

PROJECT IDENTIFICATION FORM (PIF)



PROJECT TYPE: FULL-SIZED PROJECT
TYPE OF TRUST FUND: GEF TRUST FUND

PART I: PROJECT INFORMATION

Project Title:	Sustainable Pathways -- Protected Areas and Renewable Energy		
Country(ies):	Antigua and Barbuda	GEF Project ID:	5390
GEF Agency(ies):	UNEP	GEF Agency Project ID:	01078
Other Executing Partner(s):	Environment Division, Ministry of Agriculture, Lands, Housing and the Environment	Resubmission Date:	12 April 2013
GEF Focal Area (s):	BD, CC	Project Duration(Months)	48
Name of parent programme (if applicable):	SFM	Agency Fee (US\$):	250,774

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK:

Focal Area Objectives	Trust Fund	Indicative Grant Financing (\$)	Indicative Co-financing (\$)
BD 1.1: Improved management effectiveness of existing and new protected areas. BD 1.2: Increased revenue for protected area systems to meet total expenditures	GEF TF	\$666,667	1,300,000
CC 3.2 Investment in Renewable energy technologies increased by \$4.5M CC 3.3 GHG Emissions avoided, 100,000 Tonnes of CO2 with scale up to 1MtCO2 near term	GEF TF	\$1,260,752	3,200,000
SFM 1.2: Good management practices applied in 3,502 hectares forests. SFM 1.3 Good management practices by relevant economic actors (Antigua Public Utilities Authority) in 3,502 hectares of watershed forests	GEF TF	\$586,606	600,000
Project Management Costs 5%		\$125,701	260,000
Total project costs		2,639,726	5,360,000

B. INDICATIVE PROJECT FRAMEWORK

Project Objective: Enhanced financing and management of protected areas through innovations in renewable energy capacity and arrangements						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount (\$)	Indicative Co-financing (\$)
1. Development of Sustainable Island Resource Financial Plan		Revenue for protected area systems increased by \$2 million annually	Business Plan for the Systems of Parks and the Legislation Financial support for protected areas system augmented through renewable energy proceeds (see Component 3 and scaling up of Mount Obama NP financial sustainability model	GEFTF	BD: 50,000	100,000

2. Pilot expansion of Sustainable Island Resource Protected Areas: Mount Obama National Park	TA	Improved management effectiveness of new protected areas (1,719 ha)	<p>A. Obama National Park (NP) gazetted and sustainably managed (1,039hectares) – see Component 1 details</p> <p>B. Financial sustainability system piloted At Mount Obama NP</p>	GEFTF	BD: 616,667	1,200,000
3. Pilot Sustainable Island Resource Financial Plan – Renewable Energy in support of Protected Areas System	TA	At least 100,000 tonnes of CO2 equivalent emissions avoided as direct impact of the pilot with immediate plans for 1,000,000 tCO2.	<p>A. Financial and Technical Feasibility -Feasibility and Environmental Impact Assessment -Renewable energy dynamic fluctuations and grid integration -Pumped hydro and water management integration (SFM) -Grid interconnection</p> <p>B. Capacity Building on grid interconnection and control</p> <p>C. Policy and regulation for feed-in Build Operate Transfer to APUA with Environment Management Transfer</p> <p>D. Feasibility study for 10 to 20 MW wind power integration with storage up to 10MWh (or max)</p> <p>E. Initial pilot installation >1 MW capacity installed with ~0.5 MWh pumped hydro energy storage</p>	GEFTF	CC: 1,260,752	3,200,000
4. Enhancement of Forest Ecosystems		<p>Fires reduced nationwide by 20% by project end. Reduce associated invasive spread of Citronella grass in key watersheds and protected areas (3,052 hectares).</p> <p>Targeted restoration (160 hectares) across Body Ponds Watershed and Christian Valley Watershed (3,052 hectares) enhancing carbon stocks.</p> <p>Restoration efforts and avoided degradation lead to projected annual tons CO₂ savings 43,216. Potential total carbon benefit of 1,115,709 tons CO₂ over 30 years.</p>	<p>A. Stem degradation of forest ecosystems: Obama Nat'l Park Watershed , inclusive Wallings Forest Reserve through nationwide fire prevention initiative and targeted invasives control (Citronella grass) measures.</p> <p>B. Restoring the forest above watershed conservation areas: the Bendals Valley, Wallings and Blubber Valley through reforestation to stop erosion of soil into the reservoirs</p>	GEFTF	SFM: 586,606	600,000
Sub-Total					2,514,025	5,100,000
Project management cost				GEF TF	\$125,701	260,000
Total project costs					2,639,726	5,360,000

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, (\$)

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
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Government	Environment Division	Grant	1,500,000
Government	Environment Division	Grant	500,000
Bilateral	Danish, German or Japanese Gov.	Grant	3,200,000
Bilateral	USAID, GIZ	In kind	20,000
NGO	Environmental Awareness Group	In kind	30,000
Multilateral	UNDESA	In kind	50,000
GEF Agency	UNEP	In kind	30,000
Private Sector/ Utility	APUA	In kind	30,000
Total Co-financing			5,360,000

D. INDICATIVE TRUST FUND RESOURCES (\$) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY

GEF Agency	Type of Trust Fund	Focal area	Country Name/Global	Grant amount (\$) (a)	Agency Fee (\$) (b)	Total (\$) (a + b)
UNEP	GEF TF	BD	Antigua and Barbuda	\$1,343,196	\$127,604	\$1,470,800
UNEP	GEF TF	CC	Antigua and Barbuda	\$680,594	\$64,656	\$745,250
UNEP	GEF TF	SFM	Global	\$615,936	\$58,514	\$674,450
Total Grant Resources				\$2,639,726	\$250,774	\$2,890,500

E. PROJECT PREPARATION GRANT (PPG)

During the PPG phase, the following enabling conditions will be put in place by the Government of Antigua and Barbuda

- 1) Passage of the Environment Management Bill, which includes establishment of a national-level trust fund (hereafter referred to as "the national trust fund") that includes a mandate of providing support to the management of protected areas and biodiversity conservation.
- 2) Agreement for the national trust fund to receive the profits from the the Renewable Energy Installations and that the national trust fund will direct these resources to support of the management of protected areas.
- 3) Furthermore, the Government agrees to designate sufficient lands identified for wind development and designate surrounding lands for farming or other compatible use surrounding (Crabbs Point).
- 4) APUA agrees to purchase and/or wheel renewable energy generated.
- 5) APUA agrees to maintain and operate the solar, wind and pumped hydro facilities at actual cost to be negotiated.
- 6) Decisions on development within the boundaries proposed Mount Obama National Park contingent upon the approval of the local area plan to be developed by the project.
- 7) In accordance with applicable legislation, a screening of the proposed development shall be led by the Environment Division in conjunction with the Development Control Authority.

These conditions are essential for proceeding with the CEO endorsement. Moreover, UNEP and Antigua and Barbuda understand that GEF CEO endorsement will be conditioned on the national trust fund (a) being the sole national protected area trust fund (NPATF) established in Antigua and Barbuda, (b) that it direct profits from the Renewable Energy Installation to support protected area management, and (c) that the trust fund be determined to meet, to the satisfaction of the GEF Secretariat, the requirements for NPATFs as contained in the relevant project documents of the GEF-funded, World Bank-implemented *Sustainable Financing & Management of Eastern Caribbean Marine Ecosystem Project*" (World Bank ID P103470/GEF # 3858).

PPG AMOUNT REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES) FOR MFA AND/OR MTF

GEF Agency	Type of Trust Fund	Focal area	Country Name/Global	(in \$)		
				PPG (a)	Agency Fee (b)	Total c = a + b
UNEP	GEF TF	BD	Antigua and Barbuda	\$26,667	\$2,533	\$29,200
UNEP	GEF TF	CC	Antigua and Barbuda	\$50,000	\$4,750	\$54,750
UNEP	GEF TF	SFM	Global	\$23,333	\$2,217	\$25,550
Total PPG Amount				\$100,000	\$9,500	\$109,500

PART II: PROJECT JUSTIFICATION

A. PROJECT OVERVIEW

A.1. Project Description

Global Environmental Problems, root causes and barriers.

The financial needs to meet the estimated annual operational costs of the biodiversity rich Protected Areas system of Antigua and Barbuda is conservatively estimated at \$5 million per year. The cash strapped Government is currently meeting approximately \$2 million of these costs per year. While some important headway is being made on establishing an enabling environment to raise and receive funds (national trust fund under the Environmental Management Bill), there remains an urgent need to pilot, implement and scale up conventional and alternative means to financial self-sufficiency for protected areas.

The proposed biodiversity site intervention at Mount Obama National Park is a priority in the Systems Plan for Protected Areas in Antigua and Barbuda features inclusion and proximity to Important Bird Areas, where some of Antigua's rarest birds can be found as well as many migrants on their annual migrations form the arctic and temperate zones to the north. Christian Valley IBA (AG009) within proposed Mount Obama National Park and the adjoining Walling's Forest IBA together represent Antigua's wet forest ecosystem and are the only IBAs in the country where the restricted-range *G. mystacea*, *E. musica*, *Margarops fuscus* and *M. fuscatus* are found, highlighting their critical importance in maintaining Antigua's biodiversity. This IBA is significant for supporting populations of nine (of the 11) Lesser Antilles EBA restricted-range birds that occur in Antigua. Within Antigua, some of these species (Bridled Quail-dove *Geotrygon mystacea*, Scaly-breasted Thrasher *Margarops fuscus*, Pearly-eyed Thrasher *M. fuscatus* and Antillean Euphonia *Euphonia musica*) are entirely confined to the Christian Valley and Walling's Forest IBA (AG008) ecosystem. A significant population of the Near Threatened White-crowned Pigeon *Patagioenas leucocephala* also occurs at this IBA. The area has a diverse flora and insect fauna. Seven bat species (including Antillean fruit-eating bat *Brachyphylla cavernarum* and greater bulldog bat *Noctilio leporinus*) have been documented.¹ Surrounding the summit which is in a high rainfall area, there is thick forest and especially on the steep western side a great deal of biodiversity of global significance including plant species that are not found anywhere else in Antigua. Given that more than two thirds of Antigua was at some point cleared for rural plantations, this area is unique in its ecological richness. The proposed Obama National Park would be the first protected area gazetted and managed for conservation and sustainable use of biodiversity and ecosystem services.

Mount Obama institutional barriers, while largely rooted in financial limitations, include (i) the lack of a comprehensive protected status and pressure for unplanned touristic development, ii) lack of protected areas management capacity, regulations, and enforcement; (iii) biodiversity data gaps necessary to advance managerial priorities inclusive of biodiversity protection and ecosystem services; (iv) weak environmental/biodiversity awareness among key stakeholders; and (v) lack of engagement and participatory management, and economic opportunities with surrounding communities. Additional important threats include inadequate fire control and prevention, lack of resiliency measures to natural disasters and severe weather events, invasive species prevention, control and management – particularly the every growing threat of Citronella grasses encroaching from adjoining areas (and exacerbated by forest fires) and illegal crops.

Forest ecosystems are under threat particularly by lack of fire control and awareness, which leads to increased encroachment of the invasive Citronella grass and erosion issues, threatening areas of high biodiversity and watershed significance alike. This invasive grass is a fire ecotype, burns very fiercely and recovers quickly, destroying all other vegetation and invading the forest edges that burn along with the grass. The grass grows in clumps, which allows soil to erode around the clump. The invaded areas critical for watersheds are prohibitively expensive to restore as has been learned under another GEF pilot project.

Concurrent with the issues under the biodiversity header, Antigua is challenged by its dependency on imported diesel fuel to generate electricity and its need to advance its goals to avail itself of its renewable energy options to reduce both its dependency and its carbon footprint. Sixty percent of potable water is generated from desalination of sea water which in turn depends on electricity and is exacerbated by climate change induced drought. This project proposes addressing these global environmental problems, and associated barriers to enjoin a sustainable pathway linking the proceeds from the needed RE to the financial needs of the protected areas system, thus bringing global environmental benefits under the CC objectives, the BD objective and concurrent SFM objectives in a synergistic manner.

The project aims to systematically address these issues firstly by ensuring that at least one additional area is declared as protected, and that by systematically addressing threats and ensuring its financial self sufficiency, it becomes a model for scaling up and enhancing the management effectiveness and financial sustainability, through the returns from the Renewable Energy Component, of the Protected Areas System of Antigua and Barbuda.

The baseline scenario and associated projects

¹ Joseph Prosper, Victor Joseph, Andrea Otto, and Shanee Prosper (Environmental Awareness Group). IBAs of Antigua and Barbuda

Antigua and Barbuda is on the cusp of passing a seminal Environmental Management Bill which will provide the enabling environment advancing potential for financial sustainability of its protected areas system. The Bill further provides a mechanism to declare protected areas in tandem with the recent Planning Bill, providing a more mindful and comprehensive alternative to the outdated 1984 National Parks Bill. Under the Environment Management Bill, the mandate of the Environment Division is expanded to include the coordination of the management of national parks and protected areas declared under the Bill. The Bill further establishes a national trust fund, through which the proceeds of newly identified returns can be targeted for conservation purposes.

The project will build on the outcomes of: 1) the completed OECS Protected Areas and Associated Livelihood (OPAAL), a regional project which resulted in a draft Protected Areas System Plan for Antigua and Barbuda, 2) the ongoing Sustainable Financing and Management of OECS Marine Ecosystems Project, which is supporting the establishment of a single National Protected Areas Trust Fund that will, among other things, access the funds from the regional Caribbean Biodiversity Fund and 3) lastly the Ridge to Reef Demonstration project which produced data key to the proposed park, establishing proposed boundaries. The latter project was part of the GEF funded Sustainable Island Resource Management Mechanism (SIRMM) effort which piloted baseline efforts for continued economic development of the country while protecting its natural resources.

Specific to the Mount Obama National Park, related projects have completed a bird survey and a study of vascular plants which can serve as a foundation to build a biodiversity baseline. A voluntary adhoc Mount Obama Committee has been active since 2010 and has developed a Business Plan and a business oriented "Concept" Plan for the Park, which lacks a conservation element. Tentative park boundaries have been proposed but lack the data need to define ecologically sensitive areas, to complement boundaries of this key watershed.

Although the cost of petroleum should have driven renewable energy investments, political, institutional and technical barriers have dissuaded and investment thus far. The situation is changing with the net metering option offered currently by APUA but the next immediate hurdle will be the grid stability issue and their ability to cope with fluctuating demand and supplies. The innovation proposed by UNDESA is to utilize existing water supply as the energy storage mechanism that enables elimination of diesel spinning reserve against renewable solar and wind power. While under institutional and fiscal review of the IMF, it is apparent that irregularities although probably now in the past did exist and the formulation of this project with an overall public good motive is more likely to move forward than a purely private sector engagement. Once established as a mechanism for wheeling and storage, the potential for private/public partnership expansion of renewable energy will follow. The demonstration effect of the project may be quite large – the energy storage capacity of reservoirs in the water supply sector being equivalent to a quarter of peak demand for the highest demand hour is very important to grid managers. So the innovation angle of the project justifies GEF support and the greenhouse gas emission are there although the biodiversity and sustainable forest management and water benefits are most long lasting from the initial investment. Restated, while the revenue generation of the renewable energy generation is being partially diverted to the protected area, global benefits are conserved, there will be no opposition to the wind turbines, the utility will gain capacity and ability to break their own 15 % solar and wind penetration rate and the mitigation potential will scale up.

Imported diesel and heavy oil for electricity generation is purchased by the government and supplied to the public utility as well as the independent power producers (IPPs) with a recent fuel charge as passed to the consumers of 29 US cents per kilowatt hour. IPPs charge 7 US cents/kWh to generate power. The Antigua Public sees renewable energy as an opportunity to avoid purchasing oil for the generators, APUA and the government has not been able to obtain financing for solar or wind energy. APUA is currently allowing customers to self generate power and net meter their consumption. This is a highly attractive option for consumers that can generate up to 50 kW. The utility estimates that they can tolerate up to 15% of production from solar and wind power before the grid becomes unstable. Above 15% solar and wind APUA anticipates using batteries or capacitor banks to store energy, alternatives to battery storage have never been explored. Batteries and capacitors are relatively expensive and relatively short lived. Financing and grid stability issues are major barriers to solar and wind power. Wind measurements have been made but the locations chosen may not be suitable subject to environmental impact. Other sites are available and had some measurements.

The proposed alternative scenario

The proposed Alternative Scenario is to put in place the necessary legislative, institutional and financial mechanisms to finance a protected areas system plan by piloting a new park and associated fee system and linking financial sustainability to the piloting of a renewable energy installation -- innovatively stabilized through energy storage capacity of reservoirs in key watersheds. Without a GEF intervention, there is no systemic or specific financially sustainable model of biodiversity significant terrestrial park, no new significant renewable energy-- providing a financial stream for protected areas systems, and continued degradation of forest ecosystem through fires and invasives. Four components are proposed to link Sustainable Pathways for Protected Areas and Renewable Energy. The third component is a cross cutting effort to manage forests both for biodiversity benefits in the protected areas, to restore watershed management services and innovatively, as a source of energy storage through pumped hydro through existing reservoirs...

Component 1. Development of Sustainable Island Resource Financial Plan

A. Based on existing assessment develop the total cost of protected area management as well as the cost of the implementation of the Environment Management Act.

- Estimation of the cost of the implementation of biodiversity management, including protected areas;
- Estimate of the cost of implementation of the Environmental Management Bill;
- Identification of the potential sources of revenue;
- Development of business plan for the implementation of the financial plan for the systems of parks and the legislation;

B. Financial sustainability system for protected areas system piloted and scaled up.

- Develop scale up strategy for system wide collection of fees, and other park based financial instruments (concessions, etc...) based on the piloting of the Mount Obama NP financial sustainability plan.
- Collection and distribution system of financial support system for protected areas developed and linked to proceeds from Renewable Energy component 3 proceeds which will flow through the national trust fund being established under the Environment Management Act and supported through GEF Project #3858.

Component 2. Pilot expansion of Sustainable Island Resource Protected Areas: Mount Obama National Park. The project will strengthen the protected areas system by passing the necessary legislative framework and management needs for Mount Obama National Park. Demarcation and zoning of ecologically sensitive areas of the proposed part (during PPG phase) Preliminary local area plan consistent with the Sustainable Island Resource Management and Zoning Plan for the proposed Mount Obama National Park is prepared and submitted to Physical Planning, inclusive of ecologically sensitive areas, and watershed areas of import to APUA

- Finalize mapping and zoning and gazetting of contiguous of Mount Obama National Park (inclusive of identifying priority land swaps for sensitive areas) – 1109 hectares.
- Update flora and fauna inventories to provide the basis for biodiversity monitoring plan. Of importance, the measurement of State, pressure and response variables at each International Bird Areas (IBA) should be monitored annually to provide an objective status assessment and highlight management interventions that might be required to maintain internationally important biodiversity. Basic site status monitoring could be informed by species-specific status information related to IBA data.
- Integrate biodiversity priorities into the development and implementation of a fully participatory and consultative sustainable management plan which embodies the primary objectives of the park which are to: conserve biological diversity and preserve the ecology and structure of the natural tropical forest and value of ecosystem services, as well as a landscape of historical significance..
- Implement a comprehensive business plan focusing on a cost benefit analysis which will maximize support for biodiversity benefits while ensuring financial viability of the park
- Implement institutional management arrangements derived from wide ranging consultative process to include civil society, non-governmental organizations, the private sector (tour operators, tourist associations), and relevant government agencies.
- Prioritize and implement capacity needs for park personnel and key stakeholders, including surrounding communities through a fully participatory needs assessment process.
- Priority park infrastructure as outlined in management plans and sequencing of needs (visitor/park headquarters/interpretive centres including fee collection points, ranger stations, concession stands, trails, and signage) at two access points. Cades Bay and Christian Valley.
- Identify 1-2 research related partnerships with UWI, St. Georges (Grenada) and other academic institution for priority research related to biodiversity of global significance in the proposed park.
- Public education and outreach, marketing to visitors and national population of the biodiversity and ecosystem value of the proposed Park.
- Pilot financial sustainability plan for Mount Obama NP, taking into account biodiversity sensitivities, ecosystem services and carrying capacity of the protected area.

Component 3. Pilot Sustainable Island Resource Financial Plan – Renewable Energy in support of Protected Areas System.

The renewable energy sites include wind energy to be sited remotely from the protected area close to the diesel generators on Crabbs Peninsula, Solar Photovoltaics would be sited on available roof tops – mainly the larger government buildings, airport and schools. Storage of energy – should it prove feasible – would necessarily be in the upper water sheds as this is where the height difference between reservoirs is advantageous. Any new reservoirs (above or below existing ones) would allow for additional capacity and reduced erosion while the reforestation and preservation of the forest will reduce erosion and siltation of the reservoirs. Since 1997, APUA has shifted from rainwater and wells to 60% desalinated water with an attendant large electricity load. If the desalination operations were modulated to consume mostly renewable energy, they would need water storage within the water network and if the storage is at a high enough location, it will allow pumping operations to be incurred while wind and solar are providing the energy. While this water – energy – forest linked approach presents management challenges, the cost of a diesel powered water and energy system is already approaching extreme difficulty if alternate solutions are not explored.

Wind Measurements have been carried out at 4 locations for up to 2 years. The wind speeds average 7.1 m/s at 50 m height at the most favored location of Crabbs Point near the existing generators. This location will have the least interconnection cost and a high capacity factor of 45%. Subject to an environmental impact study including bird populations, this site would be developed. It will have further work done during the project preparation period to correlate measurements to long term airport readings and to design the wind farm lay-out and specifications for tendering.

Results All Stations (2010 – 2012)

	Average wind speed in m/s at 60 m	and at Hub Height	in MWh	in % of capacity
Crabbs	7.20	7.92	7,145	45.3 %
Guinea B.	7.11	7.35	6,452	40.9 %
McNish	7.88	7.91	7,795	49.4 %
Freetown*	6.59	7.55	7,068	44.8 %
Barbuda	6.47	6.98	5,806	36.8 %
Average	7.05	7.54	6,853	43.4 %

*) measurement in only 30 m, results in a drastic overestimation of hub height values (80 m)

UNDESA and APUA have reviewed the existing water supply infrastructure that is in the watershed of the protected areas. Using only the working dams, roughly 18 MWh of energy storage is available. Heights between reservoirs considered vary from 13 to 124 m. Additional reservoirs have fallen into disrepair but could be repaired. New piping would need to be installed as well as turbines in order to provide a pumped hydro energy storage function. Wind is lowest during the rainy season when the facilities could operate as a dispatchable straight hydro generating facility (three months in a typical average year). The water volume should be discounted due to siltation. Fires and Citronella grass have resulted in erosion above the reservoirs with up to 35% siltation of the reservoirs. There is discussion of dredging. Environment Division has started reforestation above Body Ponds but a large area remains to be reforested in order to address the severe erosion. Citronella grass burns easily and regrows quickly resulting in a spread or expansion of degraded areas. There are multiple sets of combined reservoirs that will be considered. For the pilot stage Brecknocks upper to Lower appears the easiest for a pilot while longer term, Wallings to Fishers could give back-up to shut down a medium sized generator set. Wallings is in a forest reserve and is functional but needs maintenance. It has an innovative stone lined catchment canal system and reservoir built in 1909 and is a tourist attraction. While there are several other possible combinations of reservoirs, and the detailed piping calculations will affect the feasibilities significantly, potential piping (1-2 m diameter) and turbine costs will be commissioned with hydro-engineers. The third option identified is one utilizing an existing low altitude reservoir and designing a new reservoir at 130 m above. This purpose adapted pair of reservoirs benefits from the high pressure difference to accomplish about 18 MWh with a 10 MW output. So if the use of existing reservoirs proves viable a pilot plant could be installed there while the scale up to nominal diesel genset size would come with the building of a high altitude differential reservoir. In wet season, the facilities would be operated continuously when water is spilling and as spinning reserve as inflow drops below spillage. APUA and UNDESA will model the real-time wind, solar and power demand of Antigua on a finer than one hour resolution using SCADA data and wind measurements as well as solar if available. Pumped hydro will be compared to other forms of storage including batteries and capacitors as well as combinations of the same. Land tenure is not an issue, as proposed interventions sites are all government owned lands.

Example Reservoir combinations and power output.

	Brecknocks 1-2	Brecknocks 2-Fisher	Wallings – Fisher
Power (kW)	1,150	884	10,187
Efficiency	0.7	0.7	0.7
Head (m)	33.5	12.9	123.8
flow (m3/s)	5	10	12
working volume (m3)	14,729	66,373	61,827
Storage (MWh)	1.0	1.6	14.8

A. Financial and Technical Feasibility

While there are few manufacturers of retractable turbines, these will be explored against the other hurricane resilience measures for fixed turbines.

There are 4 sites under consideration

- the industrial area at Crabbs next to the power plant and extending along the High voltage transmission towers past the industrial facilities to the edge of farm land.
- The vacant sugar farming land beside a major quarry and near to a double 33kV line at Creekside – also near to the measurements at Macnish Mountain.
- Guinea B.

- Farm land near Freetown

While the measurements at Crabbs peninsula are good quality, at other sites additional measurements should be made. The Crabbs location is along a road to the site of several diesel generating sets and a desalination plant. There are currently no dwellings in the area. There are water fowl at some distance from the wind farm site and according to national legislation an Environmental Impact Assessment will need to be made. It is acknowledged that there is a need to site the wind facility and operate it in a way that avoids and minimizes bird strikes, from both migratory and resident birds. The EIA process will be used to determine an optimum siting location, and will develop recommendations for avoiding or minimizing bird strikes through an environmental management plan.

ITPower completed a survey of installed-cost renewable energy installations in the Pacific and it is assumed that solar PV in Caribbean will be 4.5 \$/watt, wind 3.3 \$/Watt and hydro 1.8 \$/watt. These are relatively high costs but reflect transport and small scale installations. More detailed costing would be completed during project preparation and is hope to allow up-scaling the project.

APUA has set a limit for renewable energy at 7.5 MW due to dynamic fluctuations and grid integration issues. Consumers can input up to 50 kW each which is much larger than typical consumption. Pumped hydro will require special attention since it is not a net generator of power except in the rainy season. As a power back-up or spinning reserve the value is in the savings of not running diesel generators at part load as spinning reserve. At part load the gensets are less efficient and incur maintenance costs. Shutting down the diesel gen sets is therefore the opportunity for pumped hydro. The valuation of the pumped hydro as firm capacity is related to APUA's demand charge.

Water management integration with the pumped hydro function is a critical linkage – if the reservoirs continue to be more and more silted the reservoir volume needed for water storage and pumped hydro benefits are lost. (SFM)

While the government and the public utility are under review and support from the International Monetary Fund, a mechanism is being established under Environment legislation to create an environmental trust fund. The fund would hold renewable energy assets and assume an equity position utilizing Bilateral and GEF grant funds with the balance of finance assumed by developers. Developers could have a Build-Operate-Transfer agreement whereby electricity and back-up power services are sold to APUA as well as major consumers. The diversification of off-taking will enhance the financing prospects and would entail a wheeling agreement with APUA. Following the Transfer, APUA would be contracted as operator of the equipment. Thus the difficulties that could be faced if government or the public utility were to attempt finance as well as public opposition to private developers making windfall profits from renewable energy can be avoided. Generated funds will flow through the Antigua and Barbuda Conservation and Climate Change Adaptation Trust being established under the Environment Management Act and supported through GEF Project #3858.

B. Training on grid interconnection and control

Grid interconnection studies are needed especially if the wind site is further from the 69kV line than Crabbs. Out in the feeder system much less power can be accepted. Grid stability needs to be examined as well as the possibility of dispatching solar and wind to batch loads such as water desalination and water pumping to high level distribution tanks. Water desalination and pumping is the largest energy consuming process on the grid with many hotels as well as the utility operating reverse osmosis plants. In a related Energy for Sustainable Development in Caribbean Buildings project now at inception with CariCom CC Centre, UNDESA and UNEP, the options of building level generation and storage will be pursued.

C. Policy and regulation for feed-in Build Operate Transfer to APUA with Environment Management Transfer

APUA has a Build Operate Transfer agreement with one of the diesel generators and an adhoc purchase agreement with another.

D. Feasibility study for 10 to 20 MW wind and/or solar power integration with storage up to nominally 10MWh and 10 MW.

E. Initial pilot installation ~1 MW capacity installed with ~1.0 MWh pumped hydro energy storage.

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Net metering is being accepted by APUA for those installing their own systems for a limit of 1.5 kW per connection and up to a limit of 15% of peak demand or 12.5MW out of 75 MW peak. The utility in effect pays 0.4 \$/kWh to displace their production while the fuel surcharge fluctuates around 0.29 \$/kWh and private Independent Power Producers charge 0.07\$/kWh to convert oil supplied by APUA into electricity. Therefore going into negotiations a benchmark of 0.36 \$/kWh is the avoided cost to APUA. Renewable energy will carry some technical risk but no fuel price risk into the future. These figures will be subject to thorough review during the Project Preparation.

Being a public utility, the board may act in the public interest as they have demonstrated in allowing the net metering on solar PV. They have used Independent Power Producers routinely with a successful transfer of one diesel plant about to mature. The Energy Desk is setting policy in terms of renewable energy shares and the policy and regulatory as well as establishing appropriate wheeling charges will be explored during the project preparation and finalized during the project.

c) While a few models are still being considered, in order to ensure flows of financial returns to the environmental protection activities, the fund is proposed as the asset holder. There are some major hotels that want green power and would be prepared to invest in the power plant, pay wheeling charges and receive power at preferential rates compared to APUE diesel generated power yet still yield some of their savings to the protected areas as another environmental aspect associated with their hotel. There are significant technology grants being made available to SIDS following Copenhagen CoP.

There have been difficulties with APUA operated wind turbines in the past, staff is now better trained, however APUA and UNDESA agree that a Build Own Operate Transfer modality would be appropriate to ensure operations are optimal during the first few years. The technology provider need only own a quarter or so of the installations so that they are paid out during these few years while operations are transferred to APUA. APUA and the national trust fund (as asset holder) may find it convenient to use an O&M subcontractor to perform the Operations and Maintenance again geared to availability of the turbines to produce power therefore ensuring optimal performance.

Component 4. Enhancement of Forest Ecosystems

A. Stem degradation of forest ecosystems: Obama Nat'l Park Watershed and adjoining Body Ponds and Christian Valley Watershed 3,052 hectares) through fire and invasives control (Citronella grass) measures. Launch a nationwide fire prevention public awareness campaign, aimed not only at the general public but also stakeholder entities (Fire Dept, Forest Division, Police force, schools). This will generate benefits not only to the Mount Obama National Park and buffers, but to the country as a whole. Build capacity of targeted stakeholders in communities surrounding Mount Obama National Park to pro-actively prevent fires with associated management and control capacity in the areas of invasives.

B. Restore the forest above watershed conservation areas: the Bendals Valley, Wallings and Blubber Valley (est. 160 hectares) through reforestation to stop erosion of soil into the reservoirs and fire control to stop the spread of Citronella grass.

Execution Arrangements. The Environment Division will serve as Government counterpart or the National Executing Agency (NEA), and will be responsible for the overall management and supervision of the GEF project. The Permanent Secretary of the Ministry responsible for the Environment Division will appoint a **Project Manager (PM)** and **Project Coordinator (PC)**. As part of the project management arrangements, the **Project Management Committee (PMC)** a management body established for all GEF projects will function as the Project Board/Project Steering Committee for the project. The **PMC** will be composed of representatives from the Ministry of Agriculture, the Permanent Secretary of The Prime Minister's Office and a representative from the Ministry of Finance and a representative from the **Energy Working Committee** and be joined annually by the UNEP Task Manager. Specific execution responsibilities are foreseen, by component (see Stakeholder Table) which will be further elucidated during the project preparation phase. A part time, co-financed advisory role may be identified for UNDESA.

The incremental cost reasoning and expected baseline contributions

CURRENT PRACTICE (BASELINE)	PROJECT ALTERNATIVE (ADDITIONALITY)
Aside from a few smaller solar photovoltaic and wind home systems renewable energy has yet to be introduced in the country.	A demonstration with energy storage could prove out a strategy for deep renewable energy penetration. Direct impact on greenhouse gas emissions of about 100,000 tCO2 are anticipated with plans developed during the project for scale up to of 10 times as much. Adaptation to climate change will also be enhanced through better water management.
Financial support for operational costs of existing and projected Protected Areas System woefully underfunded, management minimal or absent in existing areas, and unavailable for recommended expansion in draft Protected Areas System. Enabling conditions through the creation of an Environment Fund in the Environment Management Bill will permit dedicated funding window to overcome this barrier.	Linking ownership of up to 10MW (in the long term) of new Renewable Energy to the new national trust fund, together with additional innovations in environmental levies will close the funding gap for protected areas project. This project will pilot 1MW of RE which should generate a return of \$600,000 per year once on line. The project will be targeting restoration of key watershed areas above Body Ponds, which is currently severely degraded (Citronella grass induced soil erosion). Protection of these areas will be a feature of an anticipated environmental levy on water users collected to scale up and maintain critical watersheds. Additionally the project will pilot a financial sustainability system at the Park level (Mount Obama) with a view towards establishing a scaled up model in year ¾ of project.

Global environmental benefits

Biodiversity (and SFM): The Project will assist in moving forward in the program to implement sustainable management of National Parks in the country through: (i) supporting the demarcation of the protected site; (ii) supporting the formulation of the protected areas management plan for the national park; (iii) supporting the development of capacity and an implementation mechanism to manage the park, (iv) providing the tools for inventorying, managing and monitoring; and (v) and the construction of basic park infrastructure. The resulting terrestrial model, the first of its kind, is intended to be replicated throughout Antigua and Barbuda as more areas are identified for declaration as protected areas. The expected global benefits of the GEF Alternative include: (i) improved participatory management and protection of globally significant biodiversity in the area to be declared, and (ii)

demonstration of a participatory management that would be replicable elsewhere in the country, (iii) fire prevention efforts, targeted restoration and intensified management of forested areas contribute to enhanced management practices in forest ecosystems and ecosystem services (watershed). Restoration efforts and avoided degradation lead to projected annual tons CO₂ savings 43,216 with potential total carbon benefit of 1,115,709 tons CO₂ over 30 years.

Climate Change: Aside from a few smaller solar photovoltaic and wind home systems renewable energy has yet to be introduced in the country although very good resources are available from both solar and wind. Diesel and bunker C oil generate around 1 tCO₂ per kwh. A barrier for utility scale renewable energy is the intermittent nature of solar and wind energy production. A demonstration with energy storage could prove out a strategy for deep renewable energy penetration. Direct impact on greenhouse gas emissions of about 100,000 tCO₂ are anticipated with plans developed during the project for scale up to of 10 times as much.

Specifically, using capacity factors determined by a GIZ funded study and MWh production figures (as in the PIF), the following is estimated:

1MW
0.43 capacity factor
0.987 tCO₂Mwh
7,000 MWh/year
6909 tCO₂/year
15 years
103,635 lifetime CO₂

Based on RETScreen with monthly data more than double higher turbine height the production estimate could be doubled during the project. Given the conservative nature of the initial estimate and confidence to remove the APUA imposed 15% limit on renewables, scaling up to 1,000,000 tCO₂ is achievable.

Innovation. While each component has a degree of innovation, the innovative elegance of this overall project can be found in deliberately linking the proceeds from investment in renewable energy and the financial support needed for an underfunded protected areas system. The RE component is particularly innovative in that it will be exploring the challenge of stabilization of fluctuating wind energy through an innovative pumped hydro storage system, which provides the stabilizing storage of energy. Declaring and managing a park under IUCN category will be a first for Antigua and Barbuda, and thus a model for the expansion of their protected areas system.

Sustainability. As co-financing to Component 1, the government has committed to permanently staffing the park. The management plan of the park furthermore envisions a business plan which would ensure that the priority management needs can be effectively met in the longer term. **The modeling of the RE component shows net proceeds upon completion of the set up, especially if the technology is contributed by a bilateral government.** Building and funding the capacity of APUA to operate the resulting infrastructure is built into project design. As the title of the project indicates, both of these components will put Antigua and Barbuda on the path towards building a sustainable protected areas system and meeting these fundamental financing requirements by linking proceeds from the RE component through the National trust fund, which will own the RE as per agreement. The underpinning of the stabilization of forest ecosystems tying these components only serves to enhance the sustainability factors. The water resource benefits, ability to modulate the power demand of the water utility and use of enhanced water storage as pumped hydro energy storage will dramatically reduce the grid stability barrier currently set at 15% penetration of wind and solar power. Thus the scale-up pathway will be much greater as a result of this project. The concept can be replicated in many islands and is already used in Hawaii and the Canary Islands.

Turbines and service turbine sites even with updated generator every 15 years are long term high profit activities. Antigua Barbuda are confident that if they can adequately prepare technical, social and environmental feasibility of the wind and solar photovoltaic installation sites and grid integration plans that subsidized technology will be made available from donors that are focusing such support on SIDS. Should subsidized equipment be secured during the project preparation, flows to the national trust fund would occur by the end of the project. Should grant technology be only partially secured, a mix of finance would be used whereby the GEF grant portion earns its share of profit while the others are paid out. Since the National trust fund is a public service facility, it would not pay royalties for utilizing wind energy. As a non-subsidized finance scenario, a feed in tariff of 0.22 \$/kWh, 70% financed at 8% interest with 8% fuel escalation yields IRR 18% on assets and 6 % on equity or 6 years simple payback. We will try to structure the flows to the Pas to start as the project ends.

Potential for Scaling up. The model Mount Obama National park is seen as a much needed first in the country to management a park for biodiversity conservation and ecosystem services purposes. The few existing protected areas are very focused on cultural heritage and tourism development. The proposed model will serve a model of terrestrial management for the country. The project is specifically designed to scale up the wind farm to other areas on the island. Under component 3.D, a feasibility study for 10-20MW of wind power integration with storage of up to 10MWH is planned.

Vis a vis national scale up, the project is specifically designed to scale up the wind farm to other areas on the island. Please note that under component 3.D. A feasibility study for 10-20MW of wind power integration with storage of up to 10MWH is planned. The above referenced has been added to section on Potential for Scaling Up, now on page 10.

Vis a vis Regional scale up, UNEP will use several avenues to promote its replication, or permutations thereof through its Greening the Economy initiative. Furthermore, news of the project's innovative design and its progress will be shared through the UNEP managed CaMPAM network of marine protected area managers which supports the Caribbean Challenge efforts with Italian financing. Replicability of the RE- pumped Hydro concept is already being explored by UNDESA in St. Lucia, Tonga, Timor Leste, Cooks Islands, to name a few. Regular GEF communication platforms such as the GEF Caribbean Constituency Meetings would also be an avenue of sharing.

A.2. Stakeholders

Stakeholders	Role
National Parks Authority, National Management Park Committee	Consultative partner
Barbuda Council	Consultative partner
Mount Obama Committee	Consultative partner
Codrington Lagoon National Park Committee	Consultative partner
Farmers, Land owners, Surrounding Communities	Consultative partners
Private Sector: Hotel Association and individual hotels, Cruise Tourism Association, Tour Operators	Consultative partners and co-financiers
NGOs: Environmental Awareness Group	Partner executing agency
APUA water and electricity divisions	Operators and beneficiaries
*Ministry of Agriculture, Lands and Housing and Environment: Physical Planning Dev. Control Authority Forestry Division Plant Protection Department Department of Agriculture Public Works Division Lands Division Fisheries Division *Ministry of Public Works and Transportation Public Works *Ministry of Tourism Promotion and Marketing *Ministry of Legal Affairs Attorney General's Office *Ministry of Finance, Economy and Public Administration *Prime Minister's Office, Energy Desk	Partner executing agencies and co-financiers
Environment Division, Ministry of Agriculture, Lands and Housing and Environment	Lead overall Executing Agency

A.3. Risks

RISK		Risk Mitigation Strategy
Delays in the passage of the Environment Management Bill, which includes set up of Environment Management Fund, the vehicle for cash transfers for this project. Provides an enabling environment to take additional measures to close the financial gap for protected areas management	M	Awareness campaign aimed decision makers and public to build support for the bill, through increased awareness of opportunities presented by the bill and specifically the fund. This is a precursor to the launching of this project, and is envisioned to be achieved during the PPG phase under another GEF supported project.

No Agreement for 10MW to be developed over long term, by the Environment Division to generate funding (through the National trust fund) for the protected areas system.	M	These agreements are stipulated as the enabling environment needed to launch the project and will be agreed during the PPG period and prior to CEO endorsement of the proposed project
Feasibility is not positive	M	Costing values are taken from studies of technology cost on SIDS where a premium can be paid for transport and smaller scale installations. Project options allow for achieving global benefits with equivalent technical and location options.
Compatible Government Lands are not made available for siting of RE	M	Opinion at this point is that the wind and hydro sites are compatible and not highly populated by sensitive biodiversity. Other sites have been identified and measured for wind. Solar would be roof mounted. Hydro facilities mostly exist already and are designated for that purpose.
Proximity of RE installation to Important Bird Areas	L	As per the Physical Planning Act, the siting of the RE and enhanced hydro storage would trigger an environmental impact assessment. Consistency with guidelines of the American Bird Conservancy with respect to siting and operation of wind turbines.
Intensified storms due to climate change	M	Retractable or protected wind turbines prioritized as technology choice. Rebuilding and strengthening dams structures for resiliency. Forest restoration enhancement efforts take into consideration resiliency.
Dry weather patterns and lack of public awareness result in increased fires in forest ecosystems, increasing vulnerability to establishment of invasives.	M	Improved fire management integrated into protected areas management plans, will increase sustainability of forest ecosystem services and decrease the spread of invasives into valuable forest ecosystems.
Illegal crops in intervention area present potential danger to rangers work and visitation.	M	Public outreach to inform all stakeholders of proposed park activities. Illegal crop activity taken into account in planning and implementation process.

A.4. Coordination

The project leaders and technical staff of the project will form the **Project Management Unit (PMU)** for the project. The PMU will act as an advisory body to the project providing high-level technical guidance, policy input and support. The PMU will have a role in facilitating communication, technical cooperation and coordination among stakeholder agencies and other project partners. The PMU reviews technical documents and provides advice and information to consultants working to complete project activities.

The **NEA along with the PMU** will assist projects with inter alia for: recruitment of international and national consultants, including candidate search/selection; of TORs; supervision; project coordination, including organization of regular meetings with project implementing agency; financial management and accountability; issuance of payments; training staff on reporting; ensuring completeness and timeliness of reporting; technical reporting including preparation of progress reports; monitoring and evaluation; organization of training/workshop activities. The **PMU** will meet monthly and coordinate quarterly technical update meetings with a wide range of project stakeholders.

The **Project Coordinating Committee (PCC)** is the forum through which project updates will be given to the wider stakeholder community and the general public. The PCC will meet twice times per year and will receive updates on all environment related projects being implemented in Antigua and Barbuda. They will also discuss other issues related to MEA negotiations and the GEF small grants program.

The project will be carried out in close coordination with other recently approved and relevant GEF-5 projects in the UNEP/GEF Portfolio including: Energy for Sustainable Development in Caribbean Buildings, LGGE Promoting Energy Efficiency and Renewable Energy in Buildings in Jamaica, Bahamas Pine Islands - Forest/Mangrove Innovation and Integration (Grand Bahama, New Providence, Abaco and Andros, St. Lucia Iyanola - Natural Resource Management of the NE Coast as well as Caribbean Challenge related efforts, with a view towards knowledge sharing and opportunities for cross fertilization of ideas and cost effectiveness. Further coordination efforts will continue to be made by UNEP vis a vis the GEF funded OECS project, through observer status participation on the Caribbean Biodiversity Fund Board (CBF) . Furthermore, UNEP will commit to ensuring that the present proposal further strengthens the A & B Conservation and Climate Adaptation Trust” (AB/CCAT) being created under the aforementioned OECS project. These are all managed as part of the UNEP/GEF Caribbean biodiversity portfolio, and monitored by UNEP’s Caribbean Regional Focal Point (task manager for this project).

B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1.National strategies and plans or reports and assessments under relevant

conventions, if applicable, i.e. NAPAs, NAPs, NBSAPs, National Communications, TNAs, NCSAs, NIPs, PRSPs, NPFE, Biennial Update Reports, etc: (1)

UN Convention on Biological Diversity (CBD): This project is directly linked to the National Environmental Management Strategy (NEMS) for Antigua and Barbuda. Specifically, it addresses the protection of critical biodiversity areas which is a major goal of the strategy. The NEMS came out of the government’s regional commitments to meet its objectives under the Rio Conventions as well as the regional agreement called the St. Georges Declaration. Endorsed in 2001, the NEMS is the blue print which is being used by the government to achieve the goals set out by the St. Georges Declaration. This project falls under a number of the principles of the NEMS. These include:

- Principle 13 – Protect and Conserve Biological Diversity
- Principle 11 – Ensure the sustainable use of Natural Resources
- Principle 7 – Foster broad-based environmental education, training and awareness

It is also directly linked to the country’s plan for the development of a system of protected areas. With specific reference to how the project relates to protected areas for example, the sites that are being considered as part of this project have been identified as areas critical to the effective development of a system of protected area for Antigua and Barbuda. These proposed Obama National hosts a number of species of flora and fauna that are endangered or are being threatened in some way. Additionally, the project will help to make the objectives of the National Biodiversity Strategy a reality as it undertakes the advance the financial sustainability of the protected areas system through innovative linking to renewable energy capacity and returns. . This project will effectively help to achieve three of the objectives outlined in the NBSAP. These include:

- Objective 1: A national system, including protected areas, for the management and conservation of biodiversity conservation is developed and established.
- Objective 2: The capacity of governmental natural resources management institutions, as well as non-governmental organizations, to support the objectives and achieve the overall aim of the BSAP is strengthened.
- Objective 4: Public awareness of environmental issues, ecological education and public participation in decision-making is strengthened.

Antigua and Barbuda has ratified **The Convention for the Protection and Development of the Marine Environment in the Wider Caribbean Region – Cartagena Convention**. Of particular relevance is the **Protocol Concerning Specially Protected Areas and Wildlife (SPA) in the Wider Caribbean Region**, [although its principles are enshrined in existing national laws, is pending ratification by Antigua and Barbuda] committing to protect, preserve and manage in a sustainable way: 1) areas and ecosystems that require protection to safeguard their special value, 2) threatened or endangered species of flora and fauna and their habitats, and 3) species, with the objective of preventing them from becoming endangered or threatened.

“The strategic intent of the National Energy Policy for Antigua and Barbuda ... is to: *Create a stable, efficient and sustainable energy sector that fosters national economic and social development by establishing an enabling environment that exploits indigenous energy resources and reduces the total dependence on fossil fuels*. The policy outlines priorities which include to: Develop Plans to add utility scaled solar power facilities as approved renewable energy source to add 15% to the utility supply grid by 2025. Provide an enabling legal and regulatory framework for the deployment of RE technologies with particular emphasis on wind, solar and biofuels.”²

The Second National Communication to the UNFCCC identifies a scenario for solar and wind electricity penetration at significant scale.

Distributed photovoltaic	None	10 MW by 2030	15 MW by 2030 S3 only
Wind	None	10 MW in 2015, 15 MW in 2025	15 MW in 2015, 20 MW in 2025 (S3 only)

The **GEF National Portfolio Formulation Document (NPF) for Antigua and Barbuda** highlights this project as a priority for Antigua and Barbuda under GEF-5

B.2. GEF Focal area and/or fund(s) strategies, eligibility criteria and priorities: (0.5)

² Excerpt from the: Draft National Energy Policy Antigua and Barbuda December 2010 edition

Biodiversity (BD) Strategy: The project will promote the conservation and sustainable use of biodiversity and the maintenance of ecosystem goods and services through the improved management of protected area systems with a view towards long-term positive impacts in representation of terrestrial and marine ecosystems, and threatened species. The project will address **Strategic Objective 1** to improve sustainability of protected area systems through development of site specific management plans underpinned by strengthened management and monitoring effectiveness. **At the strategic outcome level**, the project will reduce the funding gap through the development and implementation of sustainable financing modalities through renewable energy generation and water management.

Aichi Targets: The project is consistent with making progress towards the following Aichi Targets

- Target 5. By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
- Target 11. By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.
- Target 12. By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained

Climate Change (CC) Strategy: The project will address **Strategic Objective 3**, to promote investment in renewable energy technologies and more specifically create a favorable policy and regulatory environment created for renewable energy investments, increase investment in renewable energy technologies. **At the strategic outcome level**, the project will mobilize at least \$4 million of investment and directly reduce GHG emissions by 100kt CO₂e with near term indirect impact of 1Mt CO₂e.

The project will be consistent with the **Sustainable Forest management/REDD-Plus Strategy**, supporting protected area management regimes that strengthen conservation, sustainable management of forests, mangroves and enhancement of forest carbon stocks.

Due to increased probability of drought due to climate change as well as growth in water demand there is a need for additional water storage, protection of the watershed will help to ensure water availability and reduce erosion that could result in siltation of the reservoirs. Additional water storage is proposed at an elevation above or below the existing reservoirs in the Body Ponds and Christian Valley Watersheds separated by enough altitude to be useful as pumped hydro energy storage as well. Water at high altitude may be useful for small scale fire fighting as well as being used by local plant and wild life especially in dry years.

B.3. The GEF Agency's comparative advantage for implementing this project: (0.5)

UNEP's comparative advantage derives from its mandate to coordinate UN activities with regard to the environment, including its convening power, its ability to engage with different stakeholders to develop innovative solutions and its capacity to transform these into policy- and implementation-relevant tools. UNEP's comparative advantages in the GEF are aligned with its mandate, functions and Medium Term Strategy and its biennial Programme of Work (2012- 2103). The proposed project is consistent with the Ecosystem management and Climate Change thematic priorities. Specifically the project seeks to support Antigua and Barbuda to address: degradation of selected priority ecosystem services, and to make sound policy, technology, and investment choices that lead to a reduction in greenhouse gas emissions and potential co-benefits, with a focus on clean and renewable energy sources. The proposed project is consistent with the expected UNEP accomplishment to support increased carbon sequestration occurs through improved land use, reduced deforestation and reduced land degradation and to support country policymakers and negotiators, civil society and the private sector in their access to relevant climate change science and information for decision-making. This proposed project is in line with UNEP's role in the GEF to catalyze the development of scientific and technical analysis and advancing environmental management in GEF-financed activities. In particular, the project further complements UNEP's aim to promote specific methodologies and tools that could be replicated on a larger scale.

UN DESA is mandated under the Mauritius Strategy for Implementation and the Barbados Plan of Action to support SIDS in their particular set of circumstances and vulnerabilities. The outcome of Rio+20 emphasizes coherent integrated approaches to sustainable development. This project exemplifies the synergies that can result from integrating energy, water, forest and biodiversity management. UNDESA in partnership with UNEP are pursuing a Low Carbon Resilient SIDS project in 4 SIDS including Tonga, Timor Leste and Maldives.

The project will also benefit from the recognized expertise of the **Caribbean Environment Programme Regional Coordinating Unit/Secretariat** to the Cartagena Convention in matters related to the marine and coastal environment and in working in a multi-lingual environment, as well as its expertise in implementing the Cartagena Convention and particularly its SPAW Protocols CAR RCU's specialized **Regional Activity Centre** for the Implementation of the Protocols on Specially Protected Areas and Wildlife is located in Guadeloupe and supported by the Government of France. The project will include this specialized technical RAC in its networking and coordination activities, in any stakeholder and partnership arrangements.

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this template. For SGP, use this [OFP endorsement letter](#)).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Diann Black Layne	GEF Operational Focal Point	Ministry of Agriculture, Lands, Housing and the Environment	

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for project identification and preparation.					
Agency Coordinator, Agency name	Signature	DATE (MM/dd/yyyy)	Project Contact Person	Telephon e	Email Address
Maryam Niamir-Fuller, Director, GEF Coordination Office, UNEP, Nairobi		04/18/2013	Kristin Mclaughlin, Task Manager	202-974- 1312	Kristin.mclaughlin @unep.org