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 (in U.S Dollars equivalent)

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). Most of the country's land area consists of two large islands – Antigua and Barbuda – with a number of smaller inhabited and uninhabited islands. The islands lie on a 3,400-km^2 sub-marine plateau and have an exclusive economic zone of approximately 110,071 km^2 – significantly larger than Antigua's landmass of 280 km^2. Antigua is fringed by 25 km^2 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 km^2, 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 at 402 m, located on the southwest corner of the island.

Figure 1. Geographical location of Antigua and Barbuda in the Caribbean[1]

Socio-economic Context

Antigua and Barbuda's population is approximately 91,000 (2014)[2] and is anticipated to reach 115,000 by 2050[3]. In 2012, 70% of the population was classified as rural, with 30% as urban[4], with a trend towards increasing urbanization. Antigua and Barbuda is considered to be an upper middle-income country by the World Bank, where ~14% of the population live on less than US$7 per day[5]. This is the second lowest poverty level among English-speaking nations in the Caribbean.

Historically, Antigua and Barbuda had an agricultural economy of primarily sugar and rum – from 1632 to 1981 Antigua and Barbuda was a colony of England. In 1981, it gained independence but remained a member of the Commonwealth[6]. While historically agricultural, Antigua and Barbuda's current economy is based on a service industry, with tourism contributing approximately 60% to the GDP[7]. Consequently, the economy is largely reliant on foreign exchange through visiting tourists. The islands' many beaches and areas of high biodiversity are among its numerous attractions. Agriculture now contributes about 3% of GDP, mostly through the fisheries subsector[8].

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[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. 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 sever 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 GDP[10].

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 limited, 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 intrusion[11]. 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 a double 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 a family's vulnerability. After a storm, the electricity grid can be interrupted, depending on the magnitude of the event, for anywhere between 2 weeks (as experienced after Category 1 Hurricane Gonzalo in October 2014) to 3 months (following Category 4 Hurricane Luis in August 1994).

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 Intended Nationally Determiend Contribution (INDC) adaptation targets alone are projected to cost $20M USD per year for the next ten years[12]. 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 main problem is that 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 12 major storms and hurricanes that 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.

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

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

centers to strengthen social capital; and 4) to provide the community with the skills and capacity they need to maintain the waterway by themselves, 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 lenders[13]. To date, microfinancing initiatives in the Caribbean have been mainly used to fund economic activities such as housing, farming and small manufacturing[14].

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 sectors[15].

Significant barriers to achieving the implementation of adaptation targets identified Antigua and Barbuda's climate action plan (INDC) 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.

This proposed project will **overcome the above barriers** and document the results as best practices that can be used for all small island developing states.

Some preliminary indicators on project impacts include:

- 5 percent of homes are equipped with 2 weeks worth of water stored on-site with filtration and pump equipment
- 5 percent of homes (approximately 200) benefit from the installation of hurricane shutters and rain water harvesting
- The number of persons requiring shelters during droughts is reduced by 50 percent, 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 25 year extreme rainfall event
- Mosquito larvae in water bodies in the area are reduce by at least 30 percent
- 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 in the waterways

[13] Carlton *et al*. 2001. *Microfinance in Uganda*. Lechner, Reiter und Riesenfelder Sozialforschung OEG, Vienna.
[14] Jamaica Observer. 2011. *Microfinance in the Caribbean.*
[15] 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.

- Physical planning in 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 world[16] 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 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.

In an effort to prepare for this adaptation financing gap, the country recently passed legislation that established the Sustainable Island Resource Financing Fund (SIRF Fund). The 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. Antigua and Barbuda's proposed Special Climate Change Fund (SCCF) project, "Building climate resilience through innovative financing mechanisms for climate change adaptation," will be a complementary source of support to this project.

The creation of the SIRF Fund is at the core of the Environmental Protection and Management Act (EPMA), being implemented by the Department of the Environment. The expenditures of the fund are guided by 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 this project.

Antigua and Barbuda, like the other islands of the Organization of Eastern Caribbean States (OECS), are signatories to the UNFCCC and related protocols, to which the

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

Adaptation Fund is a supporting mechanism. All of these 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 faces by small island states.

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 as a complementary approach at the national level. The SIRF Fund, coupled with components supported by this project, is expected to generate a significant amount of new resources for adaptation while contributing positively to community resiliency as well as the overall macroeconomic situation confronting the country.

The Northwest Coast of Antigua – A Detailed Assessment

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-km^2 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 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.[17]

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 2012[18]. 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

[17] Ivor Jackson and Associated (2002). Local Area Plan for the Northwest Coast, p. 13
[18] 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

was developed and validated through extensive national consultations, and approved by the Cabinet of Antigua and Barbuda in 2012.

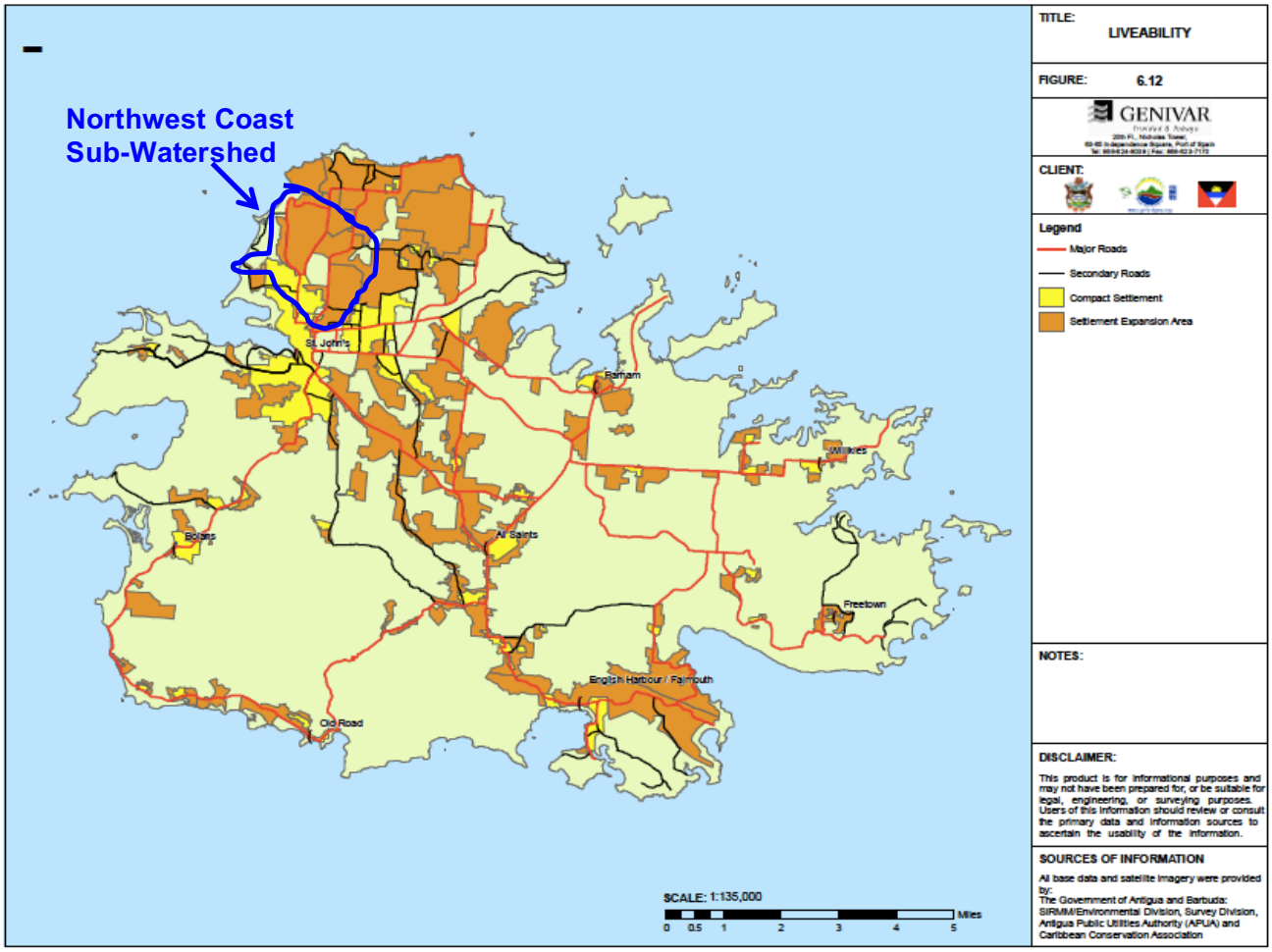

Figure 2. A "Liveability" index for Antigua identifying settlement expansion areas using social, economic and environmental criteria, with the northwest coast highlighted (SIRMZP 2012)

The northwest coast watershed area was first prioritize as a site for intervention during rigorous consultation processes while developing the national land use plan during the period of 2010 to 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 rise[19]. 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] 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

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.

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 region[20]. 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^{o}C over the time period (Figure 3)[21].

[20] Taylor et al., 2007 and Stephenson et al., 2008 in IPCC AR5 WGII Chapter 29 (SIDS), p. 1628.
[21] UNFCCC, 2009. Antigua and Barbuda's Second National Communication on Climate Change, p. 22.

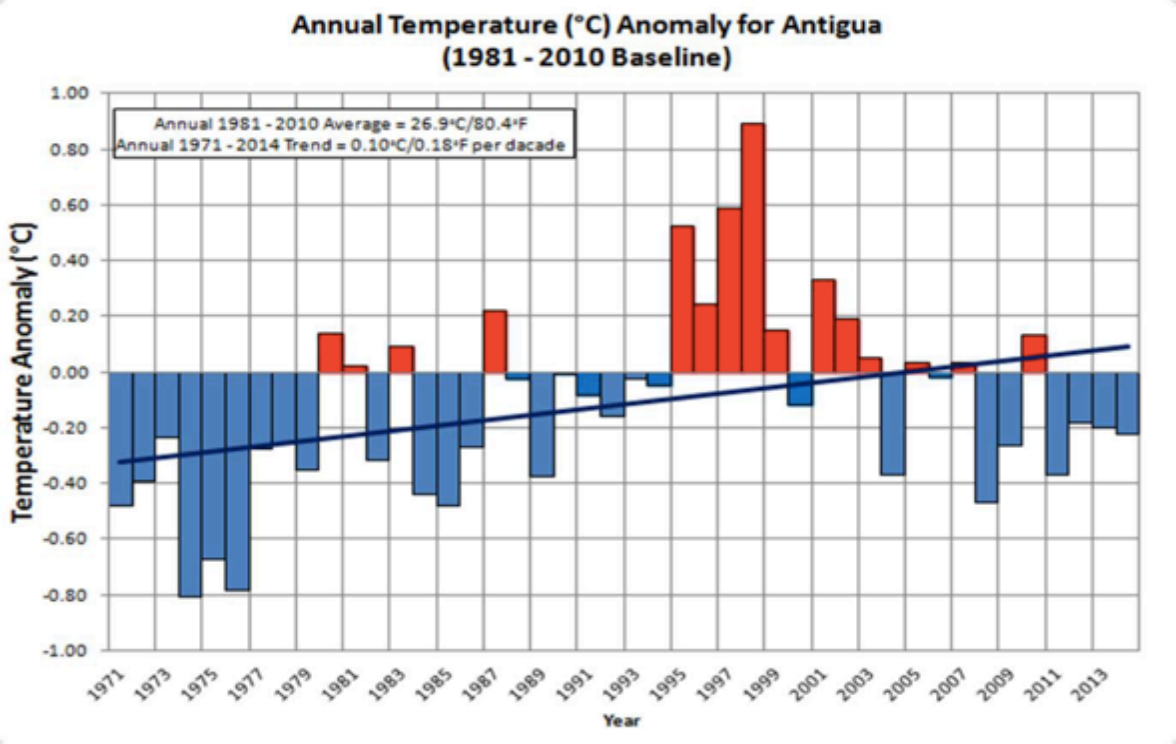

Figure 3. Annual Temperature Anomaly for Antigua (1981 – 2013) (Antigua Met Service)

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 emissions) scenarios, by 2100. There is general agreement across global and regional models in simulating future surface temperature changes[22] (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 suggest an increase with 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°C[23]. Decreasing the incubation periods by 5 days can lead to a threefold higher transmission rate of dengue[24]. Moderately higher temperatures can also hasten larval stage development, leading to smaller mosquitoes that require more frequent blood meals – and temperature

[22] ECLAC, 2010. Regional Climate Modeling in the Caribbean: The PRECIS-Caribbean Initiative. Economic Commission for Latin America and the Caribbean, April.
[23] 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.
[24] 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.

increases may also enhance metabolism, thus increasing the probability of dengue transmission to new hosts[25].

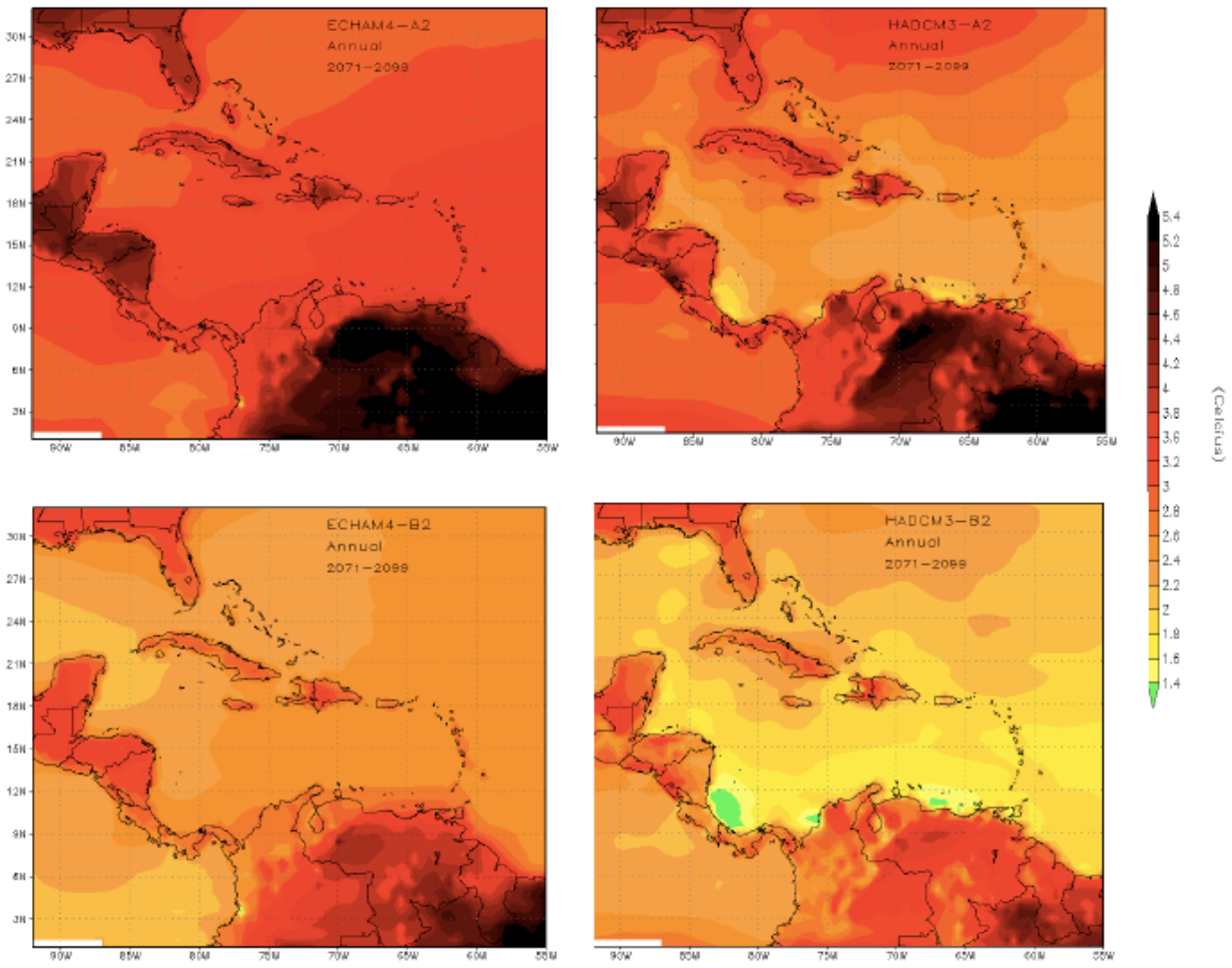

Figure 4. PRECIS regional climate model projected changes in the annual mean surface temperature for 2071-2099 (compared to 1961-1989) for high (top) and low emissions (bottom) scenarios for the Caribbean (ECLAC 2010)

Chikungunya – a viral disease transmitted to humans by infected mosquitoes – spread rapidly across the Caribbean in 2013 and 2014, including Antigua and Barbuda[26] [27]. The **Zika virus** has already spread to a number of Caribbean countries[28]. In addition, the IPCC's Chapter 29 on small islands found that in the Caribbean, all of the essential malaria transmission conditions now exist based on trends in the last 10 years[29].

[25] 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.
[26] In June 2014 there were 15 reported cases of chikungunya in Antigua and Barbuda.
[27] http://www.hhrjournal.org/2014/07/01/chikungunya-climate-change-and-human-rights-2/
[28] Center for Disease Control and Prevention: Zika Travel Information. http://wwwnc.cdc.gov/travel/page/zika-information Accessed April 9, 2016.
[29] IPCC AR5 WGII Chapter 29 (SIDS), p. 1625.

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 illnesses[30]. Increases in temperature may result in heat stress-related deaths among vulnerable groups such as the elderly and children. Increases in temperature have also been shown to result in lower economic productivity[31].

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 70% of Antigua's daily water supply is obtained through seawater desalination. This amount can increase to 100% during dry years[32]. 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. At present, Antigua is witnessing its worst drought in recorded history, with the 2015 rainfall total occurring once per 500 years. The current drought is over 32 months long, and to date, 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 current drought was caused by a number of climate actors, including an abundance of the dry and dusty Saharan air layer (SAL) from Africa,

[30] Macpherson, C. et al, 2015. Caribbean Heat Threatens Health, Well-Being and the Future of Humanity. *Oxford Joirnals*, Vol. 8, Issue 2 (196-208)
[31] Economist, 2014. *The cost of doing nothing.*
[32] Global Water Partnership Caribbean. 2013.The Post 2015 Water Thematic Consultation: Antigua and Barbuda.

positive North Atlantic Oscillation (NAO), negative Tropical North Atlantic (TNA) Index and El Nino[33].

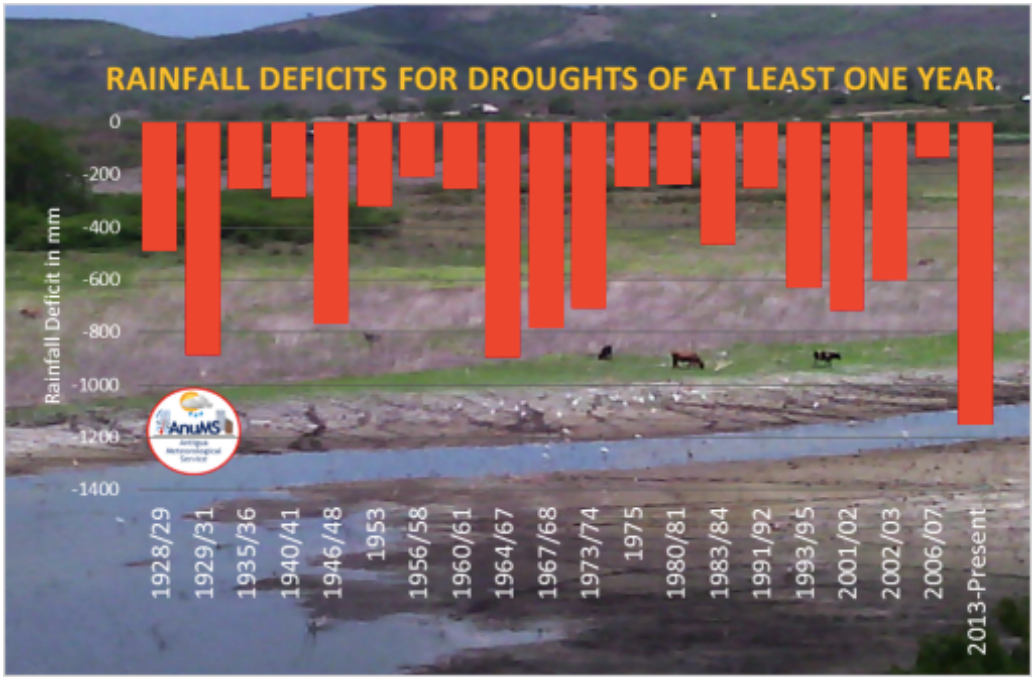

Figure 5. Rainfall deficit for 2013 – 2015 is the most extreme in Antigua's recorded history (Antigua Met Service)

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 an estimated hundreds of millions of dollars[34].

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).

[33] 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.
[34] Destin, Dale, 2016. Antigua Met Service: Weather, climate & related info for smart decisions

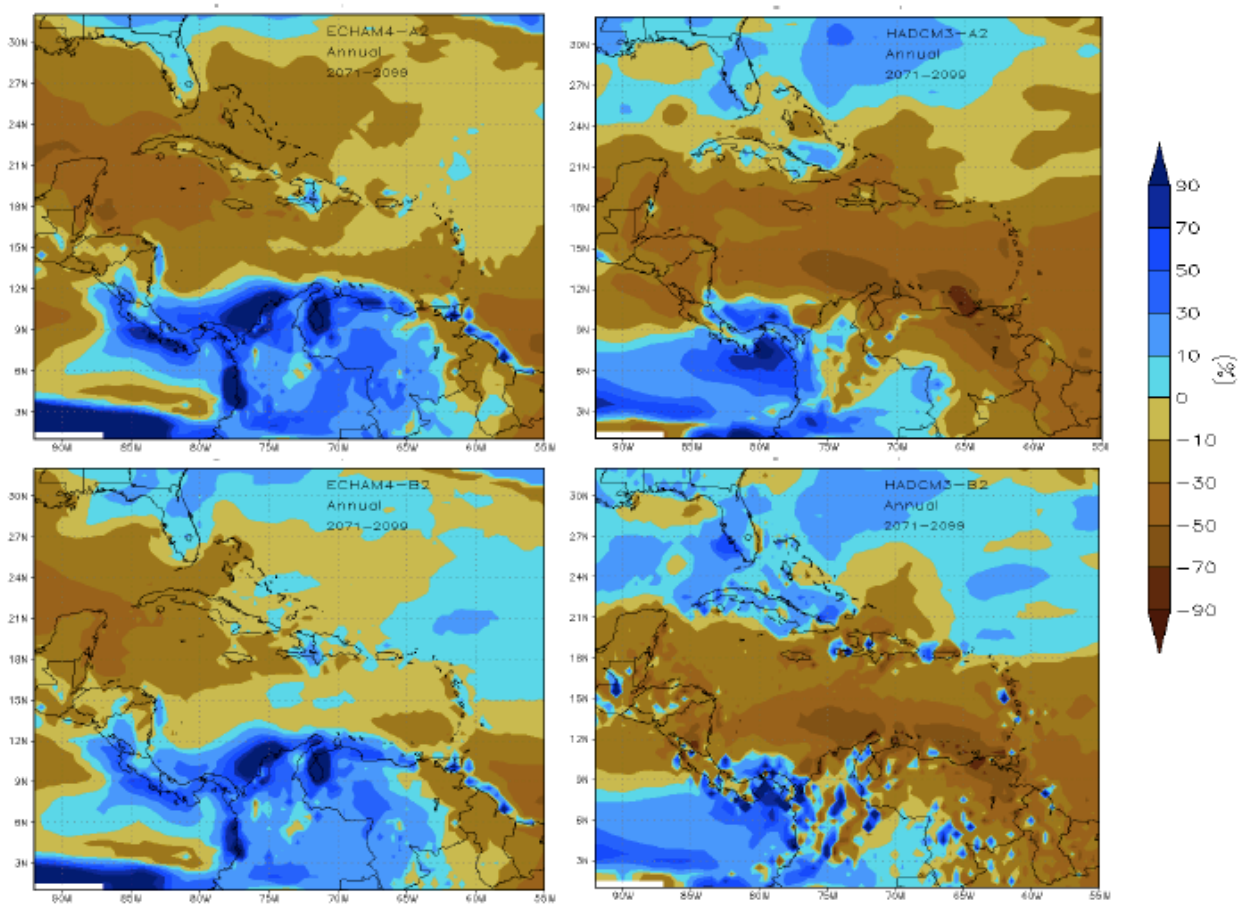

Figure 6. Annual mean changes in precipitation (%) for 2071 – 2099 as simulated by PRECIS for A2 (top – high) and B2 (bottom – low) emission scenarios (ECLAC 2010)

Drought leads to water shortages and poor sanitation practices at home, which can have detrimental health impacts. Recent changes in the epidemiology of leptospirosis – a potentially fatal bacterial disease that affects humans and animals[35] – have been detected, likely linked to factors in ambient temperature and changes in precipitation, and water availability[36].

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

The revolving loan 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, sinks, shower heads,

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[35] Centers for Disease Control and Prevention. http://www.cdc.gov/leptospirosis/ Accessed April 5, 2016.
[36] Russell 2009 in IPCC AR5 WGII Chapter 29 (SIDS), p. 1624.

dishwashers, washing machines). Rainwater harvesting is required by national building codes, however households do not or cannot always comply in practice (e.g. Figure 8). 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 extremes[37].

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.

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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 east[38]. On average, the rain gauge at VC Bird Airport receives half as much rainfall as other parts of the island. Insufficient geographic coverage of 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 rainfall[39].

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

[37] ECLAC 2010: PRECIS regional climate model
[38] http://www.sids2014.org/content/documents/17Antigua%20and%20Barbuda-National%20Report.pdf Accessed 5 May 2014.
[39] 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 periods[40].

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, Antigua, which is vulnerable to flooding and erosion[41]. 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 GDP[42]. 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 peak[43], and flood water levels reached 4 to 12 feet in vulnerable parts of the island (Figure 9). 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 significance losses [44] . Similar flood

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.

[40] ECLAC 2010: PRECIS regional climate model, p. 16
[41] 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
[42] Solomon et al, 2011 and Gores-Francis, 2013 in CARIBSAN National Vulnerability Impact Assessment
[43] Ho, B. 2008. *Agricultural losses amount to $11M*. Antigua Sun.
[44] Antigua and Barbuda NODS, 2008 in CARIBSAVE National Vulnerability Impact Analysis, p. 45

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 losses[45]. Model outputs are not confident changes in the frequency of hurricanes due to climate change, including the PRECIS regional model, however hurricanes that do form are expected to increase in intensity.

Project Objectives:

Main Objectives

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 to cope with the multiple stressors of climate change. This integrated approach will ensure that the community as a whole 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 systems along the 3 km urban and semi-urban waterways to meet projected climate change, in particular extreme hydro-meteorological events and disease vectors
2. Disburse concessional revolving loans to vulnerable households to meet new adaptation guidelines and standards for built infrastructure to withstand extreme climate variability
3. Support social adaptive capacity and local ownership of adaptation through climate resilient community infrastructure and community-owned project implementation

[45] CARIBSAVE, 2015. National Vulnerability Impact Analysis for Antigua and Barbuda

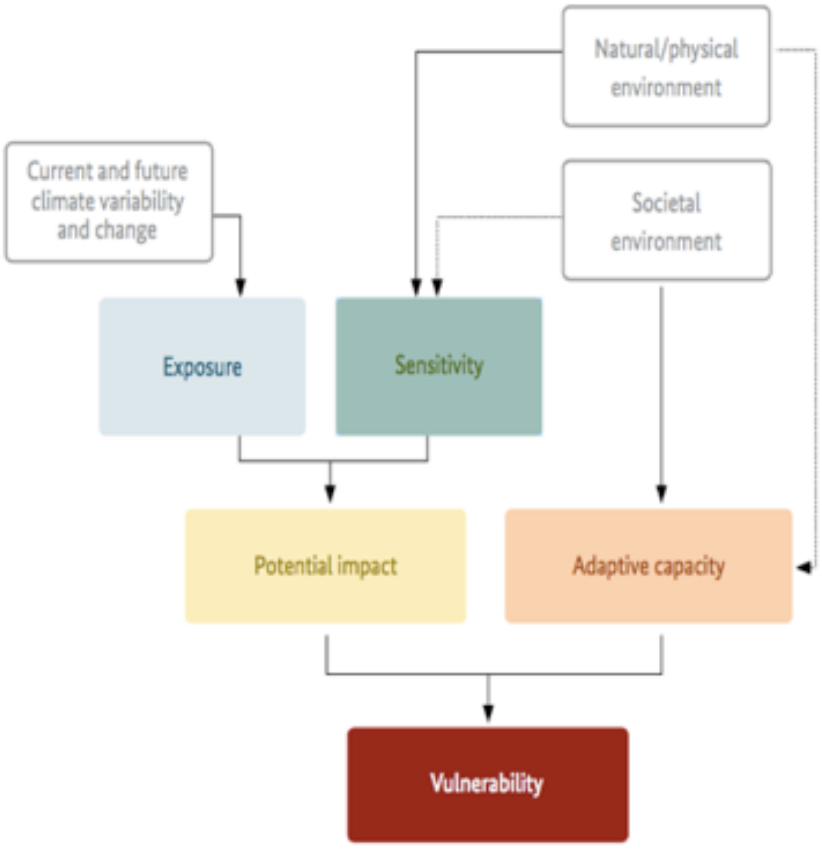

Figure 7. Visual representation of vulnerability: the objective of this project is to support natural and physical systems to reduce sensitivity, coupled with enhanced social adaptive capacity, in order to reduce vulnerability in Antigua's core settlement area on the northwest coast. Source: adelphi/EURAC 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	1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases 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	1.1 Increased ecosystem resilience of the McKinnon's waterway in response to climate change, extreme rainfall events, and disease vectors	$ 3,535,000

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	$ 3,110,000
3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions	3.1.1. 50% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings 3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project	3.1. Improved ownership of adaptation and climate risk reduction to sustain and scale-up actions for transformative adaptation interventions at the national level	$ 2,380,000
4. Project/Programme Execution cost			$ 945,000
5. Total Project/Programme Cost			$ 9,970,000
6. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)			None
Amount of Financing Requested			$ 10,000,000*

*Includes Project Preparation Grant ($30,000)

Projected Calendar:

Table 2. Milestones and expected completion dates

Milestones	Expected Dates
Start of Project/Programme Implementation	November 2016
Mid-term Review (if planned)	November 2018
Project/Programme Closing	June 2020
Terminal Evaluation	May 2020

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 gender 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.

With the interventions rooted in Antigua and Barbuda's three completed National Communications, the Intended Nationally Determined Contribution (INDC) and national development policies and plans, as discussed below, the project is in addition 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.

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

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

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 both loses from hurricanes and intense rainfall. Effective flood mitigation techniques include 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 buffers[46].

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 analysis and hazard mapping, drawing from previous studies, baseline data, and documented areas of vulnerability, in order to validate existing – but outdated – plans for the area. 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.

The technical design should 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.

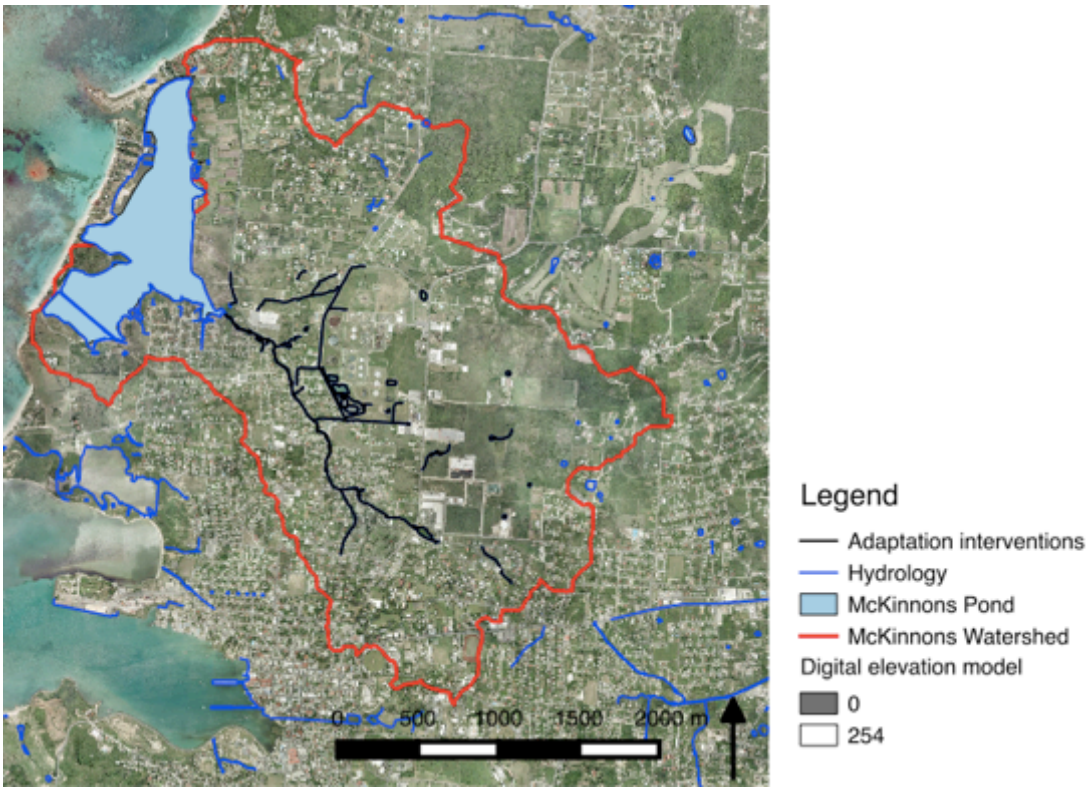

Figure 9. Map of McKinnon's watershed boundary on Antigua's northwest coast, delineating the 3 km waterways bisecting urban and semi-urban areas for adaptation interventions

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

[46] Ivor Jackson & Associated, 2002. Local Area Plan for the Northwest Coast, Antigua.

The adaptation works will support natural and physical systems along the 3 km urban and semi-urban waterways to meet projected climate change, in particular extreme hydro-meteorological events and disease vectors (Figure 10).

Activities under this output include finalization of a watershed Local Area Physical Development Plan (LAP) and an Environmental Impact Assessment (EIA), which includes environmental and social safeguards as a legal requirement.

Several "soft" policy and training activities under this project include incorporating new climate-resilient guidelines and standards into the Building Code as necessary for climate mainstreaming; and integrating the LAP into the implementation practices and work plan of the Development Control Authority (DCA). 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 in order to sustain and scale up project interventions and continue Component 1 interventions after the life of the project.

The project preparation phase will undertake the following activities: Detailed mapping of the development approval process and milestones, with stakeholder engagement during planning stages to ensure meaningful input.

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 infrastructure through small loans for vulnerable homes, 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 by drafting regulations under the Finance Administration Act of 2006, Section 42 on "Special Funds," which enables repayment into the revolving loan program[47]. The revolving loans program will also be vested into relevant institutional arrangements through the Special Fund regulations, which will be convened to oversee operationalization, disbursements and monitoring. This activity will be in part conducted as an output of the GEF-funded SCCF project as well as during the project preparation phase of this project. The regulations will be unique to each project since the loans for this project will give priority to residents of the project site. The regulations will provide the framework of the activities to be funded, the management structure of the window, eligibility for borrowing, and reporting requirements.

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

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

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 loan mechanism under the SIRF Fund will be capitalized with USD 3 M through this project (including management fees, estimated at 3%). With USD 2.91 M of 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.

This component's impact will improve access to adaptation financing for the private sector by designing and piloting a private sector section of the SIRF Fund business plan for funding adaptation, designed for homes and small businesses. The loan program will also develop community awareness of adaptation and climate change impacts, enhanced through the provision of training on accessing innovative financing for adaptation. Passing regulations under the Finance Act to govern this program will further pave the way for scaling-up adaptation loans across the country.

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 (see below for an indicative guide) and disbursing the loans
3. Monitoring and evaluation, including next steps for scaling up

Activities to be conducted during project preparation phase for Component 2 include:

i) Development of the Regulations governing the Loan scheme
ii) Assessment of risk and risk mitigation strategies, and development of detailed selection criteria for beneficiaries and activities
iii) Benefit/review criteria for adaptation projects in buildings
iv) Benchmarking of the value of adaptation actions and market research on demand for loans
v) Loan terms and draft template agreements
vi) Reporting on and managing funding received via the SIRF Fund
vii) Training and certification of engineers to participate in the monitoring program

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, in particular the Gender Affairs Division, determine priority eligibility of participants. Based on the team's experience working in the project site and knowledge

of the community, it is anticipated that the demand for low interest loan to address climate vulnerability will significantly exceed available funds.

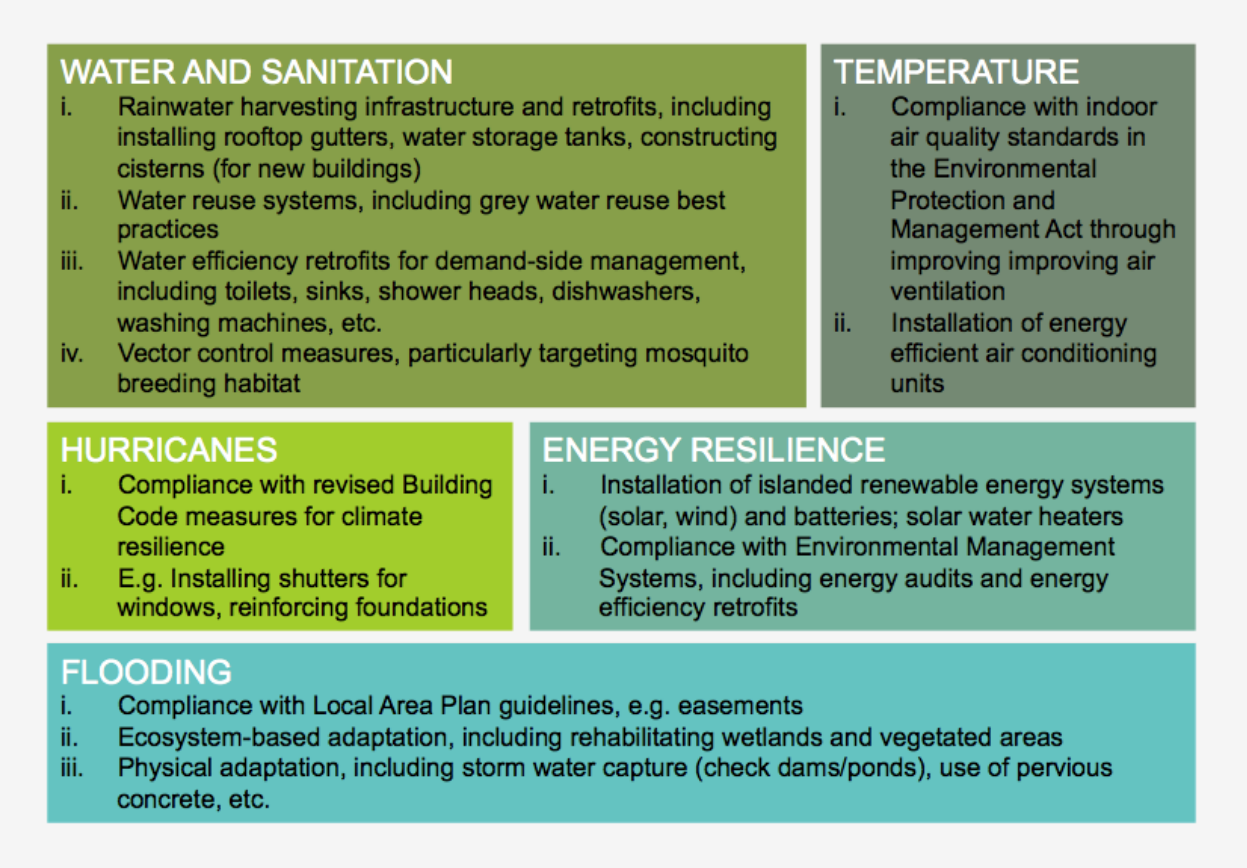

Figure 10, Indicative eligible adaptation activities in buildings to be funded through the revolving loans program

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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. 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.

Output 3.1.1. 50% 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 identifying groups in the area that qualify for grants (this will take place during the project preparation phase in collaboration with the Gender Affairs Division) and providing training in fiduciary and financial management

and technical training on adaptation, utilizing adaptation benefit/review criteria developed under Component 2. 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.

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 seek to train community groups and NGOs to manage the waterway such that the upgrades achieved by the project are maintained. 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, per the management plan delivered under Component 1.

During the project preparation phase, activities will include:

- Capacity assessment of groups and preparation of the community consultation strategy
- Two community meetings with additional meetings for targeted vulnerable groups
- Refinement of criteria for the grant scheme under this component
- Development and passage of regulations for funds to be disbursed under the NGO window

B. Benefits: economic, social and environmental

The benefits of this project will be maximized by its integrated economic, social and environmental approach.

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 events[48]. 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 baring the impacts of climate change and being "left behind" in adaptation.

This project will provide financing to communities that have traditionally had difficulties accessing resources. As opposed to centralizing support on shelters, the structure of this project is to allow people to live in homes that are resilient to the impacts of climate change, with reliable electricity and water to deal with slow onset events and after an

[48] CARIBSAVE, 2015. Local Area Vulnerability Impact Analysis, p. 25

extreme event – meaning that they can go to work, school and take care of families. The project is expected to positively impact people's well-being, in addition to building resilience.

Environmental benefits are derived from making sustainable living available to low-income residents, affording mitigation co-benefits through the uptake of renewable energy, energy efficiency, and up-scaling good practices in water reuse and conservation. The project will also apply ecosystem-based adaptation and mainstream this approach in planning and policy, with measures including easements, re-vegetating areas, and design-oriented mosquito control measures, which will support ecosystem services.

A detailed assessment of the integrated benefits of this project will be further determined during the project preparation phase (PPP) through the EIA process. The TOR for the EIA will included economic, social and environmental impacts.

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 3. 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	If no interventions are taken, the communities surrounding the waterway and 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 (22,000m^2 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, *ad hoc* disaster response costs to flooding are estimated at least ten million USD per Category 2 and higher hurricane for the property along the waterway alone.
Construct concrete drains to channel water from and through the watershed and into the Pond	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. However, these approaches displace biodiversity and traditional uses of the waterways. This project aims to demonstrate the alternative ecosystem-based approach that the Public Works Department may consider for future waterways.

	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.
Increase application of chemicals used in spraying to control mosquito populations	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.
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 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 if banks are sensitized to the hazard information. “Do nothing” by eliminating this component of the project could undermine its impact as well as jeopardize future adaptation interventions and the political will for tackling climate change.
Construct hurricane and flooding shelters that can house the community for up to three weeks at a time during a severe flooding event	This alternative would fail to mitigate the damage inflicted under the “do nothing” approach, namely direct threats to over 400 homes and buildings. Instead, this intervention would improve emergency disaster response, could fail to reduce loss of life due to extreme events. While emergency response is also a critical area for capacity building, improving infrastructure of people’s homes could reduce 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.
The alternative to SIRF small loans for homeowners is to demand that the homeowners meet the	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.

requirement of the new Local Area Plan and the building codes	In addition, this alternative has high political risks since this will marginalize most families within the area, especially low-income families. A further alternate to loans is the Government providing grants. This is not a viable option due to the Government's high indebtedness.
COMPONENT 3 - Capacity Building In NGOs And Community Groups	
Do Nothing	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.
The project can conduct the regular public awareness and hope that can change behaviour of the community and Government agencies	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 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.	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 well being of the community. By investing in community contracts to maintain project interventions under Component 3, the intervention worth USD 3 M under Component 1 will be maintained.

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"* [49]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.

Intended Nationally Determined Contributions (INDC) to the UNFCCC

Antigua and Barbuda communicated its Intended Nationally Determined Contributions (INDC) to the UNFCCC in October 2015. The INDC 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.
- 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 flooding[50].

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

[49] Government of Antigua and Barbuda, Second National Communication, pg. 261
[50] UNFCCC. (2009). Antigua and Barbuda's Second National Communication on Climate Change.

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 manner. See Annex 1 for the SIRF Fund business strategy.

National Poverty Strategy

The National Poverty Reduction Strategy (NPRS)[51] 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 ones[52] . NEST is considered a more comprehensive approach to poverty reduction in Antigua and Barbuda, which was developed with the aim of economic rebalancing[53].

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 Antiguans 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.

[51] GOAB, 2011. Poverty Strategy Reduction Strategy
[52] GOAB, 2012. National Economic and Social Transformation (NEST) Plan
[53] GOAB, 2012. National Economic and Social Transformation (NEST) Plan

E. Compliance with relevant national technical standards

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 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 Fund, and the structure of the Fund is elaborated in Annex 1. 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) 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 pilot cost-effective adaptation interventions – focused on ecosystems – through a contribution of household small loans window of the SIRF Fund, and the AF will replicate and scale-up on best practices under the SCCF project. In addition, the SCCF project will contribute to an enabling policy environment by delivering a draft National Climate Change Adaptation Policy and Implementation Strategy as well as updating the National Environmental Management Strategy to incorporate climate change resilience. Finally, local and regional education and awareness is a cross-cutting component that will magnify impact and lessons learned.

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 (34pprox.. 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.

G. Capturing and disseminating lessons learned

The project **An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed** will produce 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. The medium for communicating these outputs include:

- The Department's website is managed by a dedicated officer, who is also fluent in Spanish and French. The website is in English, and lessons learned can be adapted and communicated to other regions
- The Department has a active facebook page, twitter account, and other media, including regular TV and radio interviews
- 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.
- 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.

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 interventions[54].

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 vulnerability[55].

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 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)[56].

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 12), which are participatory vulnerability assessment tools tried and tested in adaptation literature[57].

[54] 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
[55] CARIBSAVE, 2015. LVIA, p. 13
[56] CARIBSAVE, 2015. LVIA, p. 15
[57] CARIBSAVE, 2015. LVIA, p. 15

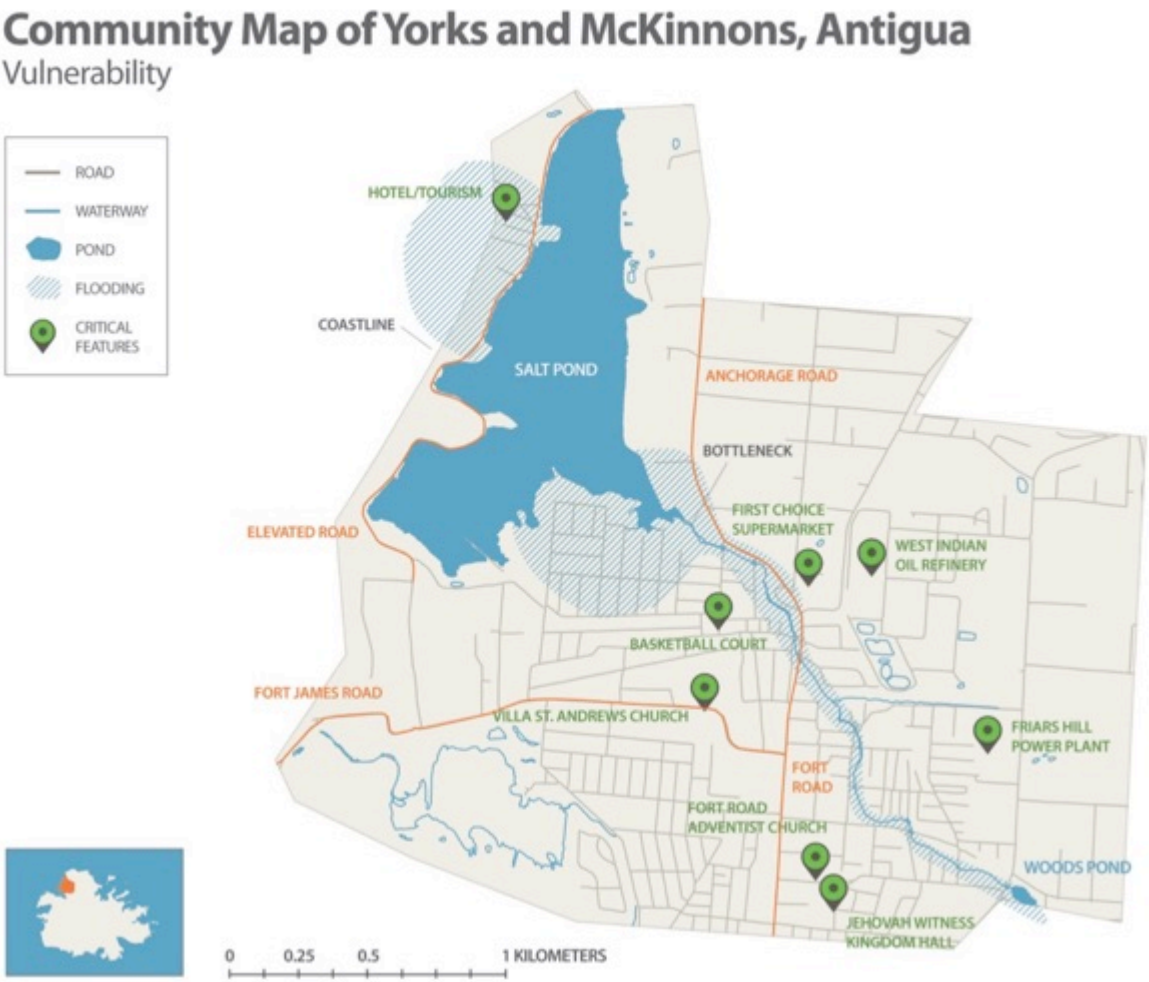

Figure 11. Results of the participatory mapping exercise conducted in McKinnon's area during data collection for the local area vulnerability assessment (CARIBSAVE 2015)

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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.

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. Further consultations with community members can take place when project funding is secured, in order to support community confidence in the Government's delivery on stakeholder priorities and to avoid burnout before projects are launched.

I. Full cost of adaptation reasoning

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.

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, quality 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 filtrating 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

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 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 will be developed 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 will be conducted 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 but do not have the capacity, financial support, or technical support to tackle the problems.

Additionality

Improving the resilience of 50% 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 communitie .

J. Sustainability of the project

The project's main sustainability feature is the revolving loan program, which will continue to function beyond the life of the project through soft loan repayments and continued disbursements through the SIRF Fund loans for adaptation window.

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. 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.

K. Environmental and social impacts and risks

Impacts are summarized below, and detailed thoroughly in the Risk Registry in Annex 2, which had proposed initial mitigation measures for identified risks

Table 4. Environmental and social impact 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
Compliance with the Law	The project is in compliance with relevant national laws.	
Access and Equity	The project is subject to the Department's stringent procurement rules.	A potential risk includes ensuring equity to direct beneficiaries of micro-loans. The project will develop access and selection criteria aligned with the GEF's ESS framework. Further modalities for selection will be developed, including "blind review" where the reviewer does not know the identity of the applicant. The loan facility may be over subscribed and some community members may not get access. This may cause come disgruntlement.

Marginalized and Vulnerable Groups	The project seeks to address vulnerable and marginalized populations through micro-loans to vulnerable households.	Vulnerable groups may be unable to pay back the small loans. 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. This may result in the devaluation of the homes and if there is still a mortgage on the homes, this may have an impact on bank lending. The project is designed to identify the vulnerability of the homes and to assist homeowners to get access to financing.
Human Rights	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.	
Gender Equity and Women's Empowerment		Local area vulnerability studies have suggested a high prevalence of female-headed households in the McKinnons area.[58] The small loans program will explore tailored programs for vulnerable women, for example lower loan payments and interest rates. Further, the M&E framework includes gender-disaggregated indicators.
Core Labour Rights	The project will be implemented in compliance with legislation including the Labour Code.	
Indigenous Peoples	N/A as Antigua and Barbuda does not have indigenous populations as defined by the UN.	
Involuntary Resettlement	There will be no involuntary resettlement under this project.	Structures on private land may need to be moved, however this will have to be done with the signed consent of the property owner.

[58] CARIBSAVE 2015. Local area Vulnerability Impact Analysis for Antigua and Barbuda

		Property owners along the waterway may object to the repair of the stream if they believe their property boundaries are being infringed on.
Protection of Natural Habitats	The project aims to rehabilitate and protect natural habitats	Work on the roadway may cause temporary untended siltation of the pond
Conservation of Biological Diversity	The project will include habitat and species protection, restoration, and monitoring activities consistent with country's NBSAP.	
Climate Change	Through ecosystem-based adaptation and climate resilient drainage, the project will address climate change impacts and where possible mitigate emissions.	Household resilience measures (e.g. AC units) may increase electricity demand, leading to increased carbon emissions. RE systems will offset emissions
Pollution Prevention and Resource Efficiency	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.	Works in the waterway may temporarily cause pollutants reach previously unaffected areas of the community.
Public Health	The project will improve public health through water quality improvements, monitoring in communities at high risk to health hazards, and design-oriented mosquito control strategies	Waterway works may increase mosquito habitats, which carry vector-borne diseases.
Physical and Cultural Heritage	The project includes activities to restore and protect natural habitat. No cultural heritage sites are located in the project vicinity.	
Lands and Soil Conservation	The project will protect critical habitat and through mitigating flood risk will promote soil conservation.	

PART III: IMPLEMENTATION ARRANGEMENTS

A. Implementation Arrangements

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. All of 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 8, include: 1) the Project Management Unit (PMU), 2) the Technical Advisory Committee (TAC), and 3) the Project Management Committee (PMC), summarized below.

While the Department has streamlined arrangements for project management, the approach is flexible and tailored to the specific needs of each project. Key stakeholders for this project will be engaged during the project preparation stage, and include:

- The **Gender Affairs Division**, which was established during the participation of the country in the international initiatives of the 1970s and 1980s, and has come to be seen as a critical institution in the thrust towards gender equity in the society
- **Women Against Rape** is a NGO focused on gender equity for local community and gender-focused capacity building, which also has experience implementing environmental projects as a GEF SGP recipient for a project in sustainable forest management
- The **Community Development Division** sits on the TAC and will play a prominent role in the stakeholder analysis and engagement plan to be further elaborated in the project preparation stage

All three of these stakeholders participated in the consultative process for the local area vulnerability impact assessment led by CARIBSAVE, described in Section H. 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.

Table 5. Institutional arrangements for project management and supervision

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)	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.	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)	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.	The PMC meets quarterly and accounts signatories meet monthly.

The Department has extensive 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 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.

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 in order 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.

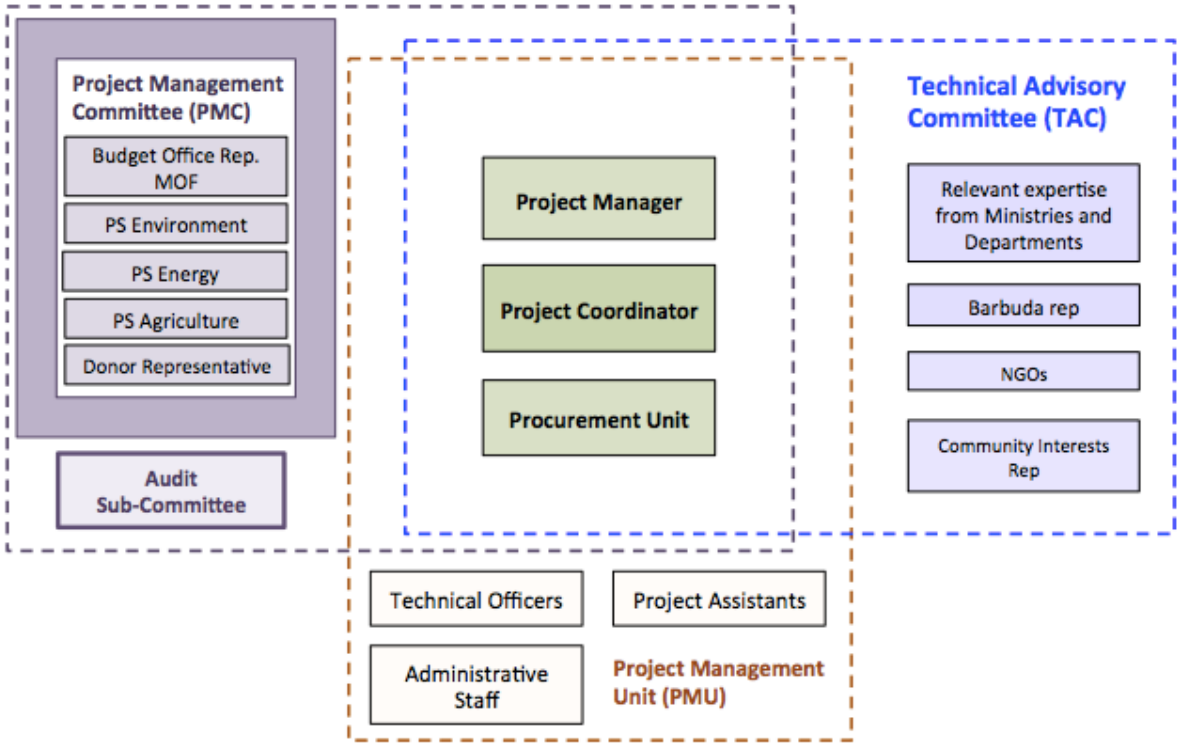

Figure 12, Diagram of the NIE's project management structure

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B. Financial and project risk management

Table 6. Risk Management framework for this project

Type	Risk	Risk Management	Ranking
Financial	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.	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.	High
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.	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. The use of the Cabinet early in the project is important since project scope has significant budget and project impact implications.	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%) 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/ High
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	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. 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.	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	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. 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.	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, which will deliver baseline data on similar interventions. 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	Low/ Medium

		for adaptation interventions.	
Environmental	Extreme climatic events and climate variability affect the confidence of local community members to embrace adaptation measures	The project will incorporate weather conditions – extreme rainfall, storm events and extreme drought – that can sometimes overwhelm ecosystem rehabilitation projects into planning and operational contingencies.	Medium
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.	Medium
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.	Low

C. Environmental and social risk management

The project is a Category B according to the Environmental and Social Safeguards guidelines – the project could have minor environmental or social impact. These will be documented in an environmental impact assessment as required under national law. These assessments will address potential environmental and social risks and include a proposed risk management plan. A preliminary environmental and social impact statement will be prepared by the Department of Environment in collaboration with experts from the Gender Affairs Division during the project preparation stage. This will be followed by a full assessment to be conducted by an independent entity during the implementation stage prior to the conduct of any works on the waterway or pond.

A comprehensive risk management strategy is an integral part of the project, and budget lines will be dedicated for Monitoring and Evaluation (M&E), 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, and drawing on the Department's safeguards formalized under the Accreditation process.

Environmental and social risk mitigation measures are assessed in Annex 2, "Risk Registry".

D. Monitoring and evaluation arrangements

The results based monitoring framework will be developed during the project preparation phase of this project, where the framework and indicators will be developed jointly among stakeholders to facilitate ownership and will include appropriate gender and social and economic variables.

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

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 CARIBSAVE team assigning and clarifying the project purpose, project roles and responsibilities, and addressing any outstanding barriers to implementation.

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 submitted to the Donor; 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. Finally, the project will conclude following an independent final 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 7. Budgeted M&E plan

Monitoring and Evaluation Costs			
M&E Activity	Frequency	Responsibility	Cost
Project Inception Workshop	At start of project	PMU, TAC	5,000
Project Progress Report	Quarterly	PMU, TAC, M&E Coordinator	
Annual Project Report including field visits and workshops	Annually	PMU, TAC, M&E Coordinator	35,000
Consultant Reports	Per Activity	M&E Coordinator	10,000
Mid-term independent evaluation	At project mid-point	M&E Coordinator	25,000
Final Independent Project Evaluation	End of project	M&E Coordinator, TAC, PMU	30,000
Total			105,000

E. Results Framework

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	1.1.1. Technical drawings taking into consideration past flooding events, AR5 projections, and designs that reduce the risks of vector-borne diseases 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	# meters of climate-resilient drainage installed Climate-resilient Local Area Plan % Improvement in water quality (nutrients, pollution levels and contaminants reduced) % change in mosquito larvae in water bodies in the area	No local adaptation plan in existence No flood capacity analysis available Regular flooding during heavy rainfall events Check dam not currently in existence Climate resilient drainage adaptation measures not demonstrated	The McKinnon's waterway can withstand a 1 in 25 year extreme rainfall event Water quality standards meet criteria set in the Environmental Protection and Management Act of 2015 Mosquito larvae in water bodies in the area are reduce by at least 30 percent	Water quality testing before and after project Visual observation of flooding during rainfall events, Project reports, land permits Results of flood mitigation climate modeling analysis Health data from local clinics
2. Revolving Loans for homes in McKinnon's watershed to meet new adaptation guidelines established in the building code and physical plan	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	# 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	Low adherence to/ implementation of climate resilient guidelines and planning requirements Building codes not uniformly followed Vulnerable community members are unable to access "soft" loans for adaptation Historical instances of damage to community property and	5% of homes are equipped with 2 weeks worth of water stored on-site with filtration and pump equipment 5% of homes benefit from the installation of hurricane shutters and rain water harvesting 50% reduction in the number of persons requiring shelters during droughts, with priority for vulnerable populations (single mothers, older	Project report Loan agreements signed Visual observation and project documents Monitoring and Evaluation

				households No ecosystem based adaptation measures demonstrated	persons, children, special needs children 5% of homes have back-up RE (for essential services including pumping water)	
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	3.1.1. 50% of the community-based buildings in the areas have benefitted from grants to improve the resilience of their buildings 3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project	% 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	No community contracts for waterway maintenance Community-based shelters do not meet safety and climate resilience guidelines No media products relating to Local Area Plan or knowledge products available	50% of community-based buildings benefit from grants to improve their resilience 30% of A&B's population is exposed to the project's public awareness material 3 community groups are trained in the management and maintenance of adaptation interventions 50 copies of McKinnon's waterway environmental management guidelines produced/ disseminated At least 3 presentations and workshops to stakeholders	Meeting minutes/record, Project documents MOUs between the Government and community groups/NGOs Contracts between the Government and community groups/NGOs Visual Observation, Project documents

F. Alignment with the Adaptation Fund's Results Framework

Project Objective(s)[59]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
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.	1) 3 km of urban and semi-urban waterways meet projected climate change, in particular extreme hydro-meteorological events and disease vectors 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 3) 50% of community infrastructure in target area is resilient to climate change and 3 community contracts are awarded for project implementation	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. Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	**10M**
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	# meters of climate-resilient drainage installed Climate-resilient Local Area Plan % Improvement in water quality (nutrients, pollution levels and contaminants reduced)	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)	**$3,535,000**

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

	% change in mosquito larvae in water bodies in the area			
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	**$3,110,000**
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	**$2,380,000**

G. Detailed Budget

PROJECT BUDGET		
	Outputs	**Cost est. (USD)**
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	
	Analysis and Hazard Mapping activities drawing from previous studies and current areas of vulnerability	10,000
	Climate impact modeling to inform planning, including modeling of sea level rise, flooding, hurricane, drought and temperature projections under AR5 climate scenarios and projected development trends	42,000
	Technical engineering drawings for the waterway	200,000
	Consultations on the new design to ensure that ESS and Gender issues are included	10,000
	Apply for Physical planning and conduct EIA and other studies required for approval	13,000
	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	
	Finalization of physical development plan and submission for approval and implementation, including pollution management, waterway management, and flood management strategy.	60,000
	Construction of flood prevention infrastructure - improving major and minor watercourse drainage, removing debris blockages, relocating natural watercourse barriers/reintegrating natural watercourses with sustainable urban drainage methods	3,000,000
	Vector control (ecosystem-based rehabilitation method)	70,000
	Monitoring and Evaluation of the Works	50,000
	Incorporating new climate requirements into the Building Codes	20,000
	Integration of the LAP into the implementation practices of the DCA (building codes into Local Area Plan, pollution regulation, accountability measures)	30,000
	Prepare management and monitoring plans, and train the implementers	30,000
	Component 1 Subtotal	*3,535,000*
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	
	Identification and costing of the adaptation actions needed for homes, private sector and community infrastructure	20,000
	Prepare regulations under the Finance Act to regulate the Revolving Loan program	10,000

	The Revolving Loan program vested into the relevant institutional arrangements, which are convened to oversee disbursement and monitoring	10,000
	Disburse loans for adaptation interventions for eligible households that will be impacted by flooding within the watershed (this includes management fees)	3,000,000
	Design and implement a monitoring program for the loan program and its impacts;	50,000
	Prepare and share best practices for entire island	20,000
	Component 2 Subtotal	*3,110,000*
Component 3. Adaptation mainstreaming and capacity building in NGOs and community groups to sustain project interventions		
Outcome 3.1. Establish a grant program for NGOs and Community groups to improve the resilience of their buildings in the target area		
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
	Adapt guidelines and adaptation criteria from Component 2 for the NGO/community grants for adaptation	10,000
	Enter into a MOU with a relevant entity to process and manage the community grants	15,000
	Disburse grants to communities and NGOs for adaptation and resilience measures in community buildings using adaptation criteria	1,500,000
Output 3.1.2. Three contracts are awarded to community groups/NGOs to maintain the adaptation interventions accomplished by the project		
	Develop a comprehensive communications plan for broad-based community education, awareness and mobilization of support	35,000
	Award a community contract to implement the communications plan and disseminate information nationally, regionally and internationally	250,000
	Award community contract(s) to maintain the sustainable urban planning interventions, working with CBH	250,000
	Award a community contract for M&E of adaptation measures including facilitating stakeholder engagement for M&E	300,000
	Component 3 Subtotal	*2,380,000*
NIE Project Execution costs *max 9.5% of total budget)		
	Project management	250,000
	Project coordination	220,000
	Administrative assistants	100,000
	Overheads and administration	110,000
	Administrative support (x3)	125,000
	Monitoring and Evaluation	140,000
	Project Management Subtotal	*945,000*
	Total Project	9,970,000

H. Disbursement schedule with milestones (loans needs to be disbursed upfront)

Table 8. Disbursement milestones

Milestones	Timeline	Disbursement Percentage
Project Inception	2016	40%
Mid-term Review	2017	45%
Project/Programme Closing	2019	10%
Terminal Evaluation	2020	5%

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

A. Record of endorsement on behalf of the government[60] *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:*

Ambassador Diann Black-Layne	Date*: April 11, 2016*

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 and Action Plan) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
 ……. *Ambassador Diann Black-Layne* Implementing Entity Coordinator	
Date: *April 11, 2016*	Tel. and email: +1 (268) 462-4625 Environment Division Antigua antiguaenvironmentdivision@gmail.com,

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.

	dcblack11@gmail.com
Project Contact Person: H.E. Amb. Diann Black-Layne Department of the Environment Ministry of Health and the Environment Botanical Gardens, Factory Road St. John's, Antigua Office: +1.268.462.4625 or +1.268.562.2568 Mobile: +1.268.464.6410 antiguaenvironmentdivision@gmail.com, dcblack11@gmail.com And/or Ruleta Camacho Thomas (Mrs) Deputy Director Department of Environment Ministry of Health and the Environment Victoria Park Botanical Gardens St. John's, Antigua *1 268 464 5031* sirmmab@gmail.com	
Tel. And Email: See above	

ANNEX 1. SIRF Fund Business Concept, identifying small loans window

Please see PDF attachment.

ANNEX 2. Risk Registry for project: *An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed*

This project is considered to be a Category B in accordance with the AF's Environmental and Social Policy.

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
Delays in policy revision process.	Any Inefficiencies in existing policy revision system hampers mainstreaming of climate change into national policies and plans. This is particularly true for adaptation where the measures may be resource intensive.	• The Project Management Committee and the Technical Advisory Committee, which consists of representatives from 15 agencies, will track and report on progress of policies as they move through the revision process – addressing procedural roadblocks as they arise. • The policy measures will be initiated early within the project and will benefit from the implementation of other project activities that will provide public and political support. The existing building codes are already at a high standard and can be an adequate basis for the loans to be process, while awaiting the approval or agreement on the new codes. • Public awareness of the impacts of climate change and the urgent need for the local area plan	Organisational	P = 3 I = 2
High turnover of staff	High staff turnover	• Deputies and alternative	Organisational	P = 1

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
members in implementing agencies Such as the public work departments and other government agencies working on this project.	and poor institutional memory result in disruptions or delays in project implementation and coordination.	representatives within the institutions will be recommended at inception to ensure that sufficient membership continuity is available. • The PMC will make use of established government structures to capitalise on functioning systems.		I = 2
Insufficient uptake of small loans	Insufficient climate change adaptations interventions implemented by vulnerable households.	• Workshops and outreach activities on applying to the SIRF. • National awareness raising activities and campaigns will be rolled out to spread awareness of innovative financing mechanisms and adaptation interventions.	Social	P = 1 I = 4
Limited capacity of institutions to undertake data collection in order to create local area development plans	Effectiveness of local area development plans reduced	• Government technicians will be trained on technical skills required to develop local area development plans *inter alia*: i) use of the EIMAS to store information and the use of GIS and other equipment/tools for mapping and planning; ii) management of threats to vulnerable ecosystems such as watershed degradation; iii) climate vulnerability and risk analysis; and iv) community engagement and outreach.	Institutional	P = 3 I = 4

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
		• The project will allow for the use of university students to assist with the development of the plan; • Community groups will be engaged in data collection and evaluation. • There is considerable amount of baseline data but the analysis based on the AR5 is still to be done for the site • Where financially possible use consultants.		
Lack of inter-institutional data sharing or collaboration.	Limited transfer of relevant project information amongst role players and end-users resulting in delayed or ineffective implementation of interventions.	• Representation of a range of stakeholders on the PMC and the TAC will promote collaboration and cooperation between government and other institutions. • Support informal knowledge sharing opportunities such as networking events between relevant government departments/units. • The local area development plans to be developed are required by law to have consultation and collaboration between institutions after which they will be approved and published by the Parliament. • The new National Environmental	Organisational	P = 2 I = 3

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
		Management Strategy (NEMS) will establish an environmental data system to provide detailed information to a wide range of stakeholders.		
Limited government support for project activities in pilot intervention sites	Loss of government support may result in lack of prioritisation of proposed project activities.	• Training of government technicians, policy makers and other relevant stakeholders on: i) the effects of climate change on Antigua and Barbuda; and ii) the benefits of adaptation interventions implemented by the project. • Enhance community support for the project, including awarding community contracts	Organisational	P = 1 I = 4
Disagreement over allocation of loans for implementation of adaptation interventions	It is expected that the fund will be over subscribed and the limited funds for loans may generate conflict. This is particularly true since the project will reveal how vulnerable homes are within the community. Although this will not	• The loans will be place within the revolving fund for adaptation under the SIRF Fund and will be governed by regulations under the Finance Act • Establish an impartial system to allocate loans • Seek additional funding to contribute to the loan scheme • Engage community leaders to assist with conflict resolution • Ensure that the system is open and transparent while maintaining confidentiality (e.g. blind review –	Social	P = 3 I = 3

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
	stop the project it may cause political and social conflict.	names not associated with applications during review process)		
Extreme climatic events and climate variability	Current climate and seasonal variability and/or hazard events result in disruption to implementation of adaptation interventions.	• Weather forecasting will be taken into consideration when planning climate-sensitive implementation activities. For example, no construction of hard infrastructure or planting will take place during hurricane season. • Design the flooding phase of the project firs and implement in as short a time as possible.	Environmental	P = 3 I = 4
Limited commitment/buy-in from local communities	Lack of commitment/buy-in from local communities may result in failure of demonstration projects.	• A stakeholder engagement plan will ensure that local communities are sufficiently consulted during planning and implementation. • Project design to ensure that the community can implement sections of the project including monitoring and evaluation. • Awareness-raising campaigns will be undertaken to promote adaptation interventions. These campaigns will highlight the importance of project interventions to the improved resilience of the community and individuals families.	Social, Environmental	P = 1 I = 4
AF 15 Risks category				

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
1. Compliance with the Law	The Department of the Environment is an entity established to enforce environmental and physical planning laws. If the laws applicable to this project are not adhered to it will result in the loss of confidence in the institution and project failure. Further the project can encounter legal challenges if the laws are not followed.	• The Department is staffed with two lawyers whose job is to ensure that the laws are closely followed • The Department reports to the Minister on these projects which provides another layer of accountability	ESS	P-1 I - 5
2. Access and Equity	The loans and grants disbursements may be perceived as unfairly distributed, resulting in loss of public trust and reputational risk for the government	• Transparency in decision-making process will be key • Introduce loan and grant review methods that distance the review committee members from personal affiliations and ties, such as conflict of interest disclosures and blind application review prcedures	ESS	P-2 I-3
3. Marginalized and Vulnerable	The project may marginalize groups	• Design social assessments to better understand the	ESS	P – 2 I – 2

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
Groups	that are non-nationals that reside within the community since they are not the home owners. Further they may not want to participate since they may be considered transient within the community.	demographics of people in the target communities, to inform policy approaches • Work with experts trained in empowering marginalized and vulnerable groups (including the Gender Affairs Division, Women Against Rape, and the Community Development Division)		
4. Human Rights	Non-identified			

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
5. Gender Equity and Women's Empowerment	The project will impact on the lives of women living within the community. There is potential that inequality may be exacerbated due to the inability of women in women led households or women who are dependent on their partners for income to be able to access loan funding due to low pay and/or poor credit.	• Liaise with community leaders to identify vulnerable women within the community. • Specifically tailor a grant mechanism that only they would be able to access. This grant mechanism should have lower rates for paying back.	Social	P = 5 I = 4
6. Core Labour Rights	No risks identified			
7. Indigenous peoples	No risks identified			
8. Involuntary Resettlement	Waterway interventions may require the movement of structures or the loss of small amounts of	• The Land Acquisition Act only allows for voluntary acquisitions. Both parties must agree. • Based on the studies conducted in the past, there are only a few structures that may pose a	ESS	P-3 I-2

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
	land.	problem to the project interventions. For example, a used car parts business is located at a critical tributary along the watercourse. The Department cannot force any property owner against their will, the relocation of structures will have to be their choice and the project can assist by providing resources.		
9. Protection of Natural Habitats	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 Environmental Management Act 2015 as well as the Physical Planning Act (2003) will be use to protect any area identified as Sites Important for Adaptation (SIAs). The SIAs will be protected from further development.		P-2
10. Conservation of Biological Diversity	No negative impacts identified.			
11. Climate Change	The improvement of the homes, for example installation of AC units to cope with heat waves, may increase electricity	• The project will be partnering with the IWeco and SPPare projects to plant new trees and the protected of the watershed to absorb carbon dioxide; • The small loans will ensure that any technology adopted will use	Mitigation	P = 4 I = 1

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
	consumption, which is currently supplied with fossil fuels.	RE as the energy source to offset potential emissions.		
12. Pollution Prevention & Resource Efficiency	No negative consequences identified.	• The project will be working with other projects to improve wastewater management. • The project will also conduct solid waste awareness on the impact of garbage within the waterways; • The community will be managing the waterway, which will also assist with pollution prevention and clean up awareness.		
13. Public Health	The project interventions may be such that it can cause the breeding of mosquitos via the settling of water within the waterway.	• The engineering design will be aware of this possibility and where possible wetland systems will be created using local species of fish for control of mosquitos and other vectors;	ESS	P – 3 I – 4
14. Physical and Cultural Heritage	There are none identified at this time			

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
15. Lands and Soil Conservation	The project interventions may cause further decline in the stability of the waterways within the watershed.	• The project has a riparian zone re-planting exercise with the project and will use public awareness programs to sensitize the community of the impact of land degradation within the community;	Environment	P = 1 I = 3

Diann Black-Layne
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April 11, 2016

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
1818 H Street NW
Washing, DC, 20433
Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

RE: ENDORSEMENT FOR PROJECT PROPOSAL:
"AN INTEGRATED APPROACH TO PHYSICAL ADAPTATION AND COMMUNITY RESILIENCE IN ANTIGUA AND BARBUDA'S NORTHWEST MCKINNON'S WATERSHED"

Regarding the captioned subject, the Department of Environment within the Ministry of Health and Environment, being the designated authority for the Adaptation Fund in Antigua and Barbuda, confirm that the project proposal, **An integrated approach to physical adaptation and community resilience in Antigua and Barbuda's northwest McKinnon's watershed,** is in accordance with our national priorities and climate adaptation agenda, in implementing activities to reduce adverse impacts of and risks posed by climate change in Antigua and Barbuda.

Accordingly, I wish to endorse the implementation of the above-captioned project, with

support from the Adaptation Fund. If approved, the project will be coordinated, implemented and executed by the National Implementing Entity, the Department of Environment, within the Ministry of Health and the Environment.

Sincerely,

…….
Ambassador Diann Black-Layne
Director, Department of Environment