ADAPTATION FUND

AFB/PPRC.18/7
3 March 2016

Adaptation Fund Board
Project and Programme Review Committee
Eighteenth Meeting
Bonn, Germany, 15-16 March 2016

Agenda Item 7 d)

PROPOSAL FOR ANTIGUA AND BARBUDA

Background

1. The Operational Policies and Guidelines (OPG) for Parties to Access Resources from the Adaptation Fund (the Fund), adopted by the Adaptation Fund Board (the Board), state in paragraph 45 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the endorsement of the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would ultimately require the Board's approval.

2. The Templates approved by the Board (OPG, Annex 4) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

> *For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.*

3. The first four criteria mentioned above are:
   1. Country Eligibility,
   2. Project Eligibility,
   3. Resource Availability, and
   4. Eligibility of NIE/MIE.

4. The fifth criterion, applied when reviewing a fully-developed project document, is:
   5. Implementation Arrangements.

5. It is worth noting that since the twenty-second Board meeting, the Environmental and Social (E&S) Policy of the Fund was approved and consequently compliance with the Policy has been included in the review criteria both for concept documents and fully-developed project documents. The proposals template was revised as well, to include sections requesting demonstration of compliance of the project/programme with the E&S Policy.

6. In its seventeenth meeting, the Board decided (Decision B.17/7) to approve "Instructions for preparing a request for project or programme funding from the Adaptation Fund", contained in the Annex to document AFB/PPRC.8/4, which further outlines applicable review criteria for both concepts and fully-developed proposals. The latest version of this document was launched in conjunction with the revision of the Operational Policies and Guidelines in November 2013.

7. Based on the Board Decision B.9/2, the first call for project and programme proposals was issued and an invitation letter to eligible Parties to submit project and programme proposals to the Fund was sent out on April 8, 2010.

8. According to the Board Decision B.12/10, a project or programme proposal needs to be received by the secretariat no less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

9. The following project concept document titled “McKinnon’s Pond Watershed Restoration and Resilience project” was submitted by the Antigua and Barbuda Environment Department, which is a National Implementing Entity of the Adaptation Fund.

10. This is the first submission of the proposal. It was received by the secretariat in time to be considered in the twenty-seventh Board meeting. The secretariat carried out a technical review of the project proposal, assigned it the diary number ATG/NIE/Multi/2016/1, and completed a review sheet.

11. In accordance with a request to the secretariat made by the Board in its 10th meeting, the secretariat shared this review sheet with the Department of Environment, and offered it the opportunity of providing responses before the review sheet was sent to the PPRC.

12. The secretariat is submitting to the PPRC the summary and, pursuant to decision B.17/15, the final technical review of the project, both prepared by the secretariat, along with the final submission of the proposal in the following section. In accordance with decision B.25.15, the proposal is submitted with changes between the initial submission and the revised version highlighted.

Project Summary

Antigua and Barbuda – McKinnon's Pond Watershed Restoration and Resilience project

Implementing Entity: *Department of Environment, Ministry of Health and the Environment*
Project/Programme Execution Cost: USD 658,400
Total Project/Programme Cost: USD 9,401,275
Implementing Fee: USD N/A
Financing Requested: USD 10,000,000

Project Background and Context:

The McKinnon's Pond Watershed Restoration and Resilience (MPWRR) project seeks to establish ecosystem-based planning in Antigua and Barbuda in order to create resilient communities and to restore fragile ecosystems. It further seeks to adapt to projected climate impacts posed by intense precipitation events and storms, sea level rise and coastal erosion. The activities focus on building resilience through hard infrastructure and upgrades to existing infrastructure and through increased ecosystem-based adaptation awareness and population-level capacity building.

Component 1: Implement ecosystem-based rehabilitation of McKinnon's Pond to increase resilience and functionality of the riparian, marine and terrestrial ecosystems enabling ecosystem services and providing a buffer zone for the communities, businesses and the natural environment in the surrounding area (USD 3,088,375)

This component aims to improve the currently degraded mangrove and salt pond ecosystem of McKinnon's Pond by opening up the Pond to ocean influence, improving water quality, replanting mangroves and establishing a formal conservation and recreational use buffer zone to accommodate projected climate impacts. This component will also develop an ecosystem valuation methodology, using McKinnon's Pond as a pilot, and conduct a flood mitigation capacity assessment in order to develop a plan for best utilizing McKinnon's Pond to prevent flooding in nearby communities. The immediate benefits of this component will be stimulating local biodiversity and aesthetic appeal, supporting alternative livelihoods through enhanced eco-tourism potential and surrounding communities through recreational value. In the long term, the pond will have enhanced function as a water filtration system and flood buffer zone for the communities in the sub-watershed.

Component 2: Reduce exposure in the McKinnon's sub-watershed to flooding during extreme hydro-meteorological events through tackling siltation, runoff and pollution as well as providing access to an innovative financing mechanism (micro-loans) that will mitigate the negative impacts of climate change through concrete adaptation interventions (USD 5,746,225)

Activities under this output include the finalisation of the physical development plan for the sub-watershed, termed the Local Area Physical Development Plan, including pollution management, waterway management, and flood and drought management strategy, for approval by Cabinet. It will also include finalization Activities under this output include finalizing the flood capacity assessment and full flood mitigation plan for watershed area. Lastly, this component will include a micro-loan program to reduce the vulnerability of community members by providing access to

innovative financing mechanisms for adapting to climate change impacts in the McKinnon's Pond watershed restoration area.
Component 3: Mainstream adaptation into local and national planning by building institutional capacity and through a communication program and awareness campaign designed to heighten awareness and ownership of adaptation and climate risk reduction processes (USD 507,000)

This component will strengthen the institutional capacity and ownership to reduce risks associated with flooding, sea-level rise and degraded ecosystems causing socio-economic and environmental losses through, inter alia, an ecosystem-based adaptation local area plan, targeted training/support, and cost-benefit assessments to support future planning for adaptation.

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regular-sized Project Concept

Country/Region: **Antigua and Barbuda**
Project Title: **McKinnon's Pond Watershed Restoration and Resilience project**
AF Project ID: **ATG/NIE/Multi/2016/1**
IE Project ID:
Requested Financing from Adaptation Fund (US Dollars): **$10,000,000**
Reviewer and contact person: **Mikko Ollikainen**
Co-reviewer(s): **Shyla Raghav, Christian Severin**
IE Contact Person: **H.E. Amb. Diann Black-Layne, Ruleta Camacho Thomas, Ministry of Health and the Environment**

Review Criteria	Questions	Comments on 1/28/2016	Comments on 2/15/2016
Country Eligibility	1. Is the country party to the Kyoto Protocol?	Yes	
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	Yes, Antigua and Barbuda is a small island developing state in the Caribbean, and primarily impacted by sea level rise, and extreme weather events such as drought.	
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	Yes, a letter has been provided signed by the DA.	
	2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change	Requires some clarification. Most of the causes of degradation to be addressed in the McKinnon Pond appear to be directly related to anthropogenic influence and not necessarily by climate change. While the benefits of each of the activities	

	and build in climate resilience?	included in the programme are albeit beneficial, the project should very clearly specify which climate change impacts are being addressed by the interventions. **CR1**: Please clarify how the project itself is designed to directly respond to climate change impacts, and how the proposed actions themselves are the most appropriate given the projected climate change impacts. **CR2**: Please clarify who will manage the proposed eco-tourism sites, including the role of the private sector, and whether local communities will benefit and/or be involved. **CR3**: Please clarify if project funds are intended for solely the development of the plan and/or for (which) parts of its implementation (output 2.1.1). **CR4**: Please clarify how the small-loans will be administered, particularly as it is a large portion of the AF project grant. Please elaborate on what additional information the proponent will include as part of the fully-developed proposal with respect to assessment of risk, demand for loans, detailed selection criteria for beneficiaries and activities, loan terms, etc. **CR5**: Please clarify how the project will address the main drivers of mangrove habitat loss. Arguably, without addressing the drivers of degradation, the stressors will remain. Further,	CR1: Partially addressed. Revisions should combine the section titled "threats" and "barriers to action and adaptive capacity" to fully build the narrative of the project – and structure the components accordingly. CR2: Please consider strengthening the community-driven components of this project. CR3: Mostly addressed, but more detail required at next stage. CR4: Not addressed, there is significant uncertainty around the expected range of projects this fund might support. CR6: Mostly addressed, pending CR8.

		please clarify what types of activities would be undertaken in output 1.1.3. **CR6**: Without community ownership, human-induced degradation will likely continue. Please clarify the role of the local communities themselves in implementing and maintaining the plans and interventions described in components 1 and 3. This is particularly relevant because should the project aim to curb habitat loss driven by communities, it may render them more vulnerable due to lack of access to natural resources. **CR7**: Please clarify why a cost-benefit analysis methodology was chosen and not cost-effectiveness, which can be more suitable for ecosystem-based measures with non-monetary benefits.	CR6: Mostly addressed, Further iterations of the proposal should flag areas that will be run, managed, or advised by the community group mentioned. CR7: Addressed
	3. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy of the Fund?	Yes, the project will be providing increased opportunities to local communities, while not increasing negative impacts on the McKinnon Pond. However, minor clarification is requested. **CR8**: As described in the project document, one of the main sources of degradation of the McKinnon Pond and surrounding ecosystems is the influx of nutrients, along with the lack of outflow from the system. Please clarify how the project will address nutrient management, from non-point pollution as well as on point source pollution. **CR9**: Please clarify how the project will intend to measure and monitor the	CR8: Partially addressed, it is not clear on the climate adaptation benefit from changing practices in wastewater management. The project proponent is encouraged to also include activities on non-point sources of pollution. CR9: Addressed

		economic benefits, as well as effectiveness, of the project from ecosystem-based measures, for which benefits and results may not be not immediate.	
	4. Is the project / programme cost effective?	Requires clarification. Further details on the loan program are requested in CR5. Additionally, this section should be reformulated to include an economic (to the extent possible) comparison of the proposed activities to viable alternatives to achieve the same impact. **CAR1**: Please reformulate the section by comparing the proposed components with other options for achieving the intended outcomes.	CAR1: Addressed, but should include economic information to the extent possible.
	5. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	Yes, the project appears to be very well aligned with relevant policies, strategies, and programs.	
	6. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?	Mostly. **CR10**: Please clarify if the project will impact any community or individual land rights, and if any people in the vicinity of the project (including watershed) are marginalized or particularly vulnerable people.	CR10: Addressed sufficiently for this stage.

	7. Is there duplication of project / programme with other funding sources?	No. However, a minor clarification is made. **CR11**: Please include within the narrative in this section how the proposed AF project will build on the relevant existing mechanisms, projects, or funding sources.	CR11: Addressed sufficiently for this stage.
	8. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	Requires clarification. It is unclear how the lessons learned and outcomes of the project will be captured and disseminated. **CR12**: Please consider to include some more tangible knowledge management outputs, such as manuals, policy briefs, pamphlets, short videos, and an online portal to share all the deliverables with the local and national constituency regionally with the Caribbean countries and globally with other SIDS countries.	CR12: Addressed sufficiently for this stage.
	9. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations?	Yes, but the consultations appear to be mostly with government agencies. **CR13**: Please expand briefly on how the consultations with communities, vulnerable groups (including women) and civil society organizations shaped the selection of project activities, as well as plans for consultations prior to the development of the full proposal.	CR13: Partially addressed. The report provided was of a consultation with government agencies, academia, and consultants, not the communities themselves.
	10. Is the requested financing justified on the basis of full cost of adaptation reasoning?	Yes, pending resolution of other CRs.	
	11. Is the project / program aligned with AF's results framework?	Yes	

	12. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	Requires clarification. It is not clear how any of the components and outcomes of the project will be sustained beyond the lifetime of the project. **CR14**: Please clarify how the project will builds long-term capacities and will maintain an incentive for communities and relevant stakeholders to continue ecosystem-based adaptation measures. **CR15**: Please clarify which, if any, components will be continued by the relevant government agencies involved in the project beyond the lifetime of the project, if known. **CR16**: Please provide additional detail to the extent possible on how the innovative finance component will sustain itself.	CR14: Partially addressed. The main provision is through manuals. CR15: Addressed, however would also be useful to add if any additional budgetary support is anticipated. CR16: Addressed with AIRF business plan.
	13. Does the project / programme provide an overview of environmental and social impacts / risks identified?	Yes, but clarification required. **CR17**: Please clarify how the project will take the appropriate measures to avoid potential invasive species. **CR18**: Please clarify how the project will target and support marginalized groups, including through the selection of intended beneficiaries of the project. **CR19**: Please provide an initial assessment of whether the project is expected to be Category A,B, or C in accordance with the AF's Environmental and Social Policy, and, accordingly, plans to develop an plan to manage potential risks. Please also outline the process planned to	CR17: Addressed. CR18: Addressed but will require further information at next stage. CR19: Addressed.

		undertake any necessary assessments before the full proposal stage (including plans for EIA under the "compliance with law" principle). Lastly, please try to list the risks defined relative to the 15 principles/categories of the AF ESP as it is unlikely that the project poses no potential risks.	
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	Yes	
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	Yes	
	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget?	Yes	
Eligibility of IE	4. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	Yes, it has been submitted by an accredited NIE.	
Implementation Arrangements	1. Is there adequate arrangement for project / programme management?	N/A	
	2. Are there measures for financial and project/programme risk management?	N/A	
	3. Are there measures in place for the management of for environmental and social	N/A For future reference, please consider highlighting how issues in CRs 2,5,	

	risks, in line with the Environmental and Social Policy of the Fund?	and 8 have been addressed in this screening and plan. The current text does not include reference to the development of a plan. Proponents are encouraged to refer to the draft Guidance document for Implementing Entities on compliance with the Adaptation Fund Environmental and Social Policy, for details. Please note that if an EIA is required, this should be done before the full proposal is submitted for approval.	
	4. Is a budget on the Implementing Entity Management Fee use included?	N/A For future reference, please ensure no overlap and distinction between use of the IE fee and execution costs.	
	5. Is an explanation and a breakdown of the execution costs included?	N/A	
	6. Is a detailed budget including budget notes included?	N/A For future reference, please note that a full budget with notes is required for the next stage.	
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators?	N/A	
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	N/A	
	9. Does the	N/A	

	project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	For future reference, some of the baseline indicators included are missing a value. Please include these to make it possible to measure when the targets will have been reached (eg sub-component 1.1.4, which is also missing water quality targets).	
	10. Is a disbursement schedule with time-bound milestones included?	N/A	

Technical Summary	The proposed project concept includes several innovative measures to enhance the resilience of McKinnon Pond and surrounding ecosystems, including a combination of ecosystem-based adaptation, innovative finance, and capacity building. Additional detail would strengthen the rationale for the project as one that is motivated by and designed to address key climate change impacts. Further, issues of cost-effectiveness, community involvement/engagement, as well as the long-term (financial) sustainability of the project should be clarified. The following correction action requests (CARs) are made: **CAR1**: Please reformulate the section by comparing the proposed components with other options for achieving the intended outcomes. The following clarification requests (CRs) are made: **CR1**: Please clarify how the project itself is designed to directly respond to climate change impacts, and how the proposed actions themselves are the most appropriate given the projected climate change impacts. **CR2**: Please clarify who will manage the proposed eco-tourism sites, including the role of the private sector, and whether local communities will benefit and/or be involved. **CR3**: Please clarify if project funds are intended for solely the development of the plan and/or for (which) parts of its implementation (output 2.1.1). **CR4**: Please clarify how the small-loans will be administered, particularly as it is a large portion of the AF project grant. Please elaborate on what additional information the proponent will include as part of the fully-developed proposal with respect to assessment of risk, demand for loans, detailed selection criteria for beneficiaries and activities, loan terms, etc. **CR5**: Please clarify how the project will address the main drivers of mangrove habitat loss. Arguably, without addressing the drivers of degradation, the stressors will remain. Further, please clarify what types of activities would be undertaken in output 1.1.3.

	CR6: Without community ownership, human-induced degradation will likely continue. Please clarify the role of the local communities themselves in implementing and maintaining the plans and interventions described in components 1 and 3. This is particularly relevant because should the project aim to curb habitat loss driven by communities, it may render them more vulnerable due to lack of access to natural resources. **CR7**: Please clarify why a cost-benefit analysis methodology was chosen and not cost-effectiveness, which can be more suitable for ecosystem-based measures with non-monetary benefits. **CR8**: As described in the project document, one of the main sources of degradation of the McKinnon Pond and surrounding ecosystems is the influx of nutrients, along with the lack of outflow from the system. Please clarify how the project will address nutrient management, from non-point pollution as well as on point source pollution. **CR9**: Please clarify how the project will intend to measure and monitor the economic benefits, as well as effectiveness, of the project from ecosystem-based measures, for which benefits and results may not be not immediate. **CR10**: Please clarify if the project will impact any community or individual land rights, and if any people in the vicinity of the project (including watershed) are marginalized or particularly vulnerable people. **CR11**: Please include within the narrative in this section how the proposed AF project will build on the relevant existing mechanisms, projects, or funding sources. **CR12**: Please consider to include some more tangible knowledge management outputs, such as manuals, policy briefs, pamphlets, short videos, and an online portal to share all the deliverables with the local and national constituency regionally with the Caribbean countries and globally with other SIDS countries. **CR13**: Please expand briefly on how the consultations with communities, vulnerable groups (including women) and civil society organizations shaped the selection of project activities, as well as plans for consultations prior to the development of the full proposal. **CR14**: Please clarify how the project will builds long-term capacities and will maintain an incentive for communities and relevant stakeholders to continue ecosystem-based adaptation measures. **CR15**: Please clarify which, if any, components will be continued by the relevant government agencies involved in the project beyond the lifetime of the project, if known. **CR16**: Please provide additional detail to the extent possible on how the innovative finance component will sustain itself. **CR17**: Please clarify how the project will take the appropriate measures to avoid potential invasive species. **CR18**: Please clarify how the project will target and support marginalized groups, including through the selection of intended beneficiaries of the project. **CR19**: Please provide an initial assessment of whether the project is expected to be Category A,B, or C in accordance with the AF's Environmental and Social Policy, and, accordingly, plans to develop an plan to manage potential risks. Please also outline the process planned to undertake any necessary assessments before the full proposal stage (including plans for EIA under the "compliance with law" principle). Lastly, please try to list the risks defined relative to the 15 principles/categories of the AF ESP as it is unlikely that the project poses no

	potential risks. The revised proposal has resolved several of the clarification requests made in the initial technical review. However, several fundamental issues remain to be fully resolved before the concept can be endorsed. The final project review finds that the proposal fails to sufficiently address the clarifications requests made in the initial review. The following observations are made: (i) The proposal should strengthen the climate change rationale for the project, including by clearly indicating which climate change impacts are being addressed by the project components, possibly by combining the section titled “threats” and “barriers to action and adaptive capacity,” linked with project components accordingly, to fully build the logic of the project, (ii) The proponent should consider strengthening the community-driven and community-owned components of this project to complement government action, and more clearly outline how it will engage and involve women and other marginalized groups, (iii) The proposal should provide additional detail on the intended scope and specifically, the adaptation benefit/review criteria, of the micro-loan program, which will be in part capitalized with AF funds, and (iv) The adaptation benefit from changing practices in wastewater management is not directly clear. Please clarify these activities, and consider addressing non-point sources of pollution.
Date:	2/15/2016

REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to:

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN P4-400
Washington, D.C., 20433
U.S.A
Fax: +1 (202) 522-3240/5
Email: afbsec@adaptation-fund.org

ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY**: Program**
COUNTRY/IES**: Antigua**
SECTOR/S: Coastal Infrastructure/Environment/Livelihoods
TITLE OF PROJECT/PROGRAMME: McKinnon's Pond Watershed Restoration and Resilience project
TYPE OF IMPLEMENTING ENTITY: National Implementing Entity
IMPLEMENTING ENTITY**:** *Department of Environment, Ministry of Health and the Environment*
EXECUTING ENTITY/IES**: The Department of Environment**
AMOUNT OF FINANCING REQUESTED**:** US$10M (In U.S Dollars Equivalent)

Project / Programme Background and Context:

Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.

Background and Context

Antigua and Barbuda is a twin-island state that is part of the Lesser Antilles, an archipelago that spans the Caribbean Sea and the Atlantic Ocean. The islands lie on a 3400 km^2 sub-marine plateau and have an exclusive economic zone of approximately 110,071 km^2 Antigua is fringed by 25 km^2 of coral reef on its north, east and south coast and by sandy beaches on the west coast, all vital to the country's fisheries and tourism sectors. There are six designated protected areas in Antigua and Barbuda in addition to two smaller national parks. The largest protected area lies on the north east coast and is rich in coral and marine biodiversity.[1]

[1] CARIBSAVE, 2015a

Figure 1. Geographical location of Antigua and Barbuda in the Caribbean[2]

Geography

The islands are primarily flat and low lying, consisting of a volcanic base overlaid with coral deposits. Both islands lie within an area of active seismic activity and are subject to periodic tremors. Antigua can be divided into three distinct topographical regions: the volcanic regions in the southwest, a central plain, and limestone regions in the north and east (Figure 1). The volcanic areas contain several small alluvial valleys rising to Boggy Peak at 402 m. The coastline is jagged with alternating bays and rocky headlands.[3] Barbuda is particularly low lying with most of the island just 4 m above sea level, rising to approximately 60 m in the east at its highest point. The island is mostly limestone and sand with extensive sand dunes and the largest saltwater, coastal lagoon in the Caribbean, virtually enclosed by a narrow sand spit on its western side and a vital nesting ground for critically endangered frigate birds.[4].

Despite the country's small size, Antigua and Barbuda enjoys relatively high levels of biodiversity, particularly in the coastal and marine environment. Mangroves, coral reefs, and sea grass beds are among the principal ecosystems in coastal and marine areas and form the basis for the country's sandy beaches and fisheries resources as well as serving as protective barriers against tropical storm and hurricane activity. Neither island has any significant freshwater sources or stream networks[5]. Any available resources, like underground well, have come under considerable pressure as result of

[2]http://www.unep.org/greeneconomy/AdvisoryServices/CaribbeanGreenEconomy/tabid/105702/language/en-US/Default.aspx Accessed 28 December 2015.
[3] Environment Department, 2002; Global Facility for Disaster Reduction and Recovery, 2010
[4] Environment Department, 2002; Global Facility for Disaster Reduction and Recovery, 2010
[5] Global Facility for Disaster Reduction and Recovery, 2010

agricultural and industrial demand[6]. Instead, the islands have seasonal watercourses, locally termed 'ghuts', which are often dry but are critical for watershed drainage during heavy rainfall events.

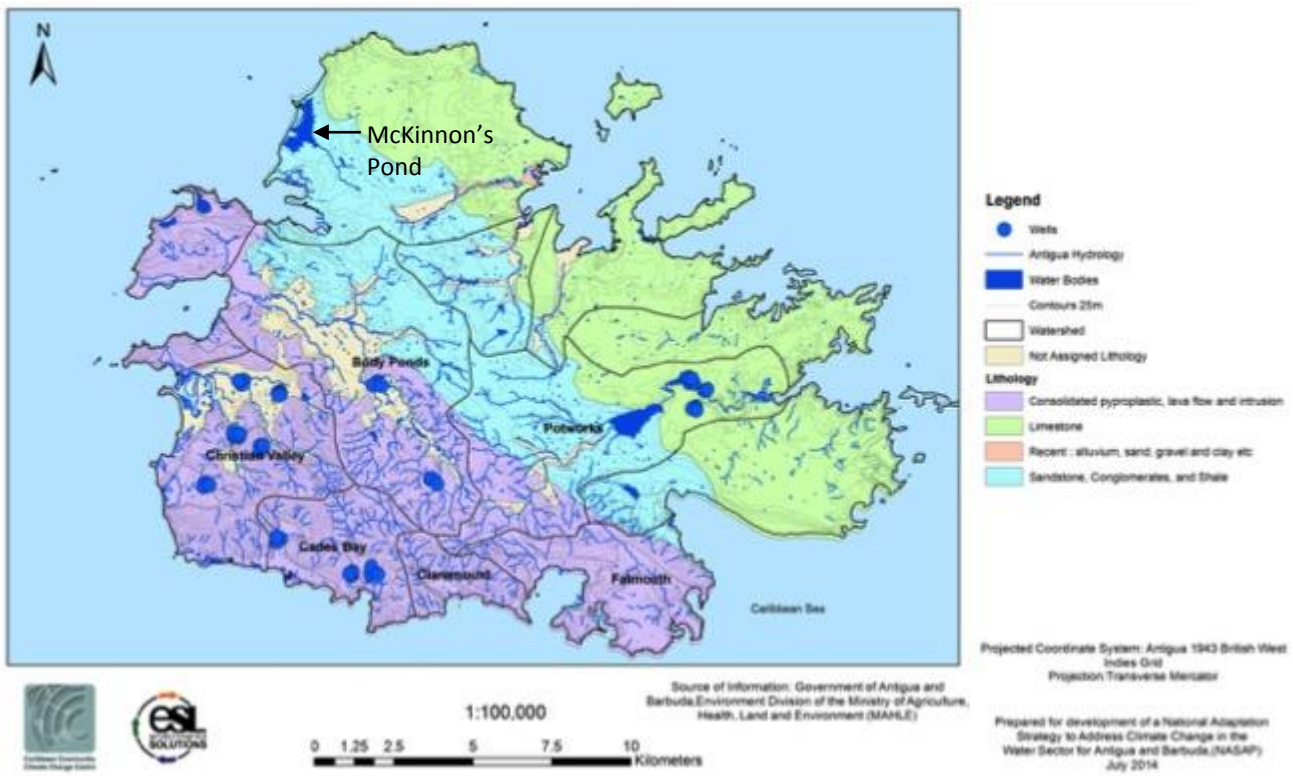


Figure 2. Geology and hydrology of Antigua, depicting McKinnon's Pond on the northwest coast (Source: ESL, 2014)

Climate

Like many islands in the Caribbean, Antigua and Barbuda are currently facing a number of climate-related impacts. Antigua is likely to experience several changes to the historical climate pattern over the next 80 years. These include increasing temperatures and a high probability of instances of intense drought, decreased precipitation and risk of flooding[7] as well as coastal inundation as a result of sea level rise and storm surge.[8]

The climate of Antigua and Barbuda has marked wet (July – December) and dry (January – June) seasons with little variation in daily seasonal temperatures. The 30-year average temperature for Antigua and Barbuda is 29.9°C (1981-2010, see Figure 3).[9] Trend analysis of average temperatures by the Department of Meteorological Services has shown a generally upward projection, approximately +0.6°C. Additionally, in the 40-year timescale provided in the data the ratio of above/below average temperature years was 15/25, but more importantly 11 of those years occurred within the last twenty

[6] Gore-Francis, 2013
[7] Solomon et al, 2011; Gomes, 2008
[8] Simpson et al, 2011
[9] Source: Department of Meteorological Services

of the timescale. Over a thirty year period, it was determined that the coolest month tended to be February while the warmest month was August.

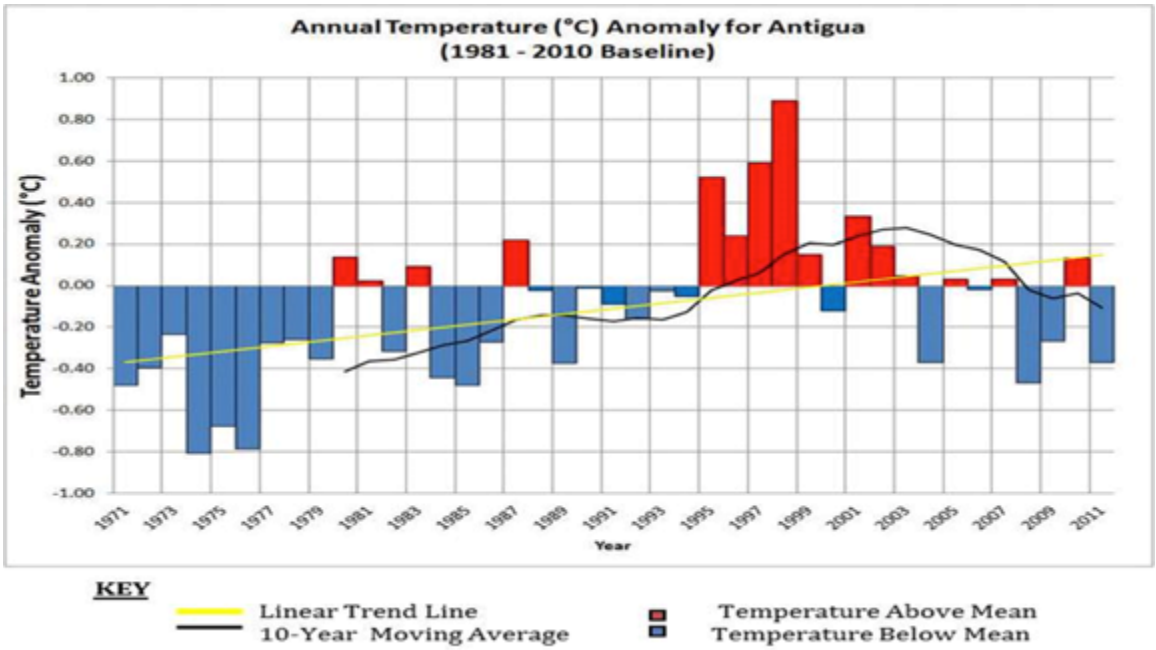


Figure 3. Annual temperature anomaly for Antigua (1971 – 2011)

Current climate trends from 1986-2010 for the eastern Caribbean including Antigua and Barbuda indicate a +0.3°C per/decade increase in the average daily maximum temperature and the average daily minimum temperature.[10] There is evidence that indicates that both local maximum and minimum temperatures have increased since late 1986.[11] Anecdotally, four of the top ten temperatures on record occurred in September and October 2015.[12]

Data from the Department of Meteorological Services are also showing a trend of rising precipitation (see Figure 4[13]). However if data were to be counted as number of years above/below the mean, then it is noted that in the eighty years spanning 1928-2008 the positive/negative ratio was 35/45. This means that although there was a general increasing trend, the norm would be to have sub-average precipitation.

Changing temperatures impact hydrology, and despite current stabilized rainfall trends, there is a strong overall drying signal in late century Caribbean climate models.[14] Antigua and Barbuda lie in a zone that is expected to receive 30-50% less rainfall in 2090 with respect to late twentieth century

[10] Stephenson et al. 2014
[11] Stephenson et al, 2014
[12] CliSec Newsletter, 2015. http://www.antiguamet.com/Climate/NEWS/NEWSLETTER/2015/ABMS_CliSec_Newsletter-Oct2015.pdf
[13] Source: Department of Meteorological Services
[14] Taylor et al. 2013; Rauscher et al. 2008

rainfall norms.[15] The drying signal has been attributed to a strengthening Caribbean low-level jet stream and a relatively cooler tropical North Atlantic sea surface temperature compared to tropical Pacific sea surface temperatures. A warmer tropical Pacific is indicative of an El Niño state, which has been known to negatively impact Caribbean rainfall in the season before tropical Pacific warming.[16]

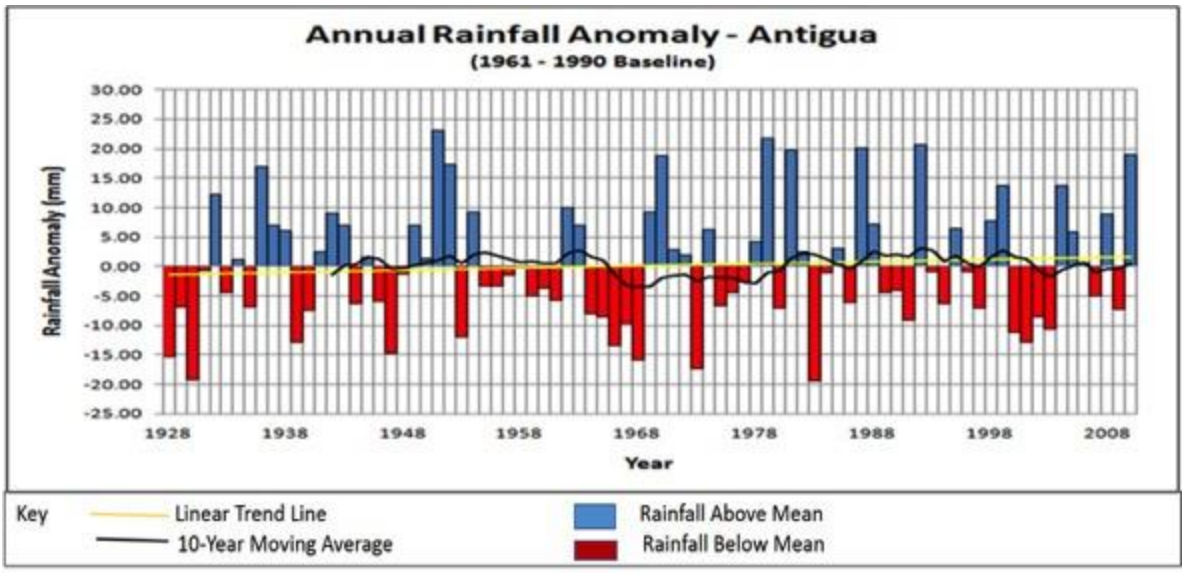


Figure 4. Annual rainfall anomaly for Antigua (1928 – 2008)

Antigua and Barbuda have faced intense periods of drought, at least one extreme drought every five to ten years, with drastic water shortages which are likely to be seen more frequently with the decrease in precipitation for this region predicted for the end of the century.[17] Antigua experienced a drought from 1983 to 2001, which resulted in losses of vegetation and land degradation. In 2015, due to a prolonged drought, 95% of the potable water supply was from desalinated saltwater.

Table 1. Climate Projections for Antigua and Barbuda and the Insular Caribbean[18]

Climate Parameter	**Predicted change for the Insular Caribbean**	**Predicted change for Antigua and Barbuda**
Air temperature	Increase of 1.8 – 4.0°C by 2099	1.3°C by the 2050s 1 – 3.5°C by the end of the century

[15] CARIBSAVE, 2015
[16] Giannini, Kushnir and Cane 2000
[17] Gore-Francis, 2014
[18] UNFCCC, 2009

Sea surface temperature	~1.7°C by the end of the century	Up to 2°C by the end of the century
Sea level rise	Rise of 0.18 – 0.59 m by 2099	Rise of 0.24 m by 2050[1]
Carbon dioxide	Reduction in pH of the oceans by 0.14 – 0.35 units by 2099	An increase in carbon dioxide emissions through 2050
Hurricanes	More intense with larger peak wind speeds and heaver precipitation	More intense with larger peak wind speeds and heavier precipitation (not necessarily increased frequency)
Precipitation	Unclear	Drier (lower annual mean) by the end of the century

In addition to drought, the island also experiences intense flooding and storm surge during tropical storms and hurricanes, leading to extensive damage to coastal and low-lying houses and agricultural land throughout the island, over the last decade. It is estimated that hydro-meteorological events will become more intense in the future, with larger peak wind speeds and heavier precipitation. Over a thirty-year period, it was noted that the months of September, October and November have the highest 30-year means (1984-2013) for rainfall (131.2 mm, 142.4 mm and 139.7 mm respectively), which coincides with the active part of the hurricane season. February is typically the driest month of the year, having an average of 42 mm rainfall, the lowest amount for the period 1984 – 2013[19].

Projections under the IPCC Special Report on Emissions Scenarios (SRES) A2 and B2 emission scenarios demonstrate an increase in rainfall during the latter part of the wet season (November-January) in the northern Caribbean (north of 22°N) and drier conditions in the southern Caribbean, with drying in the traditional wet season (June –October). The lengthening of the dry periods and increasing frequency of drought are expected to increase demand for water across the Caribbean Region[20].

Annual rainfall gradually increased to 99 mm in May before decreasing again in June to an average of 64.2 mm (mid-summer dry spell). The peak rainfall season is from September to November. Due to the

[19] IPCC, 2014
[20] IPCC, 2014 (AR5)

El Niño-Southern Oscillation (ENSO) cycle, there is the possibility of very wet years in Antigua and Barbuda.[21] El Niño and La Niña events are characterized by warmer and cooler than average sea surface temperatures in the tropical Pacific respectively and they are associated with changes in wind, pressure and rainfall patterns.[22]

Riparian and Coastal Zone Management

There are 36 mangrove sites in Antigua and 9 sites in Barbuda.[23] In Antigua and Barbuda, swamp and mangrove acreage has decreased from 2,164 acres in 1985 to 1,161 acres in 2010, although the island remains one of the most extensive networks of mangrove in the Eastern Caribbean. Mangroves are an important part of the larger coastal ecosystem, ensuring beach stability, soil stability, acting as an erosion buffer during storms, trapping sediment that can harm coral reefs, filtering runoff from land-based sources of pollution and providing a vital habitat and shelter for bird and fish life. As an ecosystem service, mangroves have been undervalued in their contribution to the agricultural and tourism sectors. Riparian areas are under pressure from economic threats that prioritize employment and growth over ecosystem resources and their services.

The Government of Antigua and Barbuda (GOAB) has recognized international and regional agreements to protect coastal ecosystems and coral reefs from degradation. For example, the GOAB has undertaken the revision and implementation of the National Land Use Plan, the Fisheries Act, the Wastewater Management Strategy, the comprehensive Environmental Protection and Management Act of 2015, and most recently is updating the national coastal zone policy.

Demographic and Socio-economic Conditions

The population of Antigua and Barbuda is around 90,000, primarily in Antigua, with 1,200 people residing in Barbuda. There are 6 parishes in Antigua, St. John's is the capital and the most populous parish with 29.8% of the population. Data from the 2011 Census of Population and Housing estimated the population of Antigua and Barbuda at 41,481 males and 44,814 females[24]. The country has a life expectancy rate of 72 and 74 years for males and females respectively. The population can be described as youthful with 28% of the population below 15 years of age and only 7% over 65 years old.[25]

Antigua and Barbuda ranks highly in terms of human development with high literacy, per capita income and relatively high life expectancy. The National Country Poverty Assessment (CPA) conducted a vulnerability study which indicated that additional 10% of the population was expected to fall below the poverty line in the event of an unanticipated catastrophe, such as natural or manmade disasters.[26] Many of the worst impacted by climate variability in McKinnon's Pond are from low-income households.

[21] Mitchell, 2009
[22] Nurse, 2011
[23] GOAB, 2009b (baseline data SIRMM)
[24] GOAB, 2012a(Food and Nutrition security policy);
[25] Ibid., CARIBSAVE, 2015a (NVIA)
[26] Goodwin, 2009 and UN-HABITAT, 2011

Economics and Development

The tourism sector directly contributes 16% and indirectly contributes 70% of the national Gross Domestic Product (GDP) and is responsible for 85% of foreign earnings, based on 2013 figures.[27] Other key economic sectors include wholesale and trade; real estate, renting and business activities; transport, storage and communications; construction; and public administration, defense and compulsory social security.

Tourism is a main driver of the economy in Antigua and Barbuda and as in many Small Island Developing States; this dependence has negative repercussions when there are downturns in the global economy. The economy of Antigua and Barbuda is highly reliant on low-lying coastal natural resources and favorable weather conditions to support the tourism sector. However, the tourism sector is relatively resilient to these perturbations and employs 40% of the work force in the country.[28] In addition, tourism development occurs mainly in low-lying coastal areas which are particularly vulnerable sea level rise, storm surge and coastal erosion. The northwest coast tourism zone is bordered by McKinnon's Pond on the inland side, and a series of fine sand beaches on the coastal side. Runaway Bay, a very narrow strip of beach populated by several hotels, separates the pond from the sea (see Image 1below).

In the area of McKinnon's Pond, there is a distinct connection between the tourism sector and the environment. The pond provides a flood mitigation service for the hotels and community along its boundaries and filters runoff from land-based water flow before the runoff reaches the marine environment. The marine environment and the provision of ecosystem services are vital to the tourism sector. Seafood, reefs and beaches, which contribute to the overall tourism experience, are at risk. Other recreational activities like snorkeling, scuba diving, hiking and sightseeing are also dependent on marine and coastal biodiversity, and the Pond's ability to filter runoff.

Threats~~Vulnerabilities~~

Antigua and Barbuda, as part of the Leeward Island chain, is often in the direct path of tropical hurricanes during hurricane season from June to November. The impacts of hurricanes and tropical storms have been severe and carry the greatest risk to Antigua and Barbuda. It is projected that the maximum wind speed of the strongest hurricane will increase by 5% (low scenario) and potentially up to 15% (high scenario), which would increase the impact in terms of loss of life and other economic losses. An increase in hurricane intensity translates into more intense rainfall over a short period. This increased intensity would result in increased flooding and damage to infrastructure and water supplies. Hurricanes have historically disrupted the water supply through contamination from landslides and salinization from damaged intake pipes and boreholes (70% of Antigua's water is from desalination plants, increasing to 95% during drought periods) as well as through pumping stoppages due to loss of power.

Hurricanes have negatively affected the economy of Antigua in the past. The most devastating hurricane, Hurricane Luis in 1995, amounted to US$128.35 million or 30.49% of the GDP. In addition, 90% of

[27] UNDP (2015)
[28] Ibid.

buildings were severely damaged; tourism declined by 17% that year and 7,000 people became unemployed as a result.[29]

Table 1.2. Hurricane events by year and associated economic losses[30]

YEAR	EVENT	ECONOMIC LOSS/DAMAGES (EC$)
1995	Hurricane Luis	347 m
1998	Hurricane Georges	200 m
1999	Hurricane Jose and Lenny	247 m
2008	Hurricane Omar	49 m
2010	Hurricane Earl	52 m

The impact of floods in recent times has become a critical concern for Antigua and Barbuda.[31] The increased concern regarding flooding is due to a number of aggravating factors:

i) increased frequency of cyclones caused by climate change and global warming;
ii) the construction of homes in high risk areas such as swamps, low lying and flood prone areas;
iii) blockage of the natural flow of the water course, ponds, wetlands and catchment;
iv) blockage of constructed drains by solid waste, uncontrolled vegetation growth and soil deposits.[32]

Issues such as reclamation of lands, sand mining and the lack of a comprehensive system to control flooding and sedimentation have also increased Antigua and Barbuda's vulnerability to coastal flooding.[33] Specific parts of low lying coastal cities, such as areas in the vicinity of St. John's, are most vulnerable to flooding and erosion.

Sea level rise is predicted to have a severe impact on Antigua and Barbuda. Current projections for the Caribbean, under an intermediate low-emissions scenario are between 0.5 and 0.6 meters by 2100.[34] A rise in sea level as low as 0.1 m could likely result in a decrease in aquifer thickness of more than 10 m and impact fresh water availability.[35] Of particular concern is the impact that sea level rise and coastal

[29] CARIBSAVE, 2015a (NVIA)
[30] CARIBSAVE, 2015a (NVIA)
[31] Solomon et al, 2011
[32] Solomon et al, 2011
[33] Gomes, 2008
[34] IPCC, 2014
[35] Simpson et al 2012

erosion will have on the tourism sector, and other economically important and ecologically sensitive areas.

McKinnon's Pond

This specific focus of this project is McKinnon's Pond, a 45-hectare salt pond on the northwest coast of Antigua (Figure 2). The pond is situated in the parish of St. John's, the most densely populated and urban parish in Antigua. McKinnon's Pond is in an area where some of the island's most beautiful beaches lie. McKinnon's Pond has potential for recreational and eco-tourism activities for both locals and international visitors. The Pond separates the mainland communities of Yorks, Upper Fort Road, Friar's Hill and McKinnon's from the barrier beach of Runaway Bay (Figure 5 below).

Figure 5. Aerial View of Northwest Coast of Antigua, looking South (2002)

The Pond was once an area of thriving biodiversity, and still provides critical habitat to significant migratory birds, including the Black Crowned Night Heron, Black Neck Stilts, Broad Winged Hawk, Green Back Heron, Least Tern, Snowy Egrets, White Cheeked Pintail, White Crowned Pigeon, Worm Eating Warbler, and the regional endemic West Indian Whistling Duck, and endangered species.[36]

[36] Prosper, J., 2002 – 2014 birding surveys, data courtesy Offshore Islands Conservation Programme (OICP) of the Environmental Awareness Group (EAG)

In its prior state, the pond acted as a natural filtration system for water runoff from the mainland communities as well as a collection point for excess floodwaters. However, the outwash point of the McKinnon's Pond was cut off from the ocean following the construction of the Marina Bay Road from Anchorage Road through Runaway Bay. This construction has obstructed the water exchange from the ocean to the pond thus rendering the pond stagnant. The stagnation has been further amplified by general misuse of the pond as an inlet for raw sewerage and as a dumping site by local communities. A number of ecological problems have plagued the pond recently; from a large-scale fish die-off in 1989 and 1990, 2010, and 2013 and most recently a 'red tide' in 2015 as a result of negative environmental factors like high sea surface temperatures, low dissolved oxygen and high salinity in the pond.[37]

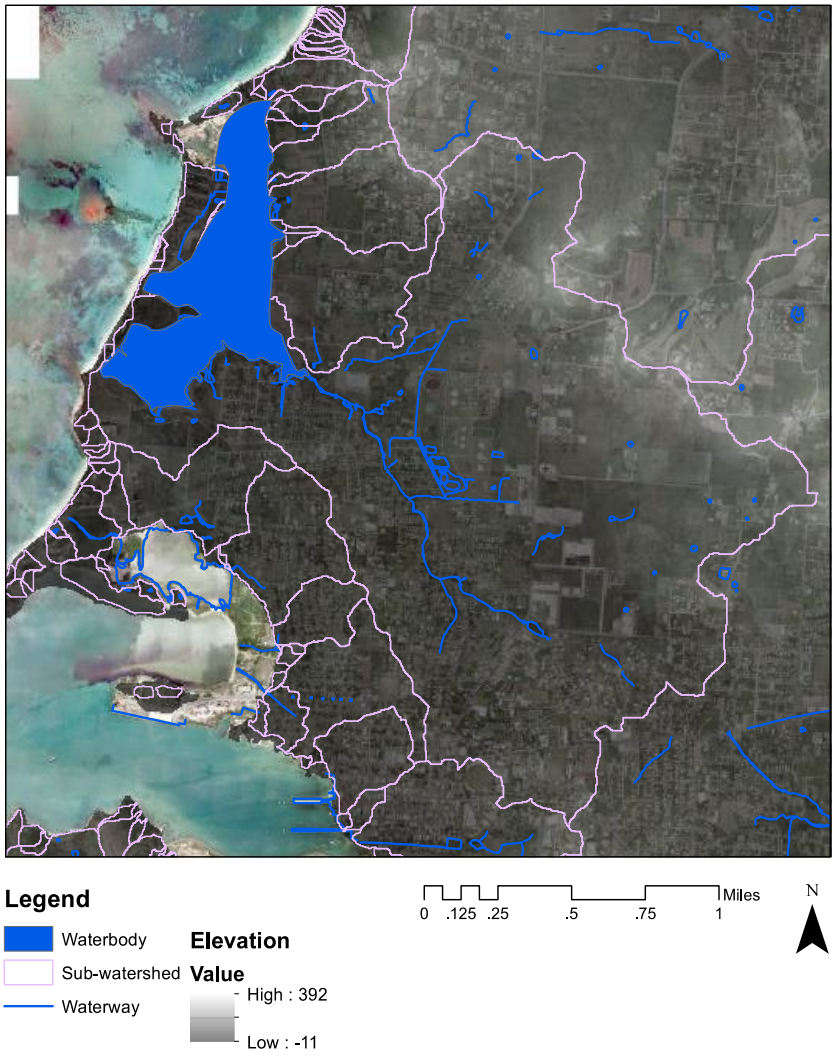


Figure 6. Delineation of sub-watershed drainage basins in the populated suburbs surrounding McKinnon's Pond, using 2010 aerial imagery as a basemap. Source: Environmental Information Management and Advisory

[37] Johnson, 2010; Butler, 2013; Antigua Observer, 2015

The area has been the focus of the United Nations Global Environment Facility Integrated Watershed and Coastal Areas Management (IWCAM)[38] program where an environmental assessment and partial regeneration was undertaken. Also through this program steps were taken to deter raw sewerage contamination via the installation of local wastewater treatment plants.

The Development planning and management system did not account for changes in Climate and this has resulted in infrastructure and housing in Antigua and Barbuda being particularly vulnerable to a variety of climate threats, ~~including~~ particularly flooding and erosion. For example, due to the seasonal nature of the watercourses or 'ghuts', combined with changing rainfall parameters as a result of climate change, infrastructure and housing is often built too close to waterways, resulting in an increased risk of flooding during periods of heavy rainfall and under projected climate scenarios. Structures in the sub-watershed drainage basins like McKinnon's Pond are highly vulnerable to degradation from flooding.[39] In addition, building and infrastructure construction in coastal areas often interferes with the natural functioning of coastal ecosystems and related ecosystem services. For example, areas of salt ponds and mangroves like McKinnon's Pond on the northwest coast, which are highly productive and help to stabilize coastal environments, have been cleared for coastal development. Poor development examples include most notably Jolly Harbour, which converted one of the island's most extensive mangrove ecosystems into a marina and resort. This development took place prior to Antigua and Barbuda's Physical Planning Act of 2003, which legislated requirements for environmental impact assessments (EIAs) and has helped to mitigate such impacts. ~~Consequently, the degradation of coastal ecosystems has contributed to erosion, storm surge damage, and inland flooding, and interventions are required to reverse this trend.~~

Antigua and Barbuda have considered climate smart planning to achieve sustainable development by protecting national infrastructure through its Sustainable Island Resource Management Zoning Plan (SIRMZP), which lays out a comprehensive zoning and national physical development plan for the island.[40] McKinnon's Pond is specifically noted in the SIRMZP as an environmentally sensitive area and recommends a development plan that incorporates environmental rehabilitation and gives careful attention to the road network and land use pattern to improve access to commercial and community facilities.[41]

The watercourse flowing into McKinnon's Pond passes through four suburbs vulnerable to frequent flooding; these are McKinnon's, Yorks, Upper Fort Road and Friars Hill road (the sub-watershed). Approximately 1666 households were settled here by 2002. The growth of development in residences is rapid, particularly in Yorks where over 125 new buildings were constructed between 1995 and 2001.[42] There are instances of 'squatting' in the suburb of York, called the York's New Extension, located on backfilled wetlands. This is due to increasing land prices and lack of human resources to deal with the

[38] See further information on the GEF IWAM project below
[39] Baldwin, J (2000). Tourism development, wetland degradation and beach erosion in Antigua, West Indies. Tourism Geographies.
[40] SIRMZP, 2012
[41] GENIVAR, 2011
[42] Jackson, 2001 (North west Local Area Plan)

level of encroachment that has occurred. Demand for middle- to low-income housing in this area is expected to grow which requires the improvement of infrastructure and adding further drainage improvements to accommodate storm water flow. Flooding in the residential and built environment can be traced to natural watercourses that have been filled in or disturbed as a result of construction and development. The areas particularly sensitive to flooding tend to be exposed to runoff from development in the industrial area and flooding in the local stream. The storm water drainage system is frequently blocked throughout the community and at the entrance to McKinnon's Pond as a result of sedimentation and pollution upstream. The waterways in these communities require upgrades while new waterways will be necessary to increase capacity for flood resilience from increasingly intense storms and hurricanes.

The impact of floods and increasing costs has become a critical concern for Antigua and Barbuda.[43] Blockages of natural flows of watercourses and drains, and uncontrolled construction in unsuitable areas have increased the exposure of communities to climate impacts. Thus, urgent adaptation action is necessary given the projected increased intensity of hydro-meteorological events due to climate change and global warming. Severe flooding, infrastructure damage, pollution and sedimentation in the communities and in McKinnon's Pond itself have affected the communities of Yorks, Upper Fort Road and Friar's Hill along the main drainage watercourse to McKinnon's Pond.

Certain areas were highlighted as particularly vulnerable to flooding during a community vulnerability mapping process (Figure 6). In order to confront these issues the community members suggested raising awareness in the community and disseminating information about these impacts. As a possible solution to flooding, community members also recommended (i) ecosystems based adaptation (EbA) activities to improve drainage problems in the area as well as (ii) the restoration of the McKinnon's Pond watershed. Increased potable water storage was cited as another potential resilience building mechanism in the community vulnerability assessment.

[43] Soloman et al., 2011

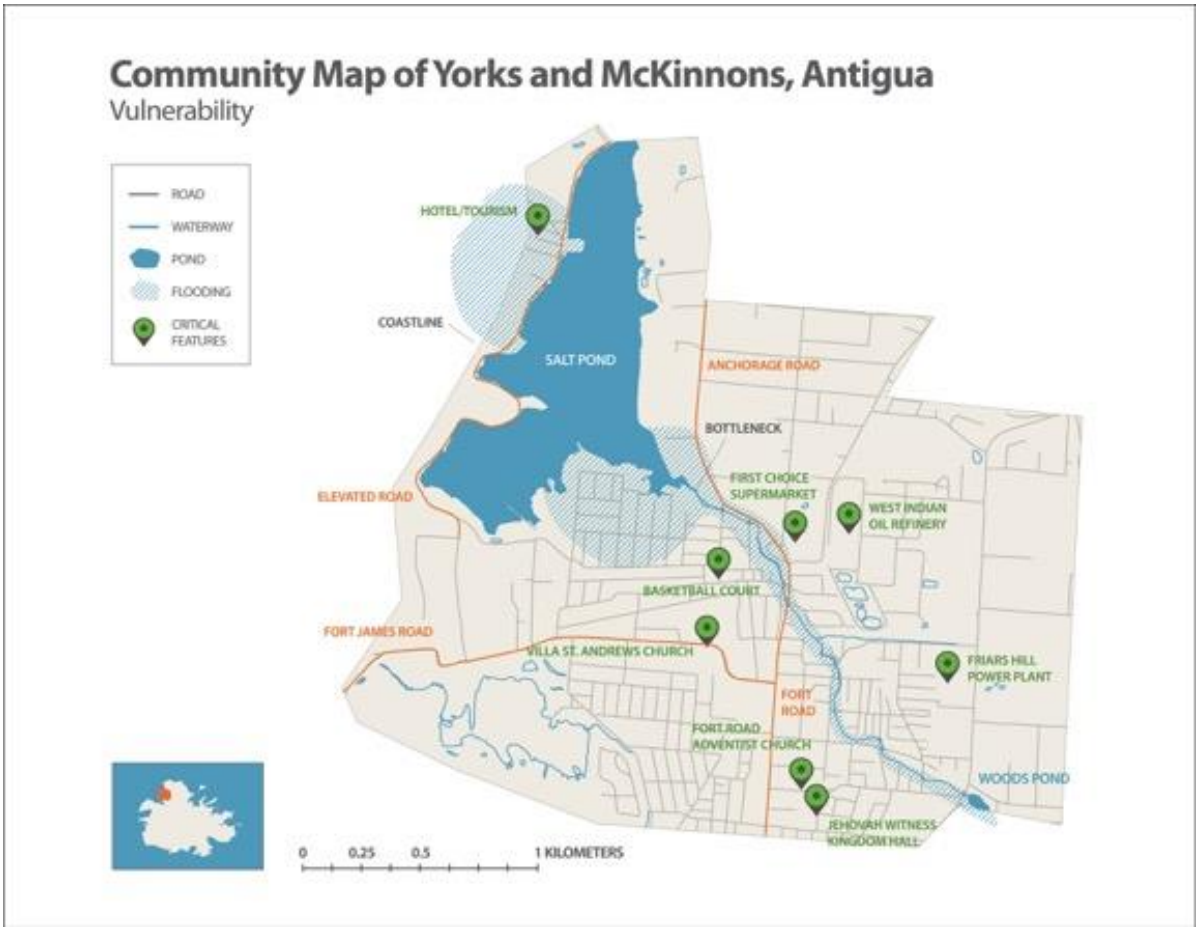


Figure 6. Community vulnerability map of McKinnon's Pond, on the north west coast of Antigua highlighting flood prone areas and critical features in the community

In addition to flooding, the communities of McKinnon's Pond, Yorks Upper Fort Road and Friars Hill experience frequent water shortages. Yorks is particularly vulnerable to drought and climate projections indicate a strong likelihood that dry periods will lengthen.[44] Only 54% of community members practice rainwater harvesting and, of those that don't, most are unfamiliar with available technology. With more frequent instances of drought, rainwater harvesting can be used as an adaptation measure for sustainable urban drainage and in order to build resilience to the impact of water shortages in Antigua.

Barriers to action and adaptive capacity

Vulnerability to climate change is a complex relationship between cause/effect of climate change and its impact on people, economic sectors, and socio-ecological responses.[45] The Fourth Assessment Report of the IPCC (AR4) provides the most widely used definition of vulnerability, summarized as the following:

> *'(…) the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the*

[44] Simpson et al., 2012

[45] GIZ, 2014. *The Vulnerability Source Book: Concept and guidelines for standardised vulnerability assessments*. In cooperation with Adelphi and EURAC Research.

character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity' (Parry et al. 2007).

This system of causality and reinforcing loops has been usefully presented in a visual diagram by adelphi/EURAC 2014 (see Figure 7).

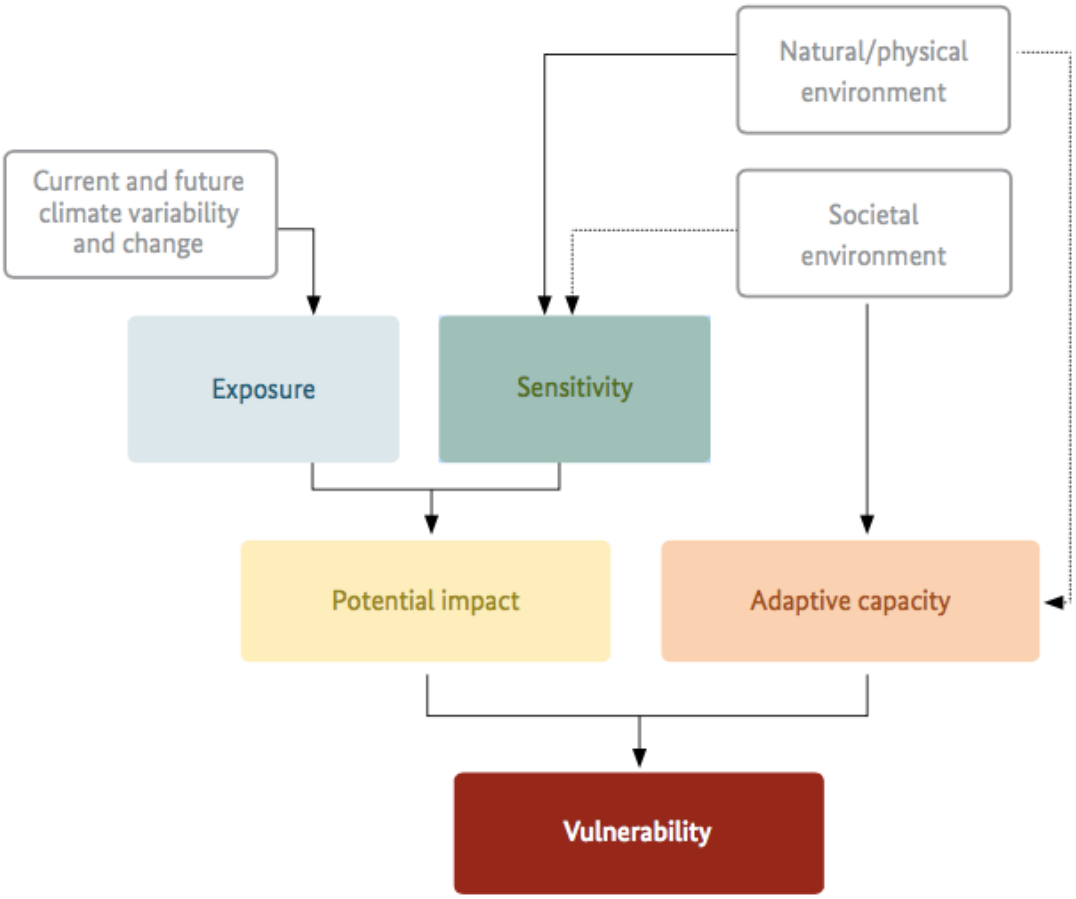


Figure 7. Visual depiction of the components of vulnerability: Climate change exposure, and a system's sensitivity to it, determine potential impact. However vulnerability to that impact depends on the system's adaptive capacity.

Of all the components that contribute to vulnerability, exposure is the one directly linked to climate parameters. Exposure factors have been outlined in the preceding sections – including temperature, precipitation, evapotranspiration, and extreme events (heavy rain and drought).

The northwest coast of Antigua is particularly exposed to climate impacts due to physical features, including low elevation, gradual topography, and clay-like soils that inhibit drainage. These are exposure factors that cannot be changed. Physical development on the northwest coast has not adequately incorporated these exposure factors into design and planning, resulting in a built environment that is increasing sensitivity to climate variation. For example, the standard planning parameter utilized by the Public Works Department in its drainage construction is two inches of rainfall in twenty-four hours. However, in October 2015, the northwest coast received two inches of rain in less than one hour,

causing flash flooding. In order to decrease sensitivity to climate events

While the GOAB has resolved some aspects of environmental regulation and monitoring, the key barriers to action ~~gaps to progress in this area~~ remain:

- Implementing comprehensive coastal zone management and physical development plans and building adaptive capacity of coastal communities
- ~~Addressing and f~~Financing sustained interventions that reduce vulnerability to the impacts of climate change and natural disasters
- Effectively capturing and incorporating necessary data on marine and coastal areas and the built environment[46]

Without adaptation-oriented planning, coastal and inland infrastructure, low-lying buildings and ecosystems are exposed to climate hazards. The lack of awareness of the causal linkages between exposure, sensitivity and the capacity to adapt to future climate impacts inhibits the resilience of communities who may be most affected by adverse impacts to the land and their livelihoods. Baseline data to inform planning and analyze the effect of past development on the environment has, until recently, not been readily available~~is scarce~~. However, a national Environmental Information Management and Advisory System (EIMAS) has been developed within the Department of Environment to address data gaps using geographic information systems (GIS) technology and will be used for mapping and monitoring ~~protected areas~~the natural and built environments, and for sound data to inform decision-making.[47] The ecological impacts of both physical development and human settlement have led to a decrease in the once thriving biodiversity of McKinnon's Pond and the surrounding mangrove forest. These multiple stressors reduce the capacity of this particular area of Antigua to be resilient and cope with the increased exposure to hazards and threats to the surrounding communities.[48]

This proposed project, the McKinnon's Pond Watershed Restoration and Resilience project (MPWRR), seeks to ~~address these challenges~~decrease sensitivity of the natural and the built environments to climate impacts through physical interventions, including ~~by~~:

- Increasing drainage capacity of the main ghut that runs through the sub-watershed basin
- Building check dams to act as emergency flood water storage
- Restoring riparian buffer zones to address erosion, non-point source pollution, and improve water quality
- Installing hard and soft infrastructure to stabilize banks and reduce sedimentation
- Addressing drivers of environmental degradation in McKinnon's Pond
- Further data collection to analyze exposure and sensitivity factors, and advance understandings of vulnerability on the local level

~~integrating the various objectives of the following guiding policies and legislation:~~

[46] Gore-Francis, 2014
[47] Devine et al, 2009 (EIMAS)
[48] CARIBSAVE, 2012 (VIAAC)

In addition to addressing sensitivity of the natural and built environment, the project is designed to reduce vulnerability by building adaptive capacity in the northwest coast to cope with losses and damages. This project will enhance adaptative capacity through:

- Demonstrating climate-resilient planning through the creation of the Local Area Physical Development Plan, implementing interventions in the plan, and demonstrating resulting benefits
- Mainstreaming climate-resilient planning into activities and work plans of key agencies
- Overcoming the financing barrier to action through sustained financing for environmental management through the SIRF Fund
- Educating the public about ecosystem-based adaptation and ecosystem services, as well as capacity building at the decision-making level
- Enhanced capacity at the local level through the provision of technology, which will be administered through the adaptation loans window of the SIRF Fund

~~i) Sustainable Island Resource Zoning and Management Plan, in which McKinnon's Pond is identified as an environmentally sensitive area~~

~~ii) Integrated Water Resources Management Strategy~~

~~iii) National Adaptation Strategy and Action Plan to address Climate Change in the Waters Sector in Antigua and Barbuda~~

~~iv) Environmental Protection and Management Act of 2015: Lists McKinnon's Pond as a critical wetland~~

~~v) Antigua and Barbuda's Intended Nationally Determined Contribution to the UNFCCC: Identifies the national target that, "By 2030, all remaining wetlands and watershed areas with carbon sequestration potential are protected as carbon sinks"~~

Project / Programme Objectives:

List the main objectives of the project/programme.

The McKinnon's Pond Watershed Restoration and Resilience (MPWRR) project seeks to establish ecosystem-based planning in Antigua and Barbuda in order to create resilient communities and to restore fragile ecosystems. It further seeks to adapt to projected climate impacts posed by intense precipitation events and storms, sea level rise and coastal erosion. The activities focus on building resilience through hard infrastructure and upgrades to existing infrastructure and through increased ecosystem-based adaptation awareness and population-level capacity building. In this project's context the working definition of ecosystem-based adaptation is, "the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change. This may include sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy that takes into account the multiple social, economic and cultural co-benefits for local communities."[49]

[49] Convention on Biodiversity (2010) Introduction, pg. 1

The three main objectives of the project, which correspond to the three project components, are to:

- Implement ecosystem-based rehabilitation of McKinnon's Pond to increase resilience and functionality of the riparian, marine and terrestrial ecosystems enabling ecosystem services and providing a buffer zone for the communities, businesses and the natural environment in the surrounding area.
- Reduce exposure in the McKinnon's sub-watershed to flooding during extreme hydro-meteorological events through tackling siltation, runoff and pollution as well as providing access to an innovative financing mechanism that will mitigate the negative impacts of climate change through concrete adaptation interventions.
- Mainstream adaptation into local and national planning by building institutional capacity and through a communication program and awareness campaign designed to heighten awareness and ownership of adaptation and climate risk reduction processes.

Project / Programme Components and Financing:

Fill in the table presenting the relationships among project components, activities, expected concrete outputs, and the corresponding budgets. If necessary, please refer to the attached instructions for a detailed description of each term.

For the case of a programme, individual components are likely to refer to specific sub-sets of stakeholders, regions and/or sectors that can be addressed through a set of well defined interventions / projects.

Project/Programme Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
1. Ecosystem-based approach to the rehabilitation of McKinnon's pond	Ecosystem services are valued; Wastewater treatment is installed; Eco-tourism and recreational amenities are installed; Watershed and wetland areas are rehabilitated	Ecosystem services are valued and protected in the McKinnon's sub-watershed	3,088,375
2. Redesign and reconstruction of McKinnon's sub-watershed using climate resilient urban drainage	Flood and drought management strategies are implemented; Micro-loans to community members are disbursed through the SIRF Fund	Surrounding communities are more resilient to climate change impacts	5,714467,225500
3. Adaptation mainstreaming and capacity building of local communities and institutions	Key personnel are trained; Watershed and Wetlands Management Committee is operational; Citizen Science programme is launched; National monitoring system is in place	Relevant institutions, communities and stakeholders demonstrate ownership of adaptation interventions and have the capacity for effective maintenance	507,000
6. Project/Programme Execution cost			658,400
7. Total Project/Programme Cost			9,401,275
8. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)			N/A
Amount of Financing Requested			9,401,27510,000,000.00

Projected Calendar:

Indicate the dates of the following milestones for the proposed project/programme

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. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

Component 1: Ecosystem-based approach to the rehabilitation of McKinnon's pond

This component aims to improve the currently degraded mangrove and salt pond ecosystem of McKinnon's Pond by opening up the Pond to ocean influence, improving water quality, replanting mangroves and establishing a formal conservation and recreational use buffer zone to accommodate projected climate impacts. This component will also develop an ecosystem valuation methodology, using McKinnon's Pond as a pilot, and conduct a flood mitigation capacity assessment in order to develop a plan for best utilizing McKinnon's Pond to prevent flooding in nearby communities. The immediate benefits of this component will be stimulating local biodiversity and aesthetic appeal, supporting alternative livelihoods through enhanced eco-tourism potential and surrounding communities through recreational value. In the long term, the pond will have enhanced function as a water filtration system and flood buffer zone for the communities in the sub-watershed.

Outcome 1.1. Mangrove forest and ecosystem rehabilitation and protection measures implemented in McKinnon's Pond and the 45 hectares of coastal wetlands which are part of McKinnon's Pond provide improved ecosystem services

Output 1.1.1. An integrated analysis of flood protection potential and sea level rise impact on McKinnon's Pond using GIS-based models

The current state of McKinnon's Pond prevents the natural flow of wastewater into the pond and out to the ocean, from the local watershed and drainage basin. This has led to flooding around the borders of the pond, which exposes certain areas to erosion and inundation. Activities under this output include analysis and GIS Hazard Mapping of McKinnon's Pond, drawing from previous studies. The communities of McKinnon's Pond and York have previously been engaged in consultations regarding the areas of their community vulnerable to flooding. The assessment will take into account this community input as well as the current state of flood prevention infrastructure and flood mitigation strategies and policies. Special attention will be paid to the gaps in current policy and strategy that need to be addressed. Results will be GIS-based, and will be integrated into the Environmental Information Management and Advisory System (EIMAS) to inform climate-resilient decision-making.

Output 1.1.2. Ecosystem services valuation and methodology developed using McKinnon's Pond as a pilot demonstration

A key underlying motivation of this restoration project is to provide a precedent for coastal ecosystem-based planning and infrastructure in Antigua that underscores the need for climate resilient planning, and the benefits of adaptation interventions. In order to support this case, an ecosystem services valuation methodology will be developed, for uptake and replication by the Watershed and Wetland Management Committee. A valuation will be conducted to assess the value that McKinnon's Pond can offer once restored (see Figure 7).

Ecosystem services are predominantly public access and therefore market analysis can be difficult. In order to analyze the value of the McKinnon's Pond's ecosystem services an assessment will need to be conducted on: the impact of land use on the natural resources; and, the economic implications of any degradation occurring. Additionally a cost benefit analysis of the various ecosystem functions available to the community and surrounding commercial entities is needed.

The groundwork for such assessments have been conducted to some extent over the years (e.g. Sustainable Island Resource Management Zoning Plan, North West Coast Local Area Plan), however these plans were never fully integrated and realized. The World Resources Institute and other leading organizations have designed best practice guidelines for ecosystem valuation for decision-making in the Caribbean.

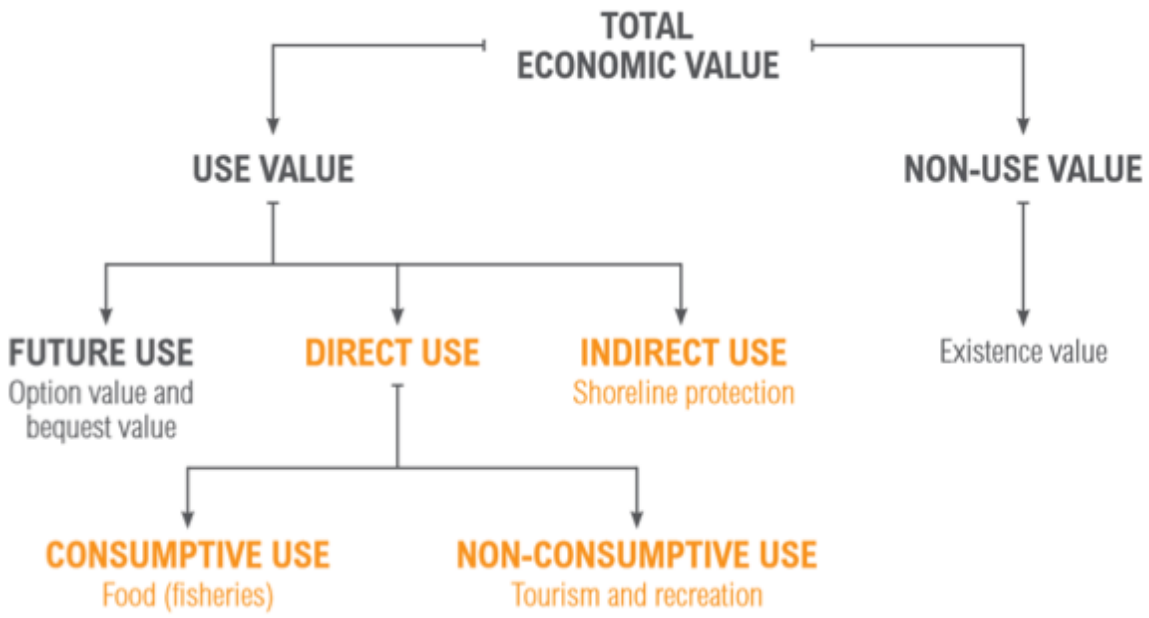


Figure 7. Breakdown of value types in ecosystem services valuation (Source: Adapted from Pagiola et al., 2004)

The overall functions of mangrove trees in coastal areas are well known. In McKinnon's Pond, mangrove and riparian vegetation provide regulatory functions in the stabilization of soil and beach, deterring the impacts of climate change by buffering land settlements from sea level rise, inundation from storm surge as well as preventing soil erosion and increased soil salinity and maintaining water quality. They also perform a mitigation function in the absorption and storage of carbon dioxide. The total economic value of mangrove habitat globally, estimated in 2013 was US$181 billion in total and between US$475 and US$1675 per hectare. Mangroves function as habitats to marine and terrestrial life. They have a productive function as a source of construction material, food products and genetic material. Species that thrive in the fresh water stream area of McKinnon's Pond are red mangroves (Rhizophora) while black mangrove (Avicennia) is more prolific in areas of heightened salinity.

Output 1.1.3. Ecosystem-based rehabilitation and restoration of McKinnon's Pond watershed and wetland

~~The overall functions of mangrove trees in coastal areas are well known. In McKinnon's Pond, mangrove and riparian vegetation provide regulatory functions in the stabilization of soil and beach, deterring the impacts of climate change by buffering land settlements from sea level rise, inundation from storm surge as well as preventing soil erosion and increased soil salinity and maintaining water quality. They also perform a mitigation function in the absorption and storage of carbon dioxide. The total economic value of mangrove habitat globally, estimated in 2013 was US$181 billion in total and between US$475 and US$1675 per hectare. Mangroves function as habitats to marine and terrestrial life. They have a productive function as a source of construction material,~~

~~food products and genetic material. Species that thrive in the fresh water stream area of McKinnon's Pond are red mangroves (Rhizophora) while black mangrove (Avicennia) is more prolific in areas of heightened salinity.~~

Key drivers of ecosystem degradation at the McKinnon's Pond are hyper-salinity, increasing surface water temperatures, and pollution from point and non-point sources.[50,51] This output is designed to rehabilitate the pond using ecosystem-based interventions that address the drivers of degradation, improve current conditions of the ecosystem, and enhance adaptive capacity to future climate impacts.

A bloom at McKinnon's Pond in June 2015 and resultant media attention and water testing demonstrated the degree to which temperature and hypersalinity are impacting the pond. Test results from two sampling locations revealed a salinity of 59ppt and 70ppt, significantly higher than the ocean's average salinity of 35ppt. Water temperatures in the Pond were above 100 degrees Fahrenheit. The Antigua Meteorological Services had reported rainfall for May at 0.82 inch, making it the driest May since 2001 and the fourth driest on record dating back to 1928. The past three months had also been seriously dry – over the period March-May, the rainfall total was 2.78 inches, putting it in the bottom 5% of all totals for this period; hence, the classification of the drought at severe levels. Insufficient rainfall had fresh water recharge to maintain standard salinity levels.[52]

Figure 1. Officers from the Department of Environment and Dunbars Lab collecting water samples at McKinnons during bloom in June, 2015.

[50] Jackson, Ivor, 2002. Northwest Coast Local Area Plan. Prepared for the Ministry of Tourism and Environment, Government of Antigua and Barbuda.

[51] Harcon Consulting, 2011. Demonstration Project Four: Promoting Best Practices In Waste Water Disposal, Water Conservation And Re-Use In The North West Tourism Zone Antigua. *Review Of Strategies And Technologies To Improve Water Conservation, And Waste Water Use And Treatment Development Of A Costing And Implementation Plan For The Proposed Natural Treatment System*. Prepared for the SIRMM Project.

[52] Department of Environment, 2015. Site visit report re: Algal Bloom at McKinnon's Pond. June 9.

Salinity has increased in the Pond over time due to a combination of several factors: accelerated rates of evaporation, particularly during the summer months; siltation of the Pond during very heavy rains, which decreases depth and holding capacity; and rainfall variability with extended drought periods. This ecosystem-based rehabilitation and restoration activity will improve the adaptive capacity of the pond to climate stressors through the following activities:

- Establish a baseline scenario for key ecosystem health indicators, including temperature, salinity, dissolved oxygen, nutrient loading, among others. Equipment for procurement include a small vessel, testing equipment, and GPS to georeference all data
- Riparian ecosystem restoration including delineating a green belt to stabilize the perimeter of the Pond
- Construct a boardwalk that, in addition to being an eco-tourism attraction, will act as a silt retention barrier. The boardwalk will also stabilize the bank by reducing foot traffic on soft soil
- Waterway improvements to further reduce the flow of silt into the pond

In 2007, the Government dredged the pond to increase its carrying capacity and reduce hyper-saline conditions. The Department of Environment monitored the resultant mangrove regeneration. However, dredging is an invasive intervention that entails negative impacts including the destruction of bird nesting sites. The dredging must be done in the early summer, during low rainfall periods and before hurricane season, and this coincides with bird nesting season – dredging entails significant problems for the wildlife. Notwithstanding the impacts on the bird populations, the dredging contributed to mangrove regeneration.

The project is also designed to address point and non-point source pollution. The riparian buffer restoration provides ecosystem services of water filtration, thereby minimizing non-point source pollution. This project will address pollution under Output 2.2.1, where the impact of sewage in the area will be reduced with a number of homes being provided with the finances to upgrade their septic systems. Further, a GEF-funded complementary initiative (IWEeco) will be expanding the current sewage systems in the area to accommodate some of the hotels and other homes and businesses that currently contribute to pollution by discharging effluent. The wastewater

treatment and reuse project will begin execution in 2016 and complements this AF project by addressing drivers of degradation – point source pollution and nutrient loading.
~~Activities under this output include establishing a baseline scenario including damage assessment and water quality assessment, procuring necessary equipment, delineating the riparian ecosystem restoration belt, and implementing rehabilitation and restoration actives. Provision will be made for community input and consultation to the site selection and supervision and implementation of activities in the restoration program.~~

~~The Northwest Coast Evaluation Project, conducted in 1998 by consultants EMPAL-Jaques Whitford Ltd, involved an extensive survey of the area surrounding McKinnon's Pond. In the survey several recommendations were made; key among them is the restoration of McKinnon's Pond watershed in order to stabilize the surrounding coastal environment. The report confirms that the degradation to the Pond is reversible. A series of infrastructure interventions in the Pond, including reintroducing marine influence into the pond, would dramatically improve the viability of the ecosystems within and surrounding the Pond. Further, the reconnection of ocean influence to the pond is key to the restoring the natural circulation of the pond. The infrastructural component of the restoration project is extensive and will require monitoring at quarterly intervals to assess the improvements in water quality, temperature, salinity, nitrate content and bacteria.~~
The private sector and civil society have been engaged in consultations throughout the process of intervention designs (see Annex 4 the minutes of the Stakeholder Consultation Workshop on the Northwest Coast Tourism Zone Wastewater Management Strategy, 2012, Sandals Grande). Further community consultations will take place as part of this Output 1.1.3 (in addition to Outputs 1.1.4 and 3.1.1). These consultations, and several workshops, will take place at the start of the project, in the middle of project implementation and preceding the terminal project evaluation to elicit to elicit ideas and integrate feedback directly from community groups.

Output 1.1.4. Installation of natural wastewater treatment systems

Natural water treatment systems will be established in the pond in order to reduce pollution from runoff originating from the upper watershed and improve the water quality of the pond. This component of the project links the Components 1 and 2 of this watershed restoration project. The natural treatment system relies on the dual success of the infrastructure upgrades and sustainable drainage system in the community as well as the restoration of McKinnon's Salt Pond.

Natural treatment systems have the potential to process effluent 'equal to that of mechanical treatment systems'. Aquatic wastewater treatment systems have the added benefit of complementing natural processes of McKinnon's Pond ecosystem, adding aesthetic value and habitat potential into these areas and avoiding unnecessary costs in the construction and maintenance of alternative treatment systems. Activities under this

output include construction of riffles in major watercourses, and re-establish natural filtration at inflow tributaries leading into McKinnon's Pond.

Outcome 1.2. Recreational and non-infrastructural uses for McKinnon's Pond are established as buffer zones

Output 1.2.1. Eco-tourism and recreational amenities are developed and use guidelines established

The restoration around McKinnon's Pond is intended to create an improved living environment through the upgrading of drainage infrastructure and the stability of the natural ecosystem and sub-watershed basin. The upgraded natural feature will also serve as an eco-tourism attraction given the unique wildlife attracted to the area and its proximity to popular beaches. The green belt surrounding the pond and the pond itself will be designed with recreation and tourism functions in mind. The greenbelt construction process will avoid unnecessary disruption of the current ecosystem and take into account the preservation of the restored pond in the design and application of tourism and recreational activities.

Activities under this output include developing trails and boardwalks with birding platforms and viewpoint lookouts, install solar lighting, compostable toilets, and other demonstration recreational amenities, and developing signage, E-brochures and other communications material to promote the area as a recreation destination. The eco-tourism site will be managed by the Department of the Environment and will be guided by the Environmental Protection and Management Act of 2015. Funding for the management of the Park area will be provided via the SIRF Fund, as well as Government budgetary allocations.

Consistent with the NBSAP strategy, the Department of Environment will also include local NGOs as part of the management process through a contract and/or a MOU. For example, the EAG is a local NGO that has been monitoring McKinnon's Pond for migratory and water birds. In addition, the local community group has proven active in the wastewater treatment interventions. The Department will continue to develop potential co-management arrangements for the recreational eco-tourism area.

Component 2. Redesign and reconstruction of McKinnon's sub-watershed using climate-resilient urban drainage

Output 2.1.1: Develop~~Implement~~ flood and drought management strategy for McKinnon's Pond and implement drought measures

Activities under this output include the finalisation of the physical development plan for the sub-watershed, termed the Local Area Physical Development Plan, including pollution management, waterway management, and flood and drought management

strategy, for approval by Cabinet. Once approved by Cabinet, the drought management components of the strategy will be implemented under this output ~~to pave the way for implementation~~.

The ~~flood management~~ strategy will provide guidance for restoration activities to be carried out to mitigate flooding in watercourses in the area McKinnon's Pond watershed restoration area (Outputs 2.1.2 and 2.2.1).

The strategy will be based on extensive consultation with community members and stakeholders. Their participation will be encouraged from initial project implementation consultation meetings and sustained through awareness raising activities. The strategy for flood and drought will also integrate and complement current discourse from the Antigua and Barbuda's ~~Second~~ Third National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), Sustainable Island Resource Management Zoning Plan, the country's climate action targets in the Intended Nationally Determined Contribution (INDC) communicated to the UNFCCC, and various sectoral strategies and sustainable development plans, and build upon project outputs under the SCCF and the IWCAM projects.

The relevant authorities will be responsible for implementing and enforcing the policy, regulations and monitoring of the Ecosystem ~~s~~ based Local Area Plan. The relevant authorities ~~will~~ include: the Development Control Authority for buildings and development proposals; the Public Works Department for adhering to climate-resilient infrastructure; the Department of Environment for safeguarding biodiversity and monitoring pollution; and the Antigua Public Utility Authority (APUA) Water Unit for overseeing water resources activities.

Output 2.1.2. Upgrade watercourse infrastructure from Upper Fort Road to McKinnon's Pond

The damage caused to properties in flood prone areas is high for government as well as private entities. Past unsustainable practices will need to be overhauled in order to build the infrastructural capacity to deal with current and future wastewater volumes. Current structures in the sub-watershed community can be protected by adapting future planning and current infrastructure using the natural watercourses and hydrological characteristics of the landscape.

Activities under this output include finalizing the flood capacity assessment and full flood mitigation plan for watershed area (integrate with 1.1.1 output), drawing on historical data in the EIMAS to quantify loss of catchment areas to guide check-dam re-construction. Detention ponds, commonly referred to as 'check dams', will be constructed in the primary watercourse. Check dams will reduce sedimentation and will filter upstream pollutants. Check dams will also encourage filtration into underlying soil. Flood protection measures will be integrated into the drainage upgrades including:

settlement ponds; sediment traps; artificial impoundments; open space networks in urban areas; flood drainage swales and flood plains.

In addition to check dams, construction of flood prevention infrastructure i.e. improving major and minor watercourse drainage, removing debris blockages, relocating natural watercourse barriers/reintegrating natural watercourses sustainable urban drainage methods, will be implemented.

Outcome 2.2. Access is enhanced to innovative financing mechanisms to address the negative impacts of climate change through adaptation interventions

Output 2.2.1. Provision and monitoring of micro-loans for communities to address the negative impacts of climate change through the adaption window of the SIRF Fund

This intervention will reduce the vulnerability of community members by providing access to innovative financing mechanisms for adapting to climate change impacts in the McKinnon's Pond watershed restoration area. This intervention is also designed as a social safeguard measure. With the projected impacts of climate change, and the awareness raised about climate risks to the McKinnon's pond area under this project, potential negative consequences include: 1) a reduction in property value in the area due to publicized hazards, and/or 2) an unwillingness of financial institutions to invest in or lend money to residents and small businesses in the area due to its designation as "high risk". This small loans intervention is critical to provide financing options for residents of the McKinnon's area to have an empowered "solutions-oriented" approach to climate change.

Output 2.2.1 involves providing micro-loans through a consultative process and will involve engagement with national and regional financial institutions – such as credit unions, ~~and banks~~or established NGOs/community groups – to design financial products that will reduce barriers to financing adaptation interventions. Financial products will include low interest loans to vulnerable households located in the Upper Fort Road and McKinnon's Pond communities that are unable to access funding through conventional means, such as bank loans. In designing these products, barriers in the private sector that inhibit access to financing for climate change adaptation will be identified in order to address the limitations of conventional loans, offering an alternative financing. Small loans for adaptation interventions will be piloted under the Special Climate Change Fund (SCCF), which is anticipated to begin in the third quarter of 2016, to ~~test~~ further compile baseline data on the procedures for disbursement and recovery of funds. Repayment schedules of the loans will depend on the ability of the household to feasibly pay back the loan.

The project team will enter into consultation with established community groups, NGOs, local banks and/or credit unions in order to establish a viable household adaptation loan structure and institutional support. Based on the results of these pilots, a strategy will be put in place to upscale and replicate funding for adaption interventions. Furthermore, a suite of adaptation interventions eligible for funding will be developed (see preliminary

guidelines in Annex 1). This mechanism will ~~draw from the~~by housed under the national Sustainable Island Resource Framework (SIRF) Fund.

Firstly, a baseline scenario will be developed and assessed under the full project document stage of this project, and through the disbursement of approximately US$1 million in the form of small loans through the SCCF project. By assessing the adequacy of support available to households for adaptation and~~,~~ drawing on vulnerability impact assessments, ~~and finalize~~the micro-loan criteria will be finalized including guidelines for high-impact interventions. Subsequently, loans for adaptation interventions under this project will be disbursed to eligible households and activities. ~~Following a pilot phase, s~~Small loans between US$10,000 - $4~~2~~0,000 will be distributed through the small loans fund for the implementation of adaptation interventions. These loans will be disbursed to low-income households that are particularly vulnerable to climate change impacts and who will find it difficult to comply with the provisions of the Local Area plans. .

Component 3. Adaptation mainstreaming and capacity building of local communities and institutions

Outcome 3.1. Strengthened institutional capacity and ownership to reduce risks associated with flooding, sea-level rise and degraded ecosystems causing socio-economic and environmental losses

Output 3.1.1. Design and implementation of Ecosystem-based Adaptation Local Area Plan to regulate and manage the environmental compliance and maintenance of the McKinnon's Pond watershed restoration area

The EbA Local Area Plan principles will be aligned with those of ecosystem based adaptation. In order to prevent further damage by continuing to expand residential development, significant expansion will be disallowed. Relevant standards and procedures for land subdivision reducing building sprawl and reducing extensive road utility networks will be adopted.

The EbA Local Area Plan is based on the maintaining ecosystem services and outlines the limitation to development that may have any adverse impact on the mangroves, the quality of McKinnon's Pond ecosystem, hinder natural waterways or pollute the watercourse and McKinnon's Pond.

The EbA Local Area Plan will be supported by current legislation and policy in Antigua and Barbuda: the Environmental Protection and Management Act (2015); the Environmental Protection Order (2004) under the Physical Planning Act which stipulates that McKinnon's Pond should be restored and protected; the National Integrated Water Resources Management policy (2011); and, the Draft Policy Framework for Integrated [Adaptation] Planning and Management. This legislation and policy is outlined in more detail under Part II: Section D.

The communities bordering McKinnon's Pond have been proposed to be included in a Special Development Area (SDA) in order to highlight the sensitivity of the watershed which drains through this location. The SIRMZP mandates that land use activities will be particularly scrutinized in SDAs while development policies, programs and projects for these areas should be prioritized. Further, the SIRMZP mandates that management plans are outlined for SDAs which monitor further development to ensure that SDA regulations are respected. Output 3.1.1 aligns with the SIRMZP as the plan will pilot a development framework that will act as a model for local development around sensitive ecosystems elsewhere on the island as there are currently no designated watershed reserves or legislation that deals specifically with their protection.

The Development Control Authority, Public Works, Antigua Public Utilities Agency, and the department of tourism and environment as well as the Registry and Lands Division will be responsible for implementing this Ecosystems based Local Area Plan, in collaboration with the local community and parish representatives. As planning spans multiple sectors and government departments the inception of the Local Area Plan will be a participatory process.

Activities under this output include integrating the LAP into the implementation practices of the DCA and the Public Works Department, so that development applications, drainage infrastructure, and other hard inverventions implemented by these agencies is aligned with the objectives of the LAP. Monitor and maintainenance plans will also be developed for the relevant authorities to ensure effective management and upkeep of adaptation interventions.

Output 3.1.2 Build the capacity of key agencies and personnel through targeted training and support

This output will build institutional capacity through by supporting the Watershed and Wetlands Management Committee. This Committee, established under Section 45 of the EPMA of 2015, is for the purposes of natural resources management under the Act, and is chaired by the Department of Environment and includes the Director of Agriculture, forest and fisheries rangers, representatives from APUA, Lands Division, Pesticides and Toxic Chemicals Board, and other relevant appointed local residents of owners of land within a watershed under consideration.

Project activities will support the Watershed and Wetlands Management Committee through the provision of technical support in developing a national watershed and wetlands monitoring system, and through training in ecosystem-based adaptation, GIS, data gathering techniques, and other capacity-building exercises. The inter-agency management Committee will be a key means of mainstreaming ecosystem based adaptation approaches into planning and development in Antigua and Barbuda. The Project Management Unit (PMU) will provide support for communication and coordination of stakeholders and various departments in this component. This includes communicating the Ecosystems based Local Area Plan to the watershed community. Presentations and workshops will be held for the watershed communities highlighting

the importance of EbA planning and their role in the supporting the McKinnon's Pond Watershed Restoration and Resilience project.

Outcome 3.2. Heightened awareness and ownership of adaptation and climate risk reduction processes at local levels

Output 3.2.1. Cost-benefit analysis of McKinnons Pond hard and soft interventions, to support future financial planning for adaptation

The purpose of the cost-benefit analysis (CBA) component is to evaluate the benefit of the MPWRR project's efficacy in order support the replication of similar projects in Antigua and Barbuda in the future. The analysis will also aid in the evaluation of the project as a whole. An ex-post cost-benefit analysis will be conducted towards the end of the project taking into account the final project cost, unforeseen costs, and future adaptation benefits of the improved infrastructure, ecosystem restoration and community support. The cost-benefit analysis will compare other possible alternative avenues of development for the McKinnon's Pond sub-watershed and is based on similar cost-benefit analyses for natural resource management. For example, alternative scenarios include the construction of a marina or the absence of any adaptation intervention at all. As an evaluative function, the CBA will draw attention to any areas where costs could have been saved and which particular activities were most beneficial.

A cost-benefit analysis is ~~the ideal~~utilized ~~methodology~~ because it is a requirement of the Ministry of Finance requires this method. ~~detailed a costing for the consideration of projects.~~ A cost-benefit analysis may also be used to ~~will~~ support the selection of adaptation and resilience-building projects using Government resources, which is important for the sustainability of this project's interventions, and to support replication of these methodologies in other vulnerable areas in Antigua and Barbuda, and planning for future adaptation costs.

Costs and benefits will be assigned a monetary value or described if monetary valuation is not possible. A multi-criteria assessment will be used in order to ascertain both the qualitative and quantitative value of the MPWRR project. This methodology will also encourage the interaction between the community, local government and the expert stakeholders, leading to a holistic evaluation of the costs and benefits of the project. The CBA will also contribute to estimating the impact the project has had in the final evaluation report which will form a key part of the monitoring and evaluation section of this project.

Using the CBA, an ecosystem services valuation and cost-benefit analysis workshop using McKinnon's case study will be provided for relevant authorities including Ministry of Finance, Ministry of Tourism, private sector and community representatives.

Output 3.2.2. Sub-watershed communities participate in awareness raising and capacity building for climate change adaptation

Community participation is key to the long-term sustainability of the project. This activity will develop a community engagement and participation plan, with a key activity being the establishment of a Citizen Science programme as a complementary monitoring and evaluation activity to on-going governmental efforts. The programme will include do-it-yourself water quality testing, calculating mangrove biomass, species identification and biodiversity monitoring, among other activities that support climate adaptation M&E. The Citizen Science programme will partner with primary, secondary and tertiary educational institutions for curriculum enhancement, and will be locally-driven to maximize community ownership.

To complement the Citizen Science programme, the output will include designing and implementing a community-oriented plan for the upkeep and maintenance of adaptation interventions.

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.

Antigua and Barbuda, like many Caribbean islands, have had difficulties in dealing with climate variability and its impacts. Multiple ecological, economic, social and geographic stressors and the interactions between them lead to vulnerability. Climate change has the potential to disrupt livelihoods, increase risk of death and injury and cause infrastructural damage, particularly from coastal flooding, storm surge and sea level rise (IPCC, 2014). Hurricanes and tropical storms are the highest-cost hazards in terms of loss of life and economic losses in Antigua. Flooding is frequently experienced during hurricanes and tropical storms, resulting in evacuations, severe damage to homes and further damage to roads, vehicles and drainage systems.

The nature of the housing of Upper Fort Road, Yorks and McKinnon's Pond are primarily informal and therefore vulnerable to extreme or unexpected climate variability. The area was not initially planned to support housing or other infrastructure and therefore the services necessary to cope with the current state of development are overextended. Given its location in a drainage basin, structures around McKinnon's Pond and in Yorks are particularly exposed to flooding during tropical storms and hurricanes (UN-HABITAT, 2011). In Yorks, McKinnon's Pond and Upper Fort Road floods impair day to day activities, damage local infrastructure like road and houses, inhibit movement within the area, and pose health risks. As a low income, informal housing community these residents' adaptive capacity is impaired by material damages (Skinner, 2011).

Yorks and McKinnon's Pond have a high proportion of households relying on one source of income. In addition, 21% of households in McKinnon's Pond and York are single-parent female headed households. In Yorks and McKinnon's Pond communities, 59% of males own their houses compared to 35% of females. Considering single source of income and a lack of physical or financial capital for females indicates the Yorks and McKinnon's Pond communities are particularly vulnerable to changes in economic circumstances and have limited adaptive capacity or in times of stress. However, many members of these communities rely on their social networks in times of financial difficulty. This indicates that there is a degree of community cohesion which will enhance community-level participation and communication.

The infrastructural upgrades and flood risk mitigation measured proposed by this project seek to avoid the potential damage caused by future tropical hurricanes and storms, especially as precipitation generally and during these events is predicted to increase. By channeling water away from houses there will be fewer instances of infrastructure damage, decreases risks to health and property. Investment into this community will also increase the value of properties resulting in improved economic security.

The Component 2.2.1 provides small loans to community member to administer their own adaptation upgrades. This is directly beneficial for the community who would otherwise not be able to afford these interventions or do not possess the collateral to insure themselves against environmental damage. One of the potential upgrades to houses is rain water harvesting. This adaptation option addresses both urban drainage and water scarcity (as Antigua is drought prone) in the community. Adaptation options like rain water harvesting will have multiple benefits for improving the safety and wellbeing of individual households.

The project also seeks to engage the local community in awareness raising activities which will improve general understanding of ecosystems based adaptation and long term community sustainability. The community will also be engaged to provide input and feedback on the project which is beneficial as this will directly address their specific needs and preferences. Our consultation can communication strategy aims to involve as many sectors of the community as possible, whether through personal communication, site visits, social media and radio communication. In this way, marginalized groups who may not usually be aware or consulted on large-scale projects will be involved in the restoration of McKinnon's Pond watershed.

The restoration efforts to McKinnon's Pond and the surrounding ecosystem restoration and greenbelt construction that this project will implement will have environmental benefits for biodiversity, ecosystem functionality, near shore ecosystem vitality, and flood mitigation capacity. This will have an overall beautifying effect to community and the environment. The restoration activities will also provide a boost to local tourism organizations whose appeal is diminished by the pollution and general condition of McKinnon's Pond.

Finally, this project seeks to provide a model for mainstreaming and applying ecosystem based adaptation approaches for planning and policy it will benefit other communities who are vulnerable to flooding. Entrenching the principles of ecosystem based adaptation through policy will enhance the sustainability of this project and others like it throughout the islands of Antigua and Barbuda. In addition, the stakeholders who take part in the capacity building activities of the project will benefit by broadening their knowledge and skill base, as well as enhancing decision making capacity.

C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.

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

Component 1. Ecosystem-based approach to the rehabilitation of McKinnon's pond ~~**The potential damage that may be incurred through sea level rise and heavy precipitation events would impact the community's ability thrive economically by disrupting the security of households and local livelihoods. The impact of climate related shocks and stressors also burden the budget of governments which has a nationwide effect. Implementing ecosystem based adaptation measures and precautionary infrastructure will save costs for the government and households within the McKinnon's Pond watershed restoration area by avoiding the damage and upheaval that can be caused by severe weather.**~~

~~**Component 1. The activities of the restoration of McKinnon's Pond and its riparian and mangrove ecology as well as its improvement as a flood mitigation measure will be quantified in an ecosystem services valuation. In addition to the physical improvement, the value of the restoration will have wide reaching effects for other industries and will form part of the national policy in ecosystems based planning. The natural treatment plant is a cheaper alternative to installing a local sewerage treatment plant which would bare major construction and plumbing costs. The natural treatment system uses ecosystem functions to filter wastewater. This also has added benefits for the pond and for the near shore marine environment. The restoration project will lead to direct improvements in the tourism industry. Tourism in the area will benefit from the improvements in biodiversity and aesthetics. In a business as usual case tourism would likely decline as the Pond continues to degrade creating severe environmental issues and decreasing the attractiveness of the area as a whole. The restoration project will also pave the way for a future coastal infrastructure development which will prevent further erosion and costly damage to the tourism establishments lining the coast between McKinnon's Pond and the ocean. The indirect ecosystem services will benefit the fisheries sector as the mangrove and the pond will provide a breeding ground thus regenerating fish stocks.**~~

~~**Component 2. This project involves hard adaptation measures in the form of infrastructure redevelopment within several watercourses leading to McKinnon's Pond. However, the costs involves in the concrete adaptation measures are small in comparison to the damage to public infrastructure, businesses and households in the McKinnon's Pond watershed when the drainage basin floods after heavy precipitation events. In addition, ecosystem based adaptation and sustainable urban drainage measures are typically more affordable than construction measures as the functionality of these drainage systems depends on working with the natural landscape and the ability of the natural ecosystem to maintain itself.**~~

~~**Component 3. There are currently no adaptation measures being implemented in the McKinnon's Pond area. The area is in need of long plans to ensure the sustainability of tourism industry and ensure the safety of households and integrity of physical infrastructure. The softer adaptation measures outlines in Component 3 will provide the policy and institutional framework, knowledge and skills for the longevity of the project. The management system that will be put in place will ensure regulation of the new developments in the area which will prevent costly damage from occurring in future severe weather events.**~~

Natural rehabilitation of McKinnon's uses ecosystem functions to filter wastewater. This also has added benefits for the pond and for the near shore marine environment. The restoration project will lead to direct improvements in the tourism industry in the area, though improvements in biodiversity and aesthetics.

Viable alternatives	Assessment of alternatives (cost-effectiveness)
Do nothing	Blooms in McKinnon's would occur more frequently, leading to lower dissolved oxygen and fish and wildlife kills; stagnant water and poor drainage increases mosquito-breeding habitat, increasing the risk of mosquito-borne illnesses. Tourism is already being impacted by the declining quality of ecosystem services would likely decline as the Pond continues to degrade, creating severe environmental issues and decreasing the attractiveness of the area as a whole.
An "armour and defend" approach would construct hard engineering structures along the coastlines and the waterway	Hard structures would have permanently eliminated critical nesting sites and wildlife habitats at McKinnon's pond.

Increased 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 fish and other species within the waterway to control vector population.

Component 2. Redesign and reconstruction of McKinnon's sub-watershed using climate resilient urban drainage

This project involves hard adaptation measures in the form of infrastructure redevelopment within the key watercourse leading into McKinnon's Pond. This project will demonstrate and validate that concrete adaptation measures are small in comparison to the damage to public infrastructure, businesses and households in the McKinnon's Pond watershed when the drainage basin floods after heavy precipitation events (see figure below). Small loans disbursed via the SIRF Fund are designed to address non-point source pollution and to reduce vulnerability of the homes within the project site.

Viable alternatives	Assessment of alternatives (cost-effectiveness)
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 result in millions of dollars every disaster (see figure below).
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, and 7.25 km of roads. Instead, this intervention would improve emergency disaster response, and 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 would have the same benefit of reducing loss of life due to natural disasters, while also contributing to economic prospering and improving quality of life enjoyed year-round. Slow onset climate impacts are a significant threat in McKinnon's, including water-borne illnesses and health epidemics, food security, and quality of life enjoyed by residents in and around McKinnon's.
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.
The alternative to SIRF small loans for homeowners is to demand that the homeowners meet the requirement of the new local area land use plan and the building codes	This alternative would externalize the cost of compliance to the private sector and homeowners, however arguably this could result in indirect costs to the government in the form of welfare and increased social services to the area. In addition, this alternative has high political risks since this will marginalize most families within the area, especially low-income families. A further alternate to loans is the Government providing grants. This is not a viable option due to Government high indebtedness.
Construct a regional Sewage treatment system and hook up all homeowners	The cost of a regional sewage treatment system, in lieu of household-scale upgrades, will require the homeowners and businesses

	to pay an additional bill. This too has political risk. However, this option may be beneficial in the future as the area further develops and density increases, resulting in a critical mass of consumers to make the venture viable. This project will ensure that activities will not preclude this option for the future.

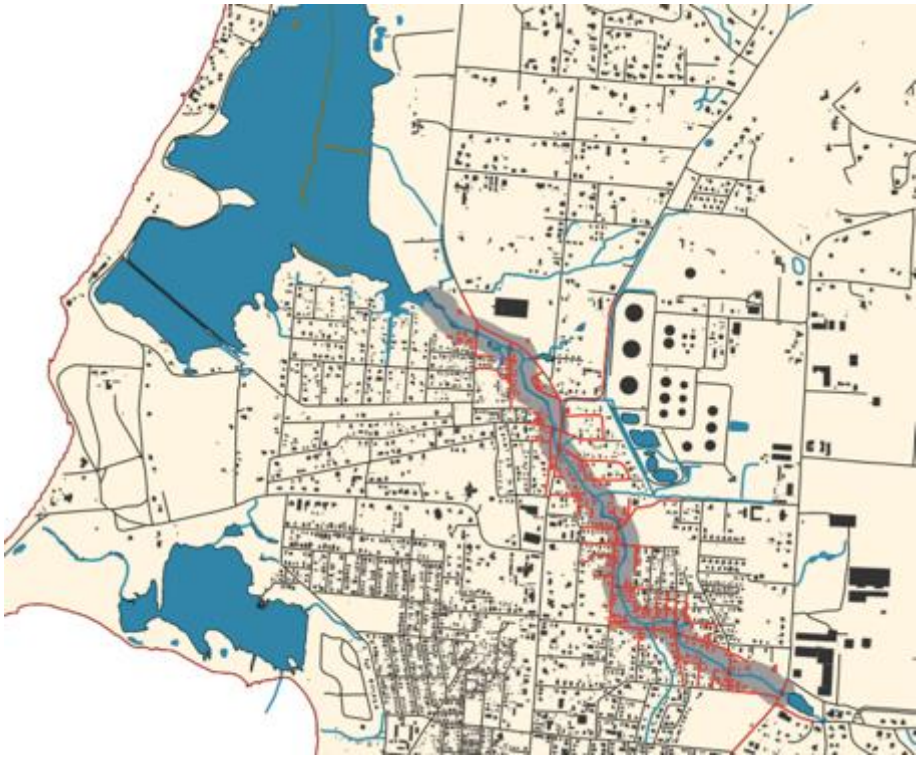


Figure. Affected infrastructure within 50m of the waterway leading into McKinnon's Pond include 424 buildings (22,000m^2) and 7.25 km of roads

Component 3. Adaptation mainstreaming and capacity building of local communities and institutions

This intervention provides the policy and institutional framework, knowledge and skills for the longevity of the project. The management system that will be put in place will ensure regulation of the new and existing developments in the area to prevent costly damage from occurring in future severe weather events.

Viable alternatives	Assessment of alternatives (cost-effectiveness)
Do Nothing	No mainstreaming / capacity building interventions is not a cost-effective

	option, because the benefits of the project would likely not be sustained beyond the life of the project implementation phase. 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 environmental monitoring and M&E.	With the Government responsible, this will rely on Government resources being available. 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.

D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

Government of Antigua and Barbuda Medium-Term Development Strategy 2016 to 2020

The Ministry of Finance and Corporate Governance finalized the Medium-Term Development Strategy (MTDS) in September 2015. The Strategy represents a set of strategies and actions to be undertaken by Antigua and Barbuda over the Medium-Term (2016 to 2020) in moving the country towards its long-term goals. Within such a framework, Antigua and Barbuda will strive to become a developed country within fifteen to twenty years, guided by the vision of “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 (SDDs):

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.

Second National Communication Strategies

In line with UNFCCC requirements Antigua and Barbuda produced their second National Communication in 2009. The documents the national context in relation to adaptation and mitigation challenges across various sectors in the islands. The extensive document largely covering the geographic, environmental and priority areas, speaks to the risks posed by ecosystem damage, poor construction regulation and enforcement, and the importance of ecosystem services. The document acknowledges the role of mangroves protecting coastal properties from erosion and storm surge and that investment in the coastal resources has so far underestimated its real contribution to the economy. For example, the fisheries sector depends on the health of coastal ecosystems like coral and mangrove to repopulate fish stocks.

The ~~Second~~ Third National Communication cites marina and tourism development as a stressor on coastal resources through poor infrastructure development, damage to beaches and improper waste disposal (especially sewage). The Ministry of Tourism have begun implementing a plan of sustainable tourism, although these measures are unlikely to respond to long term changes given the advanced state of degradation in some areas. Conversely, the tourism sector in Antigua is particularly sensitive to climate variability and relies heavily on the natural environment’s general appeal to attract visitors.

The direct implications of climate change on tourism in McKinnon’s pond and Runaway Bay will likely be increased erosion and potential harm to infrastructure. Sea level rise is a particular concern given the geography of the area, the predisposition to flooding and the degraded coastal ecosystem. Hydrological features present at McKinnon’s Pond, acting as a drainage basin, hydraulics of the local stream, low elevation, sedimentation and propensity for flooding contribute to the exposure of the area to more risk to sea level rise. The document specifically refers to the McKinnon’s Pond areas saying:

“At one time the premier resort zone in the country, Dickenson Bay/Runaway

Bay has lost much of its environmental quality with some of the damage caused by land and resource use practices in adjacent areas. However, an acceleration of beach erosion, at Runaway Bay in particular, has followed the passage of hurricanes adversely affecting its tourism potential."[53]

The ~~Second~~ Third National communication recommends several adaptation options including: restoring damaged or destroyed coastal ecosystems, construction of coastal engineering structures and public education and awareness programs. Further, it states that it will be necessary that the various entities involved in coastal zone management cooperate with a coherent coastal planning and policy framework in mind. Another priority is 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"* [54]This is particularly relevant to the community of Yorks who experience persistent flooding during heavy rainfall (as a result of blocked drains and/or inadequate infrastructure). Furthermore communities must be made aware of potential climate impacts in order to promote co-operation with planning authorities and potential allow for local co-benefits to emerge.

Essentially, the McKinnon's Pond rehabilitation project is aligned with the priority measures described in Antigua and Barbuda's Second National Communication, these are: adaptation infrastructure development, coastal protection measures and measures for strengthening capacity and public awareness for responding to the impacts of climate change.

Sustainable Island Resource Management Zoning Plan (SIRMZP 2012)

The Sustainable Island Resources Management Zoning Plan acts as a progressive development of the original National Physical Development Plan and was a product of the aforementioned Sustainable Island Resource Management Mechanism. The SIRMZP arose out of extensive consultation through the Core Zoning Plan Committee comprising of various stakeholder interest groups included government departments, agencies and NGO's. 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. It should be noted that the SIRMZP only mentions climate change in the Plan twice. The Plan includes 5 goals, each with their own activities and indicators, they are:

[53] Government of Antigua and Barbuda, Second National Communication, pg. 173
[54] Government of Antigua and Barbuda, Second National Communication, pg. 261

- Maintain and Enhance Ecosystem Integrity
- Foster Economic Development and Engaging Livelihoods
- Enhance Livability
- Improve Accessibility
- Promote Efficient and Effective Governance

The Plan proposes additional protection measures in various vulnerable areas of Antigua, including McKinnon's Pond based on "bio-quality value" (SIRMZP, 2012, 39). The benefits of mangroves are emphasized specifically their beach and land stabilization properties as well as providing a habitat for various migratory birds and spawning marine life, protection for fisherman's boats, and as a buffer from waves during storms and hurricanes. The Plan goes on to suggest that mangrove areas are avoided as sites of further development requiring a full scale Environmental Impact assessment for any clearance. This would be carried out using a 'reef-to-ridge' approach which takes "the direct and indirect effects of effluents and sedimentation on riparian vegetation, coastal water quality and other critical biophysical resources" (161). As a result of this Plan a Watershed and Coastal Zone Management Committee has been formed in order to address drainage issues while another task set included the development of environmental conservation education programs.

The plan presents an opportunity to restrict development that may have a detrimental effect on the fragile ecosystems like McKinnon's Pond. The Planning Act of 2003, whose authority underpins SIRMZP, legitimates ecosystem protection, in addition to the construction of infrastructure which prevents the degradation of these ecosystems.

Physical Planning Act (2013)

The Department of Environment in Antigua and Barbuda is in the process of formulating a draft policy aimed at addressing the adverse impacts of climate change on the coastline and the watersheds[55]. In addition, the Draft Environment Protection Management Bill, which was initially developed in 2005, was presented before cabinet in September 2013 for enactment[56] .

In the absence of a specific statutory basis of requiring an Environmental Impact Assessment (EIA) in Antigua and Barbuda, a new Physical Planning Act has been prepared and formally established an EIA process[57]. For the integration of climate

[55] UN-HABITAT, 2011
[56] Gore-Francis, 2013
[57] CARICOM, 2005

change adaptation into the EIA process in Antigua and Barbuda, some of the recommendations included:

- revision of the definition of EIA under the Physical Planning Act to adequately consider climate change;
- the establishment of a formal EIA process to provide clarity and certainty and also a framework for regulation and management of the EIAs;
- provision of comprehensive criteria for screening and scoping environmental impact ensuring that significant climate change impacts are identified;
- provision of clear guidelines for the preparation of the EIA report confirming that climate change impacts are addressed and
- provision of a clear criteria governing the EIA experts guaranteeing that the individuals possess the required qualification, technical ability and knowledge on climate change and adaptation policies and measures[58]

Environmental Protection and Management Act (EPMA) of 2015

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

Sustainable Island Resource Framework Fund (SIRF Fund)

The Government of Antigua and Barbuda is developing a national fund, the Sustainable Island Resource Framework (SIRF) Fund, to serve as the primary channel for environmental, climate mitigation and adaptation funding from international and domestic sources. Legislated through the EPMA of 2015, the SIRF Fund will provide the framework financial mechanism to implement the Act, and is the primary means for implementing Antigua and Barbuda's ambitious climate action targets. By serving as the National Implementing Entity for all environmentally-related finance and technical assistance, the SIRF Fund will catalyze internal and external funding sources to enable the country to meet its climate and sustainability goals in a coordinated, systematic and cost-effective manner.

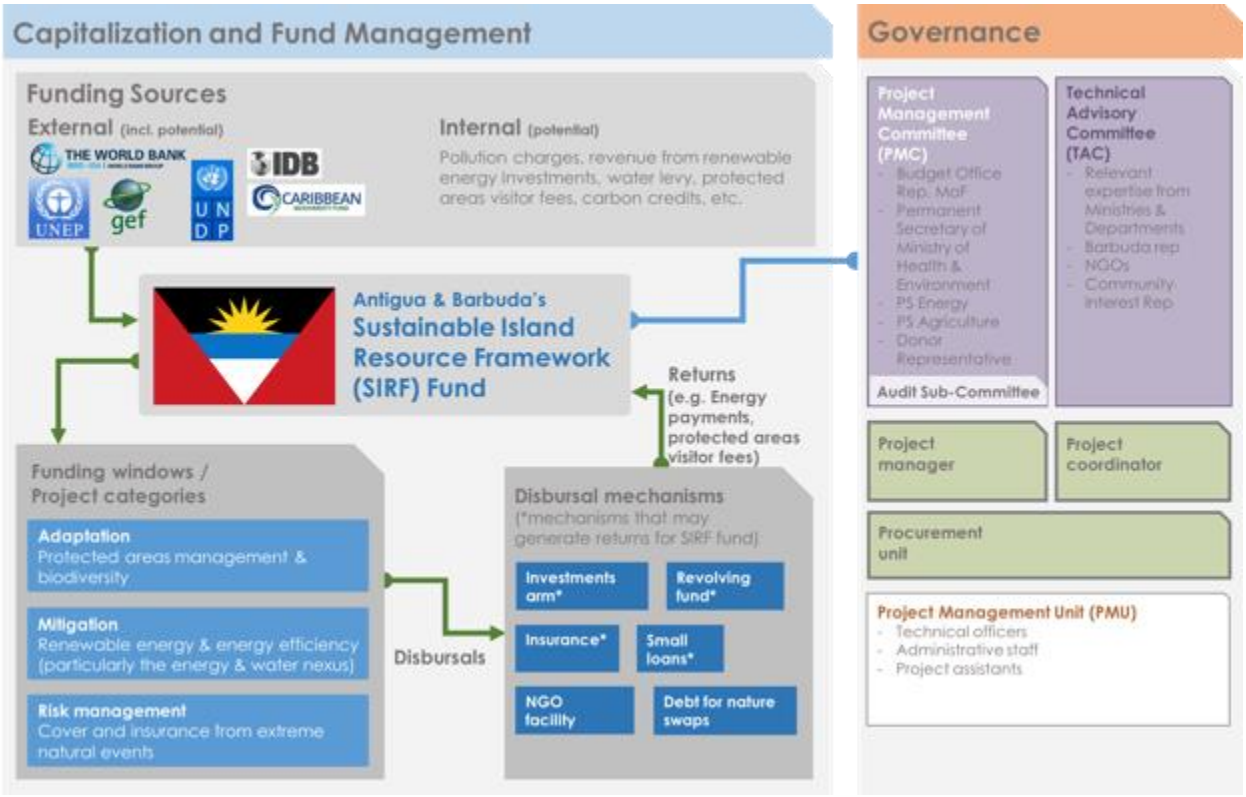
The SIRF Fund will be capitalized through three main vehicles:

- **International & regional funding agencies** such as:
  - Green Climate Fund
  - Adaptation Fund
  - Global Environment Facility (GEF)

[58] CARICOM, 2005

- Bilateral and other sources

- **Investment in renewable energy** with an expected US$ 15 million in annual savings
  - Each MW of solar PV capacity installed is estimated to save A & B about XCD 1.6 million (US$ 0.61 million) annually.
  - SIRF intends to install about 20 MW of capacity to generate electricity for sale to APUA and an additional 5MW to offset water generation cost and government electricity usage. This will save an estimated US$ 15 million annually (25 MW * US$ 0.61 million / MW).
- **National funding sources**: The SIRF Fund will also be capitalized by levies and fees, including, but not limited to:
  - Fee for tourist visits to protected areas
  - Water levy to pay for protected areas/watershed/waterways
  - Carbon tax to pay for adaptation (priority: drought / hurricanes / insurance for uninsurable areas)
  - Interest on repayments



Proposed Design of Antigua and Barbuda's Sustainable Island Resource Framework Fund (SIRF Fund)

National Integrated Water Resources Management (IWRM) Roadmap and National Adaptation Strategy and Action Plan to address Climate Change in the Waters Sector in Antigua and Barbuda (NASAP)

Antigua and Barbuda, already prone to drought, have experienced the first signs of changing climate in the increasing number of dry periods with more intense precipitation events. In order to build resilience to future impacts Antigua will need to conserve water resources while similarly upgrading infrastructure to cope with extreme events. The Integrated Water Resources Management Vision was agreed after a three years of consultation with stakeholders in Antigua and Barbuda as part of the Integrating Watershed and Coastal Area Management in Caribbean Small Island Developing States (GEF-IWCAM). The objective of this project was to encourage integrated approached to the management of watershed sand coastal areas in several Caribbean island states. The Vision aims at "ensuring the sustainable management and protection of the water resources and watersheds of Antigua and Barbuda for the equitable, economic social and environmental benefit of our people and natural resources"[59] Within the management plan ten policy elements are proposed, the most relevant are listed below.

a) Promote climate adaptation water management across all stakeholders to improve the national capacity to mitigate droughts and floods.
b) Establish and implement effective wastewater management for urban and rural stakeholders to protect the terrestrial and marine aquatic environment;
c) Establish and implement integrated watershed planning and management

The IWRM plan provides the framework to establish a water resources governance process. The plan eventually contributed to the National Adaptation Strategy and Action Plan to Address Climate Change in the Water Sector in Antigua and Barbuda published in 2014. This Plan is includes an extensive study of all available past, present and future projections data on the water sector. Although data is sparse in some areas and regionally downscaled models of projected changes in precipitation do not provide a solid evidence base, a key projection points to the potential impacts of heavy rainfall during extreme weather events. Floods area most likely during hydrological events like hurricanes and tropical storms and are generally predicted to become more intense. Adaptation strategies are necessary to prepare for impacts from these events. The restoration and resilience of McKinnon's Pond is informed by two outcomes from this proposed strategy specifically.

1. Improved physical/ infrastructural technical and institutional capacity for the water sector through which drainage systems will be improved and redesigned, and water management policy established. The McKinnon's Pond project will be vital in demonstrating eco-system based adaptation interventions as best practice in water sector management.

[59] GOAB, 2011, 2 (IWRM Roadmap)

2. Enhanced and improved Training and Awareness in relation to Climate Change and the Water Sector which aims to change the attitude and behavior of people and institutions. Capacity building in local government and planning sector is necessary in order to improve the regulation and implementation of adaptation interventions in the Yorks community and McKinnon's Pond. Planners and community members are not equipped to potential regulation measures.[60]

National Poverty Strategy

The National Poverty Reduction Strategy (NPRS)[61] in 2010 served as the strategic framework, which would guide the macroeconomic, structural and social policies and programs that would be pursued from 2011-2015. The idea was that the NPRS would provide the basis for National Economic and Social Transformation (NEST) Plan 2010-2014 by refining key strategies that are in place, identifying the gaps and supplementing the existing intervention with new ones[62] . NEST is considered a more comprehensive approach to poverty reduction in Antigua and Barbuda, which was developed with the aim of economic rebalancing[63].

Antigua and Barbuda National Strategic Biodiversity Action Plan (2014 – 2020)

The National Strategic Biodiversity Action Plan acknowledges the important role that Antigua and Barbuda's natural biodiversity play in the social and economic development of the country. The Strategy is framed around the conservation, awareness and enforcement of regulation around biologically diverse areas in the islands. The Strategy is modelled on the objectives of the UN Convention for Biological Diversity. The Strategy highlights the current, usually human driven, threats presented by the tourism industry, especially on coastal ecosystems like mangroves and coral reef. Four primary objectives of the NSBAP and their activities aligned to our own project are listed below:

- A national system, including protected areas, for the management and conservation of biodiversity conservation is developed and established
    - Establish a Protected areas System for terrestrial and marine conservation in Antigua and Barbuda
    - Identify and develop management plans for critical habitats and species (terrestrial and marine) that may be used sustainably
- The capacity of governmental natural resources management institutions, as well as non-governmental organization, to support the objectives and achieve

[60] GOAB, 2011a (IWRM)
[61] GOAB, 2011b (Poverty Strategy)
[62] GOAB, 2012a
[63] GOAB, 2012a

the overall aim of the NBSAP is strengthened
    - Develop and enhance the capacity to manage protected areas identified for sustainable use together with their associated biodiversity
- Ecological legislation that provides adequate protection of biological diversity is developed, improved, enacted and enforced
- Public awareness of environmental issues, ecological education and public participation in decision-making is strengthened.
    - Increase public awareness of the benefits to be derived from biodiversity

The restoration of McKinnon's Pond fits neatly under these objectives. Although on a local scale, the project will act as a pilot project to test the recent improvements in planning regulation and ecological awareness. It is clear, through the National Strategic Biodiversity Action Plan.

Global Climate Change Alliance (GCCA) Sustainable Land Management and Climate Change Adaptation in the Eastern Caribbean

The GCCA project is organized to contribute to the achievement of the provisions enshrined in Article 24 of the Revised Treaty of Basseterre, that each Protocol Member State shall implement the St. George's Declaration of Principles for Environmental Sustainability which seeks to, inter-alia, achieve the long-term protection and sustained productivity of the region's natural resource base and the ecosystem services it provides.

The overall objective of this OECS Project for Island Resilience (iLAND), of which this contract will be a part, is to improve the resilience of the region's natural resource base to the impacts of climate change through the following two components:

1. Effective and sustainable land management frameworks and practices; and
2. Specific physical adaptation pilot projects in relevant areas or sectors

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. The relevant targets are:

- By 2025, increase seawater desalination capacity by 50% above 2015 levels.
- 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.

- By 2030, all remaining wetlands and watershed areas with carbon sequestration potential are protected as carbon sinks.

E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

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. Relevant activities listed in the Third Schedule that require an EIA, as relevant to this project, include:

- A wastewater treatment, desalination or water purification plant; and
- An operation involving land reclamation, dredging and filling of ponds.

The Act further provides the timing and responsibilities of the various stakeholders throughout an EIA process. Additionally the work will have to be in line with the guidance provided in the Sustainable Island Resource Management and Zoning Plan of 2012 as well as the Environmental Management and Protection Act of 2015. Best international standards will also be respected in the development and rehabilitation of coastal protection structures.

In order to comply with these relevant national technical standards, a development application for the project design will be shared with the Development Control Authority (DCA) by the National Implementation Agency and the National Executing Agency, which is the Department of Environment. An EIA will be required as part of the development approval process, for which the Department of Environment is responsible for identifying Environmental and Social Safeguard risks and recommending mitigation measures to the risks. Technical staff at the Department of Environment are trained and qualified to direct safeguards in this process. The development approval process takes approximately 3-5 months, based on the Department's previous experience, and the EIA process takes an additional 3-5 months.

Technical standards for the interventions fall under the Public Works Department (PWD), however current standards are not climate-resilient. For example, the PWD builds infrastructure to withstand 2 inches in 24 hours, however current extreme rainfall events as well as climate modeling scenarios for Antigua and Barbuda demonstrate

that this threshold is too low. The capital city of St. John's received 1 to 2 inches of rainfall in 45 minutes on 15th October 2015, causing severe flooding. As such, the building code and infrastructure guidelines are in the process of being updated through the parallel Global Climate Change Alliance project (see Part II: F). The Department of Environment will ensure alignment with similar ongoing parallel processes, and align tech standards with these initiatives.

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 (see Table 3~~XX~~).

F. Describe if there is duplication of project / programme with other funding sources, if any.

This project does not duplicate other efforts. However, it is aligned with the Department of Environment's work programme and therefore complementary with several parallel and synergistic initiatives.

This AF project is designed on the basis of knowledge, studies, and analyses provided by previous and ongoing related projects and programs. As such, it benefits from considerable input from stakeholders and processes. Complementary initiatives with linkages and synergies to this project include:

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 XX. The proposed AF project will use the adaptation window of the SIRF Fund to distribute and manage the small 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 finalize a local area development plan for McKinnon's Pond, building on previous work and participatory processes, and the plan will be approved by Cabinet. The project will implement physical interventions along Friars Hill road, in the upper area of the McKinnon's watershed. The SCCF project will pilot cost-effective adaptation interventions – focused on ecosystems – through the 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 (approx. US$ 1 million).

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

The regional GEF project titled **Integrating Water, Land and Ecosystems in Caribbean Small Island Developing States** (IWEco) (2014–2019) builds on the "Integrating Watershed and Coastal Area Management (IWCAM) in the Small Island Developing States of the Caribbean" project, which strengthened and mainstreamed water resource management in the national development framework. In Antigua and Barbuda, the IWEco project will target land degradation through the development of financing mechanisms – a revenue-generating wastewater treatment and reuse facility, and oil recycling – to

promote and support sustainable land management activities. These financing mechanisms will support environmental management activities under the SIRF Fund. The IWeco project is a complementary initiative to the proposed AF project as its sustainable land management interventions, and in particular the wastewater treatment facility, is located in the vicinity of McKinnon's Pond, and will assist in addressing the drivers of degradation at the Pond.

Antigua's **Sustainable Island Resource Management Mechanism (SIRMM)** was the product of a GEF funded infrastructure project and the regional Integrated Watershed and Coastal Areas Management project. The project was led by the former Environment Division in the Ministry of Environment and Planning, running from 2011 – 2012, before it became the Department of Environment. Overall, the main aim of the project was to establish a comprehensive policy and institutional approach to the management of island biodiversity. The projects had several concrete outcomes.

- Easy and reliable access to information for Environmental Management by all stakeholders
- A Sustainable Island Resource Management Plan Developed and in Place
- Policy and Institutional Reforms to provide a framework for implementation of SIRMM Plan
- Requirements for the implementation of SIRMM Plan in place as well as mechanisms for capture fore lessons and best practice

A wastewater management strategy draft was developed in consultation with stakeholders, particularly in the Northw ~~W~~est tourism zone with the pilot area focused around McKinnon's Pond. Secondly, a program to implement a pilot waste water management software system was taken up three hotels near McKinnon's Pond to collect, monitor and disseminate data. This database is intended to facilitate monitoring and evaluation by several Government Authorities thereby encouraging cross-ministerial cooperation in wastewater management and was implemented through a public-private partnership of the Central Board of Health, and the Department of Environment and the local tourism sector. The software was provided in partnership with the University of the West Indies. The students involved in the software design and delivery also lead training programs for government personnel in GIS monitoring methods. Finally, the project resulted in a pilot sewage treatment plant on the North West coast in order for residential and commercial entities in order discourage improper disposal of waste.

The Sustainable Island Resource Management Mechanism (SIRMM) Project has as its overall objective the establishment of a comprehensive policy and institutional approach

to the management of island biodiversity. To accomplish this objective one of the main outcomes of this project is the creation of a GIS mapping tool to assist government agencies in the creation and access of up-to-date data on specific environmental indicators. This tool is known as the **Environmental Information Management and Advisory System (EIMAS)**.

The EIMAS was legislated under the Environmental Protection and Management Act of 2015, and is a GIS-based database of environmental information in Anitgua and Barbuda. The potential of the EIMAS is immeasurable. This tool will have the ability to assist many government agencies in fulfilling their mandates at much greater efficiencies. Knowing spatially the location of the key geographic and environmental features of Antigua and Barbuda is hence imperative in making life long decisions relative to the sustainability of the country's natural resources. This will act as the catalyst for spatial decision making in the future and will prompt the government to make wiser decisions in fostering sustainable development.

Finally, the Department of Environment will be required to notify the Public Investment Program about this AF project. The Investment Program was introduced into Antigua and Barbuda and many of the other islands within the Caribbean, with the assistance of the World Bank and the European Union to assist in the prevention poor planning and coordination with the capital budget process in developing countries.

The Department capitalizes on the Public Sector Investment Program (PSIP) as a means of appraising project proposals. This process not only allows for an independent appraisal, but it also serves as a guide to ensure that the Department's projects are aligned with National priorities.

Implementing agencies, like the Department of Environment, are required to complete the PSIP proposal form when new projects have been funded or are about to be funded. The form was designed to dissect the project in an effort to highlight the principle outcomes and strategies, specifically, to determine what socioeconomic benefit the project will bring to Antigua and Barbuda, review project cost requirements including co-financing, critically assess the budget and a strategic outline of how the project will be implemented.

The combined projects will look at the upper watershed (SCCF), the middle and end of the watershed (AF) and the pollution (IWEco) within the McKinnon's watershed area. The projects are also building the capacity of the SIRF Fund to disburse much-needed small loans to households (the "small-scale" private sector) to meet the new building code requirements that are being revised to enhance resilience to climate change.

The proposed AF project will build on the relevant projects and funding sources outlined above through the Department of Environment's collaborative implementation mechanism – the Technical Advisory Committee (TAC) (see Table 3 and Figure 8 below). A representative of each relevant agency, NGO and other stakeholder is represented on the TAC, which meets monthly to review project process, approve TORs, and other duties. This arrangement is designed to pool knowledge resources and enhance synergies across agencies and projects. Letters of Co-Finance will be sources from the key complementary initiatives and key partners.

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The McKinnon's Pond Restoration and Resilience Project will produce outputs ~~which~~ that will be used in communicating and sharing knowledge to promote the ecosystem~~-s~~ based adaptation approaches more widely within planning and development in Antigua and Barbuda, regionally, and with small island developing states globally. The medium for communicating these outputs include the following:

- The Department's website is managed by a dedicated officer that can speak several languages. The website is in English, and lessons learnt from other regional and countries can be adapted and communicated as well
- The Department has a active facebook page, twitter account, and other media to get the word out, including regular TV and radio interviews
- The Department will be using the Botanical Gardens as a place to show case projects and programs, including activities under this proposed AF project
- The AF project will utilize project briefs and powerpoint presentations targeted at the Cabinet and for Ministers, to communicate lessons learned at the decision-making level
- 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 are brought into projects through workshops and sub-contracts for project implementation. The use of the small grants as a means to implement the project will also be explored further during the project development phase, 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. To facilitate this, one video and monthly photo blogs of project activities will be developed for sharing with an international audience. This will be accommodated through partnership with an NGO, which has successfully been done under other such projects.

~~In a~~In terms of content, all three components include valuable information that will be harnessed for lessons learned ~~various assessments will be~~and publicized~~shed~~. Activities that the Deparmtnet will target for lessons learned include:

- The transformation of McKinnon's Pond into a riparian buffer zone and recreational area under Component 1 will be documented and publicized as part

of the official launch of McKinnon's Pond as a "critical wetland" per its designation under the Environment Act.1.1 entails conducting a

- The flood capacity assessment and flood management strategy that will provide the foundation for Component 1 and 2 and provide important understanding of the value of McKinnon's Pond's flood mitigation capacity. The assessment will be made publically available through the Department's website and contribute to growing the availability of environmental data in Antigua and Barbuda, which is scarce (Gore-Francis, 2014).
-
- The innovative financing mechanism under
- Component 2 is anticipated to produce a suite of new adaptation strategies, which will be valuable content for the sharing of climate solutions, for example best practices and technologies such as rainwater harvesting and storage, mosquito screens, hurricane shutters, roof security and septic construction and maintenance. The use of particular types of detergents may also assist in maintaining a healthy ecosystem, among other best practices
- .1.1 entails producing a flood management strategy. This strategy will be an important part of building resilience in the McKinnon's Pond Restoration and Resilience communities, acting as a commitment to the maintenance of the flood mitigation infrastructure and providing a platform for replicability in other flood prone communities.
-
- The objective of Component 3.1.1 is the creation of anThe EbA Local Area Plan under Component 3 . This plan is intended to provide a template, and evidence base, for the roll-out of an ecosystems based plan to be implemented in other ecosystems and vulnerability in Antigua and Barbuda by influencing current planning approaches. It is a document that will outline and help enforce the regulations and policy regarding planning and development in the long term for McKinnon's Pond and the surrounding communities. Both the flood management strategy and the local area plan will be disseminated to the relevant communities through locally appropriate communication channels – social media, e-i.e. Posters, brochures, radio and social media. Informative signs will installed at the project site, as it is a high-use area.
- Information relating to scope of the project, community participation measures and the role of the community in the restoration of McKinnon's Pond will be communicated throughout the project and the community will be updated throughout the course of the project
- Community members and schools will be engaged under Component 3 to assist with M&E of project interventions through the development of a "citizen science" field-based science program.

In addition, Component 3 is centered on awareness raising and capacity building. Information will be shared with all stakeholders to highlight the relationship between land use and ocean, ecosystem services and planning for adaptation during workshops and consultations. This will involve communicating technical information to various different sectoral representatives and hopefully enhance the adaptation mainstreaming

effort more generally. In some cases this information will be used to train planners and transfer knowledge on the principles of ecosystems based adaptation (Component 3.2.1).

The final evaluation will be shared with relevant policy makers, stakeholders, community members and made accessible to the general public.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

The mandate of the Department of Environment is set out in several policy and action documents. These are the National Environmental Management Strategy (NEMS), the National Biodiversity Strategy and Action Plan (NBSAP), National Communications, and the UNCCD National Action Plan (NAP). These documents are designed to identify programs and projects for implementation for the Department of Environment as well as several other agencies. The selection of projects is based therefore on not only the needs of the country but also the ability of the Department as well as the other Agencies to implement them.

Adaptation Projects are normally identified in the National Communication for Climate Change as well as the NAP and the NBSAP. Projects are normally extracted from these documents, which have undergone extensive stakeholder consultation. Projects can also be identified during national consultations as seen in the TNC Inception Workshop (2013) and the Consultation on the UNEP-ROLAC Funded Vulnerability and Impact Assessment REGATTA Workshop (2014) reports where participants identified the key areas for action.

Specific to this proposed AF project, consultations with communities, vulnerable groups, including women, and civil society organizations shaped the selection of project activities through surveys and consultations initiated under the IWCAM project[64] and were subsequent activities under the REGATTA project, both of which included household surveys, workshops to prioritize and rank interventions, and general public awareness about climate impacts and adaptation measures.

In a social survey on climate change awareness in Yorks, one of the McKinnon's communities, under the REGATTA project, which was conducted using a

[64] IWCAM, 2012. Willingness to Pay for Wastewater Treatment Services, Antigua. Project Deliverable.

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 suggests that the community is aware of the issue of climate change, and supports the assumption that this AF project will be well received in the community, given all of the foundational work that has taken place in the area.

This AF project draws from extensive national and local stakeholder consultations that were conducted throughout the identification, development and project approval phases of the SCCF project, which is thematically similar to this AF project. Consultations with stakeholders included:

- An inception workshop, held in April 2014
- A validation workshop held in August 2014
- Multiple meetings with individual stakeholders, which took place between April and August 2014.
- The purpose of the stakeholder consultations was to identify:
    - Appropriate interventions and intervention sites based on the vulnerabilities and requirements of local communities
    - Ongoing projects relevant to the activities of the project; and
    - National and local government authorities relevant to the activities of the project.

These consultations benefited from strong and cross-sectoral stakeholder engagement. For example, the following entities participated in the SCCF Inception Mission:

- Gilbert Agricultural and Rural Development Centre Non-governmental Organization
- Women Against Rape (WAR) Non-governmental Organization
- GEF Small Grants Program Multilateral Institution
- International Institute of Caribbean Agriculture Multilateral Institution
- P&LS Electrical Engineer Private Sector/Community
- Gaynor’s Farm Private Sector/Community
- Environment Tourism Consulting Private Sector
- Antigua and Barbuda Investment Authority (ABIA) Government
- Ministry of Agriculture Government
- Antigua Public Utility Authority (APUA) Government
- Development Control Authority (DCA)Government
- Development and Planning Unit Government

- Department of Environment Government
- Extension Division Government
- Fisheries Department Government
- Ministry of Finance Government
- Ministry of Works and Transport Government
- Public Works Department (PWD) Government
- National Office for Disaster Services (NODS) Government
- Forestry Unit Government
- Sustainable Tourism, Ministry of Tourism Government

As a result, the SCCF project is aligned with national priorities, and will set the stage for efficient and synergistic implementation of this AF project.

Recent private, public, and civil society consultations also took place through the development of Antigua and Barbuda's Intended Nationally Determined Contribution (INDC) on adaptation and mitigation targets (http://bit.ly/1M40gsG), as well as Cabinet approval of targets. INDC targets, such as Adaptation target #2, "By 2030, all buildings are improved and prepared for extreme climate events, including drought, flooding and hurricanes," and Adaptation target #4, "By 2030, all waterways are protected to reduce the risks of flooding and health impacts," align the AF project to national priorities.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Component 1: Eco-system based adaptation approach to rehabilitation of McKinnon's Pond as a flood control mechanism for the McKinnon's Pond watershed and to improve local biodiversity.

Baseline
The local vulnerability assessment carried out in Yorks and McKinnon's Pond[65] indicated that the community is vulnerable to flooding during intense precipitation events as a result of inadequate wastewater infrastructure, the degradation of McKinnon's pond and because of the increased development within the drainage basin around these communities. Flood management practices are needed to build resilience in the area by preventing further damage to infrastructure and preparing for future climate change impacts.

The pond is fed by a river in the southeast corner which runs from the islands interior

[65] Harcon Global Consulting, 2012

through the local communities of Yorks and McKinnon's Pond and finally drains into McKinnon's salt pond. The salt pond has been severely degraded as a result of poor planning regulation and uncontrolled pollution and run-off from the main land. Exchange of water from the ocean has been cut off following the construction of a road over the western side of the pond. The pond currently experiences climate extremes which were not as frequent before 1968. The demand for water and increases in drought has led to a decrease in the fresh water replenishment of the pond. The loss of fresh water input, increasing salinity and temperature rise has led to extreme variations in the pond as well as the pollution from direct sewerage pumped into the pond and from the stream, and increased sediment from nearby construction and residential area.

In the 1960's the pond had 20 hectares of mangrove coverage. Approximately 70% of this mangrove coverage has been lost in the period from 1968 until the early 1990's, and now comprises less than 1 hectare of the pond. This is likely due to the varying quality of the environmental factors over this time. In addition to minor oil leakages and low water levels, the pond has historically been polluted by sewerage and agricultural runoff which create high nitrate levels in the pond that have a direct influence on the viability of the ecosystem. Finally, the presence of marine and bird life has diminished dramatically over the last four decades likely due to the impacts of the factors listed above. There are few instances of bird life along the periphery of the pond[66].

Additionality

The restoration activities in McKinnon's Pond watershed will create a buffer zone for runoff thus preventing the negative impacts of flooding during severe hydro meteorological events. The waste water treatment of the pond will be enhanced by installing 'floating islands'. Briefly, the natural treatment system would entail designing and installing two artificial 'floating islands' placed near the source of waste water in the Pond, namely the stream mouth at the south-west corner. The islands themselves are made of wire mesh and marine foam, with aquatic plants suitable for the salt pond environment planted over the floating mesh in order for the roots to descend into the water for nutrient uptake Further, the activities in Component 2 will contribute to the restoration of the watershed by reducing pollution to nearshore ecosystems while enhancing the capacity of the Pond to mitigate the effects of flooding.

The overall stability of this ecosystem is in decline. The degradation of the area and the damage caused by uncontrolled development interferes with natural systems and exposes the community surrounding McKinnon's pond to risks posed by climate

[66] Jaques-Whitford, 1998

impacts. There is potential to reverse the degradation at McKinnon's Pond to become a thriving ecosystem once again, and a contributor to the adaptation activities undertaken in the area. This is the best long-term adaptive action as restoring natural ecosystems will enhance resilience and adaptive capacity, averting unnecessary damage from climate change.

Component 2: Redesign and reconstruction of McKinnon's Pond watershed communities' drainage system using sustainable urban drainage systems and rain water harvesting to reduce flooding and improve local infrastructure

Baseline

The primary watercourse that drains into McKinnon's Pond forms part of a drainage basin for the larger North West watershed in Antigua. Hydrological characteristics of these basins have been overlooked in building and other land use practices over the years. Construction and development in Yorks, Upper Fort Road and in industrial areas within the McKinnon's Pond drainage basin has. The rapid development in the area has often been unregulated and has overlooked key hydrological factors impeding natural drainage mechanisms which reduces water infiltration through soil and increases runoff in many critical areas. There are various flood mitigation activities that can remedy the flooding problem around McKinnon's Pond.

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 often unable to service the loan repayments. Consequently, such households are unable to implement the requisite adaptation interventions and remain vulnerable to climate change.

Additionality

Upgraded water courses will use the methods and designs of Sustainable Urban Drainage Systems (SUDS). Sustainable Urban Drainage Systems 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 Pond 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" (Armitage et al., 2012).Thus, the interventions in restoring and upgrading the Upper Fort Road-to-Yorks drainage system will focus on quality, quantity and biodiversity. Although flooding and erosion affect areas surrounding the Pond, this

component will only deal with that which occurs in the residential area from Fort Hill Road, Upper Fort Road, Yorks community and toward McKinnon's Pond. Low cost interventions include the use of filtrating soil and re-establishing natural vegetation in high runoff areas, particularly on slopes. Establishing a 'Green belt' from Upper Fort Road down to McKinnon's Pond 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 in light of climate change impacts.

These interventions will focus on reducing vulnerability of households to the predicted effects of climate change as a result of climate impacts from Upper Fort Road and Yorks, particularly related to flooding and drought. Interventions will be aimed at improving household resilience to these climate impacts through the means of upgrades or repairs. The criteria for approval of applications for funding will then be defined. 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 disbursement of small loans through a Local Resilience Fund among the community. This will involve an extensive study of the current sources of adaptation financing at a household level and barriers to access. 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: Ecosystems based adaptation planning mainstreamed and capacity development used to build resilience for local communities, institutions and relevant stakeholders in order to establish an EbA Local Area Planning framework.

Baseline
The land use management practices in Antigua and Barbuda thus far have failed to protect environmentally sensitive areas and prevent development in areas that already have conservation status. Construction of roads and infrastructure, poor planning practice, increased demand for fresh water resources and hurricanes have contributed to the decline in mangrove cover and riparian vegetation in McKinnon's Pond.

The Sustainable Island Resource Management Zoning Plan for Antigua and Barbuda sets out a plan for the future spatial development on the islands that integrate current

national development priorities over 20 years (2012 – 2022) with sustainable planning principles. The first goal of the plan is to provide protection of critical ecosystem functions and habitats in order to minimize environmental risk and optimize the productive use of environmental resources. The SIRMZP proposes establishing McKinnon's Pond as a protected area in order to reach the objectives of sustainable natural resource management. Ecosystems based adaptation approaches are justified in light of national development strategies and current vulnerabilities. SIRMZP refers to the need for 'Community Plans' produced on a local level and 'Ridge to Reef Planning Units' to control development around watersheds in order to evaluate the alignment of development plans proposed for the local area with the priorities of maintaining natural drainage flows and ecosystem services in order to evaluate the alignment of development plans proposed for the local area ensuring natural drainage flows and ecosystem services are maintained. [67]

As yet there has not been an opportunity to implement to the guidelines proposed by the SIRMZP.

Additionality

Using an ecosystem based approach to restoring the riparian ecosystem will involve the community and local stakeholders in order to ensure the viability of the restoration in the long term. Various factors will need to be coordinated in order to implement the MPWRR project. The watershed restoration project will require formal planning structures and monitoring frameworks in place in order to avoid future improper construction and general degradation which increase the likelihood of heavy rainfall events posing a risk on the community. Further, the process to formally integrate EbA approaches to planning and development can be piloted with the MPWRR project. Specifically, the McKinnon's Pond development area will be designated as a Special Development Area which will restrict development to parameters which will be determined by the sensitivity of the natural and artificial watercourse system and the development's potential to harm the ecosystem of McKinnon's Pond.

In order to reverse the trend towards ecosystem degradation new planning guidelines will deter development in areas with population density is already unsustainable or having or predicted to have an adverse effect on ecosystems biodiversity. The Ecosystems based Adaptation Local Area Plan will act as a regulatory framework and set of guidelines for mainstreaming adaptation, ecosystem services and resilience into future planning and development around McKinnon's Pond on the north west coast of Antigua. This plan will serve as an example for other similar interventions which will be initiated across Antigua and Barbuda.

[67] GENIVAR, 2011

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.

The foundation of the McKinnon's Pond Watershed Restoration and Resilience project is based on community and national consultations. The long term sustainability of this project rests on the established buy-in of community members and the political will to take the project forward.

The government agencies involved in the project will be responsible for carrying project interventions beyond the lifetime of the project. Key components and responsibilities are outlined below.

Table 2. Project components/outputs and responsible government authority beyond the lifetime of the project

Project Output	Responsible Government Agency
Output 1.1.1 – Flood management strategy	National Office of Disaster Services (NODS)
Output 1.1.2. – Ecosystem services valuation and methodology	Ministry of Finance; Department of Environment
Output 1.1.3. – Ecosystem-based rehabilitation and restoration	Department of Environment; Dunbars Lab
Output 1.1.4. – Installation of natural wastewater treatment systems	Central Board of Health; Department of Environment
Output 1.2.1. Eco-tourism and recreational amenities	Department of Environment; Ministry of Tourism
Output 2.1.1. - Flood and drought management strategy	Development Control Authority; NODS; APUA; Department of Environment
Output 2.1.2. – Upgrade watercourse infrastructure	Public Works Department, Central Board of Health, Department of Environment
Output 2.2.1. – Small community loans	Ministry of Finance; Department of Environment; Social Development Division
Output 3.1.1. –Ecosystem-based Adaptation Local Area Plan	Development Control Authority; Department of Environment
Output 3.2.1 – Cost-benefit Analysis of Adaptation	Ministry of Finance; Department of Environment

The needs of the community living in the McKinnon's Pond watershed have been

integrated into this proposal. There communities continued comments and feedback are an important function of the consultations that will take place periodically throughout the project. Community consultations will take place as part of Output 1.1.3, 1.1.4 and 3.1.1. These consultations, and some workshops, will take place at the start of the project, in the middle of project implementation and preceding the terminal project evaluation for feedback to be integrated and to elicit ideas directly from community groups. Output 3.2.2 involves a direct communication plan which will aim to educate the community about specific ecosystem based adaptation requirements and community responsibility in the maintenance of the natural environment in the watershed. This iterative, participatory approach reflects the principles of ecosystems based adaptation and is aligned with Principle 10 of Rio+20, which asserts that environmental matters are best handled with participation of all concerned citizens. Consultation feedback reports will be recorded and used in the monitoring and evaluation process.

Building technical and decision-making capacity at both a national and local level will empower planning personnel and government representatives to take the project objectives forward. The aims established at the start of the project will ultimately be carried forward by these stakeholders. Component 3 of the MPWRR project entails i) the design and implementation of an official EbA Local Area Plan; ii) Local capacity building to implement the EbA Local Area Plan and, iii) Awareness raising and training. Developing capacity of key personnel in relevant institutions through professional development and participatory workshops will provide a skills base that will enable proactive, responsive decision making to planning and adaptation interventions. In addition, by developing institutional capacity of particular stakeholders in this way the MPWRR project will create sustainable processes and mechanisms to implement adaptation interventions in Antigua and Barbuda. This will feed into the broader National Adaptation Plan process in Antigua and Barbuda by strengthening coordination of medium- to long-term planning for ecosystems based adaptation.

Providing micro-loans to vulnerable households will support small but concrete adaptation interventions from the community level. This empowers the community to have a degree of independence in adaptation decision making and therefore requires households to engage fully in the long term aims of the project. In establishing an ecosystem based adaptation loan mechanisms in partnership with local banks and credit unions (under output 2.2.1) the project impact will have long lasting impacts, enabling access to finance which may reduce future unforeseen risks.

Component 2 and 3 of this project makes provision for the improved regulation and implementation of ecosystem based adaptation planning. The planning guidance and EbA Local Area Plan serve to inform national and local planning personnel who will continue to rely on these official texts in future watershed development. The EbA Local

Area Plan and flood management strategy also serve as modes of accountability in cases where guidelines are contravened. Accountability will reported by long term monitoring activities and the adherence of planning in the watershed and the activities of the community, with the Citizen Science programme being a key aspect of ongoing maintenance and monitoring.

K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

Impacts are summarized below, and detailed more thoroughly in the Risk Registry in Annex 6, which proposed initial mitigation measures for identified risks.

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	~~For direct beneficiaries of micro-loans, the project will develop access criteria aligned guided by GEF's ESS framework.~~ 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 reviewed 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 n 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	~~The M&E framework includes gender-disaggregated indicators.~~	Local area vulnerability studies have suggested a high prevalence of female-headed households in the McKinnons area.[68] 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 consent of the property owner. The boardwalk will have to boarder private properties, and these owners may not want to see increased activity around their properties 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

[68] CARIBSAVE 2015. Local area Vulnerability Impact Assessment for McKinnon's Pond/Yorks New Extension, Cashew Hill, and West Palm Beach. REGATTA Project.

Conservation of Biological Diversity	The project will include habitat and species protection, restoration, and monitoring activities to support the CBD.	
Climate Change	Through ecosystem-based adaptation, 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.
Pollution Prevention and Resource Efficiency	The project targets resource efficiency and pollution prevention through a citizen science monitoring programme, and wetland restoration.	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 and monitoring in communities at high risk to health hazards.	Waterway works may increase mosquito habitats, which carry vector-borne diseases.
Physical and Cultural Heritage	The project includes activities to restore and protect a habitat as a recreational area. No cultural heritage sites are located in the project vicinity.	
Lands and Soil Conservation	The project will protect critical wetland habitat and through mitigating flood risk will promote soil conservation.	

PART III: IMPLEMENTATION ARRANGEMENTS

1) Describe the arrangements for project / programme implementation.

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. All of the officers are experienced in project development, public consultations and are familiar with the other agencies and have developed long-standing relationships with their peers in other government agencies.

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). Table 3 summarizes the purpose and operations of each entity.

Table 3. 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.
CARIBSAVE	The CARIBSAVE Partnership (**Carib**bean **S**ectoral **A**pproach to **V**ulnerability and Resilienc**E**) is a regional not-for-profit organisation with its Headquarters in Barbados, an office in Jamaica and operational staff across the Caribbean. CARIBSAVE's main services are providing innovative, dynamic and evidence-based tools and solutions for innovative policy and practice to address climate challenges. CARIBSAVE will provide support in the results based monitoring and	CARIBSAVE will meet with the TAC annually will provide communications and reporting support on a quarterly basis.

	evaluation, and communications component of the MPWRR project	

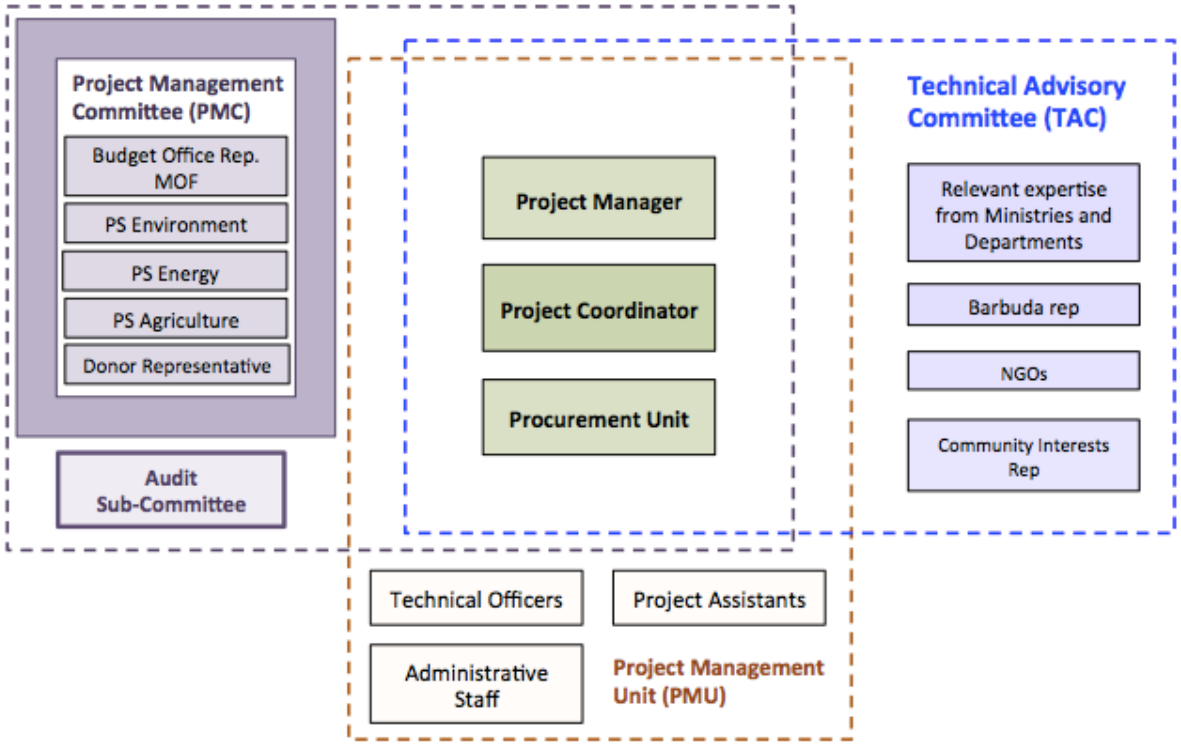


Figure 8: Diagram of project management arrangements

The Department has extensive project development and implementation experience. Project development skills exist not only within the staff members of the Department of Environment, but also as well as other Government agencies and the private sector. 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 bilateral consultations during project concept and development.

The selection of persons/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 Focal Point of UNDP, 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.

Very small procurements, which fall below the threshold of USD$1,000.00 – $4,000.00, are deliberated by a quorum consisting of the Project Manager, Procurement Officer, Office Manager and a Senior Officer. There is no report for small procurements, instead this is reported to the PMC and recorded within the minutes.

Technical consultants may be hired to provide *ad hoc* expertise during project implementation and for financial or technical backstopping as necessary.

2) Describe the measures for financial and project / programme risk management.

Table 4. Risk Management framework for this project

Type	**Risk**	**Risk Management**	**Ranking**
Financial	Scope creep is a risk with 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 Chief Environment Officer. This process can	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

	be very difficult and can result in agencies not supporting the project if their preferences are not chosen.		
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 implementation.	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 for adaptation interventions.	Low/ Medium
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.	~~Medium~~low

3) Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

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 during the Project development 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. The project will have to conduct an EIA for the waterway and watershed interventions (Outputs 1.1.3, 1.1.4, 2.1.1, and 2.1.2,); This is a legal requirement. In order to access the small loans, the homeowner will have to seek and receive Physical Planning permission before proceed with the home upgrades.

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 Department of Environment will work with CARIBSAVE as a backstopping entity with experience on the ground in Antigua and specifically in the McKinnon's and Yorks communities, to implement a comprehensive M&E framework, to 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 6, "Risk Registry".

4) Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

The results based monitoring framework will be developed during the ~~inception~~ project preparation phase of this project. The results-based monitoring framework and the 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:

- Number and effectiveness of programmes for the sustainable use of protected areas;
- Local Area Development Plans on the level of watershed units as required by the NPDP
- Incidence of unplanned development
- Number of areas with adequate sewerage disposal systems
- Proportion of population using an improved sanitation facility
- Coastal Water Quality and ground water quality – level of coliforms
- Incidence of water- borne disease, and other diseases related to poor sanitation

Given the expansive nature of the project, the CARIBSAVE Partnership will be responsible for the data collection, compilation, and monitoring and reporting of the project. CARIBSAVE will provide operational support and additional assistance in the design and implementation throughout the project. This includes 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. Therefore CARIBSAVE will use an adaptive management approach to managing the monitoring of the project.

Reporting will take place on a quarterly and annual basis in accordance with Adaptation Fund standards. The CARIBSAVE team will provide guidance and supervision of the activities of the McKinnon's Pond Watershed project according to the indicators and overall results outlined during project inception. CARIBSAVE will draw on its internal expertise in ecosystem based adaptation, infrastructural coastal protection measures and community development in order to achieve optimum project delivery. To ensure sustainability of the project, capacity building of project stakeholders and community participation, CARIBSAVE will collaborate and develop the monitoring process with the project implementation team and the local community. This will include communicating project successes and challenges to the community throughout the project cycle during community consultations.

The monitoring and reporting plan involves an iterative and adaptive 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. The report will include the summation of quarterly monitoring reports compiled by CARIBSAVE and the Environment Department according to progress towards objectives, lessons learned, barriers to action and financial management. 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 5. 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, CARIBSAVE M&E Co-ordinator	
Annual Project Report including field visits and workshops	Annually	PMU, TAC, CARIBSAVE M&E Co-ordinators	35,000

Consultant Reports	Per Activity	CARIBSAVE M&E Co-ordinator	10,000
Mid-term independent evaluation	At project mid-point	CARIBSAVE M&E Co-ordinator	25,000
Final Independent Project Evaluation	End of project	CARIBSAVE M&E Co-ordinator, TAC, PMU	30,000
Total			105,000

5) Include a results framework for the project proposal, including milestones, targets and indicators.

Components	Objectives/Outcome	Outputs	Indicator	Baseline	Target	Verification
Ecosystem-based approach to rehabilitation of McKinnon's pond	1.1 Implement an ecosystem-based rehabilitation of McKinnon's Pond to increase protection and functionality of riparian, marine and terrestrial ecosystems enabling ecosystem services and providing a buffer zone for the communities and natural environment surrounding the area.	1.1.1 An integrated analysis of the extent of the flood protection potential of McKinnon's Pond 1.1.2 Ecosystem services valuation of McKinnon's Pond 1.1.3 Ecosystem-based rehabilitation of McKinnon's Pond watershed and wetland 1.1.4 Installation of natural wastewater treatment system	Flood mitigation capacity assessment completed Area of Mangrove rehabilitation underway in a total area Increase in riparian and mangrove vegetation 35% Improvement in water quality Ecosystem services valuation produced and presented to community and incorporated in to local environmental plan Extent of greenbelt revegetated (hectares)	No flood capacity analysis available No ecosystems services valuation available Existing mangrove area 1 ha No existing formal greenbelt No treatment plan in place	Flood capacity analysis completed Ecosystem services valuation completed 20% increase in mangrove coverage in the first 5 years aiming for 50% increase in coverage over 10 years 20% improvement in water quality with maintenance and support structures in place 100m Greenbelt	Visual observation, mangrove study/survey and remote sensing Water quality testing before and after project Visual observation, Project reports, land permits Visual observation, Project reports Water quality testing

			% Improvement in water quality (nutrients, pollution levels and contaminants reduced)			
2: Redesign and reconstruction of McKinnon's watershed using sustainable urban drainage	2.1 Reduced exposure of watershed communities to flooding during extreme hydro-meteorological events (heavy rains, tropical storms, hurricanes) and reduced impact of siltation, runoff and pollution contaminating McKinnon's Pond. 2.2 Access to innovative financing mechanisms to address the negative impacts of climate change through adaptation interventions is increased.	2.1.1: Implement flood management strategy for McKinnon's Pond Water Courses 2.1.2 Upgrade of Watercourses from Upper Fort Road to McKinnon's Pond 2.2.1: Provision and monitoring of micro-loans for communities to address the negative impacts of climate change through the adaption window of the SIRF Fund	Flood management strategy produced Flood capacity assessment conducted # of or metres of new waterways constructed and maintained Water quality measurement in McKinnon's Pond reflecting % decrease in pollutants # Households targeted for upgraded urban drainage # of damage incidents reported # or progress of check dams constructed # of micro-loans disbursed	Not currently assessed Waterway blocked and ineffectual Historical instances of damage to community property and households Current water tests reflect pollutants present in water from runoff Check dam not currently in existence	1 drainage/siltation study/assessment conducted No blockages in waterway 50% reduction in biophysical impacts on watershed community 15% - 20% in high adaptive capacity for the watershed community 2 check dams constructed Approximately 75 micro-loans disbursed	Project report Visual Observation, Project documents Water quality tests conducted in monitoring and evaluation process Visual observation and project documents Monitoring and Evaluation
3: Adaptation mainstream and capacity development of local community and institutions in McKinnon'	3.1 Strengthened institutional capacity within the local, parish government to reduce risks associated with flooding, sea-level rise and ecosystem damage causing	3.1.1: Design and implementation of Ecosystems based Adaptation Local Area Plan which will regulate and manage the environmental compliance and maintenance of the McKinnon's	# of local government members attending/completing training # of McKinnon's watershed community members attending/	No local adaptation plan in existence Low adherence to/ implementation of planning regulations	Approx. 20 attendees completing training Approx. 50 attendees attendance for 5 community meetings schedules	Meeting minutes/record, Project documents Visual Observation, Project documents

s Pond watershed	socio-economic and environmental losses 3.2 Heightened awareness and ownership of adaptation and climate risk reduction processes at local level	Pond watershed restoration area 3.2.1: Develop capacity of key local and national personnel in relevant institutions through attendance of continuing education/professional development courses on ecosystem based adaptation planning 3.2.2: Community consultation of Yorks/McKinnon participate in awareness raising, adaptation capacity building	completing training # guidelines published and disseminated # of presentations conducted Community agree to ecosystem based adaption Local Area Plan actions Local government demonstrate ecosystem based adaptation Local Area Plan actions Knowledge products disseminated through local media challenge	Community members not yet consulted on plans No local level government have taken part in training No community Local Area Plan approval attained No ecosystem based adaptation measures demonstrated No media products relating to Local Area Plan or knowledge products available	throughout project process 150 copies of McKinnon's Pond environmental management guidelines produced/disseminated 3-6 presentations and workshops to community, government, tourism industry, fishing and agriculture sector	

6) Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Project Objective(s)[69]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
To use an ecosystem based adaptation approach to rehabilitate the McKinnon's Pond and the surrounding community to protect the Pond from pollution and degradation and prevent inundation in the community threatened by climate change induced perturbations in rainfall and to buffer expected enhanced erosion and coastal flooding risks arising as a result of higher sea levels and increased storm surge.	d) Ecosystem-based rehabilitation of McKinnon's Pond ecosystem, waterways and water drainage infrastructure within the watershed drainage system mitigates climate change risk and impacts on the coastal communities of McKinnon's Pond and Yorks. e) Local and national institutions have increased capacity to manage and enforce new guidelines/strategy for the area	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	2.1. No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks 2.2. Number of people with reduced risk to extreme weather events 5. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress	
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**
1.1 Implement an ecosystem-based rehabilitation of McKinnon's Pond to increase protection and functionality of riparian, marine and terrestrial ecosystems enabling ecosystem services and providing a buffer zone for the	Flood mitigation capacity assessment completed Area of Mangrove rehabilitation underway in a total area Increase in riparian and mangrove vegetation	Output 5: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)	**$3,088,375**

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

communities and natural environment surrounding the area.	35% Improvement in water quality Ecosystem services valuation produced and presented to community and incorporated in to local environmental plan # of water outlets creating flow between Pond and coastal area Extent of greenbelt revegetated (hectares) % Improvement in water quality (nutrients, pollution levels and contaminants reduced)			
2.1 Reduced exposure of watershed communities to flooding during extreme hydro-meteorological events (heavy rains, tropical storms, hurricanes) and reduced impact of siltation, runoff and pollution contaminating McKinnon's Pond. 2.2 Access to innovative financing mechanisms to address the negative impacts of climate change through adaptation interventions is increased.	Flood management strategy produced Flood capacity assessment conducted # of or metres of new waterways constructed and maintained Water quality measurement in McKinnon's Pond reflecting % decrease in pollutants # Households targeted for upgraded urban drainage # of damage incidents reported # or progress of check dams constructed # of micro-loans disbursed	Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)	**$5,71~~1~~467~~,67~~,225~~500~~**
3.1 Strengthened institutional capacity within the local, parish government to reduce risks associated with flooding, sea-level rise and ecosystem damage causing socio-economic and environmental losses	# of local government members attending/completing training # of McKinnon's watershed community members attending/ completing training	Output 2.1: Strengthened capacity of national and regional centres and networks to respond rapidly to extreme weather events	2.1.2. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased 3.1.1 No. and type of risk reduction actions or strategies	**$507,000**

3.2 Heightened awareness and ownership of adaptation and climate risk reduction processes at local level	# guidelines published and disseminated # of presentations conducted Community agree to ecosystem based adaption Local Area Plan actions Local government demonstrate ecosystem based adaptation Local Area Plan actions Knowledge products disseminated through local media challenge	Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	introduced at local level 6.1.1.No. and type of adaptation assets (physical as well as knowledge) created in support of individual or community-livelihood strategies 6.1.2. Type of income sources for households generated under climate change scenario	

7) Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Project budget		
Outputs	**Cost est. USD**	**Activity Subtotal**
Objective 1. Implement ecosystem-based rehabilitation of McKinnon's Pond to increase resilience and functionality of the riparian, marine and terrestrial ecosystems enabling ecosystem services and providing a buffer zone for the communities, businesses and the natural environment in the surrounding area.		
Outcome 1.1. Mangrove forest and ecosystem rehabilitation and protection measures implemented in McKinnon's Pond and the 45 hectares of coastal wetlands which are part of McKinnon's Pond provide improved ecosystem services		
Output 1.1.1. An integrated analysis of flood protection potential and sea level rise impact on McKinnon's Pond using GIS-based models		$42,000
Output 1.1.2. Ecosystem services valuation and methodology developed using McKinnon's Pond as a pilot demonstration		$35,000
Output 1.1.3. Ecosystem-based rehabilitation and restoration of McKinnon's Pond watershed and wetland		$1,851,375
Output 1.1.4. Installation of natural wastewater treatment systems		$160,000
Outcome 1.2. Recreational and non-infrastructural uses for McKinnon's Pond are established as buffer zones		
Output 1.2.1. Eco-tourism and recreational amenities are developed and use guidelines established		*$1,000,000*
Subtotal Component 1	*3,088,375*	
Objective 2. Reduce exposure in the McKinnon's sub-watershed to flooding during extreme hydro-meteorological events through tackling siltation, runoff and pollution as well as providing access to an innovative financing mechanism that will mitigate the negative impacts of climate change through concrete adaptation interventions.		

Outcome 2.1 Reduced exposure of York's and surrounding communities to flooding during extreme hydro-meteorological events (heavy rains, tropical storms, hurricanes, storm surge, drought) and reduced impact of siltation, runoff and pollution contaminating McKinnon's Pond.			
Output 2.1.1. Implement flood and drought management strategy for McKinnon's Pond			$1,010,000
Output 2.1.2. Upgrade watercourse infrastructure from Upper Fort Road to McKinnon's Pond			$2,117,500
Outcome 2.2. Access is enhanced to innovative financing mechanisms to address the negative impacts of climate change through adaptation interventions			
Output 2.2.1.Provision and monitoring of micro-loans for communities to address the negative impacts of climate change through the adaption window of the SIRF Fund			*$2,118~~020~~,725~~000~~*
Subtotal Component 2		*5,~~147,500~~746,225*	
Objective 3. Mainstream adaptation into local and national planning by building institutional capacity and through a communication program and awareness campaign designed to heighten awareness and ownership of adaptation and climate risk reduction processes.			
Outcome 3.1. Strengthened institutional capacity and ownership to reduce risks associated with flooding, sea-level rise and degraded ecosystems causing socio-economic and environmental losses			
Output 3.1.1. Design and implementation of Ecosystem-based Adaptation Local Area Plan to regulate and manage the environmental compliance and maintenance of the McKinnon's Pond watershed restoration area			$37,000
Output 3.1.2 Build the capacity of key agencies and personnel through targeted training and support			$140,000
Outcome 3.2. Heightened awareness and ownership of adaptation and climate risk reduction processes at local levels			
Output 3.2.1. Cost-benefit analysis of McKinnons Pond hard and soft interventions, to support future financial planning for adaptation			$15,000
Output 3.2.2. Sub-watershed communities participate in awareness raising and capacity building for climate change adaptation			$315,000
Subtotal Component 3		*507,000*	
NIE Project Execution costs *max 9.5% of total budget)			$658,400
	Project manager	127,500	
	Project coordinator	229,500	
	Administrative assistants	61,200	
	Overheads and administration	20,000	
	Administrative support (x3) (notes)	115,200	
	Monitoring and Evaluation	105,000	
Subtotal		*658,400*	
	Total Project	$ 10~~9~~,000,000~~401,275~~	

8) Include a disbursement schedule with time-bound milestones.

Milestones	Timeline	Disbursement Percentage
Project Inception	2016	40%
Mid-term Review	2018	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[70] *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*: 13 January 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: *January, 13, 2016*	Tel. and email:

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.

	+1 (268) 462-4625 Environment Division Antigua antiguaenvironmentdivision@gmail.com, 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	

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

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..... *Ambassador Diann Black-Layne* Implementing Entity Coordinator	
Date: *January, 13, 2016*	Tel. and email: +1 (268) 462-4625

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June 17, 2013 Rory Butler
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2. EXPERTS SUGGEST INVESTIGATING THE CAUSE OF RED WATER IN MCKINNON'S POND

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Antigua and Barbuda

ANNEX 1. Household and Small Business Adaptation Interventions

Risk	Strategy
Drought	Rainwater harvesting 1. Rooftop gutters 2. Cistern construction 3. Water storage tanks 4. Domestic water filtration and treatment 5. Water efficiency retrofits (toilets, sinks, shower heads, dishwashers, washing machines)
Hurricanes	Strengthening infrastructure 1. Shutters for windows 2. Reinforcing foundations
Flooding	Ecosystem-based adaptation 1. Reforestation 2. Pond or waterway restoration Physical adaptation 1. Capture storm water to prevent flooding 2. Pervious concrete
Power outages	Energy Resilience 1. Solar panels 2. Solar water heaters 3. Battery/storage devices 4. Energy efficiency retrofits
Contamination/Pollution	Wastewater treatment and management • Septic tank construction • Grey water reuse best practices • Other wastewater infrastructure
Heat waves	Temperature control • AC unit installation (efficiency criteria) • Indoor ventilation

ANNEX 2. World Resource Institute Coastal Capital: Ecosystem Valuation for Decision Making in the Caribbean Activities checklist

PHASE	STEPS
1. Scoping	1. Identify the policy question to be addressed by ecosystem valuation (i.e., the intended use of the study)
	2. Consider the context of the study area to determine if economic valuation is the right approach 1. Threats to coastal resource health 2. Economic dependence on coastal resources 3. Local champions 4. Governance
	1. Conduct a literature review of previous relevant coastal valuation studies
	2. Identify and engage stakeholders who are interested in the policy question, clarify objectives of the study, and clarify how each will be engaged 5. Primary stakeholders (e.g., fishers, farmers, local tourism businesses, local civil society groups) 6. Secondary stakeholders (e.g., national and local government personnel, resource managers) 7. External stakeholders (e.g., NGOs, developers, tourists, external investors, universities, media)
	1. Identify decision makers and other target audiences (usually among the stakeholder groups identified above) and begin developing a communications strategy

PHASE	STEPS
8. Analysis	1. Develop scenarios of possible futures through a participatory process (e.g., through Driver-Pressure-State-Impact-Response [DPSIR] framework or critical uncertainty approach)
	2. Analyze the changes in ecosystem services under the scenarios (e.g., through modeling, expert opinion, or information transfer)
	3. Choose methods to value or monetize the changes in human well-being—ensuring the methods are appropriate to the policy question
	4. Collect and analyze biophysical and socioeconomic data (e.g., primary survey data, secondary data)
	5. Account for risk and uncertainty in valuation results
	6. Develop and apply decision support tools (e.g., cost-benefit analysis, cost-effectiveness analysis, multi-criteria analysis)
	7. Report valuation results clearly and transparently, in a way that is useful to stakeholders and other valuation practitioners
9. Outreach	1. Develop synthesis products derived from the valuation results for decision makers, using metrics and products that are relevant to the target audience

PHASE	STEPS
	2. Communicate valuation results to decision makers—ideally through an interactive and iterative process—through a variety of channels (e.g., public and private meetings, traditional and social media)
	3. Share the study and results with the wider coastal valuation community
	4. Monitor and assess the impact of the economic valuation study

Adapted from Waite, R., L. Burke, E. Gray, P. van Beukering, L. Brander, E. McKenzie, L. Pendleton, P. Schuhmann, and E. Tompkins. 2014. *Coastal Capital: Ecosystem Valuation for Decision Making in the Caribbean.* Washington, DC: World Resources Institute. Accessible at: wri.org/coastal-capital

ANNEX 3. VALUATION METHODS FOR ECOSYSTEM SERVICES, APPLICATIONS, EXAMPLES and LIMITATIONS

VALUATION METHOD	APPROACH	APPLICATIONS	EXAMPLES	LIMITATIONS
Market-based methods				
Market price (MP)	Observe market prices to analyze the economic activity generated by use of an ecosystem good or service. (Includes economic impact analysis, which examines the impacts of spending related to the good or service, and can also include indirect impacts in related economic sectors, as well as financial analysis, where operating costs are subtracted.)	Coastal goods and services that are traded in markets	Fisheries, tourism, mangrove timber	Market prices can be distorted (e.g., by subsidies) and they can overestimate ecosystem values if current use is above sustainable levels. Many ecosystem services are not traded in markets.
Replacement cost (RC)	Estimate cost of replacing ecosystem service with man-made service Requires three conditions be met to be valid: (1) man-made equivalent provides the same level of ecosystem service; (2) man-made equivalent is the least-cost option of providing the service; (3) people would be willing to incur the cost rather than forego the service.[97]	Ecosystem services that have a man-made equivalent that provides similar benefits	Shoreline protection by reefs and mangroves, water filtration by forests and wetlands	Estimates might not reflect the true value of ecosystem goods and services and might inaccurately suggest that man-made goods and services are appropriate substitutes. For example, a seawall might effectively protect the shore, but does not provide fish habitat in the way a healthy coral reef does.
Cost of avoided damage (CA)	Estimate damage avoided (e.g., from hurricanes or floods) due to ecosystem service	Ecosystem services that provide protection to houses, infrastructure or other assets	Shoreline protection by reefs and mangroves	Difficult to relate damage levels to ecosystem quality.
Production function (PF)	Estimate value of ecosystem service as input in production of marketed good	Ecosystem services that provide an input in the production of a marketed good	Commercial fisheries	Technically difficult to determine and model the relationship between ecosystem change and its impact on the provision of the ecosystem service. High data requirements.
Non-market methods				
Hedonic pricing (HP)	Estimate influence of environmental characteristics on price of marketed goods	Environmental characteristics that vary across goods (e.g., houses, hotels)	Tourism, shoreline protection	Technically difficult. High data requirements.
Travel cost (TC)	Travel costs to access a resource indicate its value	Recreation sites (e.g., marine protected areas)	Tourism	Technically difficult. High data requirements.
Contingent valuation (CV)	Ask survey respondents directly for willingness to pay for ecosystem service	Any ecosystem service (most widely used for non-market ecosystem and services)	Tourism	Expensive to implement. Vulnerable to many sources of bias and requires careful survey design.
Choice modeling (CM)	Ask survey respondents to trade off ecosystem services to elicit their willingness to pay	Any ecosystem service (most widely used for non-market ecosystem and services)	Tourism	Expensive to implement. Vulnerable to many sources of bias and requires careful survey design. Technically difficult.
Benefits transfer				
Benefits transfer	Value transfer: Use values estimated at other locations ("study sites") Function transfer: Use a value function estimated at another location to predict values	Any ecosystem service	Any ecosystem service	Possible transfer errors if the "study sites" and "policy site" are different.
Meta-analysis	Synthesize results from multiple existing valuation studies, using statistical regression to estimate a value function. Meta-analysis can be used for benefits transfer.	Any ecosystem service	Any ecosystem service	Requires compilation of multiple studies and statistically significant sample size of value estimates. Adequacy of studies may vary. Can lead to a loss of important valuation information during data aggregation process.[98]

ANNEX 4. Report on the Stakeholder Consultation Workshop on the North West Coast Tourism Zone Wastewater Management Strategy (SIRMM Demonstration 4), Tuesday 12th June 2012, Sandals Grande Resort.

Demonstrating the Development and Implementation of a Sustainable Island Resource Management Mechanism in a Small Island Developing State.

Report on the Stakeholder Consultation Workshop on the North West Coast Tourism Zone Wastewater Management Strategy
Tuesday 12th June 2012, Sandals Grande Ballroom, 10am – 3pm

1. Introduction

This consultation workshop was designed facilitate discussions on the adoption of a comprehensive strategy for the management of the resources of the Northwest Coast Tourism Zone wastewater management. The workshop catered to the relevant Government Agencies involved in wastewater management. Another consultation will be held for members of the surrounding community.

2. Opening & Welcoming Remarks

The consultation workshop began at 10:20 am with welcoming remarks from SIRMM Demo 4 Coordinator, Dr. Linroy Christian. SIRMM Demo 4 addresses wastewater management in the North West Coast Tourism Zone (NWCTZ) and is a subproject of the larger SIRMM project. Two distinct consultancies were embarked upon, and as such the workshop was divided into two sessions. Session one was focused on the development and implementation of an Environment Management System (EMS). Session two was geared towards the consultancy on the review of strategies and technologies to improve water conservation and wastewater use and treatment. SIRMM Project Coordinator, Ms Ruleta Camacho gave opening remarks that highlighted the overall aims of the SIRMM Project and the expected outcome of Demo 4. Stakeholder buy in was stressed upon and the workshop's participants were invited to provide as much feedback as possible.

3. Session 1

Mrs. Mykl Clovis-Fuller, lead consultant on the development and management of an EMS for wastewater management systems, provided an overview of the consultancy and tasks undertaken. The major outputs of this consultancy included a computer software specifically designed to enable hoteliers to upload data on their wastewater management system while enabling Government agencies to monitor and assess performance standards; and a set of wastewater management guidelines to assist other hoteliers and commercial entities in the proper development and management of their own wastewater management systems. The aforementioned outputs were achieved through a series of tasks including the examination of current hotel practices, and property characteristics.

Mr. Mario Bento, manager of Caribbean Water Treatment (CWT) gave a brief overview in the technicalities used to develop the wastewater management system guidelines. The guidelines developed were specific to the proper management of existing systems studied on island. The guidelines will enable hoteliers to meet site specific performance requirements. The types of wastewater management system found within NWCTZ included septic tanks and disposal fields, activated sludge treatments as batch and, or continuous, as well as disposal with no nutrient removal.

Mr. Bento provided a brief presentation on the proposed regulatory process to implement proper wastewater management systems from development and construction through to management and monitor. One highlighted procedure included monitoring the operations of wastewater management systems by Government agencies through the use of an annual permit system. A discharge operational permit could be issued and renewed annually upon full compliance to standard performance requirements. New legislation would be required to enable the Government to take legal action against proprietors who do not conform to wastewater management operational standards.

The guidelines for wastewater management system were developed based on standard environmental management principles. The guidelines were tailored to the concept of plan, do, check, and act (PDCA). Considerations to be made by hoteliers when establishing a wastewater management system include:

- Plant Capacity vs Loading Assessment;
- Operation and maintenance procedures;
- Deviations and corrective action upon inspection.
- Effluent quality monitoring;
- Internal audits;
-

Documentation of all the previously mentioned steps was highlighted as crucial for baseline assessment. Also including in the guidelines were the implementation plan which recommended the development of clearly defined wastewater management system goals, establishment of a team, involvement of employees, conducting a preliminary review, preparation of a budget and an implementation schedule, as well as proper staff training. Certification of personnel involved in wastewater management system was also recommended. Recommendations were made for the certification of wastewater management systems via the Central Board of Health (CBH)

and Environment Division, or possibly the international Golden Globe certification.

Baseline assessments were undertaken through the examination of a large, medium, and small hotel, namely Sandals Grande, Tradewinds and Buccaneer Cove. Hotels engaged in tree planting activities to assist in nutrient absorption. A proposal was made to the SIRMM Project to include 2 monitoring wells to enable groundwater testing.

4. Session 1 Comments & Questions

a) Ms Adelle Blair, a representative of the Ministry of Tourism, highlighted that the guidelines developed only focused on the operations of wastewater management systems but lacked guidelines on design parameters. A recommendation was made to include basic prescriptions for designing wastewater management systems including the capacity of wastewater management plants. Mr. Bento noted that this was not within the scope of the project as design guidelines would be expansive. However, some general design guidelines may be inserted with considerations to occupancy levels, soil type, coastal location, as well as recommendations as to when a mechanical plant becomes necessary.

b) Mr. Ermath Harrigan, HARCON Consultants, queried the extent to which these guidelines were applied in the design of the wastewater management system under the IWCAM project. Mr. Bento highlighted that the focus of the IWCAM system was on high effluent retractile processes for the reuse of water, particularly for irrigation on agriculture farms.

c) Mrs. Mitzi Allen, HAMA Productions, queried the cost range to hoteliers to establish proper wastewater management systems. It was highlighted that concerns regarding costs came mainly from small hotel operators. Basic wastewater management could start as low as $600 to empty septic tanks. Testing of marginal (ground water) wells may increase costs. This is dependent on the location of the plant. Coastal Plants may need to be tested more frequently and would incur higher costs.

5. Session 1b: EMS Software Demonstration

Mr. Kwasi Tongue, software developer, conducted a brief online demonstration of the wastewater management system software to be used by pilot hotels and Government agencies. The demonstration included data input, data management and export. The software caters to different users, and administration; it enables administrative users (Government agencies) to possess super access of all the data entered by hoteliers. It was noted that whenever hoteliers enter incorrect or inadequate data, error messages would be generated and the data would not be accepted. Training was highlighted as a necessity for all individuals using the software. Data may be flagged both on the website and in an exported excel file to determine noncompliance to standards. A welcome letter is to be generated upon registration to the software as a possible means of certification.

This is then approved by CBH, and endorsed by Environment, registration fee included to assist in maintenance of the site. Penalty for failure to standards compliance needs to be discussed. Fines could feed into a special fund

6. Questions & Comments

a) Concerns were expressed regarding flagged invalid data. It was felt that invalid data should not be flagged on the website in order to discourage false data entry by hoteliers. It was also noted that exported Excel file reports would be used to create a form of baseline documentation over time to influence national wastewater management system.

b) Verification of loading capacity data of wastewater management plants should be addressed through the functions and responsibility of DCA and CBH during the approval of plans and construction phase.

c) Mr. Harrington queries the mechanism in place or proposed to reconcile the integrity of the data as the software is based on hotel self appraisal versus actuality. It was highlighted that the data will be tested via random sampling and verifying the data's integrity will be based on a communicated agreement between CBH and the Laboratory conducting the tests. It was highlighted that voluntary participation is short-term but long-term and nationwide participation would require a compulsory agreement through an operational permit to cater to effluent monitoring.

d) In addressing concerns regarding the admissible integrity of monitored data submitted by hoteliers, it was noted that APUA would only accept certified lab results and not the software's report. It was concluded that verification of data should be determined by the lab.

e) In light of many concerns regarding the trusted use of this software, Chief Health Inspector, Mr. Lionel Michael emphasized that use of the software was currently based on voluntary compliance and as such a certain level of trust has been established. Informal random sampling and inspection would still be conducted as part of CBH's regular functions.

f) Data submitted via the voluntary use of this software would later feed into the development of legislation and appropriate fines.

g) Mrs. Cherissa Roberts-Thomas, a member of the private sector and resident of the community, strongly suggested that there be a collaborative effort in establishing a data sharing protocol of all the data submitted. Government agencies included DCA, Public Works, CBH, APUA, Laboratory, etc.

h) A suggestion was made to utilize the Environment Management Bill as the lead instrument for regulatory control.

i) It was highlighted that legislations of the software and wastewater management systems not be limited to hotel but also commercial agencies, and apartment complexes with specified densities. Residential homes should be eliminated from proposed wastewater management system legislation.

j) There should be an effluent standard in relation to the location, surrounding ecosystems discharge hours and restrictions of the business. It was highlighted that currently, the CEHI effluent standards are used nationally, however, an update to national standards would be needed based on the Cartegna and LBS protocol.

k) With reference to discharge permits, ensuing discussions identified CBH as lead agency to issue such permits. However, it was highlighted that the Public Health Act was outdated and would not enable the empowerment of this issuance. It was suggested that power be granted to CBH under the Environment Management Bill or DCA Regulations to expedite the enactment of issuing discharge permits. Mr. Lionel Michael is to examine the possibility of such an enactment. Concerns were raised with expediting the issuance of permits as it may result in a fragmented legislative framework.

l) Legislative framework should be inclusive of both residential and commercial entities.

Many commendations were made for the software development and for partnering with a local tertiary academic institution for its design.

There was an hour lunch break followed by Session2.

6. Session 2 Proposed operation of a national wwms including hotel wwms or EMS and operational permit pending laws and regulations.

Mr Ermath Harrington, HARCON lead consultatnt, facilitated the second session of the workshop on the review of strategies and technologies to improve water conservation and wastewater management. A brief overview of the consultancy was presented. The consultancy was mainly geared towards improving the water quality of McKinnon's Pond through the use of a natural wastewater treatment system. Emphasis was placed on a natural wastewater management system as it offers more sustainability with the added advantages of low national economic consumption, little maintenance while reducing or recycling nutrient loads.

The natural wastewater management system identified was the anchored floating island concept which is a hybrid of natural wetland and aquatic plant systems. The deployment of riffles along the streambeds flowing into the pond from the Woods area will facilitate filtration. Three floating islands will be located in 3 different areas within the Pond. The floating island will assist in education and raise public awareness through the involvement of the community and surrounding schools.

This consultancy encompassed many activities to arrive at the most natural solution for wastewater management. Some of the tasks undertaken included site assessments and a legislative review. The tasks highlighted the following challenges:

- Based on the legislative review, there was negligible reference to waste water management in national laws and regulations.
- There was a lack of impact assessments or considerations of wastewater disposal on the nearby water body by surrounding establishments.
- Extreme waste discharge was found to be deposited within the pond from various activities, including the proximity of a pig farm and a mechanic shop near the pond's bank
- Little or no proper staff training in wastewater management systems amongst the surrounding entities.

Based on the varying factors identified as having an affect on the water quality of McKinnon's Pond, it was suggested that the area be legislated as an Environmentally Sensitive Area (ESA).

7. Questions and comments

a) McKinnon's Pond has been previously declared as an ESA however it has not been enforced.

b) Concerns were raised on how the behavioural patterns of the surrounding residents maybe addressed, especially in the use of pit latrines along the banks of the Pond.

c) Reference was made to the IWCAM project providing home connections to the sewage treatment plant. However, this connection avoided homes with pit latrines as these homes were identified as squatters, which is a challenge best to be addressed by

the Government, particularly the Development Control Authority, as lead enforcing agency.

d) Mr. Dubois, representative of the National Solid Waste Management Authority, suggested that the failures in the national system of the collection and disposal of waste be identified.

Mr. Harrington highlighted that in order to sustain an efficient wastewater management framework, certain parameters would need to be emplaced at various levels of national administration. These levels included:

- Policy Level
- Legislative
- Institutional
- Technical capacity
- Financial capacity
- Stakeholder engagement
- Compliance
- Monitoring and evaluation

The CREW project was identified as a possible source of funding for advancing the legislative framework on wastewater management.

Participants were divided into 2 working groups to prepare a master plan summary outlining the possible measures that may be undertaken as part of the previously mentioned administrative levels. The results have been compiled in *table 1* below:

Table 1: Recommendations of Working Groups

Group 1	**Group 2**
Policy Level Establish appropriate standards and guidelines, regulations for waste water treatment and disposal in residential, commercial and industrial entitities	**Financial Capacity Level** - fees and fines for non compliant entities - International donor funding - Taxation for providing wastewater management services. - - Statutory contributions via additions to the Environment Levy or utility bills based on building size, housing capacity, commercial or residential.

	- Sale of reused water to agriculture, etc. (APUA could be responsible aency)
Legislative Level - needed to enforce national policy developed - Clearly define each management agenciew involved, e.g APUA, Ministry of Agriculutre, CBH, DCA, Fisheries, Environment - Legislation must be developed in a manner that encompasses the aforementioned agencies	**Stakeholder Engagement Level** - Done through Public awareness campaigns, training workshops, and consultations. - Stakeholders include: ▪ Government Entities namely - *DCA, Public Works, APUA, Ministry of Agriculture and Lands, Environment, Fisheries, Tourism, St. John's Development Corporation, CBH, CHAPA, Solid Waste* ▪ Private Sector – *waste removers* ▪ Waste generators ▪ Architects & draftsmen ▪ Antigua Barbuda Bureau of Standards
Institutional Level -clearly defined roles in wastewater management - Data sharing protocol to ensure knowledge amongst stakeholders Shared vision of how policies are implemented Government manages the resources but the responsible authority manages the systems.	**Compliance** - Legislative implementation and enforcement - Adequate and modern equipments
Technical Capacity - Development of a training needs plan - Identified roles, responsibilities, and expertise needed in design, building treatment and reuse of wastewater.	**Monitoring & Evaluation** - Increase in technically trained staff - Adequate and modern equipments

The workshop concluded at 4:20pm with commendations by Dr. Christian who also highlighted the need for buy in of this strategy at the political level.

	Name	Organization	Contact
1	Adelle Blair	Ministry of Tourism	
2	Dr. Brian Cooper	National Parks Authority	481 5034 / 788 7586
3	Camaria Holder	Caribbean Water Treatment	720 3582
4	Cherisse Roberts-Thomas	C. Roberts-Thomas & Associates	
5	Doris Irep	Caribbean Water Treatment	783 0192
6	Emmanuel Dubois	National Solid Waste Management Authority	
7	Fran Fuller		
8	Kwasi Tongue	Antigua State College	
9	Lionel Michael	Central Board of Health	
10	Mario Bento	Caribbean Water Treatment	cwt@candw.ag 462 6565
11	Mitzi Allen	HAMA Productions	hamamitzi@gmail.com
12	Howard Allen	HAMA Productions	hamafilms@gmail.com
13	Simon Toulon	APUA (Water/Hydrology)	simontoulon@apua.ag 480 7063/ 720 2406
14	Tricia Lovell	SIRMM/ Fisheries Dvision	
15	Vashti Ramsey	Ministry of Tourism	
16	Veronica Yearwood	APUA (Water/Hydrology)	veronica@apua.ag

17	Dr. Linroy Christian	SIRMM/ Demo 4 Coordinator	
18	Ruleta Camacho	SIRMM	
19	Delamine Andrew	SIRMM	
20	Ermath Harrington	HARCON Consultants	
21	Mykl Clovis-Fuller		

ANNEX 5. SIRF Fund Business Concept, identifying small loans window

Please see PDF attachment.

ANNEX 6. Antigua and Barbuda - McKinnon's Pond Watershed Restoration and Resilience project

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 members in implementing agencies Such as the public work departments and	High staff turnover and poor institutional memory result in disruptions or delays in	• Deputies and alternative representatives within the institutions will be recommended at inception to ensure that sufficient membership continuity is available.	Organisational	P = 1 I = 2

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
other government agencies working on this project.	project implementation and coordination.	• The PMC will make use of established government structures to capitalise on functioning systems.		
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. • The project will allow for the use of university students to assist with the development of the plan;	Institutional	P = 3 I = 4

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
		• Community groups will be engaged in data collection and evaluation. • There is considerable amount of baseline data but the analysis based on the AR 5 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 Management Strategy (NEMS) will establish an environmental data system to provide detailed information to a wide range of stakeholders.	Organisational	P = 2 I = 3

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
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;	Organisational	P = 1 I = 4
Disagreement over allocation of loans for implementation of adaptation interventions.	The loans will be place within a revolving fund. 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 stop the project it may cause political and social conflict.	• 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;	Social	P = 3 I = 3
Extreme climatic events and climate variability.	Current climate and seasonal variability and/or hazard events result in disruption to	• Weather forecasting will be taken into consideration when planning climate-sensitive implementation activities. For example, no	Environmental	P = 3 I = 4

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
	implementation of adaptation interventions.	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.		
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 establish 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	No negative impacts identified.	•		
3. Marginalized and Vulnerable Groups	The project may marginalize 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	• Design social assessments to better understand the demographics of people in the target communities, to inform policy approaches	ESS	P – 2 I – 2

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
	transient within the community.			
4. Human Rights	Non-identified	•		
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	Non-identified	•		
7. Indigenous peoples	Non-identified	•		
8. Involuntary Resettlement	Waterway interventions may require the movement of structures or the loss of small amounts of land.	• 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 problem to the	ESS	P-3 I-2

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
		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 consumption, which is currently supplied with fossil fuels.	• 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 RE as the energy source to offset potential emissions.	Mitigation	P = 4 I = 1

Description	Potential consequence	Mitigation measures	Risk category	Probability & impact (1–5)
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			
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

Government of Antigua and Barbuda

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Ministry of Health and the
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December 21, 2015

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 "MCKINNON'S POND WATERSHED RESTORATION AND RESILIENCE PROJECT IN ANTIGUA AND BARBUDA"

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 above project proposal for adaptation in McKinnon's Pond 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 proposed 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, in the Ministry of Health and the Environment.

Sincerely,

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