-ADAPTATION FUND ID
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Date of Receipt

PROJECT PROPOSAL

PART 1:	**PROJECT INFORMATION**
PROJECT CATEGORY:	**REGULAR**
COUNTRY:	**SAINT LUCIA**
TITLE OF PROJECT:	**BUILDING RESILIENCE FOR ADAPTATION TO CLIMATE CHANGE AND CLIMATE VARIABILITY IN AGRICULTURE IN SAINT LUCIA**
TYPE OF IMPLEMENTING ENTITY:	**Regional Implementing Entity**
IMPLEMENTING ENTITY:	**Caribbean Development Bank** **Ministry of Education, Innovation, Gender Relations, Sustainable Development** **Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Cooperatives**
AMOUNT OF FINANCING REQUESTED:	**US$ 8,560,659.28**

List of Acronyms

AF	Adaptation Fund
APFS	Agriculture Policy Framework and Strategy
AESD	Agriculture Engineering and Soils Department
CARDI	Caribbean Agriculture Research and Development Institute
CARPHA	Caribbean Public Health Agency
CBO	Community-based Organization
CC	Climate Change
CCA	Climate Change Adaptation
CCADF	Climate Change Adaptation Fund Facility
CCCCC	Caribbean Community Climate Change Centre
CCMDG	Climate Change Multidisciplinary Group
CCILLC	Climate Change Interpretation Learning and Laboratory Centre
CV	Climate variability
CDB	Caribbean Development Bank
CDEMA	Caribbean Disaster Emergency Management Agency
CDERA	Caribbean Disaster Emergency Response Agency
CANRWP	Caribbean Network of Rural Women Producers
DAFNC	Department of Agriculture Fisheries Natural Resources and Cooperatives
DEAS	Department of Extension and Advisory Services
DCA	Development Control Authority
DRR	Disaster Risk Reduction
DRM	Disaster Risk Management
DRRM	Disaster Risk Reduction Management
DMS	Department of Meteorological Services
ECHAM5	European Centre Hamburg Model
EU GCCA-GoSL	EU Global Climate Change Alliance- Government of Saint Lucia
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
GAPs	Good Agriculture Practices
GCMs	Global Climate Models
GDP	Gross Domestic Product
GDI	Gender Development Index
GEF/UNDP/SGP	Global Environment Facility United Nations Development Programme Small Grants Program- Saint Lucia
GHGs	Greenhouse gasses
GII	Gender Inequality Index
GNI	Gross National Income
GoSL	Government of Saint Lucia
HACCP	Hazard Analysis Critical Control Points
Had CM 3	Hadley Centre Climate Model
HDI	Human Development Index
IICA	Inter-American Institute for Cooperation on Agriculture
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
IPRSAP	Interim Poverty Reduction Strategy and Action Plan
ITT	Informal Technical Team
LUCELEC	Saint Lucia Electricity Services Ltd.
MOA	Ministry of Agriculture
MIPST	Ministry of Infrastructure, Port Services and Transport

MSJEEY	Ministry of Social Justice, Equity, Empowerment and Youth
MOH	Ministry of Health
MTDSP	Medium –Term Development and Strategic Plan
NAP	National Agriculture Policy
NASAP	National Adaptation Strategy and Action Plan for Tourism
NEMO	National Emergency Management Organization
NETS	Saint Lucia National Energy Transition Strategy and Integrated Resources Plan (2017)
NGO	Non-Government Organization
NURC	National Utilities Regulatory Commission
NWA	National Water Policy
OAS	Organization of American States
OECS	Organization of Eastern Caribbean States
PAS	Protected Agriculture Systems
PMU	Project Management Unit
POPs	Persistent Organic Pollutants
PROPEL	Promotion of Regional Opportunities for Produce Through Enterprises and Linkages
PRA	Participatory Rural Appraisal
PSC	Project Steering Committee
RCMs	Regional Climate Models
RE	Renewable Energy
RWHS	Rainwater Harvesting System
SALCC	Sir Arthur Lewis Community College
SASAPs	Sectoral Adaptation Strategies and Action Plans
SDED	Department of Sustainable Development
SIDS	Small Island Developing States
SLBS	Saint Lucia Bureau of Standards
SLNRWP	Saint Lucia Network of Rural Women Producers
SLHTA	Saint Lucia Hotel and Tourism Association
SMB	Saint Lucia Marketing Board
SNC	Second National Communication
TNC	Third National Communication
VALIRI	Vaughn Arthur Lewis Innovation and Research Institute
UNECLAC	Economic Commission for Latin America and the Caribbean
UNFCCC	United Nations Framework Convention on Climate Change
WASCO	Water and Sewerage Company Inc.
WMPDC	Water Management Plan for Drought Conditions
WRMA	Water Resources Management Agency
YAEP	Youth Agriculture Entrepreneurship Project

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PROJECT /PROGRAMME BACKGROUND

1. Project Context

1.1 Geography and Environmental Context

Saint Lucia is located at latitude 13N 59W within the Lesser Antillean Arc of the Caribbean Archipelago. The island is 42 km long and 22 km wide at its widest point with coastline of approximately 158 km in length and land area of approximately 61600 hectares, of which 22 percent is under agriculture. The coastal shelf is relatively narrow and drops off sharply along the coast.

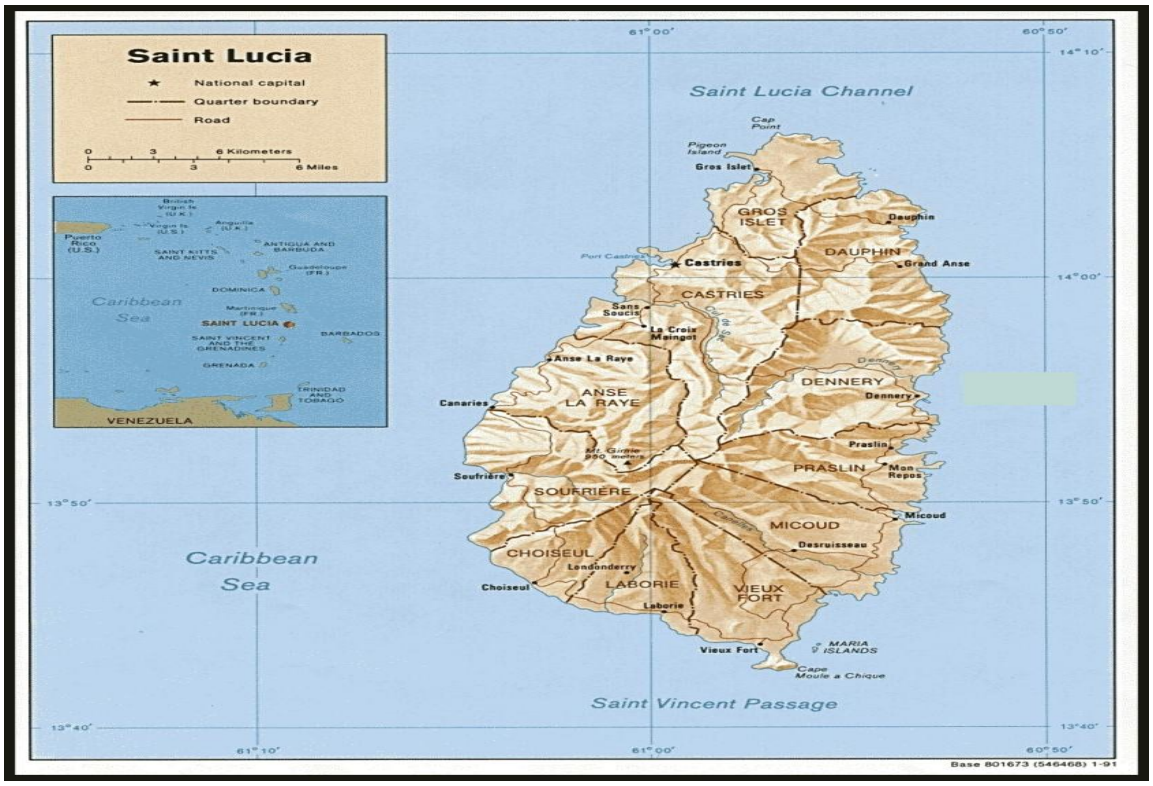


Figure A. Map showing location of Saint Lucia

Like many Small Island Developing States (SIDS), the country faces [1]disproportionately high climate change (CC) impacts and has low capacity to respond appropriately to reduce its vulnerability to CC at all spatial and sectoral levels. Typical SIDS characteristics include high vulnerability to hydro-meteorological hazards such as hurricanes and other extreme weather-related conditions, slow onset events like sea level rise, limited natural resources, and higher than desirable levels of poverty.

The country lies within the north-east Trade Wind belt, and is normally under an easterly flow of moist warm air. Ambient sea surface temperatures vary minimally from 26.7°C at any given time, rarely rising above 32°C or falling below 21°C. There is an almost constant amount of surface solar radiation over time. Together, these factors combine to give the island a tropical maritime climate, characterized by warm air temperature.

Weather is influenced by synoptic weather systems such as the Atlantic High Pressure System

[1] UNECLAC: An assessment of the economic impact of climate change on agriculture sector in Saint Lucia (2011); Building Climate Resilience in the Agriculture Sector in Saint Lucia (2015); Third National Communication on Climate Change in Saint Lucia (2017).

(Bermuda Azores), surface, mid and upper level low pressure systems, the Inter-Tropical Convergence Zone, tropical waves and cyclones and the occasional frontal system. Mesoscale and microscale weather features also affect the island. Compared to the interior lands, the coastal areas are more exposed and vulnerable to the potential impacts of tropical storms and hurricanes. These events are becoming more intense and can have devastating impacts, on climate sensitive sectors such as the agriculture sector.

Figure B. Map of Topography

The island is comprised of 37 watersheds, that are characterized by volcanic soils and a topography dominantly of steep and unprotected slopes (Figure B). As a result, most of the surface overflows and river channels flow quickly to the sea and cause severe soil erosion. This therefore poses significant long-term challenges to the availability of water for economic productivity, particularly in the agriculture sector. Additionally, research is still on-going on the potential contribution of groundwater to sustainable economic activity in the future. Hence there is no useful knowledge on the extent to which groundwater recharge through wells could significantly affect availability of water for the agriculture sector.

1.1.1 Rainfall and frequency in droughts

The country's geographic location and topography substantially influence rainfall patterns. Annual rainfall amounts vary from 1265 mm in the relatively flat coastal regions to 3420 mm in the elevated interior region. There is a distinct rainfall climatic season; a wet season of six months from June –December during which 70 percent of total annual rainfall is received and a dry season from January-May/June. Thirty-year series rainfall data provided by the Department of Meteorological Services (DMS), (Figure C) below, show average annual rainfall of 1534.8 mm over the period 1987-2017. However, (Figure D) below shows annual dry months variation across the country ranging from one month to nine months and annual cumulative moisture concentrated in the interior.

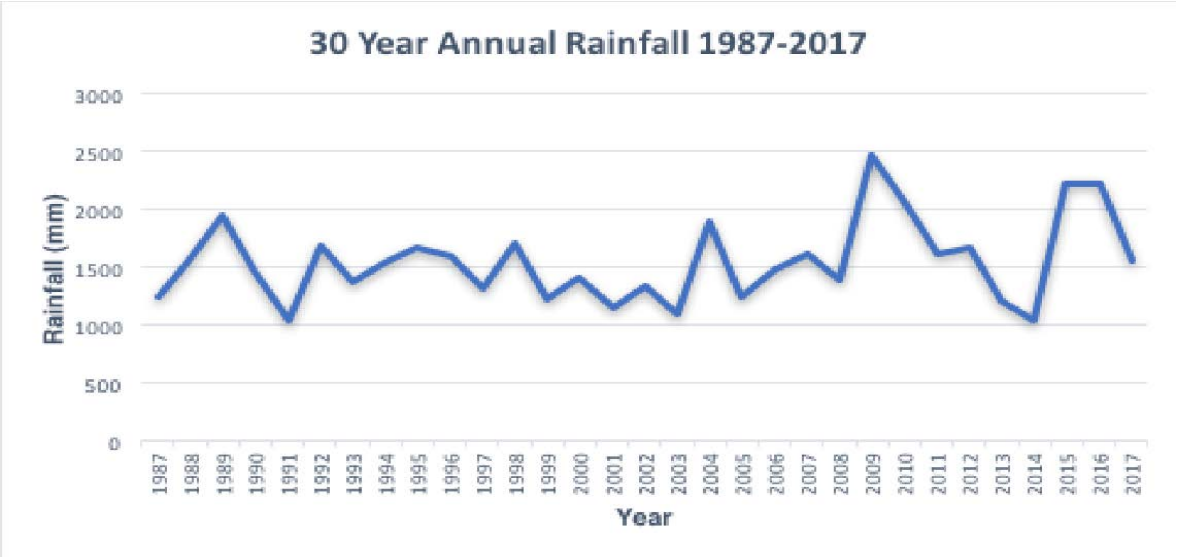


Figure C: Total Rainfall 1987-2017 -Saint Lucia -Source: Department of Meteorological Services (DMS)

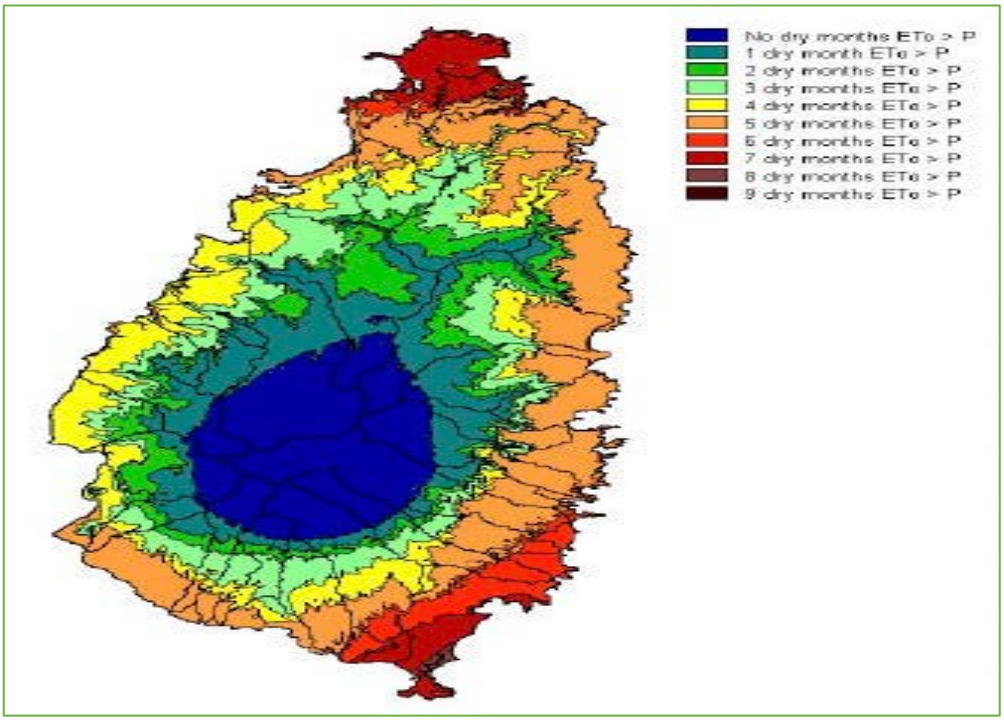


Figure D: Spatial Distribution of Annual Dry Months and Cumulative moisture in interior

Six drought years declared by the DMS during 2001- 2017, were years when annual rainfall amounts ranged from between 1040 mm – 1381 mm. Using this range as a baseline, six of the ten droughts years declared 1987- 2017, occurred between 2001-2015, suggesting a trend towards an increase in drought frequency.

Concerns over the extent of drought events in 2001 through 2004 triggered the preparation of a Draft Water Management Plan for Drought Conditions (WMPDC) approved in 2009 and the establishment of a Water Resources Management Agency (WRMA) in 2010. The information provided by the WMPDC (2009) included concerns that with climate change the trend in annual pattern of drought susceptibility coupled with the geographic distribution, could result in expansion

of water deficit zones in the east of the country and towards the interior that could have serious implications for rainfed agriculture, with adverse impacts on livelihoods, income generation, employment and food security.

One of the weaknesses of the WMPDC is that it makes no special considerations for preparations in the agriculture sector. Drought alerts do not include advisories for the agriculture sector and there is no forecasting for agricultural droughts, or official provision from public water. In addition, there is no official agriculture production data, to assess the impact of declared drought years on the sector. There is however, a well-established hydro-meteorological network, including 18 rainfall stations from which the agriculture sector could benefit from a strategy to incorporate agriculture drought alerts, as well as to track the impact of climate change and climate variability on rainfall on agricultural production and productivity and by extension, the livelihoods of those populations, in communities highly dependent on farming activities.

The challenges for water are more severe for agriculture as holdings operated by some 70 percent of the farmers are wholly rainfed, located mainly on slopes and grow mostly shallow rooted vegetables, root crops and vine fruits. The length of the normal seasonal droughts and increasing evidence of unexpected country-wide droughts during the wet season, are strong indicators of new challenges and potentially a major obstacle for resilient farming.

1.1.2 Hurricanes and related events

The geographic location exposes Saint Lucia to tropical storms and hurricane events that can be particularly damaging to the agriculture sector. The passage of hydro-meteorological events over the island between 1960 and 2016 has seriously impacted the agriculture sector, in particular the farming communities resulting in loss of 41 lives, another 13 persons reported as missing and 370 injured. Damage and losses were estimated at US$568[2] Million dollars to the sector (Table 1 below). The increasingly devastating nature of hurricanes was evident with the passage of Hurricane Tomas over the island in 2010, with the agriculture sector suffering losses and damages in the amount of US$336 Million or 59 percent of total losses and damage over the period 1960 to 2016. The damage was extensive, due primarily to many landslips and extensive soil erosion, resulting in loss of thousands of hectares of open-field crops, sedimentation in rivers and coastal areas and flooding and seven lives lost. The extent of landslips in numbers and sizes were reportedly due to the cracked and loose volcanic soils from a prolonged period of drought, from 2009-2010 up to the time of the extreme rainfall event. Major damage was experienced in the west, south west part of the country. This is also the geographic area where the project is highly concentrated.

Table 1. Hydro- meteorological events in Saint Lucia and impacts on the Agriculture Sector

Year	Event	Total Damage & Loss ECD	Types of Damage
2016	Hurricane Matthew	24,575,336.57 (agriculture only available from NEMO-Saint Lucia)	Loss of crops, livestock fishing boats sank with damages to engine; landslips taking irrigation systems and other farm assets, siltation and sedimentation, destruction of river banks due to siltation
2013	Christmas Eve Trough	34,630,000.00	Crops severely affected, loss of all livestock for some farmers, destruction of aquaculture ponds from siltation, destruction of river banks, sedimentation and flooding from poor drainage in low

[2] Figure rounded

			lying areas with impacts on the nearshore fisheries
2010	Hurricane Tomas	907,816,940 (agriculture only UNECLAC analysis from Official Government data)	Many landslides extensive soil erosion, heavy siltation cause major destruction to river banks and major destruction in forest areas-, high siltation affecting coral reefs, seagrass and sea floor systems.
2007	Hurricane Dean		Landslides
2005	Heavy rainfall		Landslide
2004	Hurricane Ivan	28,254,744	
2004	Tropical Storm Bonnie		Landslide
2002	Tropical Storm Lili	20,000,000.00	
1998	Tropical Wave	621,499.5	Landslides
1996	Tropical Wave	12,444,444.00	
1994	Tropical Storm Debby	230,000,000.00	Landslides and crops
1980	Hurricane Allen	250,000,000	Landslides
1967	Tropical Storm Beulah	2,000,000	
1966	Tropical Cyclone Tropical Depression	750,000.6	
1963	Hurricane Edith	750,000.7	
1960	Hurricane Abby	3,383998.7	
TOTAL		**(ECD$1,533,226,964.1) US$567,861,838.56**	

Source: Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Cooperatives

The Report of a Rapid Damage and Needs Assessment of a flood event of December 2013, jointly undertaken by the Government of Saint Lucia (GOSL) and the World Bank in 2014, provides further worrying information on the likely impact of future global climate change and climate variability due to the country's natural susceptibility to landslides (Figure E) below. The Report describes the most common type of landslips in Saint Lucia as debris flow; a rapid movement of a mass of soil, water and air that can travel long distances, approaches fast and exhibit a considerably destructive force.

The document further concludes that for the agriculture sector, over time the frequency and intensity of damaging events from landslips and flooding will affect the most vulnerable among the population and rural poor and that agriculturists are expected to be especially impacted. Together with Table 1 above the Map of landslide susceptibility and Table 1 show the vulnerability to landslips on the island as a major source of destruction to farm assets during high rainfall events. Poor agriculture practices on the slopes where the majority of small farms are located if continued, could increase the level of risks of landslides with worsening deleterious impacts on the sector and livelihoods in rural communities.

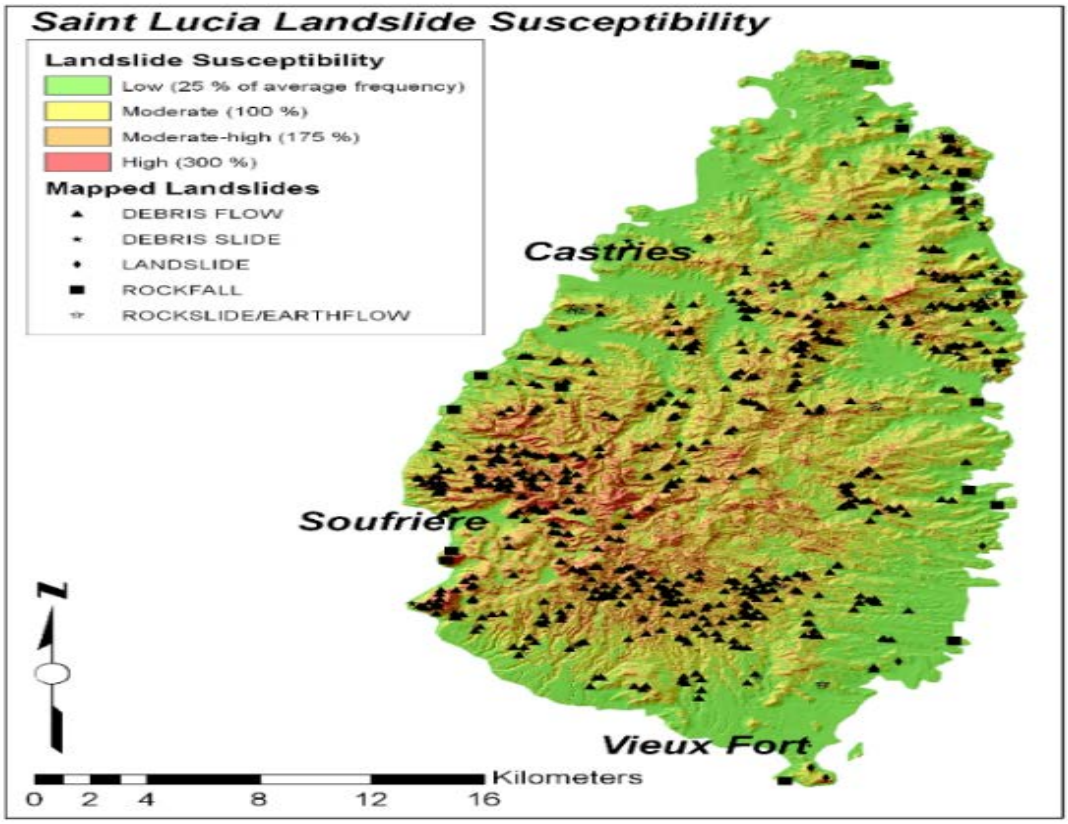


Figure E: Map of Landslide Susceptibility in Saint Lucia

1.1.3 Temperature, wind and relative humidity

The small size and geographic location, of the country result in very little annual variation in air temperatures over the island. However, due to the hilly topography, particularly in the more rugged interior, temperature varies between high and low-lying regions, ranging from 2°C to 5°C. Wind speeds and relative humidity are highest on average during the months of January to July, corresponding roughly with the dry season. Evaporation rates are highest during the dry months, but the difference is not significant throughout the year.

1.1.4 Predictions for future climate change and climate variability and impacts

Future scenarios based on PRECIS version of the HadCM3 and ECHAM5 climate models using two regional down scaled climate change scenarios provide information on future temperature and rainfall. The predictions are as reported in the Saint Lucia Third National Communication(TNC-2017), using the HadCM3 for 2040 -2069 and ECHAM5 for 2081-2100 and downscaled, using RCMs and 30 -years series data (1986-2015). The predictions are for significant decrease in rainfall, over the same periods (Table 2 below and Appendix I). Based on Table 2 below beyond the 2020s, Saint Lucia could continue to experience decrease in rainfall amounts over the entire country. Decrease in rainfall amount will be more persistent on the east coast, but more significant over the west and central areas during the period 2081-2100. Seasonal dry months (January to May/June) will continue to experience greater declines especially on the west and south west and into the interior.

Table 2: Results of climate scenario on future rainfall and temperature (2040 -2100)

Rainfall Season	HadCM3		ECHAM5	
	Period in years		**Period in years**	
	2040-2069	2081-2100	2040-2069	2081-2100
Wet season June to December	- 25 mm/season on west coast and - 60mm by season for the rest of the island	-350 mm /season to -400 mm /season	General decrease to -75mm/season for most of the island	+65mm/season to +75 mm for most of the island
Dry season January to May	-25mm/ season on the east coast; for the rest of the island -100 to -125 mm/season	-75 mm/season over most of the island	General decrease over most of the island to -75mm by season	-75 mm over most of the island
Temperature	**Period in years**		**Period in years**	
	2040-2069	**2081-2100**	**2040-2069**	**2081-2100**
Air temperature Wet season	1.75° C.	2.75 to 3.0° C.	1.25 to 1.75° C.	3.0 to 3.25° C.
Air temperature Dry season	2.5° C.	2.75 to 3.0° C.	1.251° C.	3.0 to 3.25 ° C.

Of importance to the project's strategic approach to climate adaptation is that the declines in rainfall will predictably be slower during the wet season on the west of the island. This will provide an opening to continue to build adaptive capacities in water saving methods and soil-water conservation practices that will allow the crop sector in particular, to remain resilient with the predictions for significant declines during the seasonal dry months. Temperature changes during the period 2040-2069 and 2081-2100 were below 1°C. However, the country is aware that small temperature differences can have lasting and impactful consequences on the agriculture biodiversity, with long periods of increased in variation.

1.1.5 Predictions on agriculture and future climate change and climate variability

The TNC (2017) reports that the expected impact of future climate change and climate variability on agriculture is predicted to cause severe water security, which could result in reduced acreages suitable for agriculture. There could be cascading effect with negative impacts on household food security, loss of rural livelihoods, dislocation of populations and challenges to sustainable development in rural areas. Sectors such as forestry, marine biodiversity, tourism and health that are linked directly or indirectly to agriculture through food production and ecosystem sustainability would also be adversely affected.

UNECLAC (2011) and TNC (2017): Specific findings on farming systems in these two documents, report on possible threats to production, from rising temperature, including lower yields in tomatoes, peanuts and other legumes, and a shorter growing season or cooler growing conditions for leafy vegetables such as lettuce, broccoli and spinach, while other crops such as melons and okras will do well. Specific to leafy vegetables, increasing intensity of hurricanes and increased frequency of droughts and longer droughts will be a serious threat. However, the level of risk for vegetables will be lower than for other crop types due to quick restoration of vegetables, the potential for higher levels of productivity and the range of climate adaptation options for Protected Agriculture Systems (PAS) for adaptation with climate change and climate variability. Some crops specifically, cabbage *(Brasssica spp.*), lettuce (*Cruciferous*), cucumber (*Cucumis spp.*), sweet pepper and hot peppers (*Capsicum spp.),* carrot (*Daucus spp.*), okra, (*Abelmoschus spp.*) pumpkin (*Cucurbita spp.*), will be

less threatened if temperature variations are short term. However, with any rise in temperature tomatoes, the lead crop grown by small farmers could require cooler ground, and soil-water conditions from rainfall above an annual mean of 1568. 52 mm in rainfed systems.

Fruits and grains could be affected even under well-watered conditions, if temperatures exceed maximum i.e above 2°C rise. Root crops, including sweet potato, yams, taro, dasheen and ginger would, be able to adapt to short term variations in temperature, but would be threatened by long term variation in temperature rise and rainfall below, the mean baseline (1568.52 mm based on 10-year series rainfall), as for tomatoes. Tree crops will be affected by temperature but to a lesser extent than the vegetable group. However, tree crops will show negative and perhaps significant levels of declines in yield with decrease in rainfall amounts, as already rainfall is at the lower range for some important tree crops. These include breadfruit for which the average annual rainfall is already at the lower level for economic crop yields, avocado for which the average annual rainfall is well below desired crop yields and just within the range for sufficient water for optimal yields for soursop, mango and pineapple. In general, tree crops will not do well, in the absence of climate change adaptation practices to ensure water security in farming systems.

In respect of livestock the TNC (2017) reports direct impacts will be related mainly to heat stress as well as cooler weather due to prolonged rainfall, while indirect impacts will be related to the deterioration of pasture for grazing and tree species used for cut and carry feed and that are susceptible to drought conditions as well as to access to water for drinking.

1.1.6 Predictions of future scenarios of climate change and climate variability on the marine ecosystems, nearshore and coastline activities

The TNC (2017) further reported that future climate change and climate variability will also threaten coastal and marine ecosystems and fishing villages and other infrastructure on the coastline. Some of these will impact indirectly on the agriculture sector while all are likely to have further negative impacts on vulnerable populations and marginalized groups in rural farming communities.

Threats to coastal and marine ecosystems will include sea level rise, storm surges from rising temperatures and ocean acidity affecting coastal areas. Increased sedimentation and industrial waste from terrestrial ecosystems will also be a problem due to small size and topography of the country. Mangroves, sea grass, coral reefs and other marine ecosystem services for the tourism sector could be threatened. Infrastructure including hotels, ports, seaside restaurants and marine sports could be significantly affected reducing the attractiveness of Saint Lucia as a tourist destination with serious threats to employment and income generation including in rural communities and agriculture estates that are heavily involved in agri-tourism activities. This could result in adverse impacts on poor households in rural communities that depend on agri-tourism activities for livelihoods as well as urban persons such as taxi-operates and tour guides linked to agri-tourism.

Studies on the [3]fisheries sector report that fishing villages and low lying agricultural lands are also at risk. Predictions are that fisheries productivity would shift largely away from tropical regions and to regions of higher altitudes which would, in general, have a severe impact on the Caribbean fisheries and by extension, the Saint Lucian fisheries. A decrease in catch potential of 10-20 percent by 2050 relative to 2005 catch potentials is foreseen. Low lying agriculture lands will be challenged by poor drainage and salt water intrusion, perhaps requiring need to search for salt tolerant food and feed species.

[3] Pauly 2010- Restructured Total Catches by the Marine Fisheries of Small Island States in the Wider Caribbean (Robin Ramdeen; Daniel Pauly, et al (2010).

1.1.7. Characteristics of agriculture sector

The total land area under agriculture production is [4]13771.2 hectares of which only an estimated [5]3449.6 hectares (5.6 percent of total land area) is suited to cultivation due largely to the extent of steep slopes and to soil type. The land capability map of the country shows most of the land is technically unsuitable for cultivation especially when conventional practices are used. Farm size vary from less than one quarter of a hectare to just over 55 hectares with 11,000 holders and providing lively hood security for a farm family population of 32,919 persons (Census of Agriculture -2007). An estimated 74 percent of the population of holders operate on an area of land ranging from one quarter of a hectare to 2.5 hectares and 45 percent of these holdings are under one hectare. These farms are mostly located in clusters scattered across hillsides. The 2007 data also show that an estimated thirty percent of the holdings were owned by female farmers.

The farm holders make up 22 percent of the national population (Census of Agriculture 2007). Average age of the farmer is 55 years and the most productive farmers are between the age of 45 years and 55 years. Female farmers are normally above 30 years of age and the average age is also estimated at 55 years. The crop subsector is the largest and the most productive with most farmers growing leafy vegetables, vine fruits and root crops and less so tree crops. There are 300 listed livestock farmers of which an estimated 52 percent are females. Most of these farmer's husband small ruminants and pigs and nearly all grow crops. Registered small scale fisherfolk number 1700 and there is a smaller number of inland fisheries or aquaculture farmers. Many of the farmers are involved in all three subsectors.

In general, these are largely small farmers ranging from subsistence to semi-commercial, mostly rainfed, except for a small number accessing water from the river. Farmers with access to water from a river or from established irrigation systems are eligible for registration by the major local fresh produce buyers, but buyers in Saint Lucia do not establish binding contractual arrangements with farmers. Only about two percent of the total number of farmers have access to water from established irrigation systems. Mostly small –scale livestock farmers carry water to the animal. There is a [6]general lack of capital, technical assistance, business focus and ability to respond to value-added fresh produce and processed foods in domestic and regional marketing of farm produce. The Brown and Company Review (2009) also concluded that opportunities to respond to [7]growth in the tourism and hospitality sector and a growing demand for food and nutrition security have not been fully exploited. Further evidence of this can be observed in export and import data for the period 2010 to 2017 (Figure I below).

In respect of farmer organizations, there are three well established farmers' organization comprising an estimated mix of 450 males and females in the west south west of the country, involved in crops or livestock as well as integrated farming systems with all three subsectors. There is also a National Chapter of the Caribbean Network of Rural Women Producers (CANRWP), comprising 70 rural women who make up the membership of the Saint Lucia Rural Network of Women Producers (SLRNWP), mostly involved in small scale agri-processing. Relative to youth there is a Youth Agri-Entrepreneurial Program (YAEP) comprising 150 young people focused on integrated farm production including crops, livestock, poultry, aquaculture and greenhouses. Another youth group, the Saint Lucia Agriculture Forum for Youth (SLAFY) focus on facilitation of agri- business development and modern climate smart technology.

[4] Census of Agriculture (2007)
[5] Toward the Establishment of Agriculture Land Bank in Saint Lucia (2017)
[6] Legal Review of the Land Tenure System in Saint Lucia (Brown and Company-2009).
[7] ESR 2017 reports the stay over tourists grew by 25.6 percent during 2007-2017

Capacity building for farmers is largely the function of the Department of Extension and Advisory Services (DEAS) that has institutionalized Farmer Field School (FFS) approach to extension and training in each of the eight Agricultural Regions for over a decade. Women and youth are actively engaged in the program. Currently there is no focus on capacity building for improved climate change adaptation practices in agriculture.

1.1.7 Observed impacts of changes in rainfall at the farm level

Incomplete data is showing reduced flows from rivers and local farmers complain of finding it more difficult to satisfy farm water needs for irrigation by pumping from the rivers.
Specifically, the farmers describe variability in rainfall as unexpected dry spells and higher rainfall peaks, during the normal wet period, with annual monthly variation. These changes have resulted in delays in planting dates and in severe cases, farmers have moved to more favourable conditions in the wet interior, since 2012. Farmers also perceive an increase in insect pest infestation in some root crops and increasingly higher labour costs from weed infestation. Other observations include warming of the rivers and a change in the type of freshwater fish, poor drainage problems as well as salt water intrusion into the low-lying farms on the west coast.

The observations cited by farmers are in agreement with the findings of both the Second National Communication (SNC-2015) and the TNC (2017) that the agriculture sector and particularly the largely rainfed small farming communities will likely be the first populations to be conscious of the adverse impacts of climate change and climate variability on the country. The outlook would be that the agriculture sector could become increasingly dependent on harvested water from direct rainfall resulting in serious challenges to the survival or regeneration and protection of food and feed species and plant varieties for food security, incomes and employment generation. The households most sensitive to these changes are the 32,919 persons within the small farm family population, due to the higher concentration of the poor and marginalized population among this group.

1.2 Socio- economic context

1.2.1 Social: Saint Lucia's Human Development Index (HDI) [8]value for 2015 was 0.735 placing the country in the high human development category and positioning it at 92 out of 188 countries and territories. Progress in each of the HDI indicators showed that between 1990 and 2015, life expectancy at birth increased by 4.1 years, mean years of schooling increased by 2.3 years and expected years of schooling increased by 0.5 years. Saint Lucia's gross national income (GNI), per capita increased by about 15.4 percent between 1990 and 2015. The country's Gender Development Index in 2015 was 0.986 and in the same year its Gender Inequality Index value 0.354 ranking it at 74 out of 159 countries.

In 2017, the population was 174,417 (Economic and Social Review (2017) with 33 percent between 15 years and 34 years and 50 percent of the population female. The size of the labour force declined by 2.3 percent in 2017 to 102,300 with labour force participation rate estimated at 71.4 percent. Women account for 48.7 of the employed labour force. Youth unemployment in 2017 was 38.5 percent showing no change from 2016.

1.2.1.1 Gender, youth and poverty**:** The Population Census (2010) recorded an estimated 28.8 percent of the population live below the poverty line and that 40.3 percent of the population is vulnerable to poverty. However according to a recent Poverty Assessment Report (Saint Lucia National Report of Living Conditions (2016)- Caribbean Development Bank), the level of poverty

[8] UNDP Human Development Report 2016

had declined to 25.0 percent in 2016. Further that the poverty gap fell nationally by 1.5 percent between 2006 and 2016 to 7.5 percent. Also, that poverty in 2016 was almost half of the level in urban areas compared to rural areas, suggesting an increase in the extent of rural poverty. In the context of agro-ecological zones this by definition would be in the agricultural communities.

Against this background poverty is predominantly and persistently a rural phenomenon. Figure F below shows the high concentration of poverty in some of these communities with head counts as high as 35- 43.6 percent. The map shows the higher concentration of the poor living on the west, south west and parts of the east of the country with levels of up to 24.4 percent in most of the country. The high levels of poverty have been attributed to declines in the agriculture sector, starting at the beginning of 1990's with the loss of the banana industry which was then the primary economic activity in the country.

[9]More than 50 percent of the poor are under the age of 20 years and poverty is slightly higher among men than women: 29 percent and 25 percent respectively. Twenty four percent of the households headed by females and 17.4 percent headed by males are poor. The largest percent of poor males are engaged in agriculture and forestry.

1.2.1.2 Poverty climate change and climate variability: The extent of poverty, especially in rural areas and specifically, [10]the agriculture communities could worsen with climate change and climate variability, based on the projections on changing pattern and decrease in amounts in annual rainfall in the wet season and with more dry spells and droughts from drier and earlier dry seasons.

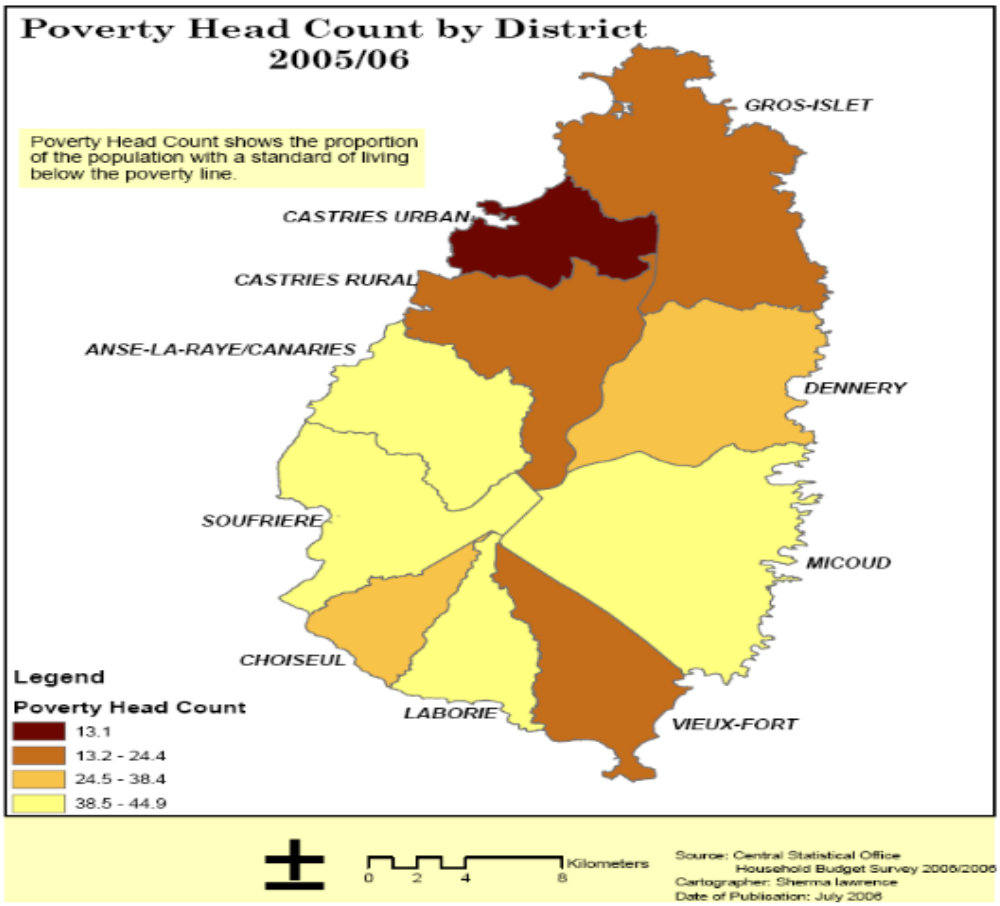


Figure F: Poverty Head Count by District

[9] Economic and Social Review 2017
[10] Saint Lucia Second National Communication to the UNFCCC (2015).

[11]Economic analyses on impacts of climate change also revealed that while short variations giving rise to higher temperature could be managed with adaptation long variations in rise in temperatures even though small could adversely impact crops and small livestock in Saint Lucia. The country is divided in 8 Agriculture Regions, with small farms scattered all across the island. This provides a good indication of the importance of resilient small farming activities at the household levels and the scope of any adverse impact on livelihoods security, whether for income generation, employment creation or for household food security.

Small size of land area under agriculture will also be a factor in climate change and climate variability as due to topography, there is not the opportunity to relocate to suitable land elsewhere. The threat to farming systems and to livelihood security, alleviation of poverty and food production, posed by climate change and climate variability calls for the most urgent action to enable a deliberate program of adaptation measures for building resilience of the agriculture sector. Some of the major climate change challenges that will be experienced more quickly by the poor and with increasingly deepening changes in livelihood security will emerge from social, economic and cultural and environmental issues including:

- **(i)** inability for small-scale farmers (two hectares and under), backyard farmers and subsistence food producers to continue growing food on the scale that they currently do, with loss of rural livelihoods directly or indirectly related to agriculture and the potential of increasingly higher demand on the share of household expenditure to purchase food;
- **(ii)** social instability and serious conflicts over access to land with rivers and springs, for food production and beach area in fishing communities;
- **(iii)** increasing rural urban drift; and
- **(iv)** inability to keep children in school due to shrinking incomes (**v)** changes in agro-ecological and marine eco-systems that could change food production systems naturally, requiring a whole new culture to cope or to positively affect welfare in at rural household level.

[12]The poor and marginalized, mostly concentrated in farming populations (ESR 2016) will be the first to experience these adverse outcomes due to inherent sensitivity to changes, and who are likely to be exposed to persistent and worsening livelihood circumstances, even without further global warming.

1.2.2 Economy: The economy of Saint Lucia is highly dependent on sectors which are sensitive to the vagaries of climate. These sectors include tourism, agriculture, biodiversity and water. Together they account for an estimated 60.7 percent of GDP, underscoring the vulnerability of the local economy to the impacts of climate change and climate variability. In 2017, GDP stood at US$1,138,333.52 Million, an increase of 2.5 percent over 2016.

The uneven trend in the growth rate over the period 2007 to 2017 is shown in Figure G below. The tourism sector continued to dominate economic activity, providing 10.9 percent. This sector, is highly dependent on agriculture for fresh food for the hotels and restaurants, as well as for sustainability of the unique terrestrial biodiversity of the country that drives the vibrant agri-rural-tourism island tours.

[11] UNECLAC- Assessment of Economic Impact of Climate Change on the Agriculture Sector in Saint Lucia (2011).
[12] Saint Lucia Second National Communication to the UNFCCC (2015)

Figure G: GDP Growth Rate 2007-2017: Data Source Economic Review- 2017

1.2.2.1 Contribution of the agriculture sector (2008-2017): Agriculture GDP growth declined from 36.2 percent in 2008 to minus 30.8 in 2010 (Figure H) below reflecting the negative impact of unfavourable conditions for the sector including two periods of extended droughts and two hurricanes and a Trough. The combined loss and damage to the sector from the three devastating rainfall events (Table 1 above) was an estimated US$ 358 Million[13]. Despite the severe impacts of these events the sector continues to be critical to the economy due to its multi-functional role in earning foreign exchange, generating an employment rate of 22 percent in 2017, a slight increase of 0.3 percent on 2016 and contributing towards food and nutrition security and social stability in rural communities

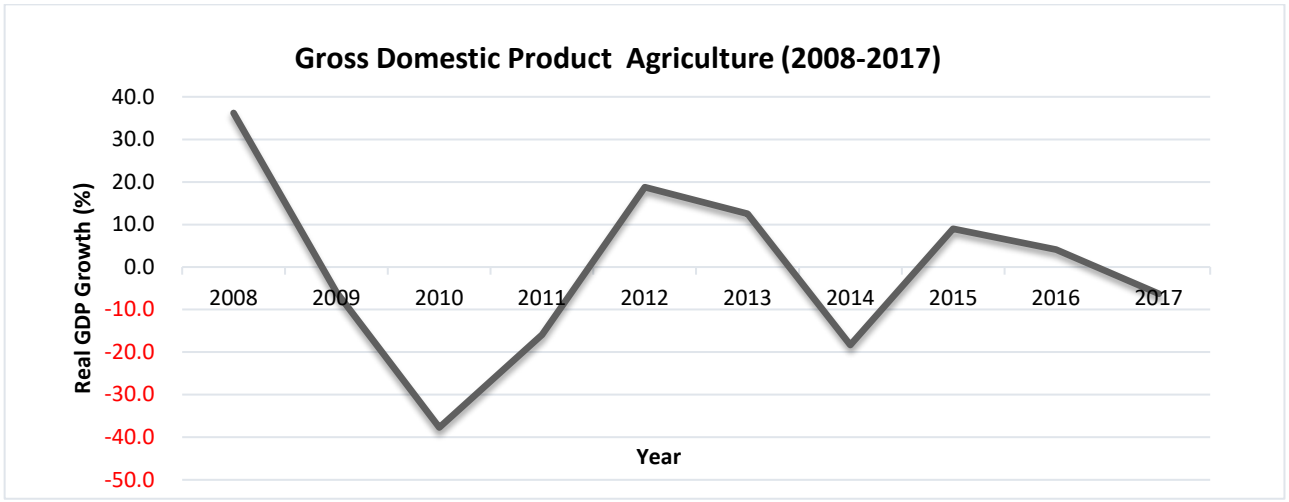


Figure H: Agriculture Real GDP Growth (2008-2017): Data Source –ESR (2017).

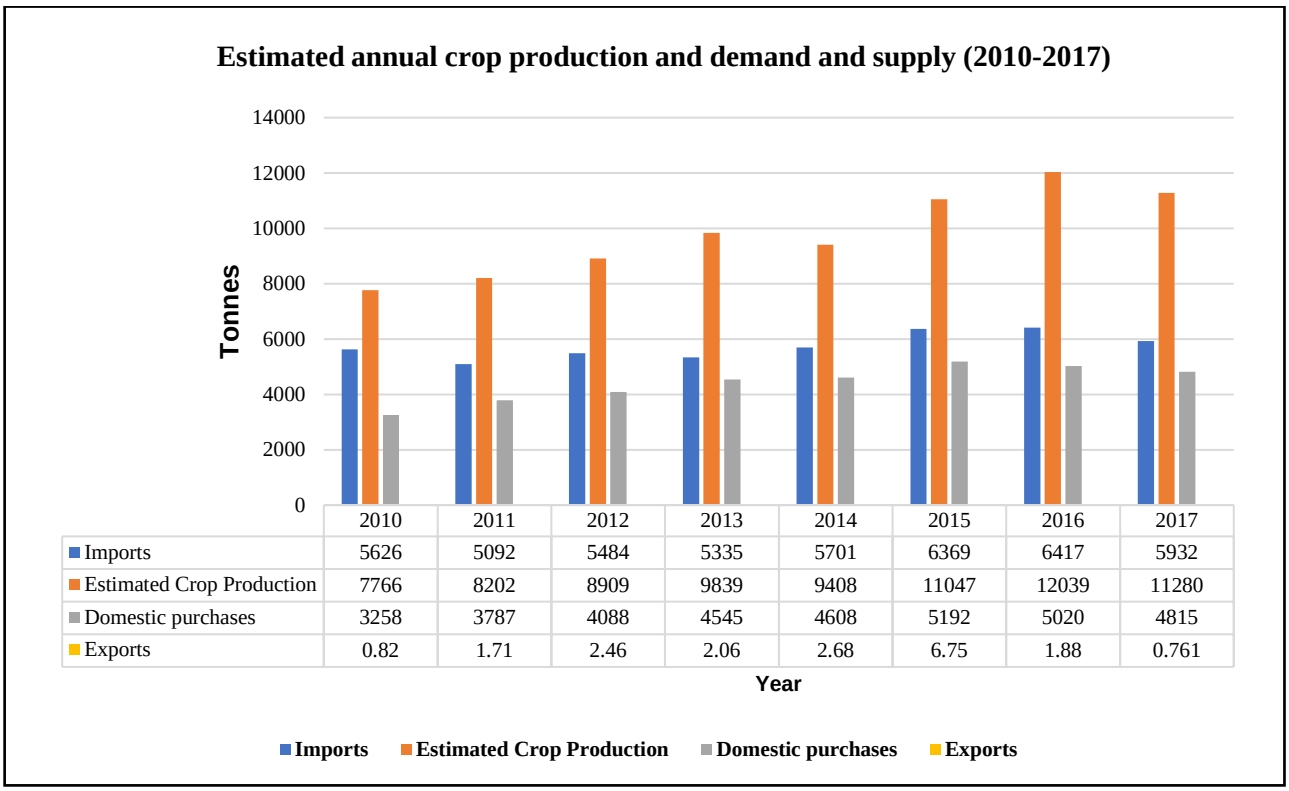
The crop subsector continues to be dominant in terms of livelihoods, food security and income generation, due to the fact that nearly all farmers grow some type of crop. However, by nature this subsector is highly vulnerable to climate change and climate variability and comparatively will pose highest risk to livelihood security with climate change and climate variability, with the projections of [14]unexpected dry spells, earlier dry months and significant decrease in annual rainfall amounts.

Figure I below shows demand and supply relative to estimated annual crop production. The data is showing average food imports as high as 55.5 percent of crop production and extremely low exports. The data also confirms that domestic purchases was only an average 45.2 percent of crop production through the period 2010- 2017. These figures reflect the following (i) the unwillingness

[13] Amount rounded.
[14] TNC (2017)

of the major buyers to establish contractual arrangements with farmers due to unreliability of timeliness in supply with shifting planting dates due to climate variability (ii) unexpected dry periods during the wet season that impact expected yields under the rainfed conditions and (iii) events of short and intense rainfall periods sufficient to prevent cultivation due to water logging and salt intrusion in the soil in the lower lying areas especially on the west. The Chart also supports the farmers' frequent complaints about gluts. Vulnerability and weak adaptive capacity of the crop subsector to changes in agroecosystem services, particularly access to water as necessary would have contributed to the low and uneven GDP growth at Figure H above.

Therefore, it is important that the strategies of the project to build resilience in agroecosystems resources to avoid or mitigate the adverse impacts of climate change and climate variability also take into serious consideration enhanced production practices that can **(i)**increase productivity (**ii**) diversify and extend agriculture value chains (**iii**) increase competitiveness in the domestic markets and (**iv**) effectively reduce fresh produce imports, with improved livelihood security and incomes for the well-being of vulnerable and marginalized rural populations.



	2010	2011	2012	2013	2014	2015	2016	2017
Imports	5626	5092	5484	5335	5701	6369	6417	5932
Estimated Crop Production	7766	8202	8909	9839	9408	11047	12039	11280
Domestic purchases	3258	3787	4088	4545	4608	5192	5020	4815
Exports	0.82	1.71	2.46	2.06	2.68	6.75	1.88	0.761

Figure I: Estimated Annual Production of Selected Crops and Supply and Demand (2008-2017)
Source: Department of Statistics; and Economic and Social Review (2016 and 2017)

Based on the foregoing there is an urgency on the part of the GOSL to pursue the implementation of climate change adaptation strategies and actions in the agriculture sector, for longer-term prosperity in agriculture and particularly so in the rural communities, highly dependent on the sector. This strategic direction is correct as despite the declines, and the evidence of adverse impacts of climate change and climate variability on the sector, farming systems continue to be important to well-being in farm family households of a population of over 32,919 or 22 percent of the population, providing livelihood security, food security, and incomes generation (ESR 2017).

1.3 Developmental – policy and strategy framework for climate resilience

The process of establishing an enabling policy and strategic framework for building resilience in agriculture was guided by deliberate measures to change likely adverse impacts of climate change

and climate variability on the country. This approach adopted is increasingly integrated and participatory in order to ensure that the quality of livelihoods including those populations most vulnerable to socio-economic and environmental impacts are not compromised. The GOSL has anchored the process described below beginning with the NCCPAP (2002) in the priorities of the 2012-2016 Medium -Term Development and Strategic Plan and Saint Lucia Development Strategy (MTDSP-SDS). The latter identifies among its priorities, the expansion of contribution of the agriculture sector to well-being of all communities, inclusive of vulnerable and marginalized households. The most recent and significant actions are briefly described below.

1.3.1 National Climate Change Policy and Adaptation Plan NCCPAP (2002):

The NCCPAP was based on the acceptance that climate change was occurring and that it would continue even if immediate steps were taken to reduce global warming. The effects would likely be profound and adverse impact on the socio-economic and environmental characteristics of the country if no deliberate climate adaptation measures were effected in a timely manner. The result was a deliberate approach for on-going climate adaptation and resilience building priorities integrated into strategies and plans, capacity and awareness building activities, incentives and economic instruments.

The outcomes of the NCCPAP (2002) were the basis for four subsequent policy documents (**1**) National Water Policy (2004) focused on improvements in efficiency in irrigation and water management techniques by farmers as well as recommendations for improved access to water by farmers (**2**)National Agriculture Policy (2009-2015) with a focus on environmental conservation, facilitation of agriculture communities to adapt to climate change and climate variability and enhance food security and sustainability of sound rural livelihoods (**3**) Revised National Land Policy (NLP) 2015, focused on optimizing contribution of land to economic development and livelihoods through protection and sustainable use of agriculture lands and (**4**) National Climate Change Adaptation Plan NCCAP (2015). The NCCAP approached adaptation through three interconnected strategy; facilitation through policy, legislation and institution and with financing by putting in place measures to ensure adequate and predictable financial flows and implementation. The aim was to ensure undertaking of concrete actions on the ground to prepare for, or respond to the impacts of climate change. Of direct relevance to the project is that the NCCAP covers deliberate concrete actions to build the productive capacities of the country's biological diversity, land and water, for agriculture, towards national food security, rural livelihoods and employment and foreign exchange.

1.3.2 Second and Third National Communications

The findings of the SNC (2015) and the TNC (2017) provide critical information for the way forward in climate adaptation and resilience in the agriculture sector. Specifically, the GOSL has taken seriously the predictions of temperature changes, in particularly rising temperatures on selected crop varieties and equally the significant decrease in annual rainfall as earlier described in the document (Table 2 – Results of climate scenario on future rainfall and temperature (2011-2100). Hence among the focus of this document, are climate adaptation practices to ensure water security for farming systems and options to improve adaptive capacities for soil conservation and soil water retention, to ensure efficient use of water. There are also considerations for options for ex-situ tracking of behaviors of local drought resistant food and feed varieties, with rising temperatures, for sustainable livelihoods, household food security and income generation.

1.3.3 Studies undertaken

Studies undertaken since 2011 of relevance include the economic assessment on the impact of climate change on agriculture of earlier and its recommendations for (a) access to water with good

management and drip irrigation as the best climate change adaptation option with good returns on investment (b) greenhouses for best management of variability in rainfall and variation in temperature with (c) capacity building to assist public servants, including staff of the DAFNC to identify and assess future climate scenario on economic impacts on crops and livestock. Another study resulted in the revision of the national environmental plans and strategies that support activities to minimize vulnerabilities and risk to sustainable livelihoods and enhance food and water security.

1.3.4 The National Adaptation Plan (2018) and Sectoral Adaptation Strategy and Action Plan for Agriculture and Fisheries Sectors (2018-2028) SASAPs

The document is comprehensive in its approach to resilient agriculture. Climate resilient agriculture best practices and businesses are given attention, as are strengthening and development of agriculture extension officers, development of a land –use plan, data management, water supply and efficient utilization of water, sustainable land management and slope stabilization. Attention is also given to early warning systems, learning by demonstration, community-based approaches and linkages to the tourism sector.

Outcomes foreseen include strengthened agriculture contribution to the development of rural areas and well-being of the rural population, improved adaptive capacities for the better use of the natural resources for ecosystem services, improve food security and modernization of value chains. The SASAPs is consistent with the process to pursue deliberate actions to build adaptive capacities in strategic approaches to climate adaptation across policy, programs and projects for resilience in agriculture (including fishing) communities, through practices for sustainable use of the natural resources.

In view of the above, the GOSL continues its partnerships with Regional entities that support resilience in agriculture. These include the Caribbean Development Bank (CDB) and the Caribbean Community Climate Change Centre (CCCCC) the Caribbean Community (CARICOM) and the Caribbean Disaster and Emergency Management Agency (CDEMA), among others. The intention is to strengthen and enhance national planning systems for climate resilience in the development sectors, directly dependent on agro-ecosystem services for livelihood security, income generation and household food security.

1.3.5 Gaps in the development framework:

GOSL recognizes some gaps in the development framework for measures to address institutional strengthening in agriculture for climate resilience, including stronger linkages with SALCC-Farm School in capacity building in modern agriculture production technologies, the DMS on downscaled rainfall data and a managed database for climate change and climate variability impacts on agriculture and rural communities.

2. PROBLEM STATEMENT

2.1 Climate variability and climate change

Saint Lucia's agriculture sector provides the main source of livelihood security, household food security and incomes for 22 percent of the population, an estimated household population of 32,919, on 11,000 farm holdings. The area under agriculture production is estimated at 13,771 hectares growing mostly a variety of crops, with small livestock, inland fisheries and aquaculture, but according to the land capability map of Saint Lucia only just over 3,000 hectares of this area is suited to cultivation due to steep slopes. In addition, there is evidence of reduction on the areas under production and abandonment of farmlands by small farmers due to weak water security, for the

mostly shallow rooted crops grown, resulting in regrowth and land cover in non-agricultural biodiversity (TNC-2017).

The productivity of the livelihood base is highly vulnerable to the impacts of climate change and climate variability, such as hurricanes, intense rainfall, floods, droughts and temperature changes. Even normal rainfall is a trigger for multiple landslides with extensive soil erosion and heavy sedimentation that cause devastating losses to the farms (Table 1). Frequent disruptions from sedimentation in freshwater and coastal and marine ecosystems services often affect tourism-based livelihoods in rural coastline communities on the west and south west of the country. Sedimentation and boulders also block river channels causing flooding in low lying areas. Small livestock farmers experience mortality in the herds, particularly the young in goats and sheep, with cooler weather from prolonged rainfall and small aquaculture farmers frequently experience losses, as the ponds go into disuse from siltation. Waterlogging and poor drainage is also problematic in low lying farms.

Official GOSL [15]documents are in agreement that the likely impact of climate change and climate variability will result in significant decrease in annual rainfall amounts and increasing demands for water security for sector. Dry months will be drier and earlier and soil water deficits in the lower lying areas could expand into the wet interior where most of the moisture from rainfall accumulates (Figure D). With no projections on the potential for underground water in sustainable development, and no natural water bodies the country is highly dependent on overflows from land into dams and reservoirs. Due to the topography and soil type of the country most of this water runs rapidly to the coastlines. In these circumstances the projected decrease in rainfall of up to 57 percent or minus 350-400 mm is of concern to the country as increase in water demand will affect all areas of productivity.

In the context of the above water security for agriculture with climate change and climate variability could pose a major problem for sustainable livelihood security in farming populations. Drying of soils is expected to worsen in soils already low in water retention and cracking is also expected to worsen with increased vulnerabilities and risks of landslips during normal or intense rainfall over the farms. This will be particularly so in the west and south west where the most productive farm areas operate and where there are high concentrations of poor households, more than half solely dependent on farming for livelihood and food security. Farm lands could be even more devastated from impacts of landslips and soil erosion that could extend to negative impacts on coastline livelihoods outside of the farming areas due to buildup of sedimentation and siltation. Due to small size of the country there is no alternative to resettle and the narrow economic base and low investment in the farming systems has stifled production value chains. Hence on one hand there is the problem of water demand with climate change and climate variability and on the on the other hand these same farming areas are most likely to become devastated and to progressively lose land under farming to landslips and soil erosion.

Inability to satisfy demand for water for irrigation as necessary has other worrying implications for farming systems some of which have already emerged. Figure I provides the context for the generally weak competitiveness in the sector to generate confidence of major buyers in local capacity for reliable domestic fresh produce supply. The low capacity to compete in domestic supply chain has been ascribed to the weak adaptive capacities in the farming systems and absence of integration of climate smart innovative approaches for timelines in supply delivery arrangements due to shifting plantings dates with climate variability, even though the buyers have publicly expressed preference to local fresh produce.

[15] SNC (2015; TNC (2017); UNECLAC (2011) on Economic Impacts of Climate Change in the Agriculture Sector in Saint Lucia

Despite preference for local fresh produce, arrangements between major buyers and crop farmers are dependent on the farmers' evidence of access to a river or other evidence of source of water for irrigation when necessary, to ensure reliability in quality and timeliness of supply. The Chart at Figure I shows less than an average 45.5 percent of annual fresh produce is recorded under domestic purchases and exports are woefully low. Essentially, the requirement for evidence of water security for ease of marketing fresh produce to the major buyers place more than 70 percent of the farmers at a disadvantage. The scattered nature of the farms and weak organizational approach in the farming systems add to the problems as this creates challenges in coordination and consistency in quality in the supply chains for the demanding tourism and upscale supermarkets. In the meantime, opportunities to respond to demand for fresh food in the growing tourism and hospitality sector and a growing is not being exploited, food imports fresh continue to be high and there is evidence of annual gluts. This could be another contributing factor to the appearance of farmers reducing on areas under production.

It will be even more difficult for local small farmers to compete with food imports based on reliable deliveries at the level of the food import markets, with the projections for increased water demand, the disruptions from landslips and soil erosion over almost 1000 hectares of farmlands in the west south west, with the prediction on decrease in rainfall and earlier dry months. This tendency to resort to food imports to satisfy food security could have serious national level implications for food security with rising food prices and weak ability to store food in the case of early warning system alerts, with serious risk of household food and nutrition insecurity in rural communities.

Relative to problems arising from changes in temperature, where affordable farmers with greenhouses and poultry are already using electric cooling fans, and crop farmers both in open field and PAS are increasingly facing higher production cost for purchasing pesticides to control increasing incidence of insect pest. Changing temperatures could also be problematic for small livestock farmers due to heat stress or cooler weather. Local farmers also complain of hotter days with intermittent rainfall showers resulting in rotting of tubers in root crops and some vegetables. There are also unsubstantiated claims of changes in the phenotypes of local crop cultivars. Higher labour cost from weed infestation partly linked to increasing levels of chemical fertilizer during the seasonal wet months was also cited as a major problem, during the community consultations that supported the project formulation process. These are problems that will only worsen even with small changes in temperature as they are already evident on the farms.

The concerns related to the likelihood of increasing negative impacts of climate variability and climate change could be strong determinants of the well-being of vulnerable and marginalized rural population. Other problems are foreseen in the predictions of the National Communications (2015 and 2017) that sited the potential for increasing loss in areas under food production due primarily to water scarcity, with dislocation of populations and in general challenges to sustainable development in rural areas. There would also be adverse impacts on livelihood security from forest, marine biodiversity, tourism and health some emerging from the continued degradation of farmlands and inappropriate practices with climate change and climate variability. Hence these sectors are highly linked directly or indirectly to agriculture through ecosystem sustainability, food security and food safety.

2.2 Baselines of climate adaptation for building resilience in farming systems

2.2.1 Data and information for climate adaptation: A fundamental concern is that downscaled data, maps and baselines are not available, sparse, in urgent need of updates and are often held in different Ministries of the GOSL.

(i) Preliminary data on agro-ecological systems, GIS maps on landslips and farming areas, and direct impacts of landslip events on farmers, for example damage and loss by farmers are held in different agencies, some not updated since 2010. In the case of the DAFNC the data used is primarily an assessment in order to determine distribution of farm agri-inputs for recovery after a disaster. Data on landslips are mostly used for rehabilitation of roads, housing or other infrastructure and are held in the Ministries covering the respective portfolios. However, as reported in the Assessment of the Impact of Hurricane Tomas (2010), the devastation in the agriculture sector was due mainly to landslips (Table 1-PART 1).

A major problem for farmers is that, typically the disaster recovery programs and projects have so far not gone beyond assistance in the form of planting material to restore the harvest and usually with no treatment to reduce vulnerability of the site. Farmers plant the same inappropriate crop in the same inappropriate cropping pattern on another part of the farm where it is still possible to carry out some cultivation practices, with little or no attention to Disaster Risk Management and Risk Reduction (DRRM) measures. At times the farmers replant on the same area or wherever the landslip settles. During drought conditions the farmers plant on the river banks causing more problems in degradation of these areas with sedimentation in river flows. As a result, land management to reduce vulnerabilities and risks from events such as rainfall events require urgent attention. During the consultation process it was clear that mapping of the landslips for adaptive capacity interventions must be addressed at the local level, due to the fact that the farms are scattered in small clusters.

(i) Rainfall data at the level of Agriculture Regions is incomplete, due to poor management of 16 of the 18 rainfall stations across the country.
(ii) Soil analysis data is outdated, there is need for Agriculture Engineering and Soil Department (AESD) to speed up delivery on soil analysis.
(iii) Treatment of soils on hillsides and slopes for reduced vulnerabilities to climate change and climate variability with improved and sustainable livelihood security and food security in the farming areas are not readily available.
(iv) There is no institutional arrangement or practice to house in one place all the requisite data necessary to support efficient and effective climate adaptation practices in farming systems.

2.2.1.1 Climate related threats are being super imposed on problems already existing in the farming systems such as:

- Low soil water retention due to topography and volcanic soils causing rainfall surface overflows to run rapidly to the coast. As a result, some 90 percent of the 11,000 largely small hillside farmers experience soil water shortages on the farm to stop planting.
- Two well- defined climatic seasons is reflected in a dry season from January to June and a wet season from June/July to December with some seventy percent of the rainfall during the wet season.
- Weak soil type and inappropriate cultivation practices on hillsides and steep slopes.
- Increased frequency in drought years since 2001, as well as dry spells during the seasonal wet months, coupled with poor land drainage and salt water intrusion, especially on the west coast are also problematic for small farmers.
- Uneven geographical rainfall distribution with a tendency for cumulative moisture to be concentrated at higher levels in the interior and away from the farming areas.
- Weak data management system to build climate resilient farming systems.

2.2.2 Key challenges of the farming systems. The participatory consultations revealed that:

(i) Extension officers and local farmers are aware of negative effects of climate variability in rainfall but there is no discreet program in the Department of Agriculture, Fisheries, Natural Resources and Cooperatives (DAFNC) to respond.

(ii) The crop subsector is the most at risk to weather changes, with low resistance to adverse drought conditions and also as it provides the largest share to farm production. Any loss in this subsector will impact negatively on the vulnerable populations, in particular the ability of small farmers to sustain their livelihoods and household food security.

(iii) The majority of the small farmers have moved away from using traditional knowledge practices such as the use of compost, mulch and fertilizer teas and biological control of insects, that could build resilience for sustainable agroecosystems. Increase in plant pests, higher application of agri-chemicals, higher costs of production and lower yield in root-crops are being reported.

(iv) Livestock farmers complain about scarcity in forage trees for livestock forcing famers to buy commercial feed at higher.

(v) Farmers in low lying areas are concerned about water logging and salt water intrusion

(vi) There is no practical demonstration of integration of benefits of climate smart innovative practices to reduce demand and increase efficiency in the use of built resilience in agro-ecosystem services with increase competitiveness in domestic supply value chains.

2.3 Non-climate variables:

There are important social and economic problems that if not addressed will burden or delay efficiency or effectiveness of the climate adaptation practices in the field and capacity building skills in intended project beneficiaries.

- General lack of capital, appropriate technical assistance and business focus in small farming systems.
- In general crop performance profiles are too weak to access credit from the financial institutions and often farmers must show evidence of another source of collateral to access credit.
- Youth continue to show a preference for off-farm income generation and employment.
- Farmer education programs and technological packages currently used by the DAFNC do not include climate change adaptation practices.
- There is insufficient coordination among the institutional resources in agriculture in the country such Sir Arthur Lewis Community College- Farm School (SALCC)-Farm School and the DAFNC.
- Weak capacity for small farmers to increase participation in the vibrant agri-tourism farm tours through mix of innovative and modern technologies.
- A national land use policy with necessary provisions to protect agro-ecological zones is not available nor is a disaster management plan for agriculture, for prevention and mitigation of impacts on the farming systems and their populations.

2.4 Geographic Location of the Project

The project interventions will be in the west, south west and northern part of the country where there are serious problems with steep slopes, landslips and water shortages within the farmlands, poor drainage and salt intrusion in low lying areas, low production capacity and weak competitiveness in the domestic supply chains. The project activities are intended to reach directly 2,400 of the farmers in the project area during four years starting from the implementation date. An

estimated 50 percent of the farmers under the DAFNC will benefit directly. The project benefits in incomes and livelihood security are expected to impact a farm family population of 7,200. It is also expected that as a result of the planned capacity building within the entire of DEAS, the agriculture extension officers outside of the project area, will be encouraged to integrate the learnt practices in the programs of their respective regions, thereby reaching another 2,400 farmers, through the regular FFS training sessions in production and utilization of material for building resilience to climate change in the farm soils.

The project area is also the geographic area where the larger segments of the population living below the poverty line reside (Figure F). These are rural populations highly dependent on agriculture. Hence the project is well placed to affect the lives of households at risk from climate change, who are among the poorest and are highly concentrated in agriculture communities. This is also where landslips and devastation in farming areas are closely linked (Figure E and Appendix II)

Three components are proposed to capture the interventions of the project and are as follows:

1) Building resilience and sustainability of farming systems through interventions for water security, soil conservation and management.
2) Integration of renewable and other energy efficient practices in intensive agriculture value chains.
3) Knowledge management and transfer to improve adaptive capacities.

The three components are complementary as they provide the building blocks for resilience in an ongoing process from (a) built adaptive capacities for resilient farming (b) a pathway to increased growth rates for resilient well-being of the target population through productivity and competitiveness in intensive farming practices and (c) improved understanding of the limits of climate adaptation options for awareness and timely integration of innovative adaptation measures to avoid or mitigate risks from increasing demands on agro-ecosystem services.

Component 1: Building resilience and sustainability of farming systems through interventions for water security, soil conservation and management.

OUTCOME: Increased productivity with improved livelihood security and incomes and new farm areas brought under production in the project area.

The interventions foreseen will achieve the following outputs

Reduce landslips and soil erosion: The approach will be comprehensive including (**a**) update of maps and creation of new maps and data on landslips, through inventory of farms, positioning of landslips relative to farms, vulnerability analysis and ranking of landslips in project area focusing on Region 6 (area with most vulnerable groups and highest concentration of landslips (Appendix (II), (**b)** production of overlay map showing farming areas vulnerable to landslips (**c)** recommendations of different types of climate adaption options and codes for the different treatments and (**d)** Community Based Disaster Risk Management (CBDRM) participatory approaches to undertake the adaptation practices.

The methods used will include restraining of debris due to the soil types such as ways to prevent debris from entering a stream channel through afforestation of landslips, with different types of agro-forestry and alley cropping, allowing for natural regeneration of landslides in some areas, trapping debris on a hillside in the channel or in a debris basin and distributing or diverting debris.

The Assessment of Hurricane Tomas (2010) indicated that many of the flow slides originated in cleared cultivated slopes with sixty of the more serious landslides identified in some of the farming areas. However, there has been no treatment applied at farm level under any discreet GOSL program and no farm overlay maps have been created. This has hampered the ability of the GOSL to develop a targeted programme to address the landslide problem. The map at Appendix II represents a coverage of an estimated 75 percent of the area of 9,000 hectares of Region 6. Due to the extent of the vulnerability and risks associated with some of these cultivated areas, the project will in its proposed six monthly inventory provide information to the DAFNC on any farms or farm settlements to which consideration should be given to suitable alternative to farming that does not focus on shallow rooted crops in monocultures for livelihood security.

Improved resilience in soil-water functionality through on-farm water security: The predictions are for a decrease in rainfall into the future making farms in the project area highly threatened by water shortages. Combined with low soil water retention of the volcanic soils in the area, strategic measures for water security is critical. TNC (2017) time line provides opportunities to secure water on the farm through RWHS with drip irrigation and to build adaptive capacities in the farming populations before the start of significant decrease in rainfall amounts around 2040. It is expected that by then these practices would have become a culture in agricultural communities. The proposed-on farm approach means that those small farmers scattered in clusters will not be denied participation in the benefits from RWHS and is therefore the best option for water security that is inclusive of all farmers target in the project area. This would include the communities of Anse-la-Raye, Soufriere, and Canaries, on the west and south west coast, identified as among poorest (National Social Protection Policy (2015)) and in La Bourne another agricultural community in the north with severe water shortages.

Two types of RWHS catchment surfaces are proposed, on-farm rooftop runoff, two of which will be standalone storage from runoff from public buildings and also bare slope surface runoff, combined with runoff from household rooftop along the main line of the slope. Livestock farmers and farmers operating on challenging sites will be provided with water from standalone RWHS in centralized areas and using mobile tanks. The RWHS sites were These sites were preselected from intensive consultation at technical and community levels in the project area, comprising farmers, interested community folks, subcontractors in agronomic practices, water management, knowledge management and GOSL technicians. Farmers assisted in describing experiences in water shortages and areas where farmers most vulnerable to water shortages were located- those wholly dependent on rainfed agriculture.

The main role of the technicians was to provide (**a**) risk assessments associated with rapid surface flows, (**b**) options for best layout so as to include as many farmers as possible, especially in locations where the farms could experience water shortages sufficient to stop planting, and (**c**) to reduce cost of conveyance lines across the hills due to the scattered nature of many of the farm clusters. The exercise resulted in an estimated 90-100 on-farm RWHS structures over 25 settlements in the west, south west of the project area, providing an estimated 270-300 farmers mostly on holdings of one hectare and under with on-farm water. The individual holders and clusters were selected on the need for water, specially targeting farms that are wholly rainfed, inclusive of youth and women. Two main seedling nurseries managed by the DAFNC will also be provided with water, to ensure that tree crop and forest tree seedlings are available for tree planting in the management of soil erosion and landslips

Due to the extent of the landslip susceptibility of the project area, the preliminary risk assessment undertaken by the Informal Technical Team (ITT) comprising Water Resources Management Agency (WRMA), AESD, Department of Forestry (DOF) and the DEAS was thoroughly reassessed through an environmental impact assessment (EIA) and an environmental plan

prepared (EMP) for the project. The conclusions of the expert are that the impacts can be easily mitigated if the sites are appropriately selected as outlined in the EIA and the EMP (TOR of the expert and EIA/EMP at Appendix 11). It is also important to note none of the sites proposed are in those considered as risks (Table 1-PART II).

Improved soil erosion control: Due to the volcanic origin of soils which makes them easily erodible all farmers in the project area will benefit from capacity building in production and utilization of soil building material (compost, vermicomposting, mulch fertilizer teas and vermi-culture). These farmers will also be able to access these inputs from six outdoor facilities constructed under the project. An updated inventory of farmers and the state of the farm will be developed supported by the overlay map prepared as proposed above in order to create a baseline for adaptive capacities within the project area. Holders of farms selected for the different interventions will be expected to actively participate in the respective farm activity in order to enhance learning by doing.

The project activities under Component 1 will be aligned with the Annual Work Plans of the DAFNC to accommodate the implementation arrangements of the project (See PART III) for Project Team Leaders and other technical support from the DAFNC to the Project Management Unit (PMU). The DOF in particular has wide experiences in participatory approaches in its field staff in recovery after devastation from landslips from weather events. The EIA/EMP also confirms that with current capacity in the DAFNC to manage landslips and assess risks in RWHS systems plus the technical support from an expert in vulnerability analysis and DRRM contracted under the project, there will be adequate built adaptive capacities in the DAFNC to monitor the built concrete outputs from this Component post project.

Component 2: Integration of renewable and other energy efficient practices in intensive agriculture value chains in green agro-parks.

OUTCOME: Increased productivity and efficiency in resilient small farming systems with improved livelihood security, income generation through enhanced production practices and value chains.

The intention of the interventions described below are expected to increase general competiveness in diversified production value chains for improved participation in domestic supply chains with improved livelihood security from resilient farming with increased incomes and employment generation. The integration of solar energy is arguably the best practice to satisfy building resilience through climate adaptation practices to raise the platform for competitiveness in the agriculture sector. This would place small farming systems with the recognition for ability to interact and do business with the demanding tourism sector that is already among the productive sector sectors that have integrated greening of efficiency and productivity practices for competitiveness by grasping the opportunity provided by the National Energy Transition Strategy and Integrated Resource Plan (NETS-2016). Through this initiative, the GOSL has set a renewable energy penetration target of 35 percent and an energy efficiency target of 20 percent reduction in consumption to be achieved by 2020. This will allow for 25kWp of solar energy system at each park at considerable savings from not using fossil fuel and with payback of four years.

The project is therefore timely for farming systems to benefit from integrating renewable energy in diversified production value chains from the building of resilience in the agro-ecosystem services through to agro-processing and awareness building. Specific to Component 2 the integration of solar energy will be for increased efficiency in water use and reduce demand on water for security, through pumping and controls to manage water and drip irrigation among several small farms operating in contiguous farms, cool greenhouses and energize aquaponics to improve soil water functionality for improved and cleaner plant nutrition with diversification into the green fresh fish supply value chain and for extended value chains into agro-processing.

For coordination and consistency in quality and greenness Component 2 will be established and managed using a park concept on two intensive production sites with built resilience for water security and soil conservation. With the green practices described above the areas will be promoted as green agro-parks with the added competitiveness that could come from farming systems operated by small farmers involved in practices that reduce carbon foot prints, thereby opening domestic supply chains. The focus will be on greening of enhanced practices that diversify production value chains with efficiency and competitiveness in the value chain and improved livelihood security for small farmers in vulnerable households with benefits to male, females and youth. The project will do this through the integration of solar energy and other efficient sources of energy at the level of the farm and in agro-processing chains. This will include innovative climate sensitive practices that will contribute to the greening concept such as aquaponics to supplement plant nutrient needs in greenhouses, and selected plants for feeding of tilapia with added value chains and for small livestock climate smart housing and on-farm protein banks.

The activities proposed under this component will result in the following two main outputs:

1) Two intensive production areas, using renewable energy, one in the west and one in the north east of the island and focused on greening of different type of technological practices for higher levels of productivity and competitiveness from built resilience for climate change adaptation in farming systems inclusive of all three subsectors.
2) Two agro-processing facilities using renewable energy and other energy efficient practices for processing and packaging for diversification of secondary agriculture production value-chain.

2.1: The activity will include the following:

In addition to the built resilience for water security and soil conservation, the activities will include drainage to reduce water logging and sedimentation and flooding at the at the mouth of one of the tributary of the Roseau river. Solar energy instead of fossil fuel for pumping of water through for aquaponics and green houses and open field production of crops over the production space. These practices will be integrated with agronomic for improved biological insect control using companion cropping patterns, mixed cropping and for intercropping systems for resilience in soil. For temperature control and water conservation green houses and climate smart housing for small livestock will also be cooled with solar energy. The climate smart practice for small livestock will also be integrated with on-farm protein banks that will also provide opportunities to build organic soils from legume waste. Restoration of aquaculture ponds and tilapia feeding with selected plants as in the case of aquaponics will provide opportunity for integrated clean practices for water recycling with the crop subsector.

The intensive production activities will generate two complementary chains, an agri-food production chain extending beyond the farm gate into agro-processing and an agri-tourism chain developed around climate change adaptation and climate resilient farm tours. The first chain is foreseen as farmers seek to benefit from year-round production from built resilience in agro-ecosystem services and enhanced production practices to manage the built resilience through integration of energy and intensive and integrated climate smart practices smart practices for productivity and diversification and competitiveness for livelihood security and incomes. A major gain will be the ability of the small farmers on both production sites to coordinate and consolidate their supply arrangements to local hotels and restaurants for competitiveness in economies of scale in capacity for volumes, with efficiency and productivity and inclusiveness as all farmers will be operating with the same quality of input resources.

The second chain is foreseen to broaden the content of the highly popular agri-tourism farm tours through the display of innovative, productive and climate sensitive approach of the farming activities in the agro-parks, enabled by climate adaptation practices. The expectation is also to build adaptive capacities in the small farmers in the project area as those farmers operating on lands close to the routes of the farm-tours will adopt some of the more attractive agri-tourism practices on their own farms to allow them to join the group of agri-tourism farms on the west and south west coast. The prospects for positive impacts for strengthening agri-tourism linkages are supported by the ESR (2017) with reports of increased external demand for Saint Lucia's tourism, with growth in hotels and restaurants, alongside stay-over arrivals that have increased by more than 24 percent since 2007.

Adherence to participation in a green approach in all the farming practices will be required of all the beneficiaries in these two production areas: Direct benefits of the project to the beneficiaries will include (**i**) on-going farmer education in adaptive capacities for resilient farming with practical demonstrations through the entire production value-chain meaning from land management and preparation to agro-processing (**ii)** water security with drip irrigation, and agronomic practices for resilience in soil fertility and structure, promotion of cropping systems for efficient water use and for biological control of pests and disease for higher levels of productivity per unit area (**iii**) strengthened organizational capacity for a producer cooperative approach to production and marketing of fresh produce across the two production sites through common approach and focus on green practices (**vi)** integration of aquaponics and renewable energy for cooling in the management of greenhouses (vii) promotion of small scale aquaculture for youth employment and practical demonstration for land management for drainage which is problematic for many of the low lying farms on the west coast.

2.2: **Two agro-processing facility at both locations using solar energy and RWHS as appropriate:**

The activities undertaken will include activities in (**i**) fresh produce quality control in leafy vegetables including packaging and (**ii**) processing and packaging of a wide range of products from local fresh produce on demand in the domestic market as will be determined by a survey, (**iii**) capacity building standards as required by the Saint Lucia Bureau of Standards (SLBS) and the Ministry of Health and technical training to the level of certification required by the SLBS. Farmers at the production sites and the project area in general will be encouraged to enter into supplier arrangements with small scale processers operating in the facility in order to minimize any loss for production, as well as to expand and diversify incomes within farming systems.

Youth and rural women will be trained to determine economically viable sized packages and to improve packaging in order to attract a higher price for the product, to prepare small agri-business plans to set up small scale green micro –enterprises in popular marketing spaces in the tourist areas as well as to brand their green products with potential to enhance penetration of the regional export markets. Small-business persons and other entities such as schools, restaurants, cooks involved in agro-processing will be facilitated under special arrangements, to use the services on scheduled days.

The promotion of investment in agro-processing facilities using efficient and renewable energy, fits with the expected increase in productivity through improvements in agro-ecosystem services and modernized technologies. Increased agro-processing activities will help to reduce gluts, a major problem during the wet season as farmers try to maximize income from improved access to water and so there will be co-benefits to farming areas outside the project area and that might still be challenged with water shortages, among other problems. This support to small-scale agro-processing in agriculture will help the SLNRWP, numbering 70 women, to become sufficiently strengthened to satisfy their goal to form a National Small Scale Agro-processing Association for Women. It will also help them to expand into networks of home-based initial processing using produce from their

backyard farm. Currently the small packages of fresh or initially processed farm products are important income generation sources for rural women and employment for young boys through rural –urban linkages. The contribution to employment for rural youth is important as 50 percent of the poor in the country are 20 years and under (Economic and Social Review 2017).

The proposed siting of the production areas and the agro-processing facility on the west and north east is convenient for the most vulnerable and marginalized households in the country living in communities on the west and south west and in the north east to benefit due to ease of access. The type of activities proposed, in particular water security in open field and greenhouses coupled with climate resilient soils and energy efficient agro-processing can help optimize the rate of growth and reasonable timelines necessary to reverse the uneven but persistent declines in agriculture since 2007 and the significant imbalance in the import export trade of fresh produce, due to low capacity of the sector to make positive changes in production data (Figure I). The outputs of this activity would therefore satisfy the objectives of the MTDS-(2010-2016) and the NAP-SASPs (2018) for concrete contribution from the agriculture sector through increase production and expansion of areas under intensive farm production, that can positively impact livelihoods, income generation, and food security, in vulnerable and agriculture communities.

<u>Component 3:</u> Knowledge management and transfer for capacity building to institutional and local level adaptive capacities.

OUTCOME: Established information and communication systems for improved adaptive capacities to build resilience in small farming systems for livelihood security, and income generation.

The activities will focus on data capture and management for shaping of adaptive capacities for building resilience and greater awareness about climate sensitive impacts at several levels of the agriculture sector.

Component 3 is cross cutting and will **(1)** Establish an agriculture database for knowledge management for climate change adaptation and lessons learnt; (**2**) Establish a Climate Change Interpretation Learning and Laboratory Centre (CCILLC) to track and expose experiences gained from project implementation and to conduct ex-situ plant behavior observations in climate control grow rooms powered with solar energy for greater awareness and for strategic direction that can change the projected negative impacts of climate variability and climate change on local food and feed varieties; **(3)** Organize events at community and national levels to analyze periodically, lessons learnt and data captured, for the purpose of enhancing deeper understanding and responsibility sharing of adaptive capacities in natural and human resources available for agriculture;(**4**) Promote and facilitate the preparation of a land-use policy with considerations for protection and conservation of lands in agriculture, particularly those lands in clearly defined agro-ecological zones and an agriculture disaster management plan and (**5**) Support the organization and management of the training and capacity building aspects of the project activities, required for project implementation to satisfy expected project inputs and outputs and for longer term prosperity with climate change and climate variability.

In respect of (2) the project will capture data generated in the laboratory, in order to identify drought resistant food and feed plant varieties and species by tracking plant behaviors for sustainable production at different levels of soil water availability and water stress and to variations in temperature and the duration of the variation in temperature. The laboratory will describe and include in the project data base those resistant varieties that can help the DAFNC to put in place a timely program for protection and multiplication of these selected food and feed plants to enhance resilience in farming systems, and minimize the predicted impact of future climate on agro-ecosystem services.

The work in this activity will be undertaken with the technical support of the UWI-Mona Climate Studies Group.

(1) Two climate control grow rooms managed to gather data on water stress on agriculture bio-diversity and other variables focusing on the most important food crops grown by small farmers in Saint Lucia, starting with leafy vegetables, tomatoes and sweet potato using multiple climate variables with soil water changes. These findings will be used to assist in awareness building of climate resilience and to conduct further field-tests of climate adaptation in small farming systems in Saint Lucia.

(2) Release promising varieties to the DEAS and the Research and Development Unit of the DAFNC including the DOF.

(3) Promote greater awareness about climate change in agriculture through information sharing on social and environmental resilience in agriculture through the proposed six monthly surveys of selected farms in the project area.

(4) Organize discussions and Biennial Conferences and Competitions to enhance capacity of public officers in the DAFNC and the Department of Sustainable Development to formulate climate policy and strategic actions to address the projected negative impacts of climate change on agro-ecosystem services and the social conditions of populations mostly dependent on these services for livelihoods.

(5) A Climate Change Interpretation and Learning Centre (CCILC) of modest proportion and focused primarily on adaptation and interpretation in farming systems is included in the design structure of the second agro-park in the north east of the country.

3. PROJECT/PROGRAMME OBJECTIVE

The Project Objective *is to build resilience in agriculture for livelihoods security through enhanced adaptive capacities for climate change and climate variability.*

The project is designed primarily to build adaptive capacities of agro-ecosystems and livelihoods to threats posed by climate change climate variability, with projections for significant decreases in rainfall, intensive hydro-meteorological events and increasing droughts. It will also contribute to the growth indicators for agriculture in the MTDPS (2012-2016), and change the potentially adverse and severe impacts of TNC predictions, for significant decreases in rainfall and increasing water shortages in farming systems. There is also good alignment with TNC recommendations for climate adaptation measures to enhance resilience in agriculture and with the proposals under the NAP-SASAP (2018) to enhance the resilience of farmers and fisherfolk to protect and improve the productive assets (soil, water, fisheries and other marine resources) while focusing on investment in the sector for poverty reduction in rural communities. Consideration is also given to UNECLAC (2011) economic analyses findings on the best climate adaptation options for agriculture in Saint Lucia for net benefits with climate variability and climate change.

<u>The components of the Project are as follows:</u>

1. Building climate resilience and sustainability of farming systems through interventions for water security, soil conservation and management.

2. Integration of renewable and other energy efficient practices in intensive agriculture value chains.

3. Knowledge management and transfer to improve adaptive capacities.

The project will target slopes on farms in the west, south west using downscaled maps that show the extent of increasing evidence of landslip between 1994 and 2018, and available data on the increasing cost to agriculture (Table 1). The project will use climate adaptation and DRR/DRM practices to reduce vulnerabilities to landslips and to create opportunities for expanding farm production areas with sustainable increase in farm incomes; improve on-farm water security with a focus on farmers wholly dependent on rainfed agriculture, integrated with improved adaptive capacities for resilience in soil functionality with rainfall variability, using compost and other organic soil-building materials.

The added benefits of energy integration using solar in resilient farming systems will result in higher levels of productivity, efficiency and competitiveness from the built resilience in agro-ecosystem services. This will happen through enhanced and intensive production in temperature controlled greenhouses using aquaponics with plant fed tilapia for diversified production value chains and improved control on water management and water use efficiency with drip irrigation spread over large areas and among several farmers involved in all three subsectors integrated for intensive production on two sites totaling 30 hectares. The activity also includes extension of the farm production chain to agro-processing using solar for greening with possibilities for competitive branding and labelling and for cost-effectiveness.

The project will also use deliberate organizational building strategies to facilitate the formation of climate change adaptation groups at community levels and at the national levels for RWHS water users, agro-processers, producer cooperatives, to strengthen a coordinated approach to domestic marketing by small farmers. The intention is to remove the current challenges presented by demands for operating in reliable and competitive domestic fresh food supply chains. There will be added benefits to livelihood security with the packaging of a climate adaptation and climate resilience farm tour value chain in order to benefit from the growing numbers in stayover tourist who continue to show interest in the unique biodiversity of the country and the linkages with its rural populations.

The third Component will be focused on the necessary actions to support planning and coordination of the capacity building sessions for building adaptive capacities in the farming systems for improved livelihood security and incomes in the farming households. This will include inventories and data to establish baselines in adaptive capacities and to develop content for capacity building, collection and analysis of field data on climate adaptation and climate resilience in the project area as well as simulation of climate variables in climate control grow rooms to observe the impact of climate adaptation practices on resistance in selected food crops grown in Saint Lucia. The intention is to identify the limitations of climate change adaptation practices to inform strategic decision making for research and development in resistant varieties in in-situ situations in the country in order to preserve agriculture biodiversity for livelihood security in farming systems.

As resilience is an on-going process the knowledge management component will be linked to the Central Planning Unit in the DAFNC through the training of technicians in economic analyses of climate change impacts on agriculture. This is to enhance the mainstreaming of climate adaptation in farming systems at the level of policy and strategy in the DAFNC. Knowledge transfer for awareness and responsibility sharing among the many players in the farming system will also extend to the local levels in the communities.

Monitoring and evaluation of the improved adaptive capacities in agro-ecosystems and the contribution to resilient farming systems and livelihood security will be on-going. Hence an important output of the Component is the proposed activity to improve or establish strong

strengthened relationships critical institutions such as the DMS for exchange of data and the Department of Statistics to ensure quality of social data. Data will be held in a climate adaptation database designed to link with the DAFNC master database.

Without the project the farming populations in the targeted areas will be significantly impacted by climate variability and climate change given that the livelihood activities in which they ae involved are highly climate sensitive and that the farming systems must be better prepared to operate in local domestic fresh food markets. Failure or delays to achieve the perceived level of built resilience to climate change and to improve the capacity to operate with competitiveness in domestic supply chains could be reflected in loss of livelihoods and continuation of poverty and reduced efficiency of agro-ecosystem functions.

PROJECT COMPONENTS AND FINANCING

Component	Concrete Outputs	Expected Outcomes	US$
Component 1 Building resilience and sustainability of farming systems through interventions for water security, soil conservation and management.	Output **1.1**Targeted farmlands in the west and south west of the project area with built resilience to climate change and climate variability.	Increased farm productivity with improved livelihood security and incomes and new farm areas brought under production in the project area.	
	1.1.1 Improved water security from bare slope water harvesting system and from on-farm rooftops installed with drip irrigation and integrated with soil building climate adaptation practices over 200 hectares and reaching an estimated 2400 farmers.		
	1.1.2 1500 farmers trained in improved land management and soil conservation on slopes using climate change adaptation practices and CBDRM on 500 hillside farms.		
	1.1.3 On-farm soil building facility on six sites for capacity building in production and utilization in CCA for improved adaptive capacity in the farming systems.		
Total Component 1			**2,951,982**
Component 2. Integration of renewable and other energy efficient practices in intensive agriculture value chains.	**2.1** Two intensive production areas totalling 30 hectares established and providing diversified value chains in food production and farm tours, integrated with green CCA practices and powered with solar.	Increased productivity, competitiveness and efficiency in resilient small farming systems with improved livelihood security and income generation through enhanced production practices and value chains.	
	2.1.1. Eight built outdoor facilities for farmer training in adaptive capacities for improved resilience in soil.		
	2.1.2 Small farmers in crops, small livestock and aquaculture production fully integrated into the value chains of the production areas.		
	2.2 Two HACCP certified agro-processing facilities powered with solar energy and providing space for training and production activities for small –scale agro-processers.		
	An estimated 300 persons from project area trained and 1000 hours of production space provided by agro-processing facility during project implementation		
Total Component 2			**2,623,814**

Component	Concrete Outputs	Expected Outcome	US$
Component 3: Knowledge management and transfer to improve adaptive capacities	**3.1** Baselines for improved adaptive capacities to build resilience in farming systems, improved access to information and communication instruments on climate adaptation practices in the DEAS and the DAFNC improved services for data management.	Established information and communication systems for improved adaptive capacities to build resilience in small farming systems for livelihood security and income generation with climate change awareness.	
	3.2 DAFNC staff with improved capacity to make strategic decisions on climate adaptation practices for resilience in the sector inclusive of access to local data generated from ex-situ climate controlled grow rooms and the field		
	3.3 Rehabilitated building, housing agro-processing training and production facilities, and knowledge management Components, including farmer training facilities and CCILLC.		
	3.4 Social capital improved through organizational building in the farming systems		
Total Component 3			**1,679,000**
GRAND TOTAL			**7,254,796**

Total			7,254,796
Project Execution			689,205.62
NIE			616,657.66
GRAND TOTAL			8,560,659.28
Projected Calendar			
Milestones			Expected Dates
Start of Project/Programme Implementation			Oct 2019
Mid-Term Review (planned)			March 2021
Terminal Evaluation			Sept 2022
Project Program (Closing)			May 2023

PART II: PROJECT JUSTIFICATION

A. Describe the project programme components particularly focusing on the concrete adaptation activities of the project, and how these activities of the project contribute to climate resilience.

Saint Lucia's agriculture sector has begun to experience the effects of climate variability and climate change. More frequent and intense rainfall events have increased the incidence of land slips and accelerated soil erosion in farm areas mostly located on steep slopes. The low water retention capacity in the soil due to the volcanic nature and subsequent rapid rainfall runoff, leading to high levels of sedimentation further adds to the problem. In addition, changing micro-climatic conditions on the farms has increased pest infestation, water logging, unexpected droughts, and higher cost of production.

TNC (2017) projections for future scenario resulting from climate change and climate variability, are for decrease in annual rainfall up to amounts of 57 percent, earlier seasonal droughts, and more dry spells. These environmental changes have the potential to decrease agro-ecosystem functionality in the traditional food production systems, including disruption of key agri-supply chains. These impacts could be increasingly severe during the period 2040-2100 due to the [16]predicted significant decrease in rainfall amounts and earlier droughts. The predictions are that these adverse changes will be slower in the west south west of the island but becoming increasingly more severe beyond 2040.

The threat to rural poverty in general and more so, to the poorest populations, concentrated in agricultural communities in the west -south west and parts of the north of the island from the likely impacts of climate change and climate variability on the sector is of major concern to the GOSL. These communities rely heavily on farming and related rural activities for livelihoods, household food security and incomes. While the poor in general will be impacted, these already sensitive households could be severely impacted due to weak coping strategies and a preoccupation with their daily needs, with little time for considerations to undertake the shared responsibility and persistence in climate change adaptation practices, without community-based organizational support for resilience in well-being.

The negative impacts of climate change could also be felt in those rural populations highly dependent on the tourism sector due to foreseen damage to infrastructure from sea level rises which could reduce the attractiveness of the island to visitors. The large majority of visitors to the country are attracted to the rural tours and provide an added source of income through purchases at restaurants along the route and the village stops. Disruptions in the tourism sector resulting in reduced visitor arrivals will also have negative impacts on livelihood security in agricultural communities, due to the dependency of the farming populations in rural communities on the markets created by the hospitality sector for locally grown fresh food, and from other services such as the well-established and popular farm tours, an important source of income in farming communities. These different populations are integrally connected in their dependency on ecosystem services that provide livelihood security for communities but the dependency of the farming sector is far more critical as it is tied directly and indirectly to the vagaries of climate change and climate variability. Both populations are primarily on the west and south west and parts of the north of the country where poverty settlements and poverty head counts are highest.

Without adequate adaptation to climate variability and change, Saint Lucia's attempts to achieve the Sustainable Development Goals for poverty reduction and food security will be severely

[16] TNC (2017)

hampered. The impacts of climate variability and climate change have the potential to disrupt climate sensitive farming systems and livelihoods thereby threatening the country's food security and poverty reduction objectives but more so in the farming populations.

Some off-farm challenges emerging from the foregoing would be the increasing levels of sedimentation in river channels that could further affect river flows, with extended impacts at the farm level. For instance, many rainfed famers who cannot show evidence of access to a source of water for irrigation when necessary are not able to register with the main buyers in the domestic markets. Unregistered farmers also experience gluts when they try to benefit from favourable weather, by planting short term crops mostly leafy vegetables. Sedimentation in coastal areas also affect marine ecosystems and coastal fisheries and weaken livelihood security for rural fisherfolk.

Interventions to be facilitated under the project are intended to change the potential for adverse impacts of decrease in rainfall and, increased frequency of droughts on the functionality of the natural resources for livelihoods security and incomes, primarily in the geographic area of the project. The project will achieve this through activities that build adaptive capacities in the populations and in selected agro-ecosystem services through the implementation of a set of concrete climate change adaptation activities for resilience in agriculture for sustainable livelihoods, income generation and food security with special considerations for vulnerable groups. The built resilience in the farming systems with climate change and climate resilience will provide the environmental conditions for super imposing targeted enhanced production practices for value-added to climate resilient farming to improve competitiveness of small farming systems in domestic markets with improved livelihood security.

The components are distinctive and measurable in outputs but highly interlinked in delivery to provide outcomes of **(i)** increased farm productivity with livelihood security and incomes and new farm areas brought under production in the project area (**ii)** increased productivity and efficiency in resilient small farming systems with improved livelihood security , income generation through enhanced production practices and value chains and (**iii)** established information and communication systems for improved adaptive capacities to build resilience in small farming systems for livelihood security. The project will use a participatory approach for inclusiveness and to make sure that all beneficiaries are treated fairly and with transparency. The expected longer- term outcome of the project is for sustainable agro-ecological system services to support farming (crops, livestock and aquaculture), through improved adaptive capacities for adverse impacts of climate change and climate variability with livelihood security and income generation. Accordingly, the extent to which the three proposed project components are strategically linked can be observed as shown below.

Component 1: Building resilience and sustainability of farming systems through interventions for water security, soil conservation and management. This component will seek to build climate resilience in two specific areas which combined, will contribute to increased resilience in farming systems.

OUTCOME: Increased farm productivity with improved livelihood security and incomes and new farm areas under production in the project area.

OUTPUT 1.1 Reduced landslips and soil erosion on farms through creation of updated maps, vulnerability analysis, and field practices for DRR/DRM and FFS.

The project activities selected to reduce vulnerability to landslips and soil erosion control

were based on an extensive review of studies on landslips susceptibility in Saint Lucia [17]reported in assessments of impacts of rainfall events and of work undertaken on landslips for roads, houses and other infrastructure. Institutional knowledge of farmers, Caribbean Agriculture Research and Development Institute (CARDI) and from agriculture extension officers, gathered during the consultations also provided information on frequency of landslips and soil erosion in the farming areas.

The review and consultations revealed that an estimated 60 sites have been identified in the farming but that no discreet action has ever been taken to address the risks to the farms and that the total number of farms at risk in the project area are far in excess of 60. Therefore, the project will conduct vulnerability analyses to identify the most serious landslips presenting risks to farms/clusters with a view to applying DRR measures to 75-100 sites during project implementation. The process will involve an integrated approach using two DAFNC teams, each comprising technicians from DEAS, DOF, AESD, and WRMA. (See Project Implementation Arrangements- PART III). This will allow each team to have the expertise to conduct farm inventory and needs assessments, identification and vulnerability analyses of landslips and agree on the type of DRR measures to be undertaken as a team. All of this information will be used to update any existing landslip map and to create new ones in other parts of the project area.

The overlay farm maps created from the inventory will enhance the decisions on the most urgent landslips and farms to benefit from the project activities. As this is also a participatory approach with farmers it will provide good learning and practical demonstrations on vulnerability analysis and DRRM for improved land stability in small farms in the areas most vulnerable to climate change impacts. The WRMA input will be primarily to use this same process to identify clusters and individual farms that should also benefit from improved water security at **2.2** below. The focus on landslips will be heavily on Region 6, as well as the extent of hillside farming observed during the field visits. No DRRM action has been taken on these landslips and no new maps have been created since the Trough of 2013 although further landslips have been observed. This work will be undertaken under the leadership of an expert on vulnerability analysis and DRR, engaged by the project and with full consideration for the Report of the Environmental Impact Assessment (EIA) and Environmental Monitoring Plan(EMP) at Appendix II.

Urgent action is required to improve adaptive capacities in as much as possible of the 3,449.6 hectares of farm land assessed as [18]suited for cultivation, as well as to leave in place a team of technical officers in the DAFNC, with the capacity to continue the process of building resilience in farming areas susceptible to landslips including from normal rainfall events. There is another 10,000 hectares of agriculture land, described as unsuitable for cultivation, due to the steep slopes with limitations on soil. By necessity these areas are under cultivation to secure livelihood and food security within the households of the 32, 919 small farm families. These lands are also at risk from landslips. Hence the project will ensure that the capacity to conduct vulnerability analysis at farm level in agriculture communities, is significantly strengthened in the DAFNC, through the work of the expert vulnerability analysis and CBDRM.

In summary, the project will use the CBDRM approach to build farmer and agriculture extension capacity to conduct inventory and vulnerability analysis to prepare an overlay farm map

[17] National Scale Landslide Susceptibility Assessment for Saint Lucia – World Bank 2016: Flood Event of December (2013)- A Report of the GOSL and World Bank (2014); MACRO-Socio-ECONOMIC and Environmental Assessment of the Damage and losses caused by of Hurricane Tomas- A Geo-Environmental Disaster. Towards Resilience – (2010) UNECLAC-OECS-UNDP-IICA)

[18] Land capability map of Saint Lucia

from [19]existing data and maps (landslips and agro-ecological systems) in the project area to update position and rank the farms most susceptible to landslips. Project beneficiaries will be selected on basis of the ranking of susceptibility of the farm or the cluster and guided by the EIA/EMP. Due to the susceptibility to landslips and the steepness of the slopes the project proposes mostly non-structural methods to reduce vulnerability to land slips as well as to protect incomes and food security of the farming populations. In this manner, the project will reverse the current practice of monocultures systems in vegetables and root crops even on steep slopes, towards tree cropping and inter-cropping.

Against this background the list of proposed treatments emerging from the consultations include (**a**) tree crops for intercropping and agro-forestry as a priority using tree crops such as coconuts, lemons, limes, nutmegs, coffee, citrus, mangoes and cocoa and tree legumes for forage and for building soil fertility and structure (**b**) hillside ditches and other drainage infrastructure including regular drainage maintenance, (**c**)cover crops and other limited land preparation practices across the slopes- minimum tillage on very steep slopes (**d)** alley cropping (**e)** establishment of fast growing crops on sloping terrain to achieve quick ground cover (**f)** establishment of contours and cross drains (**f**) application of compost, vermi-composting, mulch and fertilizer teas to improve soil structure and reduce erosion and (**g**) grass and plant barriers

<u>OUTPUT 1.2</u>. Adaptive capacities for increased production and incomes through access to on–farm water security from RWHS and drip irrigation integrated with built soil resilience using compost and other organic material.

There is obvious need for infrastructure to harvest and store rainwater during the wet season for irrigation during extreme dry spells and the seasonal dry months for improved water security on the farms for both crops and livestock (small ruminants). The project will address this problem by building adaptive capacities in the farming systems in the project area to harvest rainfall surface runoff using bare slope and from different sources of rooftops as catchment surfaces. Roof-top catchment surfaces will be on-farm from modest structures, except for where the catchment surface is from bare slope. The project will also provide (**i**)drip irrigation infrastructure for on farm access (**ii)** training for farmers in water management and soil water use efficiency in farming systems and (**iii**)the organizational capacity for management and responsibility sharing of the RWHS infrastructure, through the formation of a National Water Users' Association. The outputs of these activities will inform a country wide strategy for rainwater runoff harvesting for agriculture.

Project beneficiaries and selection process: The selection of Region 6 in Output 1.1 was guided by the several reports on the extent of landslips and the impact on the farming communities in the area as the main economic activity is farming. In this part of the project area the poverty head count ranges from 38.5 percent to 44.9 percent a strong indicator of the vulnerabilities at household level. Unemployment rates are as high as 29.7 percent across communities due to the impact of weather events. The final selection of the beneficiaries and sites will include more detailed assessment to identify and address areas, that will reduce the level of vulnerability on the farms of an estimated 500 small farmers. Further justification for the selection of this area is that a [20]cursory assessment of the scars of Tropical Storm Debbie and scars (unclassified) of Hurricane Tomas and the agriculture land-use map reveal a direct conformance of areas of landslides with areas that were farmed, especially where there were no tree crops.

[19] National Scale Landslide Susceptibility Assessment for Saint Lucia – The WORLD BANK- Caribbean Handbook on Risk Information Management –CHARIM (2016)

[20] Agriculture Tourism Plan- Elizabeth Soomer (2018)

Relative to selection of beneficiaries under Output 1.2, this process started with selection of sites during the consultative process focusing on where farms were wholly rainfed or experience water shortages during dry periods. The intention was to ensure water security for the farm for household food security, income generation and employment through a transparent process and in the most cost-effective manner. In this respect, the sites, clusters and beneficiaries was determined by the following inputs from the consultative process:

(1) Five focus group meetings in the project area to present the purpose and activities to farmers, technical staff from the WRMA, DEAS, DOF, AESD, and an Informal Technical Team (ITT) (comprising expertise in water and agri business, agronomy and post-harvest handling, land and soil engineering and knowledge management and communication) sub-contracted to strengthen the project formulation process.
(2) Field visits with farmers through the communities in the project area to listen to experiences on water needs and to view some of the sites and clusters in the farm settlements, identified in the focus group meetings. Experiences included impacts of droughts, drying of rivers and wholly rainfed situations of the clusters.
(3) A first mapping of the settlements was under taken by WRMA and AESD, followed by an assessment that included DOF and the ITT, on the safety of the largely hillside sites for establishment of the infrastructure for RWHS and of the cost effectiveness of on-farm rooftop RWHS compared to larger storage systems with water lines across the scattered farm settlements mostly in small clusters, across the hill sides.
(4) Three technical meetings to review the mapped sites and listen to further comments from farmers on the sites selected and to agree on changes based on best approach to reach optimum number of farmers, safety of sites, water needs, productivity of the farmer and to ensure women from the SLRNWP and youth farmers were engaged and included.
(5) Two field visits with the wider community including some of the leaders to present the plans for water and the sites selected and to encourage support to community-ownership of the systems.
(6) Undertaking of the AESD, WRMA and DOF with selected cooperative farmers to finally agree on the clusters in the settlements and to position some of the clusters using GPS, based on safety first and the agreements reached with the community and farmers.

1.2.2. Capacity building workshops for the water users' groups

The social aspects of vulnerability and shared responsibility of RWHS in small farming systems will be covered in workshops and enhanced through the participatory approach already started in the consultations. The workshops will include considerations for maintenance of infrastructure and other sustainability elements of ownership, governance, efficiency and effectiveness. In order to enhance effective participation during project implementation and social responsibility post-project. The workshops will also include considerations on the economic use of water through best crop selections and agronomic practices. Farmers will be asked to sign an MOU agreeing that the RWHS and the irrigation system will be managed for food production on the site for at least 10 years. Failure to adhere to these conditions could result in the removal of the system to another farm. This will apply to all farms regardless of the tenure arrangements.

The type of catchment surface was based on potential for capturing surface flows and the number of farms that would receive water relative to the cost of establishing the system. On this basis agreement was reached on the selection of the Monchy-La Bourne slope. For on-farm rooftop catchments, selections were made from 25 clusters in the project area. Selections were also made to provide standalone water storage tanks for livestock farmers and for the, two main seedling nurseries (Table 1 below). Where pumping of water is necessary the system will be solar driven.

Project beneficiaries at the La Bourne site are on steep slopes and exposed to drought conditions due to soil type. According to the major buyer participating in the national consultation, this is one of the areas where some of the most productive farmers growing crops in open field and greenhouses and keeping livestock, operate. In addition to bare slope as catchment, the conveyance system will incorporate rainwater harvested from rooftops of a public building, dwelling houses as well as on farm constructed roof catchment surfaces. This area is already fitted with soil probes, water level recorders and rain gauge. The area has two ponds which will be desilted, lined and fitted with silt traps for storage, with savings on cost of installation. These ponds will be maintained by the WRMA under its regular work programme. All of this water will be gravity fed. Farmers will be introduced to dryland farming techniques for increased soil-water saving during the seasonal wet months. A mix of farmers totaling 40-60 including youth, working on 30 hectares of mostly contiguous land, managing crops and livestock will benefit.

Table 1. Proposed sites and clusters for RWH from bare slope and rooftop as catchment on-farm and from public buildings

Project Area	Community	Description
North	La Bourne/bare slope Bare Slope harvesting	Estimated 30 hectares of mostly contiguous farms (crops and livestock) reaching 40-60 farmers Excavations - contour drains/ mini-terraces (reverse slope)mini-dams, and ponds with silt traps Minor Concrete works; Backfilling & supplementary works On-farm drip irrigation for 30 hectares; 90 mm Pet pipes and connections; 50 storage tanks with installation; ARCGPS Software -
West and south west	Fillette and Morne Sion/Lower Mongouge	On farm rooftop rainwater harvesting with storage and drip irrigation system including on farm storage systems for 30 ha of active cluster of an estimated 100 small farmers, highly vulnerable to dry spells on hillside farms with shallow and fragile soils with young population showing tendency towards rural –urban drift
	Mongouge 2 Morne Tet Roblot-Debreuille Maze	On-farm rooftop harvesting with storage and drip irrigation for active cluster of farmers growing sweet potato, other root crops, vegetables good markets on 50 hectares for 300 farmers
	Barthe	DAFNC propagation station for tree crops – 2 ha of drip irrigation with timers and tensiometers
	River Doree	YAEP in River Doree: On-farm rooftop harvesting on farm for 15 youth with storage and drip irrigation for 10 ha acres of integrated farming including PAS and livestock (poultry, pigs, small ruminants)vulnerable to drought conditions Irrigation with drip, one water tank , two pumps (one to pump from the river and the other to pump on the farms and storage for 14 hectares at River Doree/Black Bay Farmers' Cooperative,
	Venus and Tete chemin/ Region 6 and Region 2	Five roof top/on farm harvesting with storage and drip irrigation for 15 women from the SLNRWP growing herbs in clusters- estimated 3 hectares with drip irrigation conveyance storage and two groups in groups in clusters in Canaries, Soufriere and Region 2 (Babaneau) in cocoa bean production.
	Belair and Marc	Two groups of farmers numbering 50 who experience frequent dry spells due to rapid runoff and drainage problems.
	Morne du Don Balata	On-rooftop harvesting with storage and drip irrigation for 80 farmers on 25 hectares of crop and livestock .
	Mongouge	Standalone Rooftop RWHS from the Public school. Due to the high cost of the conveyance 8 mobile tanks will be provided for filling at the point of storage . (Storage with 2x30,000 gallons tank installed)at Community Centre and Public School
	Roblot (Post Office)	Stand-alone RWHS system rooftops of the Roblot Post office by houses close to a cluster of farmers. (Storage for 2x30,000 gallons) (2x 4,000 US$ installed) plus on-farm irrigation infrastructure and 8 mobile tanks.
	Rural Development and Livestock Project for Poverty Reduction	30 Small livestock farmers with four and under animals. Provision will be made for farmers in convenient clusters of four who will access water from rooftop storage. Farmers will be assisted to fetch water in small containers such as small mobile plastic tanks at an agreed volume. For sustainability these 30 small farmers will be encouraged to form an organization. Another 40 farmers with above 4- and under 20 small ruminants who fall directly under the Veterinary and Livestock Division will also receive water through mobile tanks

Project beneficiaries for RWHS from rooftop runoff were identified from 25 clusters in the west and south west: Using a participatory approach with the farmers, the technical support team of WRMA, DAFNC, AESD and the DOF mapped and GPS positioned prospective sites for water. Clusters were described by the farmers as highly vulnerable to drought conditions and highly dependent on farming a mix of vegetables, vine fruits, melons, cucurbits, sweet potato, peanuts, peas, tree crops, small ruminants, and pigs and aquaculture. There is also a good gender balance in the area- typically females are about half the number of males**.** The establishment of on-farm access to water and the proposed training in the efficient use of harvested water and in responsibility sharing, will serve to enhance livelihoods security and incomes from an estimated 200 hectares.

All farms benefitting under Component 1 will be assisted to improve soil structure and fertility. A community based participatory approach will be used for building adaptive capacities production and utilization of the soil building material from six outdoor facilities built under the project. The capacity building will be on-farm and at the production sites with a view to reach all 2400 farmers in the project area directly and another 1800 through the capacity building undertaken in the entire DEAS. Livelihoods security with land stabilization, improved production, and improved incomes are the expected outcomes. Specific to landslips and RWHS systems the selected activities under this Component will be guided by the EIA and EMP at Appendix II, under the leadership of a vulnerability analysis expert engaged by the project (Terms of Reference provided in APPENDIX III)

Component 2: Integration of renewable and other energy efficient practices in intensive agriculture value chains.

The Economic and Social Review (2017) provides evidence of persistent trends toward declines in the contribution of the agriculture sector to National GDP (PART 1-Figure H). Figure I also shows growth trends in domestic purchases with indicators of high levels of annual fresh food imports alongside gluts in fresh produce in domestic production. Understandably, the NAP-SASAPs (2018) and the TNC (2017) agree that it is unlikely that integrating climate resilience in agriculture will alone remove the constraints to local demand and supply in the sector, in light of the extent of gluts. GOSL is therefore concerned that the combination of climate and non-climate variables affecting the sector in the last decade or so could create adverse situations on livelihoods security of rural communities, especially the farming communities where poverty is highly concentrated.

In view of the above Component 2 will provide support to the [21]recommendation for urgent action for a range of modernized and enhanced production field practices, with the necessary capacity building in the DEAS that can result in higher yields from agriculture to positively impact livelihood security and incomes and reduce poverty in rural communities. In addition, the Component will use climate change and climate variability adaptation measures to reduce or minimize the incidence of annual gluts by targeting and removing the bottle-necks in the domestic demand and supply of fresh produce. The Component will also create additional chains to manage gluts through value added in agro-processing. The project will do this from production through to processing by integrating climate change adaptation practices including the integration of renewable energy for higher levels of efficiency in the use of the built resilience in agro ecosystem services with climate change and climate resilience.

[21] MTDSP-SDS (2012) the NAP-SASAP (2018-2028) and the TNC

The project will adopt an [22]agro-park concept as it provides a management approach for large numbers of contagious small farms working together to achieve high levels of productivity and efficiency. The process will involve improved productivity, competitiveness and reliability in farm production value chains for enabling a greater share in domestic fresh produce supply chains, facilitating value-added through agro-processing and promoting climate change adaptation for climate resilience in the vibrant farm tour business in Saint Lucia

OUTCOME: Increased productivity and efficiency in resilient small farming systems with improved livelihood security, income generation through enhanced production practices and value chains.

OUTPUT 2

2.1. Two green-Agro-parks established one in Region 7 in the west of the project area and another in Region 2 in the north east on a total of 34. 4 hectares of Crown Lands.

Two main activities are proposed for building adaptive capacities for climate change adaptation in highly intensive small farming systems.

(1) Integration of modernized agriculture production technologies with climate adaptation practices including drainage for improved land use, water security and built soils with drip irrigation, small livestock on protein banks and aquaculture with water recycling with crops and lined ponds for sedimentation control.
(2) Post-harvest handling for fresh produce quality control through to processing and packaging, in HACCP facilities that offer capacity building and production space for small-scale operators.

Both activities will be integrated with solar energy in different ways for enhanced efficiency, productivity and competitiveness in diversified small farm production chains with improved livelihood security and incomes for small farmers and small scale-agri-processers. There will be a strong focus on climate change adaptation practices for improvements at the farm level to enable a greater share in supply chains to satisfy domestic demand for fresh produce.

2.1.1. Intensive Farm Production output

The production areas will cover an estimated 30 hectares of farmland operated by 70-100 small farmers engaged in activities with the following outputs:

(i) An estimated 26 hectares of selected crops (leafy vegetables, root crops (sweet potatoes and or dasheen) tree crops (mangoes or cocoa) and vine fruits (water melons or pineapples) from 16 greenhouses and open field in highly intensive production systems and with built resilience in agro-ecosystem services with climate change and climate resilience.
(ii) Highly productive intensive cropping patterns with built resilience for agro-ecosystem services in water security, built soil from organic inputs and legumes in different mixed systems and adaptive capacity for biological control of insect pests with variation in temperature.

[22] Involves all facets of the agricultural chain from pre-production (land management, irrigation, drainage, access roads) driven by production practices for enhanced productivity, and post - harvest marketing arrangements to promote investment in the sector. The project will use primarily green practices to maintain the focus on resilient farming systems.

(iii) Climate smart small livestock practices through protein banks, in-house feeding and cooling, and

(iv) Restored aquaculture ponds with diversified production chains through water recycling integrated with cropping systems and farm tours (offering gastronomy (fish catch and cooking).

Production and utilization of organic material to build resilience in soil will be on site through small outdoor facilities constructed by the project. The integration of climate resilient and enhanced farm technology approaches is expected to increase productivity and improve competitiveness by removing bottle necks in the local supply chain with positive impacts on livelihood security of the 54-70 contiguous farmers on the two production sites. An additional 900 farmers external to the production sites will benefit from the capacity building exercises under the Component.

2.2. Two HAACP certified green agro- processing and training facility

Each facility will accommodate 15 beneficiaries in each session. Training in post-harvest handling will include fresh produce quality control in leafy vegetables with packaging and processing and packaging activities for the range of leafy vegetables, fruits and herbs. The project will make special provisions for equipment and training for the 70 members of the SLNRWP specifically involved in the processing and packaging of chocolates from cocoa beans grown by the women themselves. These women will also have access to the regular services of the agro-processing facility should they choose to engage in other types of agro-processing offered.

The facilities will observe all the standards as required by the Saint Lucia Bureau of Standards(SLBS) and the Ministry of Health and will also provide technical training to the level of certification required by the SLBS. The intention is to encourage supply chains between small farmers on the sites and small-scale agri-processers as a means of diversifying and expanding value chains that benefit the small farming populations and communities with greater security of livelihood.

Under the project youth and rural women specifically, will benefit from training to determine economically viable packages and to improve packaging in order to attract a higher price for the product. Rural women and youth will also be assisted to prepare small agri-business plans to set up small scale green micro –enterprises in popular marketing spaces in the tourist areas as well as to brand their green products to enhance penetration of the regional export markets. Small-business persons and other entities such as schools, restaurants, cooks involved in agro-processing and wishing to transform their own operations, using energy efficient equipment and renewable energy will be facilitated under special arrangements, to use the services on scheduled days.

Component 3: Knowledge management and transfer for capacity building to improve institutional and local level adaptive capacities.

OUTCOME: Established information and communication systems for improved adaptive capacities to build resilience in small farming systems for livelihood security, income generation and climate change awareness.

OUTPUT 3

3.1 Baselines and capacity building for adaptive capacities:

A convenient schedule will be agreed to with the leaders in Components 1 &2 to ensure timely deliveries in the proposed training and capacity building of staff of the DEAS and at the farm level. This will be done in close collaboration with all the Agriculture Regional Heads, the DOF, AESD

and the WRMA and will include the following considerations:

(i) A participatory needs assessment to establish or improve baselines for adaptive capacities and to provide information for the final determination on where the concrete field activities, particularly in Component 1 will be undertaken and also how the field training program will be scheduled for the convenience of the respective community or clusters of farmers.
(ii) Documentation of lessons learnt with easy access for use by project beneficiaries.
(iii) Provide support for timely delivery of capacity building training at the level of the DAFNC and at the farm level. This Component will also pay critical attention to the capacity building reports coming from the local level to ensure that there is no evidence of Regions or clusters of farmers in the project area being left behind. This approach is necessary as the project is intense and multifaceted and all inputs particularly of Components 1 must be properly phased and delivered in the right order**.**
(iv) Facilitation of the formation of climate change organizations, and support the organization and hosting of Biennial Competitions on climate adaptation in agriculture.

This Component will also establish a climate change resilience database for the purpose of monitoring and evaluation of the social and economic benefits of the project activities. The data collection instrument will be developed with the support of the Department of Statistics to ensure inclusiveness of women, youth and the three vulnerable and marginalized communities in the project area and especially the social considerations.

The project will also strengthen and redesign, as necessary the master data base in the DAFNC to accommodate the climate change adaptation data and to establish a more data friendly method of data capture by the DEAS. Currently the DEAS is challenged to determine a strategy that is sufficiently convenient to farmers for demonstrated willingness to collect and report on farm production data. As a result, local and national production data is inadequate or sparse. This is despite a modern data management infrastructure in the DAFNC. A portal to the DAFNC website focused on providing information for greater awareness and responsibility sharing in climate change adaptation in agriculture will also be established.

OUTPUT 3.2. Climate Change Interpretation Learning and Laboratory Centre (CCILLC)

The CCILLC will provide, graphic interpretations of the experiences and learning tracked in agriculture with a keen eye on evidence of increased resilience in the sector or of limits on adaptation options. The CCILLC will do this through two climate control grow rooms and the planned six - monthly data collected in the field. The findings will be shared with schools, the scientific community, policy makers and development partners through the sessions of the Conference Room and the cultural sessions mentioned below. The complex nature of the impact of temperature on the agro-ecosystem, in particular the crop subsector, even with slight variations will be carefully observed through climate controlled grow rooms. Tree crops and, tomatoes in particular, show this level of complexity (mango, avocado, soursop, breadfruit) in the models used in Saint Lucia (GOSL/UNECLAC -2011).

Therefore, the CCILLC activities will improve the quality of local and national awareness of climate change in agriculture, particularly focused on the farming systems and agro-ecosystem services and livelihoods of the farming population through **(i)** practical demonstrations of farmer participation and adaptive capacities demonstrated in agriculture and the farming systems through different communication instruments **(ii)** graphic analysis of impacts of the projects on livelihoods, income generation and general social well-being of the agriculture communities**(iv)**a forum for rethinking and improving climate change adaptation in agriculture including limits on climate

adaptation practices and (**v**) climate controlled grow rooms environment for observations and strategic responses on different climate scenarios managed with solar energy.

The expectation is that through the climate control rooms the CCILLC would be able to demonstrate from the work undertaken, multiple variations simulating agro-ecosystems, temperature, soil-water, light, resistant varieties, insect behavior, flowering and yields. It will also include information on evidence of built resilience in land and soil particularly structure and fertility in collaboration with AESD and the Research and Development Division through soils data collected from the field, evaluation of impact on incomes and employment and changes in areas of traditional livelihood security.

The CCILLC will bring some of this learning and interpretation once a year to a larger venue where more of the agriculture communities can participate in a practical way, thereby generating more community-based knowledge and transfer. For example, on these occasions the CCILLC will borrow the practice of engaging folks from the Monsignor Patrick Anthony Folk Research Centre to work with community based groups to communicate their experiences in climate adaptation through competitions.

The outputs will be presented in different forms of graphic data, learning and interpretation for reflection on climate resilience and adaptation strategies in agriculture. It will be presented in a form that is useful to the farming communities, through the schools, public officials and the scientific community in Saint Lucia. The quality of data collection and management will be of the category that will satisfy sharing in the OECS sub-region and other regional bodies with interest in climate change impacts on agriculture and rural communities highly dependent on ecosystem services for food production and livelihoods security.

OUTPUT 3.3 Rehabilitation of Building to Host Knowledge Management Activities of the Project

The building to house the Knowledge Management and Transfer component of the project is located at the Agro-park sited in Region 7 on 14.4 hectares of farm land owned by the Crown. This is the same area proposed for the green production sites using climate adaptation and renewable energy activities, integrated into farm production and agro-processing as well as other good practices for higher levels of productivity. This building needs to be rehabilitated and is placed here in the project as it will also house all the off-farm knowledge generated, managed and transferred by the project. These include all of Component 3 comprising the data capture and management, the CCILLC (climate control grow rooms and Conference Centre); one of the solarized agro-processing facility and training room; farmer meeting /training room, with provisions for the meetings of farmers in Region 7, and training for adaptive capacities in built soil resilience with climate change and climate variability. Currently the building houses the Agriculture Region Office and the Fairtrade Group.

At this site, the Agro-park with its innovative and modernized production and agro-processing practices, as well as the CCILLC will satisfy the requirements of a tourism attraction, generating a climate change adaptation farm tour value chain. Other added benefits of the selection of this building is that it is located along the main farm tour route around the island, whether from the city of Castries or through the well-known scenic back roads. There is also the rich history of culture and work in agronomy and GAPs for the then vibrant banana industry, which will restore the culture of intense interaction among agriculturists and farmers in research and innovation, with the enhanced intrigues and curiosity of climate change adaptation and climate resilience in agriculture.

The building was confirmed structurally sound after an assessment by the Ministry of Infrastructure, Ports, Energy and Labour (MIPEL). The MIPEL and the DAFNC will undertake the

necessary agreements with the Crown Lands Department for the Block and Parcel to be registered for this use. The DAFNC will also undertake the regularization of leases where there may be farmers who are already farming on the land without the necessary leases from the Crown Lands Department. This is a normal procedure facilitated by the DEAS.

The second learning center (CCILC) is a modest reception area only, to receive the tour groups to the farming areas covering 20 hectares of small farms using intensive production integrated with renewable energy as for the Agro-park in Region 7. This area will be accommodated in the design of the building for the agro-processing facility under Component 2.

Appropriateness of the project activities: The project activities are appropriate as they respond well to the recommendations of the TNC (2017) as well as the other main documents of the national framework that support an environment for building resilience in agriculture, with considerations for a more economically viable and environmentally secure outlook, that creates improvements in the lives of rural people. These include among others (**i**) the (MTDSP (2012-2016), that supports commercialization of non-traditional crops grown almost entirely by small and micro-farmers, sustainable land use practices, modernizing the agriculture extension system and strengthened linkages of agriculture to tourism (**ii**) the Revised (NEP-NEMS 2014) intended to minimize environmental vulnerabilities and risk, support sustainable livelihoods, with considerations to develop a green economy and (**iii**) the NAP-SASAPs (2018) focusing on higher levels of productivity with climate resilience to positively impact rural communities.

In addition to the above, the project activities also include major considerations for changing the lives of a significant portion of the estimated 70 percent of the small farms, who are entirely rainfed and another 20 percent that are supplemented with water from the rivers. Of significance is that the climate change adaptation options proposed are highly suited to small farmers, including those under the poverty line as they are based on established sustainable traditional knowledge transfer methodologies that require lower levels of expenditure for cost of production. There is therefore good reason to expect that the environmental and socio-economic benefits realized will be effectively manifested in **(i)**reduced vulnerabilities of farmland in the project area to climate related hazards (**ii**) farmers involved in more productive and sustainable livelihoods (**iii**) youth and women with strengthened capacity and improved levels of livelihood security and (**iv**) and a greater awareness of adaptive capacities and resilient farming, with climate change and climate variability.

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

The Project will benefit small farming populations, primarily farmers in the west and south west and north of the island where the larger majority of vulnerable populations live including three of the four poorest communities, Canaries, Anse-la Raye, Soufriere. Attention will be given to both genders and to youth through participatory approaches to interact with these groups in order to ensure equity and transparency. Males working in agriculture have been deemed the poorest among males in the labour force. There are about twice as many male farmers as female farmers and an undetermined number of youth farmers. Among them are 150 young persons targeted under YAEP for capacity building in livestock, crops and aquaculture on two production areas, both of which fall into the project area.

Economic: benefits: The guaranteed economic benefits include improved incomes and employment generation from water security integrated with practices for improved soil fertility and structure and with improved capacity to participate in the domestic market supply chain as harvests

are more reliable. The potential will also exist for an increase in the number of harvests, with water access during low rainfall with improved productivity from heathier soils. Benefits to greenhouse farmers will include savings accrued by greenhouse farmers who currently supplement their water needs with household water at very high cost as daily, large volumes are required, relative to the demand of a household. Open-field farmers will also improve their incomes as they would now be able to add at least two harvests annually with water security and drip irrigation during the seasonal dry, as well as to satisfy water supply during unexpected dry spells. Diversified production value chains in crops and aquaculture will also add to the economic benefits of the project while small livestock farmers will benefit primarily from the reduced cost for feed as they shift from commercial feed to on -farm protein banks. Progressively the farming households, covering three of the four poorest communities in the country will be able to raise the profitability of the farm as they gradually shift from practices such as high inputs of agri-chemicals to organically built soils using compost, mulch and other soil building production and utilization practices learnt on the project.

The economic benefit from water security for greenhouses alone is evidence of some of the early economic benefits. Calculations on annual cumulative storage from RWHS from a greenhouse with rooftop catchment of 100 square meters can provide water for irrigation for up to six months and more. Greenhouses used in Saint Lucia are normally 9.3m wide x18m providing 50 percent more surface runoff for each greenhouse, than is required over the dry months. The calculations on the 100-square catchment surface shows potential savings of US$1455.29 annually per greenhouse from not using water from the public distribution system during the seasonal dry months. There is also the greater security of domestic market for the local produce with reliable water security and for the GOSL, the expected foreign exchange savings from the expected reduction in the importation of leafy vegetables and root crops. Credible demonstration of increased yields in open field and greenhouses and the ability to prepare farm production profiles showing stability in yields and participation in domestic fresh produce supply chains will greatly assist farmers with easier access to loans from credit and other financial institutions for targeted production systems.

Other economic benefits in the farming system will derive from some farmers restarting farming activities in areas which had been abandoned due to water shortages and also to those who expand their operation on hillsides where improved land management practices have resulted in new lands for cultivation with additional sources of farm income. Small-scale agro-processers including the women involved in the project will be able to demand higher prices for their products with improved labelling and packaging that can appeal to the tourist market and upscale shopping areas, and there is potential for employment generation for rural youth involved in rural-urban selling of small sized packages of initially processed food chains (peanuts, cashew nuts, juices, and farine). The proposed climate change adaptation and climate resilience farm tours will be an added source of income for these households.

The project activities are not expected to create any harm or interruption to other farmer income generation and employment generation outside of the project area. With the high levels of poverty in some of these households it is expected that the project will be well received and will be of benefit to the 2400 direct beneficiary farm households plus marginalized households with no access to land who will benefit through employment generation. Also of importance to the marginalized households in the project area is that the project formulation process was careful to be inclusive through extensive community consultation and the proposed baseline need based and participatory approach to capacity building will ensure that no household is left behind. This will be monitored through the six-monthly data collection. Also, due to the current high level of fresh food imports relative to estimated annual crop production (Figure I), it is not expected that significant growth of the beneficiaries in the share of the domestic fresh food supply chains will disadvantage or displace any farmer outside or inside the project area.

Social benefits: All of the above will be realized in higher levels of profitability and potentially, with increased income generation, employment and improved livelihood security at the household level with improved welfare. In addition, farmers including women will no longer have to carry water, often from road side pipes or the river. This will also release pressure on WASCO to find new intakes for the public water distribution and to reduce interruption to household water in some of these very households due to water shortages. There is also the added benefit as the ease of access to water could lighten the burden of women to allow them to conveniently expand their operations, especially where they are operating on lands close to the house. Through the capacity building under Outputs 2.2 and 3.1 women and other small –scale agro-processers will be better organized to manage their agro-processing operations both organizationally as well as in the international requirements for agro-processers. These and other social benefits described so far in the project could be briefly described as:

1. Empowerment in rural communities through capacity building for organizational, ownership and responsibility-sharing in agriculture community activities and infrastructure leading to decisions making and action to make positive changes in the use of the natural resources.
2. Increased access to disposable incomes through the reduced cost of agricultural inputs and potential for increased yields with access to water with potential to improve well-being at household level in vulnerable populations in rural communities.
3. Education and awareness building for climate resilience at country level generating sustainable and appropriate responses at individual, household and country level.
4. Improved household food and nutrition security for health and economic productivity
5. Opportunities for broadened organizational base for women in agriculture through linking production with small and micro enterprises processing and 6) Less disruption in school attendance by children from marginalized households, due to the challenges of coping with poverty.

Relative to social risks the intensive and participatory consultative process, described in the document was undertaken to ensure fairness and transparency in the selection of beneficiaries and for the community members not directly benefitting to feel assured that no social harms would result to any community group from the actions taken by the project. For example, community meetings were not exclusive to the farming populations, but were attended by a number of persons including some who turned up to the field visits on their own initiative. Considerations offered from the mix of persons provided good information such as positioning standalone community RWHS, for water security for poor small livestock farmers with low numbers of animals thereby facilitating the inclusiveness of the social benefits of the selection process.

In general, the community members were satisfied that there was balance in terms of gender and youth particularly in the proposed beneficiaries for water security. These measures were a necessary undertaking to also satisfy the NSPP (2015) which seeks to ensure that sustainable development in Saint Lucia is inclusive and equitable. Relative to selection of beneficiaries on the intensive production sites in Component 2, first consideration will be given to farmers already on the site, to ensure there is no risk of loss of income to farm households in the area. In fact, none of the activities carry any threat of social loss or disadvantages. Instead, farmers will enjoy better welfare not only in terms of incomes and livelihood security but through the inputs of the proposed community and gender development specialist there will be good understanding of rights and justice in project implementation, trust building and avoidance of situations resulting in grievances which could delay results of project activities.

Environmental benefits: The environmental benefits that will result from the proposed activities include positive impacts on terrestrial and marine ecosystems from reduced landslips, soil erosion and pollution of rivers, resulting from the shift to practices with strong emphasis on climate

adaptation measures to build resilience in land-use. The list of environmental benefits would also include:

1) Improved land management in areas susceptible to landslips.
2) Increased resilience in agricultural soils for soil water retention, structure and soil fertility.
3) Reduce carbon foot prints by integrating renewable energy in agriculture value chains and by the expectation of reduced need for fresh food imports into the country that result in the daily movement of large fossil fueled trailers of imported foods across the country.
4) Improved land drainage and
5) Improved conservation of water in ecosystem from condensation in canopies of cover crops and tiered systems.

In respect of measures to avoid or mitigate environmental risks, associated with the project the main considerations would fall within those relevant to category B of the Environmental and Social Policy of the Adaptation Fund (ESPAF). These are more limitations on the establishment of on-farm RWHS in hilly areas and the appropriateness of treatments for the slopes in and around farming areas. The assessment of the EIA/EMP and EMP of this intervention is attached at Appendix II.

The project takes into consideration the conclusion of the assessment that the outlined mitigation interventions and environmental management process, and the said impacts can be mitigated even when the vulnerability is described as 'very high, high and moderate' and will therefore follow closely the EIA/EMP with technical guidance of an expert in vulnerability analysis and DRRM engaged in the project implementation. The project also takes into consideration that none of the areas proposed at Table 1-PART II fall into the areas identified as moderate to very high. The project does take into consideration the limitations on flat areas to establish RWHS on hillside farms and will be guided by the general recommendation of the EIA/EMP. The project also noted the conclusion that the baseline adaptive capacities within the WRMA, DOF. AESD and DEAS technicians is adequate for an effective participatory approach with improved capacities to manage the monitoring and evaluation post exit of the project expert on vulnerability analysis and will follow the process to ensure that the 16 technicians assigned are likely to remain with the DAFNC for a while i.e for example not close to retirement. This is important as the assessment expresses confidence that the project will greatly improve water security for farm purposes leading to a general positive impact for the economic and social development for rural areas, against a broader backdrop of declining agriculture (production, employment and farmer participation), declining agricultural exports and losses suffered due to extreme weather events.

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

Saint Lucia's agriculture sector has begun to experience the effects of climate variability and climate change with evidence of degradation of farm lands from intense rainfall events, droughts due to low soil water retention and related unreliability in yields and timing of the harvests with uncertainties in livelihood security in farming systems. In addition, sedimentation flows have resulted in freshwater and coastal and marine ecosystems with potential for negative impacts on the tourism industry and important commercial fisheries. Projections towards 2040 are for 57 percent decrease in annual rainfall, earlier seasonal droughts, and dry spells in seasonal wet, further threatening agro-ecosystem services for farming. Moreover, these projections could become increasingly more severe towards 2081.The GOSL is deeply concerned with the extent to which these projected changes could adversely impact livelihood security, incomes and food security in rural communities, and more so for vulnerable households highly dependent on farming activities, mostly concentrated in the project area (Figure F).

The cost effectiveness of the project can be best judged on the expected results over the short, medium and long term as well as on the co-benefits of the climate adaptation practices which the project will use. Component 1 will provide water security and improved land management soil quality with evidence- based results from the crop subsector by the end of year two and with longer term benefits from built resilience in ecosystem services and improved adaptive capacities within the farming population to respond to climate change and climate variability. Component 2 will build on resilient systems to increase productivity and reliability through modernized technologies for higher levels of efficiency and more intense integration of energy in the agriculture chain by using solar energy instead of fossil fuel. This is expected to increase productivity with reliability and competitiveness in the local fresh food supply chain, and to generate production value chains in agro-processing, diversification in aquaculture activities, and climate adaptation fam tours through climate smart practices including in management of small livestock and integrated farming in crops, livestock an aquaculture. Component 3 is strongly focused on building adaptive capacities for climate change and climate variability based on established baselines in the project area. The Component will capture, document and disseminate for capacity building, lessons learnt from data and information collected at local and institutional including through climate controlled grow rooms, to target and improve adaptive capacities for resilience in the farming systems in the project area. Monitoring and evaluation will also be undertaken under Component 3 with benefits to improvement on policies and strategies for climate adaptation practices for on-going resilience in the farming systems for improved livelihood security, income generation and employment for the farming households including those most vulnerable and with the necessary considerations for gender balance and youth.

The expected cost effectiveness of the climate adaptation practices is fully supported by the extent to which the climate change adaptations options targeted agree with the recommendations for effectiveness and efficiencies in climate adaptation by the [23]FAO, the IPCC Technical Paper 1V (2008) on water security for agriculture with climate change and results of UNECLAC studies on economic assessment of the impact of climate change in the agriculture sector in Saint Lucia (2011). In the case of the FAO, best land management practices for efficiency and effectiveness to reduce impact of future climate is DRRM for slopes and hillsides using agro-forestry and RWHS using bare slopes, as are the options selected by the project. FAO also recommends drip irrigation, built organic soils with compost and mulch and protected agriculture systems as in Components 1 and 2 for building resilience.

Component 2 also recommends climate adaptation options that take cognizance of water supply and demand as in the IPCC. The project targets controls for water use efficiency with pumps and soil tensiometers among soil water measuring devices, enabled by the integration of renewable energy for efficiency and cost effectiveness (Component 2). The project adopts a new modernized approach by using solar energy to manage climate control grow rooms to track the limits of climate change adaptation practices through simulations simulation and manipulation of climate change variables of relevance to identification of resistance in (Component 3). This is an example of cost effectiveness and efficiency in the project as using an agro-park concept, this solar energy is to be shared from a 25kWp system which also provides energy for managing water security in farm production systems, aquaponics and agro-processing on one site (Component 2).

Work undertaken by [24]UNECLAC focused on climate change adaptation options for improved soil water such as contours and cross drains as in Component 1 to reduce soil erosions and best options for water management using greenhouses and drip irrigation (Component 2) to conduct cost and benefits analysis. Table 2 below provides the outcome of the study conducted using 24 commodities and the targeted climate adaptation options. The best climate adaptation options

[23] Climate change food security risks and responses (2016)

[24] Economic Assessment of Climate Change Impacts on the Agriculture Sector in Saint Lucia (2011).

emerging for Saint Lucia were water security with drip irrigation, mainstreaming climate change and climate variability issues in agriculture management and established systems of food storage. While the project does not include the establishment of systems of food storage the outputs of the green agro-processing facilities potentially can establish the basis for food storage systems at rural community levels.

Taken all together the climate adaptation practices are from the most highly recommended sources climate resilience in farming systems and are highly relevant to the adaptive capacities for building resilience in the farming system in the project area with improved livelihoods security, income generation and employment over the longer term. The cost to the project for Component 1 intervention is US$2,951,982. This might have to be revised within the Component when the full extent of the vulnerability analysis of the landslips are confirmed. Component 2 of the project is budgeted at US$2,623,814 This budget is not expected to change in any way that would require more than an internal revision. The action at (**3**) above reflects the cost of rehabilitation of the building which will house the Knowledge Management Component and the agro-processing facility in Region 7, among other services and is budgeted at US$1,679,000.

It is expected that with improved adaptive capacities in the farming systems in particularly water security and built resilience in land and soil the current production levels of average 40-50 percent of expected yields in vegetables, tomatoes, vine fruits and sweet potato could be significantly improved due to the year-round water security and other built resilience. Using Component 1 alone as an example of cost-effectiveness, a breakdown of expected yields from built resilience in agro-ecosystem resources, would show the following at current farm gate price for the respective crops:

- **(i)** Vegetables as a base and assuming five harvests annually would generate an estimated US$4,699,000.00 from 200 hectares.
- **(ii)** Tomatoes annually as a base at 22,000 kgs per hectare at current farm gate would over the same area generate an estimated US$7,920,000.00; and
- **(iii)** Vine fruits would be lower due to 6803 kgs per hectare, generating an income of US$1,904,840.00 over the same area of 200 hectares assuming three harvest. While net profit is not available for vegetables, vine fruit and tomatoes, complete data on sweet potato alone (with yields per hectare similar to lettuce and with farm gate price 40 percent lower

Table 2 : Summary of Present Value Costs and Benefits of the Highest Ranked Proposed Adaptation Actions for Saint Lucia

Rank	Details	Cumulative Present Value of Benefits	Cumulative Present Value of Costs	Benefit Cost Ratio	Net Benefits	Payback Period (in (years)	Scores based on selected criteria 25 adaptation options(maximum45)
1	Promote water conservation – install on- farm rain water harvesting from roof tops	$144,387,789.58	$7,492,283.58	19.3	$136,895,506.01	0.03	39
3	Installation of Greenhouses	$37,336,193.463	$7,350,423.87	5.1	$29,985,769.59	0.13	30
3	Mainstream climate change issues into agricultural management	$188,225,078.59	$27,119,881.94	6.9	$161,105,196.65	0.13	34
4	Adopt improved technologies for soil conservation	$236,137,936.71	$94,286,451.75	2.5	$141,851,484.96	0.42	35
5	Establish early warning systems and disaster management plans for farmers.	$97,531,499.08	$7,233,793.68	13.5	$90,297,705.40	0.60	39
6	Use water saving irrigation systems and water management systems e.g. drip irrigation	$360,969,473.96	$53,688,895.44	6.7	$307,280,578.52	1.42	39

Evaluation criteria (low cost; effectiveness, acceptance to stakeholders, short-term farming; potential size of beneficiary group; institutional capacity; ease of implementation; potential for social and environmental impact; potential to sustain over time)

than lettuce) reveal net profit of US$1,396,800.00 from 200 hectares annually. These potential annual gains in income generation, are good indicators that the project activities can significantly change the well-being of the farming community.

The project has strong indicators of important co-benefits of the climate adaptation practices, beyond the boundaries of the project area which are shown in Table 3 below. This Table shows how targeted climate change adaptation practices used in the project benefit not only resilience in farming systems but protect productivity and livelihoods in the important tourist sector, release pressure on the water sector and the degradation of river banks and potentially accrue savings on foreign exchange.

Table 3. Co-benefits of the climate adaptation practices of the project.

Climate change adaptation practices	Improved adaptive capacity contribution to resilient -farming	Co-benefits of the climate change adaptation practices
Mulch and compost	Reduced vulnerabilities to landslips and soil erosion with improved soil conservation, and land management wit	improve livelihood security on rural coastline communities from healthier coastlines on the west south west Protection of a variety of commercially important nearshore marine fish species with sustained foreign exchange earnings for the fishing industry and attractiveness of sports tourism
DRM and DRR using Agro-forestry and tree crops for slope management	Reduced vulnerability to landslips, loss of farm assets and lives	New farm areas brought under production, tree crops and new livelihood chains from tree crops and forestry products.
Drainage interventions in low lying areas	Reduced water logging and siltation in farming areas.	Reduced siltation in river beds and flooding from back-up at river mouths with reduced cost to WASCO Ltd for desilting of intakes and dams.
RWHS from on-farm roof tops and from bare slope as catchment with drip irrigation.	Water security on farms	Conservation of saved water with reduced demand on household water from WASCO for agriculture. Released pressure on WASCO Ltd to find new sources of potable water intakes in project area as demand on household water for farming activities will be lessened. Reduce degradation of river banks and less cost to WASCO for river bank training to sustain flow depth as rainfed farmers no longer need to cultivate on river banks during dry periods. Reduce CC footprints from reduced clearing of forested areas for agriculture due to water shortages
Integration of renewable energy into built resilient farming systems.	Increased productivity reliability, and expanded production chains	Potential for foreign exchange savings from reduced fresh produce imports. Diversified value chains with reduced carbon footprints Associated reduction in carbon foot prints from daily movement of fossil fuelled large food trailers of imported food moving across the country

		Savings for food importers on cost of vat charges on ports of entry with improved reliability in local supply chains . Access to energy efficient agro-processing facilities for a strategy to establish community-based food storage systems in for disaster response. A database of resistant varieties of food and feed plants for food security as decrease in rainfall becomes increasingly severe.

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

Key GOSL documents that guided the project formulation process were the Interim Poverty Reduction Strategy and Action Plan (IPRSAP) (2003), the MTDSP-SDS (2012-2016), the NCCAP (2015), the Revised NAP (2009-2015), the SNC and TNC to the UNFCCC and the NAP-SASAPs (2018 -2028). The expected outcome of the enabling policy and strategic framework for the agriculture sector may be summarized as foreseen in the context of the NAP-SASAPs (2018-2028), that seeks to increase the contribution of the agriculture to national sustainable development by enhancing the resilience of the farmers (crops, fisherfolk and livestock) to protect and improve their productive assets to provide ecosystem services, thereby helping to reduce poverty, improve livelihoods, and income generation. The project activities as designed will improve the contribution of the agriculture sector to the expected outcome of the enabling policy framework by building resilience in livelihood security in agriculture through enhanced adaptive capacities for climate change and climate variability in the farming systems in the following ways:

1) Component 1 with an outcome to increase farm productivity with improved livelihood security and incomes and to bring new farm areas under production in the project area is essentially a direct response to the IPRSAP. This strategy and action plan aims to reduce the impact of poverty at households and community levels, by enhancing economic and social opportunities for poor people, especially those populations considered the poorest. As shown earlier (Figure F-PART 1) the poorest are in agriculture communities in the west and south west and parts of the north of the country where the project activities are highly concentrated. The project activities will integrate well-established climate adaptation practices that can effectively reduce vulnerabilities in farming systems to climate change and climate variability with adverse impacts with improved livelihood security, food security and incomes. This will be manifested on the farms through improved land management including soil conservation, improve access to on-farm water security, integrated with built organic soil. The immediate output will remove much of the root causes of poverty arising from inappropriate cultivation and agronomic practices that have resulted in poor yields, high cost of production inputs, degradation of farming areas and loss of income. This Component will also contribute to NCCAP (2015) that focuses on a country wide strategy for water for agriculture through RWHS.

2)Component 2 with an outcome of increased productivity and efficiency in resilient small farming systems with improved livelihood security and income generation through enhanced production practices and value chains is consistent with the strategic goals of the MTDSP-SDS (2012-2016) and the NAP-SASAP (2018-2028). Together these documents provide an outlook for a modernized and expanded agriculture with improved productivity and a level of efficiency that can attract new investment to drive production and value chains for welfare in rural communities. The project proposes to integrate energy efficiency into farm production chains using solar instead of

fossil fuel and organic soil building instead of inorganic material as well as solar energy for agro-processing. This strategy is as foreseen in the NEP-NEMS (2014) which promoted the use of renewable energy in the agriculture sector. Integration of energy also lends competitiveness in farm production vale chains by enabling the management of enhanced production practices

This component focuses on all three subsectors although more so on the crop subsector and with preference to leafy vegetables, vine fruits and sweet potato as they make up the bulk of the high fresh produce imports. The activities maintain a focus on livelihood security and income generation for households in vulnerable rural communities in the project area. Accordingly, all the climate adaptation options selected are suited to small farming systems including subsistence farmers, youth and women, or for upscaling to larger areas of production. The set of activities are defined in two complementary chains: an agri-food production chain extending beyond the farm gate into agro-processing and an agri-tourism chain developed around a climate change adaptation and climate resilient farm tours. Both production chains include discreet activities for full integration of youth and rural women in the benefits of the project.

Component 3 with an outcome of an established information and communication systems for improved adaptive capacities to build resilience in small farming systems for livelihood security and income generation is highly consistent with NAP-SASAPs (2018-2028). The focus is on building adaptive capacities in farming populations and within the public sector to move the agriculture sector forward. The document promotes the pursuit of a way forward that operates within a framework that strengthens agriculture extension officers, protects farming systems by way of an approved land-use plan, and designs a learning by participation program for improved adaptive capacities for climate resilience in agriculture from established baselines. As in Component 3 the NAP-SASAPs (2018-2028) also promotes learning by doing, community-based approaches and strengthened organizations for awareness and responsibility sharing. Component 3 will also support other policy objectives through the preparation of the Draft Disaster Management Plan for Agriculture in support of the APFS (2016-2021), that supports implementation of sustainable and environmentally friendly DRR.

Other policy and strategic directions of the GOSL consistent with the project activities include **(i)** the conduct of research and development, particularly in the area of drought resistant varieties which will be addressed ex-situ in the CCILLCC and (**ii**) [26]recommendations for capacity building for public servants to identify and assess economic impacts that may result from the projected impacts of climate change impacts and the costs and benefits of climate adaptation measures on selected agriculture subsectors.

There are some areas of the project design which cuts across different policy and strategy documents including **(i)** the promotion of gender equality and ensuring sustainable livelihoods by encouraging youth involvement in fisheries and specific activities that support rural women (NCCAP (2015) **(ii)** the urgency placed on water security from RWHS for farming systems as in the TNC (2017) and **(iii)** the strong focus on improved adaptive capacities for better use of the natural resources and strengthened agriculture contribution to the development of rural areas and well-being of rural populations (NAP-SASAPs 2018-2028). The NEP- NEMS is particularly holistic and the project finds its consistency with the strategy in several areas, including promotion of water use efficiency on the farm, sustainable land management and slope stabilization and as mentioned above energy security to minimize environmental vulnerabilities and risks with sustainable livelihoods enhanced food security through promotion of green practices.

[26] UNECLAC/GOSL (2011); EU Global Climate Change Alliance (EU-GCCA-)/GOSL

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

Overview: Sections A and B describe the project activities which indicate that the project falls into category B of the ESPAF due to the unique nature of landslips within farming areas and the fact that RWHS on the farms will also include activities on many hillside farms. In the case of water care must be taken that none of the flows to WASCO intakes are negatively affected. In this regard, the project has prepared an Environmental Impact Assessment Plan (EIA) and Environmental Management Plan (EMP) which is included in Appendix II. This plan will be monitored and assessed during the implementation process at the project mid-term evaluation and any other time if this was felt necessary.

The GOSL has for several decades been party to international agreements and commitments that speak to needs and rights relating to poverty and vulnerability and the link to the natural resources and continue to satisfy its obligations relative to sustainable development and the protection of plant genetics resources, biodiversity conservation in general and practices that could reduce carbon foot prints. For example, the GOSL continues to satisfy its obligations to the UNFCCC through diligence in its reporting to through the TNC and to the FAO relative to the use and misuse of pesticides. Through these agreements, the GOSL is aware of the sensitive link between natural resources, in particular the multi-functionality of agro-ecological services and poverty as reflected in its leading national documents linked to the sector (Section D).

Against this background, the project activities were developed within GOSL national policy framework that **(i)** seeks to assist agriculture communities to adapt to climate change and climate variability while promoting environmental conservation (NAP 2015) **(ii)** focusses on optimizing contribution of land to economic development and livelihoods, with policy imperatives for protection and sustainable use of agriculture lands (Revised NLP-2015) **(iii)** promotes actions on the ground to build productive capacities of the country's biological diversity land and water towards national food security, rural livelihoods and employment and foreign exchange (NCCAP 2015) and **(iv)** the protection of the environment through activities to minimize environmental vulnerabilities and risk, support sustainable livelihoods, and to enhance food and water security, among others (NEP-NEMS 2014). The country has also established a long-standing partnership with CDEMA, in a continuing process to integrate disaster risk reduction measures, into the national planning systems with benefits for resilience in the agriculture sector and with due care.

Therefore, as concluded in its Diagnostic Study and Proposed Interventions for Building Resilience in Climate Change in the Agriculture Sector (2015), the country has in place the requisite policy, legislative and institutional framework for compliance with the ESPAF. This framework is sufficiently enabling to support a program to build adaptive capacities for resilience in farming systems, that could reduce vulnerabilities in the agro-ecosystem services and the well-being of the populations with the necessary measures to avoid or minimize harm to the environment or to populations at any level. Hence the project activities will build and improve on agro-ecosystems services for livelihood security of the target populations in their respective communities and with evidence-based co-benefits of the climate adaptation practices to ecosystem services in general with improved livelihood security and income generation to other dependent populations, outside of the geographic area of the project (Table 3). Therefore, in compliance with the ESPAF, the GOSL will ensure oversight of the respective public sector bodies in the four areas of relevance to the project:

1)Environmental Impact Assessment for natural resources falls within the Ministry of Agriculture, Physical Planning, Fisheries, Natural Resources and Cooperatives (MOA) making the project well placed for compliance with these standards. There is also a Development Control

Authority (DCA) governed by the Physical Planning Act N0 29 of 2001 and its subsequent amendments of the Land Development (Interim Control) Act 1971 and its subsequent amendments – Revised January 2016, with guidelines for development and submission requirements. Under this Act there are 18 different types of activities which require an EIA is undertaken, non- of which applies to any of the activities undertaken under the project. In compliance with AF, the project will undertake the EMP attached at Appendix II as it applies to measures to manage landslips and soil erosion. While at this time none of the proposed RWHS systems assessed and recommended by the DAFNC fall into areas considered moderate, high risk or very high, the project will ensure due diligence to the EMP and observe the conditions governing the establishment of RWHS. These two activities will be implemented under the leadership of an expert in vulnerability analysis and disaster risk management and will be regularly monitored during project implementation. The MOA through the DAFNC Project Team (PART III) will be integrally involved in the monitoring and evaluation.

2)Building Codes are managed within the Ministry of Infrastructure, Port Services and Transport (MIPST): The functions include attention to ensuring adequate building standards that emphasize measures to avoid the damage caused by extreme natural events, normally from hurricanes or intense rainfall. The MIPST has conducted the required structural assessment and has confirmed that the building proposed for rehabilitation in one of the agro-parks is structurally sound. The intention is that normal procedure for the MIPST oversight in building construction will be continued during project implementation.

3)The Ministry of Health and the Saint Lucia Bureau of Standards(SLBS) operates under very strict standards in line with international standards and is the appropriate authority to approve technical standards for the agro processing facility. Of relevance is the Food/Agro-processers Certification and the HACCP Recognition Programme-Codex Recommended International Code of Practice and the General Principles of Food Hygiene Programmes. The Project will ensure that both of the agro-processing facilities satisfy the requirements to receive the seal of these two services. This will provide access to services such as labelling and grades.

In addition, the project will seek to benefit from on-going relations between the DAFNC and the SLBS to develop a series of agricultural standards to promote good husbandry and agricultural practices to make agriculture value chain goods more competitive in particular in the food chain. These standards will focus on advancements in the requirements for labelling and grades in order to strengthen certification of select agricultural produce.

4) National Utilities Regulatory Commission (NURC- 2016) The project proposes to integrate renewable energy for efficiency and to effect climate adaptation practices control systems such as for management of water and for water use efficiency. The project will use solar energy instead of fossil fuel as this is best practice for to satisfy building resilience through climate adaptation practices. This is also in line with the GOSL National Energy Transition Strategy and Integrated Resource Plan (NETS-2016). As described in the document the GOSL has set a renewable energy penetration target of 35 percent and an energy efficiency target of 20 percent reduction in consumption in the public sector, both of which are to be achieved by 2020. The use of solar energy in the project will be most evident in Component 2 and 3 specifically in information technology systems for data management, in production chains from the field to agro-processing and in the climate control grow rooms. Based on the assessment conducted by the Energy Division in the Department of Sustainable Development, requirement for renewable energy connectivity to the LUCELEC Grid will not exceed the limit of 25kWp set by the NURC. The NURC regulations provide standard application forms which are easily accessible on the website.

Compliance with environmental and social policy of the AF. In respect to **(1**) above none of the 18 activities identified under the Saint Lucia Revised Land Development Act (2016) falls under the actions that would require an EIA in Saint Lucia or any special permission such as change of use

of land. In the case of (**2)** and **(4)** above, the MIPST has conducted the necessary structural assessments on the building to be rehabilitated and confirms that the structure is sound and will not present any likelihood of social or environmental harm. This is supported by the necessary ground survey around the building. Instead there are positive and significant benefits to sustainability of the environment which will emerge from the project activities. For example, the integration of renewable energy in the production systems and the greening of the practices under Component 2, is in harmony with the country's obligations to the Kyoto Protocol. There will be environmental benefits from reduced carbon emissions thereby contributing to Saint Lucia's Intended Nationally Determined Contribution (INDC) under the UNFCCC set goal of reaching 16 percent reduction in carbon emissions by 2025.

The use of mulch, compost and other organic agri-chemicals, will reduce the use of fertilizers and other Persistent Organic Pollutants (POPs) extensively used in agriculture. In addition, there are expected benefits from the relationship between the MOA and SLBS to develop a series of agricultural standards that could open the opportunity for the agro-processing facilities to benchmark better selection, packaging and presentation of produce with potential from increased income from being able to meet standards of export markets. Combined all of the above will generate more sustainable environmental and social benefits to vulnerable groups in the project area, through capacity building in areas that will reduce their operating costs either in on-farm production activities or in the secondary production value chains with income generation.

F. Describe if there is a duplication of projects with other funding sources, if any

The GEF/UNDP/Small Grants Program is the only program in Saint Lucia with activities on the ground that are similar to those of the project. None of these overlap with the target populations. However, two projects of interest are described below.

1) Introduction and Optimization of Organic Farming in Canaries using solar powered hydroponics and other biodiversity agro-processing methodologies: This project targets young people in the poorest part of the west south west. The objectives are to **(i)** transform 2.5 hectares of land into farmland using organic principles and methods **(ii)** train and build the capacity of unemployed youth in ecologically sound farm production and the delivery of an environmentally friendly public education programme (**iii**) identify baseline data on current information and knowledge of the public on the use of chemicals and [27]POPs in Saint Lucia and to use at least 4 local and/or primary schools as a major avenue for education; and (**iv**) design, build and promote a major farm marketing system and sales process as a means of sustaining the enterprise.

2) Creating Sustainable Communities – Building Local Capacity for Adaptation to Climate Change: This project includes measures related to issues such as water shortages, flooding, landslides, and coastal erosion, The project has already terminated but provides valuable lessons that could be considered by the Project including (**i)** community engagement is critical to addressing climate change and climate variability (**ii**) disposable income is important and relevant to impacts and (**iii)** the need to be aware that large numbers of the beneficiaries might not be ready for project implementation and for building adaptive capacities and to address this in the project planning stage and (**iv**)greater awareness of climate change and its impacts is important to buy-in and full participation in the project implementation.

In view of the above there could be overlapping with the beneficiaries and the practices in the west south west. However, bearing in mind that this is a small project the opportunities would be for collaboration and strengthening for improved livelihood security and incomes of the group as

Canaries is one of the three poorest communities in the geographic area of the project.

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

The project formulation process included input from an expert in knowledge management who prepared an annotated Action Plan for Knowledge Management to guide a Communication Strategy for institutional building and knowledge transfer on climate adaptation practices for building resilience in agriculture. The work was undertaken through field visits and meetings in communities throughout the project area, inclusive of populations most dependent on resilient farming for livelihoods. The consultative process to capture and generate lessons learnt will be continued through the project implementation process. The intention will be to record change in the baselines and to identify the contributing factors, resulting from project implementation for planning purposes.

In order to maintain focus on the country context for climate adaptation, priority was given to data and behavioral changes towards capacities for risk reduction in land management, selection of type and siting of RWHS, and sustainability of management of plant genetic material to protect longer-term livelihoods and food security from agriculture. Due to small land space for agriculture attention will be given to documentation that can provide good learning on how to integrate climate resilience into intensive farm production value chains and with strengthened linkages to economic opportunities in agri-tourism chains, as a means of upscaling livelihood security in selected rural communities.

The consultation revealed that knowledge in climate adaptation practices in agriculture was undocumented and based mainly on perception of weather-related changes in the field, with no downscaled data support for the project area. Hence the proposed project communication strategy includes extensive participatory data collection at institutional, technical and local levels and different forms of documentation (reports, videos, technical leaflets, web site, photographs). The participatory approach to capture data will continue throughout project implementation, especially so at the agriculture community level. In this regard, the project has in place different types of engagements at community levels through workshops, focus groups and field visits including technical staff in the project area and visits of the PMU with members of the PSC.

The participatory approach to knowledge transfer is not new to farmers in Saint Lucia as for close to a decade they have been involved in FFS approach and both extension staff and farmers are well versed in the practice. The DAFNC staff and farmers are expected to show a high level of competence in the transfer of knowledge where the practice is used.

Reports of projects undertaken by GEF/UNDP/SGP Saint Lucia, in the project area were also taken into consideration. The findings were that successful dissemination and participation in project implementation could be delayed or denied where community engagement, disposable income and awareness of climate change are low. In view of this the knowledge management component of the project is strong on building climate change agriculture organizations at the community level (water users' groups; small scale agro- processers). Awareness building will be at the forefront of the gains expected from organizational building.

In summary, the learning and knowledge management component of the project will capture and disseminate lessons learnt in project implementation through:

1. Establishing an improved needs assessment baseline of the beneficiaries including staff within the DAFNC for climate change awareness and for transfer of climate change and climate adaptation for resilience.

2. Establishment of a database to support the technical quality of the inputs to the project activities for adaptive capacities throughout the farming system.
3. Institutional strengthening or creation of community-based organizations to encourage participation, facilitating community exchanges, evaluation and inclusiveness of their own concerns and findings and perspectives on climate change adaptation practices
4. Capacity building within the technical units and DAFNC Central Planning Unit for knowledge transfer methodologies
5. Communication strategy that captures, guides and monitors the work of the Knowledge Management and transfer Unit in collaboration with SALCC-Farm School, DEAS, selected farmer organizations and the Media Unit of the DAFNC
6. Ensure integrity of the information and a participatory process for a people centered approach to learning and interpretation on climate change and climate resilience.

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

A review of relevant official national documents on climate change and climate variability in the country and on the factors, that would impact a project designed to build resilience in agriculture, for livelihoods security, income generation and employment provided good information on the best approach to the consultation process. In brief the documents revealed that the enabling policy and strategy framework is adequate to support a project to build climate resilience in the agriculture sector. However adaptive capacity in the DAFNC to undertake the project needs to be improved at the technical as well as the policy level in areas such as economic analyses of climate change adaptation options and impacts with future scenario particularly for rainfall variability: both from droughts and unexpected dry spells and from intense rainfall events.

Furthermore, that to reduce vulnerabilities in the farming systems, would require improvements in a wide range of climate adaptation practices in order to build resilience in livelihood security, income generation and food security. These would include actions to improve soil conservation and land management, increase productivity through enhanced production practices and significant capacity building in the farmers, starting with baselines for adaptive capacities for climate resilience in the farming systems at the level of institutions and at the farm level. Therefore, consultations were conducted at both levels but more highly concentrated at the farm level as the poorest and most vulnerable communities in the country were in fact in the geographic area of the project (Figure F).

Consultations in the field: The consultative process included meetings with the DAFNC, specifically the DEAS and mixed sessions with the DEAS and farmers in community centers in the project area as well as several on the ground meetings in farmers' field to observe some of the experiences described by farmers and interested community folks. An Informal Technical Team (ITT) brought together by the Team leader in consultation with Regional Heads also participated in the meetings. The ITT included technicians/engineers from the DAFNC (WRMA, AESD, DOF, DEAS) and subcontractors (Agronomy/post-harvest, knowledge management, water/agribusiness and a youth volunteer video recorder). The field process was as follows:

(i) Seven PRAs with extension officers and members of the farming community to explain the project and to assess awareness, experiences and changes in practices in response to weather-related changes;

(ii) Five focus group meetings lead by WRMA, farmers and other technical staff of the DAFNC to assess sites for RWHS mostly in clusters in 25 settlements with follow-up meetings held with DOF, DEAS and the sub-contractors in agriculture engineering,

water management, agri-business, agronomy and post-harvest handling and knowledge management and the youth video volunteer, to agree on best options and safe sites for climate adaptations practices with water security integrated with soil building for resilience;

(iii) One- on -one stakeholder's meetings including Massey, SLHTA, CARPHA, YAEP, IICA, OECS-Agriculture, DMS, SALCC-Farm School, WASCO, and [28]PROPEL in Saint Lucia, among others to apprise them of the project, avoid duplication, listen to lessons learnt in the undertaking of their activities and to encourage participation in the planned National Consultation;

(iv) National Consultation held at the Department of Fisheries Conference Room to present the Project to over 70 participants and receive feedback; and

(v) Three Technical Sessions and several field visits with the Informal Technical Team (ITT) and farmers from the different communities, to confirm clusters for establishing on-farm RWHS, visits to the prospective agro- park sites to assess suitability of area (types of farmers and activities in the vicinity), land drainage and siltation problems and other infrastructure requirements such as soil stability at the site of the building to be rehabilitated.

Major findings from the consultations:

Beneficiaries: The total number of male farmers participating were more than the number of females, but the mix varied from community to community, such that in some meetings there were more females than male farmers. Male farmers were involved in crops and livestock and youth farmers mainly from the YAEP were involved in crops, livestock and aquaculture. Based on the information received a number of females were involved in PAS including shade houses with nets and raised sides but mainly greenhouses. Females were also involved in small-scale processing, and backyard gardening. According to the 2007 Agriculture Census 30 percent of individual holders were female up from 25 percent in 1996. While there is no organized process by the DAFNC to build capacity in women in agriculture, these women were participating in all the training activities and particularly active in FFS exercises which is the core training tool for the DEAS.

Practices in the field with climate change: The evidence of climate adaptation practices on the farms was limited to a very small percentage of farmers in Region 6 using contours on hillsides and to farms in Region 8 pumping water from the rivers which they indicated were drying. The best level of organization and focused approach to farm was among the Belle Vue Cooperative, Black Bay Farmers' Cooperative and reportedly Grace Farmers' Cooperative, and this was also where women appeared to be most successful. Farmers main concerns were with water shortages, the high labour cost for weed control due to rainfall peaks and increasingly high use of chemical fertilizers to sustain soil fertility, the extent of abandoned farms or the number of farmers who had reduced the area under production and challenges with feed for small livestock due to impact of droughts on trees for forage.

Impact on project components: The project components were finally designed with a view to ensuring the identification and inclusion of the best climate adaptation options to satisfy the farmers concerns which were: **(i)** persistent expression of problems that were causing increasing water shortages for the farm, (**ii)** challenges with planting dates and associated impact on timing of the harvest vis a vis need to satisfy market arrangements (**iii**) having to move to the interior of the country to satisfy soil water needs (**iv**) water logging and salt water intrusion in low lying farms (**v)** higher pest infestation and diseases, with flower drops, rotting in root crops and root vegetables and low crop yield (**vi)** shortage of forage for small livestock and (**vii**) higher cost of production from

[28] Promotion of Regional Opportunities for Produce through Enterprises and Linkages,

increasing use of agri-chemicals especially herbicides and the need to buy shop feed. Farmers also felt that the extension system was not focused on the climate change adaptation and there was a lack of awareness of these practices.

Actions by the farmers: An important outcome of the field consultations was that some of these farmers volunteered to take time off to work alongside DAFNC and the sub-contractors involved in project formulation, to identify some of the clusters and individual holders mostly affected by water shortages and who are mostly rainfed some wholly rainfed. These areas were later mapped and positioned using GPS by the DAFNC, WRMA, DOF and AESD. The participation of the farmers who were the most familiar with clusters within the group helped to ensure that farmers in small scattered clusters were not missed during implementation and also that (women in backyard farming, individual youth and very small livestock farmers were included) some through recommendations for standalone RWHS storage at community level and access through mobile tanks. Tree crop nurseries that will provide planting material for DRRM in land management were also identified for RWHS. Seedling nurseries are also a good source of employment for rural women and fitted well into the project. This practice of GPS and GIS mapping for all RWHS will continue through project implementation for monitoring and evaluation in compliance with the EMP/EIA, for data collection on sustainable production and to encourage maintenance of the infrastructure, post project.

The National Consultation provided the opportunity for more than 70 stakeholders and farmers to discuss and agree on the project interventions, during the focus group sessions. This part of the consultation process provided much information on practical sites for the green agro-parks with discussions around opportunities to extend value chains, improved coordination in production planning and marketing of fresh produce to the hospitality sector and considerations for increased use of technologies and implementing GAPs. Stakeholders and farmers were particularly interested in the foreseen increase in numbers of annual harvest with improved water security and the use of renewable energy both for cooling and water pumping in greenhouses. High productivity and the possibilities for stronger contractual arrangements in local supply chains was foreseen especially for leafy vegetables. The sites proposed were also considered convenient for the project activities to directly affect the poorest communities in the country, including some of the women involved in small-scale processing, and the two sites on which the YAEP were operating as well as to participate in the popular round the island farm tours.

Farmers felt that although there was a cost to capacity building for extension, the gap in adaptive capacities in agriculture to transfer technology and practices in for climate adaptation would only get wider with serious delays to project implementation. As a result, the project makes adequate provision in the knowledge management component and in the establishment of institutional arrangements with technical cooperation partners such as SALCC to assist with capacity building. Other areas of need emerging from the consultative process and captured in the project activities were mostly institutional including (**i**) strengthening areas for management information systems and (**ii**) how to effectively mainstream climate adaptation in the DAFNC research and development program. The considerations were wide ranging and included the need to establish climate change databases. Participants at this session also recognized important spin offs of the project activities due to the fact that populations out of the project area who are highly dependent on the marine ecosystem, for livelihoods and incomes would benefit from the reduced sedimentation affecting the coastlines and nearshores resulting from improved land management on the west and south west.

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

The project is requesting total funds in the amount of US$8,560,659.28 to support the implementation of the proposed activities intended to reduce vulnerability and increase adaptive

capacity to respond to the impacts of climate change and climate variability in the project area. This amount will be complemented by GOSL in kind contribution in the amount of US$975,823 equivalent to the cost of 20 public officers from the DAFNC assigned to the PMU over four years to support the activities under Components 1, the field production activities in Component 2 and knowledge management and transfer activities under Component 3.

The proposed activities are well-established practices that can avoid or minimize the extent to which climate change and climate variability continue to threaten livelihood security highly dependent on agro-ecosystem resources for sustainable farming systems. These practices will also increase farm productivity, bring new areas of land in the project area under production, with improved efficiency and extended production value chains from the farm gate to through access to agro-processing facilities with improvement in livelihood security and income generation. This is in addition to significant capacity building in adaptive capacities in farmers, and in the technical staff of the MOA- DAFNC, supported by improved information infrastructure for knowledge management and transfer for resilience in farming systems. The range of beneficiaries include men, women and youth engaged in small farming.

The extent of the likely negative impact of climate change and climate variability on the farming systems into the year 2081, described in PART 1 of the document is a clear indicator that sustainable agriculture for livelihoods security in Saint Lucia will not be achieved without targeted and integrated action to build resilience in agro-ecosystem resources in small farming systems. This is particularly so for some 70 percent of the farmers experiencing water shortages on wholly rainfed farms and thousands who are continue to be exposed to risks of devastation due to vulnerability to landslips, soil erosion and flooding.

While the data on economic impacts of climate change on the country is limited, there is sufficient information from the cost and benefit analysis conducted on selected crops and showing the highest ranked climate adaptation practices (Table 2- Section C above) to justify the use of the funds. The climate adaptation practices targeted in the study provided clear indicators of the ranking and benefits from the application of these selected practices. Considered against the recorded losses from the passage of hurricanes and other adverse weather related conditions during the period 1960 -2016 in the amount of US$568[29] Million dollars and the intensity in losses over the three years 2010-2013, that accounted for 63 percent of the value of loss and damage, the GOSL is anxious to implement climate adaptation measures with strong indicators of adaptive capacities to build resilience in agro-ecosystems services for agriculture. This is of extreme importance to the strategic approach described in the NAP-SASAPs (2010-2018) for agriculture to impact improve livelihood security and levels of productivity for improve livelihood security in rural communities as there are growing concerns that the outcome of the strategy could be severely minimized without measures to build climate resilient farming systems.

Table 4 below is further justification for adaptation measures for improved livelihood security by drawing comparisons between the baselines for adaptive capacities in the farming systems determined during consultation and net benefits foreseen at project termination. The level of built resilience observed in the Table would be a major contribution to livelihood security with social improvements in the circumstances of vulnerable rural households in the project area with the increase in the poverty gap moving from 1.5 percent to 7.5 percent between urban poverty and rural poverty since 2006 (1.2 PART 1). Delays in building resilience in land management and soil water functionality could significantly alter the foreseen change towards favourable circumstances of the population of 7,200 in the farm families, due to the uncertainties of sudden and devastating change in the extent of the threats in the farming systems.

[29] Amount rounded

The risks posed are immense, mostly from devastating landslips and water insecurity on the farms but can be avoided or minimized with evidence-based results in the short to medium term with the proposed climate adaptation practices and enhanced production practices proposed. The project will use the best climate adaptations options for water security, soil erosion control land management as reflected in Section C above.

Table 4. Value of the Project Interventions in Comparison to the Baseline for Adaptive Capacity and Net Benefits to Resilience in Livelihood Security

Components	Baselines for Adaptive Capacities in Agro-ecosystems (farming systems)	Residual or Net Benefits from proposed project activities.	Funding required from the AF US$
Component 1: Building resilience and sustainability of farming systems through interventions for water security, soil conservation and management	Weak adaptive capacities to reduce vulnerabilities and risks from landslips and soil erosion resulting in loss of farm assets and lives amounting to US$567.9 million from 21 events 1960-2017 and US$358.2.4 million from three events during the period 2010-2016 and uncertainties in livelihood security .	Improve livelihood security in the farming systems for a total of 4900 farmers directly using DRRM practices that reduce vulnerabilities to landslips and create additional safe areas for production on hillsides, diversify of farm production chains from tree crops and agro-forestry products over on an estimated 1000 hectares	**2,951,982.00**
	70 percent of farmers wholly rainfed operating on hillsides, low soil-water retention with projections for decrease in rainfall between 22-57 percent by 2040-2069. Reduced areas or abandonment of farm due to frequent droughts, and high cost of public water for open field and greenhouse production.	Resilient farming systems from water security and drip irrigation integrated with built organic soil with potential for increased number of annual harvest and access to forage for small livestock.	
Component 2 Integration of renewable and other energy efficient practices in intensive agriculture value chains.	Weak evidence of technical support for modernized agriculture technologies and CC and CV readiness capacities in the DAFNC to drive competitiveness and promote investment in small or medium sized farming systems at the desired level of the NAP-SASAPs -2018 -2028)	Demonstrated intensive production area of 30 hectares of contiguous small farms for crops, livestock and aquaculture on two sites, using climate change adaptation practices for resilience with CC and CV integrated with modern technologies and renewable energy with increased productivity, reliability and competitiveness in diversified domestic supply chains.	**$2,623,814.00**
	Persistent declines in value of agriculture GDP, evidence of low share in the domestic fresh produce supply chain due to uncertainty in planting dates and water availability in wet season.	Potential for expanded share in domestic supply chain for selected crops with reduced imports of selected fresh food and with foreign exchange savings on imports.	

	.	Shift from food imports to local purchase, will benefit local buyers with reduced cost of shipping from external production areas due to economies of scale and value added tax and other costs associate with imports.	
	Gluts in small farming systems and national data with indicators of low domestic purchases from local production in crops	Small farmers with access to generate diversified crop production value-added chains through efficient agro-processing facilities using green energy for branding and observing international standards for certification in processing and packaging.	

Table 4. Value of the Project Interventions in Comparison to the Baseline for Adaptive Capacity and Net Benefits to Resilience in Livelihood Security			
Components	Baselines in Adaptive Capacities in Agro-ecosystems (farming systems)	Residual or Net Benefits from proposed project activities.	Funding required from AF US$
<u>Component 3</u> Knowledge management and transfer to improve adaptive capacities.	Youth and employed male in agriculture among the poorest and in the lowest wage scale and women with low capacity to improve agro processing businesses Knowledge management on climate adaptation is tacit-resulting in weak adaptive capacities for climate adaptation among farmers and needs to be documented, shared and transferred using an established institutionalized approach Weak capacity in DAFNC for economic analyses in climate adaptation in agriculture Weak or no organizational approach at the local level relative to climate change , climate variability and livelihood security.	Strengthened and diversified value chains for farmers including youth and women including established linkages to the vibrant agri-tourism farm tours Established database to capture baselines and subsequent improved adaptive capacities in farming systems providing information on new and improved strategies to continue to build resilience in livelihood security in agriculture Capacity in DAFNC to conduct economic analyses of impact of climate change and climate variability for strategic planning for on-going built resilience in farming systems; a draft land-use policy brief and draft Agriculture Disaster Management Plan Built social capital through Water Users Association, Agro-processers Organization for Women, four Community-based Climate Change Adaptation organizations for longer term prosperity with climate change in farming systems of 2400 farming households established. Institutionalization of knowledge management and transfer to build resilience in agriculture, including dedicated space, climate control grow rooms, training and meeting space for farmers and CCILLC for awareness building and responsibility sharing. Outdoor facilities for production and capacity building in utilization of organic soil building material	**2,623,814.00**

		for longer term access to land and built resilience in soil productivity with climate change and climate variability	

The holistic approach to building resilience in the farming system will ensure timeliness in project outputs and the benefits to be derived. On the other hand, the observed uncertainties of rainfall pattern and amounts combined with the extent of susceptibility to landslips observed, if continued could increase vulnerabilities and create risks and a worsening situation in livelihood security and incomes in farming systems. This means that the funding support should be considered as urgent as the risks from the devastation from combination of cracked dry cultivated soils, intense rainfall and landslip susceptibility could extend beyond the geographic area of the project into rural coastline communities weakening livelihood security and incomes even beyond the project areas.

In addition to the devastation in the farming systems, there would be negative impacts on foreign exchange earnings from the commercial fishing industry and from heritage and water sports tourism that are major attractions for cruise ship and stay visitors. This loss of livelihoods and foreign exchange earnings could continue with different levels of frequency and intensity for undetermined periods of time due to on-going sedimentation and other forms of pollution from poorly managed hillside farms with negative impacts on households on the coastlines.

The financing from the AF is therefore critical to help the country in general and the farming households in particular to adapt to proposed practices. Due to the integrated nature of the activities ready and timely flow of access to the full cost is an imperative as any delays in one part of project financing could result in loss of gains in built resilience from another adaptation measure or Component. Hence the significance of this funding source. For example, water security must by necessity be integrated with land management and resilient soils and the expected impacts of modernized and new technologies such as aquaponics and integrated solar power will be highly dependent on the built resilience in the agro-ecosystem services.

The planned improvements on the rehabilitated building and the important role it will play in facilitating knowledge management and transfer of climate adaptation practices and gains also points to the need for the early readiness of this facility. The human resource capacity to ensure that the project is based on sound targeting, indicators and adaptation measures and limits of adaptation will be highly dependent on the capacity building and the learning and interpretation instruments which will emerge from the work to be undertaken in this building.

Eighty five percent of the funds requested for project implementation (US$6,166,576.6) will go directly to concrete activities in built resilience including, reduced vulnerability to landslips with risks to the farming areas and improved farming practices on hillsides with natural susceptibility to landslips, resilience in soil structure and fertility, water security, established climate adaptation in greenhouses, refurbished aquaculture ponds for integrated farming for youth. The funding will also go towards infrastructure for two green HACCP certified agro-processing facilities with special consideration for rural women, the CCILLC with two climate control rooms, requirements for tracking and assessing resilience in agriculture and for training and capacity building at all levels of project beneficiaries. The remaining fifteen percent will go towards the soft infrastructure to manage database and analyses, and to build capacities in climate change organizations for ownership, and responsibility-sharing in the sustainability of the built environment for agriculture and for strengthening and expansion of the organization for example the SLNRWP. Eighteen percent of the grand total is for project execution and NIE costs.

Properly executed this is a no-regrets project considering the nature of the concrete activities for short –medium term outputs and with longer term benefits. The level of financing requested is reasonable as is the level of technical human and physical resources that the country is prepared to commit to the work of the PMU. Without this source of funding that allows for timely disbursements, the economic, environmental, and social benefits of the outcomes could be severely delayed or minimized, or not happen despite the strong indications of the changes that could be realized over the short to medium–term.

Most important however would be the denial of improved livelihood security provided for an estimated 2,400 households an estimated population of estimated 7,200 persons directly impacted, with improved household food security, improved diets with reduced incidence of Non Communicable Diseases (NCDs) from pollutants in food grown with chemicals, improved household disposable incomes to keep children in school every day and the adaptive capacity to contribute to their own livelihood security and incomes. There are also the important co-benefits of the climate adaptation practices with positive impacts on livelihood security and incomes in the poor coastline communities, and protection of foreign exchange earnings for fisher folk.

Based on the foregoing the alternative to no action to build climate resilience in the sector could be that already felt impacts of climate change and climate variability on the sector will continue to result in serious adverse effects, even if weather gets no worse, some not easily reversed, particularly those linked to landslips with loss of land and lives at times and the continuing persistence in poor farming practices on the slopes in the project area.

Section J: Describe how the sustainability of the project outcomes has been taken into consideration when designing the project

Consideration for the sustainability of the project outcomes was a main focus during the review of the official GOSL documents, the participatory process in the field and also in two sessions with the DAFNC. Six critical results were identified as priority areas for enhanced sustainability and upgrade of the project gains. Effectively these results are integrations of outputs and outcomes which in the case of this project cut across in one or more ways to provide resilience with climate change and climate variability in agriculture. They include tangible results that will cause the following responses within the farming systems and in the DEAS:

1) Ensure ownership, responsibility, and perceived equity in the benefits of the concrete outputs: The best guarantee for post-project sustainability and upgrade is for farmers to be satisfied that the project had made a difference to their farming activities with improved productivity, markets and profitability as a result of the concrete activities. Also, that they have a good understanding of the climate adaptation practices. How and why they worked and can be made to continue to work to change their lives with climate change and climate variability. This will happen through the information sharing on positive changes in adaptive capacities baselines and discussions on lessons leanrt that will provide the basis for evidence- based changes within the farming systems.

The activities in the CCILLC will help to demonstrate environmental benefits of the project and are expected to generate greater awareness for sustainability, ownership and responsibility to minimize the possibility of these benefits being lost or diminished by neglect. The project therefore promotes climate change adaptation community-based organizations, RWHS water users', rural women in agro-processing, and producer cooperative.

As timeliness and quality of the deliverables will be essential for commitment to ownership and responsibility the project will ensure that outputs that are visible and stable are promoted so that the farmers and their communities would be able to make their own judgements in terms of change in livelihood security and well-being from improved incomes, employment generation and food security in their households and in the rural communities. Most importantly the interaction among farmers promoted in this approach would allow them to learn from each other thereby increasing trust, a critical ingredient for ownership and perceived equity.

2) Achieve the sustained interest of the farmers so they want to remain on the farms, and to continue to use climate change adaptation practices: It was reasonable to assume that the farmers would want to remain on the farms if there is good evidence of improved productivity, improved income generation with good farm gate prices, opportunities to diversify and extend value chains and there is uninterrupted capacity to meet the requirements for reliable supply arrangements in all of the outputs from the three subsectors. The project activities will deliver on these areas, for example, in the crop subsector by (**a**) minimizing fluctuations in farm gate prices by avoiding gluts through better production planning and control over planting dates with water security for irrigation and better quality leafy vegetables from organic soils (**b**) readiness to satisfy the requirements for registration as a supplier of fresh produce, now that there is access to water and (**c**) higher profitability from reduced use or elimination of agri-chemical inputs. Components 1& 2 include activities that will generate these benefits. Also under Component 2, the establishment of protein banks, small livestock farmers would be less stressed to find forage and could devote some of this newly found free time to crop production activities, youth will be benefitting from diversified production chains in aquaculture and small scale agro-processers would also be able to diversify production value chains in certified facilities. These are all outputs and changes in livelihood security and income that could serve to guarantee sustainability of project outcomes.

Component 3 will contribute to agriculture drought alerts for better control of planting dates and improved coordination among farmers, in production planning for selective crops and to support the Producer Cooperative approach for best organization strategies. Other important and new benefits on which the farmers would be expected to place high value is the ability to present sound investment profiles based on production performance, to allow them to access farm credit including for new opportunities to extend production into the new farming areas released from improved land improvement or brought back into production with water security. These positive changes in farming systems will serve to encourage and intensify the interest of the farms and strengthen commitment to continue and replicate the learnt practices resulting from the project activities.

3)Establish the type of institutional collaboration from policy level to the farming communities to maintain a database that satisfy monitoring and evaluation of gains and provide indicators for on-going resilience building with a focus on marginalized communities. The consultations started in the project formulation process with farming communities and with the wider stakeholders will continue at least once annually as indicated in the M&E. Also under Component 3 the project activities include the conduct of six monthly need assessments and inventory of farms and households in order to monitor benefits of the project to the targeted beneficiaries. As proposed in the document the social impacts at household level will be undertaken with the support of the Department of Statistics which has the responsibility for household poverty assessment in Saint Lucia.

4) Integration of climate change adaptation practices into the Work Programs of the DAFNC and specifically in the DEAS. The DEAS is expected to lead the process of climate resilience at the farm level post project implementation. Accordingly, the proposal is for project activities to be aligned with the Annual Work Plans of the four Agriculture Regions in the project area. This is to ensure that the DEAS is not left behind in the practices and achievements of the project. Furthermore, while during the project implementation, the focus will be on the 2400 farmers directly affected, the project activity in Component 3 to build capacity in the DEAS would have improved adaptive capacities in the entire DEAS staff to contribute to replication and upscaling of climate adaptation practices post project

5) Establish greater awareness of climate resilience in the farming systems. The project is designed to create greater awareness of climate change and climate variability in agriculture. The establishment of the CCILLC is intended to raise the level of awareness and the benefits of climate resilient adaptation. It will provide graphic presentations and discussions on the likely adverse impacts of climate change and climate variability on the natural resource base for farming, with and without resilience building in the farming systems. This will extend to annual competitions for keeping awareness building in the fore front to ensure climate adaptation practices are fully integrated in farming systems with the decrease in rainfall and the predictions of earlier and more extreme drought conditions. The project assumes that eventually the outcomes of the project activities will gain most attention through livelihood security, especially for household food security due to the expected decrease in rainfall amounts and to earlier and more extreme droughts

Section K: Provide an overview of the environmental and social impacts and risks identified as being relevant to the project

The project geographic target area is in the part of the country most vulnerable to the impacts of climate change and climate variability. This is also the area of the country most vulnerable to poverty with three of the four poorest communities. Small farming systems in these areas are exposed to environmental impacts and risks from intense rainfall and extended drought conditions over farmlands which are susceptible to landslips, poor soil water retention and located on hillsides and slopes. These are also households with weak disposable incomes, are more sensitive to shocks and

with low capacity to cope from the increasingly intense nature of recent hydro-meteorological events over the country. Already youth and males in farming are among the poorest in the country.

The project is designed to build resilience and sustainability of farming systems through interventions for water security, soil conservation and management, integration of renewable and other energy efficient practices in intensive agriculture value chains and for knowledge management and transfer for capacity building to improve institutional and local level adaptive capacities. The assessment undertaken places the project in Category B due to the steep slopes and general topography of the country. The conclusions of the EIA/EMP assessment is attached at Appendix II. In line with the ESPAF the project has been screened for environmental and social impacts against the environmental and social principles (Table 5 below).

Table 5: Checklist of environmental and social principles

Checklist of environmental and social principles	No further assessment required for compliance	Checklist of environmental and social principles	No assessment required for compliance
Compliance with the Law	✓	Protection of Natural Habitats	✓
Access and Equity	✓	Conservation of Biological Diversity	✓
Marginalized and vulnerable groups	✓	Climate Change	✓
Gender Equity and Women's Empowerment	✓	Pollution Prevention	✓
Core Labour Rights	✓	Public Health	✓
Indigenous Peoples	✓	Physical and Cultural Heritage	✓
Involuntary Resettlement	✓	Lands and Soil Conservation	✓

Compliance with the Law: Through several international agreements of which the GOSL a party, there is good awareness of the sensitive link between natural resources, in particular the multi-functionality of agro-ecological services and poverty. Hence while the country recognizes that there is potential for natural ecosystems services to contribute to [30]sustainable development, with climate adaptation, its strategies and actions will be compliant the principles of the ESPAF that seek to ensure that the project will not result in any social or environmental harms.

Access and Equity: The NSPP (2015) ensures inclusiveness and equity in Saint Lucia. All of the project beneficiaries will benefit from activities to improve livelihood security based on need assessments for improved adaptive capacities on the farm. Reduced landslips are targeted in the geographic area of the project where the most serious events have occurred over the years and increasingly so between 1994 - 2013. All farmers will benefit from soil building practices and 90 RWHS systems are planned based on needs. It is possible that some farms could fall into all three categories, hence the project will use data from the proposed inventory and needs based assessments along with the updated and newly prepared overlay farm maps for final decision- on the selection of beneficiaries.

Marginalized and Vulnerable Groups: The project activities will benefit the situation of vulnerable and marginalized groups as these populations are concentrated in the farming communities. None of the activities planned are expected to negatively affect the other members of the communities engaged in other types of livelihoods. None of the activities are expected to create negative changes in food security or in traditional cultural practices.

[30] Saint Lucia National Social Protection Policy (NSPP) (2015)

Human Rights: Saint Lucia is a party to the agreements emerging from the World Conference on Human Rights and continues to observe and promote all the rights enshrined in the obligations emerging from the Conference. There is no aspect of the project which will minimize any of these rights. Furthermore, provisions are made in the Constitution of Saint Lucia for upholding of these rights.

Gender Equality and Women's Empowerment: All of the project activities are designed and will be implemented in a manner that men, women and youth can benefit from any aspect of the project with fairness. However, there are special considerations for training of women and for providing production space in the two agro-processing facilities, as well as for water security to restore and expand growing areas for cocoa for processing.

Core Labour Rights: The project was developed with full consideration for the national laws guided by International Labour Organization core labour standards of which Saint Lucia is a party.

Indigenous People: The project does not involve any indigenous groups this concern is not relevant in respect of further assessment for ESP compliance.

Involuntary Resettlement: No resettlement is foreseen in the undertaking of any of the project activities.

Protection of Natural Habitats and Conservation of Biological Diversity The project will not result in damage to any natural habitats. In fact, there are many co-benefits of the climate adaptation practices in the project as identified of relevance to this principle (See Table 3 above).

Climate Change. The objective of the project is to build resilience in agro-ecosystem services with climate change and climate variability. The practices will include the integration of renewable energy in production value chains thereby contributing to reduced carbon foot prints, regrowth in degraded lands from new farm areas brought under production and in general a focus on greening of practices for adaptation in general and more so in Component 2.

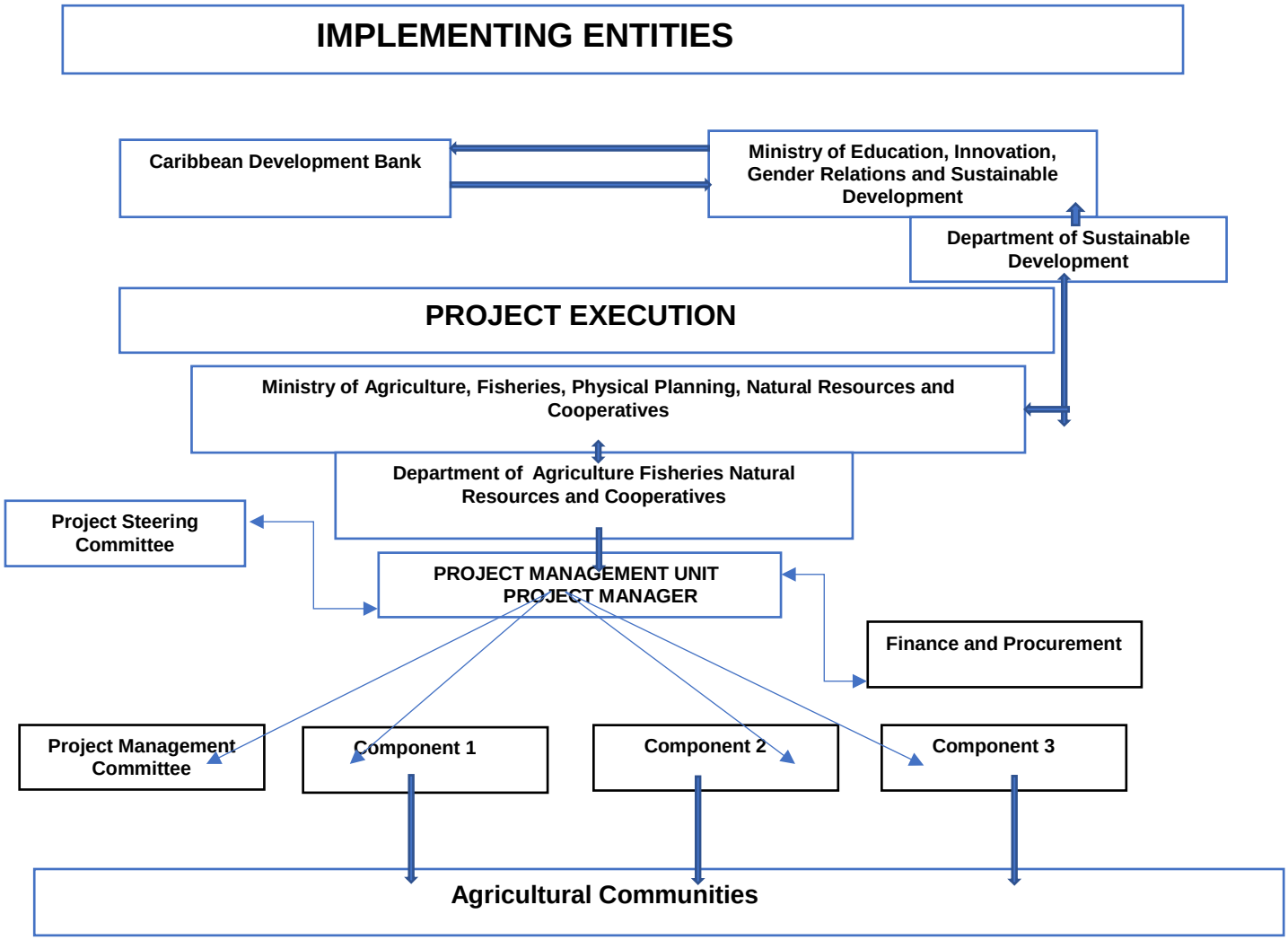
Pollution and prevention: The project will contribute to reduce pollution in soil and water, through practices that reduce sedimentation and soil erosion, and the expected shift from agri-chemicals to biological inputs.

Public Health[1]: The project will not use any practices that impact negatively on health. In fact, the project will contribute to a healthier environment and safer food through organic practices for soil building and the reduced use of commercial feeds, likely from GMO sources for small livestock and fish.

Physical and Cultural Heritage: The project activities are mainly improvements on traditional knowledge practices and are not expected to alter, damage or remove any physical and cultural practices.

Lands and Soil Conservation: The project is designed conserve land and soil and will and avoids degradation and conversion of productive lands or land that provides valuable ecosystem services into any other use.

PART III: PROJECT IMPLEMENTATION ARRANGEMENTS



A. Describe the arrangements for project/programme implementation

Project Implementation Framework

- The contracting authority of the Project is the Government of Saint Lucia represented by the Ministry of Education, Innovation, Gender Relations and Sustainable Development. The Department of Sustainable Development as the Adaptation Fund Focal Point represents the Ministry of Education, Innovation, Gender Relations and Sustainable Development in the implementation of the project.

- The proposed Project Executing Agency is the Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Cooperatives that will delegate implementation responsibilities to the Department of Agriculture, Fisheries, Natural Resources and Cooperatives (DAFNC).

- The Department of Sustainable Development will provide oversight to ensure that AF policies and criteria are followed and that the project fully meets its objective and achieves outputs and outcomes in an effective and efficient manner and will report to the Ministry of Ministry of Education, Innovation, Gender Relations and Sustainable Development on

matters related to approval of annual financial reports and financial audits, approval annual reports and monitoring and evaluation of social and environmental risks through field visits in the project area.

National Project Steering Committee (PSC)

Role and Responsibility: The Project Steering Committee (PSC) will undertake responsibility for the following:

(i) Providing strategic direction acting as the key body in the Project governance structure ensuring that project deliverables are time bound, satisfy outputs and achieve the outcomes and that funds are efficiently utilized (See project implementation arrangements above).
(ii) Providing advice on policy taking into account issues which might arise during project implementation
(iii) Reviewing and adopt the Annual Work plans and budgets prepared by the Project Manager/Coordinator in conformity with the project objectives and subject to the rules of the Adaptation Fund
(iv) Reviewing six monthly performance reports by the Project Manager, prepared in a manner that facilitates monitoring and assessments of outputs and outcomes, justification of expenditures, approval of budgets and Work plans or amendments and any other higher level decisions that might change project direction or funding arrangements and budget.
(v) The PSC, will meet every six months
(vi) Calling when necessary Extra-Ordinary Meetings, on agreement with the Chair of the Committee.
(vii) Making the necessary preparation for the six-monthly meetings or for the Extra-Ordinary Meetings of the PSC.

The mix of selection to membership of the PSC will permit coordination and enhance synergies between the project and other climate adaptation projects in the country particularly those in agriculture including fisheries, biodiversity, water and renewable energy. The PSC will be Chaired by the Permanent Secretary of the DAFNC and the Project Manager will undertake the role of Secretary/Rapporteur. Membership will agree on a Deputy Chair of the PSC. The membership will include the AF Focal point in Saint Lucia, representatives from the following Ministries of Government (Ministry of Ports Infrastructure and Energy; Ministry of Social Justice, Empowerment, Equity and Youth; Ministry of Education, Innovation, Gender Relations and Sustainable Development; Saint Lucia Bureau of Standards), UNDP-SGP-GEF-Saint Lucia Country Coordinator; representatives of - Farmer organizations, the SLRNWP, SLAFY. This list is not exhaustive and will be reviewed and expanded to include other key stakeholders during the Project Inception Workshop (See later). The PSC will provide Advisory support to the Project Manager from time to time, and if necessary to the Project Manager and Team, in addition to regularly scheduled six monthly meetings.

Internal Management of the Project

The DAFNC will create a Project Management Unit (PMU) which will be responsible for the day to day management of project implementation. Personnel will include the Project Manager and four administrative staff covering human resources and finance, procurement, executive secretary and a driver/messenger. Other members of the Unit will include Project Team Leaders and Project Support Team, Agro-Park Development Manager, Agro-processing Facility Managers and a Knowledge Management Resource Person. The short-term consultants will also be assigned to the PMU. These include a Vulnerability Analysis and CBDRM specialist, Climatologist, Economist in

agriculture and climate change adaptation, and a part time Community Development Officer with skills in gender development by lateral transfer from the Ministry of Social Justice, Equity, Empowerment and Youth (MSJEEY).

The PMU will be housed in the DAFNC and will be managed by a Project Manager. This individual will have overall day to day responsibility for the successful implementation of project activities and the achievements of planned project activities. The TOR of the Project Manager covers provision of overall direction for contractual, technical and administrative aspects of the Project in accordance with annual work plans and budgets and will require the following actions:

1) Review of the Project Document and seek necessary clarity on the AF process from AF Focal point in Saint Lucia.
2) Preparation of the Annual Budgets and Work plans and provide oversight the arrangements for audits as indicated in the M&E Table.
3) Collaborate with the Permanent Secretary of the DAFNC on the selection of the eight Project Team Leaders and the Agro-Park Development Officer and participate in the meetings to identify and agree on number of technical staff from DAFNC or other part of the public sector (See Table on Project Execution)) by lateral transfer who will provide the additional technical project support staff to be assigned to the PMU.
4) Coordinate and manage the Project Management Team to ensure adequacy of and the full involvement of all members of the Project Support Team in accordance with the project document
5) Participate in the Technical Meetings of the Ministry of Agriculture as requested by the Permanent Secretary in DAFNC and be prepared to Report in these Technical meetings on project progress or any other relevant and appropriate technical issues
6) Provide supervision of administrative PMU staff as necessary to ensure timeliness and efficiency in the deliverables
7) Provide oversight on procurement of resources
8) Prepare the Monthly Reports and Chair monthly meetings of the Project Management Team and quarterly Meetings of the Project Management Committee and ensure that minutes are prepared and circulated
9) Make provision for the periodic monitoring and evaluation at Project staff level and in the participatory processes at the local level
10) Maintain a close relationship with the Chief Extension Officer of the DEAS and other heads of Units (WRMA, AESD and DOF and Central Planning/DAFNC) through the Project Management Committee, to enhance the efficiency and effectiveness in the implementation of the activities in the project area.

Due to the level of accountability and the size of the project the Project Manager will maintain a consultative relationship with the Permanent Secretary in the Departments of DAFNC, Department of Sustainable Development and the AF Focal Point to ensure outputs and efficiency and transparency in project implementation

The Project Management Committee will:

1. Ensure that project is implemented in line with the agreed work plan.
2. Review the monthly, quarterly and annual reports and ensure that funds are used efficiently
3. Make observations on coordination of project activities and timeliness of deliverables and
4. Assess quality of the DAFNC commitment to provide technicians for the Support Team

Technical and administrative support for the PMU

1.1 In addition to the Project Manager technical and administrative support from the AF funds to the PMU will provide the following resources:

1) A Green Agro-park Manager for 45 man months with responsibility for the two sites and who will prepare an exit strategy for the project and guidance on the selection of two appropriate Senior technical staff from within DEAS (Year 3) to continue the management of agro-parks. – (Component 2), one of whom will be selected to assume the position of Manager of both production areas post project while the second will continue to provide assigned specific services in the production areas.
2) Agro-processing Facility Manager for 36 months and a second Manager for 18 months.
3) Knowledge management resource person for 40 man months – Component 3.
4) Climatologist / plant scientist from UWI Climate Studies Centre Mona for two months in two visits to provide expertise in the setting up and management of the CCILLC in particularly the climatology aspects for ex-situ tracking of climate adaptation and resilience in crops
5) Finance/ human resource Officer for 46 months.

In addition, the project will provide the funding support under the respective Component for the following consultants who will also be assigned to the PMU.

(1) Vulnerability analysis and CBDRM for land slips for 300 days over 36 months (see TORs below)- Component 1.

(2) Climate change and climate variability plant scientist from the UWI Climate Studies Group-Mona to provide support in the establishment and management of climate control grow rooms CCILLCC for two months in two visits- Component 3.

(3) Economist identified to conduct capacity building in economic analyses of the impact of climate adaptation in agriculture in staff within the Central Planning Unit in the DAFNC for 10 days in two visits. The Project Manager through the DAFNC will also seek to access this expertise under existing Technical Cooperation Programme between GOSL and UNECLAC. - Component 3.

1.2 Technical and administrative support from DAFNC for the PMU:

The DAFNC has in place some 80 technical Officers providing services in crops, livestock, fisheries, forestry, soil engineering and water resources management. Of direct relevance to the project are the soil engineers (AESD), water engineers (WRMA), forestry officers (expertise in cartography, slope and land management), agronomist and post -harvest handling, inland fisheries/aquaculture and indirectly marketing. There is also a Division of Research and Development and an active and well -resourced Media Unit. All of these officers have been trained in Farmer Field School approach and FFS is the core training tool of the DAFNC in field activities for the last decade. Among the forestry officers are three experts with good experience in creating maps such as the one shown in Appendix II and all water and soil engineers and several forestry are trained in GIS and GPS, and all forestry officers in land conservation practices.

The DAFNC will assign from this pool eight technical officers for the (Project Team Leaders) organized in two teams and an estimated 8 additional technical officers (Project Support Team) to support the activities in Component 1 and as necessary the farm production activities in Component 2. Forestry officers also work with ground staff for normal work undertaken in areas such as improved land management. As necessary, such as in disasters the DOF is also well experienced in

using contract labour to undertake additional land management and restoration work. The support required from the Department of Fisheries will be limited to one part-time fisheries extension officers for the five aquaculture ponds in Component 2.

There is therefore sufficient capacity and experience within the DAFNC to organize and to coordinate the undertaking of the project field activities in Component 1 and to provide the necessary support in Component 2 (OUTPUT 2.1). The DAFNC will designate these 16 technical officers who will be assigned to the PMU at the Project Inception. The two teams will spend the first three – six months in the field in inventories and needs assessment, vulnerability analysis and creation of the updated landslip map the creation overlay maps of the farms. This undertaking will also permit the confirmation of the target farms and settlements/clusters for on-farm water and drip irrigation. This integrated team approach will increase the efficiency and transparency of the project benefits and of the selection of beneficiaries.

Project Team Leaders will prepare quarterly sub-plans aligned to the agreed Annual Work plan and budget and the Implementation Chart of the PMU and make recommendations to the Project Manager for corrections based on lessons learnt, the need to adjust work plans due to unforeseen events such as poor weather or any other adverse natural events. The Project Manager and his /her team will not make revisions intended to change outcome deliverables but may make recommendations to the PSC for such revisions.

In addition to the above the DAFNC will also assign one technical officer from the Statistics Unit in Central Planning to provide support in Component 3 as of Year 1 and a research scientist from the Research and Development Unit to the Laboratory in the CCILLC as of Year 2. These two public officers will provide support to the Knowledge Management Resource person in the PMU. The DAFNC will also assign two Senior agriculture extension officers to support the Agro-park Development Officer. These two extension will continue to provide agriculture extension services to the production sites post project.

The DAFNC will also assign a Procurement Officer for 42 months and an Executive Secretary for 48 months to the PMU and will request the GOSL to assign a Community Development Officer with skills in conflict resolution by lateral transfer by lateral transfer from the [31]Ministry of Social Justice, Equity, Empowerment and Youth for 12 months over 40 months.
Detailed Terms of Reference of PMU staff including consultants are provide in Notes on Project Execution Budge and Personnel.

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

The GOSL has in place established procedures for reporting on funds, hence the PMU will align with budgetary and fiduciary management arrangements which govern the operations of the DAFNC and all other public-sector bodies. The PMU will also adhere to the Government's procurement policy. The PMU will also familiarize itself with procurement requirements of the CDB, the Adaptation Fund Board financial management requirements, GOSL Financial Administration Act and Financial Regulations, the Audit Act, and the Procurement and Stores Regulations.

Circulars on accounting procedures from the Office of the Accountant General Department in Saint Lucia as well as circulars issued on financial policies by the Director of Finance will also guide adherence to good practices of the GOSL. Generally Accepted Accounting Procedures Principles (GAAP) will also guide the financial operations of the Project. In addition, all financial and project measures will be assessed as on-going process through internal audits of the Project and

[31] Ministry of Social Transformation and Community Development.

financial reports and audits by the NIE- (CDB). Potential specific financial, environmental, and project risks associated with the Project are shown below in Table 1.

Table1: Major Financial Environmental and Institutional risks

Risk Class/Category	Level	Strategies and Notes to ensure project deliverables
Financial: Inflation leading to increased costs of goods and services	Low	A finance officer and a procurement officer will be employed in the PMU in order to ensure appropriate management of funds and to make timely alerts to the Project Manager should there be need to make adjustments and or seek the necessary approvals in broader situations over which the Project has no control. The budget also allows for a 10 percent contingency without exceeding the sealing of the AF financing.
Environmental: Natural hazards (hurricanes with high winds and floods, droughts, and storm surges affecting the west, south west and north east coastlines) in the early stage of the project implementation. . Project risk: Weak acceptance or lack of willingness of the population to understand climate resilience and participate in the implementation of the project resulting in weak-buy-in.	Moderate to high	The Project is expected to build climate resilience in farming systems to natural hazards during the life of the project. However the expected outcomes in farming systems, could be frustrated or denied by intense rainfall from hurricanes or from extended droughts with potential for more devastation in the farms from landslides, poor drainage in low lying farms with loss of production and incomes. As indicated in the document priority is given to Component 1(reduction of landslips and water security). In the case of Component 2 the drainage works for the area will be given first priority. Due to the possibility of weather related delays the consultant will be engaged for 300 days over 36 months. The project was designed on the basis of a participatory consultative process, identification of experiences, adaptive capacities and needs of the agricultural communities and their populations in the project area.
Project risk: Weak acceptance or lack of willingness of the population to understand climate resilience and participate in the implementation of the project resulting in weak-buy-in.	Low	Other stakeholders brought into the process through the National Consultations included public and private sector agencies, NGOs, marketers on whom these agricultural communities are highly dependent as buyers of their produce, and international partners in agriculture in Saint Lucia. The common agreement reached by this process was that the best-selling points of the project at this time would be the following areas which have been incorporated in the Components. 1. Capacity building for a understanding and awareness of climate change and the potential benefits of climate resilience for income generation and food security 2. Measures that improve participation in domestic market supply chains. 3. Knowledge transfer in project demonstrations that assess and include considerations for the value of traditional knowledge transfer and cultures. 4. Practices with short-term returns such improved water security and reduced the increasingly high cost of agri-inputs. with reduced .

Risk Class/Category	Level	Strategies and Notes to ensure project deliverables
		5. Activities that encourage youth and women participation with improved income generation.
Inadequate baseline data for planning	M	The knowledge management and transfer Component has as its first activity that of establishing the necessary baselines for the project activities, hence the individual with responsibility for Component will be employed in time to participate in the Project Inception Workshop.
Collaboration amongst the relevant technical institutions	L	The successful delivery of project outputs will be determined by the extent of the ease of collaboration and cooperation of the many technical institutions involved . The project targets those agencies which the GOSL and the DAFNC have already long established relationship. These include the CDB, and UNECLAC at the international and regional levels and at the local level DAFNC working with SALCC-FARM School, Ministry with responsibility for Infrastructure and Energy, SLBS, MOH, DMS, and MSJEEY.

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

The Project fits into category B based on the EIA undertaken mainly reflecting the possible risks associated managing landslips on slopes and in the establishment of on-farm RWHS. However, the main focus is the improved land management in these areas, improved water security and enhanced production practices for improved livelihood, and incomes. By way of its geographic location the project activities will naturally improve the socioeconomic well- being of vulnerable populations including those in three of the four settlements where poverty is most highly concentrated in the country. Table 2 below shows that the extent to which the project formulation process aligns with the risk management concerns of the AF.

Table 2: Environmental and Social Policy Concerns of the AF

Environmental and Social Policy Risk Concerns of the AF	Project formulation process and proposed actions well aligned with the ESAF
1. Project should reflect the integration of policy, and legislative framework that aligns with environmental and social policy of the Adaptation Fund	The Project is an outcome of the integration of the main policies and strategies governing Saint Lucia's actions to protect the environment. These include: a. NCCAP 2015: makes provisions for sustainable water resources for agriculture biodiversity. (Component **1.1. and 1.2**) b. MTDS and SLDS (2012-2016):seeks to build competence and education of small farmers within the strategic goals for agriculture (**Components 1,2,and 3**) c. NAP (2009-2015): promotes climate adaptation measures for improved the food security and livelihoods of the poor through increased resilience of their farm production areas (**Components 1,2 &3**). **d.** TNC 2017: recommends urgency of adaptation measures in the west and south-west where the most vulnerable agriculture populations settle (**Components 1 &2 with emphasis on Component 1)** e. Revised NEMS and NEP (2015): seeks to minimize environmental risks and to support sustainable livelihoods and food security among other areas (**Components 1.1, 1.2, and 2.1,2.2)** f. SASAP for Agriculture and Fisheries Sectors (2018-2028): seeks to ultimately reduce poverty, improve livelihoods, environmental and human health (**Components 1.1,1.2; 2.1;2.2, 3.1.2)** g. IPRASP (2003): supports institutions and programs for development for poverty reduction and for longer-term social development (**Components 1,2,and 3**).
Participatory approach for environmental risk reduction at community levels and for transparency in access and equity of benefits of the project.	Participants fully informed through focus groups meetings during formulation; field visits for site selections included technical staff from DAFNC, (WRMA,DEAS,DOF,ASED) to ensure low or no environmental risks in establishing RWHS and accompanied by community persons for transparency in selection of the respective clusters of farmers to receive water, giving adequate consideration to mixed clusters, as well as clusters of women as well as youth in working in groups.
Gender equity in participation and benefits (social and economic)	Male and female were well represented in all the sessions even though male out number female 2:1 in farming and in the case of water for irrigation the capacity of the RWHS systems per unit were the same..
Does not involve conversion or degradation of critical natural habitats or other protected areas	Instead the project activities will contribute to protection of habitats through reduction in sedimentation and siltation on the coastlines
Should not increase greenhouse gas emissions or other drivers of climate change	Generally GHGs are from the clearing of land however this project does not include clearing new lands for the activities. Project also uses renewable energy for climate adaptation practices on the farms.
Avoid pollution and maximize energy efficiency	The project activities will build organic soils and reduce possibilities of pollution from agri-chemicals. The project activities will also be using solar energy for agro-processing, pumping water and cooling greenhouses with further saving on carbon footprints

Environmental and Social Policy Risk Concerns of the AF	Project formulation process and proposed actions well aligned with the ESAF
No negative effects on public health	The project through the organic farming practices will contribute to better health and reduce risks of some the popular NCDs and other types of ailments associated with the use of agri-chemicals in farming.
Promote lands and soil conservation	Component 1 is strongly focussed on climate adaptation measures to improve land management and soil conservation in the small farming systems. Component 2 will improve drainage in low lying farms and with co-benefits for reduced siltation and flooding and land degradation at the river mouth.
Protect or strengthen social cohesion or the affected communities	The consultation process will continue, there will be community-based participatory approaches and the facilitation of Organizations and groups to strengthen adaptive capacities at community levels for cohesion, ownership and responsibility sharing in the protection of the built structures of the project for longer term agro-ecosystem services (water users groups; climate adaptation groups, national agro-processers organization and Producer Cooperative).
Promote local decision making during all project stages with special attention to marginalized and vulnerable groups.	The consultation process, including the participatory rural assessments and the many field visits established a strong relationship and trust between the DAFNC, (DEAS,WRMA, DOF AESD) and the agricultural communities. Based on the level of participation and the demonstrated commitment of the farmers and the communities to work with the project formulation team, all persons including those deemed marginalized will continue to feel that their participation and inputs into the decision-making processes are valued.
Provide timely, clearly relevant and understandable information about all environmental, social and economic aspects of the Project	Component 3 will include the preparation of farmer friendly material for training, demonstration and sharing at community through leaflets, flyers, skits and other graphics that will enhance the understanding of the project beneficiaries of these elements of the Project.
Capacity building and skills development in the communities of a local skill base and increase local content.	The project is strongly community-based in its approach and include skills such as agro-processing for small-scale businesses or homebased convenient to women; production of bio-products which will be on demand by the farming community and which with the capacity building of the project will generate farmers who will be able to produce these soil building products on the farm using simple facilities (covered sheds) and farm waste, legume cuttings and easily available plants for fertilizer teas etc. Farmers will also benefit from training in different types of improved land management (Components1 &2) and in the building of greenhouses suited to environmental conditions and using local material (Component 2).
Learning and awareness raising	Component 3 provides this opportunity to direct beneficiaries through printed material provided and disseminated as well as through the wider community through the learning and interpretation at the two agro-parks

Environmental and Social Policy Risk Concerns of the AF	Project formulation process and proposed actions well aligned with the ESAF
Create employment opportunities sourced from the communities, skilled labour and traditional knowledge	In particular it is expected that with the strong emphasis on traditional knowledge transfer of the project and the fact that this practice is labour intensive in nature, there will be opportunities created for employment at the community level; demand for compost, mulch and fertilizer teas is expected to increase; increased production through year-round water will create opportunities for small-scale *middle men* in the marketing chain and in small-scale agro-processers either as processers or sellers of the processed goods and an increased source of fresh food supply for the tens of rural women who sell or gain employment through the activities in the Castries and other local fresh market place.
Ensure coherence with and support of related objectives of broader sustainable development policies strategies and plans established at the national and local levels.	Based on the extent to which the policies and strategies of broader development initiatives have been integrated into the project activities including the SASAP (2018) and the MTDSP (2012-2016)- it is expected that outputs of the Project will contribute to the strengthening of policy and strategy and to opportunities for upscaling climate adaptation practices in agriculture including the introduction innovative and climate smart technology leveraged by built climate resilience, with many social benefits at the community levels.
Grievance Mechanism	There is no grievance mechanism in the country to deal with farmers in particular. Foreseen areas of conflict include perceived lack of transparency, access and equity, and risks to the environment or to social benefits (unfavourable impacts on incomes in very early stages due to reduced use of chemical fertilizers) primarily incomes. The project makes provision for a staff from MSJEEY to provide services in conflict resolutions. The Project Manager will manage further complaints with the support of the CEO of the DEAS. If unresolved the matter will be taken to the level of the Permanent Secretary in the DAFNC. Principles will include keeping a record and tracking of grievances, a set time frame to deal with these complaints and easy access to register complaints. In order to reduce the issue of grievances the Project will seek to regularly engage farmers in particular, during participatory training, to receive feedback on project implementation and level of satisfaction with the process and the progress. For matters requiring legal advice the matter will be reverted to the office of the Attorney General.

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan. Include breakdown of how implementing Entity's fees will be utilized in the supervision of the monitoring and evaluation function

The project monitoring and evaluation will be undertaken at various levels in line with the roles and responsibilities of the Project Implementation Arrangements. The Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Cooperatives will be accountable for the successful delivery of the Project according to AF Operational Guidelines and the responsibilities will be delegated to the PMU in the DAFNC that will be tasked with the conduct of the day to day operations of project implementation.

The PMU will hold monthly meetings, ensure minutes are accurately documented and approved by all participants. The PMU will also make arrangements for six monthly meetings of the

PSC and ensure that minutes are documented and approved. The documents will cover timely and complete summaries of all relevant outputs from Component 1,2 and 3 that could increase efficiencies or require corrections at the level of the PSC. As necessary extra-ordinary meetings of the Project Management Committee and the PSC will be convened with the reasons for these meetings and the actions taken by the Project Management and outcome.

All the reports from the Project Manager to the PSC will be signed following presentation. Care will be taken that the Agenda that guides discussions of the Project Management Committee meetings and of the PSC contribute to reduce risks associated with climate change adaptation for increase climate resilience through strengthened adaptive capacities and actions for sustainable livelihoods, incomes and employment for vulnerable populations directly or indirectly dependent on the outputs of the agriculture sector. Annual Project Reports will be prepared to monitor progress. These Annual Project Reports will as a minimum include the following (**a**) Progress made towards project objective and cumulative project outcomes relative to baseline data, indicators and end of project targets (**b)** Project outputs and state of outcomes for each Component (**c**) Lessons learnt in all three Components (**d**) Annual expenditure reports and Audits and (**e**) Impact on livelihood security, incomes and employment. The following M&E and activities that will be undertaken are shown below:

A Project Inception Workshop will be held within 3 months of project start with relevant persons and institutions directly or indirectly involved in the project. These would include those directly involved in the Project Implementation Arrangements, farmers and other stakeholders important to the demonstration of ownership of the Project and to transparency in access and equity. The Report of this Workshop will be submitted through the Department of Sustainable Development to the appropriate bodies. This Report is a key reference document that will be shared with participants to formalize any understanding or agreements reached during the Workshop. The Agenda of the Inception Workshop will address the following:

(1) Provide an overview of the Project including the Results Based Management Framework; reporting, monitoring and evaluation requirements; work plan and budget and the financial reporting procedures and obligations and arrangements and audits.
(2) Facilitate discussions to assist all partners to fully understand and take ownership of the Project
(3) Provide an understanding of roles and responsibilities within the project's decisions – making structures
(4) Clarify lines of communication and how to deal with conflicts or grievances
(5) Provide for focus group session to review project components and examine the proposed four-year Work plan and make recommendations if any on the first- year Annual Work Plan and Implementation and Procurement Chart.
(6) Agree on a methodology for tracking progress against indicators, outputs and targets identified in the Project inclusive of a role for beneficiaries in data collection.

Following on the Inception Workshop the PMU will finalize and put into operation the following M&E practices.

- Revised Annual Work plans by Components prepared by the PMU describing in detail the deliverables in terms of outputs, the activities that would be undertaken and the results expected. The PMU will provide an abbreviated copy of the Work plan for the PSC, and the Department of Sustainable Development and the AF Focal Point for ease of monitoring. Persons in DAFNC who should be familiar with the Work Plan include the Permanent Secretary, the Chief Agriculture Policy Officer and the CEO of the DEAS.

- Field visits will be undertaken regularly at least monthly and at times more regularly when necessary. These should be primarily visits to the sites and in the company of the farmers involved and field officers. Some of these visits should coincide with the practical demonstration sessions to observe exposures to learning by doing and the evidence of awareness of climate change and climate adaptation and the reasoning behind building climate resilience within the farming populations.
- Consultations, PRAs, surveys (particularly to observe changes in baselines) and focus group meetings will continue though not as intense as the project formulation process preferably tied to the six-monthly inventory updates.
- Audits carried out in line with the requirements and standards of the GOSL and the NIE as earlier described.

Table 3: Monitoring and Evaluation Activities

Activities	Timelines	Cost (USD)	Responsible Parties
Project Inception Workshop	March 2019	6,000	DAFNC,CDB-Department of Sustainable Development
Establish Project Steering Committee	First quarter	**0**	Department of Sustainable Development; DAFNC /PMU
Finalize Operational Procedures	First quarter	0	DAFNC/PMU
Progress Reports	Monthly, Bi-annual	4,000	PMU
Financial Reports	Monthly, Bi-annual	5,000	DAFNC/PMU
Site Visits	Monthly	2,000	DAFNC/PMU/PSC/SDE
Project performance Reports	Annual	1000	DAFNC/PMU/ CDB
Consultations/Meetings on Project state implementation	Annually	4,000	PMU/CDB
Mid-term Review/Evaluation	November 2020	5,000	DAFNC/PMU /CDB
Terminal Evaluation	July 2022	8,000	DAFNC/PMU /CDB
Financial Audits	Annually	25,000	DAFNC/PMU /CDB

Project Evaluation: Two Project evaluations are planned, a Mid-Term Review after the first 18 months into the Project implementation and a Terminal Evaluation six months before the scheduled closing date of the 4-year Project. This is to allow for adequate time to finalize and formalize the exit strategy for the Project in particularly, relative to the management of the green agro-parks. The Terminal Evaluation will be conducted under the leadership of the Independent Evaluator identified by the CDB with the three-general criteria; degree to which the Project was logical and adequate, its performance and its success as shown in Table 4 below.

Table 4: Project Evaluation Criteria

Monitoring and Evaluation	Criteria
Relevance: Degree to which the objective of the project is relevant to resilient agriculture with climate change and climate variability in Saint Lucia	The design of the project and its adequacy. Was there a logical approach to project planning and implementation**.**
Performance The progress that is being made by the Project relative to the objective	Efficiency- Was the project planned and undertaken in a cost-effective manner and was the best options and selected for the expected outputs.

	Effectiveness-Were the assumptions and risks identified on target and will the expected outputs/activities produce the results/outcomes Timeliness - Were the outputs timely of the expected quality/quantity relative to the expected outcomes.
<u>Success</u> The extent to which the project has brought about change	Impact – How have the project outcomes impacted the objectives of each component and overall towards resilience to climate change Sustainability- Are there indicators of project sustainability and can they be described

E. **Include a results framework for the proposal, including milestones, targets and sex-disaggregated targets and indicators as appropriate. The project results framework should align with the goal and impact of the Adaptation Fund and should include at least one of the core outcome indicators from the AF's results framework that are applicable**

OUTCOME	Outcome Indicators	Baseline	Target 2020	Target 2023	Means of verification	Assumptions and Risks
Component 1. Building resilience and sustainability in farming systems through interventions for water security, soil conservation and management.						
1. Increased farm productivity with improved livelihood security and incomes and new farm areas brought under production in the project areas.	**1.2)** Percentage change in total number of targeted farms recording improved levels of production including from new areas brought under production and of level of reduced losses and damage from climate change and climate variability events.	**1.3** Low adaptive capacities for building resilience in farming systems to adapt to the vulnerabilities to droughts and intense rainfall on slopes and susceptibility to land slips, debris flow and soil erosion. **1.3.1**.1No baselines program in the DAFNC for capacity building and transfer for DRRM and DRR on slopes.	**1.4** Revised baseline for adaptive capacities available from inventory and needs assessments of targeted farmer households and DAFNC. **1.4.1** Overlay maps of farms and landslips, agreed sites for RWHS and landslips treatment available and 50 percent of targeted DAFNC with adaptive capacities. **1.4.2** 30 percent of targeted farms, with improved adaptive capacities evidenced by treated sites.	**1.5** 100 percent of targeted farmlands with DRRM treatment to reduce vulnerability to risk from landslips and water shortages guided by EIA and EMP. **1.5.**100 of targeted area of for new lands brought under production. **1.5.2** Six monthly farm records showing improved farm income. **1.5.3** 100 percent of targeted DAFNC staff with improved adaptive capacities actively involved in CCA using FFS.	**1.6** Reports of regular assessments of land slips and soil erosion after intense rainfall events, and reduction in losses on the farms. **1.6.1** Reports of numbers of targeted farmers recording change in size of plots of the individual farms and production data. **1.6.2** Reports of sessions and participation by gender and youth.	**1.7** No major natural disaster **1.7.1** Farmers willingness to collect farm production data **1.7.2** Farmers willing to provide data on incomes.

Component 2. Integration of renewable and other energy efficient practices in intensive production value chains						
2.1 Increased productivity and efficiency in resilient small farming systems with improved livelihood security income generation through enhanced production practices and value chains.	**2.1.1** Percentage change in farm productivity, number and type of diversified value chains by gender and youth, percentage change in participation in domestic supply value chains.	**2.1.2** No reports of solar power in farming systems; low yields; low capacity to participate in domestic supply fresh, gluts, declines in agriculture GDP, widening rural urban poverty gap.	**2.1.3** 30 percent of targeted farmers on 12 hectares of intensive production sites with built resilience to CC integrated with solar power for enhanced production practices.	**2.1.4** 100 percent of targeted farmers on 30 hectares of intensive production with built resilience to CC and CV integrated with solar power for enhanced production practices in crops , livestock and aquaculture.	**2.1.5** Six monthly reports including surveys of selected households.	**2.1.6** Markets are sustained and importers maintain an interest in larger purchases from local production.

	Outcome Indicators	Baseline	Target 2020	Target 2023	Means of verification	Assumptions and Risks
Component 2. Integration of renewable and other energy efficient practices in intensive production value chains.						
2.2 Increased productivity and efficiency in resilient small farming systems with improved livelihood security income generation through enhanced production practices and value chains.	**2.2.1**.Numbers of persons and percentage change in incomes disaggregated by gender and youth participating in diversified agro-processing value chains powered by solar energy.	**2.2.2** None	**2.2.3** Enhanced efficiency in secondary production value chains in HACCP certified agro-processing facility powered by solar with access by small-scale processers including those among the most vulnerable and marginalized households in the country.	**2.2.4** Enhanced efficiency in secondary production value chains in HACCP certified agro-processing facilities powered by solar with access by small-scale processers, including those among the most vulnerable and marginalized households and with ease of access to 70-100 small farmers in intensive production systems.	**2.2 5** Reports from planned six monthly and annual data collection.	Good weather conditions.

Component 3: Knowledge management and transfer for capacity building to improve institutional and local level adaptive capacities						
3. Established information and communication systems for improved adaptive capacities to build resilience in small farming systems for livelihood security, income generation and greater awareness	**3.1.1** Number of persons disaggregated by gender and youth actively displaying improved adaptive capacities for climate adaptation at the institutional and local levels	**3.1.2** Weak at all levels	**3.1.3** Number and type of capacity building sessions undertaken with DAFNC staff and in farming systems **3.1.3.1** Systems in place for data capture and analysis of built resilience and limitations on CCA practices and lessons learnt contributing to on-going resilience in farming systems for livelihood security.	**3.1.4** Number and type of capacity building sessions undertaken with DAFNC staff and in farming **3.1.3.2** Number of strategic policy and strategy or action plan documents prepared and social organizations formed for contributing to on-going resilience.	**3.1.5** Six monthly and annual Reports **3.1.3.3** Six monthly and annual Reports	Good weather conditions Staff and farmers continue to be available

OUTPUTS	Output indicators	Baseline	Target 2020	Target 2023	Assumptions and Risks
Component 1 **1.1** Reduced landslips, restrained debris flow and soil erosion on farms	**1.1.2 Overlay** Maps of farming areas and landslips in the targeted area and codes for treatment.	**1.1.3** Less than 1 percent of farmers in project area planting on contours with cross drains only visible treatment.	**1.1.4** Update landslip maps and farm overlay maps created and DRRM codes from vulnerability analysis in participatory approach with . 100 CDRM field days and workshops in six built training and demonstration facilities.	**1.1.5** DRRM measures completed across 1000 hectares in 600 CDRM field days and workshops and 1000 technical leaflets disseminated in the project area	**1.1.6** Active farmer participatory approaches utilized No major natural disasters, effective farmer participatory approaches
		1.1.4.1 Limited	**1.1.4.2** 1500 targeted farmers trained in building resilience in soil through production and utilization of compost, mulch, fertilizer teas, vermicomposting	**1.1.4.3** Targeted 2400 farmers trained in capacity building for resilience in soil.	
1.2 Access to on-farm water from RWHS and bare slope catchment with drip irrigation integrated with built soil resilience using compost and other organic material	**1.2.1** Number and type of RWHS established and the number of capacity building workshops and field days for water management for water use efficiency	**1.2.1.2** Estimated 70 percent entirely rainfed and mostly on hillside, another estimated 20 percent rainfed and supplemented with water pumped or carried from the river	**1.2.1.3** Needs assessment conducted (disaggregated by sex, youth, subsector), area mapped and water security for 20-60 farmers on 30 hectares from slope catchment and 30 on-farm (clusters of 2-3 farmers) rooftop RWHS rain with drip irrigation	**1.2.1.4** Slope catchment with drip irrigation for 40-60 fully functional and 90-100 on-farm rooftop RWHS with drip irrigation, on 200 hectares and the two main seedling nurseries and standalone community systems for small livestock	**1.2.1.5** National Water Users' Group established and active Farmers are available for training sessions
	1.2.2 Six monthly farm household surveys of income, employment and perception of change in livelihood security	**1.2.2.3** None for farmers	**1.2.2.3** 75 participatory workshops for extension officers and farmers	**1.2.2.4** 105 participatory field days and workshops for 300	**1.2.2.5** Farmers willing to provide supplementary labour at established labour rates for farm work

OUTPUTS	Output indicators	Baseline	Target 2020	Target 2023	Assumptions and Risks
			1.2.2.3.1 Two surveys conducted	farmers conducted by agriculture extension officers on water security. **1.2.2.3.2** Minimum of six surveys conducted providing	as an incentive for time diverted from currently active source of income generation on the farm

OUTPUTS	Output indicators	Baseline	Target 2020	2023	Assumptions and risk
Component 2 **2.1** Two climate resilient intensive production sites integrated with climate change adaptation practices and renewable energy.	**2.1.1** Water security and built resilience in soil for crops, livestock and aquaculture and evidence of integrated power from solar in the production chains	**2.1.1.2** Less than 1 percent of small farmers using energy from fossil fuel.	**2.1.1.3** Estimated 12 hectares established and estimated 20-30 farmers in full production **2.1.1.3.1** Land management improved through land drainage and aquaculture ponds in disuse desilted, lined and fully functional with diversified value chains.	**2.1.1.4** Estimated 30 hectares established and an estimated 70-100 farmers covering all three subsectors in production , **2.1.1.3.2** Farmers including youth in aquaculture actively involved in farmers with improved production and diversified value chains	No major natural disasters No major natural disasters
			2.1.1.3.1.2 Three open outdoor facilities, for production, utilization and capacity building for adaptive capacities for resilient farming,	**2.1.1.3.1.3** Total of eight facilities completed and fully operating across the two intensive production areas	No major natural disasters
	2.1.2 Greenhouse using aquaponics systems and solar energy with higher levels of productivity, production and competitiveness in fresh food supply chains	**2.1.2.1** Limited to aquaponics using commercial fish feed	**2.1.2.2**Three greenhouse with aquaponics systems with solar energy for cooling, and for pumping water	**2.1.2 3** Sixteen greenhouses aquaponics systems with a total of eight solar fans for cooling, and for pumping water	
	2.1.3 Report of 140 workshops and field days providing capacity building in estimated 1000 farmers through	**2.1.3.1** None	**2.1.3.2** Practical demonstrations of improve adaptive capacities for CC and CV and greening in	**2.1.3.3** Practical demonstrations of improved adaptive capacities greening over a total of 30 hectares of contiguous small farms on two sites for 70 -100	Drainage and , desilting undertaken in low lying areas and ponds in the west ,south west.

	the activities on the two production sites.		(cropping systems for IPM and resilience in soil building, solar in greenhouses and climate smart in -house practices for small livestock on 12 hectares	small farmers in three subsectors including five aquaculture ponds desilted and lined for climate resilience.	

OUTPUTS	Output indicators	Baseline	Target 2020	Target 2023	Assumptions and risk
2.1 Two climate resilient intensive production practices sites integrated with climate change adaptation practices and renewable energy	**2.1.5** Farm tours promoted linked to the agri-tourism recreation.	**2.1.5.1** Limited to tours on large farms	**2.1.5.2**Two kiosks completed for gastronomy input to the farm tours product linked to the aquaculture ponds	**2.1.5.3** Four kiosks completed and YAEP youth trained in and agri-business in fish marketing and gastronomy	Tourism sector continues to grow and farm tours remain vibrant.
2.2 Two HAACP certified agro processing production, training and certification facilities using renewable energy established on two sites for post-harvest handling of fresh and processed foods	**2.2 .1** Inception and six monthly reports of numbers of persons disaggregated by gender and youth benefitting from the agro-processing facilities and **n**umber of production hours and number receiving certification	**2.2.1.2** None using renewable energy and no facility specifically benefitting small farmers and vulnerable and marginalized persons dependent of selling small fresh or initially processed packages for livelihood.	**2.2.1.3**.Inventory of small scale agro processors completed, and implementation work plan confirmed **2.2.1.3.1** One solarized agro-processing facility in production and capacity building **2.2.1.3.2** Estimated 40 persons trained in agro-processing facility	**2.2.1.4** Two solarized agro-processing facility in production and capacity building for different value chains and using HACCP practices **2.2.1 .5** 300 small-scale agro-processers using fresh produce space on a regularly and 100 percent of the Saint Lucia Network of Rural Women benefitting from the services	Agro-processers will show interest in certification for greater benefits from labelling marketability of the products Market for small sized packages of fresh and initially processed farm products for livelihood of women and rural youth remain vibrant.
	2.2.2 Report of six monthly and annual	**2.2.2.1** None	**2.2.2.2** Household survey of beneficiaries with positive change in incomes and employment generation and improved security	**2.2.2. 3** Household survey of beneficiaries with positive change in livelihood security,	All SLNRWP members will make the time to benefit

	household surveys (questionnaires) on income and employment generated specific to farm households		of livelihood, inclusive of 70 targeted SLNRWP women	incomes, and employment generation inclusive of all 70 targeted SLNRWP women	from the training and will organize to make full use of the production space.

OUTPUTS	Output indicators	Baseline	Target 2020	2023	Assumptions and risk
Component 3 **3.1** Baselines and capacity building for adaptive capacities	**3.1.**1 Design of a friendly survey instrument with support of Department of Statistics and DMS to capture data (rainfall data and selective social data at household level in the project area) for integration into production data resulting from the project activities available . **3.1.2** DMS issuing agriculture drought alerts and other agriculture EWS advisories also available on- line **3.1.3** Documented climate change and climate adaptation data and lessons learnt easily accessed by the different beneficiaries **3.1.4 N**umber and type of technical programs for capacity building to build adaptive capacities in the DAFNC	**3.1.2** Not available Downscaled data not available for farming systems **3.1.2.1** None **3.1.3.1** None **3.1.4.1** None **3.15.1** None	**3.1.3** Baselines of need assessment for building adaptive capacities to reduce vulnerabilities farming households to CC and CV in project area appropriately undertaken and properly assessed and a capacity building program being undertaken **3.1.2.2.** Agreement in place for DMS and Department of Statistics to collaborate finalized. **3.1.3.2.**Data Management and information system in DAFNC redesigned for input of CC, CV and CCA data and a web portal for greater awareness **3.1.4.2** Six technical workshops and field days for DEAS staff to build adaptive capacities for knowledge transfer	**3.1.3.1** At least five six monthly updates through focus groups and rapid appraisal on adaptive capacities, livelihood security, incomes, employment in beneficiaries undertaken and entered in database**.** **3.1.2.** Data management system for climate change adaptation to build climate resilience in agriculture fully functional including online services **3.1.3.3** Data Management and information system in DAFNC providing support for learning instruments to build adaptive capacities for on-going resilience **3.1.4.3** Ten technical workshops and field days for all extension staff in awareness and to build adaptive capacities for knowledge transfer	Communities will be willing to provide data Rainfall stations in project area are managed.

	3.1. 5 Number of policy officers in the DAFNC trained		**3.1.5 .2.** One five day policy workshop for DAFNC staff to conduct economic analyses of impacts of the CCA of the project	**3.1.5.3** Two five days workshops to assess adaptive capacities in economic analyses of climate adaptation	

OUTPUTS	Output indicators	Baseline	Target 2020	2023	Assumptions and risk
<u>Component 3</u> **3.2** Two Climate Change Interpretation Learning and Centres, .	**3.2.1** Rehabilitated building in Region7 (west south west) and at the agro-park site in the north completed fitted with solar energy and space for learning centres **3.2.2** Reports of quarterly activities in the CCILLC and of visits to climate change the learning and interpretation centre (CCILC) in Region 2 **3.2.3** Number of events and participation disaggregated by gender and youth	**3.2.1.1** No such facility available **3.2.2.1** None **3.2.3.1** None	**3.2.1.2** CCILLC of floor space to accommodate (**i)**two 10x10 climate control grow rooms (**ii**)Conference area fitted with requirements to host meeting of- 50 persons (**iii**) walls that will support graphics, photographs and other exhibits of built adaptive capacities and social and environmental resilience at different levels in the project area **3.2.2.2** At least two quarterly reports on activities in the CCILLC **3.2.3.2** Planning Committee in place to undertake First Biennial CCA Competition	**3.2.1.3** <u>CCILC</u> established in facility the agro-park in north eastern part of the project area (Region 2) with floor space to host reception area and conference room **3.2.2.3** CCILLC and CCILC established and fully functioning providing information on resilience in farming systems and on drought resistance in local crop varieties, **3.2.3.3** 3000 persons passed through the production areas and CCILLC and the CCILC, with greater awareness of CC and CV **3.2.3.1.1**Two Biennial Climate Change and Climate Adaptation Competitions.	Buildings completed on time Farm tours continue to be vibrant Quality of presentation of value to scientists and farmers with interest resilient farming productivity and livelihood security

F. Alignment of Project with AF Objectives – Results Framework

Project Objective(s)	Project Objective Indicator (s)	Fund Outcome	Fund Outcome Indicator	Grant Amount in USD
To build resilience in agriculture for livelihoods security through enhanced adaptive capacities for climate change and climate variability.	Number of persons (disaggregated by gender- and youth) and whose social and environmental resilience has improved through improved adaptive capacities to respond to adverse impacts of climate change and climate variability on agro-ecosystem resources (land, landslips soil and water shortages)	Outcome 5. Increased ecosystem resilience to climate change and variability	5. Ecosystem services and natural assets maintained or improved under climate change and variability.	**8,560,659.28**
		Outcome 3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1 Percentage of targeted population aware of predicted adverse impacts of climate change and of appropriate responses	
		Outcome 6. Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.2 Percentage of targeted population with sustained climate-resilient livelihoods 6.1 Percentage of households and communities having more secure access to livelihood assets	
		Outcome 7: Improved integration of climate- resilience strategies into country development plans	Outcome 7:1 Climate change priorities are integrated into national development strategy	

Project Objective(s)	Project Objective Indicator (s)	Fund Outcome	Fund Outcome Indicator	Grant Amount in USD
Project Outcome(s)	**Project Outcome Indicator (s)**	**Fund Output**	**Fund Output Indicator**	**US$**
1Increased farm productivity with improved livelihood security and incomes and new farm areas brought under production in project area.	**1.1**Areas of farmland with reduced vulnerability to landslips and improved water security with farmers showing improved adaptive capacities for resilient farming practices on hillsides, water use efficiency and DRR practices that improve livelihood security, food security and income generation	Output 5. Vulnerable physical, natural and social assets strengthened in response to climate change impacts including variability	5.1 Number and type of natural resource assets, created, maintained or improved to withstand conditions resulting from climate variability and change (type of assets)	**2,951,982.00**

Project Outcome(s)	Project Outcome Indicator (s)	Fund Output	Fund Output Indicator	US$
2. Increased productivity and efficiency in resilient small farming systems with improved livelihood security, incomes and employment generation through enhanced production value chains.	2.1 Small farmers established on intensive production climate resilient sites integrated with renewable energy for efficiency and greening in reliable and competitive value chain from production to processing.	**2.1.1** Output 3. Targeted population groups participating in adaptation and risk reduction awareness activities **2.1.2** Output 6 Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	**2.1.1.1** Output 3.1.1 Number and type of risk reduction actions or strategies introduced at local level **2.1.2.1** Output 6.1.1 No and type of adaptation assets (physical as well as knowledge) created in support of community livelihood	**2,623,814.00**
3. Established information and communication systems for improved adaptive capacities to build resilience in small farming systems for livelihood security and income generation and awareness.	Knowledge management instruments for capacity building strengthened or created with improved adaptive capacities at all levels and groups in the farming systems. New or improved policies or strategy documents prepared with contribution to improved climate resilience in agro-ecosystems with impacts from hydro-meteorological events in agriculture reaching the rural communities in the country most vulnerable to climate change and variability	Output 3. Targeted population groups participating in adaptation and risk reduction awareness activities Output 7: Improved integration of climate-resilience strategies into country development plans	3.1.1 Number and type of risk reduction actions or strategies introduced at local level Output 7.1: Number, type and sector policies introduced or adjusted to address climate change risks.	**1,679,000.00**

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

Budget and Notes

Investment Category	Activities	Total AF US$	Notes
Building resilience and sustainability of farming systems through interventions for water security, soil conservation and management	1.1 Conduct vulnerability analysis, update landslip maps, conduct inventory of farms and prepare overlay farm maps, establish codes for DRRM treatment and FFS to build climate resilience in farming systems Update maps.	**790,000.00**	Primarily in Region 6 and 7 with 13 watersheds, with multiple landslips, history of loss of lives, estimated 500 farms over an estimated 1000 hectares of farmland to be addressed. Based on the scars of the landslips, need to restrain, divert and trap debris flow to rivers internal paths and roads to the farms as well which often become blocked, and prevent farmers reaching the farms after intense rain events the cost of inputs and labour is expected to expensive. This activity will be supported by a local expert in Vulnerability and hazard risk analysis and capacity building for 300 days @300US per day over three years (see TOR) and guided by the EIA/EMP
	1.2 Establishment of 90-100 on-farm RWHS, estimated 200 hectares. with drip irrigation for an estimated 800 crop farmers and an estimated 150 livestock farmers	**1,072,000.00**	Drip irrigation infrastructure US$3000 /ha (600,000)and RWHS at US$ 4,000 installed (100x4000 =(400,000) plus conveyance on estimated 200 hectares (16000). Standalone tanks (70,000 gallons) 4x $8,000(32,000) ;10 mobile tanks x$400 (4,000) Pumps x 2 (20,000).
	1.2.1 Design and construction of infrastructure for slope harvesting in La Bourne Region 1&2 and drip irrigation for 30 hectares. Forty-sixty mix farmers will benefit including youth and women	**375,982**	Requires excavation –mini dams, ponds, minor concrete works, silt traps, back filling. Already fitted with soil probe, water level recorders, soil gauge. 30 ha. drip irrigation at US$3000per hectare, 50 storage tanks x$4000 and ARCGPS Software (US$ 10,000).
	1.3 Construction of six outdoor facilities for production and practical demonstration of soil building material over an estimated 200 hectares of farm land	**60,000.000**	Beneficiaries will vary in the access to water and landslips which will be provided based on the need assessment. However, all farms in the project area will have access to training and utilization and the soil building material produced in the six facilities (6 x10,000)
	1.5 Capacity building and training	**200,000.00**	Includes material for the compost building, green material and worm culturing.

	1.6 Tillers and other small farm equipment for hillside farmers	**100,000.00**	
	1.7 Two Vehicles to transport the two teams	**40,000.00**	These vehicles are absolutely necessary as the team will not have full time access to any other vehicles

Investment Category	**Activities**	**Total AF US$**	**Notes**
Component1: Building resilience and sustainability of farming systems through interventions for water security, soil conservation and management.	1.8 Contract labour for landslide rehabilitation activities at $37 per day; incentives for farmers estimated 500 farmers @ $37 per day	**270,000.00**	Building drains, contours , tree planting, gabion baskets and dams, restraining barriers etc. Payments made on completion of job. Estimated as 10 days required from each farmer (5000x$37) plus contract labour at same rate to undertake treatment on the farm and additional funding for areas outside of the boundary of the farm that pose a threat to the farms through landslips and debris flows.
	1.9 Restoration of grassland for use in DRRM for landslips on hillsides and for activities of the SLNRWP	**10,000.00**	This activity will be undertaken by the DOF Restoration is necessary to provide planting material for grass barriers on hillsides in DRRM and for craft (top of plant) and cosmetics and oils (from the roots) 16X2500X48 ECD
	1.10 5 RWHS for cocoa production areas for SLNRWP and soil building support	**34,000.00**	5x 4000 for RWHS; 3 hectares x 3000 for drip irrigation and 5 pumps x1000 plus soil building and other agronomic support
Subtotal Component 1		**2,951,982**	
Component 2: Integration of renewable and other energy efficient practices in intensive agriculture value chains	**2.1** Internal access roads, parking, signage, drainage and fencing the area of 14 hectares	**50,000.00**	One green agro-parks using intensive production practices integrated with renewable energy established in the west south west on 14.4 hectares . Internal access, parking and signage to accommodate farm tours.
	2.1.1 Install 6 collapsible greenhouses with (aquaponics) systems and RWHS and drip irrigation Solarisation (25 kWp Solar PV Systems and one 5 kW inverter with battery back-up for each)	**238,614.00**	2 collapsible greenhouses (30ftx60ftx10ft) @ $7,407 4 collapsible greenhouses installed with solar cooling at US 49,000 (196,000) 3 RWHS storage tanks with drip irrigation @$4000 installed plus drip irrigation and conveyance, timers and tensiometers (5,000); 12 aquaponics tanks with lining at $400 and filters and 3 pumps x$1000 plus land preparation (3000)

			Imported greenhouses with cooling and installation would be at a cost of US$122,000.00
	Land preparation	**5,000.00**	5 hectares at 1000.00 per hectare

Investment Category	**Activities**	**Total AF US$**	**DAFNC in kind Contribution US$ Notes**
Component 2 Integration of renewable and other energy efficient practices in intensive agriculture value chains.	**2.1.1.2** RWHS and drip irrigation an estimated 5 hectares of open field	**47,200.00,**	Five RWHS installed at $4000 installed;(5X3000) for drip irrigation plus tensiometers and timers (16 tensiometers and 16 timers) $1200 and conveyance/lines (6000) plus 5 pumps x1000
	2.1.1.3 Build four outdoor facilities for soil building production and utilization demonstration	**50,000.00**	Construction of four outdoor facilities for production and utilization of soil building material 4 x 10,000 plus machinery and implements for training
	2.1.1.4 Establishing systems in livestock (goats) with protein banks and in-house feeding and watering	**200,000.00**	Climate adaptation practice promoted by FAO and IICA and World Bank Climate Change Portal for unfavourable weather, energy conservation, water use efficiency and feeding. Two climate smart in house feeding facility built
	2.1.1.5 Upgrade of five aquaculture ponds	**300,000.00**	Includes procurement at US$51,000.00 each and additional cost for desilting of ponds and installation of the lining.
	Subtotal –Region 7 Production area	**890,814.00**	
	2.1.2. Region 2 Second agro-park established on 20 hectares Prepare site map and site for the establishment of production areas, building for agro-processing facility, offices and climate change interpretation and learning centre and kiosks for to accommodate farm tours	**40,000.00**	DAFNC through the PMU and with the necessary support of the Ministry of Infrastructure will undertake these activities

	2.1.2.1 Fencing and internal roads and external works	**100,000.00**	This production area is an estimated 3 hectares of greenhouses with aquaponics and also being promoted as part of the farm tour income generation product. The area will therefore have internal access roads and kiosks at strategic points to allow visitors to taste the fresh produce, particularly vine fruits and tree crops and to view the farming activities.
	2.1.2.3 Ten collapsible greenhouses with 10 aquaponics system, 5 RWHS, irrigation with drip and solar pump, tensiometers, timers and pumps growing leafy vegetables (with solar for cooling for 4 at a cost of US$ 49,000 each)	**267,000.00**	The locally built greenhouses have been well-tested in Saint Lucia. They have a life expectancy of two years and will offer the opportunity to train a cadre of small farmers in the construction of these greenhouses. Imported greenhouses of the same size and life expectancy with cooling and installation cost US$122,000.00

Investment Category	**Activities**	**Total AF US$**	**Notes**
Component 2 Integration of renewable and other energy efficient practices in intensive agriculture value chains.	**2.1.2.4** Twelve hectares of intensive open field production of estimated 30- 35 small farmers established in crops and livestock and support with small machinery.n	**100,000.00**	Farmers already on the site will be encouraged to grow selected commodities for a coordinated approach to production planning and marketing with a view to reducing the high food import bills. All farmers operating on the site will be required to use climate adaptation practices and other GAPs.
	2.1.2.5 Total of 6 RWHS with pumps for open field in open field and with drip irrigation for the crops.	**72,000.00**	6 RWHS at 4000 ($24 ,000); 12x3000 (36,000) for drip irrigation, timers and tensiometers (6000) and 6 pumps (6,000) for open field
	2.1.2.5.1 Provision for water for livestock from 2 RWHS.	**10,000.00**	2 RWHS (2 x 1000 pumps) for livestock and tree crops.
	2.1.2.5.2 Land preparation	**9,000.00**	Land preparation at 750 per hectare
	Construction of **fou**r outdoor facilities with space for on farm and community-based production and practical demonstrations in soil building for resilience with climate change and climate variability	**45,000.00**	Production of compost, fertilizer teas, vermi-composting and mulch for land management and soil building for climate resilience and one structure for vermi-culture to grow worms for the aquaponics and the vermicomposting.
	Operations (maintenance of grounds, parking areas, internal roads, kiosks	**200,000.00**	
	Subtotal – Region 2 Production area	**843,000.00**	

	2.2 Establish one green HACCP certified agro-processing facility to accommodate 15 persons for training and for small scale production at Region 2	**420,000.00**	Building to house the agro-processing facility ; office space for a manager and reception area/learning centre. Building cost 250, 000; solarisation (installation of 25 kWp Solar PV System (150,000) plus back -up batteries at 1300 each x 3.

Investment Category	**Activities**	**Total AF US$**	**Notes**
Component 2 Integration of climate adaptation practices including renewable energy and other energy efficient practices in intensive agriculture value chains	**2.2.1 Equipment and operation's for Region 2**		**The facility will provide the regular equipment required for agro-processing**
	Regular agro-processing activities equipment	**40,000.000**	Stoves, refrigerators, utensils, blenders etc.,
	SLNRWP Women cocoa producers and processing	**10,000**	Special equipment provided for SLNRWP processing of cocoa into chocolate
	2.2.3 Operations related to the agro-processing facility at Region 2	**100,000.00**	Budget is to cover at least two years of activity before the project termination date.
	2.2.4 Operations of office and learning centre and other services – Region 2	**100,000.00**	Budget is to cover the last two years of the project.
	2.3 Equipment and operations for agro-processing facility at Region 7		**Operations over 3 years**
	Regular agro-processing	**50,000**	. Stoves, refrigerators, utensils, blenders etc.,
	Agro-processing for SLNRWP in cocoa production and processing	**20,000**	As for Region 2 cocoa processing require special equipment. The group involves 70 women in small scale processing
	2.3.1 Operations related to the agro-processing facility	**150,000**	Budget to cover an estimated 3 years assuming facility will be ready at the beginning of year 2
	Agro-processing	**890,000.00**	
Subtotal Component 2		**2,623,814**	

Investment Category	Activities	Total AF US$	Notes
Component3: Knowledge management and transfer to improve adaptive capacities.	**3.1** 705 Field days and workshops in efficient management and maintenance of the RWHS and irrigation systems and efficient use of water and in building resilience in soils including data collection and monitoring for better farmer appreciation.	**285,000.00**	Field days and workshops in water and soil building at average 705 x $900 (235,000) for components 1&2 Under Component 2: 100 field days/workshops average $500.00 ($50,000)
	3.2 Workshops and sessions in community building and organizational approaches for ownership	**20,000.00**	Under Component 3 ten sessions at an average cost of $2 000.00 (20,000)
	3.3 Farmer field school approaches in climate adaptation monitoring	**30,000.00**	Forty field days
	3.4 Training in standards and technical guidelines for agro processing	**60,000.00**	28 sessions at an average cost of $2000 each
	3.5 Training of staff /guides on climate awareness and methodologies to transfer knowledge and understanding on climate awareness	**20,000.00**	In support of agro-tourism linkages with the project. Training will be as necessary but will be onsite
	3.6 Capacity building in economic analyses of the impact of climate change on agriculture crops	**20,000.00**	Under contract with IICA/UNECLAC or FAO To cover 20 days plus air plus per diem in two visits
	3.7 Capacity building of DAFNC staff in climate change adaptation, awareness and resilience	**5,000.00**	In collaboration with SALCC-Farm School

	3.9 Preparation of policy brief on land-use to protect concrete built resilience in agriculture and to prepare an Agriculture Disaster Management Plan	**20,000.00**	To be undertaken with support of local consultants
	3.10 Operations	**70,000.00**	Computers, paper printers, ink, desks and other support
	3.11 Web portal	**9,000.00**	Web portal linked to the DAFNC website. Cost is to develop material for website dedicated to building resilience in the agriculture sector

Investment Category	**Activities**	**Total AF US$**	**Notes**
Component3: Knowledge management and transfer to improve adaptive capacities.	**3.12** Database	**20,000.00**	DAFNC master data base to be redesigned to be more farmer friendly in accessing data collected by the DEAS and making provision for management of climate change and climate adaptation data and lessons learnt.
	3.13 Laboratory equipment to measure to control temperature, soil water capacity, fertility, irrigation control, CO2, gr0wers computers and other office equipment	**120,000.00**	Includes graphic's and learning material for walls of conference room equipment, chairs microphones, screens etc., facility for cafeteria/snack room/lunch room
	3.14 Rehabilitation of building to host all knowledge management and agro-processing facility and training rooms for farmers	**700,000.00**	Cost provided by the Ministry of Infrastructure Includes all external works, electricals and drainage (Appendix 3)
	3.15 Solarisation of the building	**200,000.00**	25k W Solar PV System installation (150,000) Back up batteries (3x 1300)
Subtotal Component 3		**1,679, 000.00**	
Total		**7,254,796**	
Project Execution		**689,205.62**	
NIE		**616,657.66**	
GRAND TOTAL		**8,560,659.28**	

Projected Calendar			
Milestones			Expected dates
Start of Project/Programme Implementation			October 2019
Mid-Term Review (planned)			March 2021
Terminal Evaluation			September 2022
Project Program (Closing).			May 2023

H: Indicative Implementation Chart 2019-2023

Building resilience and sustainability of farming systems through interventions for water security, soil conservation and management																			
Output 1	Activities	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	Milestone indicator	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	Milestone indicator	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	Notes
1.1	Review Component and prepare Annual Work Plans									Work plan					Revised Work plan					DAFNC /PMU
1.2	Conduct farm inventory and needs assessment for adaptive capacities; vulnerability analysis and water security.									Inventory and maps completed										
	Prepare updated map land slippage focussing on Regions 6 overlay maps of farms and sites/clusters for improved water security.									Maps of landslips and overlay farm map					Report of maps fully in use					
	Initiate process to procure RWHS systems and Two ARCGPS Software									Procurement order					ARCGPS in use					
	Six facilities for production and utilization completed									Three facilities completed					Six facilities completed					

	Capacity building in production and utilization of soil building material at selected facilities on selected days									200 farmers participating					550 farmers reached					Target is 750
	Workshops and on-farm demonstrations and activities on land management and soil erosion control to reduce landslips									40 field days and					500 field days sessions held					Target is 60-100 sites
1.1.2	Field day to launch program on CCA practices in land management and soil erosion control									Report of event										
1.2	Workshops and on-farm demonstrations on installation of RWHS, drip irrigation and soil building									27 RWHS and drip					65 RWHS with drip					Target is 90-100 RWHS and drip covering about 220 hectares

Annual work plan

Inventory and mapping

Building adaptive capacities in land management

Community based capacity building

Procurement

Field day Launch of CCA for Land Management

Integration of renewable and other energy efficient practices in intensive agriculture value chains																					
Output 2	Activities	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	**Milestone indicator**	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	**Milestone indicator**	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	Collaborators with PMU and Notes
2.1	Review Component and agree on Work plan									Work plan										
2.2	Prepare site plan for building, food production area and visitor parking									Site plan approved										Approval from Infrastructure
	Rehabilitate building with provision for installation of RE, rooftop RWHS, agro-processing facility other services in floor plan									Building approved										Agro-processing facility& other services in floor space plan
	Undertake drainage works including clearing of the river mouth and RWHS of overflows									Drainage complete										
2.3	Inventory of farmers already on the site including youth in aquaculture and farm plan									Report of inventory										
	Establish infrastructure for 9 RWHS and drip irrigation for 5 hectares of production (open field and 6 greenhouses), and 2 facilities for in-house feeding for goats									RWHS and irrigation established										
	Install 6 greenhouses (6 aquaponics tanks) with 3 RWHS, and pumps and cooling fans														6 Systems installed					4 greenhouses solar cooling fans
	Upgrade 5 aquaculture ponds at agro-park														5 ponds upgraded					

	15-20 farmers on site fully involved in climate resilient farming practices									Farmers and farm plans					15-20 active farmers					
2.4	HACCP- Agro-processing facility offering technical training and production space									Approved facility					Persons 45 benefitted					28 sessions x15 beneficiaries
	Design for learning and interpretation Centre and laboratory approved																			
	Official opening of agro-park Region 7																			
2.5	Site plan for green agro-park in 2 and facilities completed (agro-processing facility with RE, and 4 outdoor soil building facilities									Site plan approved					Facility d fully functional					
	15 RWHS and irrigation established for 18 hectares including 10 green houses with aquaponics, pumps and including 4 cooling fans.									Production infrastructure in place					50 farmers in production					4 greenhouses with solar cooling fans and tanks for aquaponics
	Workshops and field days in green agro parks in intensive farming integrated with CCA									Training program					100 w/shops					Target of 100 sessions
	Official opening of green agro-park at 1&2																			

Annual work plan

Establish agro-parks

Capacity building

Knowledge management and transfer to improve adaptive capacities																			
Output 3	Activities	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	**Milestone indicator**	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	**Milestone indicator**	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	Notes
3.1	Baselines established on adaptive capacities									Report of baseline										
3.2	Program prepared and delivered to train DAFNC staff (economists and extension staff)									Copy of program for awareness					Report of 10 days session on economic analyses					
3.3	Training and capacity building for SLNRWP in cocoa processing into chocolates									30 women trained					70 women trained					
3.4	Arrangements in place for reading of all rainfall stations and WRMA and DMS providing downscaled rainfall data.									Rainfall data					Rainfall data					
3.5	Data database for CC in agriculture created and incorporated in redesigned DAFNC master database including production data, lessons learnt, technology packages, videos and other training material									Data base in place					Learning material available					
3.6	Website portal for climate change and														Website up					

	climate resilience in agriculture incorporated in MOA website																			
3,7	Activities to support the learning and interpretation Centre and laboratory in Region 7 agreed on														Material available					
3.8	Organizational building for National Agro-processers Association for Women, small-scale agro processers and water users groups, Producer Cooperative and community-based CCA groups,									Report of 3 sessions to initiate process					Minutes of 3 meetings of organizations					.
3.9	Support Producer Cooperative to manage the production areas									Report of capacity building meetings					Registration and articles of the Association					

Baselines for adaptive capacities

Knowledge management process

Capacity building

I: Project Management Unit – Operations - Procurement Chart

Components	Activities	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	**Milestone**	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	**Milestone indicator**	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	**Budget**
1.1	Procure ARCGPS Software for vulnerability analysis									ARCGPS										**10,000**
1.2	Procure equipment to establish bare slope RWHS									receipts					receipts					**375982**
1.3	Procure irrigation infrastructure with drip for 200 hectares of farmland									receipts					receipts					**60,000**
PMU	Procure agro-processing manager for Region 7 and Region 2									receipts					receipts					**60,000 (7)** **30,000 (2)**
2.2	Procure 25 RWHS 30,000 gallons' storage tanks									receipts					receipts					**120,000**
2.2	Procure 50 RWHS storage tanks									receipts					receipts					**240,000**
2.2	Procure 25 RWHS storage tanks									receipts					receipts					**120,000**
3	Procure 9 RWHS for agro-park in 7									receipts					receipts					**36000**
3	Procure 6 greenhouses for agro-park in 7									receipts					receipts					**42000**
3	Procure lining for five aquaculture ponds									receipts					receipts					**255000**
3	Procure 15 RWHS for agro-park in 2									receipts					receipts					**50,000**
3	Procure 10 greenhouses for agro-park 2									receipts					receipts					**75,000**

3	Equipment for agro-processing facility at 7 and at 2									receipts					receipts					**45000**
PMU	UWI Climatologist expertise for two months									receipts					receipts					**18454**
3	Economist on CCA									Report					Report					**20000**
PMU	Knowledge Management &Communication specialist									receipts					receipts					**46000**
PMU	Agro-park development Manager									receipts					receipts					**97,500**
2	Vulnerability analysis specialist									receipts					receipts					**90,000.**
PMU	Purchase two vehicles for Component 1									Two vehicles					Two vehicles					**40,000**

J: Include a disbursement schedule with time-bound milestones relative to project inception and annual reporting requirements. The disbursement schedule with time bound milestones is shown below

Disbursement schedule

	Upon Agreement Signature	One year after Project start	Two Years after Project start	Three Years after Project start	Total
Scheduled date	Oct. 2019	Sept. 2020	Oct. 2021	Sept. 2022	
Payment amounts from Project Funds	3,500,000	2,000,000	1,000,000	754,796	7,254,796
Execution Costs	250,000	300,000	100, 000	39,205.62	689,205.62
Implementing Entity Fee	197,056	170,308	171,237	78,056.66	616,657.66

K: Breakdown of Execution Costs

	With signature	One year after Project start	Year 2	Year 3	Total
Project Manager/Coordinator 48 person/months	48,000	48,000	48,000	48,000	192,000
Finance/Admin /HR 46 person/months	26,667	31,111	31,111	31,111	120,000
Design and Management of Climate Control rooms for 20 days in two visits @US 500 per day plus per diem and airfare	----------	9,400	9,145	----------	18,545
Agro-park development manager for 45 person/months.	26,000	26,000	26,000	19,500	97,500
Knowledge management for 40 man/months	6,666	13,333	13,333	13,333	46,665
Agro-processing 36 months (Region7) Agro-processing 18 months (Region 2)	---------- ----------	20,000 ----------	20,000 10,000	20,000 20,000	60,000 30,000
Monitoring and evaluation	10,000	13,000	23,000	14,000	60,000
Support services	19,495.62	15,000	15,000	15000	60,000
Sub Total	**136,828.62**	**175,844**	**195,589**	**180,944**	**689,205.62**
Grand Total					689,205.62

L. Indicative funds for the NIE

Funds	With signature	One year after Project start	Year 2	Year 3	Total $US
Schedule	Oct 2019	Oct 2020	Oct 2021	Oct 2022	
Coordination and Management	60,861	60,861	60,861	40,802	223,385
Oversight and management of project development and project implementation	50,872	46,381	40,361	20,092	157,706
Financial Management including audits	13,000	6,945	9,001	7,900	36,846
Information and communication management	38,592	30,421	28,014	29,741	126,768
Overall Administration and support costs	17,985.5	17,985.5	17,985.5	17,985.5	71,942
TOTAL	197,056	170,308	171,237	113,501	616,657.66

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APPENDIX 1

Results of climate scenario on future rainfall and temperature (2040 -2100)

Climate variable		Model	Projected change (compared to 1981-2015)
Air temperature -wet season	2040-2069	HadCM3	1.75°C
Air temperature wet season	2040-2069	ECHAM 5	1.25°C to 1.75°C
Air temperature dry season	2040-2069	HadCM3	2.5°C
Air temperature dry season	2040-2069	ECHAM 5	1.25°C
Air temperature wet season	2081-2100	HadCM3	2.75°C to 3.0°C
Air temperature wet season	2081-2100	ECHAM 5	3.0°C to 3.25°C °
Air temperature dry season	2081-2100	HadCM3	2.75°C to 3 .0°C
Air temperature dry season	2081-2100	ECHAM 5	3.0°C to 3.25°C
Rainfall- wet season	2040-2069	HadCM3	Decreases in seasonal (June-December) rainfall in the future (2040-2069) along the western coast, ranging from – 25 mm/season to minus 20mm/season near Soufriere. For the rest of the island decreases in seasonal rainfall range from minus 60mm/season along the east coast to minus 35mm/season in the interior
Rainfall –wet season	2040-2069	ECHAM 5	General decrease in seasonal(June-December) rainfall in the future (2040-2069), for most of the island, of the order of minus 75mm.
Rainfall-dry season	2040-2069	HadCM3	Greater decreases in seasonal rainfall for most of the island but especially on the east coast (January to May) rainfall in the future (2040-2069), especially along the eastern coast and of the order of minus 75mm/season. For the rest of the island covering most of the west coast and the central regions, decreases in seasonal rainfall range from minus 100mm/season to minus 125 mm/season in the interior.
Rainfall- dry season	2040-2069	ECHAM 5	Generalized decline in seasonal (June to December) rainfall, with the decrease being of the order of minus 75mm/season over most of the island
Rainfall-wet season	2081-2100	HadCM3	Significant decrease in seasonal (June to December) rainfall, especially along the western and central parts of the country,

			ranging from minus 350mm/season to minus 400mm/season.
Rainfall-wet season	2081-2100	ECHAM 5	General increase in seasonal (June to December) rainfall, in the future (2081-2100) for most of the island, of the order of + 65 mm to + 75 mm for most of the island.
Rainfall –dry season	2081-2100	HadCM3	Lesser decreases in seasonal (January to May) rainfall, averaging approximately 75 mm/season over most of Saint Lucia.
Rainfall-dry	2081-2100	ECHAM 5	Generalized decline in seasonal rainfall, the decrease being of the order of minus 75mm/season over most of the island.

Source: Draft National Adaptation Plan (2018)

APPENDIX 11

I. Assessment of the Impact of RWHS on identified Farms in Region 6

The following are the key potential environmental and social impacts (negative and positive) of the implementation of the individual rain water harvesting systems (RWHS) within Agricultural Region 6 with emphasis on the Soufriere Watershed where target farmers have been identified for participation.

1. Key Potential Negative Environmental and Social Impacts of the Proposed Project - Summary

Environmental

1.1 Siltation of water courses during construction of sheds.
1.2 Contamination of ground water at springs and water intakes that are the abstraction points for communal potable water supply system.
1.3 Noise pollution during construction.
1.4 Danger posed to the public of the infrastructure, including sheds and communal tanks, dislodging during storm or extreme events.

Social

1.5 Because of praedial larceny concerns, some farmers may prefer to live close to their farms. As such, some structures could be used for habitation.

The following are the potential positive social, economic and environmental impacts of the project

Positive Impacts

1.6 Creation of some local employment
1.7 Improved farm yields and hence income from irrigated farming
1.8 Reduced reliance on abstraction from overland rivers for irrigation thereby improving dry season flows and improving water security
1.9 Reduction in the use of diesel irrigation pumps thereby reducing use of fossil fuels and area contamination (land and air).
1.10 Reduction in the impacts of droughts or water stress resulting from more extreme dry weather and or unpredictable weather patterns as projected by the Climate Change scenarios for Saint Lucia.
1.11 Lower reliance on the use of river water and a reduced tendency to occupy riparian areas to access water

2. Assessment of Locations and Farm Clusters

The key potential negative impacts of the construction of individual RWHS on small farms in the Fond St. Jacques area in the Soufriere Watershed (Agricultural Region 6) generally are as follows:

1. *Soil loss in areas of land clearance and construction*

Agricultural Region 6 covers close to six (6) watersheds all of which are vulnerable to flooding around main rivers and their tributaries within the lower watershed. Key areas of flooding include the settlement area of Fond St. Jacques, Ravine Claire and the tourism town of Soufriere within the Soufriere Watershed; the Villages of Anse la Raye and Canaries and the Anse Galet river crossing in the Anse la Raye and Canaries Watershed.

The region is also particularly prone to landslides given its rugged topography, volcanic agglomerate type geology and high rainfall regime. Under extreme weather conditions, significant landslides have occurred in the area. Where landsides occurred along rivers, significant debris flows have impacted rural settlements especially in Fond St. Jacques, Cresslands and Ravine Claire (Soufriere Watershed) and other urban areas.

Events affecting the area in recent years include: -

- Hurricane Tomas in 2010 (Category 2 Hurricane with 60 mph winds and 27 inches of rainfall recorded at Desraches in a 24-hour period) resulted in the loss of several tonnes of soil and large areas of forest. The major areas of landslides are indicated and numbered #1-#8 occurred in the Soufriere Watershed. A significant landslide also occurred in the Canaries Watershed (Colombette Slide) along the main road network as well as several other landslides either in locations along roads and rivers (upper reaches).
- The Christmas Eve Trough in 2013 impacted the Canaries Watershed (flooding and mudslides)
- Tropical Storm Debbie in 1994 (46 mph winds and heavy rainfall over a 6-hour period) affected the Anse La Raye Watershed with flooding and mudflows. Landslides were also recorded in upper reaches of the watersheds in Agricultural Region 6.

While Region 6 has regenerated naturally and the Soufriere Watershed supported by a t*ree planting programme (Australian Aid Agency),* the watershed remains naturally vulnerable especially within hillside locations that are traditionally and currently farmed. Within most areas however, adequate siting of individual RWHS can be achieved within *pockets of flat* land. Steep slopes and excavation to create flat land in steep areas should be strictly avoided.

The proposed structures are simple structures designed purely for ancillary agricultural use including storage of tools, farm inputs and produce. The proposed project will support wooden structures with stub foundations and would involve minimal soil disturbance.

Given that land parcels in the Fond St. Jacques area are typically large and under family land ownership, several family members may have farms on segments of the same parcel. High density placements should be avoided to limit soil disturbance.

2. Impact of construction on farms previously affected by past landslides

In the Soufriere Watershed Agricultural Region 6, there is a strong correlation between areas farmed and where landslides have occurred: - on the slopes surrounding the Migny River to the base of Desraches (labeled # 2and #9); Upper Migny, the Edmund Forest Complex and the Le Tan area to the north of St. Phillip (Map 1). These locations are target areas for tree planting and rehabilitation under other forestry programmes including the IWECO project which will further minimize the impacts of RWHS construction.

The location of RWHS in these areas should pay close attention to: - Slope (flat to gentle slopes); density of placement (low density), away from water intakes and 50 m away from active rivers and construction in tandem with the proposed rehabilitation and reforestation programme.

The level of vulnerability is ascribed as very high, high, moderate and low in Table 1. This is based on a subjective assessment using the following factors: -[32]

i. Steep slopes
ii. Areas of previous landslides on steep slopes
iii. Areas of previous landslides on moderate slopes
iv. Areas in proximity to water intakes (springs and rivers)
v. Areas along rivers and other waterbodies.
vi. Riparian areas prone to floods and land base sources of pollution.

These are listed below: -

Landslide # See Map 1	Location	Area Characteristics	Level of Vulnerability	Comments / Mitigation Measures
#1	Ravine Claire	Landslide – no farms are in the landside area	NA	NA
#2	Ravine Claire	Landslide and Debris Flows. Farms are around this area but not within areas affected by slides. The area is however very steep and only flat locations should be considered.	Moderate	a. Careful selection of locations for the RWHS. • Limit establishment to areas of with land pockets with very gentle slopes, • Locate RWHS within 50m from rivers • Locate away from water

[32] The entire Soufriere Watershed experiences high rainfall levels in the wet season, so rainfall was not included as a relative factor influencing vulnerability.

Landslide # See Map 1	Location	Area Characteristics	Level of Vulnerability	Comments / Mitigation Measures
				intakes (springs) b. Minimise land clearance to accommodate RWH Sheds • Construct simple wooden structures using stub secured foundations?
#3	Le Tan	Complex of landslides occurred during Hurricane Tomas and Tropical Storm Debbie within farm areas. A potable water supply system exists - intake (spring) which supplies a communal tank in Belvedere. The area is also a site for a large water body which was subsequently drained to reduce flooding. This area is intensively farmed with vegetables, root and tree crops. Pockets of flat land exist and can accommodate RWHS sheds. Locations away from rivers (50m), on flat land, limiting clearance accommodate to stub foundations. This area was declared a disaster zone and sheds should be strictly for agricultural use.		Guidance a) and b) as in #2 Target the area with a tree planting and rehabilitation programme Locate RWHS away from the filled pond in La Tan
#4	Ti Boug	Landslides – one farm exists in the slide areas	Moderate to High	See guidance above – a) to b) in #2. Tree planting programmes should target this area
#5	Mocha	Landslide. One farm is ahead of the slide and the other below		Guidance a) to b) and a?

Landslide # See Map 1	Location	Area Characteristics	Level of Vulnerability	Comments / Mitigation Measures
#6	Desraches (Lower)	Large landslide ahead of Migny river. Within this area farms under intensive vegetable cultivation exist	High	See guidance above. Tree planting programmes should target this area
#7	Lower Migny	Slides on either side of the Migny River Several farms exist in this area with locations where sheds are possible Several small springs exist in the area. A major side along either side of the Migny River resulted in debris flows during Hurricane Tomas in the Fond St. Jacques/ To Bourg areas A potable water supply system exists. The intake (spring) is adequately fenced and sited away from farms with a water tank and supply systems.	High	Pockets of flat land and moderately sloping land can be identified to accommodate RWH systems. Because of the number of farms, attention should be paid to density. Tree planting programmes should target this area General guidance as above in a) and b) should be considered
#8	Upper Migny	Large slide and exposure of several springs Target farms exist Topography is very steep and shed construction could be very constrained	Very High Risk	This area should very carefully assessed given its vulnerability to landslides and challenge of slope

Landslide # See Map 1	Location	Area Characteristics	Level of Vulnerability	Comments / Mitigation Measures
# 8b		This area is elevated and cultivated in pockets. A river tributary exists in this area with a river crossing along the main road. This was the source of debris for the debris flow which engulfed the rural settlement in Fond St. Jacques during Hurricane Tomas.	Medium	Pockets of flat land can be considered following standard guidance RWHS should be kept away from the Migny Tributary
#9	Edmund Complex	Large slides No target farms are in this area	Medium (based on location of farms)	Standard Guidance applies and area rehabilitation in farm locations would reduce landslide threats

3. *Noise Pollution*

Since the proposed RWHS are simple structures, it is not anticipated that noise pollution would be a significant issue. Given the importance of the Soufriere Watershed as a habitat for the Saint Lucia parrot, noise should be minimized.

4. *Contamination of ground water at springs or water intakes (springs or overland systems) that are the abstraction points for communal potable water supply system*

It is not anticipated that rivers and springs will be compromised or contaminated by the proposed RWHS designed for farm irrigation purposes. Soil disturbance would be minimal and as such sedimentation of water sources would be minimal.

5. *Danger posed to the general public by dislodged infrastructure including storage tanks during storm events*

While the RWHS construction are simple structures, the stub foundations should be reinforced and adequately tied to ensure firmness so that these temporary structures can withstand high category storms and are not dislodged.

6. Risk to human security and safety

The project proposes that the use of the structures will be ancillary to agriculture -related uses such as storage of inputs and crops. Many landslide prone areas are in remote areas such as Le Tan, the Migny River slope area, Desraches and the Migny areas around #8b slide. As such, structures should be used solely for agriculture and adequate evacuation plans developed for farm areas during extreme weather events

II. Assessment of the Impact of RWHS on identified Farms in Region 2 – la Bourne System

A communal type RWHS is proposed for the La Bourne Community in Region 2. The project will involve the use of existing roofs for a residential farm community for the RWHS. These will be connected to a central communal tank for use by the community for farming irrigation purposes.

The system will involve the installation of pipes and the mounting of the water tank. Key potential environmental impacts include: -

i. Engineering safety of the communal system. This should meet the engineering standards used by the Water and Sewage Company to ensure the safety of the general public

ii. The laying of the distribution lines to and from the communal tank could affect road infrastructure as lines may need to be buried and as such would require some excavation of small trenches. This could have impacts on soil loss. In some cases, the laying of pipes could cross the public road and disrupt traffic and the movement of people. Like other projects impacting infrastructure, the community should be adequately consulted and informed.

iii. Protocols need to be established for handling potential overspills in periods of high rainfall and intake.

iv. Disaster Protocols need to be established to handle possible breakage, toppling and overflow of a large quantity of stored water

v. Stored water needs to be managed to safeguard vector borne diseases and adequate health measures established should the water be used by the community of farmers for domestic purposes, especially if potable water supply intakes are affected by storms. RWHs could be used for domestic purposes as an alternative.

vi. The La Bourne system was designed and located by a technical team from the Departments of Agriculture (Engineering Division) and Forestry along with the Water Resources Management Agency and as such was guided by sound technical assessment.

The positive impacts of Communal RWHS are similar to the positive impacts for the individual systems proposed for Region 6 in section I of this report.

III. Environmental Plan (EMP)

Guided by the mitigation measures outlined in Table 1 and i-vi above, the location of farm RWHS structures should be assessed and approved by the Departments of Agriculture and Forestry in collaboration with the Water Resources Management Agency.

A Technical Steering Committee involving the said agencies and the IWECO project along with the locally based Disaster Committee should form part of the technical team for site identification, assessment and structured monitoring.

A reasonable time frame and frequency for monitoring should be established to track the potential effects of the projects and positive impacts, and used to improve the project as well as guide learning for duplication or full roll out of the project into other agricultural regions.

The Technical Committee should collaborate with active local Community based organizations (CBBs) like the Fond St Jacques Development Committee that are actively involved in environmental, social and economic development projects for the community.

Landslide Inventories for Hurricane Tomas and Tropical Storm Debby should be used for effective guidance in the location of RWH infrastructure.

CONCLUSION

The environmental impacts outlined above represents the *'do nothing scenario'* and natural vulnerability. With the outlined mitigation interventions and environmental management process, the said impacts can be mitigated even when the vulnerability is described as *'very high, high and moderate'*. In many locations, there may be basins of flat land even on farms where the general topography is steep.

The situation in the identified watershed represents a very typical situation for Saint Lucia generally - the level of vulnerability in upland or interior locations being high for landslides due to steep terrain and high rainfall, and flood vulnerability high in lowland areas especially around rivers.

The project will greatly improve water security for farm purposes leading to a general positive impact for the economic and social development for rural areas against a broader backdrop of declining agriculture (production, employment and farmer participation), declining agricultural exports and losses suffered due to extreme weather events.

Saint Lucia's over all Climate Change Scenarios (Climate Studies Group 2009) point to increasing drought situations. The general scenario for Saint Lucia is summarized below: -

Temperature:

- Minimum temperatures have increased at a rate of ~0.16^{O}C per decade, and maximum temperatures at ~0.20^{O}C per decade.
- The warming trend is expected to continue. The country is projected to be warmer by up to

1.2 ^{O}C by the 2030s, 2.1 ^{O}C by the 2060s, and 3.6 ^{O}C by the end of the century.

- Sea surface temperatures in the Caribbean are projected to warm, perhaps up to 2oC by the end of the century.
- The projected rate of warming is marginally more rapid for December, January, February (DJF) and September, October, November (SON).
- The frequency of very hot days and nights will increase, while very cool days and nights will decrease.

Rainfall

- There is a likelihood that the country will be drier (in the mean) by the end of the century.
- Global Climate Models show a median decrease of up to 22% for annual rainfall, while the Regional Climate Model suggests a decrease of up to 57%.
- Climate change will likely make the dry period early in the year and June-July drier.
- Hurricane intensity is likely to increase (as indicated by stronger peak winds and more rainfall) but not necessarily hurricane frequency.

Sea Level Rise

- Caribbean Sea levels are projected to rise by up to 0.24 m by mid-century.

APPENDIX 111

NOTES ON TECHNICAL IN- KIND SUPPORT FORESEEN FROM GOSL-DAFNC AND POST-PROJECT SUSTAINABILITY.

The details of the full in kind support from the Government of Saint Lucia in human resources assigned to the Project implementation is shown below. Due to the heavy support of the GOSL/DAFNC in kind contribution in human resource, the Project Manager will prepare an exit strategy for the project for sustainability of the quality of the human resource post project. The strategy will be reached in consultation with PMU staff, Project Management Committee and in consultation with the Directors of the DEAS, DOF, WRMA, AESD and the Chief Agriculture Planning Officer in Central Planning of the DAFNC. The project provides the following context for further details on the strategy that could enhance sustainability, at the time of project termination.

Expertise/skills provided by GOSL	Duration of assignment with the Project	Cost to GOSL US$
Community Development and gender specialist to provide skills to enhance community participation and to build organization skills in three groups (YAEP, SLNRWP, Water users' Association and the four Climate Change Groups as well as to provide skills in conflict resolution assigned through scheduled lateral transfer from the Ministry of Social Justice, Equity, Empowerment and Youth	12 months over 36 months	11,111
Procurement Officer by lateral transfer from an appropriate Ministry in the public service for 42 months.	42 months	55,056
Executive Secretary for 48 months		44,445
8 technical staff comprising the two Project Team Leaders operating in two teams (water engineers, soils engineers, foresters with extension and cartography skills and senior agriculture extension officers.	48 months	359,550
8 technical field officers to the two Project Support Team	48 months	359,550
Support staff from Policy Unit to Component 3 (database, web-portal and CCILLC activities)	42 months	31,111
Research scientist (laboratory) from DAFNC/Research and Development	36 months	35,000
Two Senior Extension Officer from Region 2 and Region 7 assigned to Production sites in Agro-park (40 months each)	40 months x2	80,000
TOTAL IN KIND CONTRIBUTION		**975,823**

Post- project sustainability foreseen is as follows

Component 1

The project activities under Component 1 are expected to be achieved during project implementation. Of significance is that an important net benefit of these activities is the improved adaptive capacity within the DAFNC that will be fully integrated into the Annual Work Plan of the DAFNC to ensure that the benefits of improved adaptive capacity in the Department are managed for the sustainable livelihood security of the farming sector in other geographic area of the country with problematic land-use threats from climate change and climate variability. The process will therefore be a reintegration of DAFNC staff into the DAFNC Work Programme and will not result in any additional cost to the DAFNC in regard to human resources. Properly organized and managed farmers will be able to benefit from the enhanced adaptive capacities for climate resilience resulting from the project activity. The two vehicles will be reserved in the DAFNC to continue to provide transportation for the field work. The management of the six soil building facilities will also be integrated into the Annual Work Plans of the DEAS as part of its capacity building in climate adaptation for longer term resilience in soils.

Components 2 and 3

The project outputs to be managed for sustainability under these Components are (**1**) the two green production sites including the production and utilization training in soil building material for climate resilience (**2**) and the two green agro-processing facilities and (**3**) the climate change database and web-portal and the CCILLC and the CCILC located in the Agro-parks. These are outputs which are central and critical to knowledge management and transfer of climate adaptation practices for sustainable climate resilience in agriculture for livelihood security and income generation in rural communities and are best managed under the Central Planning Unit of the DAFNC. The intention is to maintain the integrity of the two Agro-park sites for learning and awareness and future options for on-going built resilience with productivity and livelihood security in agriculture that impacts the small farming systems.

In line with the project document, a single Producer Cooperative will be in place and ready to take over the operations of the two green production sites and the facilities to ensure the practices for climate resilience are maintained. Provisions will be made in the by-laws governing the operations of the Cooperative for such practices. The two Senior DEAS Officers from the project will remain with the respective production sites in Region 2 and Region 7 with responsibility to provide extension advise and services to the farmers and general oversight on area to ensure its attraction for farm tours. In the case of Region 2 this officer would also assume responsibility for continuation of the organization of the farm tours. In the case of Region 7 the DEAS staff will collaborate with the CCILLC on the organization and quality of the farm tours in general. The Agro-park development Manager is tasked with facilitating a smooth process before project termination, within his/her TOR.

The agro-processing facilities will fall naturally under the Central Planning Unit as this is also where the Marketing and agro-processing Unit is placed in the organizational structure of the DAFNC. In this case, the DAFNC will meet the cost of the two mangers of the two agro-processing

facilities who are especially suited for a HAACP certified facility offering training in technical standards that satisfy meet SLBS, MOH and international certification.

Relative to the management of the database for climate change adaptation and climate resilience and the web portal, these two functions would have already been integrated in the Central Planning through the portal link to the DAFNC website and also the data collection and baselines already integrated into the master database in the DAFNC, (see Component 3 in budget notes) also staffed by officers assigned to the project from the Central Planning Unit. There is therefore relative ease of continuity at no additional cost as the office space is already fully equipped. This option at no additional cost to the DAFNC would also apply to the research scientist in the CCILLC who is also from the DAFNC and who would have been working directly with the knowledge management and transfer team under the DAFNC.

Based on the above except for the two agro-processing managers and the tour guides there should be no new cost to the DAFNC for the human resource required for sustainability and impact of the project activities and convenient ease of integration into the organizational structure of the DAFNC. In addition, there is potential for revenues to the GOSL from farm tour visits, promotion of the CCILLC at national and regional level for Conferences and learning and interpretation and reflection on climate change adaptation and climate resilience in agriculture. Training and scheduled production times in the agro-processing facilities could also include consideration for revenue earning based on ability to pay as could be the sale of soil building material to large and medium scale farms and on amounts exceeding prescribed volumes.

Terms of Reference

In addition to the TORs for the Project Manager /Coordinator and the PSC already provided in PART 111 - the additional TORs are provided as shown below.

Agro-park Development Manager

Under the Technical and Operational supervision of the Project Manager of the Project Building Resilience for Adaptation to Climate Change and Climate Resilience in Agriculture in Saint Lucia the individual will carry out the following tasks:

Duration of Assignment: 45-person months

- Familiarize himself/herself with the Project Document, particularly Component 2 and the sites selected for the establishment of the two green agro-parks.

- Review the Work plan and adjust as necessary to complete the rehabilitation of the building at Roseau by the end of the first quarter of Year 2 and the second building in Region 2 by the end of year 2.

Roseau – Region 7

- Prepare a detailed site plan layout for all of the production area for crops, livestock and the aquaculture ponds, taking into consideration space for parking, internal access and the building and the outdoor facilities for production and utilization of soil organic material on the site at Roseau. This plan must also take into consideration the installation of six aquaponics with cooling fans and 3 RWHS from rooftop runoff for the covered areas and 5 RWHS and drip irrigation in open field production as described in the project document.
- Coordinate with the Ministry of Infrastructure on a timetable and the arrangements for the rehabilitation of the WINBAN Building at Roseau and the building at the site of the second Agro-park in Region 2 using the final building plans prepared by the Ministry.
- Coordinate with the Project Management Team and the Ministry of Infrastructure on land drainage to be undertaken at Roseau as described in the project document.
- In collaboration with Project Manager/Coordinator and the Head in Agriculture Region 7 agree on the selection of an Extension officer from the DEAS to be assigned to the production area activities including the land drainage and land preparation for farming at Roseau.
- With the support of the Extension Officer assigned conduct an inventory of farmers already on the site and the selection of additional beneficiaries for the production area keeping in mind the provisions for the youth of the YAEP (aquaculture and crops), and the focus on leafy vegetables, sweet potatoes and vine fruit for the crop subsector in open field and in aquaponics systems and goats for livestock for improved productivity from land-use and livelihood security of the beneficiaries.
- Arrange through the PMU the procurement of the RWHS storage tanks and drip irrigation infrastructure, the solarized aquaponics systems and the lining for aquaculture ponds for YAEP in a timely manner. Note other support equipment such as timers, tensiometers, filters and solar pumps as described in the project document.
- Participate in the selection of the Manager of the green agro-processing facility and review list for local procurement of equipment for the facility using solar energy.
- Provide oversight on the activities of the agro-processing facility and receive the monthly reports on the training and production activities of the facility and the beneficiaries of the facility according to the Terms of Reference of the Manager.

Region 2

- In collaboration with Project Manager and the Head in Agriculture Region 2 agree on the selection of a Senior Extension officer from the DEAS to be assigned to the production area activities at the Agro-park in Region 2
- Prepare a detailed site plan for the Agro-park including the building, areas for outdoor facilities for compost production and other soil building material as for the first agro-park and as detailed in the Project Document. Site plan must make include internal access roads and interpretation stop points to accommodate farm tours and stop points for interpretation
- Provide oversight on the conduct of an inventory and needs assessments of adaptive capacity building for farmers already on the site and to guide selection of additional

beneficiaries focusing on women, youth and vulnerable and marginalized farmers in the area for improved productivity on land-use and improved livelihood security of the beneficiaries.

- Prepare an attractive and efficient layout for the production area to accommodate ten aquaponics systems with cooling fans and rooftop RWHS, and 10 hectares of open field production focusing on climate adaptation practices in leafy vegetables, tomatoes, sweet potatoes, and vine fruits, tree crops and an area for livestock (goats) and beekeeping.
- Arrange through the PMU for the timely delivery of ten aquaponics systems, 4 RWHS systems with 5 RWHS systems drip irrigation equipment over an estimated 10 hectares of open field production and additional RWHS for livestock. Note other support equipment such as timers, tensiometers, filters and solar pumps as described in the project document
- Review the entire work plan for the management of both of the production sites and adjust as necessary, including production planning for coordinated marketing to the major local buyers.
- Assist the beneficiaries to establish marketing contracts in the domestic markets through invitations to the sites to observe the operations and to promote the importance of climate resilience in agriculture

In addition to the above the individual will:

- Work closely with the DAFNC on the regularization of Crown land leases to the beneficiaries on the respective farm lots, as these are on Crown lands.
- Serve on the Project Management Committee and as a member of the Project Management Team, attend all monthly meetings and be prepared to report on the progress and challenges of establishing the production areas and the collaboration with the Knowledge Management Component, particularly for production data collection.
- Prepare quarterly and six monthly reports for the Project Manager /Coordinator on capacity building and practical demonstrations undertaken on the production areas.
- Receive monthly reports prepared by the two Extension Officers including Reports of monthly meetings with beneficiaries
- Prepare a final Report on lessons learnt to enhance the capacity building program of the Knowledge Management and the CCILLC in building resilience in agriculture in Saint Lucia.
- Prepare an exit strategy for the continuity of the two production areas of the Agro-park to be managed under a single Producer Cooperative post project.

Qualification: The Agro-park Development Manager will have at least a First Degree in the Agricultural Sciences, preferably crops, with background in agri-business, extensive work experience in greenhouse technology, a knowledge of aquaponics, the application of traditional knowledge transfer in farming systems and working with small or resource poor farmers. Knowledge and experience in extension and communication is essential. The individual must have good writing and communication skills, command of the English language. Patios spoken in Saint Lucia would be an asset. The individual should be available for at least 4o months, should have own transportation and will be reimbursed for travel at the GOSL travel rates paid to the DAFNC staff.

Agro-processing Manager

Under the Operational and Technical supervision of the Project Manager of the Project Building Resilience for Adaptation to Climate Change and Climate Resilience in Agriculture in Saint Lucia the individual will carry out the following tasks:

Duration of Assignment: 36 man months

- Familiarize himself/herself with the Project Document, particularly Component 2 and the operations of the agro-processing facilities at the two agro-park sites.
- Undertake the responsibility for satisfying and securing the technical standards and other requirements for HACCP Certification for both facilities
- Laisse with the Saint Lucia Bureau of Standards (SLBS) and the Ministry of Health to determine types of and levels of technical standards and certification that the facility could train beneficiaries in order to improve incomes and employment generation from agro-processing.
- Review the Work plan and adjust as necessary to undertake capacity building and production of small –scale processing in the facilities, suited to small scale processers. Note the products identified in the project formulation by small-scale processors as of interest and the special request for processing and upgrade of packaging of cocoa beans by the SLNRWP
- Prepare and deliver the program for training and capacity building in agro-processing from post-harvest handling in fresh produce quality control to secondary processing.
- Prepare a production schedule to meet demand for use of the facility, contribute to the reduction of gluts and to avoid down time or conflicts in the use of the facility.
- Design a method to follow the market performance, of the products processed and competitiveness in prices, packaging and taste in order to enhance incomes and employment generation among beneficiary
- Design a method to identify and test the differences if any between fresh produce grown in organic soils and produce grown in conventional practices (taste, nutrient content, shelf life and special requirements in processing) with implications for health, cost-effectiveness and i
- Prepare and be personally responsible for a production schedule for selected green product (s) or brand to create an income generating stream, using fresh produce from the green production area, that will make the agro-processing facility self-sufficient in its operational costs, post project.
- Provide training and information to allow women and other small or micro processers to operate from home base while satisfying the requirements and standards of the SLBS.
- Oversight on all production processes undertaken in the facility in particularly quality control and labelling, and health and safety guides are followed
- Prepare cost effective estimates of the production processes for different products to assist beneficiaries in decisions making on best incomes and employment generation chains
- Responsibility for maintenance of equipment and or update of equipment

- Prepare material (leaflets) to assist the Knowledge Management Component to promote renewable energy integration in small scale processing for cost efficiency, resilience and for contribution to reduction of carbon footprints in Saint Lucia
- In collaboration with the CCILLC and Component 3 calculate carbon foot prints saved through the use of solar energy in the facility
- Prepare monthly reports on training delivered and production disaggregated by gender and youth and by institutions (schools, caterers) and lessons learnt and new training needs required.
- Participate in monthly meetings of the PMU and be prepared to give performance assessments in the of facility.
- Prepare six monthly reports for the PMU input to the PSC

Qualifications: The Agro-processing Manager at least a First Degree in the Food and Nutrition or Agro –industry and at least 6 years of experience working in an agro-processing facility. Experience in small-scale agro business or SMEs would be an asset. Knowledge of the domestic market and the regional market for the products, of the farm processes relative to seasons of harvests and good communication skills are essential. The individual must have good writing skills and knowledge of patios spoken in Saint Lucia would be an asset. The individual should be available for at least 36 months, should have own transportation and will be reimbursed for travel at the GOSL travel rates paid to the DAFNC staff.

Knowledge Management and Transfer

Under the Operational and Technical supervision of the Project Manager/Coordinator of the Project Building Resilience for Adaptation to Climate Change and Climate Resilience in Agriculture in Saint Lucia the individual will carry out the following tasks:

Duration of assignment in the PMU 40 man months

- Familiarize himself/herself with the Project Document, particularly Component 3 and the CCILLC in Component 2. However, Component 3 is cross cutting and attention needs to be given to the capacity building activities in Components 1 and 2

Component 3

- Provide oversight on the inventory and needs assessment to set baselines in adaptive capacities in climate change adaptation and to build climate resilience in the agriculture sector. This will require working with the Project Team Leaders to agree the best methodology to capture the information and the ease of electronic storage of the data.
- Reminders to Project Team Leaders on six monthly and Annual updates of the inventory
- Responsibility for preparing a contractual arrangement to establish a database for climate change and climate resilience in agriculture and that provides data on climate change and climate variability, built adaptive capacities in the natural resources in the farming systems and improved livelihood security, (production, incomes, and employment generation) resulting from project activities

- Contractual arrangement to design and establish a farmer friendly climate change and climate variability and climate adaptation web portal for agriculture in the DAFNC focused on built resilience in farming systems.
- Oversight on the efficient management of the website with the support of the Information Technology Manager in the DAFNC
- Manage the database and the web portal to provide data and information on lessons learnt as a result of the project activities and changes in farm production and in incomes of the beneficiaries.
- Prepare the schedule of training and capacity building activities under the three Components and facilitate the smooth implementation of these training activities at different levels in the project through reminders to the respective Component Team Leaders, and receiving copies of quarterly reports with lesson learnt.
- Personal responsibility for arrangements for the capacity building in DEAS and for the policy officers in the Central Planning Unit.
- Arrangements through a staff member from the Ministry of Social Justice, Empowerment, Equity and Youth to provide support in the formation of organizations as proposed Component 3 including and for providing training in conflict resolution.

CCILLC

- Management of Conferences and cultural events on climate change adaptation and resilience at in the farming systems as directed by the Project Manager
- Design of the Conference Room that provides a graphic story of climate change and climate variability and climate adaptation and lessons learnt in building resilience in agriculture in Saint Lucia
- With the support of the agriculture research and development plant scientist assigned from the Department of Research and Development establish two climate control grow rooms for following different climate variables on selected food crop varieties. This will include the design of the two rooms, maintenance of the rooms, selection of irrigation and growing systems and the selection of the crop varieties to be tested for drought or temperature resistance.
- In collaboration with the Project Manager follow up on preliminary inquiry to engage the interest of the UWI –Mona Climate Studies Group including two one month visits to the CCILLC to ensure best decision-making on the design, selection of climate control equipment and to provide guidance on data collection, interpretation and statistical significance to climate variations in open field conditions.
- Collaborate with the Media Unit in the DAFNC on the hosting of the biennial Annual Competitions on climate change and climate variability to build resilience in agriculture.
- Collaborate with the Media Unit in the DAFNC for their support on preparation of leaflets, videos and other training and communication material for promotion and awareness building on climate change and climate resilience in agriculture in the CCILLC.

Operational

- Timely submissions of monthly training or capacity building schedules that will require arrangements for coffee breaks/lunches etc. by the Procurement/ Administrative Unit.
- Preparing six monthly summary reports for submission to the Project Manager/Coordinator.
- Participate in field visits of the PMU and the PSC
- Participate in the monthly meetings of the Project Management Committee

Qualifications: The individual should have as a Minimum First Degree in Communications or Knowledge Management and Transfer with at least 5 years working experience in agriculture/ climate change or sustainable development. Alternatively, the individual should have as a minimum a first degree in agriculture science/climate change sustainable development in agriculture with climate change, with at least 5 years working experience in knowledge management transfer and data base management at a Senior level. Excellent report writing skills with the use of graphics and verbal skills are also requirements.

Design and Management support to Climate Control Grow Rooms

Under the Operational and Technical supervision of the Project Manager/Coordinator of the Project Building Resilience for Adaptation to Climate Change and Climate Resilience in Agriculture in Saint Lucia the individual will carry out the following tasks:

Duration of assignment to Project 20 days in two visits

- Review the Project Document, carefully noting the evidence of climate change and climate variability in agriculture and the projections for a worsening situation in water shortages for the farm from direct rainfall and the likelihood of adverse impacts of even small but longer term variations on food and feed crop varieties.
- Review the design for the climate control grow rooms and the selection of equipment for climate control.
- Review the irrigation control systems, and the selection special requirements in the production of growing media (compost, fertilizer teas and vermicomposting and possible side effects on the environment of the room)
- Confirm agreement on data collection, in particular type of plant data and interpretation of this data relative to performance, flowering, seed yield and harvest)
- Make recommendations for best methods for testing the system for usefulness in climate adaptation in the farming systems and the changes that could enhance its usefulness.

Qualifications: The individual should be a plant scientist/plant physiologist at the level of at least a post graduate degree for at least 5 years and with good experience working in climatology and with the management of climate control grow rooms or in-situ tracking of impact on agriculture biodiversity as well as the practical application /interpretation of findings to guide climate adaptation for sustainable production through drought resistant varieties in open field or greenhouse conditions.

Vulnerability and hazard risk (DRRM at the farm level)

Under the Operational and Technical supervision of the Project Manager of the Project Building Resilience for Adaptation to Climate Change and Climate Resilience in Agriculture in Saint Lucia the individual will carry out the following tasks:

Duration of assignment: Three hundred days over 36 months with 200 days in the first 12 months

- Review the Project document and the Implementation Work plan
- Review and assess the available landslip maps and data and evaluate usefulness to undertake the work in collaboration with the Project Team Leaders focusing on Region 6
- Provide leadership to the Project Team Leaders to conduct the field work to update the landslip map(s) conduct inventory of farms in the area and prepare overlay map, rank slips and identify farms to benefit from the project activity
- Prepare the work plan to be undertake during the first 18 months of the project activities and subsequently prepare six monthly progress reports.
- Working closely with the Project Team Leaders and using a participatory approach take the lead to use the most suited climate change adaptation practices for hillsides and for the area to conduct the DRRM activities in the area to reduce the vulnerability to landslips over the first 12 months of the activity
- Prepare a report of work undertaken, achievements and lessons leanrt for the PMU
- Prepare recommendations for the Project Team Leaders to continue the work over the next 12 months, with monthly one week visits to the sites to observe the progress in built resilience on the hillside farms and in the DAFNC staff and the farmers.
- Provide oversight on the preparation of a final report by the Project Team Leaders including maps and the concrete outputs and outcomes of the project activities
- Prepare a Final Report with Recommendations for further work to reduce landslips in the area.

Qualifications and Experience

This person should possess a post graduate degree in (land-use/land management/GAPS for hazard risks from landslips/agroforestry land-use planning) or another relevant subject. A minimum of ten years' experience working in the area of landslips and land management for farming on hillsides. Excellent command of English, good writing skills, communication skills. Ability to communicate in patois spoken in Saint Lucia would be an additional asset.

Economist on Climate Change Adaptation in agriculture

Working under the direct supervision of the Project Manager/Coordinator and in close collaboration with the local AF Focal point the individual will prepare a program of work to undertake the following:

Duration of assignment: 10 days in 2 visits of 5 days

- Conduct two 5 -day workshop on economic analyses of selected climate change adaptation strategies in agriculture in Saint Lucia.

- Prepare a program of work for 12 consecutive months to collect data from project outputs as appropriate and any other necessary data to determine the most effective and efficient climate change strategy of the project.
- Prepare a breakdown of the first mission/visit of 5 days and the second and final mission/visit after 12 months to conduct another workshop using the data collected to determine the most effective climate adaptation strategy for building resilience in the environment and the income generation and livelihood security of the selected population and geographic areas of the project area.
- Make a presentation on findings on the final day of the mission and an assessment of adaptive capacities in DAFNC to continue this work integration in climate resilience programming in agriculture.
- Prepare a final report with findings and recommendations within a month.

Our Ref: 45/14/3/7/35

December 10, 2018

Adaptation Fund Board
Secretariat
c/o Global Environment Facility
Mail stop: N 7-700
1818 H Street NW
Washington DC 20433
USA

Dear Sir/Madam:

The Caribbean Development Bank, on the behalf of the Government of St. Lucia, submits the attached project proposal "Building Resilience for Adaptation to Climate Change and Climate Variability in Agriculture in Saint Lucia" for your consideration.

Also attached, is the letter of endorsement from the Government of Saint Lucia.

Yours sincerely,

Daniel M. Best
Director,
Projects Department

DMB/DG/caw

Enclosure

P.O. Box 408, Wildey, St. Michael, Barbados, W.I. BB11000
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MINISTRY OF EDUCATION, INNOVATION, GENDER RELATIONS AND SUSTAINABLE DEVELOPMENT

Department of Sustainable Development

Communication on this subject should be addressed to:
The Permanent Secretary

Norman Francis Building
Balata, Castries,
SAINT LUCIA, W.I.
Tel No: (758) 468-5833
Fax No: (758) 456-0490

November 26, 2018

Adaptation Fund Board
Secretariat
c/o Global Environment Facility
Mail stop: N 7-700
1818 H Street NW
Washington DC 20433
USA

Dear Sir/Madam,

Subject: Endorsement for Building Resilience for Adaptation to Climate Change Variability in Agriculture in Saint Lucia

This serves to confirm that the above national project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Saint Lucia

Accordingly, I am pleased to endorse the above project proposal for support from the Adaptation Fund. If approved, the project will be implemented by Caribbean Development Bank and executed by the Department of Agriculture, Fisheries, Natural Resources and Cooperatives.

Kindly note that this Department intends to communicate the change in its Designated Authority from Ms. Debra Charlery to Ms. Caroline Eugene to the Fund shortly.

for/CAROLINE EUGENE (MS)
Permanent Secretary (Ag)