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ECLAC

ECLAC SUBREGIONAL HEADQUARTERS FOR THE CARIBBEAN

# FOCUS

Magazine of the Caribbean Development and Cooperation Committee (CDCC)

## WATER RESOURCE MANAGEMENT

CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT  
IN THE CARIBBEAN



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## ABOUT ECLAC/CDCC

The Economic Commission for Latin America and the Caribbean (ECLAC) is one of five regional commissions of the United Nations Economic and Social Council (ECOSOC). It was established in 1948 to support Latin American governments in the economic and social development of that region. Subsequently, in 1966, the Commission (ECLA, at that time) established the subregional headquarters for the Caribbean in Port of Spain to serve all countries of the insular Caribbean, as well as Belize, Guyana and Suriname, making it the largest United Nations body in the subregion.

At its sixteenth session in 1975, the Commission agreed to create the Caribbean Development and Cooperation Committee (CDCC) as a permanent subsidiary body, which would function within the ECLA structure to promote development cooperation among Caribbean countries. Secretariat services to the CDCC would be provided by the subregional headquarters for the Caribbean. Nine years later, the Commission's widened role was officially acknowledged when the Economic Commission for Latin America (ECLA) modified its title to the Economic Commission for Latin America and the Caribbean (ECLAC).

### Key Areas of Activity

The ECLAC subregional headquarters for the Caribbean (ECLAC/CDCC secretariat) functions as a subregional think-tank and facilitates increased contact and cooperation among its membership. Complementing the ECLAC/CDCC work programme framework, are the broader directives issued by the United Nations General Assembly when in session, which constitute the Organisation's mandate. At present, the overarching articulation of this mandate is the United Nations Sustainable Development Goals.

Towards meeting these objectives, the Secretariat conducts research; provides technical advice to governments upon request; organizes intergovernmental and expert group meetings; helps to formulate and articulate a regional perspective within global forums; and introduces global concerns at the regional and subregional levels.

Areas of specialization include trade, statistics, social development, science and technology, and sustainable development, while actual operational activities extend to economic and development planning, demography, economic surveys, assessment of the socio-economic impacts of natural disasters, climate change, data collection and analysis, training, and assistance with the management of national economies.

The ECLAC subregional headquarters for the Caribbean also functions as the Secretariat for coordinating the implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. The scope of ECLAC/CDCC activities is documented in the wide range of publications produced by the subregional headquarters in Port of Spain.

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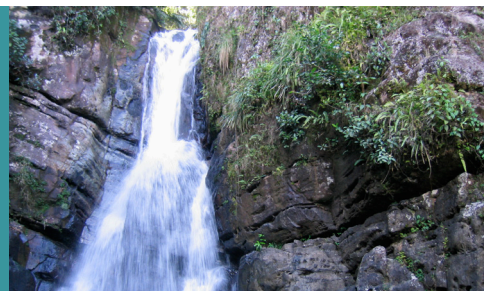
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## WATER RESOURCE MANAGEMENT, CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT IN THE CARIBBEAN



Over the past two decades, the issue of climate change has assumed increasing importance from the perspective of development thinkers, policy makers, investors, and civil society, as they have sought to design strategies to mitigate its anticipated impact. Stimulated by extensive global dialogue and relentless research of feasible solutions to this challenge, discussion on the need for adaptation and mitigation to address the increased frequency and intensity of natural events, and the importance of energy security and alternative energy solutions has become an essential element of the dialogue on sustainable development imperatives for the Caribbean.

**S**ignificantly however, the impact of climate change on water availability and management has generally never been featured in such discourse, or given the level of importance deserved. In this issue, we give focus to water and its role in our future development, with a particular emphasis on water as a development issue in Caribbean Small Island Developing States (SIDS).



Photo by Dale Alexander, ECLAC

*Ms. Diane Quarless, Director, ECLAC subregional headquarters for the Caribbean*

The UN's World Water Development Report 2015 puts water at the core of sustainable development, it being an essential element of services which support poverty reduction, economic growth and environmental sustainability. Water is of course pivotal to global food security, as an integral resource sustaining agriculture, and is critical to energy security and industrial development, since it is used for cooling power production and related industrial technologies. Water availability is also integral to improving social well-being and equity, and to fostering inclusive growth. Given its key role in the maintenance of environmental

health, this resource is central to the growth and well-being of societies.

Although water was not identified as a specific target of the Millennium Development Goals (MDGs), various achievements under the MDGs

have resulted in improved access to drinking water for approximately 2.5 billion persons. Notwithstanding this significant milestone, global water demand is projected to increase by 55 per cent by 2050, driven by increased population and urbanization, as well as the application of more water

intense food and energy security policies. The macro-economic growth of newly emerging countries through globalization is also expected to increase this demand, as changing diets and consumption patterns raise the levels of global per capita water use.

From a policy standpoint, water and sanitation comprise a number of critically interrelated components which impact overall development. These include elements such as water resources, water governance, water-related diseases, wastewater pollution and water quality, drinking water, and sanitation and hygiene.

It is all of these factors which led to a clear enunciation of water and sanitation as Goal 6 of the newly adopted Sustainable Development Goals (SDGs), the ultimate aim of which is to ensure availability and sustainable management of water and sanitation for all by the year 2030.

While for Caribbean SIDS, progress has already been

► (continued on page 19)



# WATER FOR DEVELOPMENT



Access to clean water, sanitation and hygiene plays a central role in achieving development and, as such, is recognized as a human right that affects the lives and livelihoods of millions of persons.

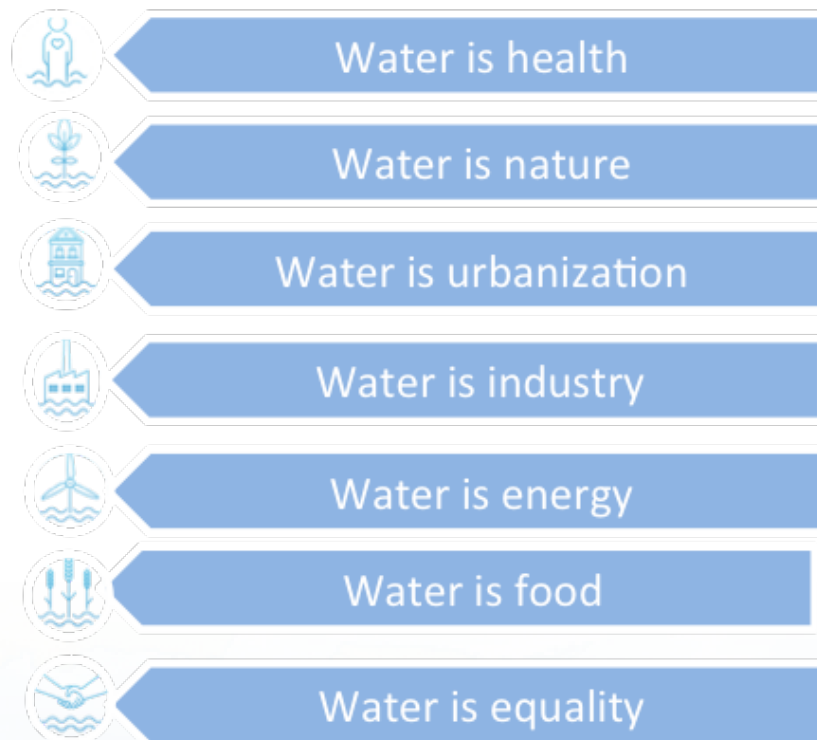
**T**he World Health Organization (WHO, 2012) estimates that investment in water and sanitation services has the potential for substantial returns, in the order of US \$5 to US \$28 per dollar invested.

Conversely, a lack of access negatively affects health and well-being, which ultimately brings additional financial costs. In this regard, major global platforms including the Millennium Development Goals (MDGs), the Samoa Pathway and the Sustainable Development Goals (SDGs) have underscored the importance of water in alleviating poverty and in promoting sustainable development.<sup>1</sup>

## WATER REMAINS SCARCE RESOURCE

Access to water is fundamental to economic and social development. However, such developments in turn demand increased use of water and bring environmental impacts.

Climate change, population



<http://www.water.org/worldwaterday/learn/en/>

growth, degrading water quality and extreme hydrological events (e.g., floods and droughts) present serious challenges to national efforts to provide sustainable water services.

Even though the link between hydrologic extremes and economic losses has been confirmed by many researchers, efforts to implement programmes to address water-related disasters and water-related climate change

impacts are not as widespread as they should be.

Accelerated global development trends and population growth are exerting pressure on an already scarce resource. Population growth and development are accompanied by urbanization, food and energy security policies, and improved living standards that inevitably lead to sharp increases in water consumption and pollution of sources.

<sup>1</sup> According to the WHO and UNICEF (2014), 2.3 billion people have gained access to an improved drinking water source and 1.9 billion to an improved sanitation facility.

Competing demands combined with management challenges will certainly exacerbate water scarcity and increase the risk of localized conflicts.

## WATER IS KEY TO SOCIAL DEVELOPMENT

A recorded 332.5 million cubic miles of water exist, but only 3 percent constitutes freshwater resources.

Much of this (approximately 68 percent) is trapped in glaciers, with a further 30 percent stored as underground resources. Readily accessible global freshwater resources therefore are estimated at about 22,300 cubic miles; approximately 1/150th of the one percent of total water resources. Even while discounting the pressure of climate change and development, water is scarce.

Nevertheless, freshwater resources are readily available in rivers and lakes, and are utilised by many sectors across society- including agriculture; energy production; recreation and manufacturing, with the unfortunate result of a virtual tug-o-war among its users. In this context, water can be classed as a resource and a sector. It is key to social development, environmental integrity and economic growth. As a sector, water requires infrastructure development and operational funds. As a resource it cuts across sectors, demanding

A drop of water is flexible  
A drop of water is powerful  
A drop of water is in demand<sup>1</sup>

Source: <http://www.unwater.org/worldwaterday/learn/en/>

a more integrated approach to management. Financing, monitoring and infrastructure have all been identified as high priority water management issues facing decision-makers.

## CARIBBEAN PERSPECTIVE

Caribbean states face three major obstacles that hinder the optimal management of water.

These are: (i) governance, (ii) infrastructure and (iii) wastewater management. The water sector is seriously fragmented,<sup>2</sup> which results in inefficient use of scarce resources, both human and financial. Typically, a number of agencies are responsible for separate but complementary components of the sector (potable water, sewerage, disposal), creating silos and often contributing to a weak enforcement of the existing regulations, many of which are inadequate and seriously outdated (Cashman 2013).

In the case of infrastructure, priority has been given to increasing access to potable water, with a focus on network expansion rather than on

network upgrade, maintenance and/or rehabilitation. This has resulted in inattention to the need to upgrade infrastructure, resulting in significant levels of water leakage<sup>3</sup> of between 50 and 70 per cent. This has been a major contributor to the waste of this vital resource and to the inefficiency of the sector.

Fragmented governance and outdated infrastructure also combine to exacerbate existing challenges. Due to its weight, water transmission and distribution consumes large amounts of energy, and in the Caribbean, inefficient energy consumption represents 30 per cent of the operational budgets of water suppliers. This is directly related to the lack of funds for investments since many suppliers show below-cost recovery revenues, which means that tariffs only cover operation and maintenance costs. Energy efficient transmission and distribution devices could create savings between 30 and 40 per cent (Cashman 2013); this is particularly relevant considering the subregion's high levels of indebtedness and dependence on imported fossil fuels.

► (continued on page 17)

<sup>2</sup> Cashman IDB 2013, CReW 2010, Riquelme IDB 2013, WB 2005

<sup>3</sup> Unaccounted for water refers to leakage, theft and under-billing.

## THE IMPACTS OF CLIMATE CHANGE ON WATER RESOURCES



Climate change aside, the challenges affecting water availability and quality include population expansion, growing urbanization and increasing demand. Over the last 10 years, global groundwater resources have been falling largely because of the increased rate of abstraction. This is a logical progression in response to increasing population growth and related development activities.

**R**esidential water demand has increased alongside growing population figures and ranks among the largest category of water users. Population and economic growth also translate into increased deforestation as forests are cleared for development, contributing to drought and flooding events. Growing populations also drive the need for irrigated agriculture, an activity responsible for more than 56 per cent of withdrawals from underground sources. This kind of agriculture is a major source of pollution for countries with mainly limestone topography like the Dominican Republic and Jamaica. It is increasingly evident that growing numbers of people in limited space without the adequate management practices can compromise water quality and quantity.

These competing pressures interact to create complex manifestations that exacerbate the threats facing water resources (Box 1). When climate change is added to this equation the impact can be significant, as it affects the cycle, availability, quantity

### Box 1. Key water challenges

- Intensifying water inefficiencies in food production
- Failing access to water and sanitation
- Stressed aquatic ecosystems and biodiversity loss
- Increasing conflicts on water rights
- Degrading water quality
- Unsustainable groundwater abstraction
- Frequent hydrologic extreme events
- Lack of investments to provide adequate services
- Closing rivers and over exploited aquifer systems
- Unplanned urban growth threatening water balances
- Inadequate human and institutional capacities
- Sectorial water management leading to confused, conflicted and unintended policy outcomes

and quality of water resources, including the variability and frequency of precipitation.

### WATER AVAILABILITY

Evidence shows that climate change is heating the atmosphere and increasing overall evaporation rates.

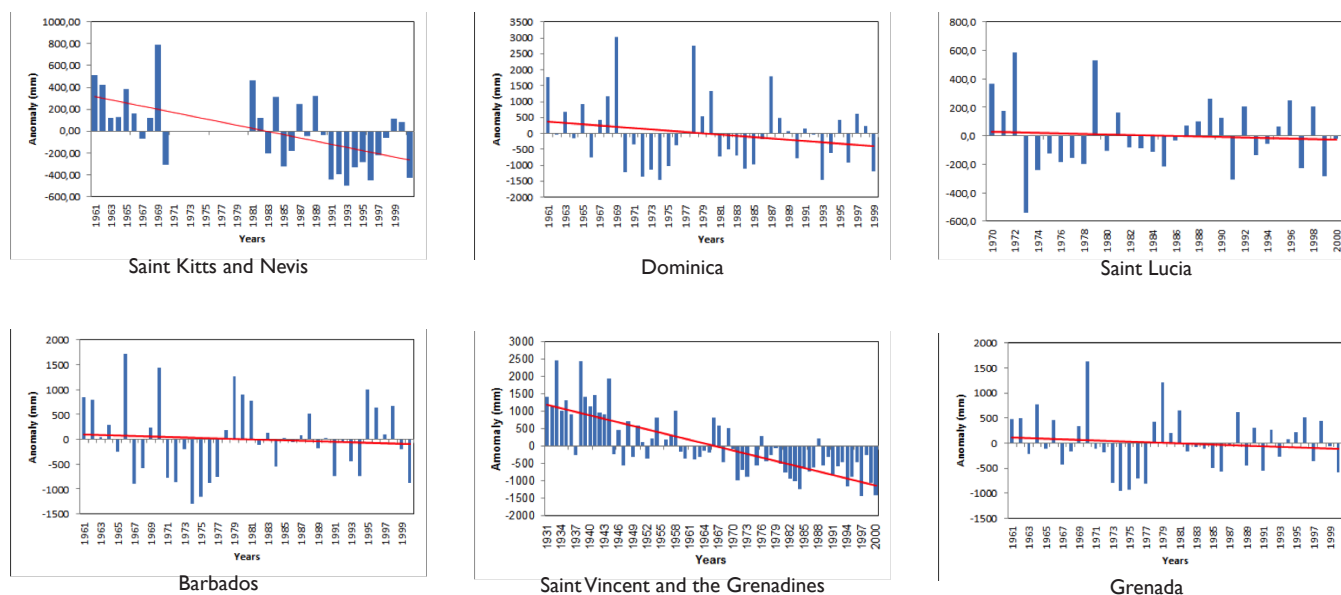
This in turn increases the volume of water held in the air, causing

heavier rainfall in many areas and drought in others. By way of example, studies by ECLAC (2013), suggest that the Caribbean region has already begun to show significant hydrological variation, with an intensification of precipitation during the winter months (December to March), and a decrease during the rainy season. Measures of anomalies in annual precipitation, from the 1960's to 2000's show overall downward trends for Barbados, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines (Figure 1).

High temperatures also cause an increase in water demand and a reduction in groundwater resources. The growing trend of reduced aquifer recharge shows the following scenarios. In the first instance, faster evaporation rates result in reduced water tables. Increased frequency and intensity of storms prevents proper soil infiltration and increases runoff. In coastal areas, rising sea levels raise water tables, but delay effective aquifer recharge. Elevated temperatures encourage faster surface drying, which reduces the existence of



FIGURE 1: ANOMALY OF ANNUAL PRECIPITATION, SELECTED CARIBBEAN COUNTRIES, 1961 - 2000



Source: ECLAC (2013) "An assessment of the economic and social impacts of climate change on the water sector in the Caribbean"

water in the near-surface interface of soil, directly impacting agricultural production. When there is less downward movement of water through the soil, the opportunity for groundwater recharge severely diminishes. This worrying situation is not readily rectified by more rainfall, mainly because the infiltration process is hampered by the high temperatures. For low-lying coral based islands like Barbados, British Virgin Islands, Cayman Islands and the Dutch Caribbean reduced precipitation is already a reality.

Furthermore, there is another perspective that must be added to the discourse to appreciate the complexity of water availability. The water cycle distributes rainfall unevenly across space and time, contributing to the variability of global water storage. This may cause greater downpours and more flash floods leading to tremendous destruction of

infrastructure, environmental damage and loss of life. This variability in time and space is a factor that deserves great consideration when developing appropriate water management systems.

## UNACCOUNTED WATER LOSS AND THE EFFECTS ON CLIMATE CHANGE

At a regional level, the implications of this variability determine water quality and quantity, which in turn hinge on size, geology, topography, climate and patterns of socio-economic development.

Many countries in the region have restricted water resources because of their geological and physical features. Depending on the financial situation of the country, rainwater harvesting and desalination may be the only possible solutions, especially in smaller and drier islands.

Limited water availability is an issue for Aruba, Barbados to a lesser extent, the British Virgin Islands, Cayman Islands and Curacao. For countries like Barbados, Antigua and Barbuda, and the Bahamas, their struggles are centred on addressing underground water resources that have been exhausted or contaminated from either pollutants or saltwater.

Another concern is the high level of unaccounted water loss. The region recorded a staggering 50-60 per cent loss. This is particularly noteworthy, considering that the Caribbean is the region with the lowest water availability per capita among all Small Island Developing States (SIDS).

► (continued on page 18)

<sup>1</sup> Source: World Resources, 1998 -1999: Environmental Change and Human Health

# INTEGRATED WATER RESOURCE MANAGEMENT



The Global Water Partnership identifies Integrated Water Resources Management (IWRM) as “a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.”

**T**here are four main principles that govern IWRM reform:

## Principle 1:

Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment.

## Principle 2:

Water development and management should be based on a participatory approach involving users, planners and policy makers at all levels.

## Principle 3:

Women play a central role in the provision, management and safeguarding of water.

## Principle 4:

Water has an economic value in all its competing uses and should be recognised as an economic good as well as a social good.

integrated one. Its foundation is based on the concept that water resources are essential to the well being of the ecosystem.

Given the threat which climate change poses to the long term water availability in SIDS countries, a broad based strategic framework for IWRM is necessary to ensure future water security.

Such a framework should include the following:

### 1- Implementation of the following adaptive strategies:

a. Infrastructural – build coastal and flood water guards to regulate sea-level rise and flooding, and devise techniques that increase water use efficiency (e.g. drip agriculture).

b. Behavioural – raise awareness in order to modify production and consumption behaviours (e.g.

### 2. Modification of current water management strategies throughout the region through:

a. Improvement, rehabilitation and maintenance of infrastructure.

b. Desalination, especially in water scarce countries.

c. Rainwater harvesting.

d. Harnessing the potential benefits of greywater as an alternative to increase the availability of water and to address the global challenge of wastewater management.

### 3. Strengthening of water resource management through assessments of water resources, economic assessments of the sector, water forecasting and industrial reform, capacity building, and establishment of water monitoring networks.

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