base for informed decision-making. A further benefit is that WaterRiSK can also provide a means to monitor and track improvements with the integration of climate resilience over time.

### 3.4. Regional Training of Trainers event

A 3-day Regional Workshop/Training of Trainers (ToT) event was held at CDB in Barbados, from 13-15 June 2018, to train country practitioners in how to establish robust and implementable climate resilience water sector policies and investment plans. Centred on the training manual, the training workshop strengthened national capacity to assess and design effective climate resilient action. The event was used to train over 50 water sector professionals from 17 Caribbean countries. Criteria were established to ensure participation in the ToT event of a good mix of professionals working across water services, water resource management, climate change, regulation, economic planning, sustainable development and finance.

In addition to the country participants, other water sector and climate focal points attended as representatives from various regional organisations and initiatives including CDB, the Inter-American Development Bank (IADB), Caribbean Water and Wastewater Association (CWWA), Caribbean Water & Sewerage Association (CAWASA), young professionals from the Centre for Resource Management and Environmental Studies (CERMES), Regional Strategic Action Plan (RSAP) on Water Governance and Climate Resilience and CReW+: An Integrated Approach to Water and Wastewater Management.

### Dominica WaterRiSK report card

**Vision** "Provide access to safe, reliable, affordable and resilient water supply services and reduce operational risks associated with climate variability and change in an environmentally sustainable manner."

Dominica is a water-rich island. Water is abstracted from rivers, streams and springs and used mostly for domestic and irrigation purposes, as well as for hydropower production.

Dominica Water and Sewerage Company Limited (DOWASCO) operates 44 independent water supply systems (Water Areas). Due to the high elevation of the intakes, water quality is sufficient that treatment is usually limited to chlorination. However, turbidity caused by heavy rainfall events can cause water systems to shut down. Extremes such as TS Erika (2015) and the Cat 5 Hurricane Maria (2017) severely impacted the sector: landslides destroyed or blocked access to water infrastructure; soil erosion caused siltation at the intakes; river courses were sometimes diverted so that there was no water flowing at the intakes.

**Impacts of Hurricane Maria**  
ECS \$5 million damage costs to DOWASCO  
Loss of DOWASCO's revenues  
Severe loss of DOWASCO's equipment  
All water supply systems impacted  
Destruction of 76% of forest cover

**Climate change**  
Higher temperatures  
Higher sea levels  
Higher wind speeds  
More intense extreme rainfall  
Less average annual rainfall

This report card has been prepared based on the WaterRiSK self-assessment approach which assesses the level (or performance) of integration of climate resilience in the water supply sector. WaterRiSK is structured around the three pillars - namely the Enabling Environment, Water Resources and Watershed Management and Water Supply Systems - recognizing their equal importance for the resilience of the sector. Performance is scored from 1 (low) to 5 (high).

### Dominica WaterRiSK report card

## Enabling environment

An enabling environment which guides and promotes a pro-active approach to the integration of climate resilience.

**National goal:** "Transform Dominica to a climate resilient nation"  
The Prime Minister of Dominica has pledged that, following four national disasters in the last ten years, he has a vision for Dominica to be the first climate resilient nation in the world. Implementing this vision will be the remit of the Climate Resilient Execution Agency for Dominica (CREAD) which will work across all sectors to develop and implement projects and programmes to build resilience.

Legislation is outdated and institutional responsibilities are fragmented and have evolved in an ad hoc manner.  
There is no National Water Policy or strategy to give direction and coherence to policy-makers, professionals and other stakeholders.  
Enforcement mechanisms for environmental protection, planning and land use need strengthening.

**Challenges**

**Actions needed**

**Institutional roles and responsibilities**  
> Establish a strong framework for the management of water resources and the regulation of water services, strengthen cross-sectoral coordination.

**National policies and strategies**  
> Produce a National Water Policy.

**Institutional capacity and knowledge base**  
> Build capacity in project identification and financing.

**Water supply services: institutional overview**

Responsible ministry	Ministry of Public Works, Water Resource Management and Ports.
Water service provider	DOWASCO.
Regulation	No independent regulator.
Water Resources and Watershed Management	No single institution or law with comprehensive responsibility for Water Resources and Watershed Management. The agencies involved are mainly DOWASCO and the Forestry Division.

### Dominica WaterRiSK report card

## Watershed and water resources management

Water resources and ecosystems provide secure water quantity and quality and are robust to cope with climate variability and climate-induced emergencies.

Dominica's rich tropical forest has been severely impacted by Hurricane Maria.

There is no single institution with comprehensive responsibilities for water resources.  
Poor land use practices and illegal dumping threaten the quality of water resources.  
Landslides and erosion can damage water intakes.

**Challenges**

**Actions needed**

**Water resources data and information**  
> Create an inventory of available water resources and a masterplan for their sustainable management, considering present and future water needs of the agricultural, tourism and energy sectors.

**Water resources and watershed management**  
> Implement an agency mandated with the management of water resources.  
> Improve land use practices, combat illegal waste dumping and encourage sustainable agricultural practices.

> Encourage communities to protect water resources and have a key role in the management of watersheds.  
> Improve coordination among the agencies that have a role in water resources management or that exploit water resources (hydropower, tourism, agriculture, water supply).  
> Implement reforestation and slope stabilization programmes, as well as green infrastructure solutions.

### Dominica WaterRiSK report card

## Water supply systems

Water supply systems can quickly respond to and recover from climate-induced disruption and users are engaged in the drive for greater resilience.

There is insufficient storage of water (90% of daily demand).  
Water treatment is usually not sufficient to cope with high levels of turbidity.  
There is insufficient redundancy in the system.  
Infrastructure is exposed to landslides and soil erosion.  
The lack of an asset database is a barrier.

**Challenges**

**Actions needed**

**Strategy and action plans**  
> Develop guidance on resilience in infrastructure design and water systems performance targets.

**Flexibility and redundancy**  
> Improve treated water storage.  
> Improve redundancy through interconnection of key water supply systems.  
> Improve efficiency through demand side options (personal storage, leakage reduction).  
> Invest in the Water-Energy nexus.

**Critical infrastructure**  
> Create an asset database and management system and develop hydraulic models.

> Upgrade or relocate most vulnerable intakes and transmission lines.  
> Enhance water treatment to cope with turbidity.  
> Develop a communication plan and strategy to communicate true value of water.

**Disaster Risk Management**  
> Have back-up power options at pump stations.  
> Increase emergency storage at shelters and strategic locations.  
> Protect DOWASCO's equipment from looting.

This Watershed report card was produced as part of the Caribbean Development Bank (CDB)-funded Planning for the Integration of Climate Resilience in the Water Sector in the Caribbean project undertaken by HR Wallingford. Project financing is provided from resources allocated under the African Caribbean Pacific European Union (CDB-NAR) Disaster Risk Management in CARIPOL Countries programme. The data report 'WaterRiSK: A self-assessment tool to support the integration of climate resilience', HR Wallingford, 2016. For further information please contact CDB at info@caribank.org.

Figure 4: Example WaterRiSK Country Report Card (for Dominica)

Source: Caribbean Development Bank (2019) - Prepared by HR Wallingford



## 4. Moving from regional to national action

### 4.1. Regional stakeholder survey on capacity development needs

A regional stakeholder survey was commissioned in March 2019 to assess needs and demand for further capacity development support at a national level. The survey was issued to Country Focal Points who attended the earlier ToT event in the form of an online SurveyMonkey questionnaire. In addition to identifying national capacity development needs, the survey also helped to better understand intentions at a national level for further dissemination and use of the training manual, establishment of a national process for the integration of climate resilience and how the new concepts learned at the ToT event would be applied and used in country.

Representatives from 17 Caribbean countries attended the ToT workshop in June 2018 and of these, 12 countries responded to the survey, with more than one respondent completing the survey in many of these countries.

### 4.2. Identified support needs

Survey respondents identified support needs where capacity development at a national level would be most beneficial, and this is summarised in Figure 5.

It was evident from the survey results that national stakeholders would welcome support across all stages of the Framework process, although higher priority support needs were identified for selected activities such as the delivery of Climate Risk and Vulnerability Assessments (CRVA) and the screening of policies, strategies, plans and legislation. A high priority was also assigned to activities related to the preparation of financing proposals, development of investment strategies and identification of funding sources.

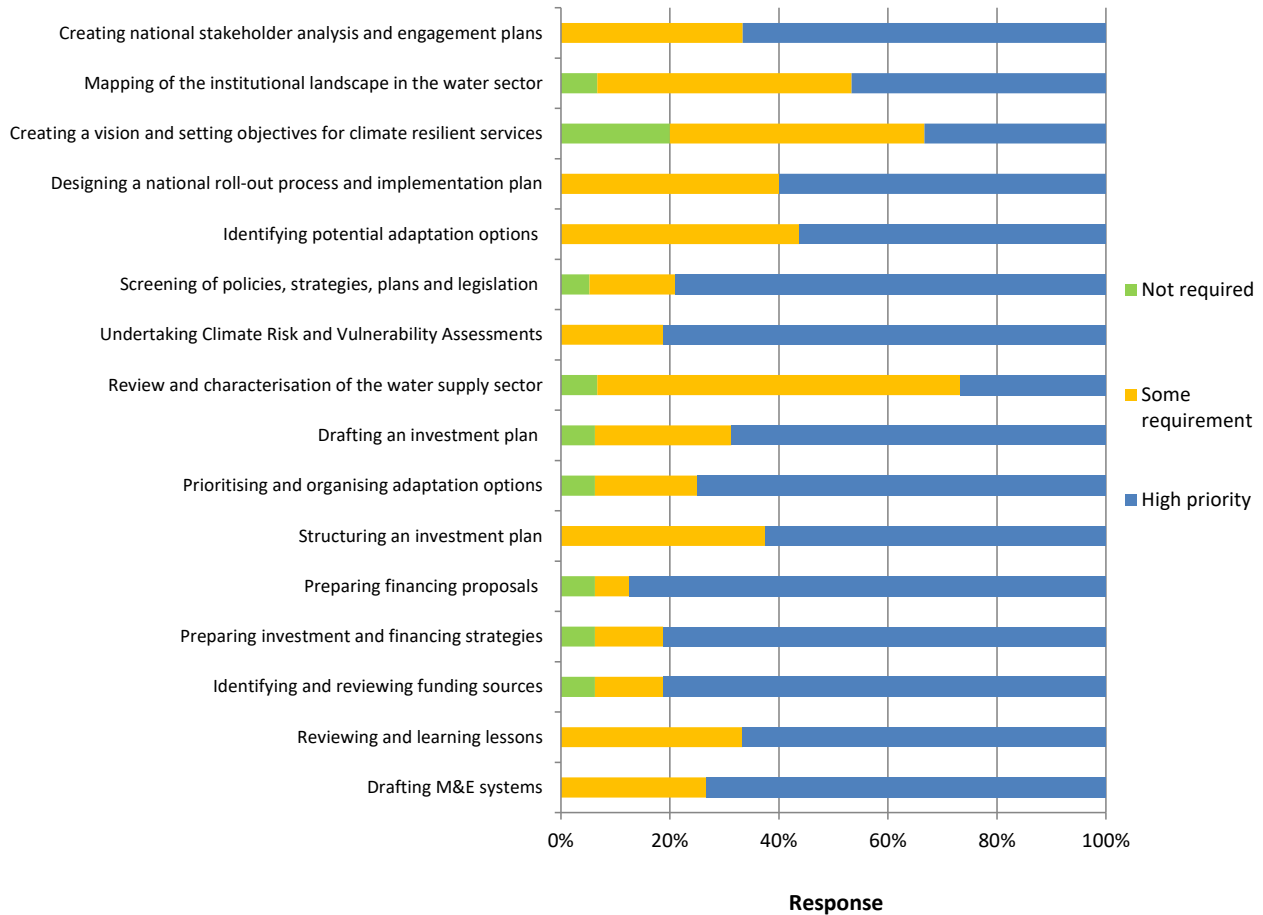


Figure 5: Which support activities/topics would be most beneficial in accelerating your national roll-out processes?

Source: HR Wallingford (2019) National Survey

A range of different modalities for capacity development support was also considered by the respondents, and a summary of those that would be most effective and beneficial to national stakeholders is shown in Figure 6. In-country support (e.g. for workshop preparation and delivery) received the highest demand, although other modalities for support, such as case examples from across the region and remote 1-1 interaction, were also highly recommended.

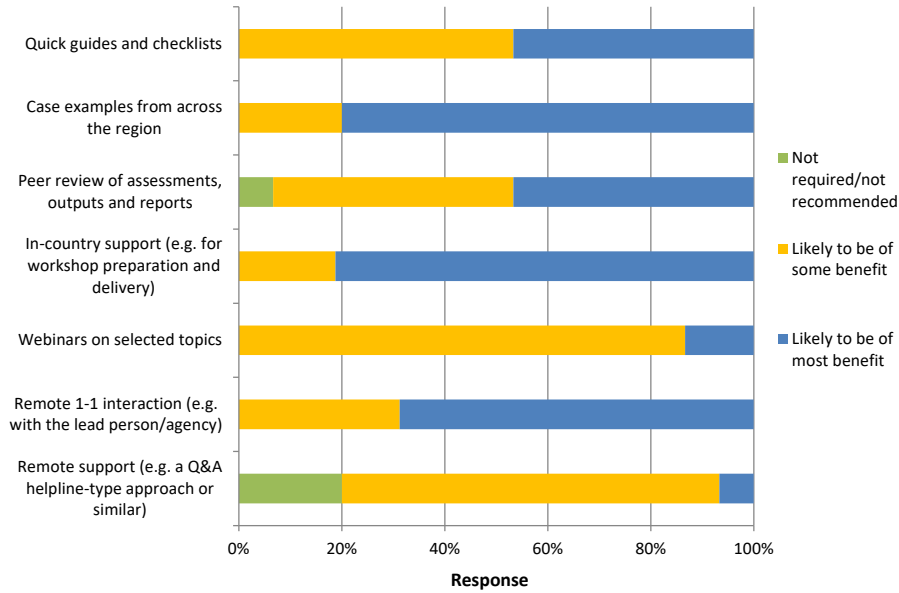


Figure 6: Recommended modalities for capacity development and support

Source: HR Wallingford (2019) National Survey

### 4.3. High demand for a Knowledge Hub

During the ToT event, national stakeholders identified the development of a regional web-based portal promoting and supporting the integration of climate resilience in the water sector in the Caribbean as a key priority alongside a provision of an e-version of the training manual.

The survey results have further reinforced the earlier findings with all responses received stating that an online Knowledge Hub to exchange knowledge and experiences across the region would be beneficial to national practitioners and professionals.

## 5. Conclusion

It is important that momentum is maintained and that The Project’s legacy leads to a transition from regional to national action, and that effective financing for implementation is forthcoming.

Ultimately, it is each country’s responsibility to drive the process forward and to secure funds for implementation. CDB has assured its Member Countries that water will continue to be a focal sector for the Bank. CDB has been a principal source of financial resources and technical assistance to the sector, and is presently supporting ongoing water projects in most of its Borrowing Member Countries. Other sources of funding are also available through other multilateral funding agencies, bilateral support, and dedicated climate financing through the Green Climate Fund and the Adaptation Fund. Domestic funds from government and water utilities will always be necessary and although investment plans to strengthen climate resilience are expected to reduce future costs or enhance public revenues, there will remain recurrent costs

that need to be budgeted. Grants for studies, training, peer exchanges and capacity building can also be maximised.

As examples, in Dominica funds have been secured under the UK Caribbean Infrastructure Fund (UKCIPF/DFID) for a Water Sector Strategic Development Plan (WSSDP) which will produce a strategic plan for medium to long term interventions in the water sector and the identification of climate resilient options for upgrading the water supply and wastewater infrastructure. The project will also develop detailed designs for priority interventions. A number of countries have already secured funding from the GCF for water sector activities including the Climate Resilient Water Sector in Grenada project (G-CREWS / US\$30million) and the Water Sector Resilience Nexus for Sustainability in Barbados (WSRN-S Barbados / US\$45million). Acknowledging these successes, the CDB is supporting other countries with their preparations of concept notes and proposals for GCF funding (e.g. The Bahamas) and regional proposals are also under consideration.