



REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND

**An integrated approach to physical adaptation and community resilience in
Antigua and Barbuda's northwest McKinnon's watershed**

Submitted by the

**Department of Environment
Government of Antigua and Barbuda**

Accredited National Implementing Entity to the Adaptation Fund



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ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

Project/Programme Category:	Program
Country:	Antigua and Barbuda
Sectors:	Coastal Infrastructure, Buildings and Environment, Livelihoods
Title Of Project/Programme:	An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed
Type Of Implementing Entity:	National Implementing Entity
Implementing Entity:	Department of Environment Ministry of Health and The Environment
Executing Entity:	Department of Environment
Amount Requested:	US\$10m

Project Background and Context:

Geographical Context

Antigua and Barbuda is a twin-island state located in the eastern region of the Caribbean Sea (Figure 1). The country's land area consists of two large islands – Antigua and Barbuda – with many smaller inhabited and uninhabited offshore islands. The twin island state lies on a 3,400-km² sub-marine plateau and have an exclusive economic zone of approximately 110,071 km² – significantly larger than Antigua's landmass of 280 km². Antigua is fringed by 25 km² of coral reef on its north, east and south coasts, and by sandy beaches on the west coast, all of which are vital to the country's tourism and fisheries sectors. Barbuda is a flat coral island with an area of 161 km², predominantly consisting of limestone flats.

Antigua's topography is varied, comprising three distinct geological zones: i) a mountainous region of volcanic soils in the southwest; ii) central plains of clay-like soils stretching to the east; and iii) limestone hills in the north. The highest point of the island is Mount Obama/Boggy Peak at 402 m, located on the southwest corner of the island.



Figure 1. Geographical location of Antigua and Barbuda in the Caribbean¹

Socio-economic Context

Antigua and Barbuda's population is approximately 91,000 people (2014)² and is projected to marginally increase to 115,000 by 2050³. In 2012, 70% of the population was classified as rural, with 30% as urban⁴, with a trend towards increasing urbanization. Antigua and Barbuda is considered an upper middle-income country by the World Bank, where ~14% of the population live on less than US\$7 per day⁵. This is the second highest income level among English-speaking nations in the Caribbean.

Historically, Antigua and Barbuda had an agricultural economy of primarily sugar cultivation and rum distillation – from 1632 to 1981 Antigua and Barbuda was a colony of England. In 1981, it gained independence and has remained a member of the Commonwealth⁶. While historically agricultural, Antigua and Barbuda's current economy is based on services, with tourism contributing approximately 60% to GDP⁷. Consequently, the economy is largely reliant on foreign exchange through visiting tourists. The islands' many beaches and inland habitats are among its numerous attractions. Agriculture now contributes just 3% of GDP, mostly through the fisheries subsector⁸.

¹<http://www.unep.org/greeneconomy/AdvisoryServices/CaribbeanGreenEconomy/tabid/105702/language/en-US/Default.aspx> Accessed 28 December 2015.

² <https://www.cia.gov/library/publications/the-world-factbook/geos/ac.html> Accessed 04 June 2014.

³ United Nations, 2013. World Population Prospects. The 2012 Revision Volume 1: Comprehensive Tables.

⁴ <http://data.worldbank.org/country/antigua-and-barbuda> Accessed 10 June 2014.

⁵ Poverty Reduction and Human Development in the Caribbean: Addressing the Millennium Development Goals, Caribbean Development Bank - Special Development Fund (SDF) 7, July 2008.

⁶ https://www.princeton.edu/~achaney/tmve/wiki100k/docs/History_of_Antigua_and_Barbuda.html Accessed 19 May 2014.

⁷ Global Water Partnership Caribbean. (2013). The Post 2015 Water Thematic Consultation: Antigua and Barbuda.

⁸ Office of the Prime Minister, 2001. Antigua and Barbuda's Initial National Communication on Climate Change.

In 2009, Antigua's economy was severely affected by the global economic crisis. From 2009 to 2011, there was a steep decline in tourism arrivals, which severely impacted employment opportunities within the country's private sector and placed pressure on the Government to absorb the persons displaced within this sector. Consequently, the Government accounts for an estimated one third of employment, and salaries for civil servants are generally low. Antigua and Barbuda's GDP in 2013 was an estimated US\$1.1 billion with a growth rate of 1.7%⁹.

The economy and the international credit rating of the Government and the local credits options available to many citizens (especially those working in sectors vulnerable to hurricanes and drought) have been negatively impacted by over six hurricanes and three droughts in the past 15 years. Although the impact of extreme weather events is not carefully documented, the impact is felt on the ground and is causing severe hardship for the country. With limited financing options, Government authorities tend to rely on higher domestic financing (mostly government securities) and arrears, to recover from natural disasters and to withstand global downturns in tourism. At the end of 2014, Antigua and Barbuda's debt-to-GDP had increased to 98.7 percent of GDP¹⁰.

Adaptation measures for SIDS are expensive, with significant cost implications for both the Government and its citizens. Adaptation costs for many buildings and services, such as homes, churches, schools, clinics and hospitals, emergency response, supermarkets, and the Public Utility's desalination plants, are being borne by the Government and its citizens. The high cost of finance and limited access to financing for private citizens is becoming increasingly difficult, resulting in higher levels of vulnerability. This affects all classes of citizens, both public and private, and especially marginalized groups.

Environment, Climate Change and Ecosystem-based Adaptation

The country has been experiencing extended severe drought beyond norms over the last century, and this is occurring at a detriment to the tourism-based economy. Whereas in the past water supply originated from rainfall accumulated in wells and surface water, this supply is insufficient to meet present day demands. In addition to the more frequent drought periods, sea level rise has resulted in the forced abandonment of wells in coastal areas due to salt-water intrusion¹¹. To cope with water shortages, five desalination plants have been installed on the island. In recent extended drought years, as much as 100% of the national water supply was sourced from reverse osmosis. The production of this water is electricity dependent and uses imported fuel. Fresh water and reliable energy are the foundation of the economy and the health care system, and this water-energy co-dependency has resulted in exposure to extreme weather events and fuel price volatility, heightening vulnerability at the national and community levels.

⁹ <https://www.cia.gov/library/publications/the-world-factbook/geos/ac.html> Accessed 9 June 2014.

¹⁰ IMF, 2015. IMF Executive Board Concludes the Third Post-Program Monitoring discussion for Antigua and Barbuda. No. 15/244, May 29. <https://www.imf.org/external/np/sec/pr/2015/pr15244.htm> Accessed April 9, 2016.

¹¹ Office of the Prime Minister. 2016. Antigua and Barbuda's Third National Communication on Climate Change.

Financing Concrete Adaptation

A priority adaptation measure for Antigua and Barbuda is to build resilience in the water and energy sectors. To address regular disruptions to their water supply, many homes and businesses have purchased small generators to function when grid electricity is unavailable. Many families however cannot afford these investments and remain vulnerable to both energy and water disruptions, which, when combined, significantly increase household vulnerability. After a storm, the electricity grid can be interrupted, depending on the magnitude of the event, for between 2 weeks (as experienced after Category 1 Hurricane Gonzalo in October 2014) to 3 months (following Category 4 Hurricane Luis in August 1994).

Given its small island developing state context, the “private sector” in Antigua and Barbuda includes homeowners, micro and small businesses, and other small-scale enterprises. A private sector assessment conducted by the Inter-American Development Bank (IADB) in 2013 found that access to finance was a critical challenge to private sector development. The report determined that:

Given the important role played by finance in the development process, the country's poor ranking in terms of access to credit represents a significant risk to private sector development and growth ... Antigua and Barbuda has attempted to fill the credit void through the establishment of a national development bank, but the credit needs of the private sector significantly outstrip the available resources.¹²

The difference between the interest rate charged by banks on loans and the interest rate paid by banks on savings deposits – the “interest rate spread” – is 8 percentage points in Antigua and Barbuda, and is one of the widest among its comparator group of countries globally¹³.

The **problem that this project seeks to address** is that current financing needs for adaptation are not being met. The Government is unable to meet needs for climate change adaptation measures – implementing the country's Nationally Determined Contribution (NDC) adaptation targets alone are projected to cost \$20M USD per year for the next ten years¹⁴. As a result of a lack of financing, on-going adaptation efforts are not effectively protecting Antigua and Barbuda's vulnerable communities against predicted climate change impacts. The country's economy is not generating adequate resources for the Government to fund adaptation. The country is currently accessing an IMF program to assist with economic recovery, following the global downturn and the major storms and hurricanes that have hit Antigua and Barbuda between 1994 – 2014. Individual property owners are often forced to self-finance their own adaptation interventions as well as disaster recovery measures.

¹² IADB, 2013. Private Sector Assessment of Antigua and Barbuda, p. 15.

<http://www.caribank.org/uploads/2014/11/2014-Antigua-and-Barbuda-PSAR.pdf> Accessed 4 May 2016

¹³ IADB, 2013, p. 15.

¹⁴ Antigua and Barbuda's Intended Nationally Determined Contribution. Communicated to the UNFCCC on 15th October 2015. <http://bit.ly/1M40gsG> Accessed 7 April 2016.

Further, there are limited financing options available for individuals, communities and businesses to access funds to implement ecosystem maintenance or restoration in the face of climate change. If the community is prone to flooding, for example, a property's value will be reduced, and the risk to financing is high. Banks are therefore reluctant to lend to these customers, who are then further exposed to the impacts of climate change without financial means to carry out concrete adaptation measures. This failure to adapt to projected climate change impacts will continue to undermine the investments of government, donor organisations – including non-governmental organisations (NGOs) – and the private sector if ecosystems and infrastructure are unable to withstand extreme weather events.

The **proposed solution to the problem** is to promote the implementation of cost-effective adaptation measures by implementing adaptation in the environment and in the community, building both natural and social adaptive capacity at the same time. This can be achieved by: i) implementing adaptation in the watershed and waterways, such as climate resilient drainage systems; 2) a “soft” loan program for home and business owners for adaptation; 3) providing grants to the community and NGOs to get their buildings ready for climate change, where upgraded community buildings can serve as hurricane shelters, community cisterns as emergency water reserves, and learning centers to strengthen social capital; and 4) to provide the community with the skills and capacity they need to maintain the waterway, with assistance and in partnership with the Government of Antigua and Barbuda.

Microfinancing, credit unions, financial cooperatives and other inclusive financial systems have been successful in creating economic growth and reducing poverty for borrowers, while also offering financial and social incentives to lenders¹⁵. To date, microfinancing initiatives in the Caribbean have been mainly used to fund economic activities such as housing, farming and small manufacturing¹⁶.

Using such financing mechanisms to fund adaptation activities provides a novel approach to climate change adaptation in Antigua and Barbuda. Furthermore, innovative financing in addition to ecosystem-based adaptation can result in cost-effective adaptation interventions to improve climate resilience by securing multiple benefits for vulnerable communities and sectors¹⁷.

Significant barriers to achieving the implementation of adaptation targets identified Antigua and Barbuda's climate action plan (NDC) are: i) limited financial resources available within a SIDS small market and tax base; ii) insufficient historical demonstration to policy makers of the benefits of cost-effective adaptation interventions focused on ecosystems; and iii) few institutions and donors that are willing and technically capable of piloting a revolving loan funding mechanism.

¹⁵ Carlton *et al.* 2001. *Microfinance in Uganda*. Lechner, Reiter und Riesenfelder Sozialforschung OEG, Vienna.

¹⁶ Jamaica Observer. 2011. *Microfinance in the Caribbean*.

¹⁷ Nicholls *et al.* 2007. Ranking port cities with high exposure and vulnerability to climate extremes—exposure estimates. OECD Environmental Working Paper no. 1. OECD, Paris.

This proposed project will **overcome the above barriers** and document the results as best practices that can be used in small island developing states. The Department's qualitative assessment of the private sector, including homeowners and businesses through consultations and experience, in addition to the quantitative assessments conducted by the IADB and others, demonstrate that the private sector has insufficient access to credit, forcing investments to be mainly self-financed. This evidence confidently suggests that the SIRF Fund initiative to improve concessional financing for adaptation interventions with sustainable development co-benefits will be met with a high demand on the northwest coast of Antigua – one of the areas experiencing growth and zoned as a key settlement expansion area.

Some preliminary indicators on project impacts include:

- 5 percent of vulnerable homes are equipped with 2 weeks' worth of water stored on-site with filtration and pump equipment, installation of hurricane shutters and rain water harvesting systems
- The number of persons requiring shelters during droughts is reduced, with priority for vulnerable populations including single mothers, older persons and children, particularly special needs children
- 5 percent of vulnerable homes and 30 percent of shelters have back up energy using renewable energy (for essential services including pumping water)
- McKinnon's waterway can withstand a 1 in 50-year extreme rainfall event
- Mosquito larvae in water bodies in the area are reduced
- 40 percent of the families and businesses are exposed to the public awareness knowledge products of the project
- Three community groups are trained in the management and maintenance of the adaptation interventions
- Physical planning in the local area is updated to reflect new findings of the IPCC AR5 report and regional climate modelling

Financing Adaptation in a "4 Degree world"

The private sector and communities are bearing the costs of climate variability by borrowing at high rates to meet adaptation needs for their businesses and homes. Local borrowing for the private sector can only take place if the value of the property can be held as collateral. Further, interest rates are at 8% and above. In many communities, however, even at these high costs to individuals, community groups and businesses cannot access the needed capital since they do not qualify for loans. With the World Bank predicting a 4-degree world¹⁸ and the IPCC AR5 Chapter 29 report for small island states, Antigua and Barbuda's lack of access to grants or concessional loans to prepare for projected impacts spells disaster for its communities.

The recent economic decline as well as demands from other sectors such as health, education and debt servicing has made it almost impossible for Antigua and Barbuda to

¹⁸ World Bank, 2012. *New Report Examines Risks of 4 Degree Hotter World by End of Century*. <http://bit.ly/1b5lwGy> Accessed April 9, 2016.

pay for the cost of adapting to climate change. This is particularly important when the need to adapt will require large amounts of accessible and predictable resources. The nature and size of the problem cannot be addressed with the current flow of donor resources, which, while important, lack predictability and impact.

To prepare for this adaptation financing gap, the country recently passed legislation that established the Sustainable Island Resource Financing Fund (SIRF Fund). The SIRF Fund is in its operationalization phase and with support from the GEF and a USD 15M concessional loan from Abu Dhabi Fund for Development (ADFD), the SIRF Fund will soon be making its first major investment in renewable energy for desalination. The SIRF Fund is also earmarked to receive 1.6M in funds to the revolving loan program from the GEF, through Antigua and Barbuda's proposed Special Climate Change Fund (SCCF) project, "Building climate resilience through innovative financing mechanisms for climate change adaptation." The SCCF project will be a source of co-financing to this project.

The creation of the SIRF Fund is at the core of the Environmental Protection and Management Act (EPMA), which was legislated in 2015 and is being implemented by the Department of the Environment. The expenditures of the SIRF Fund are guided by the legislation, which specifies several windows. Each window, as it is developed, is guided by an advisory Board and enshrined in regulations. The regulations stipulate the purpose of the funds, disbursement requirements, management of the funds and governance. This is the process for establishing the Revolving Loan Adaptation window under the project.

Antigua and Barbuda, like the other islands of the economic union of the Organization of Eastern Caribbean States (OECS) sub-region, are signatories to the UNFCCC and related protocols, to which the Adaptation Fund is a supporting mechanism. Small islands struggle with the ability to finance adaptation programs. These gaps are not due to political will, incorrect priorities, nor poor land use practices – these funding gaps are due to severe macroeconomic realities faced by small island states, which will be exacerbated by climate change (see Box 1).

Antigua and Barbuda is taking a step to implement its climate change program utilizing an integrated approach for the project, with a sustainable financial strategy is a complementary approach at the national level. The SIRF Fund, coupled with components supported by this project, is expected to generate significant new resources for adaptation while contributing positively to community resiliency as well as the country's overall macroeconomic situation.

The Northwest Coast of Antigua

This project will focus its efforts on a high risk and populated watershed on the northwest coast of Antigua. The project purpose is to build an institutional and financial framework at the national level to meet AR5 climate projections, and the northwest watershed is well placed to provide lessons learned for the entire country.

The demonstration area forms part of one of Antigua's thirteen main watersheds, and a prominent feature of the landscape and hydrology is a 2-km² mangrove salt pond, McKinnon's pond. McKinnon's watershed consists of waterways that flow through the populated outskirts of St. John's, the capital, and drain into McKinnon's pond. The predominant land use on the northwest coast is residential, including urban and suburban settlements, and tourism dominates coastal uses along the Dickenson and Runaway beaches. Industrial activities include the West Indies Oil and APUA power stations, and other small acreages of land are under vegetable farming, livestock, commercial activity, industry, public recreation and community facilities.¹⁹

The Northwest Coast's Settlement Expansion Plan

A comprehensive national land use and zoning plan was developed and approved by the Cabinet of Antigua and Barbuda in 2012²⁰. The primary goal of the plan was to present a forward-looking strategic, national spatial development framework addressing current development issues and providing a platform for private and public sector initiatives. The plan, which combined GIS-based quantitative data with participatory qualitative information, used five main development criteria for its final zoning recommendations: ecosystem integrity, enhanced livability, improved accessibility, economic development and engaging livelihoods, and efficient and effective governance.

The land use and zoning plan identified the northwest coast of Antigua as a "settlement expansion zone" using the five sustainable development criteria (Figure 2). The plan was developed and validated through extensive national consultations, and approved by the Cabinet of Antigua and Barbuda in 2012.

The northwest coast watershed was first prioritized as an adaptation demonstration site during consultations for the national land use plan between 2010 and 2012. The upper watershed is slated for rapid urban expansion, consistent with current trends where businesses are leaving the congested city center for the outskirts of town.

The area is densely populated and some districts are categorized as low-income or slum areas. These communities and families are more vulnerable to extreme weather events such as hurricanes and drought, and climate change impacts such as sea level rise²¹. The northwest coast of Antigua has a high degree of exposure to climate variability due to its physical features and low-income community; the northwest coast has been increasingly affected by extreme rainfall events causing flooding.

¹⁹ Ivor Jackson and Associated (2002). Local Area Plan for the Northwest Coast, p. 13

²⁰ Genivar, 2012. Sustainable Island Resources Zoning and Management Plan (SIRMZP) for Antigua and Barbuda. <http://www.environmentdivision.info/wp-content/uploads/2012/01/NPDP-SIRMZP-2012.pdf>

²¹ UN-HABITAT, 2011 in CARIBSAVE, 2012. Local Area Vulnerability Analysis for Antigua and Barbuda. http://www.environmentdivision.info/UserFiles/File/LVIA_Antigua_and_Barbuda_FINAL_8DEC15.pdf

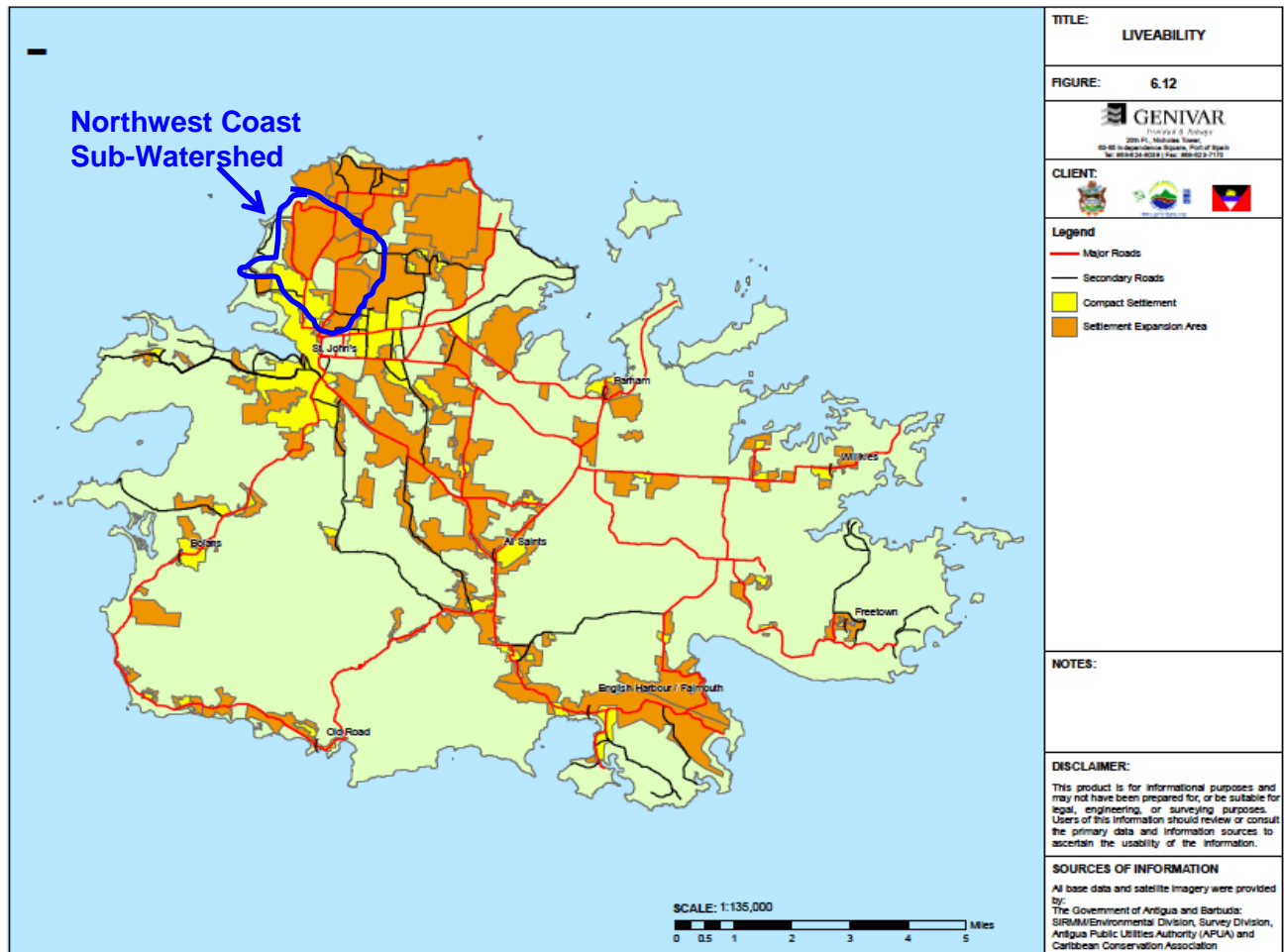


Figure 2. A “Liveability” index for Antigua identifying settlement expansion areas using social, economic and environmental criteria, with the northwest coast highlighted (SIRMZP 2012)

The project area is vulnerable to climate change, undergoing urban expansion, and supports low income and lower middle-income families.

These conditions make it a suitable demonstration area for the Adaptation Fund and for national priorities. Without this project, urgent needs to implement adaptation measures cannot be met, and the area will remain increasingly vulnerable to climate impacts, putting more people and property at risk.

Climate Variability, Projected Impacts, and Adaptive Capacity

Historical Observations and Climate Projections for Antigua and Barbuda

Climate trends for which data is available and analyzed include temperature, rainfall extremes (both drought and high intensity downpours) and hurricanes. Results from the

Hadley Centre PRECIS (Providing Regional Climates for Impact Studies) regional model are presented below. PRECIS has in recent years significantly improved the availability of downscaled climate projections on a 25 km resolution for the Caribbean region²². PRECIS results published by the Economic Commission for Latin America and the Caribbean (ECLAC) projected the following for the Eastern Caribbean, including Antigua and Barbuda, using SRES A2 (higher emissions) and B2 (lower emissions) scenarios:

- Between 1 and 4°C warmer by the end of the century
- Average annual rainfall is projected to decrease by the end of the century
- Rainfall variability is projected to increase, with more intense downpours and extended drought conditions
- Hurricane intensity is likely to increase; increases in hurricane frequency are uncertain

Temperature

Maximum and minimum temperatures have increased over the past 30 years, and the warming trend is expected to continue. Trend analysis of average temperatures (1981 – 2013) by the Department of Meteorological Services indicates an increase of +0.6°C over the time period (Figure 3)²³.

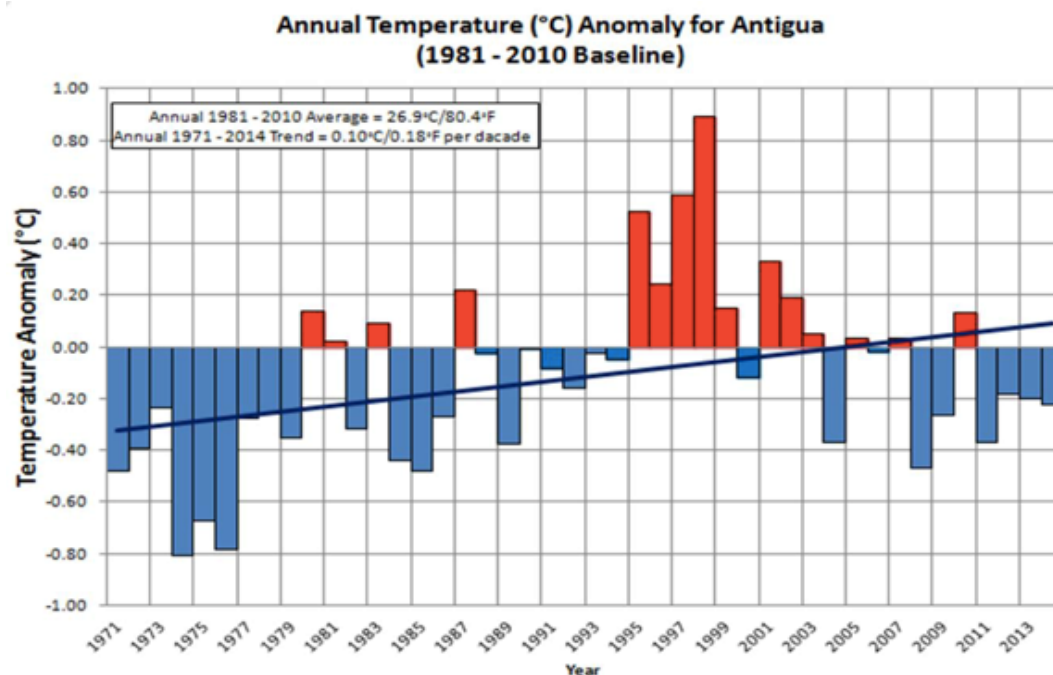


Figure 3. Annual Temperature Anomaly for Antigua (1981 – 2013) (Antigua Met Service)

The PRECIS regional model projects an increase in annual surface temperature over land on the order of 4.5°C for SRES A2 (high emissions) and 2.8°C for the SRES B2 (low

²² Taylor et al., 2007 and Stephenson et al., 2008 in IPCC AR5 WGII Chapter 29 (SIDS), p. 1628.

²³ UNFCCC, 2009. Antigua and Barbuda's Second National Communication on Climate Change, p. 22.

emissions) scenarios, by 2100. There is general agreement across global and regional models in simulating future surface temperature changes²⁴ (Figure 4 below).

Higher Temperatures: Health impacts, Risks and Adaptations measures

Recent epidemics in Latin America and the Caribbean underscore the risks of higher temperatures to human health, as transmission rates of vector-borne viruses are likely to increase under higher temperatures. Epidemiological research has linked dengue fever transmission to temperature, where warmer temperatures can shorten incubation periods from 12 days at 30°C to only 7 days at 32 – 35°C²⁵. Decreasing the incubation periods by 5 days can lead to a threefold higher transmission rate of dengue²⁶. Moderately higher temperatures can also hasten larval stage development, leading to smaller mosquitoes that require more frequent blood meals – and temperature increases may also enhance metabolism, thus increasing the probability of dengue transmission to new hosts²⁷.

²⁴ ECLAC, 2010. Regional Climate Modeling in the Caribbean: The PRECIS-Caribbean Initiative. Economic Commission for Latin America and the Caribbean, April.

²⁵ Hales et al., 1996 and Focks et al 1995 in Chen, Anthony (2006). *The Threat of Dengue Fever in the Caribbean: Impacts and Adaptation*. Submitted to Assessments of Impacts and Adaptation to Climate Change (AIACC), Project No. SIS 06, University of the West Indies.

²⁶ Koopman et al., 1991 in Chen, Anthony, 2006. *The Threat of Dengue Fever in the Caribbean: Impacts and Adaptation*. Submitted to Assessments of Impacts and Adaptation to Climate Change (AIACC), Project No. SIS 06, University of the West Indies.

²⁷ McDonald, 1957 in Chen, Anthony (2006). *The Threat of Dengue Fever in the Caribbean: Impacts and Adaptation*. Submitted to Assessments of Impacts and Adaptation to Climate Change (AIACC), Project No. SIS 06, University of the West Indies.

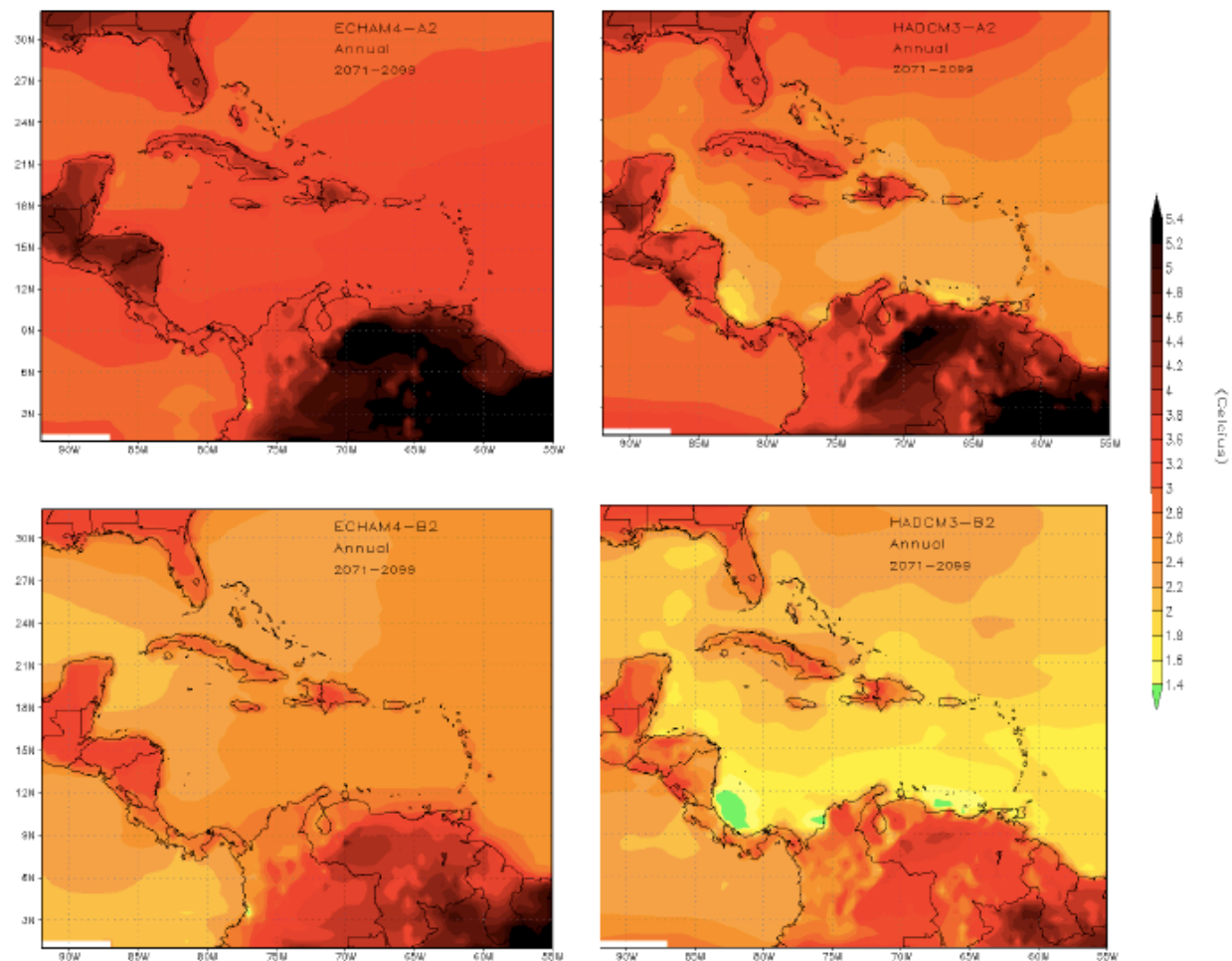


Figure 4. PRECIS regional climate model projected changes in the annual mean surface temperature for 2071-2099 (compared to 1961-1989) for high (top) and low emissions (bottom) scenarios for the Caribbean (ECLAC 2010)

Chikungunya – a viral disease transmitted to humans by infected mosquitoes – spread rapidly across the Caribbean in 2013 and 2014, including Antigua and Barbuda^{28 29}. The **Zika virus** has already spread to Antigua and Barbuda and other Caribbean countries³⁰. In addition, the IPCC's Chapter 29 on small islands found that in the Caribbean, the essential malaria transmission conditions now exist based on trends in the last 10 years³¹.

In addition to increased risks of vector-borne epidemics, increases in minimum and maximum temperatures cause physical discomfort, contributing to mental and emotional stress, and are likely correlated with increases heat- and respiratory-related illnesses³². Increases in temperature may result in heat stress-related deaths among vulnerable

²⁸ In June 2014 there were 15 reported cases of chikungunya in Antigua and Barbuda.

²⁹ <http://www.hhrjournal.org/2014/07/01/chikungunya-climate-change-and-human-rights-2/>

³⁰ Center for Disease Control and Prevention: Zika Travel Information. <http://wwwnc.cdc.gov/travel/page/zika-information> Accessed April 9, 2016.

³¹ IPCC AR5 WGII Chapter 29 (SIDS), p. 1625.

³² Macpherson, C. et al, 2015. Caribbean Heat Threatens Health, Well-Being and the Future of Humanity. *Oxford Journals*, Vol. 8, Issue 2 (196-208)

groups such as the elderly and children. Increases in temperature have also been shown to result in lower economic productivity³³.

Current and projected health threats underscore the need for adaptation to address crosscutting health issues. **Component 1** of this project will upgrade the waterways leading into McKinnon's pond to enhance resilience to projected climate change impacts, including measures responsive to disease vectors. Mosquitos breed in stagnant water, and the technical engineering outputs under this component will include design-based vector (mosquito) control measures. For example, engineering solutions can improve waterway flows to prevent stagnation, coupled with an ecosystem-based adaptation, such as rehabilitating the proper functioning of ecosystems to support natural larval predators. Design solutions to combat mosquitos can reduce the need for more aggressive chemical-based control mechanism, such as malathion, an organophosphate insecticide that is the typical mosquito control method in Antigua.

The household revolving loans programme under **Component 2** will fund adaptation measures including best practices for controlling mosquito breeding in water storage tanks on private property – compliance with mosquito control standards will be established and made a requirement of the loan scheme. Similar measures for vector control will be available to community buildings under **Component 3**.

Rainfall

There are three major freshwater sources in Antigua and Barbuda: i) surface water; ii) groundwater, and iii) desalinated seawater. During wet years, approximately 60-70% of Antigua's daily water supply is obtained through seawater desalination. This amount can increase to 100% during dry years³⁴. Consequently, the water supply is largely dependent on electricity, which powers the country's five desalination plants.

Average annual rainfall in Antigua is 1000 mm. Antigua in 2015 witnessed its worst drought in recorded history, with the rainfall total occurring once per 500 years. The drought was over 32 months long, and the record rainfall deficit of 1143 mm (45 in) exceeds the comparable drought of 1964-67 by 254 mm (10 in), or 29%. The country has missed out on approximately one year's worth of rainfall since the drought started. The drought was caused by climate actors, including an abundance of the dry and dusty Saharan air layer (SAL) from Africa, positive North Atlantic Oscillation (NAO), negative Tropical North Atlantic (TNA) Index and El Nino³⁵.

³³ Economist, 2014. *The cost of doing nothing*.

³⁴ Global Water Partnership Caribbean. 2013. The Post 2015 Water Thematic Consultation: Antigua and Barbuda.

³⁵ Destin, Dale, 2016. Antigua Met Service: Weather, climate & related info for smart decisions.

<https://anumetservice.wordpress.com/2016/03/25/the-worst-drought-on-record-for-antigua/> Accessed April 6, 2016.

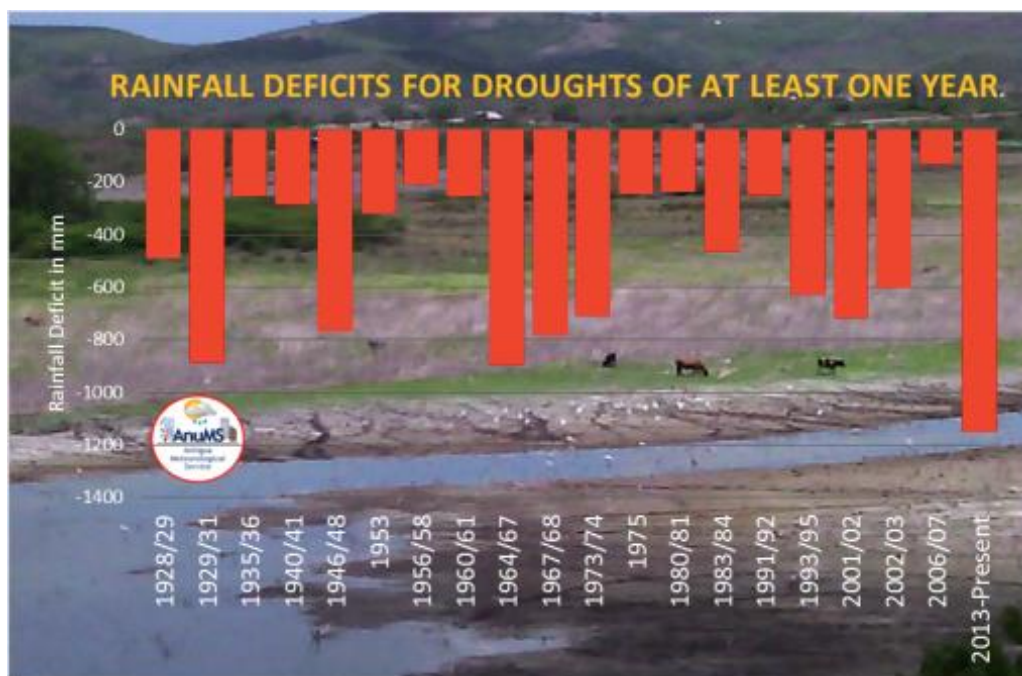


Figure 5. Rainfall deficit for 2013 – 2015 is the most extreme in Antigua’s recorded history (Antigua Met Service)

Since the drought started, the country has been completely out of surface water twice (relying 100% on desalination), with an aggregate duration of 14 months – from April to September 2014 and again from August 2015 to early 2016. The drought is estimated to have directly and indirectly cost the country estimated hundreds of millions of dollars³⁶.

Climate projections generated with the downscaled PRECIS climate model indicate a general future trend to drier conditions in various areas of the Caribbean, including the Eastern Caribbean sub-region, where impacts are in the range of no change in annual rainfall to a decrease in annual mean rainfall by 50% (Figure 6).

Drought: Risks and Adaptations

Antigua and Barbuda, and other Caribbean islands, has good coverage of water infrastructure. However, the conundrum is that fresh water is not readily available, especially during drought (a community documentary on the impacts of drought is available here: <http://bit.ly/1YfVZ6F>).

³⁶ Destin, Dale, 2016. Antigua Met Service: Weather, climate & related info for smart decisions

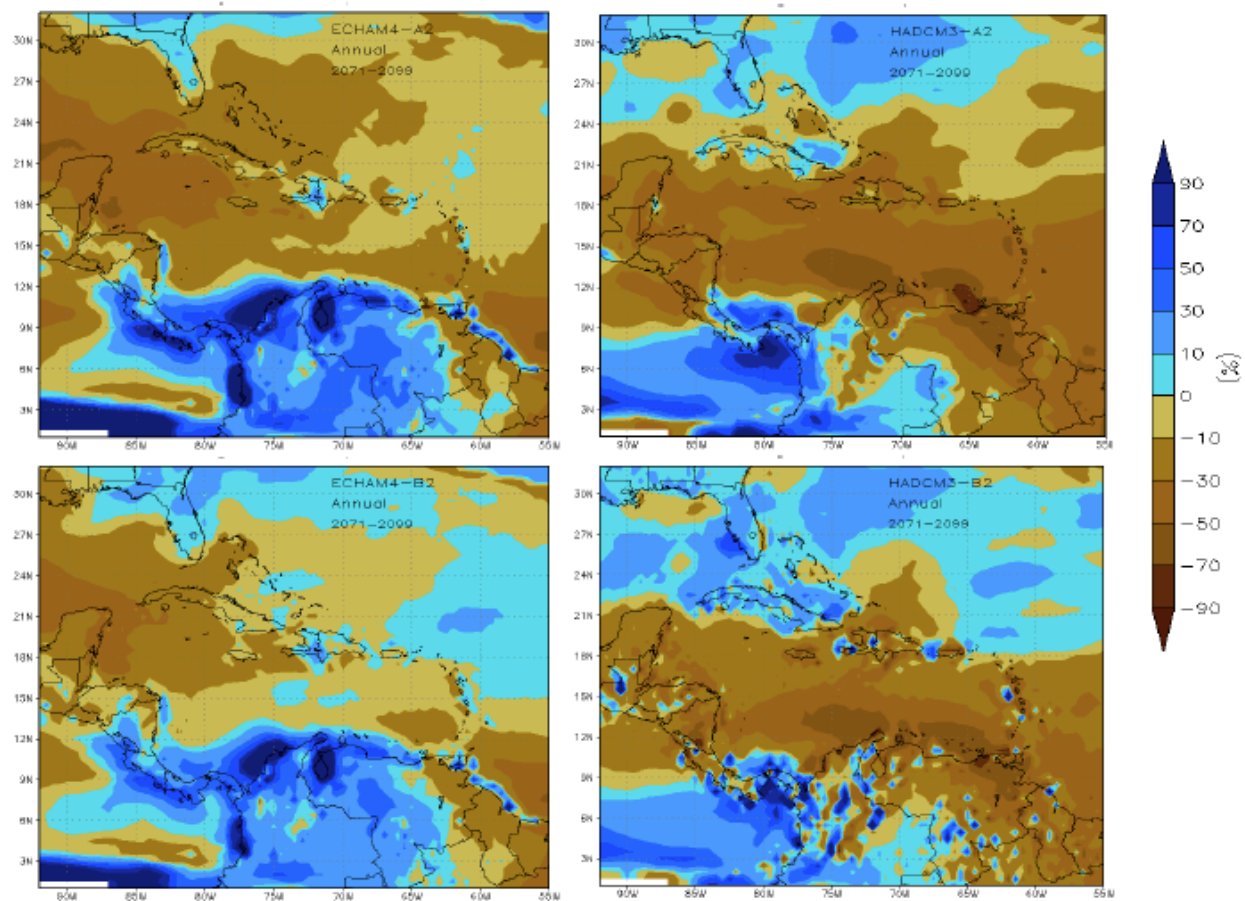


Figure 6. Annual mean changes in precipitation (%) for 2071 – 2099 as simulated by PRECIS for A2 (top – high) and B2 (bottom – low) emission scenarios (ECLAC 2010)

Drought leads to water shortages and poor sanitation practices at home, which have health impacts. Recent changes in the epidemiology of leptospirosis – a potentially fatal bacterial disease that affects humans and animals³⁷ – have been detected, likely linked to factors in ambient temperature and changes in precipitation, and water availability³⁸.



Figure 7. A household in McKinnon's pond area with braces for rainwater harvesting but no guttering installed

The Revolving Fund facility under **Component 2** will support adaptation interventions at the household level in this project, to install rainwater harvesting infrastructure including rooftop gutters, cistern construction or water tank storage, domestic water filtration and treatment, in addition to water efficiency retrofits (toilets,

³⁷ Centers for Disease Control and Prevention. <http://www.cdc.gov/leptospirosis/> Accessed April 5, 2016.

³⁸ Russell 2009 in IPCC AR5 WGII Chapter 29 (SIDS), p. 1624.

sinks, shower heads, dishwashers, washing machines). Rainwater harvesting is required by national building codes, however households do not or cannot always comply in practice (e.g. Figure 7). This component will incentivize adaptation interventions to build resilience to drought at the household and community level.

Extreme Rainfall

Climate risk is not only associated with changes in mean values, but also (and perhaps more importantly) with changes in extremes. Due to the significant economic costs of flooding, increasingly studies across the Caribbean are focusing on projected rainfall extremes³⁹.

Observational data for extreme rainfall events in Antigua and Barbuda is an unfortunate data gap across both temporal and geographic space. Temporally, daily and hourly rainfall time series are required to model rainstorms, which are short term high-intensity events. Further, an Intensity-Duration-Frequency curve (IDF) for the probability that a given average rainfall intensity will occur, has not been calculated for Antigua and Barbuda, and catchment modeling has relied on IDF curves from other islands.



Figure 8. Flooding in the outskirts of St. John's following the passage of Hurricane Omar in 2008.

Geographically, the only long-term rain gauge station is at VC Bird International Airport, situated on Antigua's northeast coast and lowest rainfall belt – average annual rainfall in Antigua varies from ~125 cm per year in the southwest to ~60 cm per year in the east⁴⁰. On average, the rain gauge at VC Bird Airport receives half as much rainfall as other parts of the island. Insufficient geographic coverage of rainfall data collection is an issue for example where flash flooding has been recorded in the McKinnon's area whereas the VC Bird Airport rain gauge had not recorded any rainfall⁴¹.

Extreme Rainfall: Risks and Adaptations

Projections using the PRECIS regional climate model indicate that along with the risk of drying, there is a change of intense precipitation events to increase over the Eastern Caribbean – including extreme rainfall separate and apart from hurricanes and tropical

³⁹ ECLAC 2010: PRECIS regional climate model

⁴⁰ <http://www.sids2014.org/content/documents/17Antigua%20and%20Barbuda-National%20Report.pdf> Accessed 5 May 2014.

⁴¹ Flash flooding occurred on Antigua's northwest coast on 19 October 2015: <http://bit.ly/25NfBF9>

storms. The general trend is for intense and heavy rainfall events to be interspersed with longer relatively dry periods⁴².

The impact of floods is already becoming a critical concern for Antigua and Barbuda, especially around the low lying coastal capital of St. John's, which is vulnerable to flooding and erosion⁴³. Building resilience to extreme rainfall events on Antigua's northwest coast settlement expansion area is a central outcome of this project, and is addressed under **Component 1**, with a large portion of this project's resources dedicated to concrete adaptation interventions described in detail below.

Hurricanes

Hydro-meteorological hazards pose perhaps the greatest risk to Antigua and Barbuda, and historic disaster records demonstrate that hurricanes and tropical storms are the highest-cost hazards in terms of loss of life and economic losses. Hurricane Luis (1995), one of the most devastating systems, resulted in a 17% decrease in tourist arrivals, left 7,000 people unemployed, 90% of buildings destroyed or damaged, and economic losses amounting to US \$128.35 million or 30.5% of GDP⁴⁴. It took three months to fully restore electricity, highlighting the need for resilient energy systems. Economic impacts of hurricanes and flooding, and resultant costs of adaptation, are proportionately extremely costly to small island states (Box 1).

In 2008, Hurricane Omar resulted in precipitation of 56.4 mm per hour at its peak⁴⁵, and flood water levels reached 4 to 12 feet in vulnerable parts of the island (Figure 8). As a result of Omar, 1,339 homes were flooded, and four homes located in close proximity to watercourses were washed away – in total, at least 5,088 persons suffered

Box 1. Why is the cost of adaptation to climate change so high in small islands?

Source: Adapted from IPCC WGII AR5 – Chapter 29 (SIDS)

Adaptation to climate change that involves infrastructural works requires large up-front overhead costs, which in the case of small islands cannot be downscaled in proportion to the population's size. This is a major socioeconomic reality that confronts small islands, notwithstanding the benefits of adaptation.

Moreover, the relative impact of an extreme event such as a hurricane that can affect most of a small island's territory has a disproportionate impact on that state's gross domestic product, compared to a larger country where an individual event generally affects a small proportion of its total territory and its GDP. The result is relatively higher adaptation and disaster risk reduction costs per capita in countries with small populations and areas—especially those that are also geographically isolated, have a poor resource base, and have high transport costs.

⁴² ECLAC 2010: PRECIS regional climate model, p. 16

⁴³ Solomon et al, 2011 in CARIBSAVE National Vulnerability Impact Analysis for Antigua and Barbuda http://www.environmentdivision.info/UserFiles/File/NVIA_Antigua_and_Barbuda_FINAL_8DEC15.pdf

⁴⁴ Solomon et al, 2011 and Gores-Francis, 2013 in CARIBSAN National Vulnerability Impact Assessment

⁴⁵ Ho, B. 2008. *Agricultural losses amount to \$11M*. Antigua Sun.

significance losses⁴⁶. Similar flood conditions were experienced during Hurricane Earl in 2010.

Hurricanes: Risks and Adaptations

Climate models project that maximum wind speed of the strongest hurricanes is likely to increase between 5% (low scenario) and 15% (high scenario), which would increase loss of life and other economic losses⁴⁷. Model outputs are not consistent regarding changes in the frequency of hurricanes due to climate change, however hurricanes that do form are expected to increase in intensity, and there is some consensus among models about this latter projection.

Project Objectives:

Main Objectives

An integrated approach to physical adaptation and community resilience in Antigua's northwest McKinnon's watershed seeks to reduce vulnerability of the community, by increasing the ability of the watershed to handle extreme rainfall, while increasing the resilience of the built environment simultaneously to cope with the multiple stressors of climate change. This integrated approach will ensure that the community will be able to withstand projected climate change impacts while the ecosystems can accommodate increased rainfall.

The three specific objectives of the project, which correspond to the three components elaborated below, are to:

1. Implement concrete adaptation actions that support natural and physical drainage systems along the 3-km urban and semi-urban waterways to meet projected climate change, in particular extreme hydro-meteorological events and disease vectors. These interventions will use a variety of approaches including ecosystem-based adaptation, such as wetland restoration to address disease vectors, and engineering solutions, such as drainage and retention ponds, to build resilience to the latest climate change projections.
2. Disburse concessional loans through a revolving fund mechanism to vulnerable households and businesses to meet new adaptation guidelines and standards for built infrastructure to withstand extreme climate variability. These interventions include for example water harvesting, hurricane shutters, mosquito screens, water storage, and other adaptation measures.
3. Support social adaptive capacity and local ownership of adaptation through community-awarded contracts and climate resilient community buildings such as community centers, schools and clinics. This will include interventions to allow the buildings to withstand hurricanes and droughts and serve as shelters.

⁴⁶ Antigua and Barbuda NODS, 2008 in CARIBSAVE National Vulnerability Impact Analysis, p. 45

⁴⁷ CARIBSAVE, 2015. National Vulnerability Impact Analysis for Antigua and Barbuda

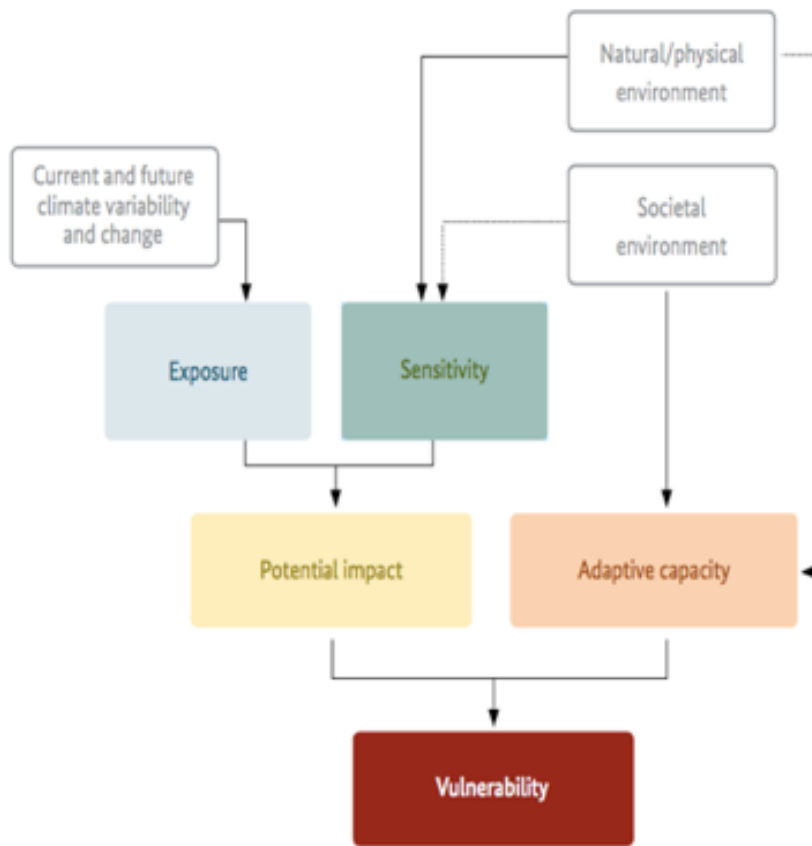


Figure 7. Visual representation: the objective of this project is to support natural and physical systems to reduce sensitivity, coupled with enhanced social adaptive capacity in the building sector, to reduce vulnerability in the core settlement area on Antigua's northwest coast. Source: adelphi/EURAC 2014

Project Components and Financing:

Table 1. Project components, results and budget

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (US\$)
1. Upgrade urban drainage and waterways to meet projected climate change impacts	<p>1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases</p> <p>1.1.2. Restore and upgrade McKinnon's 3 km waterway to meet new adaptation requirements for flooding and vector control, taking into account ESS and gender considerations within the design</p>	1.1 Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors	\$3,550,960
2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan	2.1.1. At least 10% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards	2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability	\$3,125,300
3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions	<p>3.1.1. 30% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings</p> <p>3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project</p>	3.1. Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level	\$2,223,500
4. Project/Programme Execution cost			\$636,240
5. Total Project/Programme Cost			\$9,536,000
6. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)			\$ 434,000
Amount of Financing Requested			\$ 9,970,000*

*Does not include Project Preparation Grant (\$30,000)

Projected Calendar:

Table 2. Milestones and expected completion dates

Milestones	Expected Dates
Pre-Inception Phase	February - August 2017
Start of Project/Programme Implementation	August 2017
Mid-term Review	August 2019
Project/Programme Closing	December 2020
Terminal Evaluation	August 2021

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Project components

Climate sensitivity on the northwest coast is underpinned by urbanization dynamics and population growth, limited adaptive capacity at household, community and governance levels, underlying vulnerabilities including poverty, economic sensitivity to external factors, disruptions in basic services, health risks and social inequalities.

In order to achieve the project objective, *“to reduce vulnerability of the community, by increasing the ability of the watershed to handle extreme rainfall, while increasing the resilience of the built environment simultaneously to cope with the multiple stressors of climate change,”* this project is structured to deliver concrete adaptation interventions with tangible outputs that will help transform the northwest coast of Antigua from an area with high exposure to climate variability and deteriorating ecosystems, into a pilot demonstration for resilient urban drainage, functioning ecosystem services, and strong social capital.

The interventions under this project are rooted in Antigua and Barbuda’s three completed National Communications, the Nationally Determined Contribution (NDC) and national development policies and plans. The project is also strongly aligned with the global development and climate change agenda, in particular Sustainable Development Goal (SDG) 11: Making cities and human settlements inclusive, safe, resilient and sustainable.

The Department of Environment received accreditation to the Adaptation Fund as a National Implementing Entity (NIE) in October 2015. This project embodies a nationally driven process with maximum country ownership that, in the context of a small island developing state, has the potential for transformative climate-resilient development on a shorter timescale through direct access.

The project is built around three interrelated components, which highlight the importance of tangible and concrete action, innovative financing for adaptation, and local ownership and community resilience.

1. Upgrade urban drainage and waterways to meet projected climate change impacts

Under this Component, appropriate adaptation interventions will be implemented in the McKinnon’s watershed. This component aims to increase physical resilience along 3-km of McKinnon’s waterway in response to climate change, extreme rainfall events, and disease vectors, taking into account urbanization trends that may magnify and reinforce the impacts of climate change. Concrete adaptation measures will be implemented along the waterway and drainage infrastructure bisecting urban and suburban communities on

the outskirts of St. John's, Antigua – an area that has historically suffered losses from both hurricanes and intense rainfall (Figure 9).

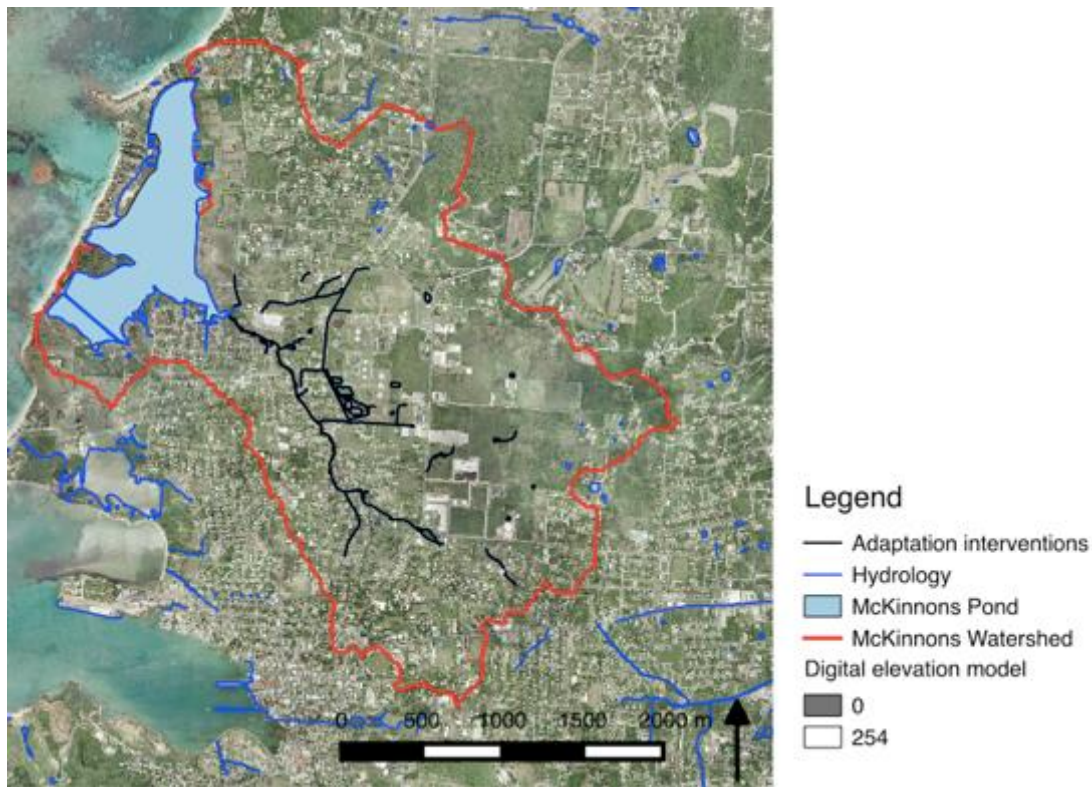


Figure 9. Map of McKinnon's watershed boundary on Antigua's northwest coast, delineating the 3 km waterways bisecting urban and semi-urban areas for adaptation interventions

A local area plan was developed for the northwest coast in 2001 that identified potential flood mitigation techniques, including settlement ponds and traps, flood drainage swales, drainage easements for 1 in 25 year storms or higher, restrictions on clearing trees, shrubs and under-story vegetation in drainage easements, and rehabilitation of vegetated buffers⁴⁸. During the project preparation stage of this project, a Technical Feasibility Study was conducted by Engineers without Borders, and interventions were validated and additional needs identified (Appendix 7). This Study was used to draft the TORs for the design and supervision contract, which will be validated by the Technical Advisory Committee (TAC) prior to issue (TORs in Appendix 13).

The Technical Feasibility Study highlighted data gaps, namely detailed topographical data for the waterway, which is necessary to develop flood hazard maps and to finalize climate resilient drainage plans. This drainage design activity has been incorporated into the project budget under Output 1.1.1. Detailed technical drawings of the specific waterway interventions will be a priority activity upon project approval, which will then enable a full Environmental Impact Assessment (EIA). The Department of Environment has provided detailed technical drawings for the Cashew Hill waterway adaptation interventions, to illustrate the outputs that will be produced at the outset of project implementation.

⁴⁸ Ivor Jackson & Associated, 2002. Local Area Plan for the Northwest Coast, Antigua.

Prior to implementation of Output 1.1.2 (physical works in the waterway), a full EIA is required by national law (the Physical Planning Act, 2006) to be conducted using the technical drawings to apply for planning permissions, following which an Environmental and Social Management Plan and Monitoring Plan specific to the interventions will be developed. The figure below provides an overview of the ESS planning and management process for Component 1.

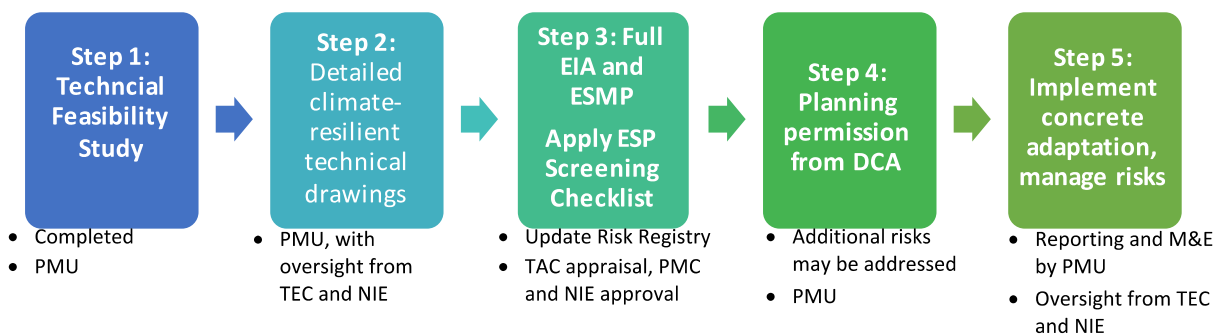


Figure 10. Five-step process for developing and managing environmental and social risks under Component 1

The above figure defines the steps consistent with an unidentified sub-projects (USP) approach. The Environmental Impact Assessment (EIA) requires that an Environmental and Social Monitoring Plan must be implemented in accordance with the EPMA, 2015 and the Adaptation Fund's 15 ESP Principles. The EIA and ESMP will screen for all 15 principles of the ESP using the checklists, as reflected in the draft Terms of Reference for the EIA. A local firm will be contracted to conduct the EIA. The Management Plan/Strategy must be implemented in accordance with Part VI Section 40 subsection 6 of the EMPA 2015 during the Operational phase.

The EIA will identify any potential risks of involuntary resettlement, whether physical or economic displacement, based on the final designs of the waterway interventions. Involuntary resettlement shall be avoided as affected persons and communities have the right to refuse land acquisition. This is consistent with the Department of Environment's risk management policy, which prohibits funding for resettlement activities. Land within the waterway setback area may not be able to get access to insurance if their owner builds permanent physical structures on the property in the restricted zone. The risks of resettlement in the area is high but this is not a result of the project activities, with or without the project those properties near the waterway are at risk of regular flooding. The project outputs will identify these properties and create an environment where new homes are not built in high-risk areas.

Economic displacement refers to the loss of assets or access to assets that leads to loss of income sources or means of livelihood. No formal or informal livelihood subsistence activities have been identified in the baseline studies conducted for the waterway to warrant risks of economic displacement. The waterway is low-flow and polluted such that it does not support fishing. There is minimal natural resources available for livelihood uses

Furthermore, the McKinnon's watershed project site has been identified as a settlement expansion zone under the national physical development plan, and local area planning and zoning will remain consistent with the guidelines. Thus, the project is not expected to cause livelihood or economic displacement.

Table 3. National physical development plan (SIRMZP 2011) Development Guidelines for the project site

Land Use Category	Permitted Uses	Intensity	Performance Criteria	Physical Planning Act Reference
Settlement expansion area	Residential, commercial, community facilities	Density: 12 lots/acre FAR: 0.5	Low traffic, noise levels, well maintained lots	PPA SSII Part VII 2

Notwithstanding low expected risks, involuntary resettlement risks will be screened on a quarterly basis and the Project Management Unit (PMU) shall notify community members about the DOE's policy on avoiding economic or physical displacement under the project. The PMU will communicate to affected community members the availability of the grievance mechanism that is available to them.

The ESMP and Monitoring Plan will detail the monitoring requirements for pre-, during- and 2 years post-implementation. This will include recommendations to ensure the documented implementation of mitigation measures; long-term minimization of negative impacts; and maximization of positive impacts. Full costing of the Monitoring Plan implementation will be included, and indicators used for monitoring will be disaggregated by gender (Terms of Reference for the EIA in Appendix 13). The EIA and ESMP will include community consultations, and the outputs will be approved be appraised by the Technical Advisory Committee (TAC) and approved by the Project Management Committee (PMC). Additional information on roles and responsibilities in risk management and ESP compliance is included in Section B below.

Output 1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases

The first step in this component is to undertake hydrological assessments, analysis and hazard mapping, drawing from previous studies, baseline data, and documented areas of vulnerability, to validate plans for the area⁴⁹. This validation process will ensure that the waterway and drainage interventions meet climate resilient criteria using the most recent scientific findings in the IPCC's AR5 as well as recent extreme weather events in the region and enable the project area to be a safe and climate resilient settlement expansion zone. This information will be used to finalize the climate resilient Local Area Plan (LAP) for McKinnon's and the technical drawings will be the guidelines for implementing the LAP (Output 1.1.2). A comprehensive EIA will be conducted at this stage (TORs in Appendix 13 for the EIA Terms of Reference).

⁴⁹ Ivor Jackson & Associated, 2002. Local Area Plan for the Northwest Coast, Antigua.

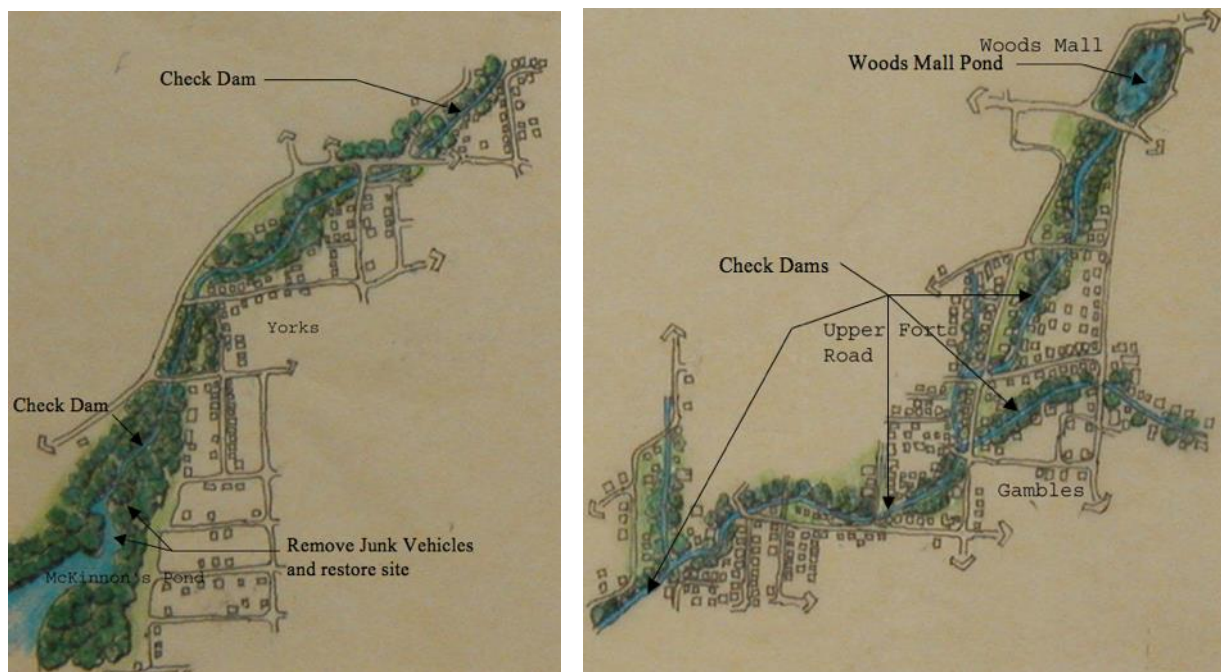


Figure 11. Drawings from Ivor Jackson's 2002 northwest coast local area plan from the waterway leading into McKinnon's pond (lower left) to Woods Pond (top right).

The existing baseline in McKinnon's watershed includes dwellings and structures that are within minimum setback guidelines (currently the setback guideline is 30 feet), and the project's approach, recognizing the current situation and vulnerability of persons in the community, is to take an incremental approach to achieving climate resilient development.

Firstly, the Watershed and Wetlands Management Committee will be convened as a consultative body for the waterway physical works. The Committee constitution is provided for in Section 45 of the EPMA and includes the appointment of local residents and other key agencies. Secondly, technical and legal experts under Component 1 will make recommendations for climate resilient waterway setbacks, which will be enshrined in law and policy. Existing structures will be surveyed as part of the technical design process, and these surveys will constitute the existing baseline where structures will be grandfathered in the waterway setbacks. Thirdly, capacity building of the relevant agencies (Lands, DCA, DoE) will be built to enhance governance arrangements. Lastly, as part of the Terminal Evaluation of the project, next steps will be identified based on consultative processes as to how to bring existing structures into compliance with waterway setbacks, if this is still necessary following the project's interventions.

The technical design for the concrete waterway interventions will recognize that this is a low-income area and that adaptation interventions should as much as possible be ecosystem-based, since these have been shown to be cost-effective with positive social and economic benefits. The technical drawings and assessments will be complemented

by in-depth consultations in the four communities in the McKinnon's watershed, which is a requirement of the EIA process prior to implementation of physical works.

Community consultations will focus on identifying localised vulnerabilities and concrete adaptation options related to flooding and other climate change impacts. Consultation guidelines are outlines in Appendix 1. In addition, the consultations will form the basis for engagement with local communities to implement participatory M&E systems and to begin outlining opportunities for Component 3 – awarding contracts to community groups/NGOs to maintain the adaptation interventions.

Output 1.1.2. Restore and upgrade 3 km of waterways to meet new adaptation requirements for flooding and vector control, considering ESS and gender considerations within the design


The adaptation works will support natural systems and physical hard engineering structures along the 3 km urban and semi-urban waterways to meet projected climate change, in particular extreme hydro-meteorological events and disease vectors.



Activities under this output include finalization of a watershed Local Area Physical Development Plan (LAP), contracting of a company to complete the detailed designs; conduct an Environmental Impact Assessment (EIA) and secure development planning approval; and supervise implementation. The EIA Terms of Reference in Appendix 13 builds on the minimum legal requirements to address the fifteen categories of the Adaptation Fund's Environmental and Social Policy.



The Technical Feasibility Study assessed the interventions proposed in the 2001 Local Area Plan, and identified new activities that would be required. Indicative concrete adaptation interventions for the waterway leading into McKinnon's Pond are outline in Table 3.



Table 4. Interventions to achieve climate resilient drainage along 3 km of waterways (Source: Engineers without Borders, Technical Feasibility Study, Appendix 7)


Problems Identified	Recommendation	Results to be Achieved
Gaps in data for full engineering analysis	Data on the level of the roads, bridges, water course side of the roads, house and land level, mainly in the flooding area	Once data is collected, finalize engineering plans. A design of corrective points could be finalized using SWMM 5.0.
Increased and modified storm flows in catchment due to land use change and	Proper buffers have not been enforced and maintained but consider: <ul style="list-style-type: none"> Revising and enforcing building regulations to setback from watercourses for all new applications (grandfathering in existing 	A steadier stream along the watershed and water run during and after the storms.

rainfall variability in last 20 years	<p>structures to achieve a phased approach to compliance)</p> <ul style="list-style-type: none"> ○ Enforcing sustainable development and low impact use as a climate resilient development policy ○ Create upstream detention at crown land site to attenuate peak downstream storm flow discharge  <p><i>Proposed site for upstream detention pond. Aerial map depicting private property and crown land. Blue lines are the waterway; Red lines are private parcels</i></p>	<p>A lower depth flow along the drainage network after tropical storm. Prevent flooding and increase safety for kids playing along the water.</p>
Evacuation structure of the McKinnon's pond is probably too small.	<p>Proceed to a study to increase the capacity of the pond to evacuate up to 200 000,0 m³/h</p>	<p>This structure will prevent flood for a 50-year rainfall rain or a hurricane all the other structure are in the same size.</p>
Some bridges over the water run have to be re-engineered. There is at least one bridge that can cause problems for a rain of 100mm in 6 hours.	<p>Modified the bridge to increase the drainage possibility. Or prepare a set-up for a pump able to be installed in a day for a week by year. This pump will be there only to help.</p>	<p>Help evacuation of water to the McKinnon's pond.</p>

	 <p><i>Bridge drainage capacity to be increased</i></p>	
<p>McKinnon's pond expands this area during flood event by the south on household development of York's.</p>	<p>Install dam and retention works at a controlled level to let the water level to be raised. Stable water levels will support wildlife and eco-tourism livelihoods, and bioremediation.</p>  <p><i>McKinnon's pond was almost dry after an extended 3-year drought</i></p>	<p>Prevent flooding under a controlled water level of the McKinnon's pond.</p>
<p>Pipes crossing the waterway, which catch debris and contribute to flooding</p>	<ul style="list-style-type: none"> - Remove the abandoned pipes (co-financing with applicable entities) - Continue discussions with West Indies Oil Company (WIOC) and APUA for solutions to move the pipes that are causing flooding - For other pipes that are in use, work with the owners to establish safe alternatives through public-private partnerships, such as the WIOC pay for the pipes to be moved and build a bridge, and the project pays for some of the restoration 	<p>Move pipes to permit restoration of the waterway, Reduced flooding as the pipes are blocking the waterway. Increase safety for kids who use the pipe as a bridge. Prevent an environmental impact if the pipe is carrying oil, wastewater or sea water!</p>

	<p><i>Pipes crossing waterway are to be elevated along with a bridge built (public-private partnership will be pursued with West Indies Oil Company)</i></p> 	
<p>There is no water park, wet area or water structure to retain water on the water run.</p>	<p>Install a dam or a structure to retain water near Wood Malls north of the road and another dam south of the road. And possibly one or two culvert of 300 mm across the water run to let cross the people, create a water retention site, but these structures will be no more than 500 mm and a large flow could pass over retaining only a blade of water.</p>  <p><i>Eroded infrastructure by Woods Pond</i></p>	<p>Retain a maximum volume of water for a period of 6 hours during a tropical storm. To make sure that all the flow will not arrived immediately to the bridge near the pond</p>
<p>Water run's slope and design are not constant</p>	<p>There is a waterway identified for all the watershed, but slopes and form are not constant and not all the time consistent caused by development. Space and slopes both side of the water run have to be verified to evacuate the capacity for all the flow (in fact a large part have a good capacity).</p>	<p>Create a uniform waterway from the Mall to the pond.</p>

<p>In many sites garbage was observed all along the catchment run.</p>	<p>Remove the garbage and make sure that the waterway will stay clean of debris who can stop the water or could jam the flow (this could be done through issuing of a contact under Component 3)</p>  <p><i>Component 3 will target public awareness about the flooding impacts of improper solid waste disposal</i></p>	<p>No external debris will jam the flow</p>
<p>Trees and grass was cut and removed leaving place for erosion.</p>	<p>Some trees and a full floor coverage of ideal grass species must be maintained on the water run, transforming it into an urban park.</p>  <p><i>Revegetation along bare areas of the watercourse to improve water quality and create attractive setting for residents to enjoy</i></p>	<p>Trees and adapted grass will: Prevent erosion, retain as much as possible water, be able to grow with roots into a wet area and able to use wastewater as sources of nutriment and by the way purified the environment.</p>
<p>Wastewater is observed on the last part of the catchment and it's providing from overflow of septic tanks.</p>	<p>It is recommended to implement a mandatory cleaning of septic tank each two years, to connect all the zone to a central sanitary sewage system, or to implement community septic systems, which would also encourage more compact development that allows for greater green spaces, lowering runoff coefficients.</p>	<p>Increase safety by taking away disease-carrying mosquitoes Decrease odors of rotten eggs,</p>

	<p>Identify type of plant, grass or trees who can grow into this environment and can use the gray water as nutriment</p>  <p><i>Evidence of poor water quality; the condition and water quality of the waterway will impede the success of the adaptation interventions.</i></p>	<p>Using bioremediation to help sanitation</p>
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Several “soft” policy and training activities under this project include incorporating new climate-resilient guidelines and standards into the Building Code for climate mainstreaming; and integrating the LAP into the implementation practices and work plan of the Development Control Authority (DCA). Training will be implemented using the guidance provided in Appendix 15, which is the CTCN-supported Workforce Development Strategy for targets in Antigua and Barbuda’s Nationally Determined Contribution. Further, the climate-resilient technical engineering drawings for the waterway (Output 1.1.1) will serve as a benchmark for adaptation in other waterways and watersheds across the island. The final activity under Component 1 is to prepare management and monitoring plans and train implementers to sustain and scale up project interventions and continue Component 1 interventions after the life of the project. Budgetary allocations for the policy interventions and training implementation under this project are minimal; the “soft” adaptation interventions will be supported by SCCF activities (Appendix 18).

2. Revolving Loans for homes in McKinnon’s watershed to meet new adaptation guidelines established in the building code and physical plan

Component 2 will strengthen buildings (homes and businesses) through unsecured low interest loans for vulnerable homes and businesses, thereby incentivising compliance with the Building Code, which is currently under revision for climate resilience measures. The objective is to disburse low interest loans through the Sustainable Island Resource Framework Fund (SIRF Fund) Revolving Fund adaptation window. This loans program will be established and regulated under the Finance Administration Act of 2006, Section 42 on “Special Funds,” which enables repayment into the revolving loan program⁵⁰. The revolving fund program will also be vested into relevant institutional arrangements through

⁵⁰ Finance Administration Act or 2006, Section 42. http://www.oas.org/juridico/PDFs/mesicic4_atg_fin_adm_act.pdf
Accessed April 6, 2016

the Special Fund regulations, which will be convened to oversee operationalization, disbursements and monitoring. This activity is being initiated under the GEF-funded Special Climate Change Fund (SCCF) project in Antigua and Barbuda, which beginning in 2017 will disburse US\$1.6 million through the Revolving Fund mechanism for households and businesses. The draft regulations provide the framework of the activities to be funded, the management structure of the window, eligibility and priority for borrowing, environmental and social safeguards and reporting requirements.

Consistent with an unidentified sub-project approach, there is a five-step process that will be followed to validate the household loans to ensure that activities will meet adaptation and resilience criteria. These steps are detailed in the Environmental Social and Gender Management Plan (ESMP) in Appendix 1, and risk management procedures are described in the ESMP and mitigation measures are tracked in the Risk Register in Appendix 12.



Figure 12. Roles and Responsibilities in the Loan Decision-Making Process. Source: Appendix 1: Environmental Social and Gender Management Plan (ESMP).

Loan applications are made to the Loan Officer, who screens for compliance with eligibility criteria and the ESP Principles using a checklist (see Appendix 1).

Applications are then passed on to the Technical Evaluation Committee (TEC), a sub-committee of the TAC, to conduct the field assessment per the pre-defined criteria, working with the Physical Planning Department, DOE, and the Technical School Department of the Ministry of Education. Revolving Fund operations will use the opportunity to train young persons in technical schools on how to provide technical assessment and reviews of adaptation interventions.

The technical teams will screen applications for basic eligibility and ESP compliance, and ensure they are complete prior to the Loan Board’s review, as well as follow up with applicants and provide status reports to the Loan Board. Once appraised by the Loan Board, applications are submitted to the SIRF Fund General Board for final approval. Compliance with the 15 ESP principles using the established checklist informs decision-making process for the Loan Board’s approval decision.

If loan applications deviate from the baseline conditions for the 15 ESP principles identified in the ESMP, then the TEC works with the loan applicant to address risks. These are documented in the ESP checklist and passed on to the Loan Board, which is guided by the DOE’s risk management policy and the project’s ESMP.

Institutional Arrangements – Loan Board and the Technical Evaluation Committee

The SIRF Fund Revolving Fund Facility Board, or **Loan Board**, comprises volunteer members nominated by the General Board of the SIRF Fund and appointed by the Governor General. Loan Board members are recruited for their expertise and potential to make a positive contribution to the Revolving Fund. The Loan Board will comprise a minimum of four (4) members and a maximum of eight (8) members.

The Loan Board reviews all loans, and makes recommendations for approval. The SIRF Fund General Board has the authority to approve loans and pledge assets (the Government assumes the risks of these loans and the Ministry of Finance is represented on the General Board). The Loan Board is responsible for the design, maintenance, and use of the loan funds.



Figure 13. The project will collaborate with a local e-waste facility to ensure proper disposal of appliances

Loan Facility activities:

Environmental Protection and Management Act (2015) Section 88:

At Stage 1, the project will develop informative and educational material about climate change and adaptation at the household level, so that potential beneficiaries understand activities that can and cannot be funded by the project. Prior surveys in the project site have shown that community members have a high understanding of climate impacts. However, technical knowledge on adaptation is low, and the project seeks to address this knowledge gap.

A draft information package, which is included in Appendix 5, provides a basis for loan approval. If household members apply for loans to cover activities not listed in the information package, when the interventions are reviewed by the Technical Evaluation Committee (TEC) in Stage 2, the TEC will evaluate the adaptation value of the interventions, and add the new interventions to the information package so that other interested loan applicants can benefit from a wider variety of approaches to adaptation. This approach will facilitate shared learning and innovation. In addition, the information package will be reviewed and revised as the Building Code is updated. The update of the Building Code to be climate resilient is budgeted under Output 1.1.1 and will provide the basis for guiding the TEC evaluation under Stage 3. Additional detail on roles and responsibilities is covered in Section II.B.

The five stages outlined in Figure 12 will ensure compliance with the 15 areas of the Fund's Environmental and Social Policy (ESP) for the unidentified sub-projects. In addition, the Environment Act in Section 88 requires by law that the SIRF Fund's activities are audited and reported in a transparent manner. The following Section 88 applies to the Revolving

(1) Subject to sub-section (2) and not later than the three months after the end of each financial year, the [SIRF Fund] Board shall submit to Cabinet an annual report on the work and activities of the Board for that financial year and Cabinet shall not later than one month later lay the same in Parliament.

(2) An annual report pursuant to sub-section (1) shall be in such form as prescribed by Regulations and shall be accompanied by the auditor's report pursuant to section 87.

(3) A summary of an annual report pursuant to sub-section (1) shall be published in the Gazette and at least two newspapers in general and at least weekly circulation in Antigua and Barbuda and the entire annual report shall be made available to the public in electronic format.

Draft Terms of Reference for the Loan Officer, the Technical Evaluation Committee (TEC), and the Loan Board of the Revolving Fund are provided in provided in Appendix 13, and will be reviewed and adopted by the SIRF Fund Board at its first meeting. The SIRF Fund Board's procedures are governed by the regulations (draft regulations are provided in Appendix 10). The Commonwealth Climate Finance Access Hub is funding a National Climate Advisor with the DOE for up to two years, who will be available to assist with SIRF Fund operations.

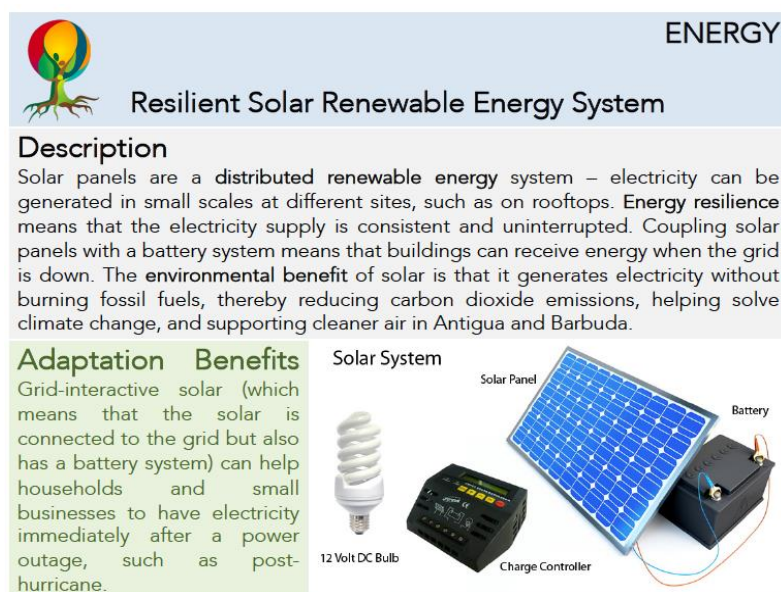


Figure 14. Screenshot of the draft information package material in Appendix 5 on adaptation options in buildings

Output 2.1.1. At least 5% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards

There are approximately 5,000 buildings in the McKinnon's area, of which an estimated 4,000 are homes. The target under this output is that at least 5% of the homes in McKinnon's watershed area benefit from adaptation interventions – totaling approximately 200 vulnerable households. The Revolving Fund under the SIRF Fund will be capitalized with USD 3 M through this project (including management fees). With the

available financing for small loans in total, the average loan size disbursement will be ~USD 14,550. The adaptation small loans will be disbursed over a period of 18 months. Lessons learned and best practices will be prepared and shared for the entire island, as well as regional and international entities. The lessons learnt will be used to extend the scope of the revolving funds to the entire island, and to other islands in the Eastern Caribbean sub-region, which is an established economic union.

This component's impact will improve access to adaptation financing for the private sector by capitalizing the revolving loan for adaptation window of the SIRF Fund business plan, which has been established under the SCCF project. These are designed for homes and small businesses particularly those that are located in areas designated as vulnerable sites by the local area plan process. This component's design is gender-responsive as micro, small and medium enterprises are noted as critical to the generation of economic activity and long-term stability, and women are considered to dominate this often-informal sector⁵¹. By reducing the vulnerability of this informal home and small business sector, and by tracking project interventions to ensure that benefits reach target populations, this project will support national gender equity goals.

The Revolving Fund program will also contribute to the community's awareness of adaptation and climate change impacts. This will be complemented and enhanced through the provision of training on accessing innovative financing for adaptation, which will be delivered by funding provided by the Government (Appendix 15).

This component will have three main activities:

1. Establish the revolving loan program, which will include the legal and institutional arrangements. It is the intention to utilize the capacity and the expertise of the Ministry of Finance, which currently manages an initiative that provides small loans of 10 to 20K USD for education, among other activities, where the loans are repaid through automated salary deductions.
2. Finalization of the adaptation activities that will be funded by the program (and disbursing the loans)
3. Monitoring and evaluation, including next steps for scaling up – this has already been initiated by the DOE through the Green Climate Fund

The criteria to access the funds will be based on in-depth market research to assess: i) the nature of the market e.g. the profile of potential target borrowers, the size of the potential market, and the nature of demand (both financial and technical), and ii) in collaboration with the Ministry of Social Transformation and Human Resource Development and its Gender Affairs Division, to determine eligibility of participants.

Based on the team's experience and knowledge of the community, it is anticipated that the demand for unsecured concessional loans to address climate vulnerability will

⁵¹ Huggins, T. 2014. Country Gender Assessment for Antigua and Barbuda. Prepared for the Caribbean Development Bank (CBDB). <http://www.caribank.org/uploads/2014/12/CGA-AB-Vol-I- JUNE-2014 FINAL.pdf> Accessed May 9th, 2016.

significantly exceed the funds available via the project. This is further explained in *Section H – The Consultative Process*.

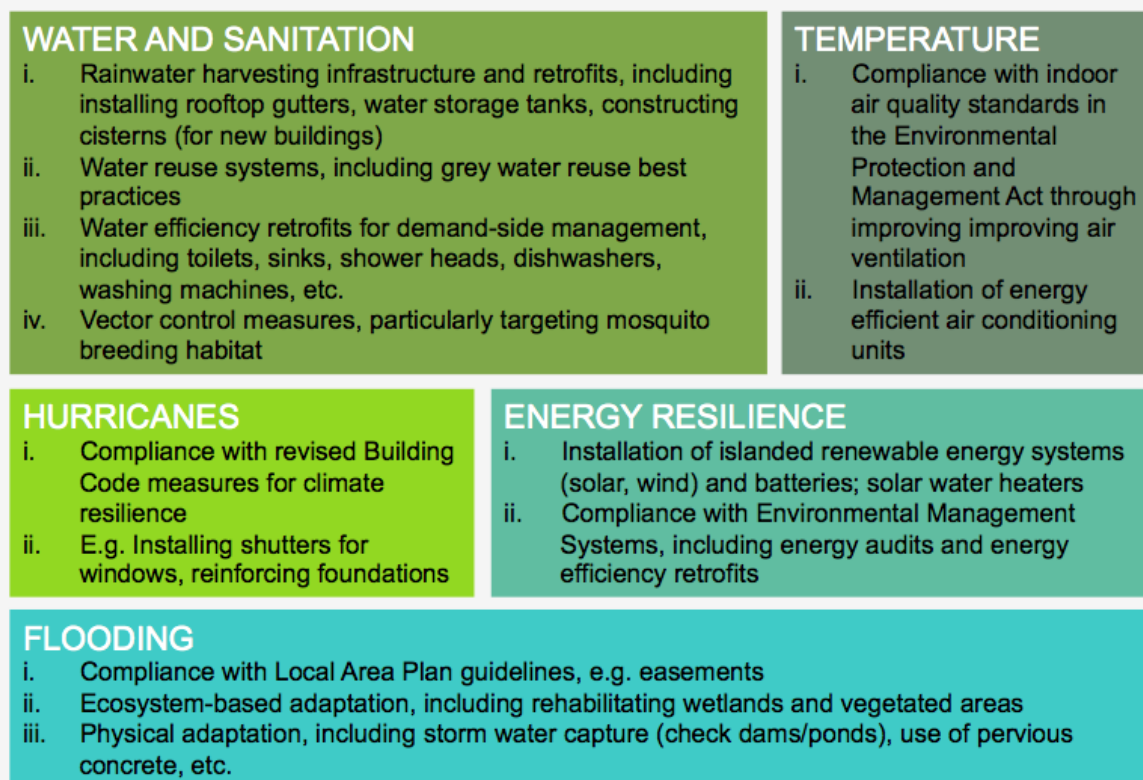


Figure 15. Indicative adaptation activities in buildings to be funded through the revolving loans program with funding from the Adaptation Fund and the Special Climate Change Fund.

3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions

This component is designed to reduce risks associated with extreme weather by providing grants to NGOs and community groups for adaptation activities in buildings, including schools, churches, community centers, and community libraries, among others. The adaptation measures and activities utilize the same adaptation benefit/review criteria as Component 3, however this component is specifically targeted at enhancing social systems to build adaptive capacity. The management of this component, as with Component 2, will be guided by regulations. However, the NGO window of the SIRF Fund will program the grants. Guidelines for these grants will include guidelines for the establishment and where necessary the formalization of shelters for both hurricanes and drought.

Antigua and Barbuda has a proven track record of awarding community grants. The national Global Environment Facility Small Grants Programme (GEF SGP) as awarded 26 community grants totalling US\$ 1,061,705 in the twin island, of which about one

quarter are in community-based adaptation.⁵² In addition, in 2015, the Marine Ecosystems Protected Areas Trust (MEPA Trust) was established as a national trust fund for community grant awards. The GEF SGP programme or the MEPA Trust may be subcontracted as an Executing Entity during project execution to manage the grant awards to community groups.

The decision-making process for grants is based on a competitive Call for Proposals in accordance with the objectives and strategies of the DOE and the objectives of the Adaptation Fund. Grants will be awarded in accordance with the DOE Manual on the Processing of Grants and Revolving Funds (July 2016).

Grant proposals shall be transparently evaluated against criteria; the following is indicative criteria, which will be reviewed by the TAC and approved by the PMC, and communicated with the announcement of the call for proposals:

- Community-based adaptation grants must address a clear climate change related threat and have a clear and demonstrable link to tangible, measurable and visible adaptation benefits for vulnerable communities;
- Clearly demonstrate that they respond to a particular climate change risk that is relevant for the northwest watershed
- Support concrete actions and deliver tangible results that increase resilience to climate variability and change;
- Must be able to show no significant risks in terms of the Adaptation Fund's fifteen ESP principles, or minor risks that can be mitigated, using the screening templates provided;
- Co-financing or the ability to leverage additional funds and in-kind support;
- Demonstrate coordination with other organizations to reduce duplication;
- Existence of partnerships or alliances with one or more organization;
- Endorsements from other recognized agencies or authorities;
- Clear plans for long-term sustainability, continuation and/or replication after initial grant funding;
- Community engagement, particularly for activities where the community plays a central role in its success; and
- Technical competence in project monitoring and evaluation to ensure proper tracking and reporting of grant activities and progress.

To ensure a transparent process, the SIRF Fund shall post the successful grant recipients on its website.

Phase 1: Grant-making Call for Proposals process

⁵² Antigua and Barbuda's GEF SGP Awards:

https://sgp.undp.org/index.php?option=com_sgpprojects&view=allprojects&country=ANT&Itemid=278

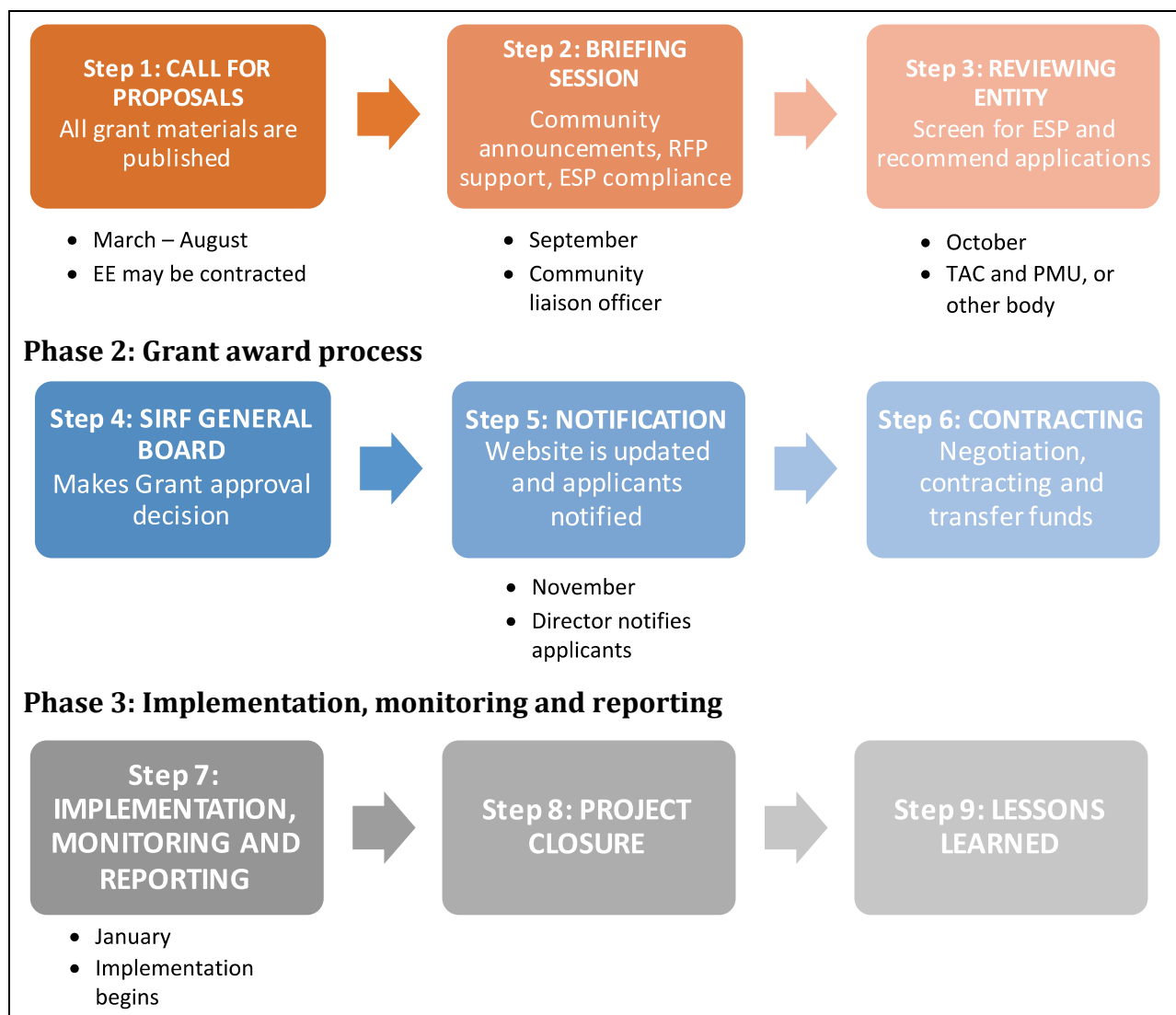


Figure 16. Step-by-step outline of the grant-making process for Component 3 of the project

The community-based adaptation grants are anticipated to be issued in Year 2 of project implementation, and the procedures and criteria for the Call for Proposals will be finalized during Year 1.

Output 3.1.1. 30% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings

Activities to achieve this output include awarding grants to groups in the area and providing training in fiduciary and financial management (particularly procurement) and technical training on adaptation, utilizing adaptation benefit/review criteria developed under Component 2 (Appendix 15). After entering into a MOU between the Department of Environment and the NGO funding mechanism, grants will be awarded and monitored as per the financial regulations.

During the project preparation stage, survey respondents identified the following community groups in the area (Appendix 4):

- Anglican Church
- CERT Members
- Community Watch Group
- Fort Road Community Shelter
- Grace Baptiste Church
- Grace Christian Church
- Jehovah Witness Church
- St Andrews Church, Nazarene
- St. Andrews Church
- St. Andrews Youth Group
- Steel Band Group
- Villa Adventist Church
- Yorks Community Group

Activities to achieve this output include selecting groups in the area that qualify for grants and providing training in fiduciary and financial management (particularly procurement) and technical training on adaptation, utilizing adaptation benefit/review criteria developed under Component 2 (Appendix 15). After entering into a MOU between the Department of Environment and the NGO funding mechanism of the SIRF Fund, which stipulates detailed funding guidelines, grants will be awarded and monitored as per the financial regulations.

Output 3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project

In addition to concrete adaptation in community buildings, this component will train community groups and NGOs to manage the waterway such that the upgrades achieved by the project are sustained and maintained. It is anticipated that if the community maintain the waterways, the community will reduce waste and other negative impacts on the waterway, thus prolonging the impact of the interventions. Activities to achieve this output include implementing a communications strategy for broad-based community education, awareness and mobilization of support, and developing three community contracts for the maintenance and monitoring of the impact of adaptation measures within the areas, as per the management plan delivered under Component 1.

In addition to the community groups listed under the previous section, technicians from supporting agencies identified the Princess Margaret School and the Men Against Negative Attitudes (MANA) Programme as potential recipients of the maintenance contracts. The final selection will be determined by a call for proposals to ensure a transparent and competitive award process.

Beyond the end of the project, the funding for the contracts will come from the SIRF Fund. The SIRF fund business model includes the provision of a water levy that will be used to protect and manage wetland and waterways such as the one within the project site. This

is legal requirement and mandate of the Environmental Protection and Management Act (2015), and is a feature of the sustainable financing approach of this project.

B. Benefits: economic, social, gender, and environmental

Introduction

In the McKinnon's area, people's livelihoods are dependent on a range of small and medium enterprises (such as shop keeping, farming and fishing) and civil service professions (such as teaching, security and medicine). Some areas of the Yorks Community (in the vicinity of St. John's City) are categorized as slum areas, and these unplanned settlements are among the most vulnerable to extreme weather and climate events⁵³. Therefore, as new adaptation standards are mainstreamed in building codes and other legislation, it is recognized that, to deliver transformative change on the ground, accessible and affordable financing must be available to help the most vulnerable from disproportionately bearing the impacts of climate change and being "left behind" in adaptation.

An environmental and social impact assessment was conducted by independent local consultants during the project preparation stage, and the analysis of the project has concluded that it has overwhelming potential to improve the current situation of the community and the watershed area. The ways in which this will happen include: 1) reversal of the current trend of degradation of the McKinnon's pond and its associated environs, 2) significant improvement in the resiliency of the community to recover from climate change impacts such as extreme weather events, 3) improvement of capacity of community organisations to assist in recovery from climate change impacts such as droughts, and 4) improvement in the landscape with the removal of solid waste as a co-benefit to the enhanced drainage systems.

The benefits of this project will be maximized by its integrated economic, social and environmental approach. The project's watershed or "landscape" methodology will benefit an estimated 4,700 households and businesses residing within the McKinnon's watershed boundary – this equates to approximately 14,100 persons to benefit from project interventions, or 15.6% of the population of Antigua and Barbuda.

Component 2 is anticipated to benefit approximately 150 – 200 families over the life of the project through the Revolving Fund mechanism. Lessons learnt the results will attract other donors to scale up the Adaptation Revolving Fund of the SIRF Fund. It is expected that over 150 jobs will be created by this project in the area for construction.

Component 3 will build the adaptive capacity of the community as a whole, by working with community organizations and where necessary formalizing such groups. The project is designed to empower community groups to design and implement solutions to climate vulnerability.

⁵³ CARIBSAVE, 2015. Local Area Vulnerability Impact Analysis, p. 25

The project will have a positive impact on the entire country and the other nations in the Organization of Eastern Caribbean States (OECS) by assisting with the piloting of the climate-resilient building codes for the OECS and the sustainable financing mechanism.

Economic Benefits

Tangible economic benefits will be enjoyed by the beneficiary population through project interventions that will increase the waterway capacity from a 1 in 5-year rainfall event, to a targeted 1 in 50-year rainfall flooding event.

The Revolving Loan Facility – Adaptation Set-Aside will benefit 150 – 200 households and small businesses through the loan disbursement of the US\$3 M principal. In addition, the financial model suggests that US\$5.8 million in additional loans can be created without replenishment of the initial US\$3 million through the revolving loan structure over the financial model's 10 year projected period (Appendix 3).

Social and Gender Benefits

This project will provide financing to communities that have traditionally had difficulties accessing resources. As opposed to centralizing support for hurricane shelters, the structure of this project is to allow people to safely live in their homes that upgraded to be resilient to the impacts of climate change. These resilience measures includes the interventions at the home that will address drought and other extreme events – meaning that they can go to work, school and take care of families. The project is expected to positively impact people's wellbeing particularly that of women.

“Women participants from a focus group discussion held in the community shared the frustration with the poor drainage systems and highlighted how it affected their health, security and livelihood. Women from the focus groups described how they have had to negotiate the high levels of water to save their lives, such as the use of sticks and pipes to pull each other out of their homes. The flooding has impacted children's access to school. Flooding also makes mobility difficult for both men and women.” – Gender Expert reporting on Focus Group Discussions held for the Adaptation Fund Project (Appendix 1)

The Ministry of Financing will underwrite the risk of the Revolving Loan Facility, which enables the Facility to offer unsecure loans and thereby securing access to credit by the most vulnerable communities, and vulnerable groups within communities. Local area vulnerability studies have suggested a high prevalence of female-headed households in the McKinnon's area,⁵⁴ and women can encounter significant barriers to accessing credit in the island.

The *Aedes aegypti* mosquito which is the vector for Zika virus that is present in Antigua, as well as dengue fever, and Chikungunya, breeds preferentially in stagnant water especially water containing bacteria associated with the breakdown of organic matter

⁵⁴ CARIBSAVE 2015. Local area Vulnerability Impact Analysis for Antigua and Barbuda

such as dead leaves. Interventions in the waterway so there are fewer places where water can stagnate will ease this problem.

Since flooding is one of the most common hazards that affect the community on the northwest coast and women headed households are affected disproportionately, the re-engineering of the waterway will have a positive impact on the community particularly women who are at a greater risk of injury and death due to societal restrictions and gender roles.

Environmental Benefits

Component 1, will be designed to provide as natural as possible a design for the interventions in such a way that the community can be involved in the maintenance and care of the results of this intervention. Further the component will be designed to ensure that the plants used to secure the buffer/easement areas can be used for the community as food (such as mango trees are very good for stabilization of waterways) or for well-being and shade.

The specific interventions under Component 1 will have the following positive environmental benefits: i) reduced rates of run-off; ii) decreased soil erosion; and iii) regulated flow of water in waterways flowing through local communities. The project activities are 'no regrets' interventions because they will improve upon the baseline conditions regardless of the severity of expected climate change effects. Environmental benefits are derived from the project's impact to improve functioning of watershed ecosystems and enhance the capacity of local communities to implement climate-resilient measures in these watersheds.

Environmental and Social Risk Management

The project will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund. The Environmental and Social Impact Assessment developed as part of the project preparation activities identified potentially negative side effects from project activities. These can be summarized as follows:

- 1) Pollution of the waterway during adaptation construction activities by inadequate disposal or storage of construction materials, waste removed from the waterway including vegetation;
- 2) Issues related to the targeting of loans to the vulnerable, recovery of loan amounts; and
- 3) Disproportionate exclusion of the most vulnerable, including women and the disabled, from the design and implementation of project activities.

However, the reviewers concluded that these impacts can be minimized or eliminated through a comprehensive risk management process. Measures are outlined in detail in Appendix 1, and include but are not limited to:

- Protection of the watershed by removing waste promptly or storing it to prevent its entry into the waterway.

- Inclusion of guidelines for disposal of waste when upgrades are being made for climate adaptations
- Monitoring of water quality at key stages of the project to ensure there is no deterioration of water quality
- Prompt re-vegetation of the banks of the water course to minimize erosion
- Instituting special arrangements for loan recovery including salary deductions and standing orders
- Deliberate targeting of vulnerable groups and training for inclusion of women at as many stages as possible⁵⁵.

Components 2 and 3 will require planning permission for each of the buildings to be affected by financial inputs. The planning permission process will determine the environmental and structural impacts of each activity. The review process at the planning office (the Development Control Authority) is to determine the environmental and structural impacts.

The legal mandate for the EIA is established under Section 23 of the Physical Planning Act of 2003⁵⁶ and Section 38 of the Environmental Protection and Management Act of 2015. These sections define an EIA as, “an analytical system of assessing or reviewing environmental, social and economic consequences that are likely to result from a proposed development activity, beginning at the inception of the activity and ending at its completion or decommissioning.” The Department of Environment has the mandate to draft the Terms of Reference (TOR) for the EIA for the review of the Technical Advisory Committee. The TORs draw on its governing policies including ESS and gender considerations (Appendix 13 for EIA Terms of Reference), and used as a starting point the DoE’s standard EIA approach, adding additional provisions to comply with the Adaptation Fund’s environmental and social policy, specifically:

1. Compliance with the Law
2. Access and Equity
3. Marginalized and Vulnerable Groups
4. Human Rights
5. Gender Equity and Women’s Empowerment
6. Core Labour Rights
7. Indigenous Peoples (not applicable)
8. Involuntary Resettlement
9. Protection of Natural Habitats
10. Conservation of Biological Diversity
11. Climate Change
12. Pollution Prevention and Resource Efficiency
13. Public Health
14. Physical and Cultural Heritage
15. Lands and Soil Conservation

⁵⁵ Appendix 15 is the Workforce Training Strategy and the strategy actively encourages the participation women and under-represented groups in all sectors of the workforce.

⁵⁶ Physical Planning Act, 2003. Government of Antigua and Barbuda. <http://laws.gov.ag/acts/2003/a2003-6.pdf> Accessed May 3, 2016.

C. Cost-effectiveness

The following compares the proposed components to viable alternatives to achieve the same impact, with a focus on economic comparisons to the extent possible.

Table 5. Scenario planning to demonstrate cost-effectiveness of the project

Viable alternatives	Assessment of alternatives (cost-effectiveness)
COMPONENT 1 – Upgrade Urban Drainage and Waterways	
Do Nothing	<p>If no interventions are taken, the communities surrounding the waterway as well as residents and businesses in low-lying areas will suffer from more intense and more frequent flooding. Infrastructure within 50 m of the targeted waterway leading into McKinnon's Pond includes 424 buildings (22,000m² in total) and 7.25 km of roads. Damages to this infrastructure would continue to incur millions of dollars in damages following disasters. While the upfront cost here of "do nothing" is zero, <i>ad hoc</i> disaster response costs to flooding are estimated at least 10 M USD per Category 2 or higher hurricane for the property along the waterway alone.</p> <p>Additionally, doing nothing will also allow the vulnerabilities to communicable disease to persist and perhaps worsen. The communities surrounding the the waterways leading into McKinnon's Swamp are some of the densest in Antigua. Further, the area is in proximity to one of the most active tourism, shopping and cultural zones further exposing large numbers who visit and transit to the area to diseases like zika, chikungunya and dengue.</p>
Construct concrete drains to channel water from and through the watershed and into the Pond	<p>It is the normal response for the Government to construct concrete drains for improving the waterway's ability to manage the increased quantity of rainfall due to intensity and runoff trends. Construction of the concrete drains along the 3 km of waterways is estimated at 4 M USD and is therefore a more costly option compared to climate resilient urban drainage (approx. 3 M USD). In addition, this approach increases runoff into McKinnon's Pond and would require regular dredging of the Pond every 5 – 7 years, which is approximately 1.5 M USD per dredging. Ecosystem-</p>

	<p>based resilient drainage is therefore significantly more cost effective.</p> <p>In addition, the concrete drain approach displaces ecosystem services of water filtration, biodiversity including critical wetland and bird habitat, and traditional uses of the waterways. Although these ecosystem services have not been valued to date, the produce tangible benefits to the community and local economy. This project aims to demonstrate the alternative ecosystem-based approach that the Public Works Department may consider for future waterways.</p> <p>Concrete drains are however easier to keep clean from solid waste and are therefore preferred option by the Public Work Department. The project will have to apply best practices in this regard.</p>
Increase application of chemicals used in spraying to control mosquito populations	<p>With the construction of hard surfaces there is the risk that the settlement of water will occur and provide a breeding place for vectors. This will have to be treated with chemicals, and Malathion is most commonly used in Antigua and Barbuda. Malathion affects the nervous system, and other health impacts have been linked to the chemical. An ecosystem approach uses native fish species and other predators within the waterway to control the vector populations.</p> <p>In 2016, the Central Board of Health (CBH) was budgeted EC\$3,574,679 (or US\$1.3 M) for the year for Vector Control. This represented a 25% budget increase in vector expenditure in just two years – the 2014 vector control budget was EC\$2,841,903.</p> <p>The cost to the Central Board of Health for vector control over the next 10 years is likely to range from a minimum of US\$13 M to upwards of US\$23 M.</p> <p>Assuming the trend of a 25% budget increase every two years, over the next decade the Central Board of Health could spend upwards of US\$23,494,792 on vector control measures.</p>
COMPONENT 2 – Revolving Loans for Adaptation	
Do Nothing	Not including this small loans component in the project risks the project negatively impacting residents on the

	<p>northwest coast of Antigua. Raising the profile of climate risks in the community through hazard mapping and climate projection forecasting can have negative impacts on community perceptions of their area and its safety, and can even result in lower property values or higher insurance rates. This can impact of the those property still making mortgage payments if banks become sensitized to the hazard information. “Do nothing” by eliminating this component of the project could undermine total project impacts and thus jeopardize future adaptation interventions and the political will for tackling climate change.</p>
<p>An alternative to the Revolving Loan Facility is to award the US\$3 M in grants to homeowners</p>	<p>Approximately US\$5.8 million is created in cumulative impact without replenishment of the initial US\$3 million through the revolving loan structure. By allocating funding through a revolving structure, the Facility nearly triples the overall impact of the funding from US\$3 M to US\$8.8 M in total (Appendix 3 – Financial Model).</p>
<p>Construct shelters to meet category 5 hurricanes and flooding</p>	<p>The cost to construct a basic community shelter is estimated at EC\$1.5 M (US\$560K) for a single storey building, and EC\$3.5 M (US\$1.3M) for a double storey. However, the cost of constructing a climate resilient community shelter with a reliable source of electricity, water and necessities, is estimated at double that cost. For the population of McKinnon’s watershed of approximately 5,000 people, at least three double storey community shelters would be needed, at a cost of approximately US\$7.8 M.</p> <p>There are over 600 hundred homes within the 100ft safety mark for the waterway. It would take well over three shelters to provide for all of the persons who live in the community.</p> <p>This alternative would also fail to mitigate the economic and social losses and damages inflicted under the “do nothing” approach, namely direct threats to over 400 homes and buildings. Instead, this intervention would improve emergency disaster response and provide shelter during emergencies. However, the provision of shelters does not combat slow onset events – for example the ongoing drought of 2015 has cost the</p>

	<p>government an estimated hundreds of millions of dollars.⁵⁷</p> <p>This scenario could also result in increased squatting or the establishment of illegal (unapproved) structures as people may find the direct costs of resilience measures too high, potentially resulting in increased damage during the passage of storms.</p> <p>Instead, by improving the infrastructure of people's homes, this project will also reduce the risk to loss of life due to natural disasters, while also contributing to economic prosperity and improving quality of life enjoyed year-round, especially in the face of slow-onset climate impacts.</p>
The alternative to SIRF small loans for homeowners is to demand that the homeowners meet the requirement of the new Local Area Plan and the building codes at their own cost.	<p>This alternative would externalize the cost of compliance to the private sector and homeowners, however arguably this could result in indirect costs to the government in the form of welfare and increased social services to the area. In addition, this alternative has high political risks since this will marginalize most families within the area, especially low-income families.</p> <p>A further alternate to loans is the Government providing grants. This is not a viable option due to the Government's high indebtedness.</p>
COMPONENT 3 - Capacity Building In NGOs And Community Groups	
Do Nothing	<p>Eliminating the mainstreaming and capacity building interventions under this project is not a cost-effective option, as the benefits of the project would likely not be sustained beyond the life of project implementation. The Department of Environment recognizes the importance of building partnerships and sharing in missions and activities, and capacity building of implementing partners, including NGOs and community groups, is a critical sustainability element of this project.</p>
The project can conduct the regular public awareness and hope that can change behaviour of the community and Government agencies	<p>Although this is a common method to change behaviour, the current project activities will go a significant step further to ensure that the awareness program can speak to the issue of economic, health</p>

	and other important sectors regarding the project area and impact.
The project could design a top down approach to address the problems within the community. The Government could be solely responsible for conducting M&E and sustaining project activities.	<p>With the Government being solely responsible, this will rely on Government resources being available, which may not consistently be the case. The community has a vested interest in ensuring that the area is maintained and cared for, since this will impact on the health and wellbeing of the community.</p> <p>By investing in community contracts to maintain project interventions under Component 3, the intervention worth USD 3 M under Component 1 will be maintained.</p>

D. Consistency with national & sub-national sustainable development strategies

The project is in compliance with key legislation and policies, namely the Physical Planning Act (2003), the national land use plan (gazetted in 2012), the INDC of 2015, the Third National Communication on Climate Change, and the National Environmental Management Strategy for Antigua and Barbuda.

National Communications to the UNFCCC

In line with UNFCCC requirements Antigua and Barbuda produced their initial (2001), second (2009), and third (2015) National Communications to the UNFCCC. The documents layout the national context in relation to adaptation and mitigation challenges across various sectors in the islands. The Third National communication recommends several adaptation options including: the protection of human settlements from increased intensity in precipitation events, which are at risk of flooding if drainage infrastructure is not upgraded or improved. In the water resources chapter, the authors state *“it is critical that engineers design post- runoff storm drains to equal the natural conditions at pre-development in a given watershed area”*⁵⁸ This is particularly relevant to the community of Yorks, which experiences persistent flooding during heavy rainfall. Furthermore communities must be made aware of potential climate impacts in order to promote co-operation with planning authorities and allow for local co-benefits to emerge.

Nationally Determined Contributions (NDC) to the UNFCCC

Antigua and Barbuda communicated its Nationally Determined Contributions (NDC) to the UNFCCC in October 2015, and ratified the Paris Agreement in September 2016. The NDC included climate action targets to which this project is aligned and will assist with implementation. Relevant targets are:

- By 2030, all buildings are improved and prepared for extreme climate events, including drought, flooding and hurricanes.

⁵⁸ Government of Antigua and Barbuda, Second National Communication, pg. 261

- By 2030, all waterways are protected to reduce the risks of flooding and health impacts.

Physical Planning Act (2003)

This Act controls the development of land; the protection of the natural environment; and building regulations. The Act requires a **National Physical Development Plan**, and includes provisions for development plans for “any specified part of Antigua and Barbuda” (Section 10), coined Local Area Plans (LAPs). The Act (2003) requires certain projects, prior to authorisation, to undertake an Environmental Impact Assessment (EIA). Additionally, this act will set policies and plans which will consider items such as: i) pollution; ii) safeguarding of water supplies water catchment areas and mineral resources; and iii) erosion, land slides and flooding⁵⁹.

Sustainable Island Resource Management Zoning Plan (SIRMZP 2012)

The SIRMZP is the National Physical Development Plan required by the Physical Planning Act of 2003. The SIRMZP arose out of extensive consultation through the Core Zoning Plan Committee comprising of various stakeholder interest groups including government departments, agencies and NGOs. The Plan includes a rigorous discussion of the current state of Antigua’s planning landscape, developments in the management and regulation of planning thus far and the priorities and guidelines for future implementation.

Environmental Protection and Management Act (EPMA) of 2015

The EPMA of 2015 is Antigua and Barbuda’s new overarching environmental legislation, which sets up effective environmental management administrative responsibilities, consolidates multilateral environmental agreements, and establishes a framework financial mechanism to implement the Act (the SIRF Fund).

Sustainable Island Resource Framework Fund (SIRF Fund)

The Government of Antigua and Barbuda is developing a national fund, the Sustainable Island Resource Framework (SIRF) Fund, to serve as the primary channel for environmental, climate mitigation and adaptation funding from international and domestic sources. Legislated through the EPMA of 2015, the SIRF Fund will provide the framework financial mechanism to implement the Act, and is the primary means for implementing Antigua and Barbuda’s ambitious climate action targets. By channeling environmental finance and technical assistance, the SIRF Fund will catalyze internal (protected areas visitor fees, a water levy, a carbon tax, and repayments) and external funding sources to enable the country to meet its climate and sustainability goals in a coordinated, systematic and cost-effective manner⁶⁰.

National Poverty Strategy

⁵⁹ UNFCCC. (2009). Antigua and Barbuda’s Second National Communication on Climate Change.

⁶⁰ The SIRF Fund’s business strategy brief is available for download:
http://www.oas.org/en/sedi/dsd/Energy/SECBI/SIRF_BusinessConceptNote.pdf

The National Poverty Reduction Strategy (NPRS)⁶¹ in 2010 served as the strategic framework, which would guide the macroeconomic, structural and social policies and programs that would be pursued from 2011-2015. The idea was that the NPRS would provide the basis for National Economic and Social Transformation (NEST) Plan 2010-2014 by refining key strategies that are in place, identifying the gaps and supplementing the existing intervention with new ones⁶². NEST is considered a more comprehensive approach to poverty reduction in Antigua and Barbuda, which was developed with the aim of economic rebalancing⁶³.

National Medium-Term Development Strategy (2016 – 2020)

The Medium-Term Development Strategy, finalized in September 2015, represents strategies and actions to be undertaken by Antigua and Barbuda between 2016 and 2020, to move the country towards its long-term development goals. The strategic vision is, “A harmonious, prosperous and modern Antigua and Barbuda founded on the principles of sustainability and inclusive growth; where equality of opportunity, peace, and justice prevail for all citizens and residents”. The attainment of this vision is guided by a sustainable development approach, “To improve the quality of life for all Antiguan and Barbudans and their posterity”. The overarching goal will be attained on the basis of the following four Sustainable Development Dimensions:

1. Optimal Generation of National Wealth;
2. Enhanced Social Cohesion;
3. Improved Health of the Natural Environment and Sustained Historical and Cultural Assets; and
4. Enhanced Citizen Security.

Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW)

The principal instrument for the protection of women’s rights is CEDAW, which was adopted in 1979 by the General Assembly of the United Nations. Antigua and Barbuda ratified CEDAW in 1989 and signed the Optional Protocol in 1996. CEDAW ensures that women are given the opportunity to represent their governments at the international level and to participate in the work of international organizations; that women have equal rights to bank loans, mortgages and other forms of financial credit; and that women in rural areas can (i) participate in and benefit from rural development; (ii) participate in development planning at all levels; (iii) obtain training, education, and extension services; (iv) have access to agricultural credit and loans, marketing facilities and appropriate technology; and (v) are treated equally in land, agrarian reform, and land resettlement schemes.⁶⁴.

E. Compliance with relevant national technical standards

⁶¹ GOAB, 2011. Poverty Strategy Reduction Strategy

⁶² GOAB, 2012. National Economic and Social Transformation (NEST) Plan

⁶³ GOAB, 2012. National Economic and Social Transformation (NEST) Plan

⁶⁴ Huggins, T. 2014. Country Gender Assessment for Antigua and Barbuda. Prepared for the Caribbean Development Bank (CDBB). http://www.caribank.org/uploads/2014/12/CGA-AB-Vol-I- JUNE-2014_FINAL.pdf Accessed May 9th, 2016.

In Antigua and Barbuda, any intervention in sensitive ecosystems that includes alteration or modification of wetlands requires an Environmental Impact Assessment (EIA) in accordance with Third Schedule of the Physical Planning Act of 2003. The Act further provides the timing and responsibilities of the various stakeholders throughout an EIA process. Additionally the work will be in line with the guidance provided in the national zoning plan of 2012 as well as the Environmental Management and Protection Act of 2015 (EPMA).

The EPMA's Part VI "Environmental Management and Monitoring", in Section 39, provides for Environmental Management Systems (EMS). This Section mandates that the Department promote the adoption and implementation of EMS, and that it assist the Bureau of Standards in this regard. The EMS will guide compliance with the objectives of the Environment Act, including compliance with permissible levels of pollution, protection of waterways, efficient use of resources, and other environmental principles established by the Act. In February 2016, the Department of Environment submitted a request to the Bureau of Standards to develop national EMS, and the development of EMS is currently underway.

In order to comply with relevant national technical standards, a development application for the project design will be shared with the Development Control Authority (DCA) by the National Implementing/Executing Agency – the Department of Environment. The Department of Environment is responsible for identifying Environmental and Social Safeguard (ESS) risks and recommending mitigation measures to the risks in the EIA. Technical staff at the Department of Environment are trained and qualified to direct safeguards in this process. The development approval process takes approximately 3 months, based on the Department's previous experience, and the EIA process takes an additional 3 months.

Technical standards for the interventions fall under the Public Works Department (PWD), however current standards are not climate-resilient. As such, the building code and infrastructure guidelines are in the process of being updated through the parallel Global Climate Change Alliance project (2014 – 2018). The Caribbean Examination Council (CXC) is also developing a course in Cape Green engineering course <http://www.cxc.org/cxc-launching-cape-green-engineering-syllabus/>.

The authorization/clearance for the project to be implemented is by Statutory instrument (see example from Official Gazette of 2004, Vol. XXIV, No. 43). During project implementation, the Technical Advisory Committee (TAC) is responsible for ensuring the technical integrity of the project. The TAC assists with the preparation of TORs for consultancies as well as providing a technical assessment of bids when submitted. This body is comprised of technical officers from a cross-section of ministries and experts from private and non-governmental agencies.

The GIS and mapping components of this project will comply with GIS standards in the Environmental Information Management and Advisory System (EIMAS), a GIS-based database of environmental information in Antigua and Barbuda. Relevant technical

standards include metadata, coordinate systems, accuracy and groundtruthing. Baseline data contained in the EIMAS will be a great benefit to this project, and GIS data developed through this project (including the hazard mapping and climate impact modeling in Component 1) will be integrated into the EIMAS to inform future decision-making.

F. Other funding sources

This project does not duplicate other efforts, however it is aligned with the Department of Environment's work programme and therefore complementary and parallel initiatives are underway. The Department of the Environment uses the same project management strategy and structure across all of its projects. This approach maximizes resources and ensures coordination of activities. Complementary initiatives with linkages and synergies to this project are summarized below.

The Government will however need other funding and resources to achieve resilience on the northwest coast. It is anticipated that these resources will be identified during the project planning stage and earmarked through a Cabinet decision.

The UNEP GEF project titled **Sustainable Pathways – Protected Areas and Renewable Energy** (SPPARE), was approved in December 2014 and will be implemented from January 2015 – December 2018. The project will enhance the financing and management of ecosystem services, through developing and operationalizing the **Sustainable Island Resource Framework Fund (SIRF Fund)**. The outcome of the SPPARE project includes the development of a business plan for the implementation of the financial plan and associated legislation – the Environmental Protection and Management Act of 2015. Moreover, the SPPARE project will establish the environmental management window of the SIRF Fund⁶⁵. The proposed AF project will use the adaptation window of the SIRF Fund to distribute and manage the revolving loans and grant financing, thus drawing on the knowledge base of and creating synergies with the SPPARE project.

The **Special Climate Change Fund (SCCF)** project, “Building climate resilience through innovative financing mechanisms for climate change adaptation” (estimated 2016 – 2019) has received US\$5 million from the GEF with UN Environment serving as the Implementing Entity and the DOE as the Executing Entity. The SCCF project will develop a local area development plan for McKinnon's Pond, building on previous work and participatory processes. The project will implement physical interventions in the upper area of the McKinnon's watershed. The SCCF project will establish the SIRF Revolving Fund for Adaptation and capitalize the SIRF Fund with an initial US\$1.6 million. The SCCF project was launched on 5 – 6 December 2016, and the first disbursement through the Revolving Fund is scheduled for February 2017.

⁶⁵ The SIRF Fund's business strategy brief is available for download:
http://www.oas.org/en/sedi/dsd/Energy/SECBI/SIRF_BusinessConceptNote.pdf

The **Global Climate Change Alliance (GCCA) Project** on Climate Change Adaptation and Sustainable Land Management in the Eastern Caribbean will implement: 1) Effective and sustainable land management frameworks and practices, and 2) Specific physical adaptation pilot projects in relevant areas or sectors. The first component is the main source of complementarity, as the framework includes undertaking a stakeholder dialogue and developing a National Climate Change Policy, Strategy and Action Plan. The project will also deliver base maps to determine land capability (including geotechnical, hazard maps) and support land use planning, as well as development and approval of a revised National Building Code and Ordinance. For the second objective, the Project will co-finance physical interventions in the Cashew Hill area, in the St. John's watershed (approx. US\$1 million).

In addition, it is expected that there will be some projects funded through the **GEF Small Grants Program (SGP)** to be implemented in the project site in the near future. During the implementation of the proposed SCCF project, there will be close coordination between it and the proponents of any GEF SGP initiatives to ensure complementarity between activities.

The **Commonwealth Climate Finance Access Hub** initiative is supporting a National Adviser for the period of 12 months (with a possibility to extend for another 12 months), to be stationed in Antigua and Barbuda. The initiative will build capacity through the placement of long-term expertise in country to assist in accessing climate finance. The initiative will strengthen and support the DoE's initiatives to scale-up access to climate financing, supporting Component 2 of this project (Appendix 11).

UNEP is providing legal technical support to the Department of Environment to revise the Environmental Protection and Management Act (2015) and to develop comprehensive regulations for the Act.

The **Green Climate Fund (GCF)** announced a Request for Proposals for Enhanced Direct Access (EDA), and the DOE in Antigua and Barbuda is developing a US\$20 million proposal in collaboration with the Commission of the Organization of Eastern Caribbean States (OECS), and the Governments of Grenada and Dominica. The EDA project will scale up the Revolving Fund for Adaptation being piloted in Antigua and Barbuda under the SCCF and the Adaptation Fund projects, and will capitalize the fund with an additional US\$3 million in each country (Appendix 11).

G. Learning and knowledge management to capture and disseminate lessons learned

The Department of Environment (DOE) is implementing a Knowledge and Information Management System (KIMS) with the responsibility of maintaining an up-to-date inventory of information on all ongoing activities. The base of the KIMS relies heavily on the Information Communications and Technology (ICT) infrastructure that resides at the DOE. This System, along with its infrastructure, allows the Department to comply with

Part IX of the Environmental Protection and Management Act (2015), which calls for the storage of “all documents produced, collected or submitted to the Department”. This present project will utilize the KIMS, and associated components, to capture and disseminate lessons learned.

The DOE manages an environmental Geographic Information Systems (GIS) database – Environmental Information Management and Advisory System (EIMAS), a functional comprehensive environmental data repository. This database consists mainly of shapefiles, feature classes, database tables and raster layers. The methodology utilized to capture and record field data involves a combination of Global Positioning System (GPS), Unmanned Aircraft System (UAS), digitization and ground-truthing. Under this project, a GIS tracking tool will be used to capture the adaptation activities and report on the learning and knowledge management. The Environmental Information Management and Advisory System Data Management Protocol, included in Appendix 14, details an inventory of existing GIS data, the knowledge and information management procedures, as well as access and sharing provisions through the template data sharing agreements.

Primarily, GPS technology will be used to capture data in the field under this project. A data dictionary has been created to facilitate capturing of data on locations of households and community shelters (Figures 12 & 13). This data dictionary will be uploaded to the Trimble Juno 5 series GPS handheld devices that will be used by the Community Based Assessors (CBA) out in the field. Prior to field surveys, these CBAs will be trained in the use of the GPS devices and conduct mock mapping exercises. Training has already taken place with several CBAs to enable spatial mapping of the household surveys conducted for the social market research field component, as demonstrated in Figure 15 below and in Appendix 4.

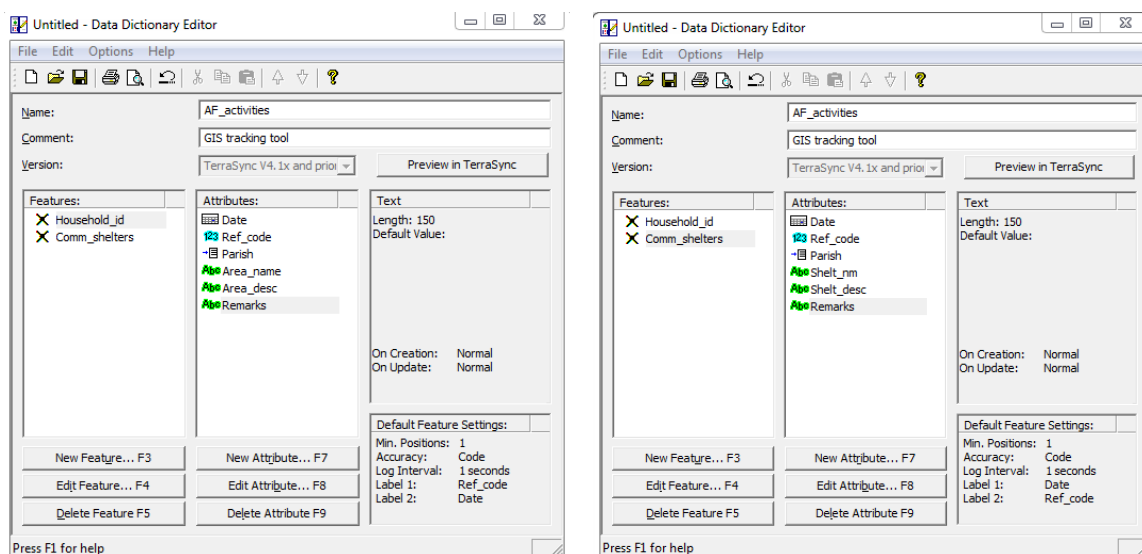


Figure 17. Data dictionary for AF GIS Tracking Tool

The data dictionary captures two specific types of features, namely households and community shelters. The former collects attribute information on date, reference code, parish, name of area, area description and general remarks. The latter will collect attribute information on date, reference code, parish, name of shelter, shelter description and general remarks. Each household and community shelter will have a unique reference code. This data, once downloaded from the GPS devices, will be stored in a feature class format.

The CBAs will also be collecting qualitative information from the households and community shelters. This information will be transferred and stored in an access database, created with specifications relevant to the information collected. In addition, each entry in the database will have a unique reference code that will coincide with the reference codes established during the GPS tracking exercise. GIS will allow for the entries in the feature class to be linked to the access database, thereby transferring all relevant data to the GIS. Analysis and querying of this data will then be conducted.

The final output of this component will be the ability to conduct spatial analysis and create maps that can be included in periodic reports. This will contribute to the monitoring and reporting by tracking progress, and will strengthen the scientific foundation of the learning and knowledge management under this project. Sensitive information will be protected in accordance with the Manual on Revolving Loans in Appendix 9 and the EIMAS Data Management Protocol in Appendix 14.



Figure 18. Data dictionary displayed on the Trimble Juno GPS device

Using this data-driven approach, the project will produce informative visual knowledge products that will be used in communicating and sharing knowledge to promote ecosystem-based adaptation approaches and innovative approaches to adaptation in

Antigua and Barbuda, across the Caribbean, and with small island developing states globally.

These knowledge products will be tailored to target different audiences, namely: the public; technicians; and high-level policy-makers. Tangible, lasting, and concrete outputs include the following indicative products:

- A Local Area Plan available online (Output 1.1.2)
- Informational briefs on the cost-effectiveness of adaptation interventions to be implemented under the Local Area Plan (Output 1.1.2)
- A revised *Adaptation Options in Buildings* informational packet using lessons learned under this project, with printed folders distributed to key partners (Appendix 5)
- At least three documentary-style videos on concrete adaptation interventions uploaded to the DoE's YouTube channel
- A jingle to sensitize the public about the economic benefits of adaptation to climate change

The above listed products will be refined and executed through the development and implementation of the comprehensive communications plan for broad-based community education, awareness and mobilization of support, and the other awareness activities budgeted for in Section G. Detailed Budget.

A Knowledge, Attitudes and Practices (KAP) study found that among respondents in the OECS sub-region, television was the preferred medium for receiving information on climate change (73.3%) followed closely by radio (63.7%). The majority also stipulated news and infomercials as their preferred TV & Radio vehicles for the 'packaging' of such information.⁶⁶ Radio and television will be a key means of communication to the public, however dissemination will target multiple avenues in order to reach a broad audience – for example, according to the KAP Study, younger respondents have a greater preference to get climate change information via websites, email, social media and text messaging. The mediums for communicating project outputs will be subsumed within an overarching communications strategy that will include a range of the following include:

- The Department's website is managed by a dedicated officer, who is also fluent in English, Spanish and French. The website is in English, and lessons learned can be adapted and communicated to other regions
- The Department has an active presence in social media, specifically through its Facebook page and twitter account. The AF project will therefore feature heavily as the project unfolds, capturing and displaying the stories of the residents and persons working closely with the project
- The Department maintains a YouTube channel for videos produced: <http://bit.ly/2c3xWvt>
- The Department further has a positive relationship with a local environmental NGO called the Environmental Awareness Group (EAG). This NGO hosts weekly

⁶⁶ Orange Media, 2014. Technical Report I: GCCA Visibility Strategy & Action Plan. OECS Project on Climate Change Adaptation & Sustainable Land Management in the Eastern Caribbean.

articles in the country's most popular newspaper, who generally has a daily readership of more than 30,000. The Department will partner with EAG to publish articles through the EAG Talk column

- The Department will be using the Botanical Gardens as a centrally located place in St. John's to show case projects and programs, including activities under this AF project
- The AF project will utilize project briefs and power-point presentations targeted at the Ministerial level and Cabinet, to communicate lessons learned for decision-makers
- The Department works closely with the GEF small grants program and its national network to extend the project activities and outputs of the project. The NGOs and community groups are empowered through projects with workshops and sub-contracts for project implementation. Component 3 will use three sub-contracts to NGOs/community groups to implement the project, building on the successful model of the GEF SGP.
- An annual stakeholder consultation meeting will be held with the community members to review progress of the project, including through presentations by beneficiaries, and solicit learning and lessons shared through focus group discussions. Annual meetings will be documented in detailed reports and will form the basis for adaptive management.
- Community members will be encouraged and supported in developing documentaries on the work that they are involved with, in the respective of components 1 and 2 (Box 1).
- Outcomes of the various components will be packaged in briefing notes/press releases that will be shared on the Department of Environment website, websites of local partner stakeholders (e.g. Public Utilities company, National Office of Disaster Services, Environmental Awareness Group, etc.)
- As the national focal point for climate change and other MEAs, the Department travels to the Climate Change meetings and are available to showcase this project at side events. For example, at COP21 in Paris December 2015, a representative from the Department presented at the Adaptation Fund's showcasing event. To develop content to support such engagement, one video and monthly photo blogs of project activities will be developed for sharing with an international audience. This will be done in partnership with an NGO.
- The Department also engages with traditional media and will ensure that the messages and outputs of the project are expressed through regular media blitzes, which include:
 - Radio & Television – Observer, ZDK, Serpent, etc.
 - Print Media – Daily Observer, Caribbean News
 - News Media - Antigua & Barbuda Broadcasting Service (ABS)
 - Cinema – Caribbean Cinemas (a high “bang for buck” publicity)
 - Community noticeboards
 - Proposed Launch Event

VISIBILITY and MOBILISATION⁶⁷

The UNDP FlipCam Project was introduced in 2009 to document their projects on the ground, the FlipCam revolutionized video production at UNDP, enabling a low-cost alternative to acquire footage on UNDP projects around the world. The FlipCam came with a 15 min instructional video that provided all the information needed to use the camera to produce short videos that tells a better story that previously.
[more info: <https://vimeo.com/5542623>]

How this could be applied to the Adaptation Fund project

The explosion of smart phones and tables with high quality cameras is an excellent opportunity to gain more visibility for the cause of concrete adaptation and best practices. Opportunities include:

1. A short film competition on the most innovative household adaptation solution
2. Documenting the progress of the waterway resilience interventions or exposure of other work being done by the community or agencies
3. Citizen journalism to cover real issues occurring in the country in real time for example, to highlight flooding or drought impacts, especially challenges faces by vulnerable community members, and to highlight the good work being done by individuals and community groups.

All of this brings compelling content that are of interest to the local communities within Antigua and Barbuda and could be tweeted, liked or viewed through the social media initiative.

Box 1. Creative visibility and mobilization content that will be further developed through the project's communications plan

Lessons learned from this Adaptation Fund are immediately transferrable and scalable to the Member States in the Organization of Eastern Caribbean States (OECS).

The OECS is a sub-regional economic union governed by the Revised Treaty of Basseterre Establishing and Organisation of Eastern Caribbean States Economic Union (the Revised Treaty). The Treaty requires, under Article 24, that each Protocol Member State implement the St. George's Declaration of Principles for Environmental Sustainability, adopted by Member States in April 2001, which seeks to *inter-alia* build the capacity of Member States and regional institutions to guide and support processes of sustainable development, including for climate change mitigation and adaptation, and it identifies common approaches and methodologies.

The OECS member states share geographical characteristics that have led to common climate vulnerabilities across the island states, where experience and expertise in one island can be more readily transferred to other island states. The OECS' small

⁶⁷ Adapted from Orange Media, 2014. iLand Resilience Public Awareness Strategy & Action Plan: Interim Report II. OECS Project on Climate Change Adaptation & Sustainable Land Management in the Eastern Caribbean.

populations have limited individual technical capacity, where sub-regional scaling of functions can be more cost effectively managed than at the individual nation level. The cumulative population of the OECS member states is 620,000 people.

The OECS Member States share Building Code standards and model legislation including environmental resource legislation. The DOE has already initiated the transfer of lessons learned about the SIRF Fund sustainable financing approach through consultative activities under the GCF EDA project. With an approved project from the Adaptation Fund, the DOE in Antigua and Barbuda will be able to support other Member States in the OECS access Adaptation Fund resources and implement adaptation concrete activities.

H. The consultative process

The northwest watershed has been recognized as a priority for adaptation since 2010, when it was identified and prioritized during consultations for national land use plan. In 2014, the CARIBSAVE Partnership conducted a Local Area Vulnerability Analysis for three watersheds in Antigua and Barbuda, including the northwest coast watershed, and in 2015 consultations were held to validate findings and recommendations, and prioritize future interventions⁶⁸.

The methodological approach for the local vulnerability assessment included qualitative and quantitative techniques to develop a holistic framework to improve knowledge and understanding of the conditions of local vulnerability to climate change and livelihoods in the three study sites – this project's Yorks/McKinnon's area, in addition to Cashew Hill and West Palm Beach. A quantitative baseline household survey was combined with focus group discussions to provide robust data required to assess vulnerability⁶⁹.

The household survey adopted a random sampling design. Community-based assessors (CBAs), specially trained for this task, compiled a detailed list of all households in the study areas. From these lists, interview participants were randomly selected with a 90 percent confidence interval sample size. A total of 159 households were sampled across the three areas (60 in Cashew Hill; **51 households in Yorks/McKinnon's** and 48 in West Palm Beach/Jolly Harbour)⁷⁰.

Although the design and structure of the household survey facilitated the acquisition of some qualitative data (e.g. respondents were asked about their attitudes and perceptions of the pertinent hazards), most of the qualitative data was collected using a focus group discussion and community mapping exercise (Figure 14), which are participatory vulnerability assessment tools tried and tested in adaptation literature⁷¹.

⁶⁸ For the in depth methodology and results, the LVIA report is available online:

http://www.environmentdivision.info/UserFiles/File/LVIA_Antigua_and_Barbuda_FINAL_8DEC15.pdf

⁶⁹ CARIBSAVE, 2015. LVIA, p. 13

⁷⁰ CARIBSAVE, 2015. LVIA, p. 15

⁷¹ CARIBSAVE, 2015. LVIA, p. 15

During the participatory exercises in Yorks and McKinnon's, participants identified the following climate change adaptation priorities for the area:

- Increased access to portable water
- Improvements in governance
- Increased activities that foster sensitization of environmental issues
- Improved drainage through incorporating ecosystem-based adaptation

These priorities were presented at a stakeholder consultation, where the participants used the guiding principles for community adaptation planning (decentralized bottom-up planning; multi-actor involvement; focus on local vulnerability and adaptation; local level ownership; decentralized financial flow and implementation; ensuring low risk and high impact; mainstreaming adaptation into development; integrated planning and delivery) to develop an implementation framework for one of these priorities. The participants selected ***improved drainage through incorporating ecosystem-based adaptation*** as the priority activity for implementation.

Community Map of Yorks and McKinnons, Antigua

Vulnerability



Figure 19. Results of the participatory mapping exercise conducted in McKinnon's area during data collection for the local area vulnerability assessment (CARIBSAVE 2015)

In the social science survey on climate change awareness in Yorks, one of the McKinnon's communities, under the REGATTA project, which was conducted using a representative random sampling method, 96% of respondents responded "yes" to the question, *Do you think climate change is real?* Over eighty per cent stated that they see the effects of climate change. Most respondents had heard about climate change through the radio, followed by TV and social media. This baseline Knowledge, Attitudes and Practices (KAP) information demonstrates that the community is aware of the issue of climate change, and indicates that this AF project will be well received in the community, building on the extensive foundational consultative work that has already taken place in the area over the past two years.

The consultative process for the micro loans component of the project (Component 2) was initiated at the national level through consultations on the SIRF Fund and its legislation, and through consultations and the inception meeting of the SCCF project, which includes a small allocation for loans (see Section F for a description on the SIRF Fund). The McKinnon's area and specifically Friar's Hill Road is one of the SCCF's pilot sites, and therefore community members have been sensitized to the small loans window for adaptation, and were also consulted on adaptation interventions along the waterway. The innovative financing approach of the SIRF Fund featured heavily in the Parliamentary Consultation on the Environmental Protection and Management Act, which took place on 9 April 2015. Since the passage of the Act in October 2015, the Department of Environment has been sensitizing the public to the upcoming small loans feature of the SIRF Fund.

An informed assumption was made during this Adaptation Fund initial project concept phase that there is significant demand for unsecured, low-interest (2 – 4%) loans for adaptation interventions in the communities of Yorks, Yorks New Extension, McKinnon's, and Gambles to access at the household/small business level. A market research study was designed and implemented by the Department of Environment during the project preparation phase (Appendix 4). The objective of the research was to collect quantitative data to assess the demand for adaptation loans, and to inform the design of the Revolving Loan Facility for Adaptation.

The research surveyed 178 persons (8% of the target population); households in close proximity to the waterway were targeted (Figure 15). Two community consultations with focus group discussions were held within the project area on 20th June and 5th July 2016 in the Yorks Community Center (Appendix 2). The project concept was made available on the Department of Environment's website⁷², along with a powerpoint presentation that summarized the project components and interventions.

⁷² Website of the Department of Environment, 2016. Adaptation Fund Project. Accessed 25th July 2016. <http://www.environmentdivision.info/news.php/news/187/group/16>

Survey Sites - Adaptation Fund Project

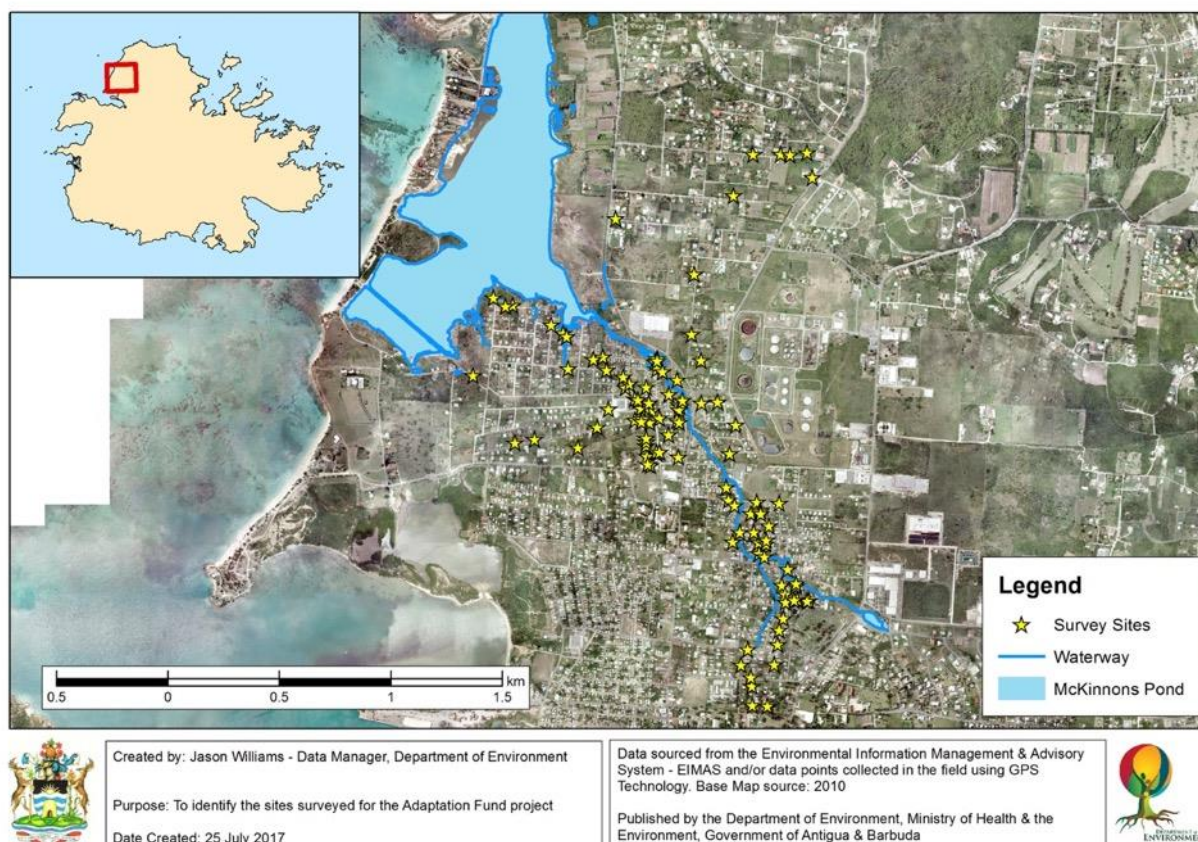


Figure 20. Spatial distribution of household and small business surveys conducted in the project site along McKinnon's waterway

Survey respondents were 62% female and 38% male. Age distribution indicated that 42% of respondents were over 50 years of age; 32% were between 35 and 50 years, 28% were 25 to 35 years, and 6% were 18 to 25 years. A total of 25% of survey respondents were civil servants employed by the Government of Antigua and Barbuda.

Results indicated that there is sufficient demand to pilot the Revolving Loan Facility for adaptation. The research indicates that 38% of the population is interested in loans for adaptation. Since the target population was estimated at 2,500, the number of households interested in accessing the loans is approximately 950. Assuming that 82% are homeowners, as demonstrated by the research, and conservatively that the landlords of the remaining properties are not interested in loans, then the number of households both interested and eligible will be approximately 780 households. The target number of loans under the Adaptation Fund pilot is 150 – 200 loans, indicating that the pilot should be oversubscribed, and supporting the original hypothesis of the Department of Environment.

Adaptation priorities were consistently spread across sectors. Survey responses indicate that priorities are evenly distributed across hurricane resiliency measures, energy

interventions (renewables and efficiency), and water technologies (for more information on the survey results, refer to Appendix 4).

Prior to the community consultations an interagency consultation was held at the Department of Environment. Invitees included key agencies that would be able to add value to Component 3 of the project, specifically the discussion on the community shelters. One of the significant issues that arose from that discussion was the need to identify vulnerable peoples within the community. Once they had been identified then further considerations would be made to the community centre checklist, as exemplified in the criteria in Appendix 6, to ensure that all the centres are accessible.



Mitchum (67 years old) lives alone and has hearing problems and is an amputee. He uses walking sticks and has no electricity or running water. His house is in very bad condition. He is very innovative in his water harvesting methods where an old spout has a hole and a piece of old metal spouting running the water to a plastic container. Wherever the spouting has a hole or

a dip, he collects the water in a container. His income comes from burning wood at the back of the yard in a large kiln to make coal. He made a cart and adapted it for pulling the wood to the kiln.

Box 2. A site visit was conducted to the homes of eight persons with disabilities in the project site, following which a recommendation was made to award grant financing under component 3, to certain exceptionally households in order to improve their resilience to climate impacts. Source: Excerpt from *Appendix 2 Consultation Minutes*.

Further, a site visit was conducted by a civil society organization along with the Community Development Division and a representative from the Association of Persons with Disabilities. This site visit completed the objectives as stated above, and also allowed for a basic assessment of the present dwellings of persons within the disabled community. A report of the site visit to exceptionally vulnerable households has been included in Appendix 2. Based on this report, the following recommendations were made:

- The Adaptation Fund project should allocate a portion of the grant resources under Component 3 for exceptionally vulnerable persons who would not be

- able to repay concessional loans so that they can improve their resilience to climate change
- Criteria to determine households that are eligible for grant funding should be transparent and equitable with strong community ownership. It is recommended that the Antigua and Barbuda Association of Persons with Disabilities (ABAPD) lead the grant award process and criteria for exceptionally vulnerable households

However, the provisions of grants under this project carries a risk of persons not wanting to repay loans. It is estimated that the extremely vulnerable is less than 25 of the 5,000 households. The project will identify these persons and seek an approach to address needs without undermining the integrity of the entire Revolving Fund program. The process to do this will be the same for the decision-making process of the project.

In summary, this project is the result of a series of consultations that began in 2014 and have culminated with the social market research on the demand for loans in July 2016. The table below summarizes key consultative outcomes, and the ways in which these findings have been iteratively integrated into the project design.

Table 6. Summary of key feedback from community consultations and how this feedback has been reflected in the project design

Source	Feedback from Community Consultations	Incorporation into Project Design
National stakeholder workshop, 2010	Northwest watershed recognized as a priority for adaptation and increasingly prone to flooding	Selection of northwest watershed as one of three priority sites to conduct a vulnerability assessment
CARIBSAVE 2016	Selection of <i>improved drainage through incorporating ecosystem-based adaptation</i> as the priority activity for implementation by the northwest community	Adaptation Fund project to address flooding problems (Component 1)
Component 3 Adaptation Fund Interagency Consultation	Identification of vulnerable areas based on experience. Itemisation of considerations for community shelter checklist	Expansion of survey area to include all areas identified. Inclusion of disabilities access and other key needs included in the community shelter checklist
Site Visit Report	Concern regarding how persons with disabilities would be included in the project design; whether they would be eligible for loans or if they could receive grants	Inclusion of disability access to community shelters within Component 3
Social Market Research (Appendix 4)	Concern about the size of the loan; a resident in the focus group indicated that they might want a loan under US\$5,000	Loans under US\$5,000 will be eligible under the Revolving Loan Facility for Adaptation

Minutes of Community Consultations (Appendix 2)	Anxiety over landlords borrowing concessional loans and then raising rent as a result of increased property value	<p>Concessionality of loans must be passed down to renters</p> <p>Inclusion of rent control provisions in the Loan agreements with landlords that rent out their properties</p> <p>Complaints mechanism managed by the DOE where residents could report issues to investigate and act as mediator</p>
Minutes of Community Consultations	Some residents were concerned about the safeguards that are in place to ensure that their homes will be climate resilient. They expressed that even if they take the loans, their homes might still be susceptible to threats such as flooding and they will be stuck with a loan.	A technical assessment was developed and will form part of the loan approval process to ensure that adaptation actions meet technical criteria and to validate the adaptation actions (Technical Assessment Form on page 75 of Appendix 9)
Minutes of Community Consultations	Concern about the selection committee that would be used to approve loan applications	<p>A manual was developed to clarify processes and increase transparency of the loan decision-making process</p> <p>Information including social safeguards will be uploaded to the Adaptation Fund page of the DOE's website</p>

I. Full cost of adaptation reasoning

The current and predicted effects of climate change will continue to have multiple negative effects on human health, economic development and ecosystems functioning in Antigua and Barbuda. The proposed Adaptation Fund project will increase the resilience of local communities and sectors to climate change on the northwest coast of Antigua. This will be achieved through strengthening the climate resilience of activities implemented by ongoing baseline projects.

Component 1. Upgrade urban drainage and waterways to meet projected climate change impacts

Baseline

The primary watercourse that drains into McKinnon's Pond forms part of a drainage basin for the larger northwest watershed in Antigua. Hydrological characteristics of these basins and projected climate change impacts have not been adequately addressed and incorporated into works, building construction, and other land use practices over the

years. The result is that core infrastructure and people's homes on Antigua's northwest coast are exposed to climate variability. Prosperity has already been eroded due to past extreme events, which further undermines adaptive capacity in a negative reinforcing loop of vulnerability. Compounding this problem, there is little proof of concept available for nationally-appropriate adaptation interventions to inform replication and upscaling strategies.

Additionality

Concrete adaptation interventions in the watercourse will use methods and designs of Sustainable Urban Drainage Systems, which are considered a low cost and environmentally complementary drainage solution, and complementary to the objectives of maintaining ecosystem services. SUDS are appropriate in the context of McKinnon's watershed as the system design has a sequential approach to the various stages of the natural hydrological cycle in order to achieve effective management of storm water runoff quality, quantity and the associated amenity and biodiversity of the urban drainage system. Thus, the interventions in restoring and upgrading the Upper Fort Road-to-Yorks drainage system will focus on quality, quantity and ecosystem services. Low cost interventions include the use of filtering soil and re-establishing natural vegetation in high runoff areas, particularly on slopes, and establishing a 'Green belt' along the primary watercourse will prevent further degradation. Upgrading the watercourse through restoration and flood prevention measures will contribute to the resilience of the community's infrastructure to projected climate change impacts.

Component 2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan

Baseline

The status quo is that, currently, the flow of international funding into Antigua and Barbuda is insufficient to finance climate change adaptation interventions at a national scale. Additionally, there are limited financial resources available within the country's small tax and market base to provide necessary investments in local-level adaptation. Consequently, vulnerable households are ill-prepared to adapt to the predicted effects of climate change such as increased flooding and storm damage.

Given the low levels of household income in Antigua and Barbuda, financial institutions are generally unwilling to provide funding to low-income households for adaptation. Interventions such as reducing vulnerability of buildings to climate change are too costly for many households to implement without additional financing. However, these households are often considered by financial institutions to be "unbankable" as they are at risk of defaulting on loans. In addition, the high interest rates on loans mean that poor households are unable to service loan repayments. Consequently, such households are unable to implement the requisite adaptation interventions and remain vulnerable to climate change.

Additionality

The Adaptation Fund project will address these shortfalls by establishing the adaptation window of the SIRF Fund. Innovative financing mechanisms will be piloted in consultation with national and regional financial institutions to overcome barriers to accessing financing. Successful applicants – particularly vulnerable households – will have access to funding for necessary adaptation interventions. The additionality of this component focuses on reducing vulnerability of households to the predicted effects of climate change, particularly flooding and drought. Interventions will be aimed at improving household resilience to these climate impacts and the criteria for approval of applications for loans will be defined at the project-planning phase. These criteria will include: i) eligibility of households based on income and other socio-economic indicators; and ii) adaptation benefits of the proposed interventions.

An operational and financial framework has been drafted (Appendix 9) and will be approved and implemented under this project to manage the disbursements of the small loans through a Revolving Fund for adaptation under the SIRF Fund. Lessons from various sources will optimize the efficacy of the loan disbursement structure. To initiate these demonstrations, workshops and outreach activities have been conducted and will be continued to introduce potential applicants to the adaptation loans framework as well as eligibility criteria and application procedures. Participants will include potential applications from the private sector as well as members of local communities that are vulnerable to the expected effects of climate change

Component 3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions

Baseline

The communities in the northwest coast watershed are aware of the problems, partly as a result of the Vulnerability Assessments that have taken place, and data has shown that there is a high degree of awareness and sensitivity to climate variability and climate change impacts. The community consultations strongly reinforced this understanding, as members talked passionately and at length about the climate-related problems they are facing and the solutions they would like to see. In fact, the situation is risk community members becoming disillusioned with the process as a “talk shop” (Appendix 1). However, at present, community members and the private sector on their own do not have the capacity, financial support, or technical support to tackle the problems, nor is it their sole responsibility. A coordinated and comprehensive approach to climate change adaptation is necessary to change the steady erosion of the environment and human wellbeing.

Additionality

The mainstreaming of climate change into local area development plans would be significantly delayed, and economic sectors and local communities would remain much more vulnerable to the current and predicted effects of climate change. Importantly, the Adaptation Fund project builds a foundation of climate awareness for government and private sector technicians – such as engineers, planners and urban designers – and their technical capacity to plan and implement adaptation interventions, which is presently

insufficient for integrating climate change adaptation into local-level planning. Improving the resilience of 30% of the community-based buildings in the area will build social capital for adaptive capacity, in addition to the three contracts to be awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project. By demonstrating concrete adaptation actions on the ground, and promoting community ownership in implementation, monitoring and evaluation, this project will build critical capacity to enable up-scaling of adaptation well beyond the life of the project, so that in the future problems that are identified can be spearheaded by communities. Consequently, the Adaptation Fund project is contributing to mainstreaming of climate change and adaptation into development planning processes and legal procedures. This will systematically build climate resilience in the activities of key planning and implementation agencies.

J. Sustainability of the project

The project's integrated approach of environmental management, social empowerment and poverty alleviate position the project for continued implementation and sustainability.

The urban drainage interventions under Component 1 will be sustained by integrating the Local Area Plan (LAP) into the implementation practices of the Development Control Authority, as the authority responsible for planning, and the Central Board of Health, as the authority responsible for public health interventions. The Department of Environment will continue to manage and promote lessons learned from the drainage interventions through the Watershed and Wetlands Management Committee, established under Section 45 of the Environmental Protection and Management Act of 2015, which has a responsibility for developing management plans and providing technical guidance in critical watershed and wetland areas. A budget line of \$30,000 has been allocated under Component 1 for the integration of this component into the implementation practices and work plans for the various agencies.

The project's sustainability feature under Component 2 is the revolving loan program, which will continue to function beyond the life of the project through soft loan prepayments and continued disbursements through the SIRF Fund loans for adaptation window. Replenishments to the revolving fund are being negotiated by the Department of Environment, such as through the use of a water levy to be earmarked for watershed and waterway rehabilitation. Depending on the success of this demonstration project, the Government may also be willing to contribute funds to the climate adaptation revolving loan scheme directly.

For the community grants awarded under Component 3 for maintaining interventions and for resilience in community buildings, this is an innovative approach and the project will be demonstrating the benefits of empowering local communities to implement and maintain adaptation as the primary beneficiaries. The project's consultative approach, which builds on a strong foundation of participatory engagement, supports the sustainability of interventions beyond the duration of the project by ensuring that the long term needs of climate vulnerable local communities and sectors are prioritized. Working

with the community by awarding contracts to maintain the waterway is expected to generate ownership and care of the upgrades. Financially, this initiative will be sustained through NGO allocations of the SIRF Fund resources. A floor of 15% of all SIRF Fund financing is to be allocated to NGOs and community groups, per SIRF Fund operating procedures. The interventions under Component 3 will be maintained and replicated in other areas through the sustainable financing mechanism of the Department.

Finally, through participatory monitoring and evaluation, the area and its residence will appreciate the reduction of the impacts of extreme weather and vectors, and education programs will be used to demonstrate to the community the progress achieved through the project and sustain interventions. By awarding a community contract for M&E under Component 3, this will facilitate uptake and replication of lessons learned among community groups and continued project development and implementation of adaptation solutions to problems faced on the ground.

The Department of Environment is developing a project for Enhanced Direct Access (EDA) to the Green Climate Fund, in collaboration with the OECS Commission, with pilot activities being implemented in Antigua and Barbuda, Dominica and Grenada. The EDA project is structured to build on lessons learned and scale up the activities of the Adaptation Fund project (see Appendix 11 for the EDA project brief).

K. Environmental and social impacts and risks

Impacts are summarized below, and additional detail on the Adaptation Fund ESP areas is provided in Appendix 1 – Environmental and Social Management System (ESMS) and project risk management arrangements, and in Appendix 12 – Risk Register.

The risks presented below were compiled using the following baseline documents:

- CARIBSAVE, 2014. Local Area Vulnerability Analysis for Antigua and Barbuda. http://www.environmentdivision.info/UserFiles/File/LVIA_Antigua_and_Barbuda_FINAL_8DEC15.pdf
- Environmental and Social Impact Assessment for all 3 Components
- Technical and financial feasibility study by Engineers Without Borders
- Financial model and analysis of the Revolving Fund
- The Risk Registry for the GEF-funded SCCF project
- Consultations with the Technical Advisory Committee (TAC)
- IPCC AR5 (2014) risks and challenges to Small Island Developing States

The registry is also based on the historical knowledge of the culture and socio-political history of the project site. This information was gathered based on interviews with current and past parliamentary representatives, church and community leaders and members (e.g. local shop owners) within the community.

Table 4. Environmental and social impact and risk assessment*

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Compliance with the Law</i>	The project has been designed to comply with relevant national laws, regulations and policies.	
<i>Access and Equity</i>	<p>The DOE's approach to access and equity is enshrined in its Code of Conduct and Ethics⁷³, which staff and consultants of the DOE are required to sign and adhere throughout their service. This includes provisions for Conflict of Interest.</p> <p>The project seeks to ensure fair access, transparency, and equity throughout implementation.</p> <p>The project's ESMP will include management measures to ensure fair access, transparency, and equity throughout implementation, clearly stating there will be neither discrimination nor favouritism in accessing project benefits.</p> <p>Direct beneficiaries of project contracts and activities are subject to the Department's procurement rules and oversight by the Project Management Committee (PMC).</p>	The loan facility may be over subscribed and some households or businesses members may not get access. A potential risk includes ensuring equity to direct beneficiaries of the revolving loans.
<i>Marginalized and Vulnerable Groups</i>	Marginalized and vulnerable groups in the target area include the disabled, single mothers who are heads of households, LBGT members, HIV/AIDS patients, the elderly including those who on a fixed income (pension), small children and migrants of questionable immigration status and their children.	There may be some downsides to the climate risk awareness activities of the project, as the local area plans will identify zones that are most vulnerable to climate change. This may result in the devaluation of properties, and bring attention to vulnerable groups squatting in high risk zones. Frequent community consultations and activity screening

⁷³ Code of Conduct and Ethics, Department of Environment:

[http://www.environmentdivision.info/UserFiles/File/NIE - Code of Conduct - Working draft NN-1.pdf](http://www.environmentdivision.info/UserFiles/File/NIE_-_Code_of_Conduct_-_Working_draft_NN-1.pdf)

	<p>Marginalized groups are already disproportionately suffering from climate impacts in the project site, where vulnerable people bear the brunt of flooding impacts. The project site was selected to assist marginal/vulnerable groups to better cope with climate variability.</p>	<p>using the ESP checklist will help to monitor and mitigate potential risks.</p>
<i>Human Rights</i>	<p>The Department of Environment has a demonstrated track record of protecting and promoting human rights, and an online complaints mechanism is available to the public. Further, the SIRF Fund operational manual is developing an Exceptional/Disputed Cases Resolution Mechanism. The risk is that persons do not know their human rights and so the NIE will promote awareness of human rights during project implementation.</p>	
<i>Gender Equity and Women's Empowerment</i>	<p>It is generally known that women find it difficult to access credit in vulnerable areas. Local area vulnerability studies have suggested a high prevalence of female-headed households in the McKinnon's area.⁷⁴</p> <p>The project will ensure that RFPs and the eventual selection of the contractors will include an assessment of good labour practices as a criterion for selection, with gender sensitive hiring practices.</p> <p>The Government policy is to be gender neutral in the hiring of contractors for all projects and programs. The project will select contractors with the oversight of the Technical Advisory Committee (TAC) which consists of a balance of men and women.</p>	<p>The risk under this project is that, despite the prevalence of female-headed households, these households will have difficulty accessing the revolving loans.</p>
<i>Core Labour Rights</i>	<p>Antigua and Barbuda has ratified 8 of 8 fundamental conventions, 3 of 4 governance conventions and 18 of 127 technical conventions making a total of 29 ILO conventions.</p>	

⁷⁴ CARIBSAVE 2015. Local area Vulnerability Impact Analysis for Antigua and Barbuda

	<p>The project will be implemented in compliance with legislation including the Labour Code. No child labour or forced labour is expected to result from this project.</p>	
<i>Indigenous Peoples</i>	<p>Antigua and Barbuda does not have indigenous populations as defined by the UN, and so Indigenous Peoples are not expected to be impacted.</p>	
<i>Involuntary Resettlement</i>	<p>There will be no involuntary resettlement under this project, and mechanisms are in place to ensure unidentified sub-projects do not result in involuntary resettlement. The DOE's Risk Management Policy is that the DOE does not fund "The resettlement of people or the removal or alteration of any physical cultural property under any circumstances". The project will be complying with established waterway setback guidelines for McKinnon's waterway.</p> <p>Existing structures and economic activities will need to be grandfathered in. The existing baseline indicates that there are structures within the minimum setback distance of the waterway (30 feet), and some structures are so close that works will have to be done by hand as machines cannot access the areas. Waterway works are conducted from time to time by the Central Board of Health (CBH), which has precedent for working with property owners in the project site.</p> <p>Baseline studies did not identify significant formal or informal livelihood-based economic activities within the area that use the waterway resources. The area is designated as a settlement expansion zone, and the project is expected to have a positive impact by managing climate risks and climate variability for the watershed.</p>	<p>Frequent monitoring and regular community consultations will identify indirect and direct risks of resettlement, including to physical assets and economic/livelihood activities, and manage potential risks per the ESMS.</p>

	The risks of resettlement in the area is high but this is not a result of the project activities, with or without the project those properties near the waterway are at risk of flooding. The project outputs will identify these properties and create an environment where new homes are not built in high-risk, climate vulnerable areas.	
<i>Protection of Natural Habitats</i>	The project aims to rehabilitate and protect natural habitats.	<p>Works in the waterway may cause siltation of McKinnon's pond.</p> <p>The area may be upgraded and then become an attraction for the private sector to invest. The gains of the project may then be reversed. The Local Area Plan to be developed under the project will have a legal protection of the site as an ecosystem and will deter attempts at conversion.</p>
<i>Conservation of Biological Diversity</i>	The project will include habitat and species protection, restoration, and monitoring activities consistent with country's National Biodiversity Strategy and Action Plan (NBSAP).	<p>Project activities will identify local invasive species, such as <i>Typha spp</i> and water hyacinths, and prevent their local spread.</p> <p>The revegetation programme will use only native species.</p>
<i>Climate Change</i>	<p>Through ecosystem-based adaptation and climate resilient drainage, the project will address climate change impacts and where possible mitigate emissions.</p> <p>Household resilience measures (e.g. AC units) may increase electricity demand, leading to increased carbon emissions.</p>	Emissions will be offset through increased uptake of Renewable Energy and revegetation measures.
<i>Pollution Prevention and Resource Efficiency</i>	The project targets resource efficiency and pollution prevention through a monitoring programme and habitat restoration, as well as incentivizing implementation of EMS and the EPMA's pollution standards.	The purchase of energy efficient appliances under the Revolving Fund programme could result in pollution if discarded appliances are not adequately disposed of. The project will partner with the local e-waste recycling organization.
<i>Public Health</i>	The project will improve public health through water quality improvements, monitoring in communities at high risk	Waterway works may increase mosquito habitats, which carry vector-borne diseases. Waterway

	to health hazards, and design-oriented mosquito control strategies	measures will be designed to specifically reduce mosquito breeding habitat.
<i>Physical and Cultural Heritage</i>	The project includes activities to restore and protect natural habitat. No cultural heritage sites are located in the project vicinity.	
<i>Lands and Soil Conservation</i>	The project will protect critical habitat and through mitigating flood risk will promote soil conservation.	The cleaning of the waterways has a risk of exposing land to erosion; however, this will be small in scale and mitigation measures can reverse impacts.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Implementation Arrangements

National Implementing Entity

The Department of Environment is the National Implementing Entity (NIE) and the Executing Entity. The Department was accredited as a NIE to the Adaptation Fund in 2015. The Department is currently staffed with eleven technical officers and just over fourteen administrative officers. All technical officers are trained at the Bachelors level and over half of the officers have attained postgraduate training in subjects ranging from engineering to environmental management and law. The officers are experienced in project development, public consultation, are familiar with the other agencies and have developed relationships with their peers in other government agencies, NGOs, and communities.

The Department of Environment is a coordinating entity that has established and maintained a strong inter-agency and cross-sectoral management framework. The three primary structures, as illustrated in Figure 13, are: 1) the Project Management Unit (PMU), 2) the Technical Advisory Committee (TAC), and 3) the Project Management Committee (PMC), summarized below.

Executing Entity

The Executing Entity with responsibility for day-to-day management of the project will be the **Project Management Unit (PMU)**, with M&E managed by the **Data Management Unit (DMU)**. The PMU is staffed by consultants and government staff from various departments, according to expertise required for the portfolio of projects under management.

The PMU is designed to achieve efficiency and coordination in the management of projects from a variety of donors, as well as the government's projects. The PMU ensures that there is effective coordination and efficiency when there are project activities that inter-dependent for execution. Antigua and Barbuda is a small island

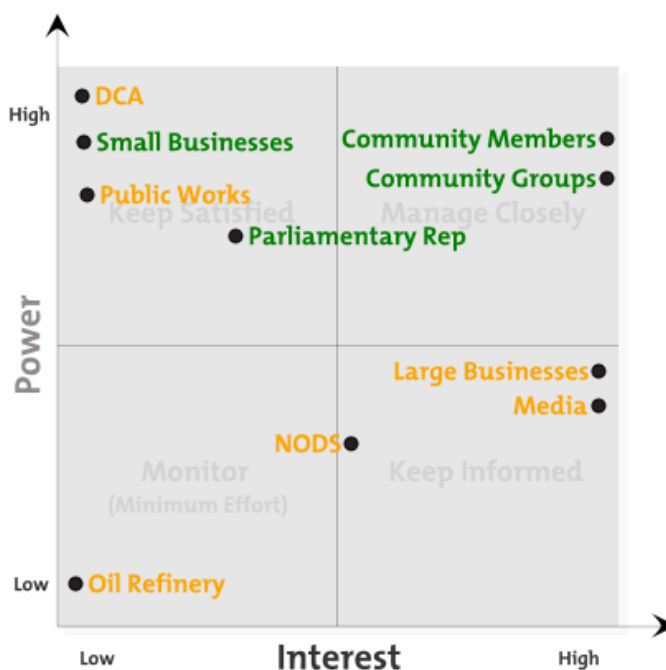


Figure 21. Stakeholder Analysis highlights supporting and neutral actors; no detractors are identified.

Key: Green (supporter); Orange (neutral actor); Red (detractor)

developing state (SIDS) and technical capacity, staff turnover and lost institutional memory is one of the core risks to the successful implementation of projects. The PMU is a mitigation measure to overcome and minimize this risk. The PMU meets monthly and outcomes of projects are reported to the TAC and the PMU.

Project Partners

While the Department has streamlined arrangements for project management, the approach is flexible and tailored to the specific needs of each project. The **Directorate of Gender Affairs**, which was established during the participation of the country in the international initiatives of the 1970s and 1980s, and is a critical institution to achieving gender equity in the society. The **Community Development Division** sits on the TAC and has been engaged during the project development process.

These key partners are familiar with the challenges faced by the McKinnon's community, associated climate risks, and the adaptation interventions prioritized through the consultations and addressed under this project.

A stakeholder analysis is shown in Figure 13. The most important stakeholders are the community members. The analysis also highlights the importance of cooperation between different government departments.

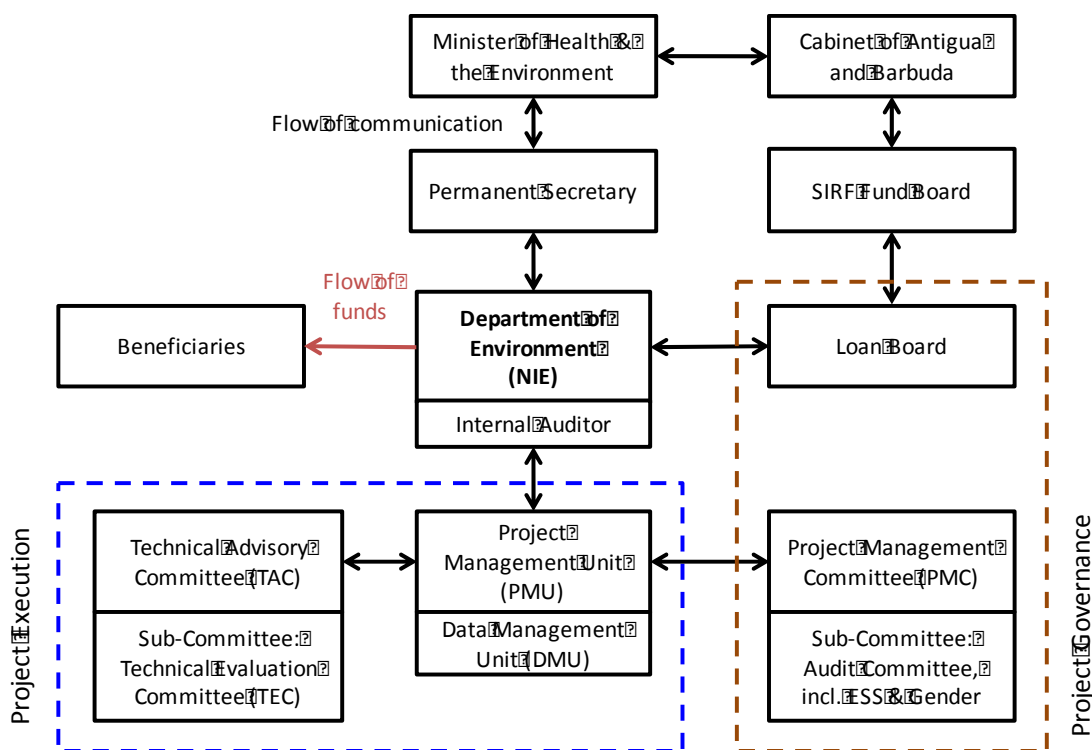


Figure 22. Institutional arrangements for Antigua and Barbuda's Adaptation Fund project, to manage ESS, financial and project risks in compliance with the Fund's policies

Table 5. Institutional arrangements for project management

Name	Purpose and composition	Meeting frequency
Project Management Unit (PMU)	The PMU consists primarily of Department of Environment staff, including project manager, project coordinator, administrative assistants and other technical staff working on the project, to coordinate and implement day-to-day activities.	The PMU works together on a daily basis, and meets monthly with the Project Manager.
Technical Advisory Committee (TAC)	<p>The TAC is the source of technical expertise and support for the PMU. The TAC provides technical guidance to projects, shares institutional knowledge, and assists with developing TORs and other project needs. The TAC has 21 members (17 governmental, 3 civil society, and 1 private sector coalition representative). The PMU provides secretarial support to the TAC.</p> <p>The TAC will appoint a Technical Evaluation Sub-Committee (TEC) to provide the required technical oversight of this project's interventions, including site visits and other validation of activities as required.</p>	The TAC meets monthly for the first year, and with a plan to meet on a quarterly basis with additional meetings as needed.
Project Management Committee (PMC)	<p>The PMC acts as an advisory body to the project providing budget accountability, project guidance, policy input and support. The PMC ensures project alignment to national priorities.</p> <p>The Audit Committee, which is a sub-committee of the PMC, is appointed by the PMC.</p>	The PMC meets quarterly and accounts signatories meet monthly.

The Department of Environment has project development and implementation experience. The expertise located within the other government agencies is available to the Department via the office of the Permanent Secretary, the TAC and or through direct informal consultations during project concept and development.

The selection of consultancies/companies is the responsibility of the PMC. The Procurement Officer or the Project Manager may, depending on the size and type of

procurement, prepare a procurement report, which is reviewed by the Project Manager. Once the report has been reviewed, it is submitted to the PMC to make a deliberation. If there is a disagreement between the Project Manager and the Procurement Officer on a specific recommendation, this is resolved at the level of the PMC.

The PMC is a high-level cross-sectorial committee comprising of lead policy makers and heads of departments. It consists of the Permanent Secretary of the Ministry of Agriculture, Lands, Housing & the Environment (Chairman), the Principle Assistant Secretary of this Ministry, the donor agency Focal Point, a representative of the Budget Office at the Ministry of Finance, the Chief Environment Officer and a secretary. The function of the PMC is to focus mainly on procurement, institutional arrangements and financial management of the project.

A key feature of the institutional arrangements is that committees are multi-stakeholder, involving community and private sector interest, and donor representation (see figure below). The constitution of the committees promote transparency and accountability in implementation. Further, all committee members are required to read and sign the Department of Environment's Code of Conduct and Ethics.⁷⁵

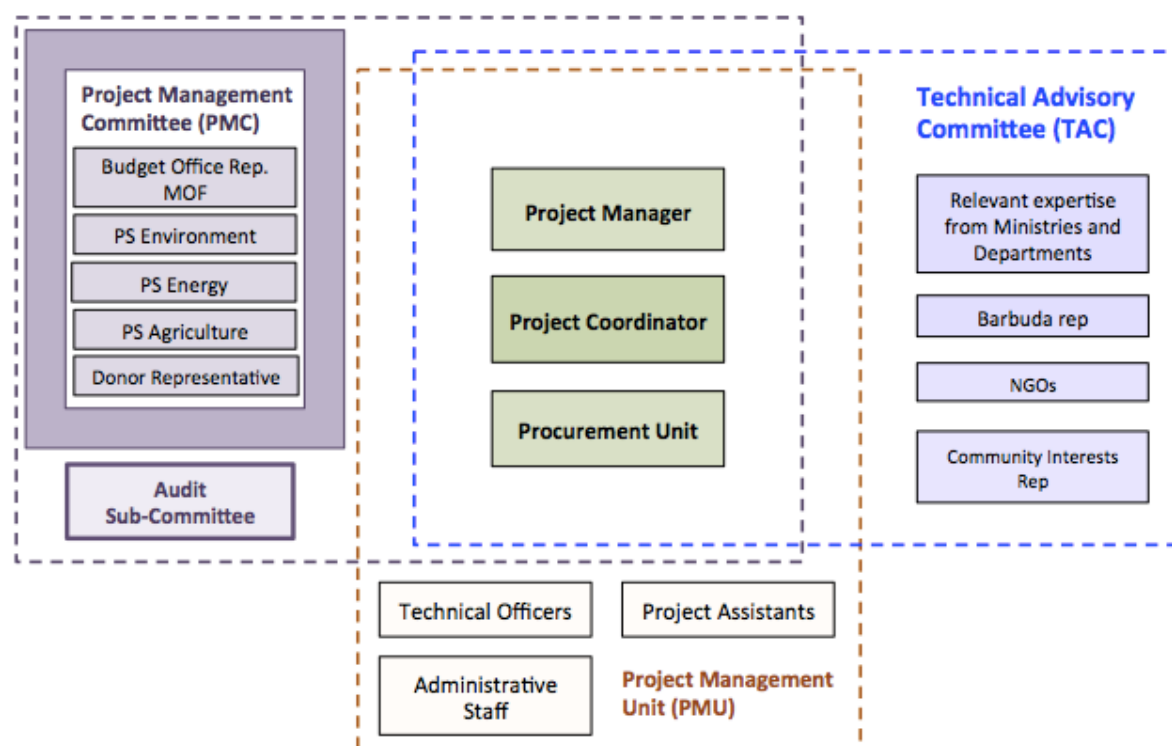


Figure 23. Diagram of the constitution of the project management structure

⁷⁵ Code of Conduct and Ethics, Department of Environment:
[http://www.environmentdivision.info/UserFiles/File/NIE - Code of Conduct - Working draft NN-1.pdf](http://www.environmentdivision.info/UserFiles/File/NIE_-_Code_of_Conduct_-_Working_draft_NN-1.pdf)

B. Financial and project risk management

Risk management is an essential element of good governance and an integral aspect of good management practice, and risk management is a shared responsibility. The Director of the DOE and the Management Teams are accountable for the overall implementation of the DOE's Risk Management Policy, and staff and managers are responsible for ensuring that risk management is integrated into all aspects of activities, including project design and implementation. The DOE's Risk Management Policy is design to build institutional capacity for risk management that applies to project oversight and implementation.

Roles and responsibilities for financial and project risk management are outlined below.

The Director of the DOE/National Implement Entity:

- promotes the development of a culture that supports effective risk management and innovation, and that encourages effective risk taking in line with DOE's risk appetite;
- integrates risk management into Programs, Projects and functions so that it is a fundamental part of how the DOE works;
- ensures that risks are managed effectively, which includes identifying, analysing, responding to, reviewing and reporting on risks;
- assigns accountability to staff for managing risks within their areas of responsibility, levels of authority and competence; and
- allows for the systematic review of risk management to ensure its effectiveness and adherence to DOE's risk appetite and project risk categorization.

Audit Committee: The Audit Committee advises the Director and Management Team on the effectiveness of DOE's internal control systems, including risk management. Its terms of reference require it to ensure that the policy is working effectively and that risk is being properly managed. It also reviews internal and external audit reports, and provides advice on the independence, effectiveness and quality of DOE's internal audit functions.

Internal Auditor: The Internal Auditor provides assurance to management regarding the effectiveness of DOE's internal control systems, governance, risk management processes and on how well the DOE is meeting its objectives. It also contributes to the assessment of risk management processes, the effectiveness of risk responses and the completeness and accuracy of risk reporting.

Director of Operations: The Director of Operations (DOO) is responsible for ensuring that the DOE manages risk effectively, especially risks that affect DOE. It establishes Department targets for all risk levels, monitors progress and keeps apprised of the high-level risks facing DOE. The DOO is responsible for reporting escalating high-level risks to the Director and for ensuring that the Department's managers understand and are assigned risk for which they are responsible are managed effectively.

Staff: All staff are required to familiarize themselves with DOE's directives on Department risk management, comply with internal control measures, and escalate (report) them to their managers when appropriate.

Project Management Unit (PMU): The PMU is the internal custodian of Department's risk management with respect to projects and programs. It informs the Director of Operations on risk and performance management, develops and updates Project and program risk management tools, coordinates risk management activities, facilitates the identification and evaluation of risks, and maintains the Department's risk management framework, ensuring that it is relevant and that it supports DOE's mandate. Performance and risk management champions in this Unit support risk monitoring and mitigation actions and ensure that performance and risk management tools are used in the offices.

Senior Management: Senior managers are responsible for ensuring that risks are managed effectively and reported. They are to ensure that responsibility is allocated for keeping risk registers up to date and for taking appropriate mitigation actions. They are responsible for ensuring that risks related to their office's objectives are identified, analysed and appropriately addressed.

Director of Audit: External audits independently assess the effectiveness of risk management and risk identification and control processes, including mitigation actions. Evaluations inform all stakeholders about the quality and effectiveness of policies, strategies and operations, and the efficiency of their implementation.

Financial and project risks and management measures are identified below. However a risk may be handled, the actions must be documented and kept on file. This is done via the Risk Register (Appendix 12).

Table 7. Screening for Financial and Project Risk Management

Type	Risk	Risk Management	Ranking
Financial	<p>One borrower risk consideration is that these unsecured loans will fund household items and services that may not provide immediate and unambiguous economic impact to the borrowers, despite the clear environmental and resilience benefit. If people do not recognize the worth, the inclination to default over time is likely to become higher.</p>	<p>Tangible economic risk is mitigated to a degree because of the recent electricity outages and water shortages, so that borrowers place a higher value on these interventions. A communications strategy about the economic benefits of adaptation would be a complementary activity to the Fund's pilot.</p> <p>An additional mitigation against this is to have the product or service sellers guarantee repairs or provide meaningful warranties covering the investment during the term of the loan.</p>	Low
Financial	<p>Raising the profile of climate risks in the community through hazard mapping and climate projection forecasting could negatively impact community perceptions of their area and its safety, could result in lower property values and/or higher insurance rates if banks are sensitized to the hazard information.</p> <p>Homeowners may not be in a position to repay the loans. Thus jeopardize the sustainability of the program;</p> <p>The funds available may not be adequate and thus create and political risk.</p>	<p>Mitigate identified climate hazards through concrete adaptation interventions, and disburse \$3M USD in small loans for concrete adaptation interventions at the household level to incentivize compliance with climate resilience standards.</p> <p>The mitigation measures are not known as yet. This will be determined during the PP phase. The intention however is to as much as possible use direct salary deductions for repayments. This is normal way to make payments on homes in Antigua and Barbuda. The aim would be to give priority to those properties that will be impacted by the vulnerability assessments, changes in the building codes and the land use plan. The project may identify stranded assets. Priority</p>	Medium

		will also be given to persons who will find it challenging to move to a shelter. These are single families with special needs individuals and elderly. Further priority can be developed with the input of the Ministry of Finance the Community and others. Finally, the SIRF Fund is seeking additional funding through other donors. The Fund aims to have 10M USD per year in the revolving loan fund. This is the amount estimated to be needed to get all of the 50,000 properties in Antigua and Barbuda ready for the impacts of climate by 2022.	
Financial	Scope creep is a risk to this project given so many agencies and NGOs each with their priorities. At the end of the consultation exercise there are normally more projects and activities than budget. The process of rationalizing this must be carefully handled and is normally left to the Minister and or Permanent Secretary based on the advice of the Director of the Department. This process can be very difficult and can result in agencies not supporting the project if their preferences are not chosen.	<p>The Department will draw on its long-term relationships with agencies to build trust and compromise. In instances where the Department may not be able to mitigate scope creep, it may ask the Cabinet to agree at the appropriate time on project scope.</p> <p>The use of the Cabinet early in the project is important since project scope has significant budget and project impact implications.</p>	High
Financial	The project may not receive the funds on time, or there may be a slow disbursement of funds, which can have a significant impact on implementation and co-financing availability.	Request a large upfront disbursement from the Adaptation Fund (40%) to ensure synergy with Cabinet decisions, the PSIP process, and ongoing projects that could provide temporary relief for slow disbursement. The Department of Environment tries to ensure that there is at least a 5% contingency fund within its core government budget for such situations.	Medium

Financial	Disputes in the decision-making process, e.g. TAC may not agree on the selection of the consultant and/or service provider; TAC may disagree on technical way forward; the Project Manager may disagree with the TAC's technical analysis and project strategy; and the PMC disagrees with the Project Manager and/or the TAC	<p>Include contract resolution procedures within contracts – most contracts are written to include an arbitration clause. The Ministry sanctions the contracts prepared by the Department. Any arbitration is the responsibility of the Attorney General Office.</p> <p>Negotiation – The Project Manager and or Coordinator is usually the first line of conflict resolution. In the experience of the Department, most conflicts encountered have been resolved at this level.</p>	Medium
Financial	Disputes during contract execution, e.g. the quality of the work is assessed to be inadequate, or regarding issues related to budget and completion time of work	<p>Mediation and Conciliation - If the Project Manager and or Coordinator cannot resolve the conflict, the matter is forwarded to the Project Management Committee and/or the office of the Permanent Secretary for mediation. Most conflicts that have reached this level are normally related to interagency differences of opinions. Generally when the Permanent Secretary rules on an issue the conflicting parties normally abide by the decision.</p> <p>Litigation - In the event of litigation this is handled by the office of the Attorney General. This level is normally reached for contract disputes and or as a result of the implementation of a project.</p>	Low

Financial	The costs of implementing adaptation may be higher than expected.	The Department has identified maximum complementarity with existing and upcoming opportunities, including the SCCF project, Commonwealth support and technical assistance available to the DOE via UNEP, among others. The Department will also secure technical capacity support for monitoring, procurement and financial reporting in order to determine spending levels versus achievement against the results framework. Where necessary and when in doubt, the Department consults the Legal Affairs department.	Medium
Financial	Adaptation interventions are insufficient and underestimate the impacts of climate change. Climate impacts are already being experienced much sooner than anticipated.	The climate risk assessments completed for Antigua and Barbuda employ different climate scenarios. The project will use the higher risk scenarios for planning and to calculate costing for adaptation interventions.	Low
Institutional	Policymakers prioritize economic benefits over sustainable and resilient ecosystems	The project has policy backing, and will build on complementary climate change policy initiatives through the regional GCCA project. The consultative processes led by CARIBSAVE have also secured local community buy-in and ongoing awareness targeted at high-level political representatives has been demonstrating the risks of flooding to economic investments.	Low

Institutional	Institutions have limited capacity to fully implement the project	Design the project to align with work plans of core staff in the respective agencies, bolstered through the PSIP process. The Project also aims to build capacity in key institutions – the Environment Department, Public Works, and the DCA.	Medium
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In addition to the above table, detailed financial risk management for the Revolving Loan Facility Adaptation Set-Aside is included in Table 1 in Appendix 3.

C. Environmental and social risk management

The project has a Category B risk rating per the Environmental and Social Policy of the Adaptation Fund – the project could have minor environmental, social or gender impacts. These have been assessed in the project's Environmental Social Management System (ESMS), which includes an ESIA and ESMP (see Appendix 1).

This project includes unidentified sub-projects (USPs) in each of its components. USPs are when the interventions are not defined at the project approval instance. For example, in the case of Component 1, climate modelling and watershed drainage design are required prior to implementation. In the case of Component 2, the revolving fund will be defined at the time that applicants submit their loan applications. For Component 3, the community buildings must be consultatively identified and assessed, and maintenance contracts awarded.

The ESMP is focused on process-oriented risk management where mechanisms are built into project implementation to ensure that rigorous risk assessment and management measures will be applied to each sub-project at each stage as activities are defined, approved and implemented.

It is recognized that there is a need to develop local capacity to empower community members and stakeholders who are anticipated to be recipients of the Revolving Fund and recipient of the grants and contracts under Component 3. The ESMP has been designed to facilitate a three-month project pre-inception phase, to facilitate the following activities prior to project implementation.

ESP Risk Screening for sub-activities

An ESP checklist will be used for regular screening across all three of the project's components at the intervals described in Section II.A. during implementation.

An explanatory document has been prepared for training and capacity building purposes and is included in Appendix 1 (ESMP). This document attempts to apply the 15 Principles to a national context in a way that will be easily understood by project partners and beneficiaries alike.

Table 8. ESP Screening Checklist for compliance with the Environmental and Social Principles

Checklist of Environmental and Social Principles (ESP)	Activity for which screening is being conducted:			
	Existing risk	Impact: Activity will have <u>positive</u> impact	Impact: Activity will have <u>negative</u> impact	Justify selection
<i>Compliance with the Law</i>				
<i>Access and Equity</i>				
<i>Marginalized and Vulnerable Groups</i>				
<i>Human Rights</i>				
<i>Gender Equity and Women's Empowerment</i>				
<i>Core Labour Rights</i>				
<i>Indigenous Peoples</i>				
<i>Involuntary Resettlement</i>				
<i>Protection of Natural Habitats</i>				
<i>Conservation of Biological Diversity</i>				
<i>Climate Change</i>				
<i>Pollution Prevention and Resource Efficiency</i>				
<i>Public Health</i>				
<i>Physical and Cultural Heritage</i>				
<i>Lands and Soil Conservation</i>				

Ineligible activities

Project funds shall not be directly or indirectly used for:

- Operational or administrative costs of ministries, departments or agencies of the Government of Antigua and Barbuda or the government of any other country;
- Salaries for executive officers and core staff of non-governmental organizations, except for such salaries related to services performed by such persons specifically for the purposes of achieving the objectives of the funds received from the DOE. In this case the amount of funding may be limited by the SIRF Fund General Board;
- Activities relating to the extraction or depletion of non-renewable natural resources (including inter alia forests, trees, beach sand, ghut sand and oil/gas);
- The resettlement of people, their livelihoods, or the removal or alteration of any physical cultural property under any circumstances; or
- Any other use that is deemed to be inconsistent with the general objective of the Environmental Protection and Management Act (2015).

This list of exclusionary activities may be amended upon the recommendation of the Technical Advisory Committee (TAC), and approval of the Project Management Committee (PMC) and the SIRF Fund General Board, to ensure that SIRF Funds are only used for the purposes of the effective implementation of the project and the EPMA, as provided for in the DOE Manual on Grants and the Revolving Fund.

Public Consultations

Community resistance to projects can slow them down or prematurely kill them. On the other side of the coin, fear of opposition can push development efforts away before they even get started. Winning over skeptical residents can appear a daunting task, but it is one worth making, and early and consistent stakeholder engagement is a critical component of project success.

The following table provides for an indicate timeline and frequency of community consultations during project implementation.

Table 9. Project Timeline for Community Consultations

Frequency	Responsibility	Purpose	Suggested Outputs
Six-month pre-inception phase	DoE and project partners	Training programme tailored to the needs of the community members and project implementers	Network of validated project partners
Project inception	DoE	To gather baseline socio-economic information	Baseline data

As needed and at least every three (3) months – rotating communities	DoE	Distill any impacts of interventions such as clearing of the waterway, construction waste, challenges with the loans; review the 15 ESP principles; and notify the public about the Grievance Mechanism	Assessment of impacts of project activities and plans for mitigation measures
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The PMU will ensure that marginalized and vulnerable groups in the target area are included in public consultations, holding smaller focus groups as necessary, including: the disabled, single mothers who are heads of households, LBGT members, HIV/AIDS patients, the elderly including those who on a fixed income (pension), small children and migrants of questionable immigration status and their children

The project's stakeholder and community consultations should follow the Department of Environment's Stakeholder and Community Consultation Strategy (July 2016), including the step-by-step guidance and for capture, analysis and reporting of feedback.

Grievance Mechanism

The Department of Environment has an established Complaints Procedure, which will be used as the project's Grievance Mechanism. This is covered in the DOE's Code of Conduct and Ethics⁷⁶, which all staff, contractors and consultants are required to sign and adhere. Complaints pertaining to the Adaptation Fund's project activities will be direct to designated personnel in the Project Management Unit (PMU).

The public can submit complaints related to the mandate of the Department of Environment via the following channels:

- On the DoE's website:
http://www.environmentdivision.info/submit_a_complaint_en_365cms.htm
- Filling out the form and emailing it to antiguaenvironmentdivision@gmail.com
- In writing to: Director, Department of Environment, Ministry of Health and the Environment, #1 Victoria Park Botanical Garden, P.O. Box W693, St. John's Antigua
- By email: antiguaenvironmentdivision@gmail.com
- By Phone: Monday to Thursday: 8am to 2pm, Fridays: 8 am to 12 pm, by calling: (+1 268) 462 4625; (+1 268) 562-2568; (+1 268) 460-7278
- Depending on the nature of the complaint, or if for any reason the complainant is unwilling to make a report to the Department of Environment, they can submit a complaint to their parliamentary representative.

⁷⁶ Code of Conduct and Ethics, Department of Environment:

[http://www.environmentdivision.info/UserFiles/File/NIE - Code of Conduct - Working draft NN-1.pdf](http://www.environmentdivision.info/UserFiles/File/NIE_-_Code_of_Conduct_-_Working_draft_NN-1.pdf)

When a complaint is communicated, the following information is recorded:

- The nature of the problem
- The location of the problem
- When the problem occurred (date and time)
- Who or what is the perceived source of the problem
- Any information or evidence you may have—particularly eyewitness information, documents or photographs, a videotape, or a water or soil sample (the information or evidence must be credible and relate directly to the incident being reported).
- The contact information of the complainant

Complaints will be handled by staff at the Department of Environment, who will investigate the complaint. This process usually includes an on-site investigation. The Department may invite other relevant agencies to participate in the investigation. During the investigation, the individuals or agencies responsible for action to correct the issue will be identified. The Department will produce a report of its findings and recommendations and action if necessary. Complainants may request for a copy of the reports related to the complaint, as per the Freedom of Information Act.

Risk Register

A comprehensive risk management strategy is an integral part of the project.

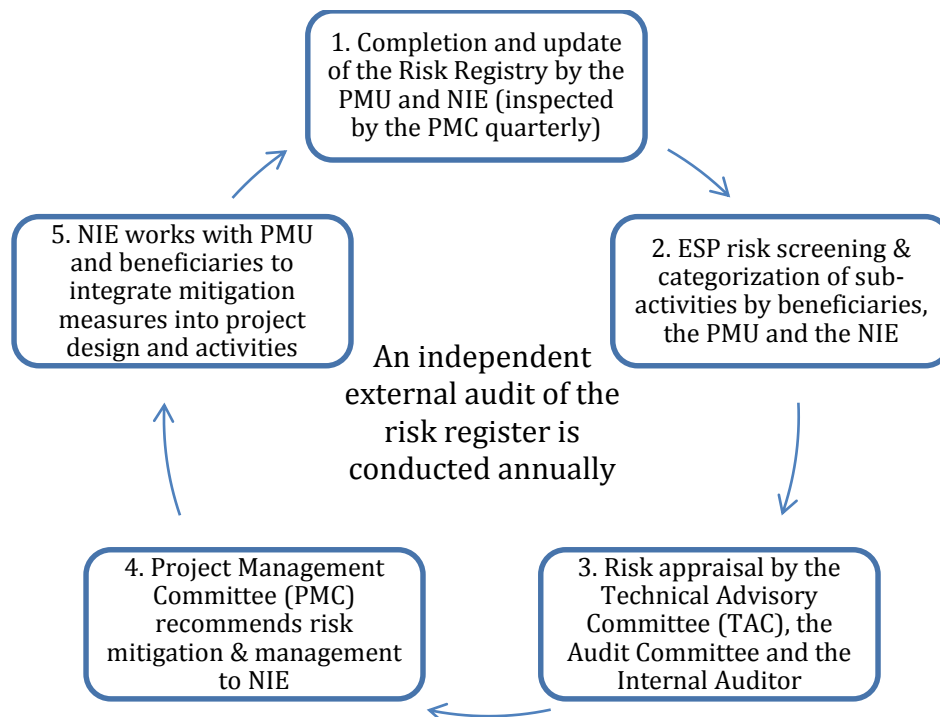


Figure 24. Quarterly risk screening, monitoring and risk management process

The Department of Environment has established and will maintain the “Risk Register” in Appendix 12 to track and evaluate risk management throughout project implementation.

This will be appraised and updated on a quarterly basis through the five-step process, and an independent external audit will be conducted annually.

D. Monitoring and evaluation arrangements

The DOE approach to monitoring, reporting and evaluation is explained in its Technical Manual. The results of M&E will be to provide project updates, risk assessments and any project change required. In summary, M&E will provide answers to questions, in a systematic way, on the progress and success of the project and its partners in achieving the desired outcomes and outputs.

Given the nature of the project, the Department of Environment will contract the services of a M&E Coordinator to be responsible for the data collection, compilation, and monitoring and reporting of the project, as well as operational support and additional assistance in the design and implementation throughout the project, adjusting project outcomes and activities according to a changing context. It is important to remain flexible to and learn from inevitable unforeseen changes in the operational landscape using an adaptive management approach.

Reporting will take place on a quarterly and annual basis in accordance with Adaptation Fund standards. The monitoring and reporting plan involves an iterative approach to collecting data and improving the project design. The project will commence following and inception workshop with local and national stakeholders, the Environment Department team and the M&E team assigning and clarifying the project purpose, project roles and responsibilities, and addressing any outstanding barriers to implementation.

Budget lines are dedicated for Monitoring and Evaluation (M&E) – including through the awarding of a community contract to support transparency and accountability – to ensure that the necessary resources are allocated to execute the M&E framework. The project's comprehensive M&E framework will meet and exceed GEF's Agency Minimum Standards on Environmental and Social Safeguards as defined in Policy PL/SD/03, the Adaptation Fund's policy, and drawing on the Department's safeguards formalized under the Accreditation process.

At the outset of the project, baseline indicators will be established to evaluate impact of project interventions. The DOE's Data Management Unit (DMU) will collect baseline data during the six-month pre-inception phase. Indicators for the results based monitoring framework have been developed below.

Proposed Performance Criteria/Standard for Component 1 – Environmental and Social Risk Management:

1. Minimize clearing of vegetation from the banks of the water course, and revegetate cleared areas using recommended species.
2. Minimize pollution of the water course and McKinnon's Pond by construction debris and other pollutants including oils from equipment, pesticides
3. A decrease in vector populations (rodents and mosquitoes) because of project interventions.
4. Improvement in quality of the water in the water course and in McKinnon's Pond; water quality within prescribed EPMA standards

5. Decrease in flooding risk because of interventions, especially for marginal/vulnerable populations.
6. Waterway interventions do not result in any involuntary resettlement, whether physical or economic displacement.
7. Equal participation of men and women in design and upgrade of waterways; participation and involvement of vulnerable populations.

Proposed Performance Criteria/Standard for Component 2 – Environmental and Social Risk Management:

1. Five (5) % of homes in the target area access loans.
2. Loan repayments result in at most a 2% - 3% portfolio attrition rate
3. All successful loan applicants are chosen in a fair and equitable manner
4. A locally relevant vulnerability index is developed and used to track impacts of loan interventions
5. Loans are not used for any activities that result in net release of greenhouse gases or activities that contribute to climate change by the release of greenhouse gases
6. Minimal increase in rent for tenants
7. Equal representation of men and women, and marginal and vulnerable groups, who access the loans
8. Balance of men and women on the loan decision-making committees

Proposed Performance Criteria/Standard for Component 3 – Environmental and Social Risk Management:

1. Capacity building of members of three community groups to successfully apply for and receive loans for upgrade of community structures to improve resilience of their buildings
2. Upgrade of 30% of community buildings benefit from concrete resilience measures
3. Grants awarded to three community groups to sustain project interventions
4. Contracted community groups meet on a regular basis and carry out maintenance activities

Monitoring of benefits and effectiveness of the project's ecosystem-based measures will be maintained beyond the life of the project through aligning this project's indicators with indicators in Antigua and Barbuda's Medium-term Development Strategy for 2016 – 2020. Indicators in the strategy that are relevant to this project include:

- Local Area Development Plans on the level of watershed units as required by the National Physical Development Plan
- Incidence of unplanned development
- Ground and surface water quality – level of coliforms
- Incidence of water- borne disease, and other diseases related to poor sanitation

Following the start of the project, two reports will document the progress of the project: the annual project performance report will be prepared by the implementation team, shared with the Adaptation Project Board; and the Mid-term report will focus on the overall

momentum of the project, financial and time efficiency, risk management and whether the project is responsive and adaptive to the barriers and challenges faced along the way. The project will conclude following an independent annual evaluation and outstanding outputs have been produced and queries addressed. The final evaluation will reflect on all previous evaluation and site visits conducted reporting the success of the project in terms of achieving the objectives set out at the inception of the project.

Table 10. Budgeted M&E plan

M&E Activity	Frequency	Responsibility	Cost (USD)
Project Inception Workshop	At start of project	PMU, TAC	5,000
Inception Report	At start of project	Project Manager/Project Coordinator and the PMU	None (included in workshop cost)
Measurement of project indicators (outcome, progress and performance indicators) including baseline data collection	At start of project	PMU	79,000
ESS Risk Updates and Community Consultations, which are captured in the Project Manager Progress Reports	Quarterly	PMU, with review of the TAC and approval of the PMC	76,800
Annual Project Report including field visits and workshops	Annually	PMU, TAC, M&E Coordinator	10,000
Loan Board, Project Management Committee (PMC) and Audit sub-committee meetings	Quarterly	PMC (PMU serves as the Secretariat)	6,000 / year
Technical Advisory Committee (TAC) and TEC sub-committee meetings	Quarterly	TAC (PMU serves as the Secretariat)	6,000 / year
Mid-term independent evaluation	At project mid-point	M&E Coordinator	18,000
Terminal Independent Project Evaluation	End of project	M&E Coordinator, TAC, PMU	30,000
Publication of Lessons Learnt and other project documents	End of project	Project Manager, Project Coordinator and PMU	8,200
Total			US\$275,000

E. Results Framework

The results framework presented here is subject to revision during Monitoring and Evaluation (M&E) baseline data collection, which will take into account: disaggregation by women and by marginalized/vulnerable representation; cost effectiveness; availability of existing data; and alignment with data collection in ongoing work programmes of relevant agencies (e.g. Directorate of Gender Affairs).

Components	Objectives/Outcome	Outputs	Indicator	Baseline	Target	Verification
1. Upgrade urban drainage and waterways to meet projected climate change impacts	1.2 Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors	<p>1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases</p> <p>1.1.2. Restore and upgrade McKinnon's 3 km waterway to meet new adaptation requirements for flooding and vector control, taking into account ESS and gender considerations within the design</p>	<p># meters of climate-resilient drainage installed</p> <p>Climate-resilient Local Area Plan available online</p> <p>% Improvement in water quality (nutrients, pollution levels and contaminants reduced)</p> <p>% change in mosquito larvae in water bodies in the area</p> <p># of consultations with affected individuals to ensure fair and equitable change</p>	<p>No local adaptation plan in existence</p> <p>No flood capacity analysis available</p> <p>Regular flooding during heavy rainfall events</p> <p>Check dam not currently in existence</p> <p>Climate resilient drainage adaptation measures not demonstrated</p>	<p>The McKinnon's waterway can withstand a 1 in 50-year extreme rainfall event</p> <p>Water quality standards meet criteria set in the Environmental Protection and Management Act of 2015</p> <p>Mosquito larvae in water bodies in the area are reduced by at least 30 percent</p> <p>Risk for ESS including gender impacts identified and all mitigated measures agreed and implemented</p>	<p>Water quality testing before and after project</p> <p>Visual observation of flooding during rainfall events, Project reports, land permits</p> <p>Results of flood mitigation climate modeling analysis</p> <p>Health data from local clinics</p> <p>Indicators identified and tracked by consultants.</p>
2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines	2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability	2.1.1. At least 5% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards	<p># of micro-loans disbursed</p> <p>% households with off-grid RE systems</p>	<p>Low adherence to/implementation of climate resilient guidelines and planning requirements</p>	<p>5% of homes are equipped with 2 weeks' worth of water stored on-site with filtration and pump equipment</p> <p>5% of homes benefit from the installation of hurricane</p>	<p>Project report</p> <p>Loan agreements signed</p> <p>Visual observation and</p>

established in the building code and physical plan			<p>% households in compliance with new climate resilient building code measures</p> <p># of climate-related damage incidents reported</p>	<p>Building codes not uniformly followed</p> <p>Vulnerable community members are unable to access “soft” loans for adaptation</p> <p>Historical instances of damage to community property and households</p> <p>No ecosystem based adaptation measures demonstrated</p>	<p>shutters and rain water harvesting</p> <p>50% reduction in the number of persons requiring shelters during droughts, with priority for vulnerable populations (single mothers, older persons, children, special needs children)</p> <p>5% of homes have back-up RE (for essential services including pumping water)</p> <p>50% of the homes identified are from the most vulnerable groups.</p>	<p>project documents</p> <p>Monitoring and Evaluation</p>
3: Adaptation mainstream and capacity building in NGOs and community groups to sustain project interventions	3.1. Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level	<p>3.1.1. 30% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings</p> <p>3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project</p>	<p>% of community buildings receiving support for climate resilience measures</p> <p># community contracts awarded for project implementation activities</p> <p># of McKinnon’s watershed community members attending/ completing training – including % of women and vulnerable peoples attending/completing training</p> <p># guidelines and media products published and disseminated</p>	<p>No community contracts for waterway maintenance</p> <p>Community-based shelters do not meet safety and climate resilience guidelines</p> <p>No media products relating to Local Area Plan or knowledge products available</p>	<p>30% of community-based buildings benefit from grants to improve their resilience</p> <p>30% of A&B’s population is exposed to the project’s public awareness material</p> <p>30% of vulnerable people in receipt of the project’s public awareness material</p> <p>3 community groups are trained in the management and maintenance of adaptation interventions</p> <p>50 copies of McKinnon’s waterway environmental management guidelines produced/ disseminated and available in easy to understand language, and using pictures.</p>	<p>Meeting minutes/record, Project documents</p> <p>MOUs between the Government and community groups/NGOs</p> <p>Contracts between the Government and community groups/NGOs</p> <p>Visual Observation, Project documents</p>

			# of presentations conducted % of women and vulnerable persons involved in contract design and implementation		At least 3 presentations and workshops to stakeholders by the department and by NGOs to the community with funding provided by the Department.	
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F. Alignment with the Adaptation Fund's Results Framework

Project Objective(s) ⁷⁷	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
<p>An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed seeks to reduce vulnerability of the community, by increasing the ability of the watershed to handle extreme rainfall, while increasing the resilience of the built environment simultaneously. This integrated approach will ensure that the community as a whole will be able to withstand projected climate change impacts.</p>	<p>1) 3 km of urban and semi-urban waterways meet projected climate change, in particular extreme hydro-meteorological events and disease vectors</p> <p>2) \$3M is disbursed in soft revolving loans to vulnerable households to meet new adaptation guidelines and standards for built infrastructure to withstand extreme climate variability</p> <p>3) 30% of community infrastructure in target area is resilient to climate change and 3 community contracts are awarded for project implementation</p>	<p>Assist developing-country Parties to the Kyoto Protocol that are particularly vulnerable to the adverse effects of climate change in meeting the costs of concrete adaptation projects and programmes in order to implement climate-resilient measures.</p> <p>Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors</p>	4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	<u>10M</u>
Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator	Grant Amount (USD)
1.1 Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors	<p># meters of climate-resilient drainage installed</p> <p>Climate-resilient Local Area Plan</p> <p>% Improvement in water quality (nutrients, pollution levels and contaminants reduced)</p> <p>% change in mosquito larvae in water bodies in the area</p>	4.1. Development sectors' services responsive to evolving needs from changing and variable climate	4.1.1. No. and type of health or social infrastructure developed or modified to respond to new conditions resulting from climate variability and change (by type)	<u>\$3,550,960</u>

⁷⁷ The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability	# of micro-loans disbursed % households with off-grid RE systems % households in compliance with new climate resilient building code measures # of climate-related damage incidents reported	6.1 Percentage of households and communities having more secure access to livelihood assets	6.1.1. Number and type of adaptation assets (physical capital, natural capital) created in support of individual or community livelihood strategies	<u>\$3,125,300</u>
3.1 Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level	% of community buildings receiving support for climate resilience measures # community contracts awarded for project implementation activities # of McKinnon's watershed community members attending/ completing training # guidelines published and disseminated # of presentations conducted	3.2. Modification in behavior of targeted population	3.1.1 Number and type of risk reduction actions or strategies introduced at local level	<u>\$2,223,500</u>

G. Detailed Budget

ACTIVITY	BUDGET USD	BUDGET NOTES
Component 1. Upgrade urban drainage and waterways to meet projected climate change impacts		
Outcome 1.1. Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors		
Output 1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases		
Develop an island-wide drainage code with appropriate IDF and DDF curves and integrate into implementation	\$42,000	Hydraulic Engineer 20 days @ \$1,200 Statistical Analysis & Hydrology 10 days @ \$1,200 Process Engineer 5 days @ \$1,200
Climate impact modelling to inform local area physical development planning, including modelling of sea level rise, flooding, hurricane, drought and temperature projections under AR5 climate scenarios, and projected development trends	\$72,000	Climatologist 30 days @ \$1,200 GIS expert 20 days @ \$1,200 Human geographer 10 days @ \$1,200
Revise the Building Code with climate resilience measures and submit to Attorney General for approval and Gazette and signing by the Minister	\$45,000	Engineer 10 days @ \$1,200 Architect 15 days @ \$1,200 Climate Adaptation Specialist 10 days @ \$1,200 Legal consultant 2 days @ \$1,500
Topographical survey data of McKinnon's watershed basin for hydrological and hydraulic models	\$25,000	Based on similar data collection consultancy for Cashew Hill (1:50,000 Topographical Maps for 3,400 feet of watercourses) @ \$25,000, including land ownership information
Technical designs for flood mitigation measures in the waterway	\$140,000	Detailed engineering designs based on past experience with engineering firm for works in Cashew Hill under GCCA project @ Euro 119,000
Consultations on planning and designs	\$15,000	At least 3 consultations at \$5,000 each
Enter into waterway easement agreements with applicable landowners	\$45,000	Legal fees 30 days @ \$1,500 per day

Conduct the EIAs and other studies required for approval; Apply for Physical planning to DCA	\$39,600	Environmental and Social Impact Specialist 28 days @ \$1,000 per day Development planner 5 days @ \$1,200 per day
Output 1.1.2. Restore and upgrade McKinnon's 3 km waterway to meet new adaptation requirements for flooding and vector control, taking into account ESS and gender considerations within the design		
Contract for Supervision of the Works	\$75,000	Engineer design specialist 75 days @ \$1000 per day
Waterway preparation works - removing debris blockages (solid waste and pipes, etc)	\$500,000	Excavation inclusive of carting away materials to an approved site and repurposing where possible (500 cubic meters at \$20); with WIOC and APUA develop and implement solutions for pipes and other hazards @ \$490,000
Construction of flood prevention infrastructure - improving major and minor watercourse drainage, relocating natural watercourse barriers/reintegrating natural watercourses with sustainable urban drainage methods	\$2,405,360	Indicative costs of: - 1,700 m of hillslope channeling @ US\$ 175 per metre; - 250 cubic metres of road drainage storage @ US\$ 150 per cubic metre; - 35,250 cubic metres of earthworks for check dams @ US\$ 20 per cubic metre; - 1,751 m of diversion channels @ US\$ 300 per metre; - 5,501 cubic metres of retention ponds @ US\$ 60 per cubic metre; - 1,500 feet of covered canals @ US\$ 130 per foot; - 1,500 feet of swale @ US\$ 35 per foot; - 1,500 feet of pedestrian walkways @ US\$ 35 per foot - Insurance securities and bonds @ \$30,000; Environmental mitigation and compliance and health and safety @ \$20,000 - Provision for dewatering during drainage works for contract @ \$40,000; Contingency @10%
Vector control using ecosystem-based rehabilitation methods	\$130,000	Construction of expanded channel downstream of watercourse confluence with shall wetlands to facilitate water quality improvement and natural

		mosquito control through fish reintroductions 1,300 square meters @ \$100
Development of Local Area Physical development plan and submission for approval and implementation	\$62,000	Urban Planner 30 days @ \$1,000 per day GIS expert 10 days @\$1,200 per day Legal consultant 10 days @ \$1,500 per day Botanist/Landscaper 5 days @ \$1,000 per day
Integration of the LAP into the implementation practices of the DCA and Public Works Dept (to give legal effect to the policies and measures being implemented by the project)	\$30,000	Development of communications material; Training for DCA and Public Works (details for mainstreaming into practices to be finalized as LAP is developed)
Component 1 Subtotal	\$3,550,960	
Component 2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan		
Outcome 2.1 Increased adaptive capacity of built infrastructure and communities to withstand extreme weather and climate variability		
Output 2.1.1. At least 10% of the homes in the target area, during the life of the project, have applied for loans for adaptation measures to meet new standards		
Develop Access database to track loan disbursements and repayments; develop MRV systems	\$24,000	Database expert 20 days @ \$1,200 per day
Prepare regulations under the Finance Act to regulate the Revolving Loan program	\$15,000	Legal consultant 10 days @ \$1,500 per day
The Revolving Loan program vested into the relevant institutional arrangements, which are convened to oversee disbursement and monitoring	\$20,000	Training on adaption for relevant personnel; convening of the Loan Board and the Technical Evaluation Committee (TEC) for adaptation; approval of manuals, forms and processes and training on operations
Disburse loans for adaptation interventions for eligible households that will be impacted by flooding within the watershed	\$3,000,000	Approximately 200 loans averaging US\$15,000 per loan
Design and implement a monitoring, reporting and verification system for the loan program	\$28,800	Financial expert 20 days @ \$1,200 per day Engineer 4 days @ \$1,200 per day

Prepare and share best practices for entire island	\$37,500	Communications expert 25 days @ \$500 per day Graphic design specialist 15 days @ \$1,000 per day Video production \$10,000
Component 2 Subtotal	\$3,125,300	
Component 3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions		
Outcome 3.1. Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level		
Output 3.1.1. 50% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings		
Identify groups in the area that qualify for grants and provide training in fiduciary and financial management, and technical training on adaptation	\$20,000	Community Liaison 15 days @ \$1,000 per day Adaptation Specialist 5 days @ \$1,000 per day
Enter into a MOU with a relevant entity to process and manage the community grants	\$15,000	Legal consultant 9 days @ \$1,500 per day; Consultations \$1,500
Engineering assessments of the community shelters; designs of engineering measures	\$36,000	Engineer 5 days @ \$1,200 Architect (Resilience specialist) 15 days @ 1,200 Renewable Energy specialist 5 days @ \$1,200 Disaster and Community Liaison Specialist 5 days @ \$1,200
Disburse grants to communities and NGOs for adaptation and resilience measures in community buildings using adaptation criteria	\$1,500,000	Grants will be provided to at least 5 community buildings for approximately US\$300,000 each
Output 3.1.3. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions		
Develop a comprehensive communications plan for broadbased community education, awareness and mobilization of support	\$32,500	Communications expert 25 days @ \$500 per day Community Liaison 15 days @ \$1,000 per day Adaptation Specialist 5 days @ \$1,000 per day
Award a community contract to implement the communications plan and disseminate information nationally, regionally and internationally	\$150,000	Community contract award for \$150,000 (terms of reference to be developed bending initial project outputs)

Award community contract(s) to maintain the sustainable urban planning and drainage interventions, working with the Central Board of Health and the Development Control Authority	\$220,000	Community contract award for \$220,000 (terms of reference to be developed bending initial project outputs)
Award a community contract to for M&E of adaptation measures, data collection and consultations	\$250,000	Community contract award for \$250,000 (terms of reference to be developed bending initial project outputs)
Component 3 Subtotal	\$2,223,500	
IE Fee / Oversight Costs (*max 8.5% of total budget)	\$434,000	
DoE Oversight	\$275,000	M&E budget as reflected in the project document: - Project Manager 48 months @ US\$ 1,600 per month - Project Inception Report @ \$5,000 - Measurement of project indicators and baseline data @ \$80,000 - Annual Project Report including field visits and workshops @ \$10,000 - Project Management Committee meetings @ \$6,000/year - Technical Advisory Committee meetings @ \$6,000/year - Mid-term independent evaluation @ \$18,000 - Terminal Independent evaluation @ \$30,000 - Publication of lessons learned and project documents @ \$8,200
EIMAS Oversight of M&E results as per the Legal requirements	\$30,000	Data Management Unit - to purchase software and other items related to GIS mapping.
Reporting	\$5,000	Reports to the Cabinet and to the Parliament
Financial oversight (internal auditor)	\$40,000	4 years @ US\$ 10,000 per annum
Audit	\$54,000	4 annual audits @ US\$ 13,500 per audit
Misc.	\$30,000	
Project Execution costs (Project Management Unit) *max 9.5% of total budget)	\$636,240	

Project Coordinator	\$216,000	Project Coordinator 48 months @ US\$ 4,500 per month
Loan Officer and Program Officer for Component 2	\$105,000	Loan Officer (US\$35,000/year) for 4 years
Technical project Officer	\$88,000	Technical assistance to the PC 40 mths @ USD 2200.00/mth
Administrative support	\$110,000	two persons, each at 4 years @ US\$ 13,750 per annum
Project vehicles	\$75,000	Electric vehicle @ US\$ 75,000
Maintenance of office facilities	\$25,000	Maintenance of office and facilities for 4 years @ US\$ 6,250 per annum
Office administration and consumables	\$17,240	Office consumables 4 years @ US\$ 4,310 per annum
PROJECT TOTAL	\$9,970,000	

H. Disbursement schedule with milestones

Table 11. Disbursement milestones

Milestones	Timeline	Disbursement Percentage
Three-month pre-inception phase	Feb – Aug 2017	5%
Project Inception*	Aug 2017	40%
Mid-term Review	Aug 2019	40%
Project/Programme Closing	2020	10%
Terminal Evaluation	2021	5%

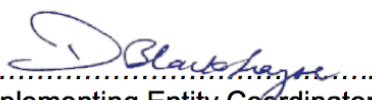
*Note: the frontloading of disbursements is to accommodate the need for upfront disbursements of the adaptation Revolving Fund under Component 2.

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government¹ *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

Diann Black-Layne	Date: January 9, 2017
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B. Implementing Entity certification *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (National Communications to the UNFCCC, INDC, National Physical Development Plan, National Biodiversity Strategy and Action Plan) and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund</u> and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
 Implementing Entity Coordinator	
Date: January 9, 2017	Tel. and email: +1 268 462-4625
Project Contact Person: H.E. Amb. Diann Black-Layne Department of Environment	

⁶ Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

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and/or

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