

POLICY BRIEF

ENHANCED WATER RESOURCES MANAGEMENT IN THE CARIBBEAN

Framing the Issue

Water is the lifeblood of the planet, and the state of this resource affects all natural, social and economic systems. Water serves as the fundamental link between the climate system, human society and the environment. In the Caribbean, freshwater is a major requirement for agricultural and other commercial production systems. However, global climate change is severely impacting the hydrological cycle and consequently, water resources management¹ (United Nations, n.d.); therefore, failure to manage adequately our water resources will definitely jeopardize the Caribbean Region's progress on poverty reduction targets and sustainable development in all economic, social and environmental dimensions: the reality is that adequate management of water resources on many Caribbean islands is sorely lacking (Farrell, Nurse and Moseley, 2007).

The Intergovernmental Panel on Climate Change (IPCC) identifies the Caribbean region as the most severely impacted by climate change in terms of accentuation of an already severe water scarcity. Several islands in the Caribbean are defined as water scarce with respect to natural freshwater resources. Moreover, available data averaged for the Caribbean shows inconsistent temporal or spatial rainfall trend, while recent downscaled model outputs from the Hadley Centre's PRECIS model indicate a possible project the Region's future tendency towards drying, with a higher number of dry days and fewer consecutive wet days for the region.

In particular, these Regional Climate Models project: decreased average precipitation; increased atmospheric temperatures; and sea level rise. Further, declines in precipitation would lead to an increase in the risk of periods of drought for the Caribbean region², which are likely to occur more frequently and be more severe. According to Farrell, Nurse and Moseley (2007) these model predictions support the Region's experience with the warm phases of El Nino Southern Oscillation and are corresponding below-average rainfall in the Atlantic. These conditions are becoming more frequent and intense as recorded during the 1987/88: there was widespread drought in the Caribbean, *with Guyana experiencing the worst effects* (Farrell et al, 2007). Countries which rely mainly on surface water rather than aquifers could be affected by declining precipitation levels since surface water generally responds more rapidly to drought conditions than aquifers where flows in rivers decline or stop altogether.

As climate continues to change, precipitation and consequently droughts and floods are expected to change in their frequency, intensity and distribution. This change in pattern violates the hypothesis of stationarity – where statistical characteristics are assumed fixed - which water planners and managers apply conveniently in the design and operation of water resources systems. This changing

¹ Managing water has always implied that societies deal with natural variability in the water supply and its effect on competing uses (United Nations. n.d.)

² CARICOM nations which have been particularly prone to water shortages or drought conditions are: Antigua and Barbuda, The Bahamas, Barbados, Dominica (in the dry season when demand is also highest), St. Kitts and Nevis (particularly Nevis island) and St. Lucia (in the dry season). Aquifers in Barbados have experienced saltwater intrusion due the drought conditions reducing the amount of groundwater recharge. Antigua and Barbuda are heavily reliant on desalination, particularly during periods of drought.

hydrological variability has already resulted in substantial overdesign of and subsequent losses in productivity and efficiency of a large number of water infrastructures.

Climate change will definitely exacerbate problems of water resources management: currently, water management and security in the Caribbean is threatened by several factors, including increased urbanisation, depleting ground water aquifers, loss of water ecosystems services associated with destruction of watersheds, poor water governance characterised by overlapping organisational functions, limited institutional capacity in terms of human and financial resources, lack of accountability, competing land use and vulnerability to natural and anthropogenic hazards, including droughts, cyclones and urban pollution, limited water information systems to facilitate planning; limited research and development capacity for evidence based decision making; and public mis-conceptions about water resources (Bynoe, 2008).

Consequences of Inaction

Failure to manage water resources in a changing climate will result in a number of irreversible impacts³ (depending on base line conditions of water supply systems and other factors): the principal ones being:

- Increased water scarcity⁴;
- increased pressure on sensitive environmental and human systems;
- increasing risks of coastal erosion, flooding and inundation;
- decreased security of potable and other water supplies;
- reduction in subsistence and commercial agricultural production of such crops as bananas and coconut and associated food insecurity (agriculture contributes to >20% of the GDP and is seen as a major economic driver);
- changes in supply and demand of food commodities;
- decreased water quality: under climate change, the quality of water available from both surface and groundwater sources may be compromised. Both a drying and a rise in sea levels can increase the risk of saline intrusion into coastal aquifers.
- increased risk of dengue fever, malaria, cholera and diarrhoeal diseases; and
- decreased human comfort.

Currently, management of water resources in the Caribbean is carried out by governments in a highly centralised manner. As is the case in many environmental agencies in the Caribbean, water resource provision is not a coordinated effort across responsible groups and in many cases is not considered to be a high priority (Farrell et al. 2007, Cashman et al. 2010). Surely, taking appropriate actions NOW to reduce the Caribbean Region's present day vulnerability could go a long way toward diminishing the effects of future climate change on water resources.

³ Adapting to climate change in water resources and water services in Caribbean and Pacific small island countries.

http://www.worldwaterforum5.org/fileadmin/wwc/Library/Publications_and_reports/Climate_Change/PersPap_03._Small_Island_Countries.pdf

⁴ Most projections for the Caribbean suggest that by the end of the current century there will be less rainfall which is indicative of a decrease in available water (Taylor et al, 2011).

Taking Appropriate Action Now

Water resources management aims at securing supplies to meet demands. This task requires matching demand not only in quantity and quality, but also in location and timing. The projected impacts of climate change on water resources management call for adaptation options which fall under the umbrella of Integrate Water Resource Management (IWRM). Integrated Water Resources Management (IWRM): promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. A critical step in achieving IWRM is the development of a policy and strategy based on the following elements:

- Desalinisation by means of accessible and affordable technology (both thermal and mechanical);
- Water harvesting and Water storage;
- Introducing mechanisms for market based transfers (trading water rights through markets) among uses;
- Water demand management through water allocation based on objective analysis of use value (high or low);
- Water pricing to reduce water wastage and recover production cost;
- Reduced 'unaccounted for water' in the distribution system by repairing and maintaining physical infrastructure;
- Ground water management (for example, by restricting ground water extraction for agricultural and other activities);
- Water resources protection through implementation of new and revised legislation and regulations;
- Watershed management;
- Waste water treatment and re-use accompanied by public health regulations on application;
- Disaster risk reduction measures to mitigate effects of floods and droughts;
- Adopting a participatory approach involving users, planners, and policy makers;
- Reforming the agricultural sector (through training, education, financial support) to promote improve water efficiency and water productivity;
- Investment in research and development, periodic and long term monitoring and information management to fill knowledge gap;
- Promoting more efficient intergovernmental collaboration and coordination among national and local institutions (for example through a National Water Council as in Guyana's case) to facilitate the sharing of data and information and improve water resources planning;
- Raising public awareness;
- Modifying irrigation techniques, including amount, timing or technology (e.g. drip irrigation systems);
- Adopting water-efficient technologies to 'harvest' water, conserve soil moisture (e.g. crop residue retention, zero-tillage), and reduce siltation and saltwater intrusion;
- Modification of crop calendars, i.e., timing or location of cropping activities;



Impact Sprinkler System:
Barbados

- Integration of the crop, livestock, forestry and fishery sectors at farm and catchment levels; and
- Implementation of seasonal climate forecasting.

Additional adaptation strategies may involve land-use changes that take advantage of modified agro-climatic conditions. More importantly, Caribbean governments should embrace the concept of a adaptive management⁵ should be the approach since this would allow for adjustments in decision making to be made as more information is known, especially in the face of some degree of uncertainty introduced by potential climate change.

Already, there have been important regional initiatives taken to support IWRM in the Caribbean. These include the Mainstreaming Adaptation to Climate Change (MACC) - Global Environment Facility (GEF) Project, Integrating Watershed and Coastal Area Management (IWCAM) - GEF/UNEP, the CARICOM Consortium of CARICOM Institutions on Water; and the Global Water Partnership – Caribbean (GWP-C). Additionally, a few countries have developed water policies (for example, Grenada and Guyana).

What is promoted here is not “one size fits all”, but rather, the policy should respond to the specific national environmental, economic, social, cultural, institutional and political circumstances.

Information Sources

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⁵ Adaptive management is one decision process that “promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood” (National Research Council, 2004).

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