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Virtual

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Outline of Technical Paper on the incorporation of freshwater issues into the LBS Protocol

For reasons of public health and safety associated with the COVID-19 pandemic, this meeting is being convened virtually. Delegates are kindly requested to access all meeting documents electronically for download as necessary.

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Information Document

An Integrated Water Resource Management Framework to Support Implementation of the Cartagena Convention

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April 2021

Content

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Executive Summary

The “Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region”, referred to as the Cartagena Convention (CC), entered into force in 1986. It´s the only regional legal framework for the protection and development of the Wider Caribbean Region (WCR) and include three protocols concerning land-based sources of pollution (LBS), oil spills and specially protected areas and wildlife (SPAW). The LBS Protocol adopted by the Convention in 1999 and entered into force in 2010 recognizes that the WCR marine and coastal resources and human health have ecological, economic, aesthetic, scientific and cultural values that are seriously threated by pollution from land-based sources and activities.

After almost 20 years of adoption of the CC and ten of the adoption of the LBS Protocol, pollution prevention and control from wastewater and agricultural runoff is still a challenge for the region. It represents a severe impact to the marine ecosystem mainly due to high nutrient loads. In addition, the WCR presents high vulnerability to extreme events that is exacerbated by climate change; it mainly affects coastal areas where 41 million people lives. This situation is having a high negative impact to the regional ocean-based economy that represents 18.4% of the GDP of the region, and therefore to the prosperity and welfare of WCR people (Patil et al., 2016).

As a response to this scenario, the CC is interested to have a better regional integration of Integrated Water Resource Management (IWRM) into the Convention. This information document provides technical and policy strategic recommendations to outline a regional IWRM framework to address existing challenges and opportunities.

IWRM is a process which promotes the coordinated development and management of water, land, and related resources to maximize the resulting economic and social welfare in an equitable and sustainable manner (UN Environment, 2018). It is a guiding process for the water community and the way to connect with other communities and natural resource management process. Besides IWRM other water resource management approaches have been proposed. The water security approach establishes a desirable condition any society is expecting from water: peacefully, having water for human well-being and development, avoiding water related health problems and disasters, and preserving biodiversity. The Food Water Energy Nexus support an integrated planning approach among those main water users, and as the best way to formulate effective and efficient solutions.

Under current global challenges of climate change, biodiversity loss, resilience building and development, IWRM needs to play a leading role. Water is identified as the number one priority for adaptation actions in most of the intended nationally determined contributions (INDCs) and is directly or indirectly related to all other priority areas (UNESCO, UN Water 2020). IWRM could become a powerful tool for biodiversity conservation if the role of hydrological regimes is understood as the key driver for many biological processes and as a provider of ecosystem services. The 2030 Agenda for Sustainable Development, the most important development agreement ever, integrates 17 Sustainable Development Goals (SDG) and for the first time an SDG 6 about water, which goal is to ensure availability and sustainable management of water and sanitation for all, that is sufficiency, sustainability, health, and inclusiveness. It comprises six targets and eleven indicators that represent a full global water resource management agenda for the years to come. As part of the SDG Integrated Monitoring Initiative, a baseline for indicator *6.5.1 Degree of IWRM implementation* was presented in 2018. The WCR average final score was 34, that indicates a medium-low level. The report concludes that at this level countries are unlikely to meet the global target unless progress significantly accelerates (UN Environment, 2018).

Based on previous experiences and future challenges, the WCR needs an accelerated approach to adopt IWRM. As a part of this approach, it is essential to develop a clear understanding of the benefits and potential synergies with other natural resource management and social processes to support sustainable development. Nowadays, more than ever IWRM must be developed as an ecosystem-based process to maximize benefits for all, respecting economic and social constraints, and integrating solutions for climate change, health, and development. Such a process should avoid being dominated by an economic sector or by emerging conflicts, it must be a governance process able to give voice to all and to build water security for the region.

An IWRM framework for the region should focus on having common regional principles, proposing key IWRM instruments to start or to consolidate the process and open opportunities for integration among different agendas. Common principles are those proposed by the Regional Strategy for the Protection and Development of the Marine Environment of the Wider Caribbean Region (UNEP CEP, 2021) and other related with global agendas. They are ecosystem-based management, source-to-sea, sustainable consumption and production, natural capital approach, science-policy interface, resilience building, one health for all, and public participation.

The key elements that an IWRM process must develop are those related with water governance, water for the environment and water budget and allocation, planning, financial mechanisms, data and information knowledge. These actions should be developed at the appropriate water management scale, i.e., river basins, sub-basins, micro-basins, aquifers, deltas, and according with each country political system (states or municipalities) including transboundary systems. Whatever the scale, it is essential to ensure coordination at the broader scale, that could be a national level or at the main hydrological basins through a designated water authority.

A Conceptual Framework for IWRM integration into the CC is proposed based on those strategic approaches/issues able to create synergies with the protection of the marine environment and trigger integrated processes for join investments and governance. This will inform more programmatic and less project focused approaches in the WCR including through the work of the CC Secretariat.

The Conceptual Framework presents, at global level, water as a connector that integrates implementation of the 2030 Sustainable Development Agenda, Paris Agreement and the Sendai Framework for DRR agendas. At local level, there are three processes that must guide integration of water and marine programs under a resilient goal: IWRM, Disaster Risk Management (DRM) and Integrated Coastal Zone Management (ICZM). At regional level, the CC plays a brokering role to promote a management cycle in which the global agenda feed the local projects and local projects meet global commitments, through a regional institutional structure.

An implementation outline with some specific actions is proposed to set out an IWRM process with the regional purpose of delivering results at the coastal zone, and thus make its contribution to the protection of the Caribbean marine ecosystem. Actions are organized following the four dimensions of the indicator SDG 6.5.1 (enabling environment, institutions and participation, management instruments, and financing) at local, regional, and global level.

Currently, there are several projects and initiatives in the region that could be part of the implementation process, based on their own goals and experiences but adopting common principles to facilitate integration, synergies and to deliver expected results together.

Current low IWRM implementation in the WCR offers the opportunity to agree upon a different approach to overtake current situation, and even to go beyond. In this regard, these are the main issues that could make the Conceptual Framework a different approach from previous experiences:

- It opens the process to other sectors such as environment and health, and other processes such as DRM and the ICZM.
- It is based on common principles, particularly an ecosystem-based management principle to promote integration and to build long-term solutions.
- It is geographically focused on the Coastal Zone and oriented to the restauration/conservation of the marine ecosystem as a common goal.
- It clarifies that although full water and sanitation coverage is urgently needed, it cannot be the only goal for the water sector in the region. IWRM must guide a broader process to build water security for all.
- It observes the importance of having a water governance structure in place, supported by the Escazu Agreement, as a unique binding agreement for Latin America and the Caribbean.
- It remarks the three-level governance model to leverage action from local to global and promote regional collaboration.
- It is oriented to build a climate smart and resilient ocean-based economy for the region.
- It proposed to make the economic case to support the value of integration, synergies and coordinated action for all.

1 Background information

The “Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region”, commonly referred to as the Cartagena Convention (CC), officially entered into force in 1986. It´s the only regional legal framework for the protection and development of the Wider Caribbean and include three protocols concerning land-based sources of pollution (LBS), oil spills and specially protected areas and wildlife (SPAW). It is considered today to be one of the most fully developed and innovative cooperative arrangements among the 13 Regional Seas Programmes, and a valuable framework for decision makers in the region.

The CC covers Wider Caribbean Region (WCR), that is the marine environment of the Gulf of Mexico, the Caribbean Sea, and the areas of the Atlantic Ocean adjacent thereto, south of 300 north latitude and within 200 nautical miles of the Atlantic coasts of the States. This area covers 28 islands and continental states, plus several islands which are dependent territories. USA, United Kingdom, France, and the Netherlands participate with their dependent territories or associated states within the region. There are 13 dependent territories, all islands (except for French Guiana).

From the 30 Governments in the WCR 27 have ratified the treaty and committed to protect, develop, and manage their common waters individually or jointly. In a region of mostly developing countries, such a regional approach to ocean governance is the only effective method to achieve sustainability while reducing the financial burden upon member states (UNEP-CEP, 2002).

The LBS Protocol adopted by the Convention in 1999 and entered into force in 2010 recognizes that the WCR marine and coastal resources and human health have ecological, economic, aesthetic, scientific and cultural values that are seriously threated by pollution from land-based sources and activities. In addition, it also recognizes the inequalities in economic and social development and the need to cooperate in taking appropriate measures and to commit at the highest political level (UNEP-CEP, 2002).

LBS and activities means those causing pollution of the Convention area from coastal disposal or from discharges that originate from rivers, estuaries, coastal establishments, outfall structures, or other sources on the territory of a Contracting Party, including atmospheric deposition originating from sources found on its territory.

The LBS Protocol establishes general obligations to prevent, reduce and control pollution, develop and implement plans and programs, at national, subregional, or regional level. In the annexes, it focuses on sources categories, activities, and associated pollutants, effluent and emissions limitations and or management practices, and the timetable to achieve them. In addition, the Protocol promotes cooperation for monitoring activities, research, exchange of scientific and technical information, and identification of most proper technologies.

It also has specific conditions to adopt environmental impact assessment guidelines and apply them to planned land-based activities likely to cause substantial pollution or significant and harmful changes to the Convention area and make the relevant information available to the affected persons. In the case of transboundary pollution, the Convention invites the concerned Contracting Parties to make the best efforts to consult and resolve the issue.

The LBS Protocol also have provisions for participation, education and awareness, reporting, institutional mechanisms, the scientific, technical, and advisory committee, operational procedures, and funding. Currently, 15 parties have acceded or ratified the protocol.

In 2013, an assessment of the status of the LBS Protocol revealed a great disparity among countries; some have progressed more than others including those that have not yet acceded to the Protocol, but in this case without adequate coordination. While the LBS Protocol provides such a coordinating mechanism and common framework, ratification and implementation of the Protocol needs to be improved (Corbin, 2013, cited in UNEP-CEP 2019).

In 2019, as a part of the State of the Cartagena Convention Area (SOCAR) Assessment of Marine Pollution from Land-based Sources and Activities in the WCR the following conclusions were presented (UNEP-CEP, 2019):

- Discharge of untreated domestic wastewater into coastal waters continues to be a significant threat to the region's marine environment. Most WCR countries are still plagued by inadequate domestic wastewater treatment infrastructure. Of the estimated 15 km^3 of domestic wastewater generated in 2015, 63% (instead of the commonly used 85%) was untreated and released directly to the environment.

- Over the 20th century, nutrient loads delivered from river basins to coastal areas almost doubled. Nutrient enrichment of coastal waters is explicitly addressed in SDG 14.1, owing to its potential to radically impair the functioning and productivity of marine ecosystems. About 560,000 tonnes of total nitrogen and 190,000 tonnes of total phosphorus are estimated to have been released to the WCR's coastal waters from domestic sources in 2015.

- Agriculture is the single most important anthropogenic source of nutrients in coastal waters in the region, greatly exceeding contributions from domestic wastewater and sewage. However, groundwater impacted by agricultural run-off, rather than agricultural surface water, introduces the highest loads of nitrogen to coastal waters. This underscores the need for increased attention to non-point sources of nutrient pollution and to protection of groundwater resources.

- The highest loads of domestic wastewater and nutrients discharged occur in sub-regions along the continental margins, particularly the northern Gulf of Mexico and the southwestern Caribbean. These sub-regions are heavily influenced by rivers that drain extensive watersheds in which urban centers and agricultural and industrial activities are concentrated.

The same assessment concluded:

> *Governments and other stakeholders need to adopt a different approach to addressing land-based pollution. An extensive range of on-the-ground actions and concrete measures to reduce pollution loads at the source are available and various sustainable financial mechanisms have been developed. There is an urgent need for governments to adapt and scale up existing experiences, best practices, and technologies, and undertake the required institutional, policy, legislative, and budgetary reforms to address land-based pollution, particularly at its source (UNEP-CEP, 2019).*

The WCR has the highest density of tropical cyclones in the world which means high vulnerability to climate change and other threats (Figure 1).

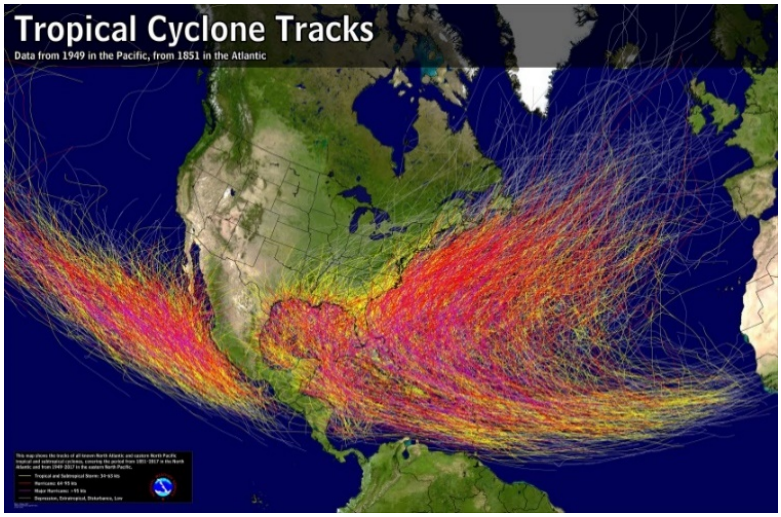

Figure 1 All North Atlantic and Eastern North Pacific Tropical Cyclones (Pickhardt F., 2017 June 11)

Since 1950, 324 natural disasters have struck the Caribbean, killing around 250,000 people and affecting more than 24 million people. Six Caribbean islands are in the top 10 most disaster-prone countries in the world, while all Caribbean countries are in the top 50. In Dominica, the costs of the 2015 floods were equivalent to 96% of GDP; in Grenada, the 2004 hurricane cost damages corresponded to 200% of GDP; and the 1998 storms cost Saint Kitts and Nevis over 100% of the country's GDP. The average annual damage cost from disasters in the Caribbean is equivalent to 2.4% of regional GDP, which is about 0.6% higher than other small states (Fuller C. et al, 2020).

Coastal development is especially important for the WCR. The sea surface area of the region is about 3.3 million sq. km, with an average depth of 2,200 m and a coastal length of 55,383 km. The coast/area ratio (km/km^2) is double the world's average, highlighting the importance of coastal management for the region. With over 40 million people living within 10 km of the coastline, human activities are reported to threaten 2/3 of the Caribbean's coral reefs, placing 1/3 at high risk (UNEP CEP, 2021).

Due to their small land size, most of the Caribbean countries' population, infrastructure, and activities, are situated within 25 km of coastline and in several countries over 20 per cent of the population lives in low elevation coastal zones (LECZ). Both factors – coastal exposure and low-lying geography – contribute to increased Caribbean countries' vulnerability to recurrent disaster related hazards and climate change impacts (Figure 2). (ECLAC, 2020).

The Small Islands Developing States (SIDS) are a specific case in the WCR, because of their unique vulnerabilities. The Caribbean SIDS refer to sixteen UN members in the WCR (Annex C) and the territories of: Anguilla, Aruba, British Virgin Islands, Bermuda, Cayman Islands, Curaçao, Guadeloupe, Martinique, Montserrat, Puerto Rico, Sint Maarten, the Turks and Caicos Islands and U.S. Virgin Islands. The great challenges and the need of international support for sustainable development for the SIDS have been recognized since the Agenda 21 in the early nineties, and up to the 2030 Agenda. In 2014, the SIDS Accelerated Modalities of Action (Samoa Pathway) was adopted; it addresses priority areas for SIDS and calls for urgent actions and support for SIDS' efforts to achieve their sustainable development. (UN SDG Knowledge Platform March 3, 2021).

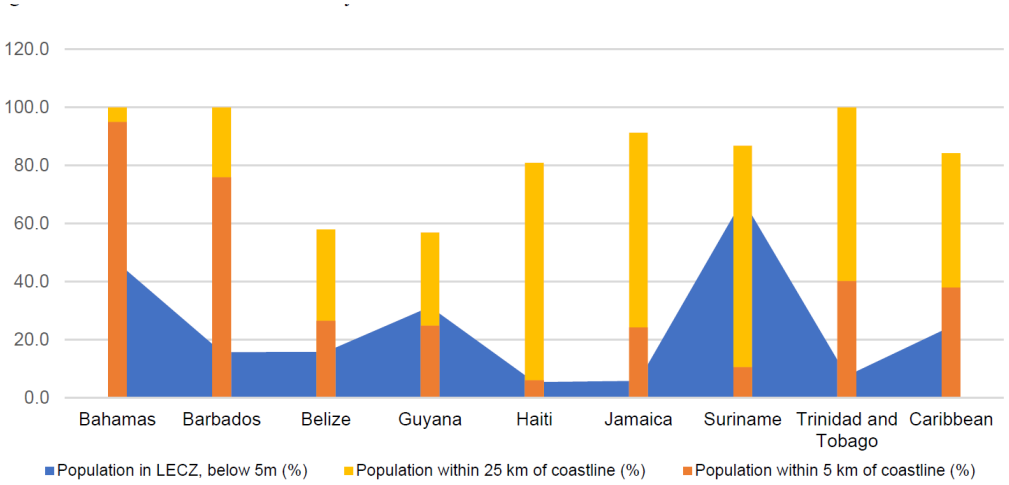

Figure 2 Caribbean Coastal Vulnerability (ECLAC 2020, from IDB, 2017, WB, 2013)

The WCR is an ocean-based economy. Recently, the World Bank estimated that annual gross revenue generated from ocean economy in the Caribbean Sea was US$ 407 billion in 2012, which was equivalent to 14-27% of world's total ocean economy. The major contributors for the WCR's ocean economy were the shipping sector (76%) followed by the tourism industry (47.1%); fisheries and aquaculture represented US$7 billion (Patil et al., 2016). It is projected that the total contribution of maritime and coastal tourism to GDP in the region will continue growing. In 2017, tourism contributed US$ 17.9 billion to the Caribbean islands and it is expected to grow 3.6% per year from 2018 to 2028 (World Travel Tourism Council, 2018).

After almost 20 years of adoption of the CC and ten of the adoption of the LBS Protocol, pollution prevention and control from wastewater and agricultural runoff is still a challenge for the region. It means a severe impact to the marine ecosystem mainly due to high nutrient loads. In addition, the WCR presents high vulnerability to extreme events mainly affecting coastal areas where most of the population is living and exacerbated by climate change. This situation is having a high negative impact to the regional ocean-based economy, and therefore to the prosperity and welfare of WCR people.

2 Purpose and scope of the document

The purpose of this information document is to provide technical and policy strategic recommendations to discuss how to propose a better integration of IWRM in the CC. In this sense, the document will focus on:

- Outline a regional IWRM framework to address existing challenges and opportunities
- Frame water related projects and activities within IWRM (national and regional)
- Identify opportunities and synergies for integrating IWRM with Integrated Coastal Zone Management (ICZM), and Disaster Risk Reduction (DRR)
- Recommend on how the Cartagena Convention/LBS Protocol could further support IWRM implementation.

3 Why an IWRM approach?

3.1 IWRM

Integrated Water Resource Management (IWRM) is an approach that the water community has developed and implemented for near 30 years. It comes from the Dublin Statement on Water and Sustainable Development issued in 1992. It proposed four guiding principles for an effective water management: a holistic approach, a participatory approach, the recognition of women's vital role, and the recognition of the economic value of water (UN, 1992).

Currently, it is understood as the activities related to handle the hydrological cycle for using water in a sustainable and equitable way. It´s about knowing the amount of water that is available in time and space, who needs the water, how to reach agreements upon distribution, how upstream stakeholders commit with those downstream, and how to minimize impacts and handle conflicts. At the end, it is a matter of understanding the whole water cycle under specific geographical conditions, and then agree upon how to share a common good and their benefits among all.

After many decades of experience, the IWRM definition globally accepted as a part of the Sustainable Development Goals (SDG) is:

> *A process which promotes the coordinated development and management of water, land, and related resources to maximize the resultant economic and social welfare in an equitable and sustainable manner (UN Environment, 2018).*

IWRM is a guiding process for the water community and the way to connect with other communities and natural resource management process.

In addition to the IWRM, other approaches have emerged that support and strengthen water resource management. Water security has become a strong concept that refers to a desirable condition or a goal for a local community, a river basin, a country, a region or even the world. It´s defined as:

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

Another approach to water resource management is the Nexus. It refers to the relationships among water, food, and energy security and the need for integrated planning. UN Water explains that the complex linkages between these critical domains require a properly integrated approach to ensuring water and food security, and sustainable agriculture and energy production worldwide (UN Water 2021, Feb. 22).

Considering that agriculture consumes around 70% of global water resources, that 75% of industrial water extraction is for energy production, that 90% of global power generation is water-intensive (UN Water 2021, Feb 22) and the expected increases on water withdrawals in the future makes the Nexus a relevant approach for the development of water resource management capacities worldwide.

IWRM supports the economic, social, and environmental dimensions of sustainable development (UN Environment, 2018). It is a globally accepted process to the sustainable

management of water resources. The water security approach establishes the desirable condition any society is expecting from water: peacefully, having water for human well-being and development, avoiding water related health problems and disasters, and preserving biodiversity. Complementing this water management framework, the Nexus support an integrated planning approach among those main water users, such as food or energy, and as the best way to formulate effective and efficient solutions.

3.2 Water in the Sustainable Development Goals

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, is the most important development agreement ever. It represents the common goal for peace and prosperity for people and the planet of current and future generations. It integrates 17 Sustainable Development Goals (SDG) and for the first time an SDG about water (Figure 3).

Water has been always considered a key resource for human wellbeing; however, since the Earth Summit it was taken as a cross-cutting issue. In the global development agenda, water was everywhere but nowhere at the same time. Now, having water as an independent SDG means a specific agenda covering the whole water management actions, besides all the interactions with other SDG.

Figure 3 Sustainable Development Goals

The structure of SDG 6 is presented in Annex 2. It includes the main goal, six targets and eleven indicators. The goal is to ensure availability and sustainable management of water and sanitation for all, that means sufficiency, sustainability, health, and inclusiveness. Targets focus on universal access to drinking water and sanitation, pollution control, water use efficiency by all sectors, protection and restoration of water related ecosystems, IWRM, international cooperation and local communities' participation. Overall, this is a full water resource management agenda for the next years and for the whole world.

Although divided in 17 main goals, SDG represents an integrated framework in which achievement involves recognition of SDG interactions among them. Thus, to achieve the *SDG 2 Zero Hunger* entails water for irrigation is well used and do not restraint water for people and nature. Water resource management is also a key element to achieve many other SDG such as *SDG 13 Climate Action, SDG 11 Sustainable Cities and Communities, SDG 15 Life on Land or SDG 14 Life Below Water*.

As part of the SDG Integrated Monitoring Initiative, a baseline for indicator *6.5.1 Degree of IWRM implementation* was presented in 2018. Indicator structure consists of four components (UN Environment, 2018):

1. Enabling environment: The conditions to support implementation of IWRM such as policies, legal framework, planning tools.

2. Institutions and participation: Role of institutions and other groups to support IWRM implementation.

3. Management instruments: Tools and activities to make rational and informed choices.

4. Financing: Budget and financing for water resources development and management.

This indicator has been proposed to follow up the process to build and consolidate IWRM in each country and these four dimensions are the perfect roadmap for IWRM implementation.

Baseline global results show that only 19 percent of the total countries had a High or Very High score, while 21 percent had a Medium-high score, and 60 percent had a Medium-low, Low and Very low score. That means that these countries have institutionalized most IWRM elements or have started developing those elements.

Results of 24 countries of the WCR are presented in Annex 2. Average final score for the region is 34, that means a Medium-low level that correspond to a condition where most elements of IWRM have been institutionalized. Considering the 75th-percentile, 18 countries got a final score of 42 or lower, being the lowest result 32 for those indicators under the enabling environment category. The report points out that at this level countries are unlikely to meet the global target unless progress significantly accelerates (UN Environment, 2018).

3.3 IWRM and Climate Change

Climate change is producing hydrological changes that produce extreme events either floods or droughts that affect water availability and therefore the way water resources must be managed. The projections for the Caribbean are for rising sea levels, hotter temperatures, more variable rainfall with increased drying, increased sea surface temperatures, and more intense hurricanes (CSGM, 2020).

Although, water is not mentioned in the Paris Agreement, it is a central issue of any mitigation and adaptation strategy. Water is identified as the number one priority for adaptation actions in most of the intended nationally determined contributions (INDCs) and is directly or indirectly related to all other priority areas (UNESCO, UN Water 2020).

3.4 IWRM and Biodiversity

Water has been extracted from rivers and aquifers damaging freshwater ecosystems and species. The Global Wetland Outlook estimates that up to 87% of wetlands has been lost since

1700, and that wetlands are lost three times faster than natural forest. Wetland-dependent species are in serious decline. Since 1970, deterioration has affected 81% of inland wetland species populations and 36% of coastal and marine species (Ramsar Convention on Wetlands 2018).

IWRM could become a powerful tool for biodiversity conservation if the role of hydrological regimes is understood as the key driver for many biological processes and as a provider of ecosystem services. For instance, IWRM is the way to secure connectivity, an adaptive response for biodiversity conservation. Connectivity is vital for migratory aquatic species and under climate change it is an adaptive response to ensure species can move and adapt along the territory from the high lands to the sea.

In the coastal zones, sea level rise (SLR) is a threat to coastal ecosystems. In the case of mangrove forest and tidal freshwater forested wetland, SLR will result in inland migration if there is enough space available and if a healthy hydrological regime in terms of water and sediments is maintained. Extensive areas of non-mangrove coastal wetlands, as well as a low upland topographic profile, provide ample opportunity for mangrove migration (Ward, R. D. et al 2016).

3.5 Water Resilience

Resilience is defined as the ability of social, economic and environmental systems exposed to hazards to resist, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions, while also maintaining the capacity for adaptation, learning and transformation (IPCC, 2014).

Water resilience has many implications for water resource management. It is the way ahead to deal with uncertainty, not only from climate change but from other risks, such as the pandemic, or any other economic and social disruptions.

Water resilience requires a new way of thinking in which the main goal is to build system resilience and the mechanism to compensate for impacts. It requires to discuss different approaches to understand and monitoring water systems. IWRM could be a powerful approach because of the thirty years of experiences around the world; however, it needs to be reinforced and renovated with other approaches, such as ecosystem-based management, or risk management, to build a unified resilient response to future risks.

4 An Integrated Water Resource Management Framework to Support Implementation of the Cartagena Convention and its Protocols.

4.1 Previous experiences

As mentioned in the background section, the CC has approached the water related issues through the LBS protocol, focusing on water pollution control from point and non-point sources. LBS Protocol Annexes I-IV establishes a pollution control program based on effluent and emission source controls, and specific obligations to regulate domestic wastewater and agricultural non-point source of pollution. It´s a technically structured program that depends on a reliable operation of wastewater treatment plants and support activities such as pretreatment of industrial wastewater and knowledge of the assimilation capacity of receiving water bodies or ecosystems. In the case of non-point sources, control relies on best management practices and plans developed by each country. Only, 15 countries out of 30 have ratified the Protocol (Annex C) and then have committed to apply the Annexes. As a part of them, countries must submit

reports and pollution control plans; however, it´s recognized that reporting has been a difficult task for that should be discussed.

In the WCR, there´s been several initiatives to promote IWRM. Cashman (2012, 2017) has developed detailed analysis of water policy in the Caribbean to figure out why IWRM has not been adopted. One of his main conclusions refers to the need for a better understanding of how to realize benefits to all stakeholders in the short as well as the long term and the role of 'brokers' rather than focusing only on champions. Brokering requires the ability to recognize and reconcile the needs and aspirations of different stakeholders, particularly the political ones, by ensuring that there is a 'fit' between the problem and the proposed solution (Cashman A, 2017).

The Caribbean Water Initiative (CARIWIN) is a project on IWRM, led by the Brace Centre for Water Resources Management at McGill University and the Caribbean Institute for Meteorology and Hydrology (CIMH), Barbados. The 6-year project was launched in February 2007 and is funded by the Canadian International Development Agency (CIDA) (CARIWIN - Caribbean Water Initiative - McGill University). The project focused on development decision support tools as the National Water Information Systems and the Caribbean Precipitation and Drought Monitoring Network, both of great importance to support a regional IWRM process.

GEF projects have also supported IWRM implementation. The GEF IWCAN was focused on SIDS in the Caribbean where IWRM Road Maps were developed but unfortunately where never operationalized; however different pilot projects were developed that show a pragmatic approach for IWRM implementation under SIDS conditions (UNEP, 2012).

The Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States (GEF-IWEco) Project is a multi-focal, regional project that builds upon the work of previous initiatives, to address water, land and biodiversity resource management as well as climate change in ten participating countries (Annex C). It started in 2016 and is due to end in 2023. This project is relevant to the SIDS in the WCR. Components 2 and 3 refers to IWRM, Water Use Efficiency (WUE), and Sustainable Land Management (SLM) and ecosystem monitoring, in terms of strengthening of the policy, legislative and institutional reforms, and capacity building, and monitoring and indicators framework (IWEco: Integrating Water, Land and Ecosystems Management in Caribbean Small Island Developing States).

The Caribbean Regional Fund for Wastewater Management (GEF-CReW) was developed from 2008-2016 in 13 countries of the WCR (Annex C). The Terminal Evaluation consider that the project has identified many lessons and experiences that are applicable widely on financing issues, enabling conditions, policies, capacity building, and awareness. It also points out the project has tested innovative approaches to financing and has highlighted the essential and symbiotic role of 'institutional capacity building' to support wastewater management to ensure that required enabling conditions are in-place to allow effective exploitation of the investments (UNEP 2017).

The GEF-CReW+ *An integrated approach to water and wastewater management using innovative solutions and promoting financing mechanisms in the Wider Caribbean Region* is a continuation of GEF-CReW project. It is implemented in 18 countries (Annex C), started in 2019 and is due to end in 2022. Its objective is to implement innovative technical small-scale solutions in the WCR using an integrated water and wastewater management approach building on sustainable financing mechanisms piloted through the Caribbean Regional Fund for Wastewater Management. Component 1 is focused on institutional, policy, legislative and regulatory reforms for integrated water and wastewater management, with several outcomes aiming to review and consolidate country and regional legal frameworks and instruments, the LBS protocol among them (UNEP CEP, Jan. 14, 2021).

In addition, Global Water Partnership (GWP) Central America and Caribbean Offices are playing an important role promoting IWRM adoption and monitoring workshops for indicator SDG 6.5. The Organization of East Caribbean States (OECS) and ECLAC are also active on analyzing IWRM opportunities and promoting implementation.

Another relevant effort is the *Regional Strategic Action Plan* (RSAP) *for the Water Sector in Caribbean to Develop Resilience to the Impacts of Climate Change* proposed as a regional agreement. The RSAP is a response to the myriad of common challenges facing the Caribbean Water and Sanitation Sector aiming to address the major challenges facing the sector exacerbated by the reality of climate change (Corbin, 2021).

In the case of Central America, there´s been a slow and partial adoption of IWRM mainly due to the lack of legal frameworks. However, at community level a good understanding of the connection between water sources, sanitation and river basin protection is promoting IWRM adoption. This a particularly important source of experiences and opportunities to accelerate national and regional IWRM adoption. GWP Central America is leading a process to support municipalities to develop IWRM plans and integrating IWRM and risk management in the municipal development plans (GWP Centro America - GWP).

These experiences recognize that there is an important and complex link between water resources management, the provision of terrestrial and marine ecosystem goods and services especially in coastal areas and small islands and that IWRM will be best realized when there is a more integrated approach to use of natural resources and integrated land use planning.

4.2 A regional IWRM approach

Based on previous experiences and future challenges, the WCR needs an accelerated approach to adopt IWRM. As a part of this approach, it is essential to develop a clear understanding of the benefits and potential synergies with other natural resource management and social processes to support sustainable development.

Nowadays, more than ever IWRM must be developed as an ecosystem-based process to maximize benefits for all, respecting economic and social constraints, and integrating solutions for climate change, health, and development. Such a process should avoid being dominated by an economic sector or by emerging conflicts, it must be a governance process able to give voice to all and to build water security for the region.

This section proposes a IWRM framework to support discussion for a better integration with the CC and promote a regional approach. The framework will focus on having common regional principles, proposing key IWRM instruments to start or to consolidate the process and open opportunities for integration among different agendas.

4.3 Common principles

Water management has impacts across different sectors, then these impacts could become opportunities for integration. Having a common understanding and rationality will be fundamental to seek integration and build synergies for multisectoral approaches.

The Regional Strategy for the Protection and Development of the Marine Environment of the Wider Caribbean Region (CEP Strategy) is the framework to agree upon common principles for integration, right from the adopted vision and mission, and guiding principles (UNEP CEP, 2021):

Vision: Healthy coastal and marine ecosystems of the Wider Caribbean Region provide a secure supply of ecosystem goods and services for human well-being and livelihoods.

Mission: To facilitate integrated ecosystem-based management through the control, reduction and prevention of marine pollution and the conservation, sustainable use and restoration of coastal and marine resources and habitats.

The guiding principles from the UN Environment´s Ocean Strategy are enhancing ecosystem-based management, promoting source-to-sea approaches in management of land-based pollution, expanding sustainable consumption and consumption patterns, fostering natural capital considerations in resource management, and strengthening the science-policy interface.

In addition, complementary principles from the international development agenda particularly those based on current regional challenges, such as resilience, one health, and social participation should be proposed.

4.3.1 Ecosystem-based management

It provides a comprehensive, integrated approach to management of human-ecosystem interactions (UNEP CEP, 2021). For IWRM it means to understand the hydrological regime as part of the ecosystems playing different biological functions, such as modeling habitats and triggering biological cycles of plants and animals. In this sense, water extraction as a natural resource must be limited by the amount of water needed in the environment to maintain a desired ecological status of any given ecosystem and the ecological services it provides. This condition also applies to pollution control. Wastewater management must be established to reach an accepted level of contaminants to maintain this ecological status. More details on water for the environment are included in sections 4.4.2 and 4.4.3.

Based on this principle, relations among freshwater, terrestrial and marine ecosystems must be understood as ecosystem interactions; therefore, management practices must be based on ecosystem processes, such as water cycle, biogeochemical cycles, energy flux, and population dynamics. Thus, IWRM is responsible for the water cycle as an ecological process and its interactions with other processes. This is a fundamental change on how IWRM has been understood, and how management practices should be based on these ecosystem interactions.

4.3.2 Source-to-sea (S2S)

The S2S approach taken as IWRM principle implies to think water as a continuum from the catchment areas down to the sea. IWRM involves the full hydrological cycle, that is the S2S component plus the atmospheric water or hydrometeorological component.

The Source to Sea Platform supported by the Stockholm International Water Institute defines that the S2S approach directly addresses the linkages between the source-to-sea segments of land, water, delta, estuary, coast, nearshore and ocean ecosystems leading to holistic natural resources management and sustainable economic development. The intended outcome is to identify appropriate courses of action to address alterations of key flows that connect the source-to-sea segments: water, biota, sediment, pollution, materials, and ecosystem services (Source-to-sea - Stockholm International Water Institute (siwi.org)).

In terms of IWRM, the S2S approach implies to keep water flowing to carry the ecological content of sediments, and the limited amount of pollution and materials, keeping biological

connectivity and maintaining ecosystem services such as water supply and distribution, assimilation of pollution, flood control, aquifer recharge, and navigation, among others. In the field of water resource management these conditions have been approached under the current science of environmental flows.

The main challenge of the S2S approach is how to create synergies beyond coordination. The key issue is how the limits between the river basin as a freshwater ecosystem and the marine environment are defined. In one hand, it depends on understanding how the river basin, the deltas, the coastal aquifer, and the coastal dynamics interact at the coastal zone. On the other hand, it´s related with the policies and institutional interactions, overlaps, voids, and agreements.

An interesting experience has taken place in the Mediterranean where the Strategic Partnership for the Mediterranean Large Marine Ecosystem produced a comprehensive and operational methodology for the integrated management of Mediterranean ecosystems encompassing coastal zones, river basins and coastal aquifers called Integrative Methodological Framework (IMF). From this experience four key lessons are proposed: (UNEP/MAP-PAP/RAC, GWP-Med and UNESCO-IHP, 2015).

- Convergence of approaches, including a common definition of integration, is key
- The value of the Drivers-Pressures- State-Impacts-Responses (DPSIR) framework as a tool for integration is high.
- Operational practicalities should remain lean: the value of a simple and common road map that is adaptable to local circumstances is recognized.
- The focus is on delivering results: realizing the vision renders the process valid.

4.3.3 Sustainable consumption and production

For the CEP Strategy, this principle will contribute to the decoupling of economic growth from environmental degradation in the marine environment by applying life cycle-based approaches, taking all phases of resource use into account, based on the use of fewer resources (UNEP CEP, 2021).

Sustainable production and consumption of water is a keystone of any IWRM plan. Unsustainable practices mean extracting two liters or more out of the environment to have one liter or less in domestics households, irrigation land, or industrial process. It means losing freshwater ecosystems, less water for people, more wastewater to treat, higher energy consumption, larger investments on infrastructure and higher operational costs. An inefficient use of water cannot be afforded any more, and that is the reason it is part of SDG 6, target 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity (Annex B).

Under this principle, the circular economy concept applied to the water and wastewater sector has emerged as the needed water revolution in LAC in which wastewater must be understood as a source of water/nutrient/energy (IADB, 2018a).

Another IWRM related action refers to reduce Non-Revenue Water (NRW), that is the difference between the water supplied into a distribution system and the amount of water billed to consumers. For the Caribbean region, NRW is estimated between 30%-70% (CWWA, 2019).

4.3.4 Natural capital approach

Biodiversity and ecosystem services in marine and coastal environments must be incorporated into policy and decision-making processes, and better described in terms that decision-makers can understand and use (UNEP CEP, 2021).

The same concept should be applied to IWRM. The value of biodiversity and ecosystem services that IWRM is providing to the whole river basin, and particularly to the coastal and marine environments should be clearly evaluated and included in water policy instruments.

Perhaps, the clearer example is the mangrove ecosystems and the ecosystem services they provide as fish nurseries and coastal protection. As explained above, mangrove forest relies on a healthy inflow of freshwater and sediments. For this, it is essential to keep connectivity from S2S, control sediment runoff (avoid deforestation) and major alterations of river flows and coastal aquifer extractions.

A watershed-based runoff analysis, done by the World Resource Institute in 2004, in the Wider Caribbean Region shows that one-third of all Caribbean coral reefs are threatened by sedimentation, with 20% classified as a high threat (Sedimentation and Erosion | The Caribbean Environment Programme (CEP) (unep.org)).

An estimation of the monetary values of services provided by mangroves and tidal marshes based on regulating, provisioning, habitat and cultural services shows values between 1,995 - 215,349 USD per hectare per year (Russi et al 2013).

Mangrove forest is a particularly important ecosystem for the WCR. It covers 1.8 million hectares that could represent several billion dollars annually in ecosystem services that should be considered in the national economic accounts and the national and regional planning processes.

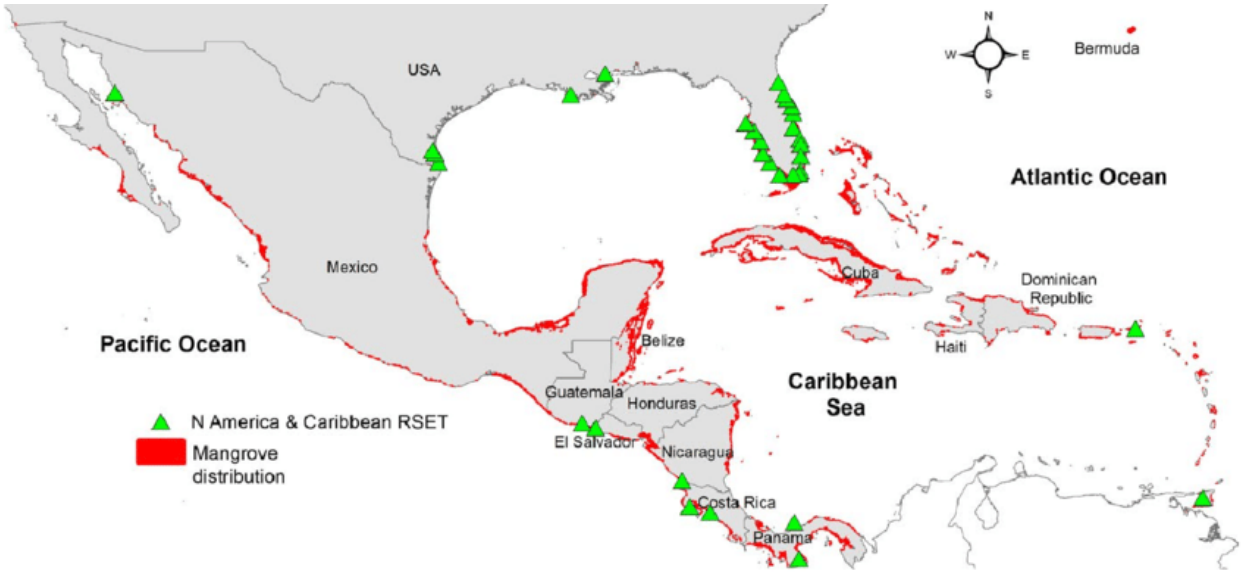

Figure 4 Mangrove distribution in Central America and the Caribbean (Ward D.R., 2016)

4.3.5 Science-policy interface

This principle seeks to reinforce the application of scientific evidence on the health, functions, and value of ecosystems, without prejudice to the long-standing recognition of the precautionary principle, to trigger needed policy reform at the national and regional levels to support comprehensive ecosystem-based management and improve sustainable consumption and production patterns (UNEP CEP, 2021).

This principle must be extended to the freshwater ecosystems to approach knowledge generation in an integrated way. Science must understand connections and direct implications under the principles discussed above and under a holistic view, to support IWRM policies.

In addition to natural science-policy interface, water governance challenges (see section 4.4.1), that are environmental governance challenges requires a social science-policy interface. Participation of social scientist is also needed to understand and proposed adequate institutional and legal frameworks to avoid fragmentation and promote integration at all scales and among all social groups.

4.3.6 Resilience Building

Resilient societies, economies and ecosystems is the current development challenge. The vulnerability conditions of the WCR makes the adoption of a regional resilience strategy the only way ahead. CARICOM has already recognized the importance of resilience and it is expressed in their vision of a Caribbean Community that is integrated, inclusive and resilient.

Thus, resilience building should be considered an umbrella principle to be included in the design of policies, institutions, and regulatory instruments in the region. Every water and environmental action must contribute to the overall system resilience; that´s one of the most important reasons to adopt integrated approaches. Isolated actions could have a negative impact on the entire system resilience.

4.3.7 One health for all

During this pandemic time, it has been clear the implications of living in a world where population is growing and expanding to new lands, climate conditions are changing, ecosystems are suffering a critical degradation and that people, animals and plants are moving all around the globe. Thus, many governments and institutions are promoting the *One Health* concept,

The World Health Organization (WHO) defines *One Health* as:

> *An approach to designing and implementing programs, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes.*
>
> *The areas of work in which a One Health approach is particularly relevant include food safety, the control of zoonoses (diseases that can spread between animals and humans, such as flu, rabies and Rift Valley Fever), and combatting antibiotic resistance (when bacteria change after being exposed to antibiotics and become more difficult to treat)* (One Health (who.int)).

The US Center for Disease Control and Prevention defines One Health as:

> *A collaborative, multisectoral, and transdisciplinary approach — working at the local, regional, national, and global levels — with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment (*One Health Basics | One Health | CDC).

One health concept has direct implications on environmental resource management and particularly on the IWRM processes. It relates to safe drinking water and sanitation, a sustainable water allocation, pollution control, and supporting healthy freshwater ecosystems.

In the post pandemic world, all the agendas must be connected in one way or another to the *One Health* approach.

4.3.8 Public participation

The Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America, known as Escazu Agreement is the Latin America and Caribbean region's first environmental treaty, the only binding agreement adopted thus far that has emerged from the UN Conference on Sustainable Development (Rio+20), and it is the first in the world to contain provisions on human rights defenders in environmental matters (ECLAC, 2020, Jan. 22).

The objective of the Agreement as stated in Article 1 is:

> *…to guarantee the full and effective implementation in Latin America and the Caribbean of the rights of access to environmental information, public participation in the environmental decision-making process and access to justice in environmental matters, and the creation and strengthening of capacities and cooperation, contributing to the protection of the right of every person of present and future generations to live in a healthy environment and to sustainable development.*

The Escazu Agreement is unique because it is an environmental and a human rights regional agreement for the 33 countries of the Latin America and the Caribbean Region, and it establishes the principles and provisions for public participation.

Currently, 12 countries have ratified: Antigua and Barbuda, Argentina, Bolivia, Ecuador, Guyana, Mexico, Nicaragua, Panama, Saint Vincent and the Grenadines, Saint Kitts and Nevis, Saint Lucia, and Uruguay. The date of entry in force is Abril 22, 2021.

4.4 Key IWRM actions to support coastal and marine management processes

The key elements that an IWRM process must develop are those related with water governance, water for the environment and water budget and allocation, planning, financial mechanisms, data and information knowledge. These actions should be developed at the appropriate water management system scale, i.e., river basins, sub-basins, micro-basins, aquifers, deltas, and their relationship with the political system at country level (states or municipalities) including transboundary systems. Whatever the scale, it is essential to ensure coordination at the broader scale, that could be a national level or at the main hydrological basins. For instance, Mexico has thirteen hydrological regions, while Colombia has sixteen.

Figure 5 presents these key actions as a management cycle to denote the adaptive approach needed to develop an IWRM process. Water governance, water budget and allocation and

water for the environment set the water balance for the system up and the limits for water extraction, complemented by a DRM analysis. Based on these activities, planning of integrated solutions, such as integrated wastewater management or water source recovery, should be better supported. Two final activities refer to financial mechanisms and information and knowledge management, both offer good potential for integration with other programs. There are other activities that could be considered as a part of the IWRM cycle depending on specific needs or scales.

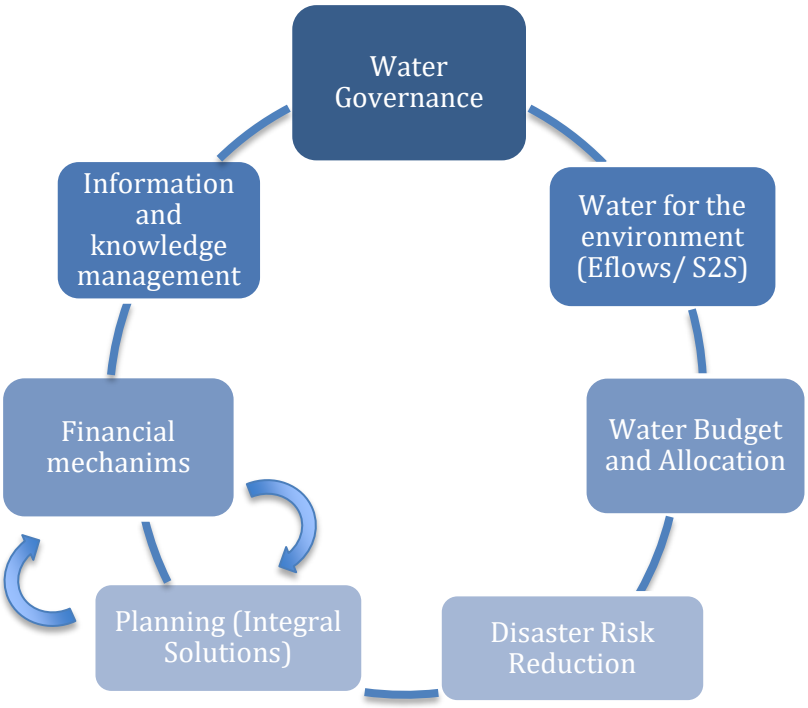

Figure 5 Key IWRM actions to support integration

4.4.1 Water governance

Water resource management is conflict management. Conflicts among water uses and users, priorities, costs, and benefits. It is about how the society takes decisions and how decisions are met, changed, adjusted, and respected for all parties. Governments have formal authority to lead water resource development; however, nowadays society is demanding more participation, transparency, and accountability. In the world, water management is moving from a government centralized process to governance models, as it is proposed and assess by indicator SDG 6.5.1.

Governance is defined as “the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and cooperative action may be taken (Commission on Global Governance, 1995)

For the *Water Governance Facility*, water governance refers to the political, social, economic, and administrative systems in place that influence water uses and management. Essentially, who gets what water, when and how, and who has the right to water and related services, and

their benefits (The Water Governance Facility 2021, Feb. 22) What is Water Governance? - Water Governance Facility - Water Governance Facility

Government suggests activities that are backed by formal authority whereas governance refers to activities backed by shared goals that may or may not derive from formally prescribed responsibilities and do not require police powers to ensure compliance (Dellapena W. J., and Gupta J. (Eds), 2009).

IWRM needs to have in place a water governance model to support a national water authority on each country. It should be made of social agreements among governments, society, and business to seek common goals and benefits for all. These agreements relate to how society will used water and under what conditions. They are the content of water plans, drought plans, or climate adaptation national plans.

Without water governance, interest of individuals or specific sectors will be likely to prevail over common goals. This is happening when water utilities, energy production or agriculture take control of water management, development, and planning. In this sense, the role of an independent national water authority is fundamental to lead, to reach agreements among all the sectors, to set goals and restrictions and to enforce compliance.

Water governance is a multi-level process occurring at local, subnational, national, regional, and global scale. It must be integrated based on legal frameworks and institutions of each country, starting from integrating a water authority, and given special consideration to gender, youth, and vulnerable communities participation.

A guiding framework to build a water governance process is given by the four dimensions of the SDG 6.5.1 indicator (see section 3.2). The main challenge is to design a coherent approach among different laws, institutions, participation spaces, instruments from different sectors and financing mechanisms.

As stated by the SDG 6.5.1 monitoring report, developing water governance conditions do not necessarily depend on levels of development or wealth, it rather depends on the level of political engagement and priority given to IWRM by each country (UN Environment, 2018).

4.4.2 Water for the environment

The water cycle or hydrological regime is a fundamental ecological process on earth. It is a habitat modeling force; it regulates biological cycles and mass and energy transport along different ecosystems. Any alteration of the hydrological cycle influences biodiversity.

It was until the second half of the twenty-century, that water community started talking about environmental flows (eflow) as the minimum amount of water to be left in any river. In the nineties, the scientific community advanced the understanding of water in the environment from the idea of a minimum amount of water to the concept of natural flow regime, and therefore importance of variability. Freshwater ecosystems depend on hydrological variability; they get flooded and dried up during intra and interannual periods. Setting a flat, minimum flow of water or flood is not what is needed.

Currently, eflow science is becoming an important discipline to support water resource development and management. Its implementation has direct implications on water availability but is a condition for sustainability. It contributes to understand the ecological significance of the hydrological flow regime (ecohydrology), resulting from surface and groundwater interactions, and then eflow science proposes how to manage alterations to preserve an ecological status on

any given ecosystem. These alterations refer to water quantity and quality acting together to modify ecological conditions. These are some of the reasons why eflow is a powerful tool to support IWRM. It is important to emphasize that eflows imply water resource development to a greater or lesser extent. Eflows are not estimated to forbid water usage, but to agree on a balance between water extraction and water for ecosystems.

In many countries, eflows are considered as an additional water user competing for water, and therefore a cost for the society. In a practical way this could be true; however, eflows must be understood as the support of sustainable water resource management and the provider of ecosystem services. The water kept in the environment is a source of ecosystem services for society; It is the water connecting, transporting sediments, nutrients and species, and buffering against climate change impacts, such as sea level rise. This water then has an important value for society that must be managed by a water authority.

One of the most important experiences on the integration of eflows within the water resource management process is the Mexican Water Reserves Program (Barrios et al. 2010). Eflows have been estimated in more than 300 river basins and implemented as water reserves for people and the environment. Near half of the annual runoff in the country is now under an eflow regime and then sustaining water resource management. Eflows are now considered a welfare indicator in the Water National Program 2020-2024.

Water reserve is an instrument in the Mexican Water Law that allows to take an annual volume of water out of the allocation process for specific purposes. This volume is defined by an eflow assessment and no user can apply for this volume.

Some of the key lessons from this program are:

- Water flowing in the environment is an indicator of a healthy water resource management process. It could be adopted as a common goal for all the stakeholders.

- Water for the environment must be secured before setting the water extraction limits. It must be taken out of the allocation process to avoid overallocation, maintain a reserve for future generations and to face future uncertain conditions.

- There are many eflow assessment methodologies but only those based on scientific principles are valid, such as the paradigm of natural flow regime (Le Roy P., et al., 1997).

- It is feasible to follow a rapid assessment to define general eflow allocations for planning purposes under a preventive approach, using hydrological approaches and an estimation of current and future water uses.

- Eflow assessments can be applied to recover water from users or to agree upon limits before overallocation. The latter is a unique opportunity for many countries in the WCR.

Protecting, recovering, and managing water for the environment should be the main goal of an ecosystem based IWRM, and eflow is a powerful tool to do it.

4.4.3 Water budget and allocation

Water availability is the amount of water available in a hydrological system. Water allocation is the legal right to use water given to any user. Water balance is the difference between supply and demand. Water budget is a useful instrument to define a volume that can be allocated, once specific provisions, such as eflows, a preventive policy to protect a volume of water, or that

needs to be recovered due to a negative water balance, or as a part of a drought management plan.

Water budget and allocation could be considered the core activity of water resource management. It is a process that essentially defines water supply and demand, based on water availability, allocation and recovery from different users, and storage to keep a sustainable water balance. Allocation has many technical issues related with hydrological variability (time and space), water quality and quantity, water use priorities, and monitoring and evaluation.

Desalination is a source of water that increase the supply. In the WCR, it is an important source to meet water demands, particularly for the SIDS. In the Caribbean region it represents 12% of the total water supply and for Anguilla, Bahamas, British Virgin Islands, Cayman Islands, Turks and Caicos is the only source (IADB 2018). Decision about desalination as a supply should be part of the water availability and the water budget, once all the economic and environmental implications has been evaluated.

In the real world, water usage is often happening without having a legal water allocation in place; therefore, it is mostly a process to regulate water that is already used. This is quite common for agriculture or water supply for local communities. If the system has enough water, this means a positive water balance, there´s an opportunity to develop allocation rules; however, if there´s not enough water in the system, that is a negative water balance, allocation becomes a difficult task.

Water budgeting is an instrument to agree upon a volume of water that can be temporarily or permanently allocated without compromising water for people and the environment and avoid overallocation. It is useful for recovering an overexploited system or adjusting water allocations due to seasonal fluctuations. It provides flexibility to the management process needed to face natural scarcity or disaster conditions, and to move toward a sustainable water usage. This type of instruments must be included in the Law to avoid legal constraints for adapting to variable conditions. An overallocated system has limited capacity to respond to risk conditions.

If there´s no water allocation rules/agreements in place, water is used without limits. Under this condition, water is often taken by the powerful players. Solutions are biased toward increasing supply rather than reducing demand; it is easier to extract more water instead of improving water efficiencies, for instance. It is also the case of land development ruled by land availability without any consideration to water availability, which promotes rapid urbanization or agriculture, putting a lot of pressure on water sources.

Therefore, an agreement upon a water budget i.e., water extraction limits based on securing or recovering water for the environment and ecosystem services is becoming the cornerstone of water resource management for the following years.

Mexico started an intensive water allocation process since the adoption of the Water Law in 1989, after many years there are some important lessons to share:

- The most important goal of any water allocation process is to avoid overallocation. Once a volume of water is legally allocated is difficult to get it back. What is call *paper water* must not be greater than real water.

- It is necessary to avoid a rigid allocation system in which private water rights prevail over common rights.

- It is not necessary to have the best technical water balance for a river basin including aquifers. The key issue is to define a water budget and then start the water allocation process with the best water estimates but taking a precautionary principle to avoid overallocation. Precision should improve as a part of the management process. Water allocation must be flexible.

- Water availability and therefore water budget is more an agreement than a complex technical solution. It is an essential instrument to build confidence and thus a pillar of water governance.

- Stakeholders and society must know and trust water availability, how it is estimated, who has the right to use the water and under which conditions.

- Water allocation is not an end by itself. It is a water resource management instrument to start walking in the same direction toward common goals.

4.4.4 Disaster Risk Management (DRM)

One of the components of an IWRM is to managed catchment capacity of river basins to maximize water storage and transportation either in nature (river, lakes and aquifers) or infrastructure (reservoirs) and avoid disasters.

The Sendai Framework for Disaster Risk Reduction 2015-2030, adopted by UN Member States in 2015, remarks the important role of water in disaster risk reduction, and then pledged:

> *"To promote the mainstreaming of disaster risk assessment, mapping and management into rural development planning and management of, inter alia, mountains, rivers, coastal flood plain areas, drylands, wetlands and all other areas prone to droughts and flooding, including through the identification of areas that are safe for human settlement, and at the same time preserving ecosystem functions that help to reduce risks."*

This is one of the most important integration areas between land and water management. It has strong implications in terms of risk reduction to protect human life and economic loses that have been particularly important for the WCR. And at the same time, it is a fundamental part of the IWRM cycle planning and operation (see section 0).

As a general principle, land use management must be designed to maximize rainwater catchment, aquifer recharge and storage, and provide safe water transit to zones of extraction and to the sea. Under this principle, ecosystems are the land support of the water cycle and therefore they provide reliable solutions now considering Nature Based Solutions (NbS) or Green Infrastructure.

4.4.5 Planning for integrated solutions

Once there is an agreement upon a water balance and water budget and DRM actions are considered, then planning for integrated solutions must be better approached. An IWRM process should provide a larger programmatic approach, for any kind of project, particularly in the case of proposing integrated wastewater management strategies, as it is the case in the region under current projects. These are some of the advantages:

- A water governance structure as mentioned above to enforce compliance and accountability.

- A river basin water balance with water extraction limits in which any solution must contribute to comply or recover the water budget and then gets a value as a resource.

- Water usage goals to reduce water demand, and then reduced wastewater volumes.

- Capitalize green infrastructure by integrating pollution assimilation capacity of the environment in flowing rivers, wetlands, estuaries, coastal lagoons, soil or constructed wetlands as an additional barrier to reduce pollution of marine ecosystems.

- Water reuse projects to exchange water among agricultural or industrial sector with urban areas.

As mentioned in section 0, discharge of untreated domestic wastewater is still a significant threat to the region´s marine environment. It is noted that what has been missing in these experiences is the lack of an IWRM process to support an integrated wastewater management plan once a water budget has been agreed upon. This is an essential step to develop an adequate plan that improves feasibility of wastewater treatment projects by setting up resource recovery goals.

There are additional opportunities to improve feasibility of wastewater treatment projects under the circular economy approach such as biosolid production, and nutrient and energy recovery that should be made across different sectors.

Planning based on a water budget applies to any solution to improve the system water balance, such as catchment protection, water storage, aquifer recharge, water utilities efficiency (reduce non-revenue water), energy production, irrigation systems, etc. by recovering water, improving efficiency, or even to decide to use more water for social benefit, that is *invest water* for development.

Once planning is in place an iterative cycle will be established with the financing phase, to agree on adjustments and modifications due to budget restrictions. A water plan is not a plan if it does not have the right budget.

As in other IWRM actions, the key issue is to start the planning process under a water governance model and relying on the available knowledge. In some places, there will be more capacity than others, and plans will be more substantial, and in other places more pragmatic, but in any case, improving the planning process should be part of the long-term water plan itself.

4.4.6 Alternative financial mechanisms

Financial mechanism for water resource management, water resource development and water supply and sanitation are not the same. The former relates to a IWRM process and the later to infrastructure development and operative costs. Although, it could be approached under the same strategy, it is important to make the difference because of different costs and benefits. In general, water services are financed by taxes, tariffs and transfers (OECD, 2009).

IWRM is mainly financed by water abstraction and wastewater discharges charges and taxes. Other revenues are fees from energy production, navigation, extraction of sand and gravel from the riverbed, stormwater collection and ecosystem services (ACTeon, 2010, OECD, 2009).

Costs of operation, maintenance and investment of infrastructure are the main source of income to the water sector. IWMR costs must be considered within this financial cycle.

Integration of ecosystem services and resource recovery practices offers the opportunity to increase financial sources and make users more conscious. For ecosystem services, the most common mechanism in the region is what is call Payment for Environmental Services (PES) to avoid land use changes that have an impact on water quality or quantity at the catchment level. It is important to clarify that this payment is a compensation given to landowners to persuade them from carrying out legal activities that could have an impact on water availability. It is important to be clear on this to avoid a misunderstanding that support the idea that everybody must be paid somehow.

Mexico has one of the largest PES experiences in the region. It has had good results in terms to generating a cash flow to landowners, most of them rural and indigenous communities to reduce deforestation, and therefore protect catchment capacity in the river basin and reduce soil erosion. Every year, the National Water Commission made a financial transfer to the National Forest Commission to support the PES program. This resource is coming from water tariffs paid by water users.

Identifying specific ecosystem services, beneficiaries, and its role in the water management process is a starting point to develop alternative financial mechanisms to complement traditional approaches. For instance, the ecosystem service of pollution assimilation has an equivalent cost on wastewater infrastructure. Taking advantage of this service will reduce wastewater treatment costs for society, and a revenue for IWRM process.

In the field of DRM, floodplains provide hydraulic capacity to control storms and avoid floods. Conserving this land will avoid at some extent damage costs estimated in 2.4% of Caribbean GDP (see section 5), then an annual budget allocation to maintain floodplains will benefit water management, urban landscape, biodiversity, and human lives. This would imply to develop multisectoral financing mechanisms.

Participation of private sector is an opportunity to traditional and innovative financing approaches; however, it requires a regulatory framework to support terms and conditions and avoid undesirable impacts to society. The GEF-CREW project terminal evaluation identifies as the most significant lesson the importance of the enabling environment for wastewater management necessary to ensure the effective utilization of the innovative financing approaches (see section 4.1).

4.4.7 Information and knowledge management

Lack of information and limited knowledge have been considered an obstacle for IWRM and that is true somehow. However, it is important to understand that IWRM is a management process of a natural resource in a socio-ecological system. It is not an industrial plant where all the inputs and outputs, and variables are known and controlled.

It is also true that it is not possible to manage something that is not measured; however, for developing countries it is essential to learn different ways to *measure*; that is how to integrate knowledge using every available source, such as traditional knowledge, community and farmers understandings, or industrial sectors; and then understanding the kind of information that is required to take a reliable decision. For instance, local communities have traditional knowledge about freshwater ecosystems, fishermen know about presence of different species, farmers know about weather and droughts, different industries such as energy or beverage normally operates water supply monitoring systems as a part of their operations.

Being IWRM a process, it is essential to consider a knowledge generation component to support decision making. The process should start from best informed guesses to a science-based decision support system as a part of the management cycle.

Regional collaboration is a key element for developing and strengthening information systems, mainly in the field of weather, climate and water. It requires coordination agreements and protocols to share information and generate regional knowledge. The Caribbean Meteorological Organization (CMO), and the Caribbean Institute for Meteorology and Hydrology (CIMH) (Caribbean Regional Climate Centre – RCC (cimh.edu.bb)) are good examples of a regional center to support water resource management on each country. The CIMH drought and precipitation monitoring reports, climate bulletins and long-range forecasts and provide data services. In the case of Central America, there is also a regional initiative at the Comisión Centroamericana de Ambiente y Desarrollo (Sistema de la Integración Centroamericana (SICA)) that under the climate change and risk reduction initiative has established a Regional Water Resource Committee to produce regional information on meteorology and hydrology (Cómite Regional de Recursos Hidráulicos (recursoshidricos.org)).

A key element of information and knowledge management is public access. As explained in sections 4.4.1 and 4.4.3 stakeholders and society must be informed as an essential principle of IWRM, but also as a regional commitment establish by the Escazu Agreement (see section 4.3.8).

4.5 Conceptual Framework

IWRM is a framework by itself to integrate all water resource management actions under a common goal across different sectors, instead of having a fragmented approach or isolated actions, such as wastewater treatment or drinking water supply,

This framework intends to show why and how IWRM is part of the solutions, keeping in mind that it is not necessarily a sequential process from laws and institutions to instruments, but rather the result of the willingness to advanced good water management practices under existing legal and institutional systems (UN Environment, 2018).

The main purpose is to identity those strategic approaches/issues that offer the potential to create synergies with the protection of the marine environment and trigger integrated processes for join investments and governance. This will inform more programmatic and less project focused approaches in the WCR including through the work of the CC Secretariat.

Because of the direct implications that water has with the environmental and development agendas, as presented in Section 3, lately it has been proposed to recognize water not as a community but as a connector. 2030 Development Agenda is at the top leading through the 17 SDG and their monitoring framework, many of them related with water as it is also the case for the Paris Agreement NDC and the Sendai Framework.

Focusing on implementation, water can be located at the intersection of the 2030 Sustainable Development Agenda, Climate Change and DRR agendas (Figure 6). Under this understanding, water resource management should integrate implementation, connect different strategies, and reduce fragmentation; however, a strong political will and leadership are needed to highlight and mainstream water´s value in implementing the global agreements (UNESCO, UN Water, 2020).

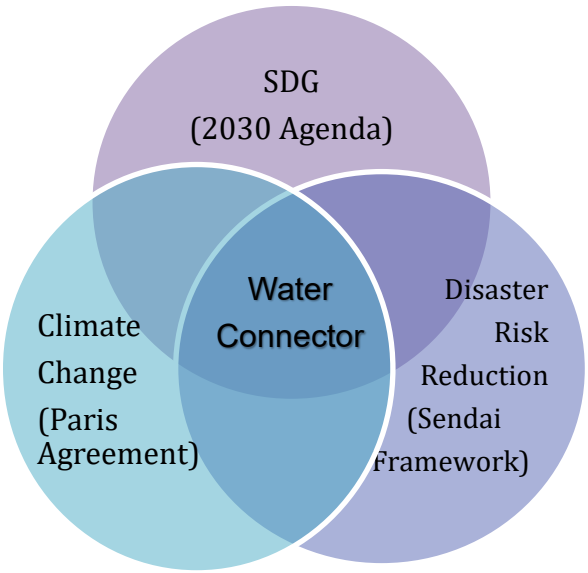

Figure 6 Water as a connector among the global commitments (UN Water, 2020)

Considering the main challenges in the WCR (see Section 1) and the common principles for integration (see Section 4.3) there are three processes that must guide integration of water and marine programs under a resilient goal: IWRM, DRM and ICZM. These processes coincide at the coastal ecosystems, that is estuaries and deltas along the coastline. Thus, coastal ecosystems would facilitate the adoption of common goals for the three main management processes under common principles, while upstream, IWRM would cover the hydrological river basin (including groundwater) and DRM would be the link between water and land management, fully integrated at the river basin scale down to the coastal zone (Figure 7). Thus, water quantity and quality as a flow regime either from rivers or aquifers would be the goal for an IWRM process upstream that includes land management implications as a goal for DRM. Mangrove ecosystem illustrates this process (See section 4.3.4 and Figure 4 Mangrove distribution in Central America and the Caribbean (Ward D.R., 2016)Figure 4); it could become a conservation goal for the WCR in which water, land, and marine ecosystems are managed under IWRM, DRM, and ICZM to protect marine biodiversity, coastal resilience and therefore a regional ocean-based economy. Table 1 shows an example of common agenda for IWRM-ICZM-DRM integration.

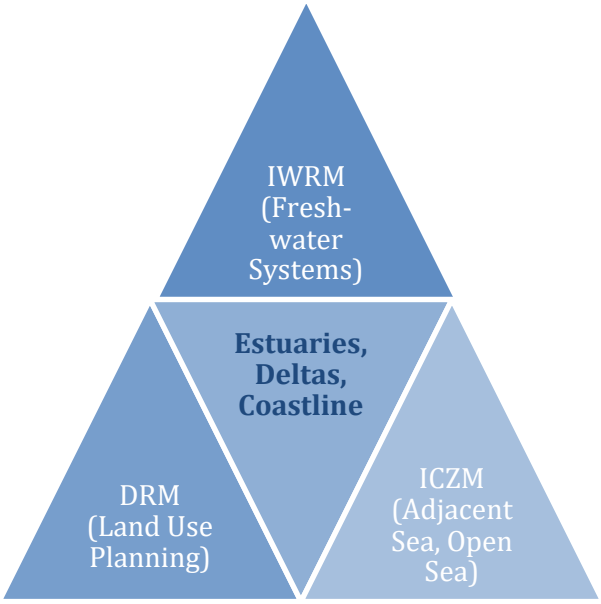

Figure 7 IWRM, DRM and ICZM integration

Table 1 Example of Common agenda for IWRM-ICZM-DRM

Principle	*IWRM*	*ICZM*	DRM
Ecosystem-based management	• Eflows based on hydrological regime/hydroperiod of coastal ecosystem including water quality (pollution, sediments, nutrients) • Water allocation for coastal ecosystems as a goal for IWRM • Land use plans for coastal ecosystems risk reduction • River basin green infrastructure for DRM		
S2S	• Protect water catchment, storage and distribution • Regulate water uses • Ensure connectivity	• Set limits to sediment and nutrient loads • Define ecological process for migratory species	• Define river hydraulic capacity for protection (floodplains, riparian corridors) • Avoid invasion of flood prone areas
Sustainable consumption	• Water use efficiency • Wastewater resource recovery	• Fisheries • Deltas and estuaries protection (mangrove)	• Specific risk reduction plans for economic sectors
Natural Capital	Integrated value of coastal ecosystem services *(e.g., Mangrove Management)*		
Resilience building	River basin resilience (water resilience + coastal resilience)		
Science-Policy	Integrative knowledge socio-ecological systems		
One health	• Safe drinking water and sanitation • Aquifer pollution control	• Healthy coastal ecosystems	• Ensure resilient infrastructure
Social participation	• River basin councils	• Coastal communities, port authorities and tourism sector	• Disaster Risk Governance

Figure 8 shows the full picture for integration of the global agenda to the local water and management land processes, with the CC at the regional level, playing a leading and brokering role as explained in section 4.1, and thus establishing a management cycle in which the global agenda feed the local projects and local projects meet global commitments, through a regional institutional structure.

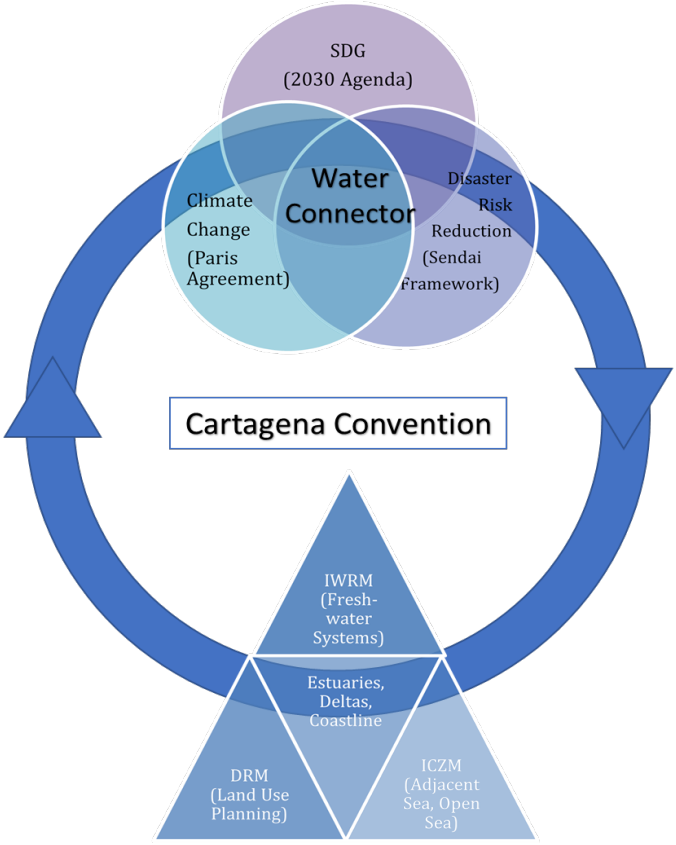

Figure 8 Conceptual Framework for IWRM integration to the Cartagena Convention

5 Implementation Outline

IWRM implementation in the WCR has been proposed under different approaches such as S2S, ridge-to-reef, integrated watershed management, white water to blue water, etc. The main driver for these approaches has been several GEF projects as mentioned before (see Section 4.1). In some way or another, there are gaps and barriers in the region that have resulted in a low level of IWRM adoption and development as shown by indicator SDG 6.5.1 for the WCR (see Section 3.2 and Annex B). However, it is important to remark that one of the most important barriers is the lack of clarity on IWRM benefits for all, in the short and long term, as Cashman has proposed (see Section 4.1).

This document has already discussed some of the main gaps and barriers and the opportunities ahead. In this section, an outline with some specific actions is proposed to set out an IWRM process with the regional purpose of delivering results at the coastal zone in conjunction with ICZM, and DRM, and thus make its contribution to the protection of the Caribbean marine ecosystem.

5.1 SDG integration map

As mentioned above, the SDG are the most important and useful framework to identify integration, common targets and to monitor progress. SDG 6 provides an implementation roadmap for water-related actions if they are addressed in an integrated manner, rather than as individual actions (see Annex 2). This is not a trivial issue since it requires additional analysis of the overall progress on each target and their relation among each other. For instance, progress in safe drinking water without progress in sanitation, and therefore degradation of ambient water quality will soon mean a failure.

Integration of SDG targets is also providing a roadmap for implementation at regional and country level. As explained before, there are conceptual relations among them that must be integrated under specific country and regional plans to reach a synergistic positive impact. For instance, nutrient control in the marine environment relates to the greatest extend to non-source pollution from agriculture that contaminates groundwater, and in a lesser extend to domestic wastewater. Then it relates with SDG 2.4, indicator 2.4.1 agricultural area under productive and sustainable agriculture, indicator SDG 6.3.1 and 6.3.1 related with safe wastewater treatment and bodies of water with good ambient water quality, and SDG 14.1 related with reduce marine pollution of all kinds, indicator SDG 14.1.1 index of coastal eutrophication.

In the case of SDG 6.5.1 the four dimensions of the indicator can be used to organize key actions at local, regional, and global level and different institutions and players in the region, show alignment from global to local and vice versa, and then report on progress.

5.1.1 Enabling environment

This dimension refers mainly to legal frameworks, policies, planning tools and any other issues that enables IWRM implementation. Past and current GEF projects have included this dimension as a component of the projects plans; therefore, different achievements and proposals are already in place, although is still a weakness for the region. Based on these initial experiences, the most relevant action is to start the IWRM process up and consolidate those already running. In this sense, a pragmatic approach to implement IWRM must be considered, such as it has been recommended for the SIDS. This approach suggests avoiding expensive and time-consuming institutional reforms, and then start with small actions, using pressing water-related issues as “entry points”, and then fine-tuning their IWRM strategies from experience (UNEP, 2012).

Considering the potential of water as connector of the global agendas at country level and the integration of processes at the coastal zone as presented in the Conceptual Framework (Figure 8), then having a water authority to lead this process has a strategic importance. Although each country has different needs and approaches, having a water authority body able to lead a national process and coordinate legal and institutional reforms, plans and actions within the water sector and across other sectors is one of the first action to be taken. Under the Conceptual Framework the water authority should plan on common goals with ICZM and DRM processes and then be responsible for implementation and compliance. At some point, this plan must be considered among country priorities and fully integrated to the National Sustainable Development Plans.

Alternatives to set a water authority up should be defined. For those countries without a water authority, it could be established within the environment sector as a non-permanent body until a legal structure will be adopted. For those countries with a water authority in place it will be important to review if this body has adequate technical, political, and social capacities to comply

with its mandate, and then develop a plan to fill the main gaps. This is an opportunity for regional collaboration, such is the case of regional information systems.

Water resource management is normally based on hydrological units considering both surface and groundwater and the functional divide with the coastal zone. A clear definition of the limits between the freshwater and coastal ecosystem is a key issue to avoid legal gaps and confusing overlap. IWRM must cover the coastal area where water management actions should be implemented. In addition, hydrological units should be coordinated with political boundaries, at international, national and subnational levels.

At regional level, the CC and LBS Protocol and the Escazu Agreement are a unique regional framework. Main action should be focused to promote ratification to increase country participation and political support. The Escazu Agreement is entering into force in April 2021.

At global level, implementation of IWRM is supported by 2030 SD Agenda, Paris Agreement and the Sendai Framework. As mentioned before, it is the most ambitious development and environmental agreement ever, therefore full alignment from local to regional and global would mean strong political and financial support.

5.1.2 Institutions and participation

At local/national level the priority should be to define if under current policy and legal framework is possible to institutionalize a water governance model with a water authority body as explained above, and able to guarantee stakeholders participation, with minimal or any changes to formalize water policies and plans. These are the main content of the water governance model to support common goals and benefits for all as explained in Section 4.4.1.

Water utilities are key players for IWRM implementation; however, it must be clear that their main role is to provide water and sanitation services in the most efficient and equitable manner, which is a huge challenge. Managing water resources for all is a different task that water utilities should not be responsible for. If this would be the case, it is important to design a governance model based on a steering committee with participation of authorities from the environmental, risk management, health, and other relevant ministries to avoid conflicts of interest. There´s no doubt, water utilities can strongly support IWRM activities, but it is important not to compromise their responsibilities and the water governance structure in the country.

In designing/reviewing the institutional framework, the participation of different actors and stakeholders is an opportunity for innovation. Particularly, the participation of private sector to build solutions beyond business development and traditional social responsibility programs. Currently, there are different private sector initiatives looking for new solutions, such as the CEO-Water Mandate Water Resilience Coalition to deal with water and climate and reduce water stress by 2050 or the Alliance for Water Stewardship.

The participation of civil society is also an opportunity to strength the governance model under the Escazu Agreement as explained before (Section 4.3.8). It is important that any participation space be supported by a communication process and public access to information.

At regional level, there are many regional processes running no to only in the environment sector. In the water sector, there are good examples of institutions that have supported the IWRM process, such as GWP, OECS, CARICOM, ECLAC, CWWA, etc. The Conceptual Framework is offering a proposal to organize participation, assign responsibilities and coordinate actions under common goals. Thus, it will be important to design a regional coordination mechanism that could be assumed by the CC Secretariat.

Private sector participation is a key element of any governance model. It is considered one of the actions of indicator 6.5.1 IWRM implementation. Considering regional business, such as shipping and tourism, and professional organizations, promoting regional participation could leverage country processes.

At global level, the main activity would be related with strengthening regional capacities for an effective and efficient implementation of global programs, such as the Samoa Pathway or the Caribbean Resilience Fund.

5.1.3 Management instruments

At country level, there are two key actions to fully adopt an ecosystem and risk management based IWRM. The first one is to define water for ecosystems as the core goal of the IWRM process based on the best available water balances and ecological knowledge. The GWP-C is planning to support the development of hydrological maps that will be an important input for this activity. Based on this, the main action is to develop water plans based on eflow estimations to fulfill water management issues, such as sea water intrusion and aquifer pollution, and ecosystem hydrological needs at the coastal zone (see Sections 4.3.1, 4.4.2 and 4.4.3, and Table 1).

A second key action is to integrate water and land management based on a DRR plan, in which ecosystems would play a key role for both risk management and water security (see Section 4.4.4). This action will require to harmonize legal and regulatory frameworks to ensure there are no gaps.

It is important to reiterate that currently, the goal is to start developing or strengthening the IWRM process under these principles, and to design/adjust regulatory frameworks and management tools as a part of the process itself. It is not a matter of intensive capacities and resources, but clear principles and goals.

A useful assessment to gain political support at national level would be to understand the extend of water acting as a connector based on SDG, NDC, and SF, as proposed in the Conceptual Framework (Section 4.5).

At regional level, the main activities are those related with reviewing, analyzing and designing a regional strategy based on the Conceptual Framework (Figure 8). This document is a first step in this direction to start the discussion and then define the required components such as instruments, institutional capacities, collaboration, and financing. Considering a new protocol for the CC, it should be based on establishing the ecosystem-based management principle, as the way to really provoke integration. In this sense, building capacity on ecosystem-based management would be an important component of this process.

Due to the lack of country water management tools and standards such as water reuse, eflow or aquifer recharge standards, developing regional criteria would support country activities. Regional standards would promote a regional knowledge development process and a market for professional services. In a recent Symposium organized by GWP Caribbean office (March 23-25, 2021), a moderated session called *Time to take a Regional Approach to IWRM*, participants identify as opportunities: a common historical cultural context, opportunities on data collection, funding schemes, multi-country projects and guidelines, sharing best practices, and common quality standards.

Strengthening regional information systems is an opportunity as it was explained in section 4.1. Regional hydrometeorological centers such as CIMH or the Comité Regional de Recursos

Hidráulicos under SICA in Central America are good examples. Increase collaboration at regional level with USA and Mexico could represent an opportunity.

As a part of the monitoring strategy, monitoring of indicator SDG 6.5.1 on IWRM implementation must be a priority for the region. The monitoring process is mainly developed by government agencies, then a systematic participation of different stakeholders and sectors would improve the monitoring process.

At global level, as explained before, there is a complete monitoring system to follow up on progress and compliance of the countries, that would support regional and country instruments.

5.1.4 Financing

This dimension has the lowest score in the SDG 6.5.1 indicator for the region (Annex B). It is clear, it should be reinforced at local, regional and global scale to considerably increase investments to achieve SDG, NDC and DRR.

At global level, the GEF and the Green Climate Fund (GFC) are the most important financing sources for projects. Currently, GFC has 13 projects in the region covering 15 countries (Annex C) and a total investment of USD839 million (GCF, March 15, 2021).

In addition, the Samoa Pathway is the main mechanism mobilizing international support and resources for the implementation of the Programme of Action for SIDS. As a part of it, the Debt for Climate Adaptation Swap initiative proposed by ECLAC for the WCR is an innovative financing approach in which debt relief is linked to investment in sustainable development and green economy projects through a Caribbean Resilience Fund (IISD, 2019).

Recently, The Global EbA Fund was launched as a quickly deployable mechanism for supporting innovative approaches to Ecosystem-based Adaptation (EbA). The Fund is structured to support catalytic initiatives to help to overcome identified barriers to upscaling EbA. (“Environmental and Social Management System”) Furthermore, it is expected that the Fund will address the gaps in knowledge and planning for EbA, as well as to increase access to public and private funding for catalytic adaptation interventions (Global EbA Fund – Funding Innovative and Catalytic Ecosystem-based Adaptation Projects).

At regional level, developing the economic case proposed by the Conceptual Framework would be a strong support. As presented along the document, being the WCR one of the most vulnerable regions in the world to cyclones and therefore to climate change, and the extraordinary costs that this situation represents (see Section 0), a regional and country specific economic analysis should support the investment on IWRM-DRR-ICZM integration as proposed in the Conceptual Framework. Making the economic case should include social and private costs and benefits including ecosystem services and health, and then proposed a cost recovery strategy. For instance, the WHO estimates that each dollar invested in water supply and sanitation generates between USD 4-12 in health benefits alone, depending on the type of water and sanitation service (WHO, 2008).

At country level, Integration is an opportunity to propose a IWMR financing strategy based on a multisectoral approach including water and sanitations services, DRR, health, ecosystem services, tourism and other economic activities that accrue benefits from water resource development and management, that is from having IWRM in place (see Section 4.4.6).

5.1.5 Summary of implementation actions

Based on previous sections, Table 2 presents a summary of actions proposed as an example to guide integration under the Conceptual Framework from global to local. As it was mentioned along this document, the main concept behind this proposal is to integrate and achieve synergies interacting at these three levels.

At regional level, this table summarize the opportunities to develop a regional instrument for a better integration of IWRM to the CC.

Table 2 Proposal of actions to implement IWRM under the Conceptual Framework

Dimension	Local	Regional	Global
1. Enabling environment (policies, legal framework, planning tools)	• Water Authority to lead planning and integration • SDG integration map	• CC, LBS Protocol Ratification • Escazu Agreement Ratification	• 2030 SD Agenda • Paris Agreement • Sendai Framework
2. Institutions and participation (role of institutions and other groups to support IWRM implementation)	• Water governance model for participation • Private sector participation • Informed participation of civil society	• Regional coordination mechanism • Promoting private sector participation through professional and business organizations.	• Strengthening support for regional implementation of global programs
3. Management instruments (tools and activities to make rational and informed choices)	• Water plans based on eflow needs at the coastal zone. • Water-land management integration for DRR • Country assessment on water as a connector based on SDG, NDC, and SF.	• CC instrument to promote ecosystem-based integration at the coastal zone. • Capacity building on ecosystem-base management • Regional Hydrometeorological Services • Regional guidelines • Strengthening monitoring of SDG 6.5.1 indicator	• Indicator systems: SDG, NDC, and Sendai Framework (targets, priorities, and guiding principles)
4. Financing (budget and financing for water resources development and management)	• IWRM multisectoral financing strategy	• Economic case of the IWRM-DRM-ICZM implementation	• Samoa Pathway • GCF • GEF • Caribbean Resilience Fund • Global EbA Fund

5.2 Current projects

There are several projects and initiatives in the region promoting IWRM adoption. This section is focusing on making some remarks about some strategic opportunities to promote implementation within the scope of this document.

The CEP Strategy is the guiding framework for the CC and therefore to promote IWRM adoption in the region according to the adopted vision and mission (see Section 4.3). The Conceptual Framework proposed could make specific contributions to the expected outcomes; however, a strong support to adopt the principles is needed. Particularly, adopting the ecosystem-based management principle would represent a transformational change for the region, that would have an impact in how natural resources are managed; that is how decisions are taken and how natural resources are valued. Fully adoption of this principle will leverage adoption of the rest of the principles. This is one of the most strategic changes needed in the region and requires a different mindset and developing specific capacities. It will be of strategic importance that IWRM fully adopt this principle and then it will become a strong advocate of this transformation.

In this sense, within the CEP Strategy it will be important to move from ecosystem-based management projects to ecosystem-based management policies.

Being nutrient pollution the most important challenge for the region, the Regional Nutrient Pollution Strategic Action Plan (RNPSAP) is an opportunity to integrate actions under one common regional goal and under the proposed Conceptual Framework. There are two concepts that could strength the RNPSAP: a multibarrier approach for nutrient control and adoption of country plans for nutrient loads. The multibarrier approach implies alignment of policies right from the source down to the maximum loads and concentration in the environment. The country plans imply a key role for water community. An IWRM process would play a key role to coordinate actions on land-based pollution and transport through rivers and aquifers. Some of these actions are part of an Integrated Wastewater Management (IWWM).

The GEF IWEco Component 3 (Strengthening of the Policy, legislative and institutional reforms and capacity building for SLM, IWRM/WUE and ecosystem services management) is a good opportunity to consolidate water and land management integration under an ecosystem-based principle. It is important to emphasize that the discussion is about managing water and land under ecological processes, and not as an isolated resource. In the remaining two years of implementation, this project could lead a systematic discussion to transform ecosystem-based management projects into regional and country policies.

Currently, the project is developing an assessment of the institutional frameworks in participants countries (Annex C) including status of policy and legislative implementation and upgrading of regional and national strategic and action plans with specific focus on IWRM, WUE, SLM, ICZM and ecosystems-based management. Besides, a Regional Action Framework for IWRM for the CARICOM is expected around Feb/March 2022.

ECLAC is also an active institution promoting IWRM. Currently is finishing a consultancy to examine the institutional arrangements for IWRM in the Bahamas, Barbados, Belize, Guyana, Jamaica, Suriname and Trinidad and Tobago to provide information on the progress of implementation of SDG 6 of the 2030 Agenda, using as the frame for measurement Indicator 6.5.1. Results from both, IWEco and ECLAC assessments will be important to consolidate a regional IWRM strategy.

The GEF-CREW+ is a key project to promote IWRM in the region. It presents a broad and ambitious plan that cover most of the gaps for a better IWRM implementation, from institutional

and policy, to instruments, financing innovation, knowledge management and advocacy, and pilot projects. This project is in the best position to lead a regional process to accelerate IWRM adoption. For this, the Project Coordination Group and the Steering Committee require enough flexibility to identify opportunities, synthetize experiences, and provide strategic guidance and thinking to the regional processes and to each country, going even beyond what is planned. As explained above, there are strategic actions for the region, such as the adoption of common principles into policies and practices, that are not necessarily considered in the project, but that could deliver as an outcome. This is the case of promoting IWRM as an output when promoting Integrated Wastewater Management is considered an outcome.

In addition to the strategic guidance, Component 4 on *Knowledge Management and Advocacy on the importance of IWWM order to achieve the Sustainable Development Goals* offers an important platform to develop a regional communication on common principles and strategic concepts to build regional common understandings.

The Regional Strategic Action Plan for the Water Sector in the Caribbean to Develop Resilience to the Impacts of Climate Change is currently the most important water action plan in the Caribbean focusing on water security. It proposes regional actions, based on the identification of core problems and suggested interventions coming out of workshop and discussions with stakeholders. The CWWA could become the regional counterpart for the CC in the Caribbean to agree on a IWRM regional strategy.

6 Closing remarks

IWRM concept has been discussed as a process initially proposed 30 years ago, and now as a key indicator of the SDG 6. Currently, water management is considered as a powerful connector of the most ambitious global agreement ever to build a new future for the planet.

IWRM has received most of the attention mainly because of the humanitarian debt related with the lack of water and sanitation services for many people; however, nowadays besides this humanitarian and ecological debt, climate change and the dangerous loss of biodiversity requires urgent responses but not only from the water community.

This document attempts to inform a regional discussion to accelerated IWRM implementation in the WCR. The current low IWRM implementation offers the opportunity to agree upon a different approach to overtake current situation, and even to go beyond.

In this regard, Section 5 presents an implementation outline with specific actions and recommendations, based on the content and explanations presented on previous Sections. In addition, these are the main issues that could make the Conceptual Framework a different approach from previous experiences:

- It opens the process to other sectors such as environment and health, and other processes such as DRM and the ICZM.
- It is based on common principles, particularly an ecosystem-based management principle to promote integration and to build long-term solutions.
- It is geographically focused on the Coastal Zone and oriented to the restauration/conservation of the marine ecosystem as a common goal.

- It clarifies that although full water and sanitation coverage is urgently needed, it cannot be the only goal for the water sector in the region. IWRM must guide a broader process to build water security for all.

- It observes the importance of having a water governance structure in place, supported by the Escazu Agreement, as a unique binding agreement for Latin America and the Caribbean.

- It remarks the three-level governance model to leverage action from local to global and promote regional collaboration.

- It is oriented to build a climate smart and resilient ocean-based economy for the region.

- It proposed to make the economic case to support the value of integration, synergies and coordinated action for all.

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Annex A. Interviews, events and presentations

Interviews

1. David Wilk, Consultant IADB, (01/26/2021)
2. Pedro Moreo, IADB/Regional Project Coordinator for the IDB UNEP GEF CReW+ Project (01/26/2021)
3. Fabiola Tábora, GWP-Central America, (01/27/2021)
4. Simone Lewis, GWP-Caribbean (3/02/2021)
5. Julio Montes de Oca, GIZ, (3/02/2021)
6. Joaquín Viquez, GIZ, (3/02/2021)
7. Andrés Sánchez, OEA, (3/02/2021)
8. Artie Dubrie and Elizabeth Thorne, ECLAC, 05/02/2021
9. Farzana Yusuf-Leon, Nicole Owusua Caesar, Cornelius Isaac, Jan Betlem OECS (10/02/21)
10. Isabelle Vanderbeck and Jill Raval, UNEP (10/02/21)

Events

1. HELP Consultation on Principles for Addressing Water-Related Disaster Risk Reduction during the COVID-19 Pandemic, February 9th, 2021
2. PRE LBS STAC-Meeting, March 8-9, 2021

   Presentation: An IWRM Framework to Support Implementation of the Cartagena Convention (Submitted in electronic format)
3. Fifth LBS STAC Meeting, March 15-17th, 2021
4. The Global Water Partnership-Caribbean (GWP-C) Caribbean Science Symposium on Water, March 23-35, 2021

Annex B. SDG 6 Sustainable Development Goal for Water

SDG Goal 6. Ensure availability and sustainable management of water and sanitation for all

Target	Indicator
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping, and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated. 6.3.2 Proportion of bodies of water with good ambient water quality
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time 6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	6.5.1 Degree of integrated water resources management implementation (0-100) 6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes	6.6.1 Change in the extent of water-related ecosystems over time
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling, and reuse technologies	6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan
6.b Support and strengthen the participation of local communities in improving water and sanitation management	6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

Baseline of IWRM implementation in CC countries (based on SDG 6.5.1 indicators)

Country	Final IWRM Score	Section 1 Average Enabling Environment	Section 2 Average Institutions and participation	Section 3 Average Management instruments	Section 4 Average Financing
Antigua and Barbuda	**30**	32	33	40	15
Bahamas	**33**	34	31	36	33
Barbados	**42**	30	48	59	30
Belize	**20**	28	26	18	8
Colombia	**50**	55	55	53	38
Costa Rica	**43**	30	44	51	48
Cuba	**80**	70	91	80	80
Dominica	**40**	18	61	56	25
Dominican Republic	**36**	32	50	44	16
Grenada	**25**	24	31	40	5
Guatemala	**25**	28	36	19	16
Guyana	**16**	15	6	21	20
Haiti	**29**	27	38	28	25
Honduras	**21**	20	24	22	16
Jamaica	**43**	32	42	65	33
Mexico	**49**	66	51	53	28
Nicaragua					
Panama	**37**	30	35	42	40
Saint Kitts and Nevis	**22**	15	20	33	20
Saint Lucia	**40**	30	64	44	23
Saint Vincent and the Grenadines					
Suriname	**15**	16	11	23	10
Trinidad and Tobago	**25**	26	29	33	13
Venezuela (Bolivarian Republic of)					
Regional Scores	**34**	**31**	**39**	**41**	**26**

Annex C. List of Countries in the Cartagena Convention participating on initiatives and projects

Country	LBS Protocol	SIDS	GEF-CReW	GEF-IWEco	GEF-CReW+	GCF*
Antigua and Barbuda	X	X	X	X		XX
Bahamas	X	X				
Barbados	X	X	X	X	X	X
Belize	X	X	X		X	X
Colombia					X	X
Costa Rica	X		X		X	X
Cuba		X		X	X	X
Dominica		X				X
Dominican Republic	X	X		X	X	X
Grenada	X	X		X	X	XX
Guatemala			X		X	XXXX
Guyana	X	X	X		X	
Haiti		X				X
Honduras	X		X		X	XX
Jamaica	X	X	X	X	X	
Mexico					X	X
Nicaragua						X
Panama	X		X		X	X
Saint Kitts and Nevis		X		X	X	
Saint Lucia	X	X	X	X	X	
Saint Vincent and the Grenadines		X	X	X	X	
Suriname		X	X		X	
Trinidad and Tobago	X	X	X	X	X	
Venezuela (Bolivarian Republic of)						
United States of America	X					
France	X					
United Kingdom						
European Commission						
Total participants	**15**	**16**	**13**	**10**	**18**	**15**

*X stands for number of GCF projects in each country