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FIRST IMPLEMENTATION PLAN REGIONAL LEVEL RESPONSES

REGIONAL STRATEGIC ACTION PLAN FOR THE WATER SECTOR IN THE CARIBBEAN TO DEVELOP RESILIENCE TO THE IMPACTS OF CLIMATE CHANGE

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Glossary

| ACP | Asia Caribbean Pacific | IDB | Inter-American Development |
|-----------|---|--------|---|
| CARICOM | Caribbean Community | | Bank |
| CARIFORUM | Caribbean Forum | IWEco | Integrating Water, Land and Ecosystems Management in |
| CARPHA | Caribbean Public Health Agency | | Caribbean Small Island |
| CAR/RCU | Caribbean Regional | | Developing States |
| | | MEA | Agreement |
| CAWASA | Association Inc. | MFI | Multi-lateral Financial Institution |
| CC & CV | Climate Change and Climate Variability | NAMA | Nationally Appropriate Mitigation Actions |
| CDB | Caribbean Development Bank | NAP | National Adaptation Plans |
| CDEMA | Caribbean Disaster Emergency | NRW | Non-Revenue Water |
| CEP | Management Agency Caribbean Environment | OOCUR | Organisation of Caribbean Utility Regulators |
| СІМН | Programme Caribbean Institute for | РАНО | Pan-American Health Organization |
| | Meteorology and Hydrology | RCC | Regional Climate Centre |
| CLME+ | Caribbean Large Marine Ecosystem | RSAP | Regional Strategic Action Plan for Water Governance |
| CReW+ | Caribbean Revolving Fund for Wastewater | SDG | Sustainable Development Goals |
| CWWA | Caribbean Water and Wastewater Association | SMART | Specific, Measurable, Achievable, Relevant, Time- bound |
| DRR | Disaster Risk Reduction | SOE | State Owned Enterprise |
| EU | European Union | TBD | To Be Decided |
| GCF | Green Climate Fund | UNDP | United Nations Development |
| GEF | Global Environment Facility | | Programme |
| GWP-C | Global Water Partners- Caribbean | UNEP | United Nations Environment Programme |
| HLF | High Level Forum of Ministers with Responsibility for Water | UNFCCC | United Nations Framework Convention on Climate Change |
| IBNET | International Benchmarking Network for Water and Sanitation Utilities | USAID | United States Agency for International Development |

Introduction

The Regional Strategic Action Plan for the Water Sector in the Caribbean (RSAP) is built on work and studies carried out in the Caribbean and extensive consultation with national and regional water sector stakeholders. The RSAP is a response to the myriad of common challenges facing the Caribbean Water Sector and to identify the major challenges facing the sector. Cognisant of the challenges and grounded in the regional realities, the RSAP sets out a framework of action, at the national and regional levels. In this respect, the RSAP recognises that whilst there are commonalities, the actions must be nationally relevant, involving stakeholders. However, given the commonalities there is scope to scale-up synergies by way of regional cooperation and collaboration to inform and support national actions.

The document was developed through the Caribbean Water and Wastewater Association (CWWA) as part of the Caribbean Region's participation in the 8th World Water Forum, held in Brazil, 18 - 23 March 2018. It was presented as a White Paper at the 13^{th} High Level Forum of Ministers (HLF) with responsibility for Water held in Georgetown Guyana, 17 - 18 October 2017. Based on further feedback and the experience of the World Water Forum a revised and updated document was presented to the 14^{th} High Level Forum, held in Montego Bay Jamaica, 9 - 10 October, 2018. Following the presentation and discussion of the document, the Ministers declared that:

- The CWWA and partners should be commended for working through the process of developing the RSAP for the Region.
- That the CWWA and its partners should continue the development of an Implementation Plan for the RSAP, and that this decision does not bind any government to any financial or new policy obligations.
- That they be kept informed about and engaged in the implementation of the RSAP.

This document is a direct response to the Ministers' request that there should be the development of an Implementation Plan. The implementation proposals set out are based on meetings, workshops and discussions that have taken place since the 14th HLF. The Implementation Plan sets out a regional level response based around the five pillars identified in the RSAP:

- Climate-resilient Water Governance,
- Climate-informed Decision Support,
- Climate-resilient Water Resources Management,
- Climate-resilient Water Service Provision, and
- Capacity building and sensitization for Climate-resilience.

Added to this, and coming out of the HLF discussions consideration should be given to addressing the research and development needs of the water sector and to incorporating this into the RSAP Implementation Plan. Additional sub-component elements have been added to Climate-resilient Water Services Provision that were not previously captured, and a Monitoring and Evaluation sub-component has been added to Capacity building and sensitization for Climate-resilience. It also acknowledges the role of regional institutions and in particular the CWWA in monitoring and reporting back to Ministers on the progress in respect of the development and implementation of the RSAP.

Each of the five pillars have a set of Objectives around which Actions have been identified as contributions to the achievement of the Objectives. The Actions would primarily be undertaken at the national level, responding to and incorporating local needs and conditions. It is recognised

though that notwithstanding the need for national responsibility and ownership of the actions, there are cross-cutting and regionally common dimensions which can inform national actions. In such cases, collective or collaborative action will not only be desirable but also beneficial in that it would promote the sharing and implementation of best practices, and reduce, time, effort and costs. The proposed Actions respond directly to this.

Since the 14th HLF, and in accordance with ministerial wishes, the scope and focus of regional actions aligned with the RSAP to be addressed through the Implementation Plan have been the subject of discussion among Development Partners. The Implementation Plan – Regional Level Responses, advanced in this document, is grounded in the discussions that have taken place since the 14th HLF and a Regional Workshop convened by CWWA with the support of the Inter-American Development Bank and the Government of Jamaica in Jamaica 17 – 18 September 2019¹. The objectives of the Regional Workshop were to:

- 1. Begin developing Action Plans addressing identified areas requiring intervention,
- 2. Identify areas of intervention that could be supported by the IDB, CDB and other Development Partners.

The Regional Workshop identified common cross-cutting Actions, which are aligned with the five plus one pillars of the RSAP. These form the First Implementation Plan - Regional Level Responses. That this is the First Implementation Plan recognises the reality that not all of the issues and challenges identified in the RSAP can be addressed at one time and that a phased approach is required, cognizant of funding and resource constraints. At the same time, individual countries have been developing their own national action plans and programmes and advancing with the drafting of concept notes, actively securing resources, and embarking on actions informed by and consistent with the content of the RSAP. In this regard it can be noted that there are regional organisations who are mandated to provide support to national level utilities and organisations in the form of grants and loans to advance water sector resilience to climate change and climate variability. For example, grants of up to US\$50 million can be made as well as loans of up to US\$250 million for water sector climate adaptation projects. These are just some of the concessionary funds options available, and national governments are encouraged to explore the available channels open to them for sector support, for example through the CDB, IDB and the CCCCC. Regional organisations, such as the GWP-C are already working as intermediaries, with national governments to support the development of bankable projects and to assist in approaching potential funding bodies.

This First Implementation Plan document contains summary of the expected sector level impacts of climate change and climate variability, outlining the future environment and conditions within which the sector can expect to have to operate and provide services. In many cases these will constitute additional stressors, having a multiplier effect that could otherwise circumscribe the ability of the water sector to achieve Sustainable Development Goal 6: Clean Water and Sanitation. It also sets out the Implementation Plan Actions to be undertaken that respond to the cross-cutting and/or common regional challenges.

The success of the Implementation Plan depends on vision, leadership and commitment. Regional and national organisations have developed a clear vision of how they see the Caribbean moving forward to a water secure future and through this action plan for Regional Level Responses they are committing themselves to assist with the achievement of the objectives set

¹ See the Workshop Report for the record of the proceedings and discussions.

out in this document. However, firm leadership is required in order to achieve the goal of a water secure Caribbean in which all its citizens can realise their Human Right to Water. In this respect there has been a consensus that the CWWA will take the lead. This role though does require acknowledgement and endorsement on the part of CARICOM of the proposed Regional Level Action Plan set out in this document and recognition of the need for a lead, coordinating and monitoring agency through which reporting on progress to CARICOM is to be channelled. At present the CWWA is fulfilling this role, through the host of the HLF of Water Ministers.

Summary of Climate Change Impacts on the Water Sector

The effects of climate change and climate variability on the water sector can be broken down into the effects on water resources and on the provision of water services, as discussed in the RSAP. Through on-going research into the potential consequences of continued greenhouse gas emissions on the global climate a more detailed appreciation of the effects on the regional climate continues to develop. Changes in rainfall patterns, intensities, increases in the number and frequency of continuous dry days, increases in day and night time temperatures, increases in continuously hot days, sea level rise and other parameters are now better understood, with a higher degree of probability, depending on climate scenario. However, according to the World Meteorological Organization's latest assessment the signs and impacts of global heating are speeding up climate changes. Given the vulnerable nature of the Caribbean Region this should add fresh urgency to efforts to include and operationalise climate resilience into the water sector. The following provides a very general overview of impacts, acknowledging that there are local factors that will modulate the effects of climate change and climate variability.

Water Resources Impacts

Water resources provide the supply of water to meet the consumptive needs of a country. At a basic level, climate change and climate variability will have impacts on water quantity and water quality. In general, there is expected to be a general drying trend and increased variability; less overall rainfall, increases in the number of consecutive dry days, increased prevalence of drought conditions and changes in rainfall intensity. Coupled with the expected increases in temperature these conditions will over time change the condition of watersheds and catchments. Changes in vegetation to cope with prevailing higher air and soil temperatures and lower soil moisture will have a direct impact reducing the amount of run-off and a deterioration of water quality through increased sediment loads and erosion.

Human activities in watersheds and catchments will also respond to the changed conditions through changes in agricultural practices and cultivation, increased water use, and increased use of fertilisers and pesticides in an effort to maintain productivity. Such adaptive practices run the risk of accelerating the detrimental effects on watersheds and catchments through negative feedback loops.

Overall there will be less run-off to maintain surface water resources and greater variability in runoff with both lower and higher flows. Higher rates of run-off and instream flows will not only transfer greater volumes of water into the marine environment, but they will also carry higher sediment loads, including biochemical pollutants. Intense rainfalls and flash flooding often provide the trigger for mass movements such as landslides which damage infrastructure like pipelines and water installations and have reduced the storage capacity of dams and impoundments. Even under non-extreme conditions greater variability of soil temperature and moisture induces soil movement, stressing buried infrastructure and increasing bursts and leakages particularly among aging pipeline assets.

Similarly, changes in rainfall-runoff patterns will impact groundwater recharge; decreases in rainfall means lower recharge while higher rates of run-off will exceed the infiltration capacity of soils and aquifers also resulting in lower recharge rates. Changes in land and agricultural practices that result in loss of vegetative cover adversely affect recharge as water is not being retained and made available for recharge. Furthermore, increased use of biochemical pollutants increases the risk of contamination of aquifers. Groundwater flows also have a role in maintaining surface water flows. Decreases in recharge to coastal aquifers increases the risk of saline intrusion and if abstraction rates are not adjusted accordingly, they run the risk of having to be abandoned as a freshwater resource due to the increase in salinity levels.

Drought conditions exacerbate the negative impacts described above; salinization of aquifers, reduction in the dilution of pollutants, reduction in streamflows and aquifer recharge, and accelerated degradation of watersheds. The expected increase in the recurrence of drought conditions will pose severe challenges for maintaining a basic level of supply and increase costs through the need for remediative actions such as tinkering and desalination. An emerging concern is that of water security, particularly in times of emergencies as limited water supply from a diminished or compromised resource could have adverse socio-economic and public order consequences. Table 1 summarises the impacts of climate change and variability on water resources and provides an indication of common responses that have been proposed to adapt to or mitigate the impacts on the supply side.

| Driver | State | Impact | Response |
|---|--|--|--|
| Intense rainfall | Higher run-off Landslides Flooding Debris flows | Increased pollutant loads Loss of supply Loss of storage capacity Damage to water infrastructure Impact on marine environment Loss of power supplies Socio-economic stresses | Increase systems resilience and redundancy. |
| Decreased rainfall and increased variability | Decrease streamflows Variable surface water flows Decreased aquifer recharge | Decrease in available water and loss of supply Loss of arable land | Improve watershed management Increase water capture and storage Diversify water resources Introduce payment for environmental services schemes Develop water sharing protocols |
| Higher temperatures | Increased evaporation and evapotranspiration Deterioration of watershed conditions Soil movement | Reduction in water quantity Increased pollutant loads Increased in bursts and leakages Environmental health impacts | Improve watershed management |
| Drought conditions | Salinization of coastal aquifers Reduced stream flows Reduced aquifer recharge and yields Deterioration of watershed conditions | Decrease in available water Saline intrusion Increased levels of pollution Water rationing Socio-economic stresses Loss of agricultural productivity and vegetation cover | Reduce demand and consumption Improve water use efficiency Wastewater reuse Desalination |

Table 1: Impacts of Climate Change on Water Resources

Water Services Impacts

The provision of water services; i.e. water supply, wastewater collection, treatment and disposal, are dependent on the availability of water resources. Water services encompasses the physical infrastructure required to convey water to points of consumption and from there to collection and disposal. It also entails institutional and economic aspects that condition the way in which the services are provided.

Intense rainfall events including those associated with tropical storms can give rise to flash floods and debris flows. The rainfall can result in slope instabilities resulting in mass movements and landslides. Landslides affect water distribution systems, pump stations and reservoir impoundments whilst flooding and debris flows have damaged water and wastewater infrastructure.

Decreases in water availability resulting from reductions in water resources is felt through a need to find additional sources of supply and to provide additional storage capacity to bridge periods of low supply. Decreases in volumes can have water quality impacts. Firstly, through an increase in pollution concentrations and secondly intermittent supplies mobilise sediments in the pipelines. On the one hand this leads to increased water treatment costs and on the other results in poor water quality being supplied, and an increase in complaints. The link between increases in temperature and other weather-related factors and water consumption has so far not been shown to be strong with respect to domestic demand; however, for other sectors such as agriculture the need to offset higher rates of evapotranspiration is well established. Climate change and climate variability is expected to result not only in high water demands but also in increased competition for the available water resources. In the absence of robust water sharing protocols, levels of constrained demand, social inequality and economic impacts will increase – particularly acute during times of drought. Decreases in water availability may have some limited beneficial effects in that it would encourage a greater emphasis on water use efficiency; achieving the same level of service and satisfaction but with a reduced volume of water.

Seasonal and intermittent changes in soil temperature and moisture lead to differential soil movement which affects buried assets such as pipelines. In the cases where these assets are 'old' and depending on factors such as the pipe material and age, an increase in differential movement will stress the pipelines and result in an increase in bursts and leaks. Newer, more flexible materials with fewer joints perform better under these conditions but many water distribution systems are characterised by an aging infrastructure. Increased temperatures would have a negative effect on impoundments through increased rates of evaporation and could reduce 'headroom' – the difference between water available and water required to meet demand.

With respect to the impact of climate change on sanitation and wastewater there may be some beneficial aspects with respect to wastewater treatment. Increased temperatures are likely to have a positive impact on microbial activity, increasing the effectiveness of treatment. However, since the Caribbean has a low coverage of centralised wastewater treatment works any potential benefit will be limited in scope. Wastewater treatment works are usually located downstream from where wastewater is generated and often in lower lying coastal areas. These are particularly vulnerable to flooding and debris flows associated with intense rainfall events.

Overall, the consideration of the potential impacts of climate change and variability on water services needs to be an integral part of water master planning and asset management. Whilst there are impacts on the water services physical infrastructure, they also have institutional and

financial implications; challenges to managerial capabilities, financial impacts and regulatory implications. On top of mostly poorly maintained and aged infrastructure resulting in low continuity of service, climate related impacts have already exposed vulnerabilities in water systems and resulted in increased capital and operational costs, particularly during fast and slow onset events. Failure to increase the resilience of the water sector infrastructure, physical and non-physical will result in an escalation of costs and a deterioration of levels of service to be provided, compromise a country's ability to provide for the social welfare of its citizens, and impede development. The impacts are summarised in Table 2.

| Driver | State | Impact | Response |
|---|--|--|--|
| Intense rainfall | Landslides Flooding Debris flows | Damage to intake structures, pump stations, pipelines, reservoirs, water treatment works, and wastewater treatment works | Adopt climate resilient design codes Increase inter-connectivity of water systems |
| Decreased and more variable water availability | Decrease streamflows Variable surface water flows Decreased aquifer recharge | Insufficient storage, poorer water quality and increased treatment costs, increased complaints. Increased competition for water. | Diversify water sources. Pipeline replacement programme Increase water use efficiency Reduce leaks and bursts |
| Higher temperatures | Soil movement Increased evaporation from impoundments | Reduction in water quantity and increased pollutant loads Increased in bursts and leakages Increases in water demand Wastewater treatment improvement | Implement NRW Water quality monitoring Demand management |
| Drought conditions | Reduced water availability Poorer water quality | Restricted and constrained supply - rationing. Decrease in productivity Increase in social and economic stresses | Reduce consumption through rationing and cut-offs Introduce water efficient incentive mechanisms |

Table 2: Impact of Climate Change on Water Services

A survey of water utilities and responsible ministries² identified damage to infrastructure, saline intrusion, drought and extreme flooding as the primary threats to the water sector from climate change. It is interesting that the impacts on utilities primary productive input – water resources, were not mentioned. Only salinization of coastal aquifers is related to water resources. The top priority actions identified by the survey included: redesign and protection of critical water infrastructure, improved water management, and improved water storage².

National Actions

Annex 4 of the RSAP provides, as of October 2018 a listing of ongoing interventions in the Water Sector of the Caribbean. These are broken down by the eight of the sixteen countries that responded, and the interventions are categorized under: governance related interventions, water supply and availability related interventions, and climate resilience related interventions. The listing is not complete and should, ideally, be updated, the gaps filled, and more details of the interventions given. It is recommended that this be done as it would provide an additional opportunity to identify synergies and opportunities for developing regional approaches to common challenges.

² HR Wallingford (2018). Planning for the integration of Climate Resilience in the Water Sector in the Caribbean. CBD.

Since 2018 a number of Caribbean countries have been developing their Nationally Appropriate Mitigation Actions (NAMA) under the UNFCCC³, and cross sectoral actions that reduce emissions. More pertinently, countries have also been preparing their National Adaptation Plans which aim to reduce vulnerability to the impacts of climate change and to integrate climate change adaptation into policies, programmes and activities. An example of how this can be used to guide interventions in the water sector can be seen from Saint Lucia and its "Sectoral Adaptation Strategy and Action Plan for the Water Sector"⁴. There have also been successful applications to the Green Climate Fund (GCF) with respect to the funding of water sector projects; in this regard mention can be made of two. These are the Water Sector Resilience Nexus for Sustainability in Barbados (WSRN-S0) project through the Caribbean Community Climate Change Centre and led by the Barbados Water Authority; and the Grenada Climate-Resilient Water Sector (G-CREWS) project which are proving to be models for the implementation of climate adaptation projects in the region. Other completed projects include the two solar-powered renewable energy desalination water supply projects in Bequia and Carriacou which are providing water supply to these two small islands.

Another development has been a push to develop Concept Notes and Project Proposals for submission to the Green Climate Fund (GCF) which address climate related challenges facing national water sectors. Both Barbados and Grenada are receiving funding for interventions in their respective water sectors. In May 2019 Global Water Partnership-Caribbean organised a workshop to strengthen the capacity of water utilities and ministries in developing climate resilient proposals, with the objective of preparing a Regional Water Sector Programme, aligned with the RSAP, for submission to the GCF. Attended by representatives from 10 Caribbean countries, the outcome was the preparation of 10 country specific project ideas and Logframes. These were taken through to a follow up meeting in Panama in September 2019. Interest in approaching the GCF to support interventions in the water sector is high and it can be expected that coming out of the recent initiatives that more funding will become available. The Caribbean Development Bank is engaging with The Bahamas, St Kitts and Nevis and St Lucia over the development of Concept Notes as a first step to developing Project Proposals for funding by the GCF. Other developments include regionally focused water related projects such as PAHO's Climate Change Resilient Public Health Systems for strengthening the Health Sector in CARIFORUM countries funded by the EU, the Enhancing Climate Resilience in CARIFORUM countries component 2: Enhancing climate resilient water infrastructure also funded through the EU. Other relevant projects are indicated in Table 3.

Core Problems to be Addressed

Water sector governance is essentially about who gets water, when and how. It is about the determination of the equity and efficiency in water resources and water services allocation and distribution, balancing the competing uses of water by different stakeholders. Water governance encompasses the formulation of policies, supportive legislation and regulation, institutional arrangements concerning roles and responsibilities, and the instruments available to ensure the desired outcomes. The elements of water governance comprise:

- Institutional frameworks defines roles and responsibilities,
- Enabling environment encompasses the setting of policies and enacting legislation,

³ United Nations Framework Convention on Climate Change

⁴ <u>https://climatechange.govt.lc/climate-change-programme/</u>

• Management instruments – covers the allocation, assessments and economic levers.

The water sector is embedded in the wider social, political and economic environment, affected and affecting outside of the sector. Given the complexity and multi-faceted nature of water it is no surprise that the water sector struggles to its aspirational goal of underpinning meaningful and dignified human development. Often failure to achieve this is in large part due to a failure of governance. Governance operates at many levels; at the regional level shaping the relationship between individual countries and between countries and regional coordinating mechanisms (CARICOM), at the national level between the actors that constitute the water sector, and at the organizational level. Figure 1 below summarises the core problems identified in the following text and relates them to the respective pillars of the RSAP; note that many of the core problems are of a cross-cutting nature.

At the September 2019 Workshop in Montego Bay, Jamaica, the Governance Paper⁵ commissioned by the IDB was a key point of discussion. The Paper assess the performance of the water and sanitation sector in the Caribbean and provides recommendations to improve the governance of the sector in the region. The Paper complements and reinforces an earlier study⁶ commissioned by the Caribbean Development Bank into the performance of water utilities. Whilst both the papers consider the Caribbean Region, their focus is on the governance of water utilities. The papers taken together with other reports and the discussions that have taken place during the Workshop and with stakeholders have highlighted a number of **core problems** within utilities. These core problems are common across utilities and form a cross-cutting subset of challenges within the ambit of the RSAP. As such they would be amenable to a coordinated regional approach. The core problems identified are discussed below and a proposed set of actions and activities are set out in the subsequent Table 3 of proposed Regional Level Responses.

Non-Revenue Water

Levels of Non-Revenue Water (NRW) are, with the exceptions of Belize, Grenada and Curaçao, above 30% of the water produced and many utilities have NRW levels in excess of 40% and even extending to as much as 70% in some cases. Losses of this level, real and apparent, put a strain on water resources, incur additional and unnecessary costs, give rise to complaints about poor service provision. Perversely, they can encourage the development of additional expensive resources rather than invest in reducing losses. NRW also represents lost revenue which could otherwise have contributed to the financial stability of utilities. In a water constrained environment, addressing non-revenue water often offers better cost-effective investment than other augmentation options, and reductions in water losses will postpone major capital investments. High levels of NRW are seen as symptomatic of poor financial planning, resource allocations, and weak management drivers; ultimately these are a product of poor governance.

The causes of NRW include: unbilled and unauthorised consumption, metering and data handling inaccuracies, and leakage from transmission and distributions pipes, losses from reservoirs and leakages from service connections. Unbilled and unauthorised consumption indicates that a utility's systems for storing and processing customer information is either inadequate or not being adequately utilised, that quality control processes are not fully in place, and that it is not identifying

⁵ Castalia (2017). Governance Positon Paper on the Caribbean Water and Sanitation Sector: Final Report and Action Plan – produced for the Inter-American Development Bank

⁶ Cole Engineering Group (2015). Assessment and Analysis of the Water Sector in the Caribbean. Caribbean Development Bank.

illegal connections and responding accordingly. Metering inaccuracies and data handling errors are indicative of not having proper quality control and assurance procedures within the organization. Unbilled and unauthorised consumption, and metering inaccuracies and data handling errors constitute commercial losses and are a result of inadequate management systems within a utility. To address these issues is a matter not only of a change in management culture but also of ensuring that the necessary Information and technology infrastructure, quality assurance procedures and reporting mechanisms are in place.

The leakage losses constitute physical losses from a water supply system and arise due to inadequate operations and maintenance procedures, a lack of leakage control actions and poor quality of the underground and reservoir assets. All water supply systems age and deteriorate over time; deterioration of the condition of the system can be due to a number of variables. The rate of deterioration is influenced by the level of maintenance and the replacement rate, amongst other factors. Maintenance is an operational expenditure whilst replacement is a capital expenditure, both of which have to be budgeted for and funded. Lack of adequate finance will almost inevitably be manifest in high leakage rates. An additional, compounding problem, is the lack of understanding of where leaks are occurring, the extent of losses, and their criticality (risk-based assessments). In other words, the necessary physical and organisational infrastructure and the financial resources are not fully in place to understand the nature of the leakages, the financial implications and the ability to reduce leakage levels.

Water utilities are often ill-equipped and under-resourced to institute measures to address and reduce the level of losses. Some utilities have sought to address NRW through in-house interventions, Belize Water Services for example, others have sought to contract it out, as in the case of The Bahamas, whilst Jamaica has gone for a hybrid approach being a blend of developing in-house capacity married with a performance based contract. Increasingly, water utilities have recognised that they have to address NRW, particularly taking into account climate change and variability.

Under these circumstances it would be prudent to put in place measures that would allow utilities to share their experiences, offer advice and assistance, lessons learnt, what the necessary conditions are for successful performance based or other forms of contract. This lends itself to a regional approach.

Inadequate Planning

Few countries have a water sector master plan which guides their medium to long term goals, programmes and projects; there are no formal drivers which require them to be produced or if they do to update them on a periodic basis. The planning emphasis is on responding to short-term needs and problem solving. There is thus a focus on delivering capital works projects that meet perceived needs but that are not based on proper cost/benefit analyses and an appreciation of wider needs. This bias towards a project-based approach is compounded by an absence in the organisational arrangement of utilities of a planning function and dedicated department⁷. The

⁷ Martin, N and Sohail, M. (2005). Can regional cooperation deliver private investments for the water and sanitation sector in the Caribbean. Social and Economic Studies 54(4) 42-69.

Andrés, L., Guasch, J. and Azumenti, J. (2011). Governance of State-Owned Enterprises Revisited: The case of Water and Electricity in Latin America and the Caribbean. World Bank Policy Working Paper 5747. Scobie, M. (2016). Policy coherence in climate governance in Caribbean Small Island Developing States. Environmental Science and Policy. 58. 16-28.

tendency towards short-termism runs counter to the fact that water utilities are dependent on assets which are long-lived and expected to function over extended periods of time; there are operational pipelines which are 150 years old. Failure to take a long view runs the risk of utilities becoming 'locked in' with infrastructure assets and operational procedures that do not meet the needs of the country or impose an unnecessary economic burden. Thus, the programmes, projects and designs should take into account future conditions under which they will be called on to operate: meeting future growth, water demands and quality requirements; the impact of climate change and variability and; providing robust and resilient infrastructure to withstand extreme events and disasters. In the absence of a medium to long-term planning ethos that is embedded within national development plans and sectoral policies there will be sub-optimal investments.

Planning also has to respond to and be driven by national and sectoral policies. Indeed, planning is the bridge between policymakers/shareholders and utility managers. Without planning that responds to policy directives, it will not be possible to identify the extent to which policy objectives that incorporate social, developmental, economic and environmental goals can be achieved and the resources required for their achievement. This is a necessary condition for the productive interplay between the political and the technocratic spheres, distinguishing between the possible and the aspirational. It not only requires particular skill sets and an institutional/organisational 'home' but also to be used to inform decision-making and allocation of funds to meet stated targets. Periodic reviews of water master plans and related supporting plans (e.g. drought management plans) are required to ensure their currency. A benefit of institutionalising planning is that it will serve to highlight data, information and analytical deficiencies. This is a first and necessary step towards mobilising efforts to improve the collection and analysis of data and to support evidence-based decision-making. As more and more utilities become subject to independent regulatory scrutiny there will be an increasing requirement for them to demonstrate that planned investment and asset management programmes represent value for money and achieve desired outcomes at least-cost.

The present lack of institutionalised planning and preparedness for independent regulation implies that utilities may not be fully supporting national development needs.

Planning by its nature is reliant on and makes use of the best available data to inform decisionmaking; whether the decision-making concerns daily production or long-term capital investment decisions. The generation of data and information, the quality and completeness of data, and the choice of what data to gather is an important determinant of the quality of planning and decisionmaking. There are opportunities for water utilities and water resource managers to improve significantly the base information through the adoption and introduction of SMART water information systems. Advances in Information and Communication Technologies coupled with advances in the application of computing and data mining techniques to water systems have demonstrated that data collection and analysis can make a substantial difference not only to the management of water systems e.g. through energy efficiency and optimisation measures but also to short-, medium- and long-term planning. Serious consideration should be given to the adoption and incorporation of smart water systems as a means of enhancing climate resilience.

Uncertain Funding

It is a common enough complaint from water utilities that they are not properly financed, that tariffs are low and do not cover their costs and that they do not have the funds necessary to improve the services they provide. It is clear from the information contained in the Governance Position Paper that many water utilities are financially challenged but also that they do not have the data

needed to properly understand their financial position. Furthermore, many of them have only a basic idea as to their future funding requirements – in part due to factors discussed in the previous section. Whilst utilities may be able to cover their operation and maintenance costs from funds raised from tariffs, there is a reliance on forms of government support (e.g. transfers and guarantees) to enable the financing of investment programmes and capital works. Government support though can be fickle for a variety of reasons, particularly when there are many calls on a government to provide support across different sectors and sections of the population. Even this source of support is being challenged as governments move towards the minimisation of direct financial support to State Owned Enterprises (SOEs) and imposing requirement for them to move towards self-financing of operations and services. In itself this would not be problematic, if governments were to accept the principle of cost recovery through tariffs but in many cases such a move would be politically challenging, which puts water utilities in an uncertain position regarding finances and the need for clarity regarding the level and nature of support.

There is clearly a problem for utilities to understand what their future financing needs are and the extent to which internally generated funds contribute towards that. The gap between funds that can be generated internally, and the estimated, long term investment requirements represents the funding requirements that would need to be met from other sources. The ability to raise such funds is in part dependent on the level of risk investment associated with utility, a reflection of its ability to service any debt and by extension its financial competency and standing. If, as it appears from the Governance Paper that there exist deficiencies in this regard then it is indeed uncertain as to whether a utility would be in a position to raise the necessary finances required to achieve its investment and asset management goals. Uncertainty over where and to what extent funding can be obtained constrains the ability of utilities to provide the level of service, now and in the future, that society expects of them. A potential option is the greater use of Public Private Partnerships (PPP), this though is controversial. Inclusion of PPP needs to be handled with care and sensitivity, balancing efficiency gains against lock-in. The design of PPP is a crucial element requiring skill, expertise and transparency in drafting such contracts.

Governance Issues

Few countries have water sector policies in place that set out objectives and priorities which governments expect their water utilities to achieve and the means of funding to so achieve. Concomitantly, in the absence of explicit national policies, water utilities' planning and decision-making are unclear, which in turn should inform their investment and capital works programmes, planning and operational objectives as discussed above. It is widely accepted that the legislative frameworks within which many water utilities operate are outmoded and inadequate to sustain efficient water utilities. Most of the utilities are government-owned, established by acts of parliament which do not clearly provide for accountability, transparency and managerial autonomy to deliver water services under sound business principles. As a result, there can exist a spiral of decline in the performance of water utilities and concomitant poor service provision. Below are examples of lack of policy that illustrate key problems:

Enabling Environment

I. In all of the English-speaking Caribbean wastewater coverage in terms of improved collection treatment and disposal is at or below 30% of the population. However, except for a few countries, there are no policy pronouncements as to what level of coverage respective governments wish to see achieved and no dialogue informing the formulation of a policy. In the absence of a policy steer the water sector is left uncertain in determining

what it should aim for and how it may get there. It also complicates reporting on progress towards achieving Sustainable Development Goal 6.2: the achievement of access to adequate and equitable sanitation and hygiene for all.

II. The second example relates to cost recovery policies with respect to the provision of water and wastewater services. In many countries the extent to which water utilities are to be expected to cover their operations, maintenance, investment and other costs by way of tariffs and other charges is seldom set out. The result is an inability for proper planning to fund the services and that governments are left, to a greater or lesser extent, being responsible for the shortfall between revenues collected and the cost of service provision. The net result is the water utilities are under-funded and often in weak financial position, which inhibits their ability to improve services, and fund replacement, upgrading and expansion of service provision to meet developmental needs.

Institutional Framework

- I. One of the principles of integrated water resources management is that there should be a separation between the provision of services and the allocation and management of water resources. Whilst there has been progress towards separating these functions, there are still examples of where the service providers are also responsible for water resources management. Quite apart from the management of water resources being a much lower priority than the provision of water services, it constitutes a conflict of interest. Decisions regarding access to and the use of water resources are made with the interest of the utility foremost and often such decisions lack transparency and accountability.
- II. The other example concerns economic regulation of the utility and in particular the setting of tariffs. Again, best practice suggests that there should be independent oversight of the determination of tariffs in order to protect the interests of consumers as well as of the utility. The absence of independent adjudication of tariff setting means on the one hand that there is little objective scrutiny of the proposal and on the other, knowing that ministers and cabinet are tariff-raising averse, there is a reluctance to apply necessary increases.

Similar arguments can be made with respect to the use of management instruments such as requirement for formal planning, asset management and investment plans.

Many of these governance problems are common across the Caribbean and there is a continuum of practices, for example with respect to economic regulation and the management of water resources. Hence, a regional approach to the evaluation of experiences, lessons learnt, benefits and costs would be advantageous and has been built into Table 3. A key factor would be the development of a monitoring and evaluation framework to provide timely feedback.

Utility Turnaround Issues

During the September Workshop, the World Bank's Water Utility Turnaround Framework document was used to illustrate the determination of where utilities were with respect to their performance and ability to improve performance. A fundamental issue was the ability to collect and access the data required to carry out the evaluations. In addition to this, there was a perceived need to support utilities in understanding their financial performance and developing water sector plans. As discussed above, water sector plans respond to national economic development plans and inform asset management plans, taking the impacts of climate change

and variability into account and incorporating operational and capital works requirements. These are required as inputs into financial planning and the determination of how new investments can be financed.

The lack of water sector planning, not just within utilities but also applied to the management of water resources hampers the ability of the sector to respond to developmental needs and take account of the impact climate change and variability and the demands that it will make on infrastructure provision. The absence of policies with regard to wastewater treatment (primary, secondary, or tertiary) and reuse, efficiency of water supply and use, and leakage levels for example compound the difficulty for utilities to ensure that they can deliver the level of service expected of them and that they are organisationally, financially and technically sound enough to do so.

There was a strong recommendation that a regional approach to assisting utilities in the application of turnaround metrics and with planning through the development of regional expertise should be developed. Coupled with this was an identified need for there to be a monitoring and reporting mechanisms⁸. This is reflected in Table 3 as a proposed regional initiative.

Capacity Building and Knowledge Management

The approach to training, capacity building and knowledge management can be considered fragmented. There are many different initiatives, often attached to particular projects or programmes, which when they are completed leave no institutional memory or succession plan. This can lead to the duplication of effort, inefficient use of resources, and restricted access to materials developed. Very often there are insufficient funds allocated to be able to offer the level of training that goes beyond the 'one-off' intervention.

An approach to address this issue would be to develop a regionally based mechanism that would allow the collation and curation of information regarding training, capacity building, and knowledge management. This would provide a better understanding of what is available and match this against the sector's needs and requirements. It would then be possible to assist projects and programmes that incorporate training and develop more coherent and targeted training opportunities while at the same time improving the ability of the region to provide for its own capacity building and knowledge management needs.

⁸ An example of a monitoring, reporting and rating system is AquaRating, a rating system for water and sanitation utilities developed by the IDB and the International Water Association, see <u>http://aquarating.org/en/</u>. It can be used to identify utility strengths and inform specific actions.

| Climate Resilient Water Governance | Outmoded governance arrangements Uncertain funding Lack of regional level coordination Inclusion of climate change and disaster risk management Inadequate planning approaches |
|--|--|
| Climate Informed Decision Support | Deficient data collection and data use Inclusion of climate change and disaster risk management |
| Climate Resilient Water Resources Management | Uncertain funding Inadequate planning approaches Deficient data collection and data use |
| Climate Resilient Water Services Provision | Uncertain Funding High levels of Non-Revenue Water Inadequate planning approaches Undeveloped wastewater services policies Deficient data collection and data use |
| Capacity Building and Sensitization for Climate Resilience | Ad hoc capacity building programmes and initiatives Absence of systematic approaches to training and capacity building |

Figure 1: Relationship of Core Problems to the Pillars of the RSAP

Implementation Plan: Regional Level Responses

Table 3 below sets out the proposed regional actions, based on the identification of core problems and suggested interventions coming out of the Workshop and discussions with stakeholders. It is to be emphasised the Implementation Plan is a living document to be updated and revised in line with developments and on-going needs assessment. It therefore has to be responsive to changes and progress made with respect to the identified actions. Given the number and scope of activities outlined in Table 3, the need to confirm lead responsibility and identify sources of funding, and to develop concept notes it is expected that the term of this first Implementation Plan would be three years.

It is taken as a given that the regional level responses will be reviewed and updated as part of the proposed Monitoring and Evaluation activities. As per agreement at the 15th HLF in St Kitts and Nevis, the CWWA will take on lead coordinating responsibility for this first Implementation Plan.

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|---|---|---|--|---|---|--|
| Component 1: Cl | imate Resilient Wa | ter Governance | | | | |
| Sub-component 1.1: Improve national and regional institutional and legislative frameworks | Activity 1.1.1: Develop or review national water policies against international best practice. | Develop a check-list for reviewing water policies against accepted standards. Request national water sector focal points to complete the check-list. Analyse results and prepare report. | Through GWP-C; University postgraduate as a Researcher. | MFI | Submission to 16 th HLF, October 2020. | 1.Student dissertation 2.Summary to 16 th HLF |
| | Activity 1.1.2: Establish water resources agencies in each Member State | Carry out a review of water resource management agency arrangements across the Caribbean including; institutional arrangements, regulatory scope and remits, staffing, legal status, powers, and financing arrangements. Evaluate the relative effectiveness of the regional arrangements, report on best practice, and set out proposal and a roadmap for implementation. | Through GWP-C | Multi-lateral Financial Institutions (MFI) | Submission of funding request to MFI by June 2020 | Report on fund raising and initiation of action |
| | Activity 1.1.3: Develop effective national cross-sector coordination mechanisms. | Evaluate current cross-sector coordination mechanisms. Identify successful ones and develop lessons learn or identify success factors that could be replicated in other countries. | Through CWWA | MFI | Submission of request for funding to MFI by March 2020 | Report on fund raising and initiation of action, 16 th HLF |
| | | UNEP Caribbean Environment Programme (CEP) through its activities and programs is supporting the establishment of National Inter-sectoral Committees, including water | UNEP CAR/RCU | UNEP/GEF | On-going | Progress reports, 16 th HLF |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|-----------|--|--|--------------------------|---------|----------------|---|
| | | resources issues and water utilities. | | | | |
| | Activity 1.1.4: Review and modernise water sector legislation. | Carry out a comparative review of the status existing of water sector legislation. Identify the impact of current legislation and the case for updating or revision of legislation and/or regulation as well as areas that might benefit from adjustment or inclusion in legal systems. Under the Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States (GEF-IWEco) Project (8 participating Caribbean countries) there is provision for actions to strengthened national policy and legislation for the effective management of water, land and ecosystems resources that account for climate change under Components 1 and 3. The works is aligned with the RSAP. | UNEP CAR/RCU & CARPHA | GEF | Up to 2023 | Strengthen national policy and legislation for effective management of water, land and ecosystem resources that account for climate change. Strengthen capacity of national and regional institutions and other stakeholders for water, land and ecosystems management that account for climate change Improved engagement and information access through knowledge sharing networks. |
| | | Under an ACP-MEA involving UNEP-Caribbean Environment Program (CEP): 1. Convene workshops to support ratification, updating and implementation of the Cartagena Convention Annex III Land based Sources of Marine Pollution Protocol; | UNEP CAR/RCU | GEF | Initiated 2019 | Inception report and update to 16 th HLF |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|---|---|--|---|---------|---|--|
| | | Update national legislation and regulation on wastewater effluent discharges; Develop national pollution reduction action plans supporting the Regional Nutrients Reduction Strategy with UNDP GEF CLME+ Project; GEF funded projects on nature-based solutions and use of wastewater as a resource. | | | | |
| | Activity 1.1.5: Establish independent national water utility regulation | Carry out a review of the status of national frameworks for the regulation of the water sector including water utilities, benchmarking against international best practice and evaluate the scope for change. | Organisation of Caribbean Utility Regulators (OOCUR) | MFI | Submission of request for funding to MFI by March 2020 | Report on fund raising and initiation of action |
| | Activity 1.1.6: Develop mechanisms to engage the private sector. | No proposed regional level action Note: UNEP CEP projects; CLME+ IWEco and CReW+ include elements to enhance engagement with the private sector including tourism. | | | | |
| | Activity 1.1.7: Establish a regional coordinating mechanism for the water sector. | Discussions with CARICOM Quasi-Cabinet. Prepare a White Paper to HLF setting out the proposed Coordinating Mechanism and Arrangements. | CWWA | CWWA | Submission to 16 th HLF, October 2020. | Report Country-level sign off 17th HLF supports recommendations |
| Sub-component 1.2: Mainstream climate change policies in the water sector | Activity 1.2.1: Incorporate climate resilience and disaster risk reduction into sector & national development plans | No proposed regional level action UNEP through the Panama Regional Office, the Caribbean Sub-Regional Office in Jamaica and the UNFCC and other | | | | |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|--|---|--|--------------------------|--------------|-------------|---|
| | | Disaster Risk Reduction | | | | |
| | Activity 1.2.2: Establish mechanism for national coherence of water sector plans with development and investment programmes | No proposed regional level action Accelerate development of bankable projects and applications to Adaptation and Green Climate Fund | | | | |
| Component 2: Cl | imate-resilient Wa | ter Resources Managemer | nt | | | |
| Sub-component 2.1: Quantify water resources, water budgets and supply-demand balances | Activity 2.1.1: Undertake a programme of surface and groundwater modelling to estimate water resources, and the capacity to meet future demands | Development of a Concept Note and supporting studies to assess the potential use and deployment of new technologies to assess surface and groundwater resources including water quality, in three pilot study countries. | CCCCC | GCF | May 2020 | Concept Note and Accompanying Studies |
| Sub-component 2.2: Develop and adopt IWRM Plans | Activity 2.2.1: Develop watershed/catchment management plans | No proposed regional level action See IDB Discussion Paper IDB- DP-00712 (2019) Aquifer Storage and Recovery: Improving water supply security in the Caribbean opportunities and challenges Action is being supported through the UNEP CAR/RCU IWEco project with the framework of pollution prevention, and the protection of coastal and marine resources and ecosystem. | UNEP CAR/RCU & CARPHA | GEF | 2021 | Progress report to 16 th HLF |
| | Activity 2.2.2: Reduce sources of pollution through: | The CReW+ Integrated Approach to Water and Wastewater Management using | GEF-CReW+ | GEF/IDB/UNEP | 2018 – 2024 | Progress reports to 16 th HLF |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|-----------|---|---|--------------------------|---------|-------------|--|
| | legislation, and public education | Innovative Solutions and Promoting Financing Mechanisms in the Wider Caribbean Region Project Components 1 and 4 address the legislative and educational aspects with respect to the treatment of wastewater and the reduction of pollution. The activities of the CReW+ project align with the RSAP. | | | | |
| | | The IDB has been developing the "Optimal Sanitation Initiative' for Latin America and the Caribbean. The Initiative aims to increase financing to the sanitation sector in the next five years, building on existing experiences and developing a series of financial and non- financial products. These will include setting up a Sanitation Financing Facility and supporting innovation and governance. Six Caribbean countries have indicated their support and participation. | IDB | IDB | 2019 - 2024 | Progress report to 16 th HLF and financing proposals |
| | Activity 2.2.3: Involve communities in watershed protection | Under Component 4 of the Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States (GEF- IWEco) Project there is some provision for enhancing livelihood opportunities and socio-economic co-benefits for targeted communities from improved ecosystem services functioning. | UNEP CAR/RCU & CARPHA | GEF | Up to 2023 | Improved engagement and information access through knowledge sharing networks Progress report to 16 th HLF. |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|---|---|---|--------------------------|---------|----------------------|--|
| | Activity 2.2.4: Explore Payment for Environmental Services schemes | Under Component 1 of the GEF- IWEco project. Review of opportunities for the use of PES schemes to improve water resources management. | UNEP CAR/RCU & CARPHA | GEF | Up to 2023 | Reviewofpracticesandenhancedivelihoodlivelihoodopportunitiesopportunitiesandcommunitysocio-economicco-benefitsfromimprovedecosystemservicesandfunctioning. |
| | Activity 2.2.5: Develop water sharing protocols | The GWP launched in 2019 a Water Sharing initiative looking at the robustness of water sharing arrangements in the context of valuing water. There may be opportunities to develop a relationship. | GWP-C | GWP-C | Up to end of 2020 | Regional position paper and symposium |
| Component 3: Cl | imate-informed De | ecision Support | | | | |
| Sub-component 3.1: Develop National Water Decision Support System (WDSS) for climate-informed decision-making | Activity 3.1.1: Develop data and information management protocols for collection, storage, analysis, dissemination, and archiving of data | Between 2011-2015 the Caribbean Community Climate Change Centre (CCCCC) executed the "Database Management System for Regional Integrated Observing Network for Environmental Change in the Wider Caribbean (DBS). The purpose of the project was to develop a regional operational Database Management System to facilitate the open access to data products useful for observing environmental change in the Wider Caribbean. | CCCCC | IDB | 2011 – 2015 | Gap Analysis of geospatial information and regional action plan. Conceptual design of Database Management System Input and Output. Database Management System outreach and education. Sustainability Plan. |
| | | For discussion: Consideration should be given to building on the work done to put in place | CCCCC | MFI | 2021 onwards | Development of proposal for funding. |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|-----------|--|--|-------------|---------|--------------|--|
| | | National Water Decision Support Systems. | | | | |
| | Activity 3.1.2: Establish a data centre to host the WDSS; develop WDSS architecture for storage, access and analysis of disaggregated data | No proposed regional level action | | | | |
| | Activity 3.1.3: Develop monitoring system for data collection and integrate within the WDSS. Deploy instrumentation and equipment for data collection. | No proposed regional level action | | | | |
| | Activity 3.1.4: Develop models to predict the impact of extreme events on the water sector | The Caribbean Institute for Meteorology and Hydrology (CIMH) provides forecasting capabilities and climate related services through its Caribbean Regional Climate Centre (RCC) the aim of which is to support socio-economic development by generating suites of user defined climate products and services to inform risk-based decision-making in climate sensitive sectors at the national and regional levels. | CIMH | USAID | Ongoing | Services (forecasting, training, etc.) |
| | | For discussion: Consideration should be given to engaging with CIMH to explore how Activities $3.1.4 - 3.1.7$ could be operationalised, first at the regional level. | CWWA | MFI | 2020 onwards | Discussion document |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|---|---|--|-------------|---------|--|---|
| | Activity 3.1.5: Analyse and interpret data with the WDSS to assess social, economic and environmental impacts on water resources | No proposed regional level action | | | | |
| | Activity 3.1.6: Develop national early warning systems to facilitate forecasting of water- related crises | No proposed regional level action | | | | |
| | Activity 3.1.7: Training and capacity building for personnel in data entry, analysis and dissemination | The CWWA and CAWASA through their joint capacity building and training sessions can undertake regional training for business analytics in the sector utilising tools such as AquaRating. | CWWA | MFI | Submission of request for funding to MFI by June 2020 | Report on fund raising and initiation of action on training schedules, programmes and manuals |
| Sub-component 3.2: Establish water resources | Activity 3.2.1: Establish periodic national water census to quantify and value water resources as part of the work programme of the national statistics office. | No proposed regional level action | | | | |
| management planning cycle for improving responsiveness to climate impacts | Activity 3.2.2: Set standards and benchmarks to measure progress in relation to climate impacted variables. Set standards for reduction of demand. | No proposed regional level action | | | | |
| | Activity 3.2.3: Institutionalise 'State | No proposed regional level action | | | | |

| | Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|--|---|--|---|-------------|---------|--|---|
| | | of the Water Sector' report. | | | | | |
| | Activity 3.2.4: Develop national level requirement for water resources management planning taking in future development scenarios. | No proposed regional level action | | | | | |
| | | Activity 3.2.5: Establish and monitor operational resilience metrics and Levels of Service | Using the foundation work of the IDB's Governance and Performance Paper, as well as the CDB's Governance Assessment, the CWWA can agree with utilities to develop a regional system for data collection among utilities, verification and validation of data, and compiling of dashboards. For example, a Caribbean version of IBNET. | CWWA | MFI | Submission of request for funding to MFI by June 2020 | Report on fund raising and initiation of action |
| | Component 4: Cl | imate-resilient Wa | ter Services | | | | |
| | Sub-component 4.1: Reduce water demand to acceptable levels to adapt to climate related water scarcity | Activity 4.1.1: Reduce levels of Non-Revenue Water (NRW) | Several countries have embarked on NRW reduction strategies, they are at different stages of implementation and are using a variety of approaches. Given the seriousness of this issue and its implications for service provision and for resource utilisation there is an imperative to share experiences and for collective learning. To this end a regional Information and Experience Sharing Seminar will be convened. The purpose will be to review the different approaches to the | CWWA | IDB | March 2020 | A NRW Checklist, Regional Toolbox and Guidance Notes |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|--|--|--|-----------------------|---------|--|---|
| | | implementation and operationalisation of NRW reduction strategies, forms of contract, pre-requisites for successful NRW interventions, organisational and operational requirements, benchmarking, and monitoring evaluation and reporting. Following this a regional toolbox to support utilities in the execution of NRW reduction programmes can be implemented | | | | |
| | Activity 4.1.2: Establish appropriate incentives to encourage water use efficiency | Carry out a review of economic and social incentives, including tariffs, that have been used or proposed, assessing their practicality, impact on water use, financial impact, and organisational requirements. | GWP-C | MFI | Submission of request for funding by March 2020 | Report on fund raising and initiation of action |
| Sub-component 4.2: Optimise efficient use of water resources to adapt to climate related water scarcity (Climate- proof water resources and services) | Activity 4.2.1: Improve water storage infrastructure including increased storage at the domestic and commercial level | No proposed regional level action | | | | |
| | Activity 4.2.2: Effectively manage recycled wastewater, rainwater and untreated surface water for use and reuse in landscape irrigation and agriculture. | There are a number of projects and intervention in which rainwater harvesting features. The CReW+ project considers the productive use of treated wastewater, at the same time there has been little attention given to the capture and use of surface water run-off. The effective use of these resources has to be grounded in national realities and circumstances. However, there may be some scope for drawing on regional | UNEP CAR/RCU & IDB | GEF | 2018-2021 By December 2019 | Documentation for National demonstration projects for decentralised wastewater management |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|-----------|--|---|-------------|---------|---|-------------------------------|
| | | experiences in developing a guidance document to inform national level initiatives with respect to feasibility and practicalities. | | | | |
| | | Investigate best practice, technologies, appropriate uses and opportunities to adopt, include and promote the recycling and reuse of water both as part of IWRM and water services solutions to water scarcity. | | | | |
| | | Example: Kamins Lagun Project, Bonaire treats wastewater including from septic tanks, and treated water is used in agriculture and gardens. Other examples of uses of treated wastewater include use in irrigation of golf courses. | | | | |
| | Activity 4.2.3: Climate-proof water storage, treatment and distribution infrastructure to better withstand the impact of climate change and extreme events | IDB-Invest is undertaking a study of the feasibility of creating a Caribbean Water Utilities Mutual Insurance facility to insure against climate related risks, support early warning systems and recovery, and ultimately increasing the resilience of water infrastructure in the face of the impact of extreme events. The Mutual structure will promote the adoption of best practices as increase resiliency would result in lower premium. It will result in opportunities to scale-up | IDB-Invest | MFI | Feasibility study in execution, implementation program 2020 | Report to 15 ^h HLF |

| Component | Activities | 3 | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|-----------|---------------------|---------------|--|---|---------|--------------------------|--|
| | | | resiliency and adaptation investment. | | | | |
| | | | Increase resilience of water infrastructure and reduce recovery times after extreme events including the physical and structural resilience of infrastructure. | | | | |
| | | | Support to Utilities affected by Hurricanes Maria and Irma (through CAWASA) | CAWASA | CDB | Completed 2018 | Repair and reinstatement of water supply and sanitation services |
| | | | Natural Disaster Risk Management Programme in CARIFORUM countries reducing vulnerability to the long-term impacts of natural hazards including the potential impacts of climate change. Planning for the integration of Climate Resilience in the water sector in the Caribbean | CDB & CDEMA | EU | Completed 2018 | Investment plans for the water sector to improve climate resilience |
| | | | Caribbean Regional Resilience Building Facility; providing technical assistance to mainstream resilience, leveraging investment to reduce vulnerability, and expanding financial protection against disasters | World Bank's Global Facility for Disaster Recovery and Reduction (GFDRR) | EU | Launched January 2019 | Financial support |
| | | | Climate change resilient Public Health Systems, strengthening the Health sector in CARIFORUM countries. | PAHO in collaboration with CARPHA, CIMH, UWI & CCCCC | EU | Commencing 2020 | Project update to 16 th HLF |
| | Activity Develop | 4.2.4: and | No proposed regional level action at this stage. | | | | |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|--|---|--|--|---------|--|--|
| | implement contingency plans including but not limited to desalination facilities that can be deployed in of situations of acute water scarcity | Potential development of a regional framework for addressing water scarcity, water sharing and drought management, with the assistance of the World Meteorological Organisation's Integrated Drought Management Programme and GWP | | | | |
| | Activity 4.2.5 Green Climate Fund Related Activities | Concept Notes for The Bahamas, St Kitts and Nevis and St Lucia; improved climate resilient water governance and water resource management, national decision support systems, climate resilient water services, demand reduction and energy efficiency. | CDB | GCF/CDB | 2021-2027 | Country projects to improved resilience to climate change and energy efficiency |
| Sub-component 4.3: Improve energy efficiency in water use | Activity 4.3.1: Reduce energy costs by energy efficient measures and use of renewable energy sources | Carry out a regional review of renewable energy initiatives including in the water sector to assess practices, practicalities, identify opportunities, operational considerations, and the capital and operational cost implications. The performance and resilience of renewable energy installations under extreme weather conditions to be evaluated. Prepare a report on the findings. | CWWA & Caribbean Centre for Renewable Energy and Energy Efficiency | MFI | Submission of request for funding by March 2020 | Report on fund raising and initiation of action |
| | Activity 4.3.2: Explore the feasibility of installing back-up energy sources as contingency measures during energy supply | No proposed regional level action | | | | |

| | Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|--|--|---|--|--------------------------------|---------|---|--|
| | | interruptions after extreme events | | | | | |
| Subcomponent 4.4: Improve the performance of the water and sanitation sector | | Activity 4.4.1: Assess status of Organisation and Strategy: strategic plan, competent management with autonomy and accountability, | Revise and update the Governance Paper prepared for IDB by Castalia and K&M Advisors based on the latest information provided by Utilities. Paper approved for publication. Develop outreach, approximation and | IDB | IDB | December 2019 December | Report Outreach and |
| | | developing capital investment projects, integrated IT systems, and IWRM plan in place. | dissemination strategy for the Governance Paper. | | | 2019 | strategy |
| | Subcomponent 4.4: Improve the performance of the water and sanitation sector | Activity 4.4.2: Assess adequacy of Human Resources Management. | CAWASA through the Caribbean Water Operators Partnership (CariWOP) provides access to training and capacity building for utility water operators. Assess the status of current offerings, identify needs and gaps, and develop revised programme of capacity development and certification. | CAWASA & CWWA | MFI | TBD | Programme of training and capacity building |
| | | Activity 4.4.3: Evaluate the state of Financial Management: reliable budgeting and planning cycle in place. | Finance and financing are critical to the sound operation of utilities, this entails having an understanding of what is needed to develop a comprehensive utility master management plan aligned to the World Bank's Water Utility Turnaround Framework, assess the cost of services, understand cost recovery, and undertake economic analyses including cost-benefit analyses. In order to assist utilities in better understanding a Hands-on | CWWA & UWI Business Schools | MFI | Submission of request to MFI for funding by March 2020 | Report on fund raising and initiation of action for programme of training and capacity building |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|--|--|---|-----------------|---------|--|---|
| | | training and capacity building programme can be developed with the financial assistance of Development partners. | | | | |
| | Activity 4.4.4: Benchmark Technical Operations: coverage, water balances, NRW strategy, preventative maintenance, life cycle costing, water quality testing and monitoring regime. | No proposed regional level action | | | | |
| | Activity 4.4.5: Assess the status of Commercial Operations: customer consumption profiles, extent of metering, accuracy of meter readings, and public relations strategy. | No proposed regional level action | | | | |
| Component 5: Ca | apacity Building ar | nd Public Education for Clin | nate-resilience | | | |
| Sub-component 5.1: Promote and encourage regional learning and replication | Activity 5.1.1: Develop a regional community of practice that will allow for sharing of experience, information and replication of best practices | Administer a survey to determine the need for and expectations of a community of practice and the development of a skills bank. The survey will also explore the preferred format and platforms for communication and consider linkages with Sub-component 5.2: Support training and capacity building. | CWWA/GWP-C | TBD | Submission of request for funding by April 2020 | Report on fund raising and initiation of action |
| | | Based on the results of the survey, prepare a feasibility report for the setting up and | CWWA/GWP-C | MFI | Submission of request for | Report on fund raising and initiation of action |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|--|--|--|-------------|---------|--|---|
| | | curation of a regional community of practice. Investigate the feasibility of developing a regional Skills Bank & Networking App to support the Community of Practice. | CWWA/GWP-C | MFI | funding by June 2020 Submission of request for funding by June 2020 | Report on fund raising and initiation of action |
| | Activity 5.1.2: Develop and maintain a database of water professionals to assist during national or regional emergencies | The organisation "Operators Without Borders', based in Canada but primarily active in the Caribbean has mobilised and provided support to water utilities impacted by hurricane events. It draws on support from Caribbean as well as Canadian utilities and works in conjunction with the Caribbean Disaster Emergency Management Agency (CDEMA), CWWA and Caribbean Water and Sewerage Association (CAWASA). Carry out an evaluation of the effectiveness of "Operators Without Borders', identify gaps and propose interventions to build on the work to date. | CAWASA | MFI | Submission of request for funding by March 2020 | Report on fund raising and initiation of action to 16 th HLF. |
| | | Develop skills bank of the water professionals and corporate entities in the region | CWWA | MFI | June 2021 | Skills bank |
| Sub-component 5.2: Support training and capacity building | Activity 5.2.1: Undertake a capacity needs assessment, and develop and execute a training programme at regional and national level to improve | Gather information on the training and capacity building interventions in the water and associated sectors (e.g. land management, public health) carried out by international, regional and national organisations over the last 5 | CWWA/GWP-C | MFID | Submission of request for funding by_June 2020 | Report on fund raising and initiation of action to the 16 th HLF. Training needs assessment |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|--|--|---|----------------------------------|---------|--|--|
| | technical capacity in the water sector | years including the costs. Evaluate the appropriateness and effectiveness, or otherwise, of the interventions and measures for assessing them. Determine the capacity needs and assess the ability of bodies and institutions to deliver training and capacity building including quality, certification and qualification. Assess current programmes being offered in the Caribbean and identify gaps and their inclusion into existing or new programmes. Include capacity building and support outlined under Activity 4.4.3 – Utility Master Planning in alignment to the World Bank's Water Utility Turnaround | CWWA & UWI Business School(s) | MFI | Submission of request to MFI for funding by June 2020 | Report on fund raising and initiation of action for programme of training and |
| Sub-component 5.3: Engage in a comprehensive public awareness campaign | Activity 5.3.1: Raise public awareness to promote and encourage action to adapt water use and wastewater management behaviour to climate variability and change | All current initiatives as well as national water sector agencies have public relations and communications as a core part of their activities. As a first step an identification of who is doing what and creating an accessible web-based inventory would provide a basis for building the elements of a comprehensive public awareness campaign and potentially reducing costs. | CWWA/GWP-C | MFI | Submission of request for funding by June 2020 | Report on fund raising and initiation of action for digital platform for sharing of best practice and case studies via a Community of Practice initiative. |
| Sub-component 5.4: Monitoring and Evaluation of RSAP Implementation | Activity 5.4.1: Develop a Monitoring and Evaluation mechanism to track the progress of the | Carry out a feasibility study into the setting up of an open platform for a monitoring and evaluation framework for utilities and other stakeholders to provide information on the | CWWA | MFI | Submission of request to MFI for funding by June 2020 | Report on fund raising and initiation of action to stakeholders and 16 th HLF |

| Component | Activities | Description of Actions | Lead Agency | Funding | Timescale | Outputs |
|---|--|---|--------------------|---------|---|--|
| | implementation of the RSAP | implementation of the RSAP, and to report progress. | | | | |
| Component 5a: Research and Development | | | | | | |
| Sub-component 5a.1: A mechanism to coordinate research and identify research needs | Activity 5a.1.1: Develop proposals for appropriate funding mechanisms to support research | Few water utilities actively engage in and support research related to their operational challenges. At the same time regionally based researchers have limited access to research funds, and often these are part of research grants to organisations and universities not based in the region. In other parts of the world funds have been set up to support and encourage research. The first step will be to review funding initiatives from other regions and to consider the practicality of setting up a regional research fund, an appropriate fund raising vehicle and an estimation of the funds that could be raised. | CWWA/GWP- C/UWI | MFI | Submission of request for funding by June 2020 | Report on fund raising and initiation of action to 16 th HLF |
| | Activity 5a.1.2: Develop proposals for the establishment of a Caribbean Water Research Council (CWRC) | To follow from 5a.1.1 | | | | |