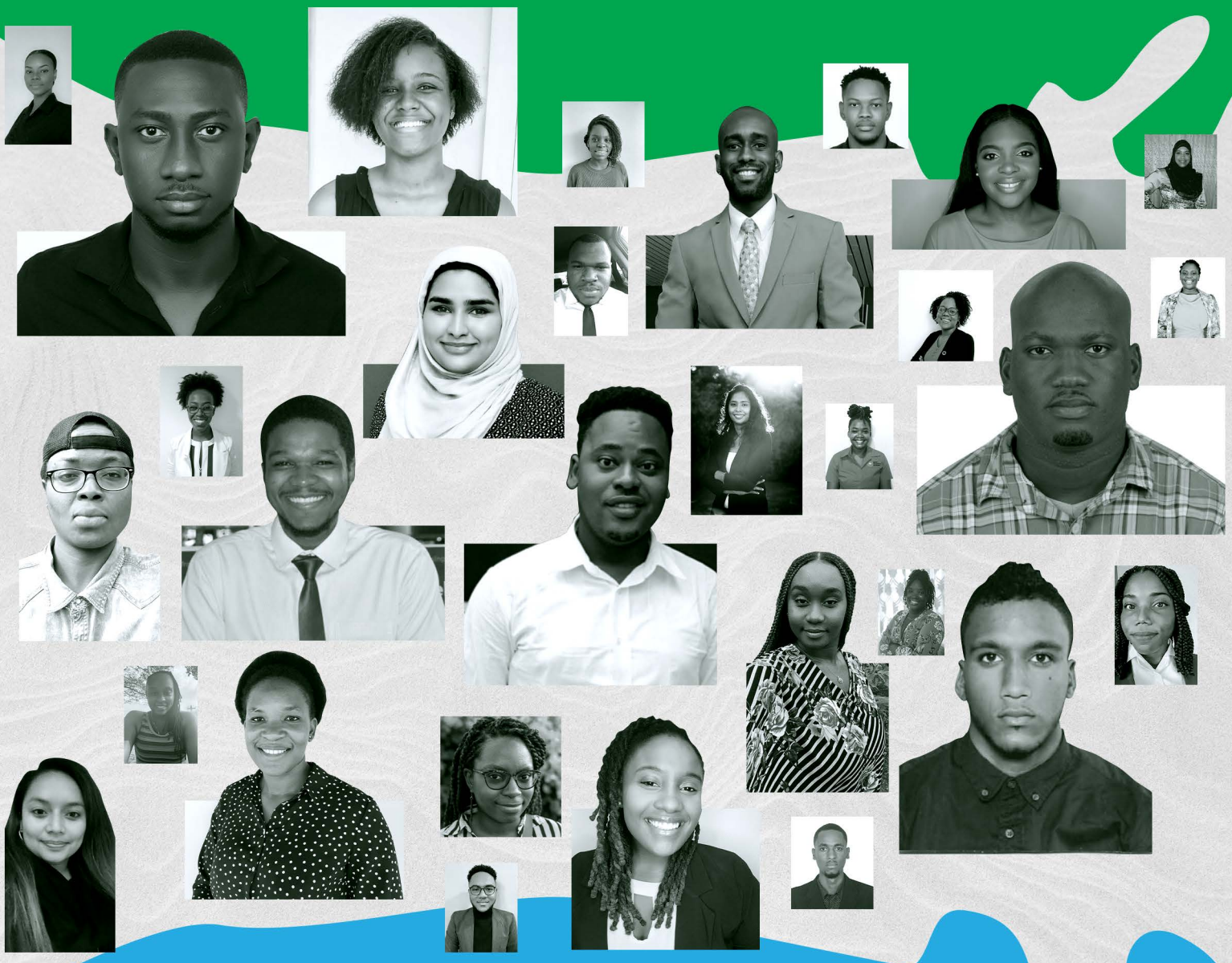
Global Water Partnership Caribbean

GWP-C WATER ACADEMY FOR YOUTH (GWP-C):

A Collection of Scientific Articles and Papers on Caribbean Water Issues



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GLOBAL WATER PARTNERSHIP-CARIBBEAN (GWP-C)

About GWP-C

VISION

A water secure Caribbean.

MISSION

To support Caribbean countries in the sustainable development and management of their water resources at the community, national and regional levels. GWP-C {established in 2004} is 1 of 13 Regional Water Partnerships of the Global Water Partnership (GWP) {established in 1996} with a network of over 3,000 partner organisations in over 180 countries, all working to promote and foster **Integrated Water Resources Management (IWRM)**.

GWP-C works with its Partners to promote and strengthen interaction and coordination at all levels and across different sectors to sustain IWRM in the Caribbean. **GWP-C currently has over 120 Partners from the following countries:**

Anguilla, Antigua, Aruba, The Bahamas, Barbados, Belize, British Virgin Islands, Cuba, Curaçao, The Commonwealth of Dominica, Dominican Republic, Grenada, Guyana, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Puerto Rico, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Suriname, Trinidad & Tobago, The United States Virgin Islands, The United States of America and Canada.

> “IWRM is 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 and the environment. – GWP”

Any organisation with an interest in water sustainability in the Caribbean can become a GWP-C Partner.

GWP-C Partners include: public water management agencies; government ministries; water user associations; private water management agencies; private sector organisations; professional and civic organisations; non-governmental organisations; community-based organisations; regional organisations; consultancy organisations; youth organisations; research and educational institutions; training organisations; funding organisations; and more.

GWP-C NICHE AREAS:

Mobilisation of Multi-Stakeholder Groups/Supporting Caribbean Countries in Better Water Management
GWP-C mobilises stakeholders from different backgrounds, organisations and sectors to work toward better water resources management in the Caribbean. We create a neutral space for multi-stakeholder groups to come together to build common ground and engage in robust water management decisions. We also help countries develop IWRM plans and policies.

Advocacy
GWP-C engages in and develops activities aimed at building awareness on water in the Caribbean. This includes working to make water a top policy priority in the Caribbean.

Capacity Building
GWP-C provides training and technical expertise in a range of water-related areas, as well as supporting water-related dialogues on participatory approaches.

Communicating Knowledge
To build capacity, knowledge is required. GWP-C produces various knowledge products on various water-related issues and themes.

Building Partnerships
Establishing cohesive alliances to support better water management in the Caribbean region at the community, national, regional and global level.

Published 30/8/2022

The **Global Water Partnership-Caribbean Water Academy for Youth (GWP-C WAY)** is a specially designed training programme for Caribbean young leaders and professionals between the ages of 20 – 35 years. The carefully crafted 3-month programme which is the first of its kind in the region, which builds capacity in Integrated Water Resources Management (IWRM) and equips participants with a range of skills which would allow them to provide sustainable solutions to Caribbean water issues.

The Academy aims to:

1. Provide capacity-building opportunities to empower young Caribbean leaders to influence holistic positive action to address IWRM related challenges in a Caribbean context.
2. Support young Caribbean leaders through theme-specific pairing (mentoring) with our regional partners to address local water-related issues.
3. Establish at least one (1) youth IWRM focal point per participating country.
4. Integrate into our network the two (2) GWP-C WAY IWRM Ambassadors and the GWP-C National Youth IWRM Focal Points to represent youth at national and regional activities and to contribute to the successful implementation of GWP-C's regional and country-level activities.
5. Promote action by youth through evidence-based interventions, utilising the knowledge and problem-solving skills acquired from the GWP-C WAY.

The GWP- C WAY Magazine

The GWP- C WAY magazine is public recognition of the commitment of the first Cohort totaling 32 members and representative of 12 Caribbean countries: **Barbados, Belize, Curaçao, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Vincent and the Grenadines, St. Kitts and Nevis, Suriname, and Trinidad and Tobago.**

The magazine aims to:

1. Raise awareness of the academy and the opportunities it provides .
2. Provide a platform for the continued dissemination of the scientific writing work (Articles and Papers) related to water resources management from members of the GWP-C WAY Cohort.

It also highlights and validates the value of creating youth opportunities and empowering them to be agents of change while sharing knowledge and experiences as it relates to water in their respective countries.

MS. SIMONE LEWIS

GWP-C Regional Coordinator

It is with great honour that I share these few congratulatory words with the first cohort of the GWP-C Academy for Youth as we celebrate their achievements during these extraordinary and challenging times. During the pandemic period, GWP-C was driven to become very innovative in building the capacities of the youth in the region, while witnessing the struggles of society in reacting and adjusting to the new conditions brought on by COVID-19. As a response to these unique challenges, the GWP-C WAY was developed, adding a new dimension to how knowledge can be imparted using the virtual space. Throughout the Academy, the cohort was taught to be creative and innovative problem solvers, to think proactively and unconventionally, and not to be afraid to push the boundaries. Still, above all, they learnt new skills and techniques in the sphere of IWRM, were open to new ideas and approaches, and were willing to accept the "different" and embrace the unknown.

The participation of the youth in the Academy undoubtedly contributed to the region's transformation in its ability to adapt to critical adversities and provide solutions to the challenges plaguing the Caribbean region. The 2021 cohort has indeed made history and contributed to achieving the mission of GWP-C in their unique way. Completing the program in 2021 is not the end; it is the beginning of a new, exciting and unpredictable journey that will lead you to the next step in your professional career.

Our GWP-C WAY Partners

The Global Water Partnership-Caribbean (GWP-C) must acknowledge the support of its partners that helped to make the first-ever GWP-C WAY in 2021 a reality:

Global Water Partnership (GWP)
The Global Water Partnership (GWP) is a multi-stakeholder action network and intergovernmental organisation dedicated to working with countries towards the equitable, sustainable, and efficient management of water resources. It comprises of 3,000-plus partner organisations in over 180 countries. The network of Regional and Country Water Partnerships convenes, and brokers coordinated action by government and non-government actors. A long-time advocate for integrated water resources management (IWRM), GWP draws on implementation experience at the local level and links it across its network and to global development agendas.

Global Water Partnership Caribbean

Website: www.gwp-caribbean.org

Caribbean WaterNet (Cap-Net UNDP)
Caribbean WaterNet is the Caribbean arm of global Integrated Water Resources Management (IWRM) capacity building network, Cap-Net UNDP. The network provides technical, human and financial support geared towards regional IWRM capacity building activities and disaster risk resilience initiatives.

Its mandate is to improve regional IWRM with specific focus on Hydro-Climatic Disasters. Its mission is to improve attitudes, awareness, knowledge and competency in the implementation of IWRM and Hydro-Climatic Disaster Risk Management in the Caribbean. Additionally, its goal is to facilitate capacity building and communication in IWRM related areasthroughout the Caribbean.

CARIBBEAN WaterNet Cap-Net UNDP

Website: www.caribbeanwaternet.com

The Faculty of Food and Agriculture (FFA) of The University of the West Indies (UWI) - St. Augustine Campus
The Faculty of Food and Agriculture of The University of the West Indies (UWI) St. Augustine Campus, focuses on agricultural progress, sustainable food production, improving food security in the region, increasing the environmental knowledge base of its members and thereby improving the quality of the lives of those touched by its work. With its relevant research and wide range of undergraduate and graduate offerings in agriculture, agribusiness, food and nutrition, geography and related areas, the Faculty is poised to make a significant contribution.

THE UNIVERSITY OF THE WEST INDIES
FACULTY OF FOOD AND AGRICULTURE

Website: www.sta.uwi.edu/ffa

The Caribbean Community Climate Change Centre (CCCCC)

The Caribbean Community Climate Change Centre (CCCCC) coordinates the Caribbean region's response to climate change. The Centre is the key node for information on climate change issues and on the region's response to managing and adapting to climate change in the Caribbean. It's a repository and clearing house for regional climate change information and data and provides climate change-related policy advice and guidelines to the Caribbean Community (CARICOM) Member States through the CARICOM Secretariat.

Caribbean Community Climate Change Centre

Website: www.sta.uwi.edu/ffa

Caribbean Climate Innovation Centre (CCIC)

The Caribbean Climate Innovation Center (CCIC) was launched in 2013 as a Consortium jointly managed by two (2) leading scientific institutions in the Caribbean, the Scientific Research Council (SRC) based in Kingston, Jamaica and the Caribbean Industrial Research Institute (CARIRI) located in Trinidad and Tobago. CCIC is a part of infoDev's Climate Technology Program (CTP) which focuses on empowering developing countries to proactively and profitably adapt, develop and deploy climate smart (clean tech) technologies and business models.

This CTP is part of the broader Entrepreneurship Programme for Innovation in the Caribbean (EPIC) program being funded by the Canadian International Development Agency (CIDA). The CCIC's thematic areas of focus are (a) water management (b) sustainable agriculture (c) energy efficiency (d) solar energy and (e) resource use efficiency. Its goal is to be able to support companies from the nascent stage up to later stage innovations, by providing early stage education, bootcamps, accelerators, grants and other services.

Caribbean Climate *innovation* Center

Website: www.caribbeancic.org

After taking part in the first-ever GWP-C WAY, participants have been able to increase their understanding of water issues and this is demonstrated in the four (4) articles featured below.

JEVAUGHN HENRY

ECONOMIC INCENTIVES FOR WATER CONSERVATION IN JAMAICA

Article Prompt – Faced with the prospect of insufficient water resources to meet rising demand, the Government wishes to reduce water consumption. Write an article around the use of economic incentives that would promote conservation in your country.

Abstract

With water security becoming a challenge faced by many countries, there is a need to change water consumption patterns. This article gives an overview of water conservation practices and the economic incentives which can be implemented to promote sustainable water conservation practices amongst water users. A review of articles, reports and working papers from credible sources was conducted to determine the economic incentives that could be implemented in Jamaica. Research on understanding which incentives would that positive and negative economic incentives could be utilised. Further, this research illuminated the role that incentives can play in implementing Integrated Water Resources Management. Economic incentives can be beneficial in changing the behaviour of water users towards more sustainable consumption practices. A detailed economic assessment of the water sector in Jamaica could yield a better understanding of how to implement incentives islandwide.

1.0 INTRODUCTION

Economic incentives can have a significant influence on water conservation in Jamaica. With a growing population and an increasing percentage of that population living in urban areas, increased strain is being placed on water resources. Water security is a growing concern across the Caribbean region, and the impacts of climate change are exacerbating it. Jamaica is one of the many countries that face challenges in water availability as there are periods with too much water, which leads to flooding and periods with too little water, which results in drought. Water conservation is a means to curb water consumption patterns to manage water resources more sustainably. Through the use of economic incentives, Jamaica can increase participation in water conservation in order to protect valuable water resources. This paper begins by giving an overview of water conservation practices that are utilised globally. It then delves into the economic incentives for water conversation which can be implemented in Jamaica and the role that incentives play in Integrated Water Resources Management (IWRM).

2.0 WATER CONSERVATION PRACTICES

According to the United Nations' Glossary of Environment Statistics (1997), water conservation refers to the preservation, control and development of water resources, both surface and groundwater, and pollution prevention. Integrating water conservation in water resources management can aid in reducing water consumption by all users. Water conservation practices can be divided into two categories, engineering and behavioural practices. Engineering practices are based on modifications to hardware such as plumbing and fixtures or water supply operating procedures, while behavioural practices are based on changing water use habits (UNEP International Environmental Technology Centre; OAS Unit of Sustainable Development and Environment; UNEP Water Branch, 1998). Some of the various practices can be seen in Table 1 below, adapted from the United States Environmental Protection Agency Report on Cleaner Water Through Conservation.

Table 1: Water Conservation Practices (United States Environmental Protection Agency, 1995)

User Group	Engineering Practices	Behavioural Practices
Residential	Low-flush toilets, showerheads, and other related fixtures	Pricing
	Greywater reuse landscaping	Public information and education
	Drought-tolerant plants	Lawn irrigation scheduling
Agricultural	Low volume irrigation technologies	Irrigation scheduling
	Wastewater reuse and recycling	Public information and education
Industrial and Commercial	Cooling water recirculation	Enforcing water use practices
	Wash water recycling	Educational programmes

The impacts of climate change are intensifying, and there is a need to practice water conservation. According to Jamaica's 2018 Economic and Social Survey (2019), there were eight (8) more severe droughts than in 2017, with the average annual rainfall being below the 30-year mean for most parishes. Water availability will become a greater challenge in the future and mitigation and adaptation measures will need to be implemented to ensure that the population can access safe water for drinking, sanitation and hygiene.

3.0 ECONOMIC INCENTIVES FOR WATER CONSERVATION

According to the Council for Economic Education (2015), economic incentives encourage people to make certain choices or behave in a certain way. They usually involve money, but they can also involve goods and services. There are two types of economic incentives, positive and negative. Positive economic incentives reward people or businesses for making certain choices and behaving in a particular manner. On the other hand, negative economic incentives result in a loss or punish people/businesses to deter or modify particular behaviours or actions. Generally, economic incentives for water conservation encourage water users to use water more carefully and efficiently (Global Water Partnership, 2017).

Positive Incentives for Water Conservation

One of the main incentives which can be implemented in Jamaica is to provide subsidies to consumers who are willing to utilise modern fixtures which are more water-efficient. Fixtures include low-flush toilets, low-flow showerheads, pressure reduction devices and efficient washing machines. The National Water Commission (NWC) could facilitate the administration of these incentives to its customers. Programmes that aid in retrofitting homes with these efficient fixtures could also be developed to increase the effectiveness of this water conservation strategy.

Authorities can provide rebates on property taxes to homeowners and real estate developers to use more drought-tolerant and native plants for landscaping. Good landscape design can significantly reduce water use; it can also take advantage of native plants with evolved water-saving characteristics ideally suited for the local climatic conditions (United States Environmental Protection Agency, 1995). The Government of Jamaica (GOJ) could encourage sustainable landscaping by increasing the number of free or low-cost trees or plants such as Lignum Vitae and Poor Man's Orchid available from the Forestry Department. The GOJ could also lead a public education campaign about the benefits of good landscaping practices for water conservation.

The GOJ can also provide grants or low-interest loans to homeowners and commercial and industrial building owners to install rooftop rainwater harvesting systems. The collected rainwater can be used for irrigation, flushing toilets, laundry and supplying cooling systems. Rainwater harvesting can be very successful; this can be seen in the Japan Caribbean Climate Change Partnership rainwater harvesting project, which provided 70 training institutions across Jamaica with an additional 65,800 gallons

of water (UNDP Multi Country Office in Jamaica, 2019). Additionally, domestic rainwater harvesting can deliver between 30% and 50% annual water savings (Campisano et al., 2017). Rural communities often face challenges in accessing water; hence, rainwater harvesting systems can provide much-needed relief.

With continuous changes in climate, Jamaica's water resources can be negatively affected by more prolonged droughts, saline intrusion of groundwater resources, pollution due to flooding and various others (The Water Project Jamaica, 2018). As these challenges intensify, the GOJ can utilise treated wastewater to alleviate water supply problems. Treated wastewater can be sold at a lower rate to consumers for non-potable uses such as irrigation in the first phase, and following changes in public perception, this water can be provided for potable uses. In water-stressed areas such as Orange County, California, wastewater recycling plants deliver water to consumers at lower prices, sometimes multiple times cheaper, than water delivered from dams, rivers and reservoirs (Leslie, 2018).

Negative Incentives for Water Conservation

The current water tariffs charged by the NWC are insufficient to cover the total cost of service delivery. One of the primary reasons for this shortfall is the impact of non-revenue water, which stood at 75.1% of total water production in 2020 (Planning Institute of Jamaica, 2021). The National Water Sector Policy and Implementation Plan (2019) refers to the establishment of a Special Capital Improvement Fund to finance capital works which are estimated to be US$3.4 Billion up to 2030. A fixed-rate of 4% could be charged to monthly customer bills to facilitate improvements in infrastructure and efficiencies. Based on detailed assessments and maximising the return on investment, the improvement fund could be combined with funding from private partnerships and grants to produce the most impactful results for water conservation. To promote accountability and manage expectations, periodic updates can be provided to customers and other stakeholders on the progress towards network improvements.

Currently, The NWC imposes water restrictions during drought periods to reduce the rate of water consumption across its network. Some of the restricted activities have included watering gardens, refilling swimming pools and washing pavements. These offences were punishable by a fine imposed by the court after conviction or imprisonment for up to 30 days for failing to pay the fine. Strategies that could improve the effectiveness of the current restrictions during drought periods include the establishment of more enforcement mechanisms and increasing the fines for violations. Public education is crucial to inform individuals of good water conservation practices and the bad practices which could potentially attract a fine. As part of the public education campaign, actively accepting reports of violations from citizens through dedicated communication lines such as by telephone and social media, the water restrictions can be better enforced. Public education combined with, fines for violating water restrictions can lead to positive behavioural changes and the adoption of more sustainable water use practices in the long-term.

Economic Incentives for Water Conservation in Jamaica

4.0 THE ROLE OF ECONOMIC INCENTIVES IN IWRM

According to the Global Water Partnership (2017), economic instruments are one way to change the behaviour of water users towards more sustainable practices to achieve water security. Economic incentives are one of the many economic instruments that form part of the management instruments used to implement IWRM. The process of IWRM needs to be mainstreamed into all national development plans and the country's fiscal budget so that incentives can be prioritised and expanded. Economic incentives can be a powerful tool for improving water governance; however, they must be flexible, agile and consider the perspective of different domains to achieve the best outcome. The incentives highlighted in Section 3 can be implemented at different scales based on the enabling environment, institutional arrangements and participation level and the amount of financing available for IWRM implementation in Jamaica.

Negative economic incentives such as fines generate revenue which can be used to finance projects and initiatives to drive the implementation of IWRM. Primarily, revenues can be reinvested in initiatives that reward users for water conservation. Alternatively, revenues can support monitoring and evaluation activities to support the tracking of IWRM implementation. Revenues can also be used to finance stakeholder engagement and research and development of new policies. Economic instruments work best when combined with other supporting tools and measures of water governance such as monitoring, regulation and enforcement of public health and environmental standards (Global Water Partnership, 2017). To successfully support water conservation, economic incentives should form part of a holistic programme with a focus on other aspects such as public education and monitoring and evaluation.

Conclusion

Water conservation practices have a pivotal role to play in the management of the use of water resources. Economic incentives can spur the growth and widespread adoption of sustainable water conservation practices across Jamaica. With water security becoming a growing concern, water conservation needs to be at the forefront of managing water resources. The use of positive incentives such as grants, subsidies, rebates and low-interest loans and negative incentives such as infrastructure improvement charges and fines can promote engineering and behavioural water conservation practices. When combined with other supporting tools and measures in a holistic, well-designed programme, these incentives can play an essential role in the implementation of IWRM in Jamaica and in protecting the water resources for all.

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KEISHA-ANN BELLE

WATER SCARCITY IN THE 21ST CENTURY CARIBBEAN

The Caribbean is one of the American regions bordered by the Caribbean Sea and North Atlantic Ocean. It is approximately 1,063,000 square miles in extent. The Caribbean is a diverse region because of its cultural, linguistic; and ethnic diversity. The region has significant economic potential despite its limited natural resources. However, one common feature of the Caribbean is that the countries of the region are extremely vulnerable to natural disasters and the effects of climate change. Natural and climatic disasters have impeded economic development in the Caribbean. In 2004, Hurricane Ivan caused more than US$360 million worth of damage to property and infrastructure in Jamaica alone. Like many other Small Island Developing States (SIDS) with limited natural resources, the Caribbean region has experienced its own difficulty in providing sufficient high-quality potable water to satisfy its growing demands. Water scarcity is a threat to basic human rights water like any natural resource is critical for economic and social development. "Water security is an integral part of human security and central to the achievement of other rights such as the right to life, to education, to health, and adequate housing" (Cashman, 2013). Additionally, the region is quite vulnerable to natural disasters such as hurricanes and flooding which have increased stress on their water resources. Also, ageing infrastructure, changes in demographics, pollution, high levels of unaccounted water and unreliable service provision are some of the factors affecting water scarcity in the Caribbean.

In this paper, we will be talking about the issue of water scarcity in the Caribbean, more specifically in Barbados and the factors affecting the management of this natural resource as well as solutions that can be implemented considering the impacts of climate change.

Approximately two (2) billion people around the world are living in water-stressed countries: seven are from the Caribbean. "The Caribbean accounts for seven of the world's top 36 water-stressed countries, with Barbados in the top ten. "Antigua and Barbuda, St. Vincent and the Grenadines, and St. Kitts and Nevis are all classified as water-scarce, which the UN defines as countries with less than 1000 cubic meters per capita of renewable water resources per year. Barbados' situation, with only 350 cubic meters per capita is especially grave" (Eco Watch, 2021). The situation is further exacerbated in Barbados, where

recent research has shown that groundwater recharge is restricted to the three wettest months of the year, and only 15-30 % of annual rainfall reaches the aquifer. The Barbados Water Authority (BWA)- the state agency in charge of the water management and distribution in Barbados obtains its water supply from twenty (20) groundwater wells, two (2) springs and one (1) privately owned reverse osmosis desalination plant. The water distribution network consists of approximately three thousand two hundred kilometers (3200) of water mains, thirty (30) reservoirs located both under and above ground and seventeen (17) re-pumping stations. In Barbados, the agriculture and domestic sectors are the largest consumers of water, with the tourism sectors being responsible for the growing consumption of water nationally. “In 2011 some 17.6 million tourists went to the Caribbean on holiday, with an average stay of 7–10 days. Tourism and tourist facilities are large consumers of water, with visitors often consume at least three times as much as the local population. While in some instances hotels are responsible for their supplies, many are supplied from municipal distribution systems, and they can account for between 10–15 per cent of all water supplied” (Cashman,2013).

The demographics can also influence water scarcity in most of the Caribbean countries. “According to UN data, the Caribbean population has more than doubled from 17 million in 1950 to 41 million in 2010. However, as a general rule, water distribution infrastructure in the 19th and 20th centuries did not anticipate this growth. This has led to many cases of water stress and scarcity, particularly in Barbados.

The high levels of unaccounted water resources reported across the Caribbean have compounded the issue of water scarcity in the region where countries like Jamaica, Barbados and Trinidad and Tobago have reported 67%, 50%, and 40% of unaccounted water, respectively. The Global Water Partnership (2014) states, “The paradox is that many of these countries have sufficient water resources to meet demand, but do not have the infrastructure or institutional frameworks to close the supply-demand gap”. High levels of accounted water in Barbados are attributed to the under-reading by domestic meters and bulk production (by 50% and 15% respectively), also bursts and leakage (40%). The maintenance of water infrastructure has not been prioritized which has contributed to the increasing percentage of unaccounted water, therefore, exacerbating the water scarcity issue in Barbados. “Many Caribbean countries (including Barbados) have ageing water infrastructure and focus on the maintenance of supply to customers. In Barbados, some of the country’s water pipes date back over 150 years. As a result, the water network experiences frequent leaks and the Barbados Water Authority tries to “manage a balancing act of keeping water pressure high enough to reach far-flung households, but not so high that it causes more ruptures in ancient pipes” (Green Climate Fund. Investment in mains replacement, as well as leakage management, has not received the attention it deserves. This is partly due to water resource scarcity being something of a ghost issue (meaning that people hear about the issue but do not believe that it exists), with management efforts being focused on ensuring new developments are serviced, siphoning off investment in water loss, and prevention measures” (Cashman,2013).
Barbados, which has been classified as water-scarce being among the top

twenty water-scarce in the world would benefit greatly from using Integrated Water Resource Management (IWRM). But due to the topography, a source to sea approach should be considered when implementing IWRM. “Islands in the Caribbean region have a “close interconnection between land and sea and the role of water as the medium of connection between them… [therefore] the use and management of land and water resources…integrated water resources management must adopt a ‘source to sea’ approach as an integrating framework” (Global Water Partnership,2014)

However, the implementation of IWRM as a solution has not been greatly explored. “The institutional arrangement in the water sector has not changed significantly since the 1980s. An attempt was made in 1997 to develop a National Water Resource and Development Policy, which was taken to the Cabinet in 2000 but was shelved. In 2008 an IWRM road map was formulated but despite widespread national consultation and stakeholder buy-in it was possible to get the responsible minster to accept it” (Cashman,2017)

Halliday said climate change has already “significantly impacted” Barbados’ water supply, too. All of Barbados’ internal renewable water resources come from rainfall, he explained, and in 2019 the country saw its lowest recorded levels since 1947” (EcoWatch,2021). Climate change affects water resources through sea-level rise, increased temperatures and changes in precipitation patterns which results in flooding and droughts. Climate also causes an increase in the frequency and intensity of storms such as tropical storms and hurricanes.

For many small island states, the prospect of saline intrusion into the freshwater lens would be a matter of great concern. In many of these islands where salinization from over-pumping of aquifers is already occurring (e.g., The Bahamas and Barbados), sea-level rise would compound the risk. In some cases, higher salinity would be experienced not only in coastal aquifers but also inland at freshwater pumping plants as the salty groundwater rises.

The increased occurrence of droughts will have adverse effects on the sectors with “serious economic and social consequences. This is particularly important since the majority of the Caribbean Agriculture. With irrigation use becoming more widespread in the Caribbean, countries’ freshwater supply will become increasingly important” (FAO,2016).

According to the Food and Agriculture Organization Regional Office for Latin America and the Caribbean (FAO) (2016) “Between 1970 and 2000, the Caribbean region suffered direct and indirect losses estimated between US$700 million and US$3.3 billion due to natural disasters associated with weather and climate events”.

Since the issue of water scarcity in Barbados was identified and analyzed, some deductions were made to ameliorate the problem. Barbados has installed measures to combat water scarcity like laws to prohibit the use of water for purposes such as washing cars, gardening, filling swimming pools, etc. For example, in 2016 the BWA implemented a three-month water ban to prohibit the use of water for the above mentioned. These laws also required

the Barbadian public domestic tanks to be connected to their water supply and sewerage system. Some critics believed that Barbados would visit the option of rainwater harvesting to reduce the stress on water resources. “As a “water-scarce” country, Barbados must revisit the use of rainwater harvesting to produce water for non-potable uses, as a means of reducing the stress on the public water supply. The wide acceptance and practice of rainwater harvesting will require a substantial public information and education programme, and fiscal incentives to encourage the homeowner and commercial sector to embrace the concept” (Hutchinson, 2010). Governments and authorities are actively seeking investment to fix the problems attributed to water scarcity in Barbados. There is a financial investment in infrastructure such as production wells, water treatment works, pumping installations, leakage reduction and water main replacement. Financing agencies like the Caribbean Development Bank and Green Climate Fund are critical to creating projects that would solve the water insecurity issue and implementing sustainable water resource management practices. For example, the Barbados Water Authority has embarked on a project funded by the Caribbean Development Bank: Water Supply Upgrade Network Project (WatSNUP). This project which started in 2016 seeks to mitigate the challenges experienced by the Barbados Water Authority and will address issues pertaining to failing infrastructure, inefficiency in operations and frequency of water outages experienced throughout the island.

However, all hope is not lost in the action of water resource management to combat water scarcity in Barbados and the wider Caribbean region. The Barbados Water Authority is currently conducting various projects to increase water availability as well as water resilience to climate change. One project is- The Water Sustainability Resilience Nexus for Sustainability in Barbados in collaboration with the Caribbean Community Climate Change Centre funded by the Green Climate Fund. This project aims to improve resilience to storm events and BWA’s carbon footprint reduced; expanding adaptation and mitigation initiatives through a Revolving Fund, building resilience to climate change and disruptions in water supply, creating capacity building and public awareness, include initiatives to enhance public-private partnerships (PPP), reduce water consumption, create/update legislations to support climate-smart development and water sector resilience. Some activities include the installation of photovoltaic renewable energy systems, replacing deflective mains, and installation of potable water storage systems at homes and public institutions. The completion of this project is expected to be in 2023. The Caribbean region may be affected by many problems surrounding the consumption and protection of our water resources. But with action from not only governmental agencies, but NGOs, academia, and the public, we can achieve our goal of water for all.

Water Scarcity In The 21st Century Caribbean

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NATALEE HUTCHINGS
WATER RESOURCES AUTHORITY JAMAICA

THE SCARE OF WATER SCARCITY IN JAMAICA

Main Issues and Solutions

INTRODUCTION

Water scarcity is a [deficit] in availability [of water] due to physical shortage, or [limitation] in access [due] to the failure of institutions to ensure a regular supply, or due to a lack of adequate infrastructure [1]. Small Island Developing States (SIDS) are particularly vulnerable to increased stresses on their water resources as a result of limitations [2] which have the potential to lead to water scarcity. In the Caribbean, the urgent need to address water scarcity was identified for ensuring long-term water security [3], [4] and to mitigate against the impacts. Jamaica, a SIDS located in the Caribbean is working to meet the Sustainable Development Goals (SDGs) by the year 2030. Particularly, the SDG 6.4: "to address and substantially reduce suffering from water scarcity…" [5] poses a rising challenge. In Jamaica, total water demand for the island is 816 Mm3/year. The current total exploitable resource is 5,818.82 Mm3/year, and the total allocated volume on a national level is 1,354.49 Mm3/year; leaving approximately 4,464.33 Mm3/year available for use [6]. This shows that there are adequate resources to satisfy demands, however Jamaica's water resources are unevenly distributed [6] due to inadequate storage and distribution systems.

Unfortunately however, Jamaica's water resources are projected to decrease; with gradual reductions to 4,619.40 Mm3/year by 2025, then to 3,846.65 Mm3/year by 2030 and to 2,017.93 Mm3/year by 2050 [6]. One significant cause is as a result of rapid urbanization and population growth. Demands for water in some sections of Jamaica exceed the local water availability and the projected decreases in supply could result in a natural disaster [7] as a product of impending water scarcity. The greatest risk for scarcity in water supply is for the Kingston Metropolitan Area (KMA) in the Kingston Hydrologic Basin which have projected deficits at -2.3 Mm3/year by 2025 [8] due to over-exploitation and contamination. Undoubtedly for this country that is called "the Land of Wood and Water", the scare of water scarcity is highly apparent; and therefore at a great risk for water insecurity..

CURRENT AND ONGOING ISSUES THAT MAY LEAD TO WATER SCARCITY IN JAMAICA

Population Growth and Rapid Development

Population growth is happening in cities and the world is gradually urbanizing, accelerating sustainable development and water management challenges, particularly in developing countries [9]. The gaps between population distribution and water resource availability are also evident as urban sprawl continues at an increasing rate in areas with over-exploited resources [10] for example the KMA in Jamaica. Jamaica's population is approximately 2.7 million [11], [12]. The major urban centre, the KMA, has a population of over 937,000 [13]. With population growth at a rate of 0.26% per year [14], increased water demand as a result will exacerbate existing shortages and increase risk of water scarcity if public water supply efficiencies are not significantly improved and managed [15]. Water demand and population growth are correlated [4], therefore as population increases, so does demand, and so does the risk for water scarcity.

Aging Infrastructure and Non-Revenue Water Loss

Non-Revenue Water (NRW) is water that was produced (collected, treated and supplied) but is lost (due to aging infrastructure or stolen), and can be detrimental to the financial viability of water utilities (earns no revenue) and to the quality of the water itself [16], [17]. In developing countries, approximately 45m3 of water is lost daily with an economic value exceeding US$3 billion per year, and a global estimate of physical water losses at 32 billion m3/year; half of which occurs in developing countries such as Jamaica [18]. There are pipeline leaks which contribute to the continuous loss of over 3,785.41 m3/day of water in Jamaica [19]. In the KMA, prevalent illegal connections are major issues affecting water supply and delivery [20]. 53% or approximately 108,000 m3 of the water produced for the KMA daily is either stolen or wasted through leaks [16], and is approximately 65% for the country in general [17]. If water losses in developing countries could be halved, the saved water might sufficiently supply around 90 million people [18]. NRW loss in Jamaica remains a major problem and is a significant contribution to possible water scarcity.

Water Quality Issues

In general, Jamaica's freshwater resources are considered to be of high quality [21], however, contamination and pollution of some aquifers creates unavailability of water for usage. The Liguanea Aquifer in the Kingston Hydrologic Basin has a relatively low water allocated volume (30.1 Mm3/year), however there are long standing water quality issues [22]. This Basin (where the KMA is located), is home to 40% of the population but only accounts for 1.5% of allocated water due to unusable groundwater resources as a result of saline intrusion, and nitrate pollution and contamination of the underlying aquifer. This puts a strain on available water resources with the consequence of water shortages especially during drought periods [10], and creates increased risk for water scarcity.

Insufficient Storage

Water scarcity is as a result of water demand outweighing supply; and can be influenced by the capabilities (or lack thereof) of infrastructure [4] for storage and distribution. One major problem is the siltation of the Mona Reservoir in Jamaica, which has decreased its capacity (3.675 Mm3) for storage by as much as 22% [10]. caused by soil erosion due to the karst topography and agricultural practices [7]. An auxiliary storage however exists at the Hermitage Dam in Kingston with a 1.789 Mm3 capacity [10]. Siltation and sediment built-up are major contributors to reduction in storage capacity. Nevertheless, these storage facilities are seldom at capacity as there is a general reduction in flows from less rainfall due to longer drought periods as a result of climate change. With ongoing decrease in storage capacity of Jamaica's largest storage systems, the risk of water scarcity increases.

Climate Variability and Change

There is an expected 40% global water scarcity attributable to the current climate situation [23] and a growing water stress due to increased water demand and use in the Caribbean. Climate projections indicate decreases in average annual rainfall by 4.8% to 7.2% by 2050 for Jamaica [12]. As the negative effects of climate change (adversely affecting Jamaica since 2010) [24], unpredictable rainfall patterns and the risk of extended drought conditions continue, water availability and supply in Jamaica is expected to be severely affected; especially if they lack resilience and the capacity to mitigate and adapt. This may lead to impacts on resource sustainability, and a rising potential for conflicts among users.

Caribbean islands which depend on groundwater as the primary source to meet demands will be severely impacted by effects of climate change [25]. Rising temperatures, increased evaporation, reduced rainfall and increased drought are stressors which affect replenishment of groundwater sources, recharge, and quality [12]. Groundwater supplies 85% of the Jamaica's water demands [17] which represents 84% of available exploitable water [12]. In addition, there is a lack of enough relevant infrastructure to mitigate the effects of climate change, such as flooding or localized water shortages caused by events associated with climate change [17]. With all this, water scarcity is a likely outcome.

MANAGEMENT STRATEGIES AND SOLUTIONS FOR WATER SECURITY IN JAMAICA

Integrated Water Resources Management (IWRM)

One practical step is for countries to develop clear water policies and regulations based on the principles of IWRM, as this approach offers a way to address issues of water scarcity and security [4]. While this involves addressing water scarcity issues, there is a long way to go and Caribbean governments are struggling to mainstream IWRM [2] including in Jamaica. One of Jamaica's main strategic objectives is for increased resilience to climate change by the year 2030 [26]. However, to prevent negative outcomes from possible water scarcity, the Government of Jamaica has developed a Water Sector Policy and Implementation Plan in alignment with the Vision 2030 development goals for Jamaica. The first three principles and goals of this Policy include Sustainability, Efficiency and IWRM [17]; with emphasis on plans to improve the efficiency and sustainability of water use via IWRM principles.

The Scare of Water Scarcity in Jamaica

Improve Water Use, Supply and Energy Efficiency

Water conservation and improving water use efficiency are the most effective and sustainable solutions to address water scarcity [27] as well as NRW leak-detection, repairs and increased storage capacities [28]. Notably, water use efficiency by itself cannot completely resolve the problem of water shortages,. but by Iimproving the productivity with which energy is used to supply water [29] will improve and may provide long-lasting and sustainable success for water supplying initiatives.

When supply cannot meet demand, this can be alleviated by introducing measures to decrease demand [10]. In Jamaica, water availability is more prevalent in the north, while there are limited resources to meet demands of the growing KMA in the southeast and agricultural-focused lands in the mid-south and southwest. Thus, water security can be realized through sustainable economic development [4], where the social and economic development of other parishes is planned for implementation with focus on sustainable water demand management in order to reduce future water stress on other areas. Jamaica's IWRM plans include a demand management plan as a management instrument and public education [17]. Also, a combination of mains replacement, installation of solid state water metres and other technical and commercial interventions are being undertaken to address NRW loss in the island [30]. Additionally, there is the exploration of opportunities for the reuse of wastewater for irrigation purposes, especially for high water demand crops, however within the bounds of sanitation, quality control and management, along with published guidelines and the requisite professionals for the management of these requirements in Jamaica [17]. Notably, tThe Aquifer Protected Zone in St. Catherine and the KSAC tertiary boundary in Kingston were designed as measures to remediate groundwater contamination in the respective hydrologic basins and underlying aquifers.

Increase Water Storage Capacity

The irony is that Jamaica has sufficient water resources to meet demands, but lacks the necessary infrastructure or institutional frameworks to close the supply-demand gap [2]. It is possible that improvements in water storage capabilities can shift water availability across time and space [10], and reverse the projected scare of water scarcity for Jamaica. Storage therefore has multiple purposes and plays an important role in ensuring water availability, providing multiple benefits such as: balancing variability in precipitation, ensuring availability to meet demands, mitigating vulnerability to floods and drought, and mitigating against scarcity.

Populations can range up to 3 million in Jamaica [2] and is projected to increase. Therefore, to reduce the stress on the current water availability, and ensure availability for the projected increased demands from increased population, there needs to be additional storage and sources of supply.

Areas with projected increases in rainfall may become more important as catchment areas for construction of additional reservoirs. Construction of individual storage systems are recommended to mitigate against local water shortages.

Jamaica has installed and currently monitors the Managed Aquifer Recharge station in St. Catherine which includes facilities designed to increase the groundwater potential in the limestone aquifer, by treating and discharging surplus surface water into sinkholes and wells [17]. This measure also plays its part in increasing groundwater storage capacity and potentially reducing saltwater intrusion and other groundwater contamination.
There is also movement towards implementation of a National Water Supply Plan to facilitate the north to south transfer of water [17].

Augment Supply via Water Transfers
The transfer of surplus water resources is an alternative and practical strategy to augment resources or to meet demands in vulnerable/stressed areas [31]. In Jamaica, ongoing efforts to curtail water supply deficits, over-exploitation and demands include the transmission of water from both St. Thomas [32], and St. Catherine [19], [33] to augment water supply in the KMA. Even though approximately 27.21 Mm3/year of water was transferred initially [34] and was sufficient for the demand then, population and water demand projections indicate that more water will be needed with sound strategic planning to meet projected demands, promote water security and mitigate against scarcity.
The Jamaica Water Supply Improvement Project has identified areas of need (as well as areas with surplus) and the strategic initiatives to be undertaken to satisfy those unmet needs in quick and efficient ways [35], such as via water transfers. Since projected water supply shortages, deficits and demands are major concerns, it is vital that efforts be made to develop strategies which would immediately militate against a deficit in supply and prevent scarcity. Augmentation of supply through water transfers from the north (where resources are in abundance) to the south, may prove to be a relatively swift solution [36].

Rainwater Harvesting (RWH)
For additional water augmentation, including RWH is one of the most appropriate solutions to increase water supply as the technologies are simple to install and operate, locals can be easily trained to implement them, and construction materials are also readily available [37]. Whilst recognising that RWH has a role, the motivation for its promotion and adoption is that it can be a means of increasing resilience in the face of extreme events that disrupt utility water supplies and address issues of water security, and prevent growing concerns over climate change and water scarcity [10]. Recently, the Government of Jamaica announced strategies to renovate catchment tank systems and to install additional RWH systems at schools [10], and in areas with the greatest vulnerability to water scarcity. Work is being undertaken under the Rural Water Upgrading and Repairs Project and the RWH and Catchment Tank Rehabilitation Programme to upgrade, rehabilitate and repair minor water supply systems and catchment tanks in several rural communities [30] in Jamaica.

Conclusion

Regardless that Jamaica has enough water resources to meet the current population demand, the resources are unevenly distributed and some are contaminated. Adding to this are other factors such as: increasing population growth, rapid urbanization, increasing water demand, aging infrastructure, non-revenue water loss, insufficient storage and negative effects of climate variability and change.

These factors all contribute towards a high risk for vulnerable areas in Jamaica to experience water scarcity if the challenges are not strategically managed. Some ongoing and suggested management strategies include: IWRM, improved supply and use efficiency, increased storage, augmentation of water supplies via water transfers and rainwater harvesting. These management strategies are just some of the solutions to the potential and high risk of water scarcity and insecurity in Jamaica. They also place Jamaica on track towards achieving the SDGs by the year 2030.

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The Scare of Water Scarcity in Jamaica

TAWAKIE RICHARDS

THE USE OF ECONOMIC INCENTIVES THAT WOULD PROMOTE WATER CONSERVATION IN ST. VINCENT AND THE GRENADINES

One of the basic necessities for every living thing is Water. Water is an invaluable natural resource for survival and covers 71% of this Earth's surface. That is to say, it is the main constituent of planet Earth. Moreover, 97% of Earth's water is found in the oceans, 3% of the earth's water is fresh and 2.5% of that fresh water is unavailable due to being locked up in glaciers, polar ice caps, the atmosphere, and soil; which is highly polluted; or that lies too far under the earth's surface to be extracted at an affordable cost. Therefore, 0.5% is available freshwater (Bureau & Basin of Reclamation, 2020). Thus, fresh, clean water is limited in nature and water conservation is of paramount importance.

Conservation of water usually refers to the prevention, control, development and management of water as a resource. Conservation to some people means conserving water behind the dam.

The use of economic incentives that would promote water conservation in St. Vincent and the Grenadines

Others see conservation as any reduction in the human consumption of water. Water efficiency as conservation has two components. The first component being in the short term and the next component being in the long term.

Short term conservation has often been thought of solely as drought management, but it also needs to include ongoing efficiency which means planning the financing not only for water efficiency, but also water infrastructure (Alliance for Water Efficiency, 2019). Financial planning also needs to include efficiency pricing, which is where the rate tells customers the value of the water; this can be high or too low.

This article focuses on the component of long term conservation. Long-term conservation methods include: planning for water use efficiency as a water resource investment option; designing, funding and implementing water efficiency use programmes; and thinking of water use efficiency as an information good, where it includes public information products and standards as information goods. Precisely, this article focuses on economic incentives; including the aforementioned long term conservation methods, that will promote water conservation in Saint Vincent and the Grenadines.

According to The Alliance for Water Efficiency and California Water Efficiency Partnership (n.d.), understanding the flow of economic logic is key. In the flow of economic logic, water systems are designed, it takes costs to implement them and they have to be paid for through water rate charges which in turn, have an effect on customer demand. Thus, municipal retrofitting can act as an economic incentive to promote water conservation, as fixing easily corrected household leaks can save homeowners about 10 percent on their water bills. This will especially benefit poorer families, who cannot afford the tools and hardware that will pay for themselves in water savings. In essence, municipal retrofitting occurs when people have faucets, pipes etc. inspected and replaced. Checking faucets and pipes for leaks is important because even a small drip can waste 50 or more gallons of water a day. Moreover, leaks waste water 24 hours a day, seven days a week. Thus, The Central Water and Sewerage Authority (CWSA) could go around the municipalities to inspect and replace those leaky faucets and pipes (on public not private systems).

Funding and implementing water efficiency use programmes can be designed to include, develop or promote economic incentives that will promote water conservation in Saint Vincent and the Grenadines. The Central Water and Sewerage Authority (CWSA) can partner with internet service providers Flow and/or Digicel to launch a biannual water conservation challenge initiative. This initiative can reward customers with $30.00 credit or more, if there is 10% reduction in their water consumption. In this initiative, intangible benefits should outweigh the cost. These benefits should include customer satisfaction, and productivity, improved company perception as well as conserve millions of gallons of water.

Thinking of water use efficiency knowledge products as an information good including public information standards can also promote water conservation in Saint Vincent and the Grenadines. CWSA can educate the public and students at the St.Vincent and the Grenadines Community College (SVGCC) by engaging in educational seminars with students about water conservation. Moreover, they can partner with supermarkets and stores across the capital city of Kingstown to provide vouchers and gift cards to seminar attendees. Moreover, after being educated about water conservation, seminar attendees can obtain a tuition discount and certificate from the college. However, they will still receive vouchers and gift cards even if they are not interested in obtaining the certificate from attending the seminars.

In conclusion, water conservation aids in supplying more water for longer usage. This has become a necessity as this natural resource reduces along with an increasing population and its usages. Hence, when considering economic incentives to promote water conservation in Saint Vincent and the Grenadines, the long-term conservation component must be the focus. The long-term conservation methods should be planning for water use efficiency as a water resource investment option. Furthermore, designing funding and implementing water efficiency use programmes; and thinking of water use efficiency as an information good should be taken into consideration.

MEET THE 2021 GWP-C WAY FACILITATORS

Dr. Gaius Eudoxie
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Senior Lecturer and Deputy Dean (Outreach and Internationalization) in the Faculty of Food and Agriculture of The University of the West Indies (UWI), St. Augustine Campus.

Carlinton Burrell
GWP-C WAY Facilitator on Business Development and Entrepreneurship Skills

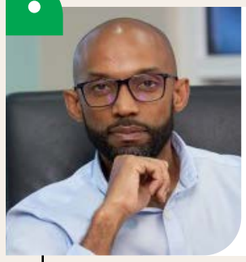
Chief Executive Officer (CEO) at the Caribbean Climate Innovation Centre (CCIC).

Dr. Adrian Cashman
GWP-C WAY Facilitator on Scientific Writin

A Water Resources Management Expert with over 35 years of experience in the water sector & GWP-C and GWP Technical Committee Member.

Dr. Monica Morrison
GWP-C WAY Facilitator on Storytelling in Water

Storytelling, Knowledge Management and Communications Expert.



Lorenzo Hodges
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Innovation Strategist

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Project Development Specialist at the Caribbean Community Climate Change Centre (CCCCC).

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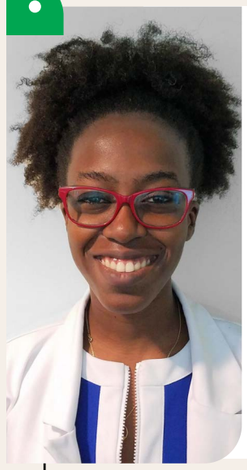
SHORT TESTIMONIALS FROM SOME 2021 GWP-C WAY COHORT MEMBERS



Jheuel Carter-Guy
Country: Trinidad and Tobago

“My greatest takeaway came from the final assignment when we had the opportunity to develop an actual proposal. We were advised to pay closer attention to our budget and make realistic estimates based on concrete research. In light of the subsequent research, our limited budget highlighted the importance of financing for IWRM projects. In coming up with creative mitigation strategies for this, I also learned the value of networking and in-kind support. It was a great opportunity to reinforce and build upon my IWRM knowledge, as well as network with established and upcoming water professionals.”

Salina Mohammed
Country: Trinidad and Tobago

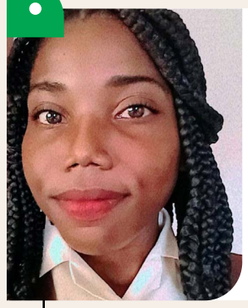
“GWP-C WAY was a great introduction to IWRM in the Caribbean with cross-cutting skills and knowledge taught. It was also a great opportunity to network with other like-minded youth, determined to make positive changes for our future. My greatest takeaway was the friends made along the way, while building our capacity for a better future.”

Oclaya Verwey
Country: Suriname

“It’s an honour to have participated in the first cohort of GWP-C WAY. To have discussions about water challenges in the region, once again proved that no water challenge is unique and that we can learn from and apply best practices from the region to reach a better water management sector. Most importantly is that is doesn’t stop at the training but I got the opportunity to continue as Suriname’s Youth Country Focal Point for GWP-C to carry on working on better water resources management.”

Latoyaa Roberts-Thomas
Country: Trinidad and Tobago

“I appreciated the opportunity to learn and share with so many brilliant minds from around the region on water usage, conservation and sustainability. The lessons and materials covered by GWP-C WAY engaged participants in critical thinking and discussion, but also practical activities. I am glad that the Academy has empowered my knowledge but also advocacy.”



Tawakie Richards
Country: St. Vincent and the Grenadines

“In the GWP-C WAY, I learnt that water resources management in the Caribbean requires stakeholders from the Caribbean region coming together to reach a consensus. My knowledge-based connections expanded, which made my overall experience enjoyable.”

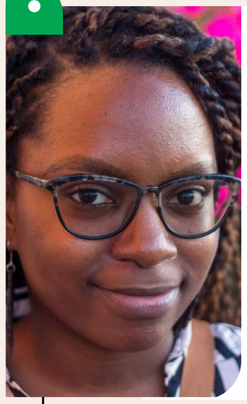
Nekelia Gregoire Carai
Country: Dominica

“Firstly, it was an honour to be chosen to be part of the first ever GWP-C WAY. The greatest takeaway for me is that, within a short space of time, I was able to receive guidance and develop skills in project proposal writing, which is a critical component for obtaining much needed finance to implement and improve integrated water resource management (IWRM) in the Caribbean Region. Overall, the GWP-C WAY was a great experience where essential skills were developed, old connections were rekindled and new ones made.”

SHORT TESTIMONIALS FROM SOME 2021 GWP-C WAY COHORT MEMBERS

Jevaughn Henry
Country: Jamaica

“The GWP-C WAY provided an excellent learning opportunity and most importantly, facilitated networking with professionals from across the Caribbean. I would strongly recommend all youth to participate in this, concise, but meaningful opportunity for growth and development.” “I entered the academy with very little knowledge of water resources management and left feeling educated enough to start making a difference.”



Amana Hosten
Country: Grenada

“My biggest learning experience in the GWP-C WAY was creating a water story. It challenged me to use the creative side of my brain to use a very technical document to craft a story that centres people in water resources management and that would engage my target audience.

At the end of this exercise, I am surprised to say that I enjoyed it.”

MEET THE GWP-C WAY IWRM AMBASSADORS

At the end of the GWP-C WAY, two (2) top alumni were voted amongst the Cohort as Integrated Water Resources Management (IWRM) Ambassadors and were each awarded a one (1) week internship at a GWP-C Partner. Meet the GWP-C WAY IWRM Ambassadors:

Jheuel Carter-Guy
Country: Trinidad and Tobago

Jheuel sees herself as both a steward of the environment and an advocate for communities. She has always been fascinated by the interconnectedness and interdependence of ecological and human systems, which made sustainable development a natural fit. She has volunteered with the Caribbean Youth Environment Network (CYEN). While at the University of South Florida, she became heavily involved in the Student Environmental Association (SEA). As president of the SEA, she spearheaded a campus-wide recycling awareness campaign which sought to empower fellow students to take action on recycling and composting through a month of workshops and activities. Since returning to Trinidad, she has represented the Ministry of Tourism at several conferences and committees, often as the youngest and most vocal participant, seeking to advocate for sustainable development initiatives.

Geasean Johnson
Country: Jamaica

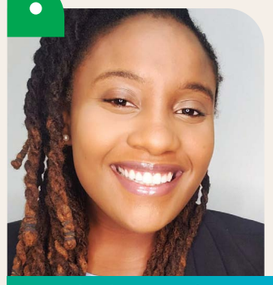
Geasean is passionate about climate action and understanding the social impacts of climate change. His most important role as a youth leader to date, is through the Jamaica Climate Change Youth Council. He is a sub-committee leader in Research, Policy and Advocacy and has been leading the charge in connecting the dots between climate impacts and homelessness in Jamaica. This has led him to engage with other like-minded youth to explore the inter-sectionalities of climate change and social impacts. In 2015, he was awarded a Chinese government scholarship to study within the field of environmental management and sustainable development. Six (6) years later, he is still committed to the cause.

GWP-C WAY STORY AWARD WINNERS

1st Place Winners

Joshua Prentice,
Khadija Stewart and
Dareem Jeffrey
Trinidad and Tobago

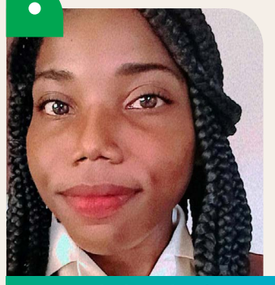
Story: “The Waterless Cries of Moruga”



2nd Place Winner

Sherlanna Ferret
Trinidad and Tobago

Story: “Community Flood – An Alternative Reality”



People’s Choice Award

Tawakie Richards
St. Vincent and the Grenadines

Story: “The New Normal: Another Day, Another Disaster!”

HONOURABLE MENTION AWARDEES

“Rainwater Harvesting – A Voice at Last”

by Salina Mohammed, Jheuel Carter-Guy and Akil Crichlow (Trinidad and Tobago)

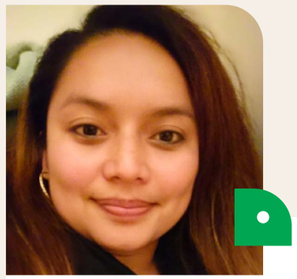
“Pressure Buss Pipe”

by Colis Allen (Guyana)

HONOURABLE MENTION AWARDEES

“Porey Springs into Action”

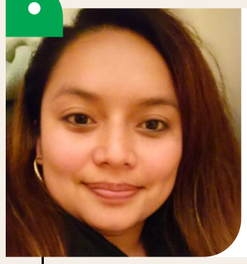
by Amina Desai, Keisha-Ann Belle and Adiel Charles (Barbados)



“Stopping the Flow”

by Minerva Gonzalez (Belize)

GWP-C WAY BEST CONCEPT NOTE



Minerva Gonzalez from Belize for her concept note titled “Identification of aquifers in Northern Belize for groundwater management.” She was awarded 4,000 Euros in seed funding to support the implementation of the project.

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Global Water Partnership Caribbean