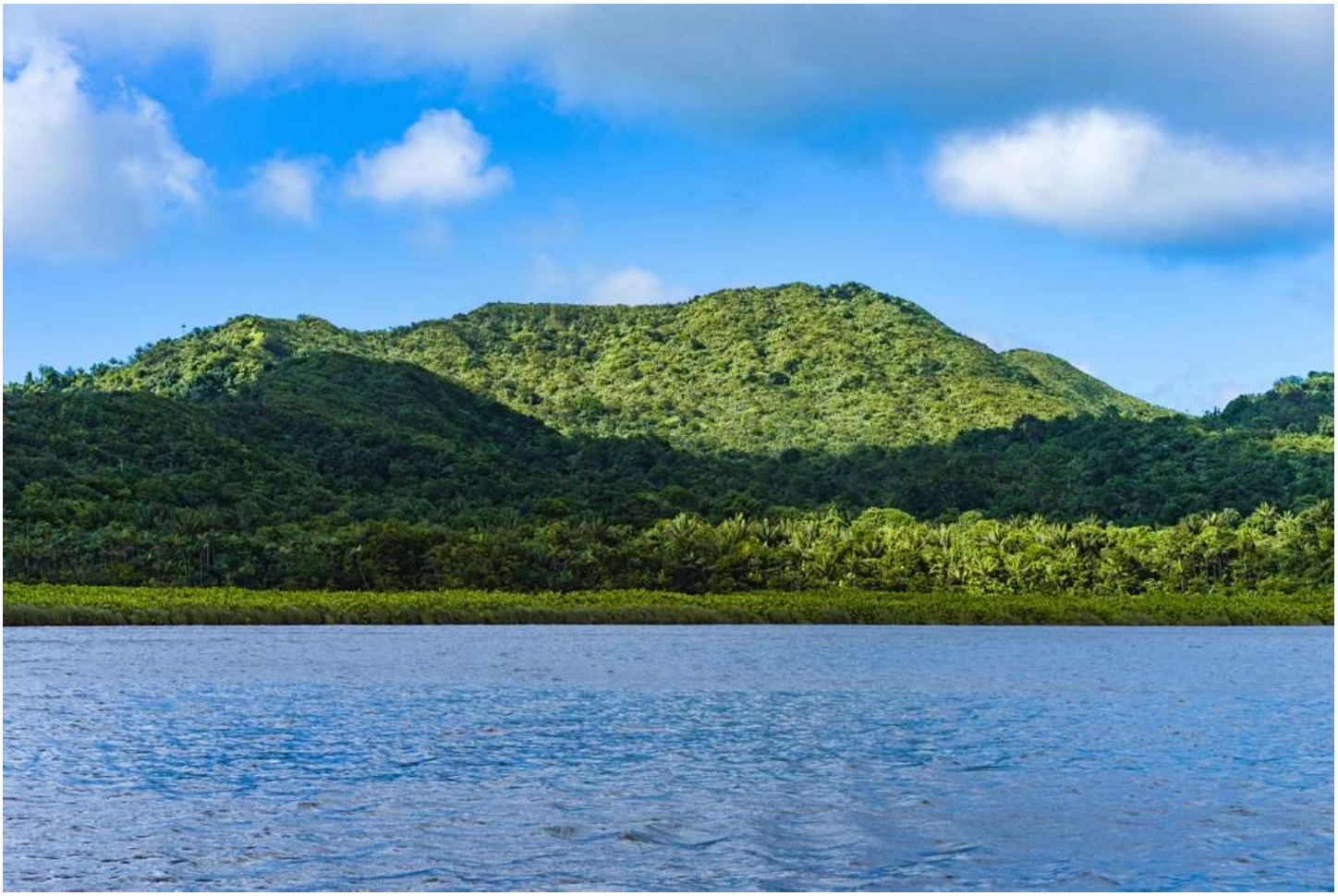

Quenching Grenada's Thirst for Development: Integrated Water Resources Management as Key Aspect of Economic Development

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[1] Climate-Resilient Water Sector in Grenada (G-CREWS)

Key Messages

- Grenada's economic development is based on two sectors which are heavily reliant on water: tourism and agriculture.
- Grenada's water supply relies on surface water which is at risk due to reduced precipitation, increasing temperatures, and saltwater intrusion in aquifers (climatic reasons) but also due to a lack of reservoir infrastructure to supply its growing population and tourism industry.
- Grenada's aging infrastructure has not seen adequate investments in improvements over the years. This is leading to increasing water losses in the system through leaking pipes. Non-revenue water perpetuates a vicious cycle in which the lack of revenue causes less finance available for investments and therefore more incidents of water losses.

- The Climate Resilient Water Sector in Grenada project (G-CREWS) was developed to avoid critical climate-induced water shortages in the future and to increase systemic climate change resilience in Grenada's water sector.
- An Integrated Water Resources Management (IWRM) approach is key to addressing the numerous challenges facing the water sector, including policy and regulations, infrastructure and tariffs, public awareness, and incentives.

Introduction

Grenada is a small island nation of the Caribbean region with a population of 124,000 inhabitants according to its 2021 census and a GDP of US$ 1.12 billion. The country faces significant challenges in ensuring water security for its economic development. The country's reliance on water-intensive sectors such as tourism and agriculture, combined with the impacts of climate change and aging infrastructure, has highlighted the need for a comprehensive approach to water resources management. The Climate Resilient Water Sector in Grenada (G-CREWS) project aims to address these challenges and enhance water security through integrated water resources management. This case study examines the potential economic benefits of the G-CREWS project in Grenada.

Grenada's Current Economic Context

Grenada's traditional prominence of agriculture in its economy has been replaced in recent years by the tourism industry. Today, tourism plays an important role in Grenada's economy. Since 2018, Grenada has attracted up to 0.5 million tourist arrivals each year pre-COVID, leading to an inbound tourism expenditure of about 46 percent of GDP from just 14 percent in 2013 (UNWTO, 2021). Services, including tourism and education (with the presence of a major American offshore university campus on island), form the largest economic sector with about an 80 percent share of GDP (UNCTAD, 2021). Important infrastructure investments and projects related to tourism have been recently reflected in the growth of the construction sector in Grenada. Today, agriculture represents only 5.8 percent of the country's GDP (UNCTAD, 2021).

Such a sharp growth in water-intensive industries such as tourism, education, and construction are placing considerable strain on Grenada's water resources and infrastructure in that they add temporary users to the country's demographic. For example, tourism plays a major role in water use as the number of annual visitors to the island surpasses the number of inhabitants by many folds.

The agriculture sector is already impacted by the changing climate. According to the IMF's 2022 economic country report, there was a sharp fall in agricultural production, largely due to adverse weather. The Government of Grenada in its 2022 economic report highlighted a fall of 57 percent of the cocoa production, one of Grenada's main export crops, and the Marketing and National Importing Board's (MNIB) purchases of other crops such as fresh fruits, vegetables, and root crops declined by 13.4 percent. This decline is reportedly due to low production caused by limited or low access to water (little to no rain).

Water scarcity, and the resulting decline of agriculture output, has serious implications for Grenada's trade balance as its main export products shrink and the country relies more intensely on importation of food items. At a time when the country could take advantage of an ongoing trend for

high quality cocoa, its cocoa production stumbles. The same applies to other highly sought-after crops such as nutmeg and soursop. This is directly impacting the farmers but also the country's trade balance and foreign exchange reserves. It also put in jeopardy Grenada's food security and the ability of its citizens, many of which are in low-income groups, to provide affordable, quality food for their families. Imported food prices have been impacted by increased transport costs and local food prices have also been impacted by the decline in yield.

Yet, the biggest macroeconomic impact of potable water scarcity could be the impact it will have on Grenada's growing tourism industry. A late bloomer in the region, Grenada's tourism industry grew from 40 percent of the country's foreign exchange earnings in 2000 to 88 percent in 2018 and from 21 percent of its GDP in 2000 to 56 percent in 2019 (World Bank, 2019). Yet, Grenada's tourism industry still has a lot of room for growth to reach the earning potential of its more developed neighbors Barbados and St Lucia.

With 25 percent of its population under 15 years old and 75 percent under 55 years old, Grenada's young and dynamic population is ready for economic growth and demanding it from the country's leadership. Hence, the country's economic development is at the heart of the government's priorities. Developers have already recognized that, and the construction industry is booming, with several new hotels being built. Although it is encouraging to see the country developing its potential and bringing opportunities for employment to the young population, this development is also under threat from limited and shrinking critical resources, water being one of them.

Challenges Facing the Water Sector

Grenada relies mostly on surface water sources for its drinking water supply. Many small rivers originate at the center of the island, which is a volcanic mountain ridge peaking at over 800 m and is covered with forest. Annual rainfall is high, from 1000 mm near the coast to over 4000 mm in the central mountains, but there is a very marked dry season from January to May. Water is supplied by the National Water and Sewerage Authority (NAWASA). NAWASA as a public institution in Grenada is by law the only provider of potable piped water. NAWASA operates 28 different water systems, of which 27 are located on the mainland Grenada, with one on the sister island of Carriacou. However, Grenada's aging infrastructure suffered throughout the years from a lack of investments in improvements. This is leading to increasing water losses in the system through leaking pipes; non-revenue water perpetuates a vicious cycle in which the lack of revenue causes less finance available for investments and therefore more incidents of water loss.

Climate change poses a severe threat to Grenada's water supply, since about 90 percent of Grenada's average daily production of 32,700 m^3/day is sourced from surface water intakes. While in the rainy season, the available water resources exceed the water demand, there is a considerable deficit in the dry season as the river catchments are too small to store enough water during the rainy season. Along with the increase in average temperature due to climate change, this deficit causes a serious current and potential threat as annual rainfall is projected to decrease by up to 21 percent, leading increasingly to droughts. Saltwater intrusion in coastal groundwater aquifers due to sea-level rise

will further limit the availability of water in the future. In addition, more frequent heavy rainfall events — predicted as another major impact of climate change — aggravate the problem of more frequent water supply outages due to high turbidity in the raw water supply.

Finally, more frequent catastrophic events such as hurricanes are predicted as climate change intensifies. Although the Caribbean chain of islands has been in the path of seasonal hurricanes and tropical storms historically, the small countries still need to build more resilience to these catastrophic events. This is due to a number of reasons, the main one being scarce access to finance to improve infrastructure in ways that would help it withstand devastating storms. When Category 4 Hurricane Ivan hit Grenada in 2004, not only was 80 percent of its housing stock either destroyed or seriously damaged, but the country's electricity was cut out for up to 6 months in some areas and up to 30 days for the water supply.

The damages from Hurricane Ivan in Grenada were estimated at US$ 900 million, or twice the GDP. The lack of critical utilities such as water and electricity meant that it took longer for Grenada and its citizens to get back on their feet. The damages to the water infrastructure alone was estimated at US$ 2.82 million — very significant in terms of the state-operated NAWASA, which had little or no insurance protection from natural disasters and has a small average revenue base.

Reducing Water-Related Economic Vulnerabilities with the G-CREWS Project

The Climate Resilient Water Sector in Grenada (G-CREWS) project was developed to avoid critical climate-induced water shortages in the future. As such, the main objective of the G-CREWS project is to increase systemic climate change resilience in Grenada's water sector. The project supports Grenada's water sector in using water resources more efficiently and in improving water availability using an integrated approach to water management. To reach its broad objectives, G-CREWS is jointly financed by the Green Climate Fund (GCF) and the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) under its International Climate Initiative (IKI), and the Government of Grenada. Over six years, the Government of Grenada, the Grenada Development Bank (GDB), and NAWASA, in partnership with the German Development Cooperation (GIZ), implemented the project with a total budget of €45.297 million. The project supports the water sector's comprehensive transformation on multiple levels, which represents a nationwide paradigm shift for Grenada's overall resilience. The project is articulated around five main components:

1. **Climate-Resilient Water Governance**. Previously, Grenada managed its water resources mainly through the national water utility, NAWASA. However, this simple approach, where the national water utility acted as the regulator, didn't allow for a comprehensive and transparent management of resources. This approach didn't consider national policies, involve various stakeholders, or centralize statistical data from these stakeholders.

   With the development and adoption of a Water Resources Management and Regulation Act paving the way to the set-up of a

Water Resource Management Unit (WRMU), Grenada will strengthen the overall water governance of the tri-island state and will set out the conditions for sustainable water resource management which follows the Integrated Water Resources Management (IWRM) approach.

This newly established WRMU, overseen by the Public Utilities Regulatory Commission (PURC), now holds the responsibility of managing Grenada's water resources holistically. This will be achieved by collaborating with stakeholders, businesses, and civil society, and by conducting awareness campaigns and public outreach. The overarching vision is of "[a] water secure Grenada in which stakeholders are treated equitably and fair." The WRMU is tasked with regulating water resources, ensuring their protection, facilitating information sharing, and responding to climate change. This approach will empower Grenada to have better oversight over water usage for both social and economic development. Other regulatory changes include the integration of rainwater harvesting into the building codes and the phasing out of water-inefficient sanitary ware.

2. **Climate-Resilient Water Users**. The Grenada Development Bank is implementing the Challenge Fund to assist farmers and hoteliers to integrate water saving measures into their daily businesses. Under the fund, selected farmers and hotels will receive grant finance to install water saving devices such as low-flow toilets and drip irrigation systems. In addition to reducing the general water consumption, these measures will also reduce operational costs for businesses. The project also integrates a large public awareness component to trigger a behavior shift in the general public about their use of water and water conservation measures. Through a coordinated communication and sensitization strategy involving community and school outreach, brochures, advertisements on multiple media channels, interviews and other outreach activities, the G-CREWS project is already seeing this shift happening.

   A 2023 mid-term Knowledge Attitudes and Practices (KAP) Survey revealed an uptake of water saving measures among Grenadians in their daily lives: taking short showers, turning off the water while brushing teeth, doing full loads of laundry, checking for leaks, as well as using rainwater to wash vehicles and cleaning the yard, to cite a few. The survey showed a positive progression of understanding the link between water usage and water bills as well as the added value of water saving devices. Citizens' understanding of the link between climate change and the water supply system was confirmed by 75 percent of the responders.

3. **Climate-Resilient Water Supply Systems**. The bulk of the project's finance is being used for infrastructure improvements and the supply of additional storage tanks to ensure that Grenada's water supply is stabilized even throughout increasing droughts or disaster. In addition to infrastructure investment, the project seeks to use better technology for system mapping, data collection, and reporting so that leaks can be detected, reported, located, and repaired faster.

4. **Additional Contributions of the Water Sector to Grenada's Climate Goals**. Under the G-CREWS project, NAWASA, aims to move towards a CO_2 neutral water utility by 2030 by reducing its electricity-based CO_2 emissions. This goal is to be fulfilled by implementing energy saving measures as well as integrating renewable energy throughout its operations. This will also support the financial viability of the water service structure by bringing the running costs down.

   In terms of energy management opportunities, the two main areas of savings consisted of replacing the utility's outdoor lights with solar LED lights and replacing the energy inefficient and high greenhouse gas potential AC units with modern inverter units. Together these measures were expected to save 2 percent of the utility's annual energy bill. Yet, the biggest impact on its CO_2 emissions will be achieved through producing renewable energy from and for its own water production. The utility plans to utilize its land and roof space to install PV (solar) panels which in turn will power the water pumps used to send water uphill to reservoirs and storage tanks. The utility is also exploring the potential to install micro power turbines which act both as hydropower generating units and pressure reducing valves on its gravity-fed pipes network.

5. **Regional Learning and Replication**. The project supports Grenada in becoming a regional frontrunner for climate-resilient water management. The creation of a regional community of practice, which brings together key players from the water resources sector in the Caribbean, as well as the implementation of a knowledge management platform to share lessons learnt and other important outputs from the project, will support other countries in region in developing and implementing their own sustainable water resources management efforts.

Conclusions

The G-CREWS project in Grenada represents a comprehensive and integrated approach to address water vulnerabilities and enhance water security. By focusing on climate-resilient water governance, infrastructure improvement, behavior change, renewable energy integration, and regional collaboration, the project offers significant economic benefits and lays the foundation for sustainable economic development in Grenada. It serves as a model for other countries facing similar challenges in the Caribbean region and beyond, highlighting the importance of integrated water resources management for long-term economic resilience.

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