PROJECT IDENTIFICATION FORM (PIF)

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

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PART I: PROJECT INFORMATION

Project Title:	**Promotion of environmentally sustainable and climate-resilient grid-based hydroelectric electricity through an integrated approach in Sao Tome and Principe**		
Country(ies):	Sao Tome and Principe	GEF Project ID:[1]	5334
GEF Agency(ies):	UNDP	GEF Agency Project ID:	4602
Other Executing Partner(s):	Ministry of Energy and Natural Resources (MENR), *Empresa da Agua e Electricidade* (EMAE – water and electricity company), Central Bank of Sao Tome and Principe	Submission Date: Resubmission Date:	21 February 2013 11 April 2013
GEF Focal Area (s):	MULTIFOCAL AREA	Project Duration (Months)	60 months (5 years)
Name of parent program (if applicable): • For SFM/REDD+ ☒ • For SGP ☐		Agency Fee ($):	501,081

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK[2]:

Focal Area Objectives	Trust Fund	Indicative Grant Amount ($)	Indicative Co-financing ($)
CCM-3: Renewable Energy: Promote investment in renewable Energy technologies	GEF TF	1,776,484	10,890,000
LD-3: Reduce pressures on natural resources from competing land uses in the wider landscape	GEF TF	2,443,151	5,700,000
SFM-1: Reduce pressures on forest resources and generate sustainable flows of forest ecosystem services	GEF TF	1,054,909	3,800,000
Total Project Cost		5,274,544	20,390,000

B. INDICATIVE PROJECT FRAMEWORK

Project Objective: To introduce an integrated energy and ecosystems-based approach to grid-based hydroelectric electricity generation in Sao Tome and Principe.

Project Component	Grant Type[3]	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount ($)	Indicative Cofinancing ($)
1. Policy, institutional, legal and regulatory framework for on-grid mini-hydro established	TA	Streamlined and comprehensive market-oriented energy policy and legal/regulatory framework for on-grid, mini-hydro electricity generation by Independent Power Producers (IPPs)	1.1 Appropriate policy and legal/regulatory framework established and operational, including development of updated integrated resource and forestry/watershed management master plan[4] and environmental safeguards for site applications 1.2 Technical report on grid capacity requirements to enable feed-in for grid-connected hydro systems followed by development of an updated grid code 1.3 Established procedures and	GEF	$380,000 (CCM) $142,500 (SFM) Total= **$522,500**	2,428,000

[1] Project ID number will be assigned by GEFSEC.
[2] Refer to the reference attached on the Focal Area Results Framework when completing Table A.
[3] TA includes capacity building, and research and development.
[4] This will include support for updating and finalizing the National Forestry Management Master Plan, which has been in draft form for several years.

			standardized PPAs for the introduction of a transparent procurement process in the selection/award of hydro sites by private developers 1.4 One-stop shop for issuance of construction licenses and permits to private mini-hydro developers. 1.5 Methodology developed for a joint environmental (including climate resilience), economic and financial evaluation of on-grid hydro plants in line with government regulations and policies[5] 1.6 Capacity developed within EMAE, local banks and key national actors such as Ministries of Energy and Finance to appraise mini-hydro projects for PPAs and lending			
2) Promoting investment in mini-hydro through appropriate catalytic financial incentives for project investors	TA & INV	Increased mini - hydro capacity of 4 MW installed by private developers leading to 11,913 MWh of electricity generated per year from mini-hydro plants on the grid by end of project (reduction of 168,780t CO2 over their lifetime)	2.1 Renewable Energy Guarantee Scheme (REGS) established and capitalized to support private investment in grid connected mini-hydro to EMAE 2.2 MOU signed with Central Bank of Sao Tome to set out the objective, funding mechanism, administration rules and confirmation of their participation as fiduciary agent of the REGS 2.3 Installed capacity of 4 MW of on-grid generation from mini-hydro IPPs (with off-take partially guaranteed from REGS) commissioned at various sites by end of project[6] 2.4 Signed Agreements between private investors and EMAE covering the obligations and rights of the partners regarding installation, operation and maintenance of all mini-hydro systems supported under the project 2.5 Standardized baseline developed for hydro sector leading to reduced carbon finance transaction costs	GEF	1,326,660 (CCM) Total= **$1,326,660**	8,250,000

[5] Climate resilience analysis will include measures to mitigate the possible impacts of CC-induced increased sediment loading (along with other factors such as changed composition of water) in hydropower plants which can lead to greater exposure to turbine erosion and generator efficiency, resulting in a decline in energy generated (and less envisioned GHG reductions).

[6] Measures will be adopted to ensure systematic monitoring of GHG emission reduction from the hydropower plants throughout their lifetime

3) Watershed and sustainable forestry management and implementation	TA & INV	Pressures on natural resources from competing land uses and hydro energy development in 10,000 ha of the country's inland watersheds are reduced through uptake of SLM and SFM practices leading to the following benefits: ***LD*** *- reduced water deficiency* *- reduced erosion and flooding* *- increased sediment retention* *- increased dry season stream flows (where applicable) and groundwater recharge* ***SFM*** *- Direct rehabilitation of 3,000 hectares of secondary forest around planned hydro sites and in critical riparian zones resulting in 444,000 t/CO2 of additional carbon stocks* ***BD*** *Stabilization of 20% of all forest buffer zones around Obo National Park (covering 29,500 ha)*	3.1 Institutional planning and interventions for watershed management *- Integrated watershed plans in place* *- Definitions established in plans of threat hotspots, measures to address threats and legal provisions for management and protection* *- Conservation farming practices*[7] *identified and piloted over 10,000 ha* *- Fire management practices operational over 10,000 ha* *- Site-specific forest rehabilitation done over 3,000 ha* 3.2 Institutional Framework for SLFM governance *- A national legal framework for SLFM is under construction* *- An SLFM unit in charge of SLFM installed under the National Coordination Committee/CCD is functional* *- Guidelines for mainstreaming of SLFM principles and priorities into the agriculture and forest sectors developed and operational* 3.3.Framework for re-investment of energy proceeds into community conservation *- Mechanism for establishment of community trusts in all hydro sites* *- Benefit sharing schemes established between IPPs and communities for maintenance of ecosystems services*	GEF	$2,320,994 (LD) $866.788 (SFM) Total= **$3,187,782**	8,962,000
		Subtotal			5,036,942	19,640,000
		Project Management Cost (PMC)[8]		GEF	237,602	750,000

[7] The possible measures to be piloted will include (to be defined at PPG phase) minimum and reduced tillage; biomass management + mineral applications; grassed banks, cover and green manure cropping; alley cropping,;contour farming & strip cropping; organic and biodynamic farming; mulching and integrated pest management (IPM)

[8] To be calculated as percent of subtotal.

Total Project Cost			5,274,544	20,390,000

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

Sources of Cofinancing	Name of Cofinancier	Type of Cofinancing	Amount ($)
National Government	Government of Sao Tome & Principe	Cash and in-kind	1,500,000
GEF Agency	UNDP	Cash & in kind	1,000,000
Multilateral Aid Agency	European Union (EUEI PDF)	Cash & in kind	1,000,000
Multilateral Aid Agency	UN-REDD / Congo Basin Forest Fund	Cash	7,000,000
Private sector	Private investors & banks	Cash & in kind	3,000,000
Non-governmental organization	Clinton Climate Initiative	In-kind	50,000
Multilateral Aid Agency	SE4A, SIDS DOCK	Cash	6,840,000
Total Co-financing			**20,390,000**

D. INDICATIVE TRUST FUND RESOURCES ($) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY[1]

GEF Agency	Type of Trust Fund	Focal Area	Country Name/Global	Grant Amount ($) (a)	Agency Fee ($) (b)[2]	Total ($) c=a+b
UNDP	GEF TF	Climate Change	Sao Tome and Principe	1,776,484	168,766	1,945,250
UNDP	GEF TF	Land Degradation	Sao Tome and Principe	2,443,151	232,099	2,675,250
UNDP	GEF TF	SFM	Sao Tome and Principe	1,054,909	100,216	1,155,125
Total Grant Resources				5,274,544	501,081	5,775,626

[1] In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

[2] Indicate fees related to this project.

E. PROJECT PREPARATION GRANT (PPG)[9]

Please check on the appropriate box for PPG as needed for the project according to the GEF Project Grant:

	Amount Requested ($)	Agency Fee for PPG ($)[10]
• (upto)$150k for projects up to & including $6 million	**100k**	**$9,500**

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

Trust Fund	GEF Agency	Focal Area	Country Name/ Global	(in $)		
				PPG (a)	**Agency Fee** (b)	**Total** c = a + b
GEF TF	UNDP	Climate Change	Sao Tome and Principe	50,000	4,750	54, 750
GEF TF	UNDP	Land Degradation	Sao Tome and Principe	50,000	4,750	54,750
Total PPG Amount				**100,000**	**9,500**	**109,500**

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[9] On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

[10] PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

PART II: PROJECT JUSTIFICATION[11]

PROJECT OVERVIEW - A.1. Project Description

Global environmental problems, root causes and barriers that need to be addressed

Africa remains the region with the lowest ratio of hydroelectric deployment-to-potential, and the opportunities for growth are very large across the continent. However in Africa – and particularly in African SIDS – complicated competing priorities and unique vulnerabilities mean that hydropower development is not always straightforward. In Central Africa the total current installed capacity of hydropower – most of which is large-scale – is currently around 3,816MW out of a total potential capacity of 419,000 MW.[12] Significant planning, consultation, safeguards and incentives are required for hydropower development, especially in SIDS with fragile forest ecosystems. In addition, the unique combination of inaccessibility and relatively small populations exposes SIDS in the region to the enduring challenges that arise from lack of economies of scale, high oil prices, high transportation and communication costs, expensive public administration and infrastructure, and lack of skilled human capital. Thus the transformation of the energy sector in SIDS to an economically viable and environmentally friendly system requires a comprehensive and multi-faceted approach in the design of the appropriate policy and planning frameworks and incentives to fully integrate RE technologies in way that is climate resilient and minimizes negative impacts on ecosystems.[13]

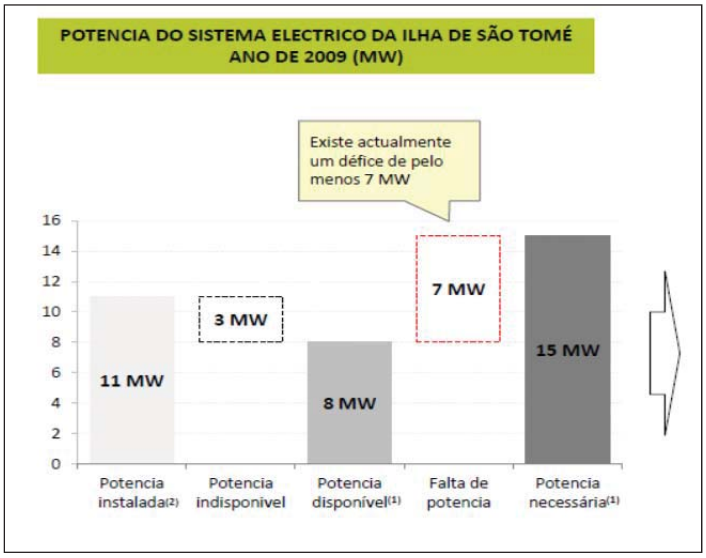
The country of São Tomé and Príncipe (STP) is a case in point. The country is heavily dependent on the support of the IMF and other donors. Despite policy slippages under its previous IMF agreement, the government has signed a new three-year, SDR2.59m (US$3.9m) program under the IMF's extended credit facility (ECF) which followed São Tomé's enactment of a new national poverty reduction strategy (NPRS). The new NPRS focuses on making the economy more competitive by increasing investment in infrastructure (which is badly neglected) and promoting agriculture, fisheries and tourism as key sectors for growth and employment.[14]

Status of the Energy Sector

Despite relatively steady economic growth in recent years and associated surging demand particularly for electricity, the country's energy system is in dire condition and needs rapid reform and investment in the NPRS targets are to achieved. Out of a total installed generation capacity of 12.3 MW (2012), about 2MW is currently based on hydropower while the remainder is being produced by conventional thermal power plants. The country is solely dependent on oil imports from Angola (oil consumption and imports in 2009 were around 1,000 barrels a day; the fuel comes mostly from an Angolan supplier that has an effective monopoly). Spending on fuel imports amounted to US$ 16 million in 2009, or 15.4% of the total imports to the country.

Figure 1 – National energy supply/demand balance (2009) (Source: EMAE/Gesto)

[11] Part II should not be longer than 5 pages.
[12] HYDROPOWER RESOURCE ASSESSMENT OF AFRICA, MINISTERIAL CONFERENCE ON WATER FOR AGRICULTURE AND ENERGY IN AFRICA: THE CHALLENGES OF CLIMATE CHANGE, 2007
[13] *Policy Challenges for Renewable Energy Deployment in PICTs*, IRENA Policy Brief, 2012
[14] Economist Intelligence Unit Report, São Tomé and Príncipe, 1st Quarter 2013



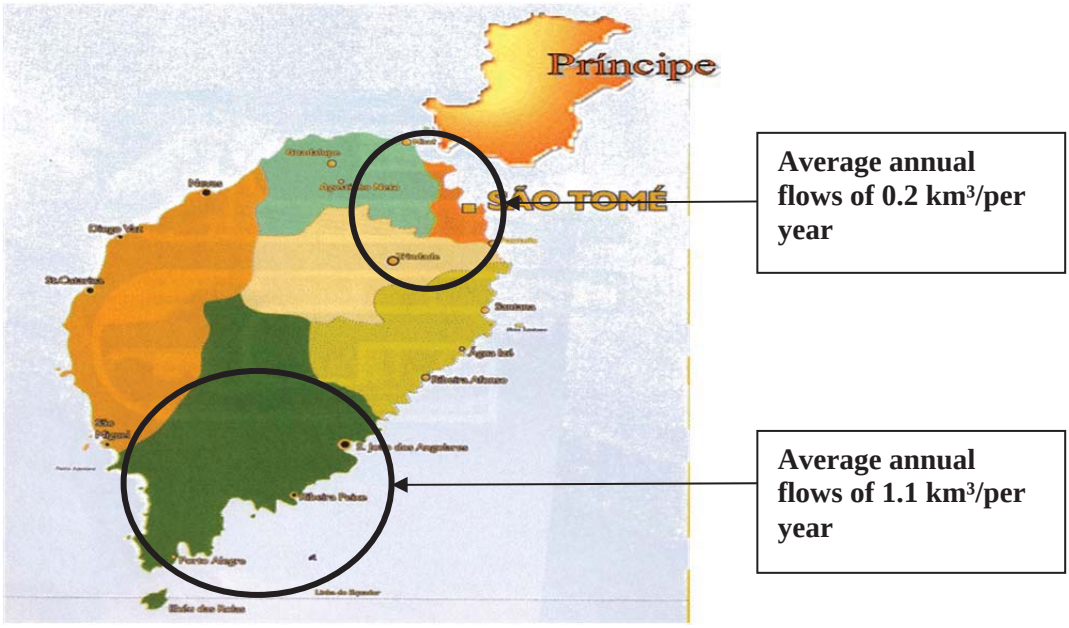
Demand has now risen to 15MW and is expected to continue to increase with economic growth (see Figure 1 – in the long-term the new harbor that is being constructed in São Tomé will alone need about 20 MW when it comes online). The total capacity of all current systems is now about 8.7 MW and the country has an immediate energy deficit of 6-7 MW. However numerous studies have shown that the country has massive generation potential for hydropower; ***a recent study estimated that the country has a total potential installed capacity of 63 MW that can be deployed in the short and medium-term, in sizes ranging from micro- up to 3 MW***. As of 2009, approximately 4 MW of new hydropower capacity was under construction in the country (developed by EMAE). A very detailed resource mapping and feasibility assessment of the country's hydropower potential has been carried out with the support of Taiwanese development cooperation but the country still lacks an appropriate policy and legal/regulatory framework to attract and regulate on-grid hydropower investment from IPPs. Meanwhile a lack of access to electricity for about 40% of the population has been identified by the government and international donors as a central constraint for the country's development. One of the other problems associated with current and previous donor activities in the energy space is that various actors have small insular projects that are not integrated into a wider vision or strategy, nor connected to the relatively small grid (due to the size of the two islands).

Water and Forest Resources

As regards the broader ecosystem upon which hydropower depends, STP is biogeographically part of the Congo Basin, an area which constitutes the second largest area of dense tropical rainforest in the world. As noted in a number of studies, in STP ***the viability of inland water ecosystems are closely linked with forest ecosystems and present a high degree of interaction, not only between flora and fauna but also man-ecosystem interaction***.[15] There are 50 riverbeds on the islands, with inland springs flowing across dense forests towards the ocean. The total capacity is 2.1 million m^3 of water/km^2, equivalent to 10,000 m^3/year per inhabitant. However the spatial distribution of streams is unequal: more than 60% of streams are in the southwestern and southern part of the two islands due to the greater amount of rainfall in these areas (see Figure 2). The country's largest river is the Ió Grande whose watershed is located in the southeastern area. The rivers Quijá and Xufexufe are located in the South; the Ouro, Lembá and Contador rivers are located in the North; and in the central part of the island are the rivers Manuel Jorge and Abbot. On Príncipe there is the Parrot River, which is the longest and begins in the South.

[15] NATIONAL REPORT ON THE STATUS OF BIODIVERSITY IN S.TOMÉ AND PRÍNCIPE, September 2007

Figure 2 –Hydrological Patterns - São Tomé and Príncipe



Approximately 28.1% of STP's land mass – or about 27,000 hectares – is forested. Of this 44.4% -- or roughly 12,000 hectares – is classified as primary forest (called "*Obo*"), the most bio-diverse form of forest. Secondary forest (referred to as "*capoeira*") occupies nearly 30% of the country's surface. The secondary formations (*capoeira*) are typically vegetal communities already under human intervention and are mostly comprised of organized plantations such as cacao, coconut, and coffee which are almost all perennial. There is also a variety of exotic species (trees or shrubs) with specific production or protection functions. It is estimated that Sao Tome and Principe's forests contain 4 million metric tons of carbon in living forest biomass (FAO).

In addition to their role as carbon sinks, the preservation and sustainable management of Santomean forests are of crucial importance to the country's agrarian system (regulation of rainfall, insulation and evapo-transpiration); protection of hydrographic basins; protection of soil against erosion; recycling of nutrients and the reconstitution of natural fertility in soils. In 1988, scientists classified the forests of São Tomé and Príncipe as the second most important in terms of biological interest out of 75 forests of Africa (World Bank). Obo National Park is the main protected area in the country covering some 29,500 ha (30% of the island of São Tomé in its south and 65 km² of Príncipe Island). The national park is internationally recognized among conservationists for its biologically rich dense virgin rainforests. It is also characterized by a wide range of biotopes, from lowland and mountain forest, to mangroves and savanna area which contribute to its unique ecosystem. The park includes virgin Atlantic high altitude rainforest (primary forest) and *capoeira* forests, which are mainly abandoned plantations. The WWF has listed the forests of the national park as among the Global 200 (the 200 most important biological areas on the planet) and the forests of Obo are listed as an Important Bird Area (IBA) of Africa.

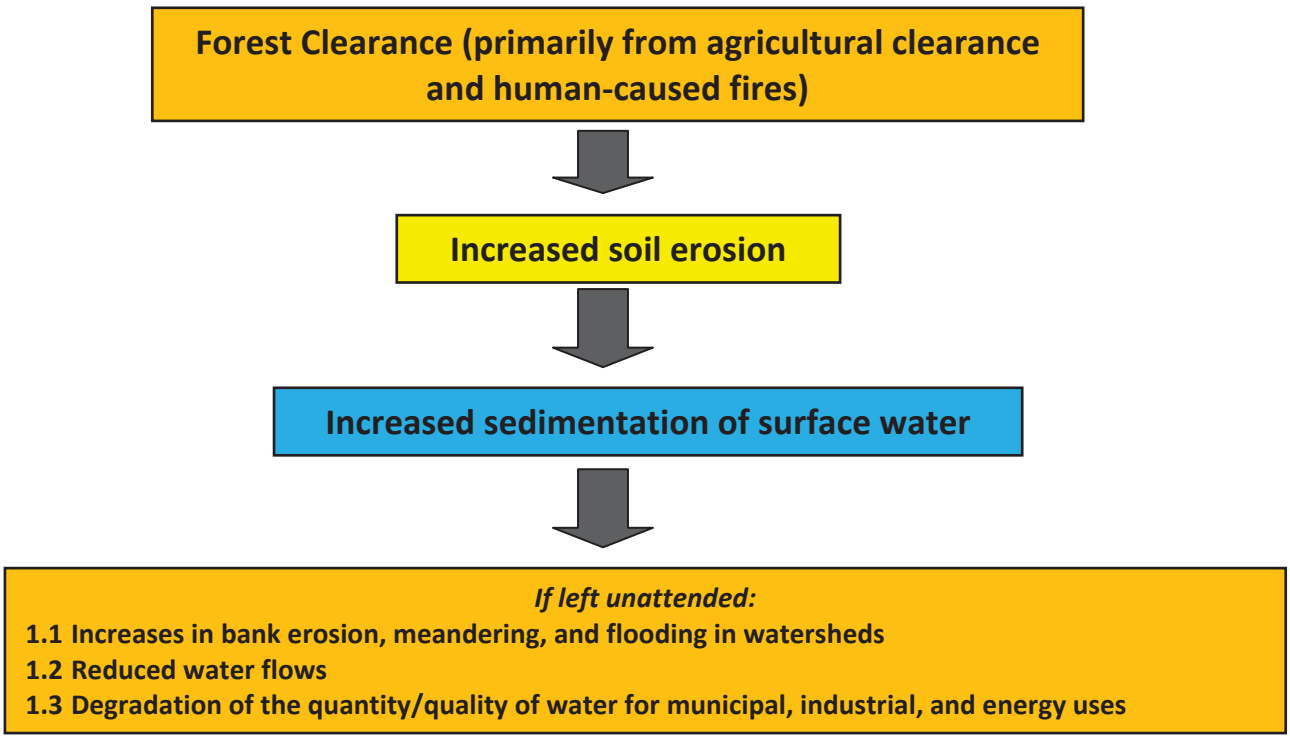
Unfortunately the country's forests – particularly the low-altitude regions – have undergone considerable degradation from their original vegetation type stemming in large part from the introduction of crops such as sugar cane, coffee and cacao. Land degradation has been happening since colonial times in STP but in recent times has been exacerbated. One particular government initiative – the Land Distribution Project (PPADPP) initiated in 1993 – has had a considerable effect on the country's forest cover. During the course of that program some 27,121 ha of land was distributed, of which 10,362 ha was given to small-holding families and another 7,759 ha was given to medium-sized agricultural businesses. During the same period, a total of 8,872

family farms were created as well as a total of 230 medium-size agricultural businesses.[16] Although PPADPP contributed to the creation of small independent farmers and led to positive increases in food production, from an environmental point-of-view the PPADPP's impacts were negative. The program led to wide-spread indiscriminate and illegal clear cutting of trees, including the deforestation of areas with declining tree populations. The program also began the practice – now commonplace in several parts of the country – of raising crops in relatively high slopes, without the application of measures against erosion. This has led to steady and massive reduction of vegetation coverage leading in turn to erosion and soil fertility losses. Moreover in many areas crop land is used intensively, without crop rotation or fallow periods and/or intercropping with leguminous plants. A cycle of soil degradation with loss of fertility and eventual desertification has thus begun in many areas.

A related and similarly damaging pressure on STP's land ecosystem comes from uncontrolled practice of human-caused fires of small woodlands and plowing fields done by farmers to clear land. The reason appears to be economic; most farmers cannot afford land clearance using mechanical plowing. The repeated practice of human-caused fires – in most cases yearly – has a negative effect on the vegetation whose growth is seriously affected. The excessive use of chemical fertilizers in traditional farming practices further contributes to the impoverishment of the country's arable lands.

In summary, as regards the specific physical interaction of land use change and impacts on inland water ecosystems, current trends in STP reveal that forest clearance and unsustainable land use practices are causing soil erosion which in turn has led to increased sediment loads in many watersheds (see Figure 3 below). If left unattended these processes can be expected to have several broader impacts: 1) major increases in bank erosion, meandering, and flooding in watersheds**;** 2) reduced water flows; and 3) degradation of the quantity and quality of water for municipal, industrial, and energy uses (which is a threat to utilization of the country's hydro potential).

Figure 3 – Physical Causes of Land Use Change and Impacts on Watersheds – São Tomé and Príncipe



[16] Information from the cancelled UNDP/GEF project "Legal and Institutional Capacity Development for the Mitigation of Soil Degradation and Deforestation in São Tomé & Príncipe"

Vulnerability of the Hydropower sector to Climate Change

As a backdrop to these worrying trends in the energy and natural resource sectors is the vulnerability of the islands to climate change and its expected impact on realization of hydropower potential. *In STP annual temperatures have risen by approximately 0.4°C between 1960 and 2006 and are expected to increase by between 0.8 and 2.4°C by 2060.* Statistically significant trends indicate that March to May rainfall has been decreasing whilst heavy rainfall during the September to November period has been increasing.[17] Future projections of rainfall suggest a likely increase in rainfall during the October to December period with accompanying increases in heavy precipitation. These hazardous events lead to impacts on water availability through decreases in river flow and flooding due to heavy rainfall. These risks and associated losses are expected to increase in some regions of the country due to the increased availability of atmospheric moisture and intensity of rainfall in the future. Severe weather, associated with convective weather, atmospheric heating and moisture, will likely increase in many regions and can result in increases in rain, hail and winds, leading to damages to agriculture and energy infrastructure.

The main impacts of climate change on hydropower projects which must be considered in a Sao Tome context are as follows. First, the forecasted changes in the available discharge of various rivers (which is usually related to local weather conditions, such as temperature and precipitation in the catchment area) will have a direct influence on economic and financial viability of any hydropower project. Hydropower operations may have to be redesigned to the extent that hydrological periodicities or seasonality change; if the flow of water changes, different power generating operations, e.g., peak versus base load, would be possible using other designs for water use, such as reservoirs. Second, the above-mentioned expected increase in climate variability may trigger extreme climate events which can impact operations and damage infrastructure. Finally, changing hydrology and possible extreme events must of necessity impact sediment risks and measures. More sediment, along with other factors such as changed composition of water, could raise the probability that a hydropower project suffers greater exposure to turbine erosion, which in turn results in less power output. An unexpected amount of sediment will also lower turbine and generator efficiency, resulting in a decline in energy generated.[18] Another climate change-related problem in STP is that a climate monitoring system either does not exist or does not function as well as it ought to for long-term planning, management and risk reduction activities across sectors, including the energy sector.[19]

<u>Problem Statement:</u> The country urgently needs investments and incentives for the development and deployment of its hydropower potential to meet its growing energy gap. The country's water resources are highly vulnerable to climate change which impacts the already weak management of country's forest resources and watersheds, as well as hydropower potential. The development of this new hydropower potential therefore requires to be integrated with an approach to land-use planning and sustainable land and forestry management practices that is: 1) climate-resilient; and 2) mitigates degradation of water resources in surface and groundwater basins; and 3) preserves the integrity of the country's riparian forests. The country lacks the capacity and enabling environment to promote such an approach.

[17] Tadross M. (2011) Sao Tome & Principe: Adaptation to Climate Change Program Technical support for climate modeling: Projected and observed changes in climate from historical data and General Circulation Models. Technical note. World Bank. Washington DC. pp 22

[18] *Estimating Global Climate Change Impacts on Hydropower Projects*, Working Paper, World Bank, 2007

[19] This specific problem is now being specifically address through the new UNDP/GEF LDCF Project "*Strengthening climate information and early warning systems in Western and Central Africa for climate resilient development and adaptation to climate change – São Tomé and Príncipe*" (now at PPG phase)

Barriers

These findings clearly indicate that STP faces environmental issues in the form of a progressive degradation of its agro ecosystem and forest ecosystems – which combined with the lack of an enabling environment for energy investment – in turn threatens the country's ability to utilize its hydropower potential. The main barriers to addressing the complex challenges that have hereto been described can be grouped in three main categories:

Barrier 1 - Absence of a clear market-oriented energy policy and legal/regulatory framework for on-grid, mini-hydro electricity generation: The lack of a clear enabling environment for on-grid, mini-hydro electricity generation prevents the country from fully exploiting its proven hydrological resource potential via market investments. One clear real-life example of this barrier is the situation with the Bombaim Small Hydropower Project, which has been under development for over five years by a Portuguese energy developer, Hidroeléctrica STP, LDA. That project aims to install a high-head, run-of-river small hydropower plant, along the Abade river on ST island with a total installed capacity of 4 MW. However as noted in the Project Design Document (PDD) for the project as submitted to the UNFCCC, the planned investment cannot go ahead because of the lack of a formal PPA: ***"The Environmental Impact Assessment was approved by the Government on 1 September 2008...Due to a land subsidence and the lack of a formal Power Purchase Agreement (PPA) with the Government, the project activity stopped soon after the initial steps back in 2008. On the 29 October 2012 there is still no formal decision to restart the project due to lack of formal PPA."***[20]

This example underscores the types of policy barriers facing potential investors in the hydropower sector. There is a general lack of institutional capacity across MNER, EMAE and other government agencies to develop the required policies. The country also lacks adequate environmental safeguards and climate-resilience measures for the hydropower sector and does not have any methodology in place for joint environmental (including climate resilience), economic and financial evaluation of on-grid hydro plants in line with existing government regulations and policies. Climate resilience measures are needed to ensure that none of the hydropower plants suffer undue exposure to turbine erosion (which in turn results in less power output) or an unexpected amount of sediment, thus lowering turbine and generator efficiency (both can be caused by climate shocks). Integrated energy and NRM planning are also hampered by unclear mandates and lack of coordination among government departments in the energy and NRM sectors; water management and planning for multiple uses has been cited by several studies as especially poor.

Barrier 2 - Lack of appropriate financial de-risking incentives for project investors in the energy sector which can mitigate off-take risk for energy sales: Even if the appropriate enabling environment were in place for private investments in on-grid hydropower, there remains significant off-take risk in STP related to any energy sales to EMAE by a private IPP. In the WB/IFC Doing Business 2013 data, **STP was 158 out of 185 economies on protecting investors and 181 out of 185 on enforcing contracts**.[21] The rest of the tables summarize the key indicators for each topic and benchmark against regional and high-income economy (OECD) averages. The current government is seeking to maintain the previous administration's efforts to overhaul its fuel and power subsidy regime and address long-standing problems in EMAE and the national oil distribution company, *Empresa Nacional de Combustíveis e Óleos* (ENCO) but this will take time. The latest EIU report highlights EMAE's fiscal problems and notes that "renewed tax arrears from EMAE and ENCO will continue to hold back revenue growth."[22] STP remains at high risk of debt distress and for the medium-term the government will have to rely on concessional borrowing and grants while improving public financial management; therefore investor risk is a major challenge to facilitating infrastructure investments in the near term.

Barrier 3 - Inadequate watershed management: There are three major hurdles to the preservation and sustainable management of inland water ecosystems in the country: *a) lack of technical capacity and know-how; b) insufficient planning and regulation; and c) the absence of inter-sectoral institutional coordination frameworks.*

As regards the first hurdle, stakeholders across the spectrum lack the technical capacity to sustainably manage the country's inland water resources. This shortage is evident at the level of individuals, state organizations, civil society organizations, NGOs and the private sector. National decision-makers lack solid information on which to base decisions

[20] PDD, Bombaim Small Hydropower Project, as submitted to CDM EB, UNFCCC

[21] See http://www.doingbusiness.org/data/exploreeconomies/s%C3%A3o-tom%C3%A9-and-principe?topic=enforcing-contracts

[22] See footnote #12

regarding land use allocation and management. Municipalities lack the capacity to generate, implement and enforce integrated land and water management measures and communities often do have access to the information required to rehabilitate degraded areas. Meanwhile small-holder farmers who depend on the land for their livelihoods lack the skills to mitigate erosion and reconstitute organic materials to a substantive level in the areas where they farm. Farmers are often not aware of the impacts of intense cultivation of marginal lands such as steep slopes, higher elevations or in drought-prone environments or the impacts of human-induced forest clearance for agricultural expansion. Because of rapid decomposition and soil types in the country, special care is required in farming practices, especially in the context of crop diversification due to the insufficient nutrition elements for many of crops under consideration. An added challenge to this lack of capacity is the island's vulnerability to climate change which brings another layer of complexity to stakeholders' understanding the physical changes in their environment.

In terms of the second issue, without a proper assessment, monitoring and planning regime for the maintenance of ecosystem services in watersheds, managers and users have a difficult time evaluating and integrating land degradation risks within broader decision-making processes. At the level of institutional and legal resources, there is a considerable lack of planning to meet the needs and problems of rural development and a lack of mechanisms to induce synergies and coordination among development donors and government agencies. In terms of existing regulations and legal frameworks for the management of lands and forests, these are inadequately applied, when applied at all. Watershed plans do not exist except for a few basins and there is no national legal framework for SLFM. As customary lands are often difficult to monitor and manage by the government, it has been extremely problematic to regulate land-use practices as landowners often work independent from government and thus do not apply any proper guidelines for SLFM. Lack of guidelines and regulations for on-site preservation activities and reforestation schemes exacerbate land degradation in development zones and there are no guidelines for mainstreaming SLFM into sectors like agriculture or energy. Communities also lack benefit-sharing plans that provide them the financial resources to be involved in SFFM conservation. Overall there is a critical unmet need to infuse new approaches and regulations into the management system that focus on the key sectors and threats that are driving land degradation.

Finally as regards the third issue the very limited financial and human resources earmarked for agriculture, forestry and improvement of water quality in the country's watersheds are deployed and managed by sectoral departments working in silos. There are no harmonized and coordinated inter-sectoral mechanisms across sectors that allow for integrated and coordinated approaches to energy and land use planning that balance socio-economic and environmental objectives.

The baseline scenario and any associated baseline projects

In an effort to address the barriers above, this project aims to pioneer an integrated energy and ecosystems-based approach to grid-based hydroelectric electricity generation in the country via three interrelated components: 1) development of an appropriate regulatory framework; 2) catalytic de-risking instruments for investors; and 3) watershed and sustainable forestry management and implementation. Such an approach will help to deliver multiple global environmental benefits in synergy in key sectors of the economy. This will lead to the direct reduction in GHG emissions from the electricity generation and land use sectors and ensure that all new mini-hydro plants that come online are sufficiently climate-proofed, as well as alleviate land degradation and maintain ecosystem services in the country's inland water basins and forests. The broader aim of this project is to pioneer a new paradigm for sustainable development of mini-hydroelectric plants in ecologically-vulnerable landscapes in SIDS.

The main relevant baseline activities are described below and summarized in Table 1:

Government of STP investments in the hydropower, water management and forestry sectors: In recognition of the level of environmental degradation facing the country, the government of STP has decided to allocate USD 200K per year from the state budget (starting in 2013) to the forestry, agriculture and natural resource activities under the Ministry of Energy and Natural Resources (MENR). Activities to be funded under this project include: *1) Reforestation of degraded areas in the district of Lobata (mainly) and other districts with local and adapted species to climate change; 2) The realization of a forest inventory to assess level of biodiversity loss to adopt and implement protective measures as responses to this endangering phenomenon; 3) Capacity building of farmers in new agricultural techniques, land use and conservation techniques; 4)*

Creation of resilient agriculture co-operatives across the country with introduction of improved seeds; and 5) an awareness campaign for communities in forests and near protective areas on conservation.[23]

As regards new hydropower investments, the government has been in process of developing 2 new mini hydro plants: Santa Luisa with 1.2 MW and Bombaim with 4MW. The estimated cost of these new power plants is 7.6 million USD but has not yet been secured. [24]

Sustainable Energy for All (SEFA) and SIDS DOCK: SEFA is a UN initiative that promotes a universal Energy access by 2030. SIDS DOCK is an initiative of the Alliance of Small Island States (AOSIS) to provide the Small Island Developing States (SIDS) with a collective institutional mechanism to assist them transform their national energy sectors into a catalyst for sustainable economic development and help generate financial resources to address adaptation to climate change. STP has submitted proposals for both the SEFA and SIDS DOCK initiatives. The SEFA proposal is an ambitious plan of 5.4 million USD that aims to develop a renewable energy capacity assessment; an Energy Master Plan; a National Assessment and Gap Analysis; and a policy design and implementation strategy for the country's energy sector. The SIDS DOCK proposal focuses on low emission measures.

European Union Energy Initiative Partnership Dialogue Facility (EUEI PDF): The EUEI PDF is an instrument developed and funded by a number of EU member states and the European Commission in the context of the EU Energy Initiative. The overall objective of the EUEI PDF is to support countries and regions across Africa, Southeast Asia, Latin America and the Pacific in developing policies and strategies for the promotion of access to energy. In Sao Tome, the Partnership plans to assist the country in developing a National Energy Strategy. The objective of the EUEI PDF project in Sao Tome is to strengthen the capacity of the government of Sao Tome and Príncipe and assist them in developing a coherent and integrated energy strategy with a view to increasing access to energy and raising the share of renewable energies in the energy mix.

Reducing Emissions from Deforestation and forest Degradation: The UN-REDD Programme is the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries. Sao Tome has been benefiting from this initiative through the Congo Basin Forest Fund (CBFF) since 2011. The CBFF, launched by the Governments of Norway and the UK, through the African Development Bank (AfDB), is funding a regional initiative to help ten Central African countries – of which STP is one – to set up advanced national forest monitoring systems. The initiative will focus on providing technical support to countries enabling them to use remote sensing technologies to estimate forest cover and forest cover changes, as well as to estimate the amount of carbon stocks contained in forests in the region. The 7 million USD initiative will be managed by the UN Food and Agriculture Organization (FAO), the Central Africa Forests Commission (COMIFAC) and the Brazilian National Institute for Space Research (INPE). The project will also help countries to prepare funding proposals for creating forest monitoring systems for each country, as part of the initiative for REDD+ (reducing emissions from deforestation and forest degradation in developing countries, as well as conservation, sustainable management of forests, and enhancement of carbon stocks). It will also help strengthen regional cooperation and experience sharing.

Clinton Climate Initiative: CCI's Diesel Replacement Project advises governments and assists in the design and implementation of demonstration projects and policies that directly reduce greenhouse gas emissions through the decreased use of imported fossil fuels and create replicable and scalable implementation models for others to follow. CCI's Diesel Replacement Project also attempts to achieve the benefits of scale on behalf of small countries by bundling these programs together in negotiations with global suppliers and financial institutions. CCI also has a Green Islands initiative and is currently in discussions with the government of STP on the provision of advisory support for various green energy projects.

[23] Government of STP budget information sent to UNDP

[24] As such this is not counted as co-finance in Table C – these two projects will be subsumed into the project framework as regards the installed capacity targets

Local banks: The banking system in Sao Tome is still weak compared to other countries. Apart from the Central Bank and other Government Banks, there are few commercial banks present in the country. Local banks face several difficulties preventing them to invest in the energy sector, such as a clear legal framework and a guarantee scheme that would cover the high risks. However, some of them, especially Ecobank, Commercial Bank and Afriland Bank, have credit lines for infrastructure projects that can be channeled to the energy sector for investment.

Table 1. Summary Overview of all Relevant Baseline Activities

Initiative	Budget
Government of Sao Tome & Principe	1,500,000
European Union (EUEI PDF)	1,000,000
UN-REDD / Congo Basin Forest Fund	7,000,000
Private investors & banks	3,000,000
Clinton Climate Initiative	50,000
SE4A, SIDS DOCK	6,840,000
Total co-finance (sub-total excluding UNDP co-finance)	**19,390,000**

The proposed alternative scenario, with brief description of outcomes and components of the project

As regards the energy-related components, it is important to note from the onset that this project's design is illustrative of and modeled on the approach presented in the new UNDP and GEF publication *Transforming On-Grid Renewable Energy Markets* (2012) in that it proposes a combination of policy de-risking instruments and market-enabling activities under Component #1 that will then be followed by the introduction of a financial de-risking instrument (in this case a partial guarantee fund) under Component #2.

The three different components of the project are briefly described below:

Component 1: Policy, institutional, legal and regulatory framework for climate-resilient, on-grid mini-hydro established

This component seeks to remove the underlying barriers that have prevented a market transformation of the sub-sector by developing a streamlined and comprehensive market-oriented energy policy and legal/regulatory framework for on-grid, mini-hydro electricity generation by Independent Power Producers (IPPs). Among the relevant activities for funding are the core prerequisites for on-grid investments (technical report on grid capacity requirements, establishing a transparent procurement mechanism for selection of IPPs and off-take arrangements, standardization of PPAs, etc.). The project will also fund a national standardized baseline for hydropower which is a key "public good" for private investors to develop carbon finance projects that add a secondary revenue stream to the development of mini-hydro plants in the country.

The project's integrated energy and ecosystems-based approach consists of a number of activities to ensure that land use and climate adaptation considerations are specifically incorporated into the legal/regulatory framework for on-grid mini-hydro. This includes adoption of a methodology for a joint environmental (including climate resilience), economic and financial evaluation of all on-grid hydro plants in line with government regulations and policies. Specific assessments will be done for all mini-hydro applications made under the new procurement mechanism to ensure adequate bank protection in the relevant catchment area and protection of the natural vegetation in the watershed to minimize erosion and prevent sediment loading. As regards climate-resilience standards and expected increased precipitation rates, the assessment methodology will also ensure that all plants are designed to account for changes in river flow patterns and have linkages with the Watershed Management Plans developed under Component #3 for the relevant basins. In general hydropower plants of all sizes are able to withstand flooding events by opening floodgates and shutting down

turbine operation but firstly should be situated in areas not prone to landslides, which will be a requirement of the project.

The Ministry of Natural Resources, Energy and Environment, Directorate General for Environment/Directorate for Natural Resources and Energy, in coordination with such stakeholders such as EMAE[25], will be responsible for the energy-related policy work and will work in close cooperation with the Directorate-General for Environment (the agency responsible for environmental policy) on the land use measures mentioned. The recently formed Committee for Sustainable Development will provide key advisory assistance and ensure inter-sectoral coordination, as will the newly formed corollary group consisting of a multi-stakeholder forum on Climate Change Adaptation.

Component 2: Promoting investment in mini-hydro through appropriate catalytic financial incentives[26] for project investors

Under this component a RFP for installed capacity of 4 MW of on-grid generation from mini-hydro IPPs will be launched following the completion of activities under Component #1. The private sector is expected to play a key role in project implementation since at present EMAE requires government support in order to remain financially viable and the country does not have cost-reflective tariffs; as such it seems that private investment is the best short-term option to bring on additional generating capacity. While various procurement options will be analyzed during the PPG phase, the likely scenario is a tendering option whereby IPP developers will be invited to apply to bid for mini-hydro contracts of between 250 to 1,000 kW per installation. The premise in this approach is that EMAE's internal generation capacity from Diesel GenSets is currently considerable higher than what an IPP developer would offer as regards energy off-take (on an LCOE basis) from a mini-hydro plant and thus there is a strong incentive for EMAE to sign PPAs with IPPs. While PPP options will be explored and analyzed, the likely scenario is that the applicants to the RFP will need to arrange their own debt and equity from private sources.

At the preparation stage, discussions were held with a well-known Portuguese energy infrastructure developer and investment firm with significant past experience developing RE investments in various Lusophone countries in Africa. Those discussions confirmed that RET investors would likely be interested to invest in IPPs in the country (particularly Portuguese investors who have access to off-shore debt financing in Portugal) if the enabling environment was in place and there was security in the off-take to mitigate any exposure to commercial risks related to the utility's financial and technical performance. In order to apply for the RFP, a given IPP's lenders and investors will need credit enhancement from other sources to backstop the utility's payment obligations under any PPA.

Preliminary analysis has suggested that in the short-term the most effective way to mitigate such significant investor off-take risk already mentioned would be through the establishment and capitalization of a Renewable Energy Guarantee Scheme (REGS). This would be a type of partial risk guarantee that would cover IPPs against the risk of a public entity (in this case EMAE) not fulfilling its obligations with respect to the off-take agreements in the PPAs developed under Component #1. The REGS would be a non-grant financial mechanism established at the national bank and linked to the RFP for project developers to submit bids for investing in mini-hydro systems for feed into the grid with the REGS securing the risk on the off-take. The REGS would be designed during the PPG phase but is envisioned as a partial guarantee scheme that would go into effect in the case of non-payment of the off-take from EMAE; the REGS would then step in and pay the developer a certain percentage of foregone income (in cents/kWh e.g.) based on the non-performance of contractual obligations under the PPA. This would indirectly reduce the overall risk profile

[25] EMAE ensures the supply of water (collection, transport, treatment and distribution) and energy

[26] The recent UNDP/GEF publication highlights the importance of financial de-risking instruments in addressing financial barriers to RE and EE uptake in a sustainable way: "*Financial de-risking instruments do not seek to directly address the underlying barriers, but instead transfer the risks that investors face to public actors, such as development banks and donors.*"

for the investment, making it easier and cheaper for the developer to raise the necessary financing for the installation costs. If a REGS on the off-take was not feasible for whatever reason (this will be analyzed during the PPG) then it could be applied to the installation costs and partially cover the outstanding principal and accrued interest of an investor's debt tranche. Payment in that case would be made only to a given IPP if the debt service default was proven to caused by risks specified under the guarantee and non-performance of contractual obligations undertaken by EMAE as part of the RFP and/or PPA.

It is estimated that by establishing the REGS and linking it to the policy environment reforms and frameworks developed under Component #1 the project could catalyze the commissioning of mini-hydro systems of at least 4MW by private companies[27], resulting in an estimated 11,913 MWh per year of clean electricity generated from mini-hydro plants on the grid by end of project. Specific activities will be implemented to ensure systematic monitoring of GHG emission reduction from the hydropower plants throughout their operations. It is expected that most if not all of the mini hydro plants facilitated by the project will be run-of-river (ROR) hydropower system with little or no storage (if they had storage it would only be a small dam or pondage). The cost of the REGS and how much of the risk it would cover as regards either non-payment of energy delivered or debt obligations for the capital cost of a portfolio of mini-hydro plants will be analyzed during the PPG phase. The cost of hydropower obviously varies within countries and between countries. Mini hydro plants with capacities of less than one MW have higher costs where the specific (per kW) electromechanical costs can be very high and dominate total installed costs. Preliminary feasibility studies for 14 sites commissioned by EMAE suggest investment costs ranging from US$3,000 to US$10,000 per installed kW. Data for small hydro in developing countries from an IRENA/GIZ survey and from other sources suggest that in Africa small hydro costs typically range from USD 4,000 to 5.000/kW. At present we have estimated that with GEF capitalizing the REGS with an initial investment of $1 million (75% of the CCM resources for Component #2) with a partial guarantee of some form (either on the off-take or capital costs) the guarantee could cover up to 4 MW of new installed capacity. The exact REGS structure will be designed during the PPG phase. What makes establishing the REGS attractive is that, if successful, it could easily be co-capitalized by other donor entities or the government as a performance-based mechanism.

Component 3: Watershed and sustainable forestry management and implementation

This component has three broad categories of interventions. The first is *Institutional planning and interventions for watershed management*. Under this component robust watershed basin management plans will be developed enabling equitable water resources allocation and protection to support sustainable economic development, public health and environmental protection. Water quality monitoring surveys will be conducted in basins to look at physical (sediment and solid waste), chemical (nutrients and pollution) and bacteriological water quality (mostly sewage and cattle grazing contamination) and establish baseline water quality and critical areas of land use impact upon the river systems. Definitions and operational targets will be included in the plans to define threat hotspots, specific measures to address threats in a given basin, and legal provisions for management and protection. The plans developed will prioritize coverage of relevant district(s) (likely Caué which covers the southwestern and southern part of Sao Tome) in basins where the mini hydro plants will be located under Components #2 and #3, thus ensuring optimal allocation of water resources to generate energy supplies and critical environmental benefits in tandem. Under the plans municipal committees in the relevant watersheds will ensure the arrangements are in place to provide sustained monitoring of water flows, levels and quality in the relevant areas and particularly across low flow and high flow periods. Relevant water/hydrological service staff (both at the national, district and municipal levels) will be capacitated to implement the watershed plans.

Specific activities under these plans will then be piloted across a landscape of 10,000 ha (encompassing the defined threat hotspots). The two main pilot activities to be introduced at the landscape level will be conservation farming practices and fire management measures since as discussed earlier these are the main causes of soil erosion and in turn systemic degradation of the country's inland watersheds. Assessments will

[27] This could include the already designed Luisa and Bombaim Small Hydropower plants

be done during the PPG phase as regards the most optimal conservation farming and fire management techniques and measures to be introduced in line with crop choices, soil types and local capacity.

Under the watershed management plans and in tandem with the above-mentioned interventions, specific reforestation activities will be implemented in 3,000 ha of degraded secondary forests in selected riparian zones around and upstream of the proposed mini-hydro water intake sites and groundwater recharge areas. These on-site reforestation schemes will be in line with national directives that recommend reforestation with rapid-growth native species such as *Ceiba pentandra, Olea capensis, Prunus africana, Rauvolfia macrophylla*. These rehabilitation activities will complement and reinforce more site-specific mitigation efforts that IPPs will be required to undertake as a result of the significant loss of the vegetation due to earthworks, truck movement and other construction activities related to the building of the mini-hydro plants. A priority focus of the conservation farming and fire management activities – as well as the reforestation activities – will be frontier areas of Obo National Park in the Districts of Lemba and Caué where fires and human encroachment are severely threatening endemic flora and fauna.

The second sub-component is an *Institutional Framework for SLFM governance*. Under this category a national legal framework for SLFM will be developed under the leadership of the Directorate-General for Environment and an SLFM unit in charge of SLFM will be installed under the National Coordination Committee/CCD. Guidelines for the mainstreaming of SLFM principles and priorities into the agriculture and forest sectors will be developed and operational; this particularly applies to the Forest Law which includes mechanisms to ensure forest zoning, as well as the monitoring and functioning of forest management.

The third sub-component will be *Framework for re-investment of energy proceeds into community conservation*. This will establish a mechanism integrated into the national legal framework for SLFM and the legal energy frameworks formulated under Component #1 requiring that IPPs whom rely on and benefit from watershed restoration or preservation are mandated to contribute to either a centralized fund or community trust which then channels those funds back into community-level interventions. This will be a sort of Beneficiary-Pays Fund[28] that will be managed by a trustee(s) (to be determined) and ensure that financial reflows and benefit sharing schemes are established between all IPPs and communities for maintenance of ecosystem services post-project in areas where the min-hydro sites are located. The exact structure of the watershed payments by IPPs into the fund will be designed during the PPG phase and first year of the project as part of the development of the policy framework and standardized PPAs under Component #1.

A full elaboration of all detailed linkages (and sequencing) between the various components will be done at PPG phase and provided at CEO endorsement.

Incremental cost reasoning and expected contributions from the baseline, the GEF TF and co-financing

The GEF funds will be used for incremental activities designed to remove the identified barriers. In particular, the GEF funds will be used for those incremental activities that expand the scope of, or supplement, the baseline activities in leading to or enhancing global environmental benefits. A component-by-component assessment of the incremental activities and expected GEBs is described below:

Table 2: Project Activities and Incremental Reasoning

Baseline practices	Alternative to be put in place by the project	Expected Global Benefits
Component 1: Policy, institutional, legal and regulatory framework for climate-resilient, on-grid mini-hydro established		
- A resource map of the country's	A market-oriented policy, institutional,	The electrcity supplied to the grid

[28] Selected examples of payment for watershed services and beneficiary pays funds in Africa are highlighted in *Charting New Waters - State of Watershed Payments 2012*, Genevieve Bennett, Nathaniel Carroll, and Katherine Hamilton, Ecosystems Marketplace, January 2013

hydropower potential has been conducted but there is no clear market-oriented energy policy and legal/regulatory framework for on-grid, hydropower generation from IPPs - No standardized PPAs, grid capacity requirements or updated grid code - Investors have no access to a one-stop shop for licenses and approvals thus making transaction costs for development of hydro plants - Policymakers have no environmental methodology, safeguards and climate-resilience guidelines for hydro-plants that minimize negative impacts to the country's vulnerable water and forestry resources - EMAE, local banks and key national actors such as Ministries of Energy and Finance do not have the capacity to appraise mini-hydro projects for PPAs and lending - No standardized baseline exists for hydropower investments	legal and regulatory framework for climate-resilient, on-grid mini-hydro will be developed and codified to address all BAU barriers cited and in the short-term facilitate 4 MW of mini - hydro capacity installed by private developers leading to 11,913 MWh of electricity generated per year All of the work under this component for on-grid mini-hydro deployment will be mainstreamed into and inform other donor initiatives that are targeting the broader development of a National Energy Strategy (to be funded by EUEI-PDF) that will include targets for different subsectors (including hydro) and likely include a set of policy interventions (including regulatory and legal aspects) for implementation of the energy strategy and the integration of so far underexplored resources and measures in the area of renewable energy and energy efficiency. All activities under this component will be implemented to expressly address the broader issue of unclear mandates and lack of coordination among government departments in the energy and NRM sectors that is also a baseline practice under Component #3	by the plants facilitated by the project will result in a reduction of 168,780 tCO2 over their lifetime The establishment of this framework will also apply to all future hydro investments and thus can be estimated to indirectly contribute to additional emission reductions post-project (this will be defined at the PPG phase)
Baseline practices	**Alternative to be put in place by the project**	**Expected Global Benefits**
Component 2: Promoting investment in mini-hydro through appropriate catalytic financial incentives for project investors		
- Overall STP has a poor track record of enforcing contracts and protecting investors (see WB/IFC Ease of Doing Business rankings) EMAE's precarious fiscal situation and dependence on a government that is at high risk of debt distress makes investors wary of possible contract default on PPAs and makes attracting finance for plants more difficult - IPPs are left to their own devices to negotiate financing for possible energy investments with little security over whether PPAs will be finalized or contracts honored. - No de-risking instruments exists in the country to mitigate the off-take risk IPPs will face in deciding whether to	The project will design a Renewable Energy Guarantee Scheme (REGS) that will be capitalized to support private investment in all the plants targeted for development under the project. An MOU will be signed with Central Bank of Sao Tome to set out the objective, funding mechanism, administration rules and confirmation of their participation as fiduciary agent of the REGS. The guarantee scheme will indirectly reduce the overall risk profile for the investment, making it easier and cheaper for the developer to raise the necessary financing for the installation costs of the plants. The combination of the policy framework supported under Component #1 and the de-risking instrument – together with previous work mapping the resource base – will ensure that both policy-level and financial barriers are	The electrcity supplied to the grid by the plants facilitated by the project will result in a reduction of 168,780 tCO2 over their lifetime The establishment of the REGS will also benefit future hydro investments and thus can be estimated to indirectly contribute to additional emission reductions post-project (this will be defined at the PPG phase)

invest in a hydro plant and the associated financial costs that come with that risk	removed and the targeted IPP investments can be realized.	
Baseline practices	**Alternative to be put in place by the project**	**Expected Global Benefits**
Component 3: Watershed and sustainable forestry management and implementation		
Degradation of ecosystems: - Indiscriminate and illegal clear cutting of trees, including the deforestation of areas with declining tree populations. - Cultivation of crops in relatively high slopes, without the application of measures against erosion. - Little crop rotation or fallow periods and/or intercropping with leguminous plants. - Uncontrolled practice of human-caused fires of small woodlands and plowing fields done by farmers to clear land. - Excessive use of chemical fertilizers in traditional farming practices further contributes to the impoverishment of the country's arable lands - No on-site preservation activities and reforestation schemes in development zones - Degradation of critical capoeira forests near buffer zones of Obo National Park Inadequate institutional management and capacity for watershed protection - No national legal framework for SLFM - Few watershed basin plans developed - No proper assessment, monitoring and planning regime for the maintenance of ecosystem services in watersheds - Lack of appropriate land-use plans and tools to manage and develop hydropower investment potential. - No harmonized and coordinated inter-sectoral mechanisms across sectors that allow for integrated and coordinated approaches to energy and land use planning - No guidelines for mainstreaming SLFM into other sectoral plans - No mechanism for community-based benefits sharing from hydropower installations	Three sub-categories of activities will be put in place by the project to address the BAU practices cited. The activities will include a mix of upstream institutional planning and governance support for the management of the watershed and SLFM sectors as well as a suite of specific downstream activities designed to address the core landscape-level drivers of degradation of the country's watersheds. These will include promotion of conservation farming and fire management activities across 10,000 ha of the country's inland watersheds with a focus on critical threat hotspots, including buffer zones of Obo National Park. Specific reforestation activities will be implemented in 3,000 ha of degraded secondary forests in selected riparian zones around and upstream of the proposed mini-hydro water intake sites and groundwater recharge areas. These rehabilitation activities will complement and reinforce more site-specific mitigation efforts that IPPs will be required to undertake as part of EIA directives. The project will also establish a mechanism integrated into the national legal framework for SLFM and the legal energy frameworks formulated under Component #1 requiring that IPPs whom rely on and benefit from watershed restoration or preservation are mandated to contribute to either a centralized fund or community trust which then channels those funds back into community-level interventions for post-project sustainability.	The expected GEBs are multiple: **LD** - reduced water deficiency - reduced erosion and flooding - increased sediment retention - increased dry season stream flows (where applicable) and groundwater recharge **SFM** - Direct rehabilitation of 3,000 hectares of secondary forest around planned hydro sites and in critical riparian zones resulting in 444,000 t/CO2 of additional carbon stocks **BD** - Stabilization of 20% of all forest buffer zones around Obo National Park (covering 29,500 ha)

Global Environmental Benefits

A very preliminary and conservative estimate indicates that the total direct project CO_2 emissions reduction from the deployment of an additional 4 MW of installed capacity from mini hydropower plants facilitated by this project is 168,780 tons[29] which translates into an abatement ratio of $10.48 of GEF CCM funds per tCO2 reduced.

As regards forest rehabilitation activities under Component #3 STP does not yet have detailed carbon stock measurements but based on an overall literature review and using the best available data both from plot, inventory and GIS approaches from various sites in the Congo Basin, the following C stock estimates by land cover classes (see Figure 3 in the annex for more detail) can be estimated (using 0.47 as the 'biomass to carbon' conversion factor) gives an estimate of 46 billion metric tons for the C stored in the Congo Basin with 185 t/CO2 per km2 as the estimate for in dense humid forests (which can serve as default reference for STP). At the same time as previously mentioned it is estimated that Sao Tome and Principe's forests contain 4 million metric tons of carbon in living forest biomass (FAO) from 27,000 hectares. Using the FAO estimate the average C per hectare of forest in STP would be 148 t/CO2 per hectare so with a target of rehabilitating 3,000 hectares of secondary forest via this project the resulting estimated additional carbon stocks would be 444,000 tons.

In addition to all the other GEBs mentioned it is important to note that forests in the Congo Basin have been shown to help to regulate the regional and local climates. In particular, they ensure that water is recycled as over 50% of the rainfall on the Congo Basin comes from local evaporation and evapo-transpiration. [30]

Climate resilience benefits

As regards the benefits of promoting climate resilience, given that this project is funded from STAR funds this project does not directly focus on this category of global environmental benefits but the climate-proofing of the proposed upstream policy work and activities to ensure climate-resilience of the targeted plants are nonetheless critical components of a sustainable approach and ancillary benefits of the project. As noted in footnote #5, the project will specifically focus on supporting measures to mitigate the possible impacts of CC-induced sediment loading (along with other factors such as changed composition of water) in the targeted hydropower plants which can lead to greater exposure to turbine erosion and generator efficiency, resulting in a decline in energy generated (and less envisioned GHG reductions).

Innovativeness, sustainability and potential for scaling up

The broader aim of this project is to pioneer a new paradigm for sustainable development of mini-hydroelectric plants in ecologically-vulnerable landscapes in SIDS. Innovation is a central aim of the project with the focus on combining and sequencing instruments and approaches funded under different focal areas in a synergistic way and maximize GEBs. The focus of the RE component will be economically viable and proven small scale mini-hydropower technologies that have short gestation periods, low investment needs and minimal environmental impact. Certain components such as the REGS have tremendous potential for scale-up since once established and proven it's a ready-made performance-based financial mechanism that can be capitalized by further donor or government investments and either used to catalyze additional roll-out of mini-hydro or even replicated for other RE technologies. The approaches piloted in this project can also be applied to small-scale and large-scale hydro

[29] **CO2 emission reductions attributed to a combined total of 4 MW mini hydropower plants:**
Assumptions: (1) Capacity of mini hydro plants: 4 MW; (2) hydro power generation capacity factor = 34%; (3) Useful life of hydropower plant = 20 years; (4) Sao Tome grid emission factor = 0.7084 ton CO2/ MWh
Calculations:
Annual Electricity Generation = 4_{Mw} * x $0.34_{capacity\ factor}$ * 8760_{hours} = 11,913 MWh
Annual CO2 emission reduction = 0.7084 x 11,913 = **8,439 tons/year**
Lifetime CO2 emission reduction = 8,439 x 20 = **168,780 tons**

[30] THE FORESTS OF THE CONGO BASIN, State of the Forest, Congo Basin Forest Partnership (CBFP) 2006

and it is hoped that if successful this type of integrated and climate-resilient approach will be a model for similar development of RETs in other SIDS.

A.2. Stakeholders. Identify key stakeholders (including civil society organizations, indigenous people, gender groups, and others as relevant) and describe how they will be engaged in project preparation:

The following table lists the stakeholders of the proposed GEF project. Included in the list are the summary of expected roles of each stakeholder in the design, development, implementation and management of the proposed project.

Stakeholders	Expected role
Ministry of Natural Resources, Energy and Environment	• Coordination of the overall project; and all aspects regarding policy design and implementation • Legislates and supervises the relevant directorates and EMAE
EMAE	• Ensure the supply of water (collection, transport, treatment and distribution) and energy • Facilitate the development and implementation of projects for PPAs
The Directorate for Natural Resources and Energy	• Carry out the institutional and human resources capacity building in climate change and Low carbon Energy Access; • Lead the update and implementation of the *Energy Master Plan*. • Assist technicians and scientists on identification and development of new and adapted types of mini hydropower plants
Directorate-General for Environment & The Directorate for Conservation of Nature, Sanitation and Environmental Quality	• The ministry, through these two Directions, will be the executing bodies of the component on land use and tenure and forest management. They will be in charge of executing projects activities, monitoring, evaluation and reporting
Other Departments	• The direction of land registry, the direction of land reform , the direction of conservation and the national obo park will as well play a significant role in aligning interventions and efforts according to their past experience of hosting or being involved in similar past initiatives within the country
Ministry of Finance	• Lead and provide guidance on the conception phase of the financial mechanisms and incentives • Assist in the establishment and operationalization of financial mechanisms and incentives
Central Bank	• Define through a signed MOU the objective, funding mechanism, administration rules and confirmation of their participation as fiduciary agent of the REGS
The regulatory authority	• Regulate activities in various sectors, including the water sector
Private sector and local banks	• Provide investment flows to the project • Participation as fiduciary agent of the REGS. • Ensure initiative sustainability
UNDP	• Provision of technical support to the project • Provision of M&E to the project
Local communities organization and NGOs	• Construction of small scale water supply networks and for managing small-scale infrastructure, such as fountains and launderettes, and protecting sources of water • Organization and conduct of awareness raising campaigns • Knowledge sharing

A.3 Risk. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable):

The following risks are identified but hopefully will be addressed and minimized through appropriate mitigation measures.

Risk	Level of Risk	Mitigation Action
The water flow level of rivers and watersheds may be reduced due to a prolonged dry season exacerbated by climate change. Prolonged dry seasons are becoming more regular due to accelerated deforestation.	High	This risk is caused by both localized and external factors (i.e. climate change) but in the short-term to the extent possible will be mitigated by using climate modeling data from the GEF-funded climate monitoring systems project as well as applying the proposed methodology developed for a joint environmental (including climate resilience), economic and financial evaluation for all hydro plants and data collected as part of the development of the watershed basin plans. Hydro sites will not be selected in watersheds which are deemed to have inordinate exposure to reduced water flows from drought.
Floods occur with watersheds and cause damages in reforested areas and mini hydro installations.	Low	This risk is caused by both localized and external factors (i.e. climate change) but in the short-term to the extent possible will be mitigated by using climate modeling data from the GEF-funded climate monitoring systems project as well as applying the proposed methodology developed for a joint environmental (including climate resilience), economic and financial evaluation for all hydro plants and data collected as part of the development of the watershed basin plans. Hydro sites and rehabilitation activities will not be selected in watersheds which are deemed to have inordinate exposure to flooding and procedures will be put in place as part of the watershed management plans to control water levels.
Technology risks related to the introduced technologies, in particular the mini hydro technologies and their operation. Although the project will be establishing proven technologies, there might still be risks involved with the components	Moderate	The project intends to utilize proven feasible and affordable technologies and duplicate solutions that have been successfully introduced in several countries in the region. The project will establish technology transfer schemes from successful examples in African countries. On the hydro plant type and size, the PPG phase will help to define the suitable design that suits the local country conditions.
An increase in the incidence and frequency of fires beyond the background rate, swamping the coping capacity and threatening conservation farming and other proposed activities	Low	Fire management is a core component of the project and so this risk will be addressed in large part via project activities. Particular fire threat hotspots will be identified as part of the watershed plans and particular mitigation measures will be designed for those areas.
Rehabilitation of forests and defining no-development zones in the country's watersheds may encounter resistance from production sectors such as infrastructure, agriculture, and local communities	Low	The project will work towards developing capacity of local government officials and stakeholders in different sectors in developing integrated local land-use and development planning. The process will be done with the full participation of the stakeholders in government, non-government and the private sector, and including women, fostering understanding of the need for striking the right balance between development and safeguarding of ecosystems. The project will also make the economic case of sustainable land management versus the development of certain sectors in sensitive areas delivering critical ecosystem services. An effective communication strategy and stakeholder involvement plan will also be developed and implemented, for stakeholder support.
Insecurity and political unrest resulting in considerable delays and postponement of project implementation.[31] The fragmented political scene and the disruptions caused by the sudden change of government could mean that	Medium	Consultations with government stakeholders reveal that the project objective and proposed reforms and interventions enjoy wide support from all political factions. The new national poverty reduction strategy (NPRS), which focuses on making the economy more competitive by increasing investment in infrastructure (particularly energy), enjoys broad-based support and this bodes well for continued political support for the project's proposed interventions regardless of possible changes in government.

[31] The turmoil following the dismissal of the minority government led by Patrice Trovoada, the leader of Acção Democrática Independente (ADI), after it lost a no-confidence vote in parliament, could undermine political stability in the country

Risk	Level of Risk	Mitigation Action
implementing policies and enacting new legislation are likely to be difficult.		
Several Government departments are involved in this project, and a lack of cooperation between them may cause difficulties in the project management	High	The project will create a Coordination Structure/unit to ensure that all relevant Government departments are involved. UNDP local office in the country will help on this. The project will ensure that all departments operate their part in relative isolation, without immediate negative impact.
Overall Risk Level	Moderate	

A.4. Coordination: Outline the coordination with other relevant GEF financed and other initiatives:

During the PPG phase, in-depth consultations will be undertaken to establish partnerships and practical modalities for linking and collaborating with all relevant ongoing and planned projects/programs in Sao Tome and Principe. Initial discussions were conducted with the implementers/owners of the identified relevant projects that are ongoing and planned in the country, particularly those that will used as baseline for the proposed GEF project. A strategy and plan for collaboration with relevant ongoing and planned initiatives will be prepared during the preparatory phase. It will include the delineation of the roles and responsibilities of the project implementers and owners, the scheduling of the baseline activities, the arrangements for the monitoring and reporting of results of the baseline activities that they will implement, and the joint evaluation of the results and outcomes of the baseline and incremental activities. The CEO endorsement request document will include a detailed description of the coordination mechanism.

Coordination with the following GEF project is expected to be particularly important: UNEP/UNDP/GEF Project "*Implementing integrated water resources and wastewater management - Integrated management of the Rio Provaz hydrographic basin.*" The latter project has as its aim develop a river basin management plan for the Rio Provaz Basin enabling equitable water resources allocation and protection to support sustainable economic development, public health and environmental protection. The Rio Provaz basins is located in the north-west of the island of Sao Tome and while it's not a basin that has major hydro potential it nonetheless will be very important to coordinate activities of Component #3 with activities under this project. Similar coordination will be important for other GEF/LDCF projects implemented by UNDP & the World Bank.

This project will build on the ongoing work of other past and current initiatives such as the EU projects, and ongoing initiatives (SIDS DOCK, Sustainable Energy for All, Clinton Climate Initiatives, GACC, etc.). It is important to note that a certain level of sustainable management of the lands and of the forests has been accomplished through the participation of various development stakeholders. Their actions have involved working through the following completed programs (among others):

- The program for the "development and implementation of legislative and regulatory texts" (FAO, World Bank, UNDP, Portugal) includes actions relative to the diligent execution of measures to be implemented on forest law and its dissemination.
- The "Land Use Zoning" program (FAO, UNDP, World Bank, Portugal and France) identifies a pilot zone for the preparation of an area with a strategic site for forest development and follow up through remote sensing images.
- The "Management of forest resources and arable lands" program (FAO, France, UNDP/GEF, World Bank, Taiwan) seeks the implementation of sustainable development of natural resources and the promotion of accompanying measures.
- The "Institutional strengthening program" to enhance management capacity seeks to support an institutional review of the sector (forests and environment) for the Department of Natural Resources and the Environment. This review entails the implementation of a management system for forest statistics and institutional support.

The project will also liaise with the Global Alliance on Climate Change (GACC) project, an EU-funded program that aims to develop policies and interventions on Climate Change that will help address climate adaptation and vulnerability. STP is currently negotiating a USD $3 million grant with GACC (to be implemented in large measure through local NGOs) with proposed activities still to be defined.

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.:

The Second National Communication (SNC, 2012) of Sao Tome and Principe highlighted that the Forestry sector is the major source of GHG emissions (97 Giga grams in 2005) via deforestation driven by extraction of fuel wood and charcoal, but also due to the intensification of unlawful and arbitrary exploitation of timber in recent years. The Energy sector is the second source of GHG emissions (66 Giga grams), caused by the burning of fossil fuel. Emissions from the energy industry are derived mainly from the burning of diesel fuel used to produce electricity.

Several mitigation measures were proposed in the SNC to reduce GHG emissions, among them (i) Construction of several hydroelectric power plants; (ii) Initiate a policy of energy planning of S. Tome and Principe; (iii) Efficient exploration, through appropriate management techniques, potential agro-forest lands; and (iv) reforestation, through the application of agro-forestry techniques, forest areas, belching. The proposed GEF-assisted project is in line with most of the climate change mitigation measures stated in the SNC.

The project is also consistent with the objectives and priorities of the *Strategy and the National Report on Desertification and Land Degradation* (2005) which prioritizes (i) monitoring and evaluation of the effects of desertification and drought; and (ii) prevention of soil erosion through the extension and protection of forests. More specifically the project will help the implementation of several key actions planned under in this Strategy:

- Elaboration of a Master Plan for Forestry and Land management: Through the output 1.1 (Appropriate policy and legal/regulatory framework established and operational, including development of updated integrated resource and forestry/watershed management master plan and environmental safeguards for site applications) the project will support this initiative by finalizing and updating the forestry management master plan, which is still in draft form.
- Measures designed to Protect National Resources: The project will contribute to this objective through Component #3 (watershed management and SFM implementation)
- Measures designed to Improve the Administrative Structure: The project will contribute through Output 1.6 (Capacity developed within EMAE, local banks and key national actors such as Ministries of Energy and Finance to appraise mini-hydro projects for PPAs and lending)
- Measures designed to deepen the knowledge of the phenomenon of Land Degradation, Desertification and its Control: The project will contribute to this objective through various activities under Component #3.
- Reforestation of key areas, such as Bombaim, Monte Café and Plateau: The project will contribute to reforestation efforts in these areas via Component #3.

The proposal is also consistent with the National Adaptation Plan of Action (NAPA, 2006), which prioritizes actions on Water and Energy, such as (i) Sustainable management of water and energy; (ii) Evaluation of hydro resources and (iii) Construction of two hydro power plants. The project will also conform to the national report on Desertification and Land Degradation (2005) strategies, such as (i) monitoring and evaluation of the effects of desertification and drought; (ii) prevent soil erosion through the extension and protection of forests.

The project is also consistent with the new national poverty reduction strategy (NPRS) which focuses on making the economy more competitive by increasing investment in infrastructure and promoting agriculture, fisheries and tourism as key sectors for growth and employment.

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

This project has been designed with the express intention of responding to GEF's overall strategic vision under GEF V of helping countries meet their sustainable development needs and achieve multiple environmental benefits through an integrated approach. The project is consistent with GEF-3 CCM and LD strategies of assisting countries in the deployment and diffusion of low-carbon, renewable energy technologies through investment, capacity building, and technology cooperation and addressing management of competing land uses and resulting changes in land-ecosystem dynamics. The project will promote an integrated approach towards fostering sustainable land management that balances environmental management with energy and development needs. The project has also been designed in line with GEF Investment Guidelines for Sustainable Forest Management (SFM-1) and REDD+ Programme and supports the development of policies and regulations to rollout and implement SFM interventions that complement existing REDD activities in the country. The islands' natural forests possess a wealth of endemic flora and fauna of high scientific value, which means access to biological resources and equitable distribution, are of the utmost importance in the country.

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

The proposed project is clearly within the comparative advantages of UNDP as stated in the GEF Council Paper C.31.5 "Comparative Advantages of GEF Agencies". UNDP is one of the few GEF agencies present in the country. It has the ability to mobilize and make available quality technical expertise to develop policies and strategies (particularly in climate mitigation and adaptation, social sectors, governance and environmental management and risk disasters); knowledge and ability to take into account the rights and basic needs of the most vulnerable segments of the population; the ability of partner, mobilize and empower the communities and individuals to identify and own their problems and come up with pragmatic solutions; the focus on capacity building in all areas of support; and confidence among populations and national and international partners. UNDP has also developed and implemented several projects in STP related to Energy and Environment, among them 4 GEF projects.

As regards the non-grant financial mechanism (REGS) the Clinton Climate Initiative, which has extensive public sector, business, and financial expertise, will be consulted on the design and development of the scheme and will help facilitate access to required expertise from financial actors. UNDP's EITT (Energy, Infrastructure, Technology and Transport) group is already working with CCI and other stakeholders such as EIB on the development of de-risking instruments in several other African SIDS (Seychelles and Mauritius).

This project also feeds under the UNDP-GEF EITT Signature program number 1 "SP1 – Clean Energy" Promoting access to clean and affordable energy systems and services. This signature program aims at improving the energy access, use and supply through the promotion of distributed clean energy systems, based mainly on hydro power plants for electricity generation. The project also feeds under the UNDP-GEF Ecosystem and Biodiversity Signature program number 3 "SP3 – Ecosystem based adaptation and mitigation" Managing and promoting ecosystems for adaptation to and mitigation of climate change.

In Sao Tome, the project is in line with the United Nations Development Assistance Framework (UNDAF 2012-2016). UNDAF aimed to reduce poverty, the degradation of basic social indicators, and set the country on a pathway to sustainable development.

Finally UNDP's MDG Carbon Facility has particular experience assisting private developers of small hydro plants. In January 2013 MDG Carbon registered a small hydro CDM program of activities (POA) in Kenya developed by the Kenya Tea Development Agency, one of the first of its kind in Africa. The PoA covers 10 small hydro sites between 2 and 5 MW in size, attracting an estimated USD 50 million in co-financing. MDG

Carbon is also performing pioneering work with CDM standardized baselines; this work will also be leveraged for the benefit of this project.

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

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)*
Mr. Lourenco MONTEIRO DE JESUS	GEF Operational Focal Point / Direction of Environment	Ministry of Natural Resources	**FEBRUARY 18, 2013**

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	Telephone	Email Address
Adriana Dinu UNDP/GEF Officer-in-Charge		April 11, 2013	**Saliou Toure** Regional Technical Advisor EITT	Tel. +221 33 869 07 89	saliou.toure@undp.org
			Lucas Black Regional Technical Advisor EITT	Tel: +27 12 354-8132	lucas.black@undp.org

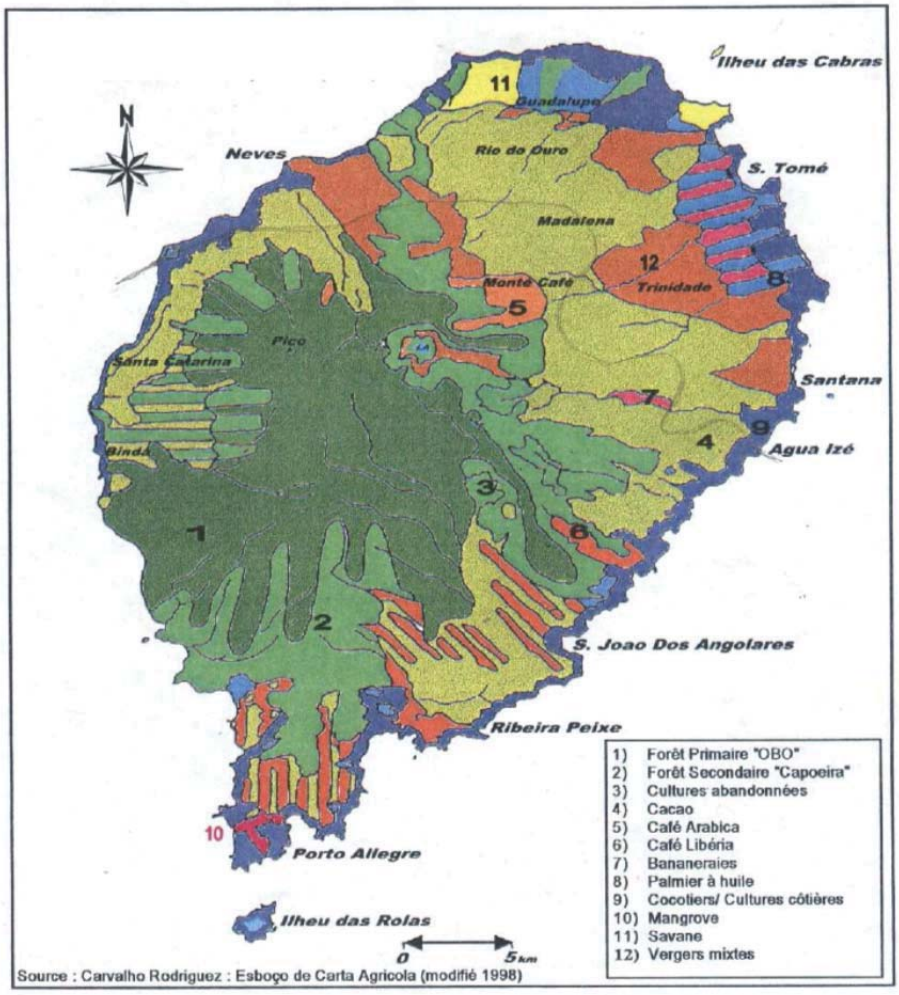
Annex I

Figure 3 – Total carbon stock estimates for the Congo Basin[32]

Land cover classes (LCC)	Area (km²)	Carbon pools (t/ha)				Total C
		AG C	R/S	SOC	C	(million metric tons)
1. Closed evergreen lowland forests	1,421,834	125	0.235	38	192	27,299
2. Swamp forests	123,264	85	0.235	38	143	1,761
3. Sub-montane forests (900-1,500 m)	63,100	68	0.235	38	122	770
4. Montane forests (>1,500 m)	9,754	68	0.235	38	122	119
Dense humid forests (1-4)	**1,617,952**	**147**			**185**	**29,949**
Closed deciduous forests	304,808	42	0.275	38	92	2,791
Mosaic forest/croplands	370,123	54	0.275	38	107	3,955
Mosaic forest/savannas	588,011	14	0.42	38	58	3,403
Deciduous woodland	630,890	21	0.322	38	66	4,149
Grassland, shrub land, sparse trees		5	0.42	38	45	1,770
Congo Basin sub-region	4,048,470					46,016

AG C: aboveground carbon; SOC: soil organic carbon; R/S: root/shoot ratio

Soil occupation on S. Tomé – Location of main forest ecosystems



[32] *A First Look at Carbon Stocks and their Variation in Congo Basin Forests*, Robert Nasi, Philippe Mayaux, Didier Devers, Nicolas Bayol, Richard Eba'a Atyi, Antoine Mugnier, Bernard Cassagne, Alain Billand and Denis Sonwa