ADAPTATION FUND

ADAPTATION FUND PROJECT ID:

(For Adaptation Fund Board Secretariat Use Only)

Date of Receipt:

PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	**REGULAR**
COUNTRY/IES:	**JAMAICA**
TITLE OF PROJECT/PROGRAMME:	**ENHANCING THE RESILIENCE OF THE AGRICULTURE SECTOR AND COASTAL AREAS TO PROTECT LIVELIHOODS AND IMPROVE FOOD SECURITY**
TYPE OF IMPLEMENTING ENTITY:	**NATIONAL IMPLEMENTING ENTITY**
IMPLEMENTING ENTITY:	**PLANNING INSTITUTE OF JAMAICA**
EXECUTING ENTITY/IES:	**NATIONAL ENVIRONMENT AND PLANNING AGENCY, NATIONAL WORKS AGENCY, MINISTRY OF AGRICULTURE AND FISHERIES, MINISTRY OF TOURISM**
AMOUNT OF FINANCING REQUESTED:	**US$9,995,000** (In U.S Dollars Equivalent)

List of Acronyms

AF	Adaptation Fund
AFB	Adaptation Fund Board
CARDIN	Caribbean Disaster Information Network
CBO	Community based Organization
CCADRR	Climate Change Adaptation and Disaster Risk Reduction
CC	Climate Change
CIDA	Canadian International Development Agency
CVI	Coastal Vulnerability Index
DRR	Disaster Risk Reduction
EFJ	Environmental Foundation of Jamaica
EIA	Environment Impact Assessment
EU	European Union
FAO	Food and Agriculture Organization
FCF	Forest Conservation Fund
FFS	Farmers Field School
GAAP	Generally Accepted Accounting Principle
GCM	Global Circulation Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Risk Recovery
GOJ	Government of Jamaica
HDI	Human Development Index
IDB	Inter- American Development Bank
IDP	International Development Partners
IFRS	International Financial Reporting Standards
IPCC	Intergovernmental Panel on Climate Change
JCCEAP	Jamaica Climate Change Enabling Activity Project
JCDT	Jamaica Conservation and Development Trust
MAJIC	Marketing and Agriculture for Jamaican Improved Competitiveness
MDG	Millennium Development Goal

MOAF	Ministry of Agriculture and Fisheries
NCRPS	Negril Coral Reel Preservation Society
NEPA	National Environment and Planning Agency
NEPT	Negril Area Environment Protection Trust
NGO	Non- Governmental organization
NIC	National irrigation Commission
NIE	National Implementing Entity
NMTPF	National Medium-Term Priority Framework
NRCA	Natural Resources Conservation Authority
NRM	Natural Resource Management
NWA	National Works Agency
ODPEM	Office of Disaster Preparedness and Emergency Management
PIOJ	Planning Institute of Jamaica
PPCR	Pilot Programme for Climate Resilience
RADA	Rural Agricultural Development Authority
RiVAMP	Risk and Vulnerability Assessment Methodology Project
RWH	Rain Water Harvesting
SDM	Species Distribution Model
SECIN	Social and Economic Information Network
SLM	Sustainable Land Management
SLR	Sea Level Rise
SNC	Second National Communication
SST	Sea Surface Temperature
TOT	Training of Trainers
TWG	Thematic Working Group
UNDP	United Nations Development Programme
UNEP	United Nation Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UWI	University of the West Indies
WMU	Watershed Management Unit
WRA	Water Resources Authority

WUA	Water Users Association
WUG	Water Users Group

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Several projections have also been made regarding the impact of climate change on tropical cyclones in the Caribbean Region. While these are inconclusive with respect to the overall frequency of cyclone events for the sub region, the forecast is that the North Atlantic region will likely experience an increase in the frequency of more intense systems (Categories 4 and 5). Insufficiency of data has made it difficult to adequately project SLR for Jamaica but it is assumed that it will follow the trend of global means. Given the projections, Jamaica's vulnerability to changing climatic conditions is likely to increase unless early and comprehensive intervention is introduced to reduce and adapt to such impacts. Table 1 provides a summary of climate model predictions for Jamaica..... 14

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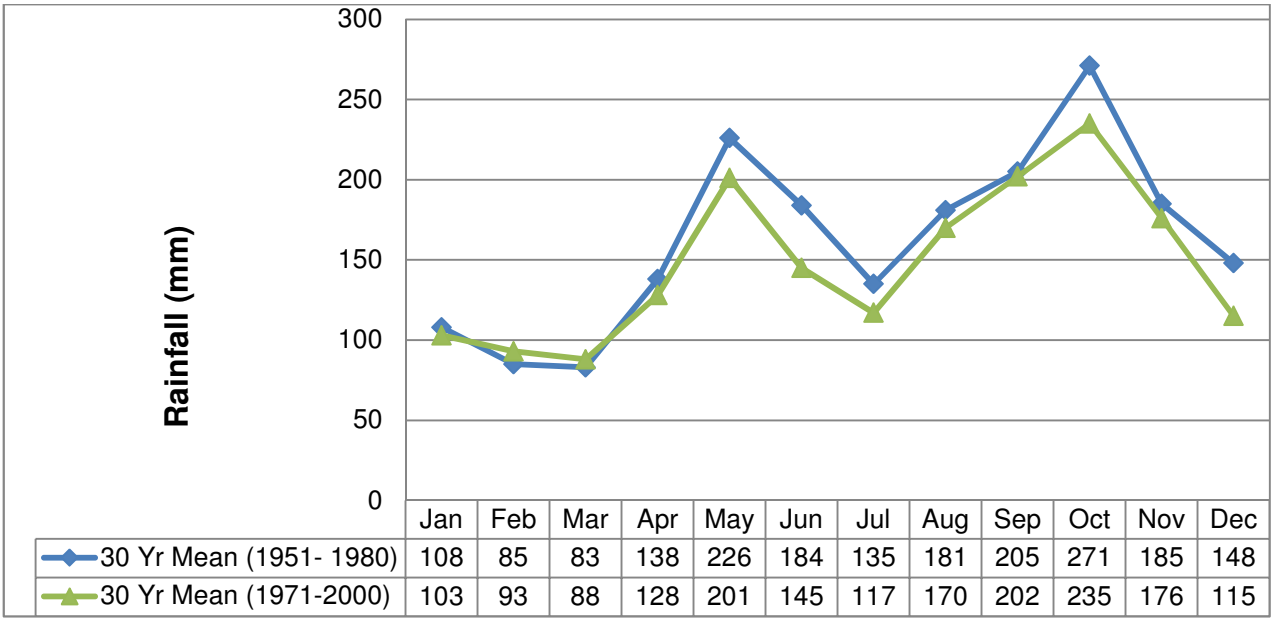
Country Context

Jamaica, 18N 77W, is a Caribbean small island developing state with a land area of approximately 11,000 km^2 and territorial waters of approximately 16,000 km^2. The island's topography is characterised by an east-west trending mountainous interior surrounded by narrow discontinuous coastal plains. The Blue Mountains, the highest mountain chain, peaks at 2,256 metres above sea-level. Many inland upland areas are susceptible to soil erosion and landslides while for the lowland areas, flooding is the predominant hazard. Jamaica experiences a tropical maritime climate characterised by year round warm and humid conditions. On average, Jamaica receives 1,980 mm of rain each year. Rainfall pattern is highly influenced by the island's topography which has created a range of micro-climates. As such there are wide variations of rainfall throughout the island. Rainfall is generally more abundant in north-eastern Jamaica but the southern sections of the island, lying in the rain shadow of the mountains, have a semiarid climate and receive less than 1,500 mm of rainfall annually. The country has a bimodal rainfall pattern with the primary rainfall in October and secondary in May.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30 Yr Mean (1951- 1980)	108	85	83	138	226	184	135	181	205	271	185	148
30 Yr Mean (1971-2000)	103	93	88	128	201	145	117	170	202	235	176	115

Figure A: Plot of 30 Yr. Mean Rainfall (1951-1980 and 1971- 2000) for Jamaica (Source: Meteorological Services)

Figure A shows a comparison of the thirty year mean for 1951-1980 and 1971-2000. Analyses to determine whether the difference shown is significant are not yet complete. However, the graphs as well as observations made by farmers that there is less rainfall now than before, might well be valid. Temperatures vary from 26^0 C in February to a high of 30^0 C in August.

The latest Population Census (2001) has estimated the population at approximately 2.7 million of which 70 per cent live in the coastal zone. The highest agricultural development and industrial and urban centres (highest water demand centres) lie along the south coast of the island within or

adjacent to the coastal zone. A recent risk evaluation[1] estimates that the value of social and economic assets and infrastructure exposed to hazards is US$18.6 billion. A significant portion of this exposure is located in the coastal zone, highlighting the need for incorporating climate change risk management into policies and plans that impact on these areas.[2]

Jamaica's economy is primarily dependent on goods and services which, to a large extent, are derived from the natural environment. The two key areas to be addressed by the AF programme are agriculture, including fisheries and forestry management and rehabilitation of coastal resources with spin-off benefits for the tourism sector. Agriculture and fisheries rely directly and heavily on natural resources. The agricultural sector contributed an estimated 5.8 per cent of real Gross Domestic Product (GDP) in 2009 and provided employment to 20.2 per cent of the labour force. It continues to be an important contributor to GDP, food security, employment, foreign exchange earnings and the livelihood of the predominantly rural population (which represents approximately 48 per cent of the total population (ESSJ 2010). The tourism sector, the largest foreign exchange earner for the country (US$2001.2m in 2010), employed approximately 131 000 and contributed 7.3 per cent of GDP.

Jamaica's total labour force was 1.19 million in 2010. Overall, women account for 43 per cent of the employed labour force but 20 per cent of the agriculture work force and about 26 per cent of the production of domestic and export crops. They are however, the primary vendors of crops, and are most likely to be directly impacted by food security issues. Of the 20,000 fishers in Jamaica, about 70 per cent[3] are men who are mainly involved in going to sea. Women are primarily responsible for vending and the management of operations, including vending sites. Whilst only 6 per cent of registered fisherfolk are women, they are often boat owners and are active in fishing cooperatives. Women dominate the employment in the tourism industry, accounting for 58 per cent of jobs in the Hotels and Restaurant sub-sector.

While Jamaica's Human Development Index (HDI) of 0.727 in 2010 puts it among the category of developing countries with high human development, there remains an issue with the increasing level of poverty which has been trending upwards over the last three years. The country has a national poverty rate of 17.5 per cent in 2010. Women accounted for 47.6 per cent of the poor; 45.5 per cent of households are female headed, about 30 per cent of which had consumption expenditure below the poverty line in 2009.

The geographical distribution of poverty and expenditure levels is shown in Figures B and C respectively. The PIOJ Poverty Map ranks communities into four categories (Quartiles), with Quartile 1 being the least poor and Quartile 4, the poorest. The ranking is derived from several indicators including the percentage of households without piped water, the percentage of households without exclusive use of water closet (flushable toilets), the percentage of the labour force within the community that is unemployed, and the percentage of community population with primary education only.

Most (61 per cent) of the poor live in rural areas, are dependent on the agriculture sector and are therefore disproportionately at risk to climate change impacts.

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[1] Country Specific Risk Evaluation, Catastrophe Risk Profile Jamaica, 2009. Commissioned by the Inter American Development Bank (IDB)

[2] There are varying definitions of coastal zone by the National Environment and Planning Agency, usually variations of the following:- The area of sea and seafloor extending from the high water mark out to the edge of the island shelf. The entire area influenced by, and influencing coastal and ocean resources and ecosystem

[3] *Report on Rural Women in Agriculture for the period 2002 – 2008.* (July 2009) Produced by the Ministry of Agriculture and Fisheries in July 2009 for the Jamaica Bureau of Women Affairs in partial fulfillment of the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) report.

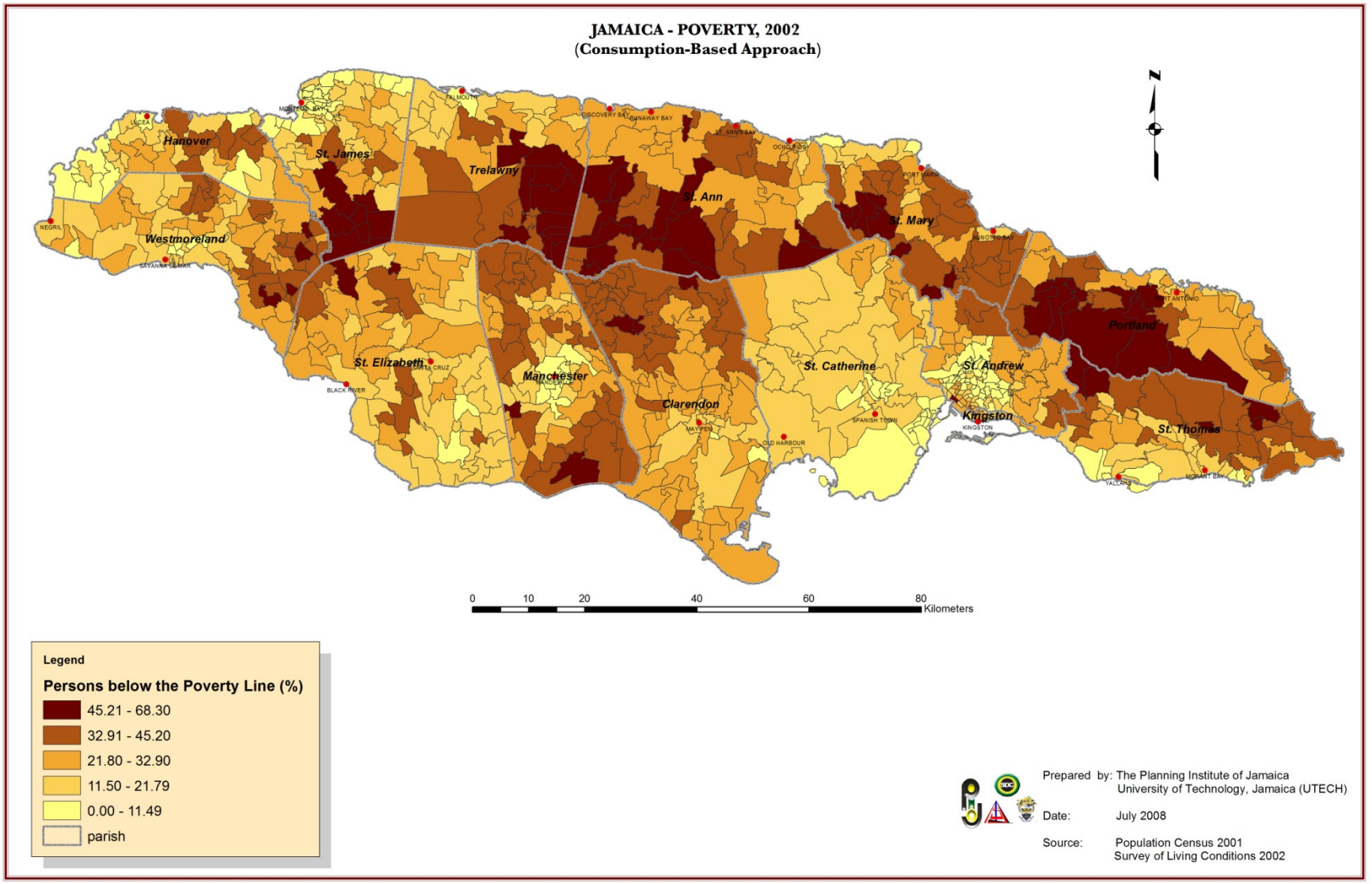


Figure B: Poverty Map of Jamaica (Source: PIOJ, 2001)

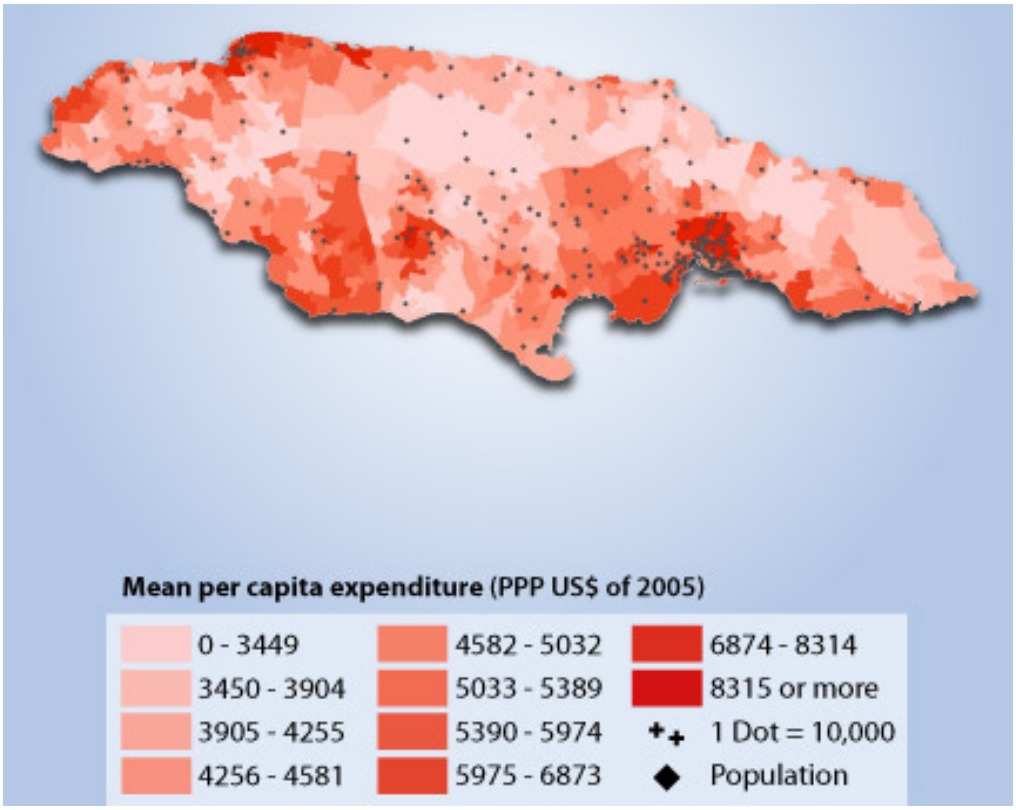


Figure C: Per capita Expenditure and Population Density of Jamaica (Source: World Bank[4])

Jamaica has approximately one million hectares of land, of which 270,000 hectares are arable. Of the arable lands only 18 per cent are flat mechanizable land. The use of these arable lands is characterized by two very distinct categories of farmers: a small number of large scale producers of export crops and a large number of very small farms producing mainly for the domestic market and home consumption. Forty seven per cent of farms are less than 0.81 ha and 93 per cent are less than 4 hectares (Agricultural Census 2007). Vegetables, legumes, fruits, plantain, roots and tubers, cereals and condiments are the main categories of domestic crops produce by the small farmers. As such, it is these farms that provide the foundation to the country's food security. However, these are the farms which are most vulnerable to the impacts of climate change.

The need for food security has emerged as a national priority, as global economic and environmental forces combine to threaten long-term food supply and prices. On average, food accounts for approximately 43 per cent of the consumption expenditure of Jamaicans, which means that food accounts for the greatest proportion of national consumption and leaves consumers vulnerable to price shocks.[5] The agricultural sector makes an important contribution to food security through domestic food production. Despite local production, Jamaica's food import expenditure amounted to 11.0 per cent of GDP in 2010.

[4]World Bank, 2009. Reshaping Economic Geography in Latin America and the Caribbean. Washington D.C.

[5]Ministry of Agriculture, (2008). Food Security in Jamaica.p. 20.

Water demand for agricultural (irrigation) has increased steadily from an average of 268 million gallons per day in 2005 to about 315 million gallons per day in 2010. While there is adequate water to meet existing demands, uneven rainfall distribution causes water supply problems in the drier areas of the island, and during the dry season. Jamaica is heavily dependent on ground water which accounts for an estimated 92 per cent of water supplied to all sectors (domestic, industrial and agricultural), most of which is used for irrigation.[6] Agriculture in Jamaica is mainly rainfed.

Environmental Context

Jamaica's environment is characterized by a high degree of biodiversity with a variety of coastal, freshwater and terrestrial ecosystems. The country has gained international recognition for its biodiversity and high levels of endemism of flora and fauna species. Rated fifth among islands of the world in terms of endemic plants, roughly 1/3 of the estimated 3,304 species of vascular plants occurring in Jamaica are endemic. There are also high levels of endemism for many species of animals including crabs, birds and reptiles. 98.2 per cent of the 514 indigenous species of land snails and all of the 22 occurring species of amphibians are endemic to the island[7].

Coastal ecosystems comprise bays, beaches, rocky shores, estuaries, mangroves, cays and coral reefs and sea grass beds. These ecosystems are important because they contribute to biodiversity by providing nurseries and habitats for fish and non-motile species, and act as defences or buffers against flooding, storm surges and wave action. By hosting a number of commercial species such as oysters, spiny lobster, queen conch and several coastal and pelagic fish species, the ecosystems also support numerous livelihood activities, particularly related to fishing and tourism. Among the more serious environmental concerns is the continued degradation of coastal and marine ecosystems by both man-made and natural factors.

The island's terrestrial ecosystems include wet and dry forests, rivers, caves, mineral springs, rocky shores, herbaceous swamps, mangrove swamps, marsh wetlands and swamp forests. Over 30 per cent or 335 900 hectares (ha) of Jamaica's land surface is covered by natural forests. These include lower montane mist forest, montane mist forest, dry limestone forest, wet limestone forest, mangrove woodland, herbaceous swamp and marsh forest. Notable forested regions include the Blue and John Crow Mountains, and Hellshire Hills in south-eastern Jamaica, and the Cockpit Country in central Jamaica. These forests are the most important repositories of Jamaica's biodiversity, especially of endemic plants and animals. They are also essential for national development as they provide goods and services which sustain livelihoods for many households, including the following: fuel wood; medicinal plants; yam sticks; lumber for construction and furniture; fence-posts; wood for fish pots; and wicker and other materials for craft items[8].

The major wetlands in Jamaica include the Upper and Lower Black River Morass, the Negril Morass, the Mason River, West Harbour, and Cockpit-Salt River wetlands in Clarendon, Cabarita Swamp, Great Salt Pond and Manatee Bay in St. Catherine. With an area of an area of 2,289 hectares (5,657 acres), the Negril Morass is among the largest wetlands accounting for approximately one fifth of all wetland areas in Jamaica. The Negril Morass consists of herbaceous marshlands, mangrove forests,

[6]US Army Corps of Engineers (2001). Water Resources Assessment of Jamaica.

[7]National Environment and Planning Agency, 2003. National Strategy and Action Plan on Biological Diversity in Jamaica

[8]National Environment and Planning Agency, 2003. National Strategy and Action Plan on Biological Diversity in Jamaica

swamp forests, and lowland forests and supports several species of animals, including tree crabs, birds, and several species of fish.[9]

The freshwater environment of Jamaica is home to three endemic freshwater fish species, fourteen indigenous freshwater shrimps (these migrate from the marine environment early in their life cycles) and one endemic freshwater turtle. The shrimp species in particular are important economically for subsistence fishing in rural communities.

The island is divided into twenty-six (26) Watershed Management Units (WMUs) comprising all the land from the mountains to the sea and containing over 100 streams and rivers (Figure D). These WMUs are comprised of watersheds which fall within ten (10) hydrological basins. The land in the upper part of the WMUs is characterized by steep slopes usually in excess of 20 degrees. Limestone derived soils cover about 65 per cent of the watersheds and the remaining areas are composed of soils derived from weathered igneous and metamorphic rocks.

Given the socio-economic and environmental challenges facing Jamaica, urgent interventions are needed to promote sustainable livelihoods, improve agricultural practices and production for food security and enhance management of natural resources, especially the coastal and marine resources. Also, the vulnerability of Jamaica to the impacts of climate change warrants the implementation of effective measures to adapt to climate change.

PROBLEM STATEMENT

Jamaica is vulnerable to climate related hazards, in particular hurricanes, floods, storm surges and droughts, due largely to its geographical location and the exposure of social and economic assets in coastal areas. This situation is made worse by the country's low adaptive capacity especially in the climate sensitive sectors of the economy.

Data from climate models have indicated that Jamaica will experience significant changes in temperature, precipitation and sea-level rise (SLR) by 2050. Jamaica's Second National Communication (SNC) on Climate Change lists the main climate change hazards as follows:

- sea level rise
- increase in extreme events – precipitation and drought
- more intense storms and storm surge
- increased temperature

Several projections have also been made regarding the impact of climate change on tropical cyclones in the Caribbean Region. While these are inconclusive with respect to the overall frequency of cyclone events for the sub region, the forecast is that the North Atlantic region will likely experience an increase in the frequency of more intense systems (Categories 4 and 5). Insufficiency of data has made it difficult to adequately project SLR for Jamaica but it is assumed that it will follow the trend of global means.[10] Given the projections, Jamaica's vulnerability to changing climatic conditions is likely to increase unless early and comprehensive intervention is introduced to reduce and adapt to such impacts. Table 1 provides a summary of climate model predictions for Jamaica

[9]Mangroves and Coastal Wetland Protection Draft Policy: Annex 1: General Information on Jamaica's Mangrove Wetland Resources. www.nrca.org.

[10]This assumption is derived from evidence quoted by Chen et al. (2008) that the Caribbean has experienced changes similar to that of the global mean.

Table 2: Summary of climate model predictions for Jamaica

Parameter	PRECIS Model	SDM
Temperature	- Increase of: 0.4-0.9˚C by 2015 0.5-1.0˚C by 2030s 0.7-1.8˚C by 2050s 1.8-3.5˚C by 2080s - South-western Jamaica will experience the greatest change in the 2050s - The latter half of the year will experience the greatest increase in the 2050s.	- Increase of: 0.5-0.7˚C by 2015 0.8-1.3˚C by 2030s 1.1-1.8˚C by 2050s 1.9-2.6˚C by 2080s - March - May will see greatest increase
Precipitation	- Rainfall decrease in most regions by the 2050s - By 2080s, decrease ranging from 25 per cent to 40 per cent of current rainfall levels will take place in all regions	- General pattern of decreased rainfall over-time - Significant decrease in rainfall starting in 2050s - June - November will have most pronounced decrease - Number of wet days will decrease
Other		- Stream flow of some major rivers will decrease due to reduced rainfall

(Source: Climate Studies Group Mona)

Climate Variability

In addition to the changes in average climatic conditions by 2050, projections have also been made which indicate increased climate variability. Some of the features of the projections for climate variability are as follows:

- Decrease in the length of the rainy season by 7-8 per cent;
- Increase in the length of the dry season by 6-8 per cent;
- A 20 per cent increase in the frequency of intense rains

Based on these projections, increased climate variability is likely to have a number of impacts on water supply including:

1. Reduction in the safe yield from some water sources
2. Increase in sediment loads due to increased frequency of intense rains
3. Decreased groundwater recharge.

Climate variability will also affect agriculture, as most crops are rain-fed. There is already anecdotal evidence from farmers that changing weather patterns are making it increasingly difficult to successfully carry out traditional farming methods; traditional planting times, for example, have to be adjusted to the prevailing weather conditions.

Climate Change Impacts:

Anecdotal evidence suggests that climate in Jamaica has been changing at least over the last decade. Some observed changes include:

- increasing frequency of hurricanes and storms - the country is experiencing at least one storm event per annum
- increases in land and sea-surface temperatures, leading to loss of agricultural productivity; loss of coral reefs and loss of fisheries and livestock
- longer dry seasons leading to drought conditions, often followed by intense rains, leading to flooding and landslides
- increasing coastal erosion from high wave and storm surge activity causing beach loss and damage to coastal infrastructure,
- bush fires leading to loss of crops, livestock and terrestrial ecosystems.

Over the last 20 years, 116 lives have been lost to weather related events. Since 1988, the cumulative economic impact of damage and losses due to storm events has been estimated at $111.81 billion. The impact has been heightened by the level of social dislocation to communities and families, especially the poor. This has included the disruption of schools, health services, transportation and loss of shelter. Environmental damage since 1988 is reflected in the destruction of terrestrial, coastal and marine ecosystems leading to a reduction in the level of goods and services they provide. Examples include reduced fish catches, impacting livelihoods and food, soil loss leading to reduced agricultural productivity and pollution of coastal ecosystems, decline in the health of coral reefs and loss of sea-grass beds.

An overview of the projected impact of climate change on Jamaica is given in Table 2.

Table 3: Climate change threats and potential impact on Jamaica

	Climate Change Threats	Impacts on Jamaica	Affected Sectors
1	Sea level rise	Flooding of coastal areas Loss of coastal habitats Loss of coastal infrastructure – houses, hotels, roads, bridges, utility lines Loss of beaches Coastal subsidence/Reduction of land mass Reduction in freshwater quality due to saline intrusion	Tourism Agriculture Infrastructure Water Resources Natural Environment
2	Increase in extreme events –precipitation	Increased flooding leading to: loss of lives, property, and income, particularly for small farmers on hillsides and slopes Damage to houses (especially poor quality in marginal or environmentally sensitive areas) Increased soil loss Increased sedimentation of coastal waters	Agriculture Water Resources Tourism Fisheries Health Built and Natural Environment
3	More intense storms and storm surges	Damage to coastal infrastructure Loss of coastal ecosystems Increased incidence of landslides and flooding Coastal aquifer saline contamination Increased run-off and decreased recharge	Agriculture and Fisheries Tourism Infrastructure Natural Environment
4	Increased temperature	Loss of coral reefs from coral bleaching Loss of agricultural productivity – fisheries, crops and livestock Increased water demand	Agriculture and Fisheries Tourism Water Resources
5	Longer and more intense droughts	Reduced availability of water especially in dry seasons for agriculture, domestic consumption Lower soil productivity impacting agricultural output Loss of heat sensitive crops/animals	Agriculture Water Resources

(Source: Compiled by PIOJ from various sources, 2011)

Some of these effects are already being felt. Productive sectors of the economy, such as agriculture and tourism, have been particularly hard hit[11]. In the former, both domestic and export agriculture have been affected. The impact extended not only to the short- term availability of food items, but also influencing food prices, the country's earnings from food export and the food import bill. For the tourism sector, damage to beaches and other coastal ecosystems and infrastructure have affected that sector with the potential to have long term and long lasting impact on Jamaica's competitiveness.

At the local level, climate change has the potential to impact the livelihoods of over 200 000 farmers (30 per cent of whom are females[12]) and an estimated 20,000 registered fisher-folk. Small farming is highly dependent on rainfall intensity and regularity and anecdotal data indicate that reduced rainfall in some areas has had a significant impact on both. In addition, during the dry spells, access to water for farming and domestic use is severely curtailed. Bush fires also pose a problem during the dry season, causing losses of crops, livestock and sometimes housing in farming areas. Table 4 shows losses from fires and weather-related impacts to agriculture from 1994 to 2008, estimated at $7.5 billion.

[11] The banana and coffee industry have been repeatedly impacted. In 2007 Hurricane Dean destroyed 85% of banana crop. Also, approximately two-thirds the total hectarage of vegetables was lost. In 2008, 80% of the banana crop was destroyed due to Tropical Storm Gustav.

[12] Agriculture Census 2007

Table 4: Agriculture-related losses / damage from climate-related hazards, 1994-2008 (Selected Years)

HURRICANE	FARMERS	CROPS (HA)	CROPS (VALUE $)	LIVESTOCK VALUE $	GREEN HOUSE	TOTAL ESTIMATED (VALUE $)
Charley August 2004	986	792	88,644,500	1,828,000		90,472,500
Ivan September 2004	117,698	11,130	2,433,638,540	677,749,950		3,111,388,500
Dennis July 2005	6,700	610	126,700,000	29,598,000		156,798,000
Wilma October 2005	19,973	1,572	197,108,000	40,326,000		237,434,000
Emily August 2007	1,499	656	39,205,000	420,000		39,625,000
Dean August 2007	63,707	5,473	904,373,000	52,470,000		1,031,343,000
Tropical Storm Gustav August 2008	24,255	2,777	520,000,000	26,700,000	19,700,000	565,600,000
Nicole September 2010	18,601	3,741	531,632,000	32,415,000	12,451,000	1,151,056,000
FLOOD RAIN					**Others**	
1994		2,250	101,459,500			
1998		210	23,030,175			23,030,175
2000		327	46,363,000	2,604,000		48,967,000
2001	13,350	1,911	375,637,708	28,421,400		404,059,108
November . 2006	811	50	20,282,500	2,770,000	15,300,000	38,352,500
BUSH FIRE						
March. 1996	60	63	2,500,000			2,500,000
April . 2000		46	11,300,000			11,300,000
July . 2001	38	41	3,800,000			3,800,000
February. 2005	100	74	17,450,000	441,000		17,891,000
DROUGHT						
1999 / 2000	8,278	2,779	248,365,600			248,365,600
1995		1,817	149,027,085			
1997		5,907	254,266,420			
March. 2005	14,269	2,058	296,048,100			296,048,100
4-Mar-2008	70	79	34,119,000	640,000		34,759,000
Total	**290,395**	**44,363**	**6,424,950,128**	**896,383,350**	**47,451,000**	**7,512,789,483**

(Source: Rural Agricultural Development Authority, RADA)

Intervention Target: Coastal Area - Negril

While most tropical cyclones take an east to west track from the Atlantic into the Caribbean, systems that form in the central Caribbean during mid to late October through to December and move north, are a threat to Negril as the south-western beaches which are normally protected from the east-west tracking systems are exposed directly to the storm surges and swell waves of these north-northwest tracking systems.

Data from the National Hurricane Centre showed that 83 tropical storms and hurricanes have passed within 300km of the Negril coastline during the period 1900 to 2006. Furthermore, there is empirical evidence that from 1950 -2007 approximately 79 storm systems came within 250 miles of Jamaica. Thirty or approximately 41 per cent of these storms can be categorized as late season systems. Thirty one (31) systems attained hurricane status at their closest points to Jamaica. Over the last 50 years there have been at least six periods of higher than normal storm activity, all of which had storm erosion implications for Long Bay Negril. These periods are; 1950-1952, 1961-1964, 1969-1971, 1979-1981, 1988-2001 and 2004-2007 (NEPA, n.d.).Table 4 shows some storms whose trajectory path was close to Negril from 1998 – 2007.

Table 5: Storms Passing Close to Negril 1998 – 2007

Hurricane	Impacting Date	Status closest to Jamaica	Direction of movement	Main features
Mitch	October 25- 27, 1998	Category 4	230 miles south and North West	One of the deadliest and most powerful hurricanes on record in the Atlantic basin. Reached category 5 status.
Michelle	October 31, 2001	Category 4	250 miles west and North	One of the strongest hurricanes of the 2001 Atlantic hurricane season. Reached category 4 status.
Ivan	September 10, 2004	Category 4	30 miles south and west	Strongest hurricane of the 2004 Atlantic hurricane season. Reached category 5 status.
Wilma	October 16-18 2005	Tropical depression	160 miles south – north west	The most intense hurricane ever recorded in the Atlantic basin

Dean	August 20, 2007	Category 4	50-60 miles south and west	Strongest tropical cyclone of the 2007 Atlantic hurricane season. Reached category 5 status.

(Source: National Environment and Planning Agency (NEPA)

Hurricane Ivan caused severe damage to natural coastal assets, which sustained damage of about J$600 million. Coral reefs were badly affected: branching forms were broken, coral heads toppled, and coral rubble scattered (PIOJ 2004). The beach in Negril suffered a net loss of 4 m (Table 5). Hurricane Wilma in 2005 also resulted in significant beach erosion, compounding the on-going decline in beach width, and also hampering the recovery that was taking place after the damage from Hurricane Ivan. A large quantity of sea weed was uprooted. Further details are provided in Table 5.

Table 6: Impact of selected events on beach erosion in Negril

Major Events	Impact on Beach
Hurricane Michelle, 2001	1. Eroded 14 m 2. Accreted 14 m
Hurricane Ivan, 2004	1. Average erosion of 16 m 2. Average accretion of 12 m 3. Net change: **Loss of 4m** of beach
Hurricane Wilma, 2005	1. Average erosion of 19 m 2. Average accretion of 18 m 3. Net change: **Loss of 1 m**
Hurricane Dean, 2007	1. Average erosion of 11 m 2. Average accretion currently not available

Source: NEPA (n.d.)

In 2010, severe weather associated with Tropical Depression No. 16, later to become Tropical Storm Nicole, caused adverse effects on the resort area of Negril (PIOJ 2010). This again led to extensive beach erosion and loss of vegetation.

The natural breakwaters, particularly coral reefs, have been able to provide protection to the coastline in the past. However, constant pressure from changing natural elements and human factors has reduced their resilience to natural hazards and therefore reduced their ability to diffuse wave energy. Projections by the IPCC (2007) suggest that the North Atlantic region is likely to experience an increase in the frequency of more intense cyclone systems (Categories 4 and 5). This implies that coral reefs, seagrass beds and beaches will be exposed to even higher energy waves and storm surge with attendant environmental and economic effects.

Intervention Target: Agriculture

Climate change is likely to further aggravate long-term trends in damage and losses, thus placing inland and coastal communities under intense pressure to secure their livelihoods and food security. The plant production cycle of a large majority of small farmers is wholly dependent on the seasons. This has, more often than not resulted in large surpluses of food in the rainy season and shortages of food in the dry season. Climate change effects, including extended periods of drought, increasing frequency of flooding and changes in rainfall will worsen soil erosion and degradation and affect water

quality. Recharge of groundwater aquifers will also be affected. This will result in major economic losses, disruption of livelihoods and increase the threat to food security given decreased crop yields. Figure E shows the historical impact of climate related events on agricultural production.

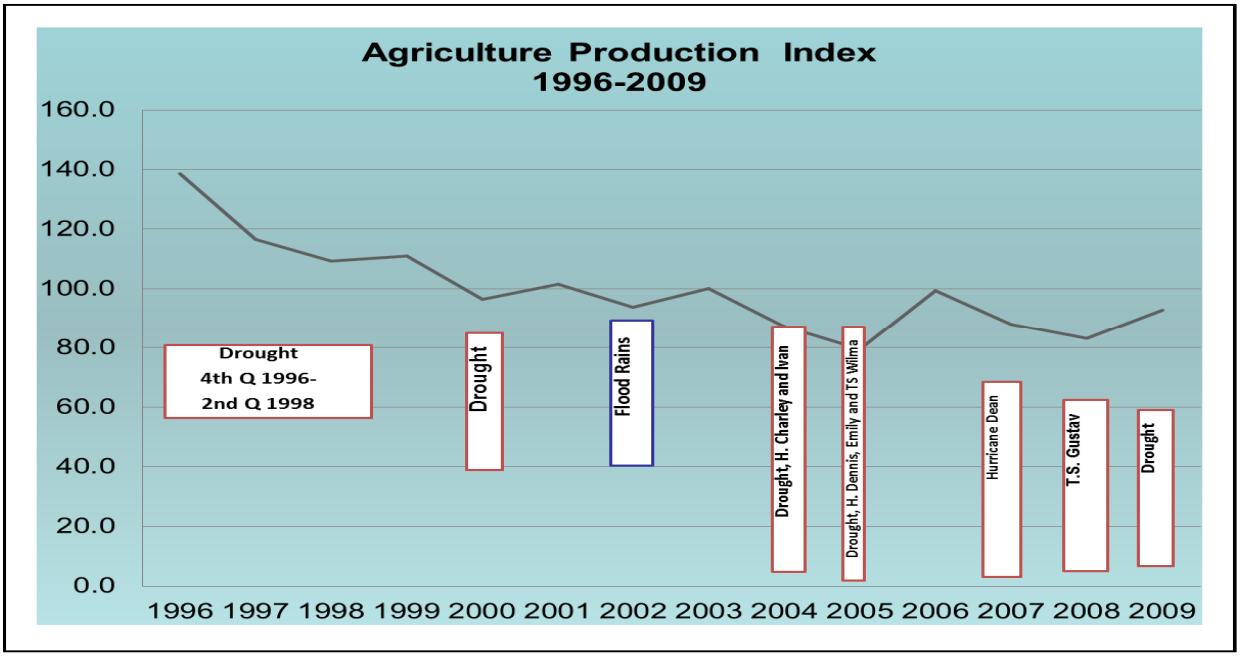


Figure D: Agriculture Production Index, 1996 - 2009 and the Impact of Extreme Climate Events

(Source: Ministry of Agriculture and Fisheries, MOAF)

Projections are that climate change will exacerbate the impacts observed over the last two decades. Thus, it is estimated that the economic impact from climate-related disasters will increase from 2-3 per cent of GDP annually to 13.9 per cent by 2025 (based on 2004 GDP), 27.9 per cent by 2050, 42.3 per cent by 2075 and approximately 56.9 per cent by 2100.[13] Should these projections be realized, they would significantly alter the country's current and planned development path, reduce food security and further marginalise the poor, thereby increasing their vulnerability.

Following extensive vulnerability and adaptation assessments of five sectors, namely Water Resources, Agriculture, Coastal Resources and Human Settlement, Health and Tourism, carried out under Jamaica's Second National Communication (SNC) to the United Nations Framework Convention on Climate Change (UNFCCC), it was identified that much more needs to be done to improve climate resilience. The five areas were identified as being priority sectors for climate change adaptation. For this AF programme, agriculture and coastal resources are the primary sectors being addressed. However, intervention in these sectors will have spin-off benefits for the other three sectors.

The agricultural and coastal and marine resources sectors provide good examples of the nexus between climate change and environmental degradation, particularly in rural communities, most of which have a high degree of dependence on natural resources. For example, the main economic activities of the communities being targeted by this programme are centred on subsistence farming, fishing and tourism. The limited availability of alternative livelihoods and the generally high poverty rates among these communities make them highly vulnerable to external shocks.

[13]Bueno et al, (2008)

Component 1: Increasing the climate resilience of the Negril coastline

General Information:

Negril is one of Jamaica's main tourist areas, providing micro and macro-economic benefits. The interventions identified in Component 1 of the AF programme are geared specifically towards the main beach areas of Long Bay and Bloody Bay which are confined to narrow, low-lying lands between the Caribbean Sea and the Negril Great Morass. The area is a barrier beach system with elevations not exceeding 2m.

Climate Impacts:

According to the United Nations Environment Programme (UNEP) 2010 report entitled "Linking Ecosystems to Risk and Vulnerability Reduction: The Case of Jamaica" under a project called RiVAMP[14,] the beaches in Negril have been eroding at a rate of 0.5m/year and 1.0 m/year in Bloody Bay and Long Bay respectively over the past 40 years. Some sections of the beach have retreated more than 55m during that period. Evidence suggests these trends were likely due to:

- accelerated sea level rise which was estimated at 0.14 m over the 1968 to 2006 period; and
- recent intensification and changes in storm wave and storm surge activities in the region.

Negril, specifically in the Long Bay and Bloody Bay vicinity, has also suffered due to the degradation of coastal and marine ecosystems – mainly coral reefs and seagrass meadows – which are also responsible for the supply of biogenic sand and the protection of the coastline. The damage to these natural assets has resulted in a decline in fish and other marine species. In community consultations conducted under the RiVAMP project, many fisher-folk highlighted the decline in the quantity of fish and also linked it to the decline in ecosystem health. It was no longer a viable livelihood for many, who sought alternative livelihoods including small-scale farming and jobs in the tourism sector.

It is becoming evident that climatic changes – storm activity, sea level rise, and sea surface temperatures (SST) – will exacerbate the existing degradation in Negril. Global circulation models (GCMs) are inconclusive on their projections for the frequency of storms in the Atlantic Ocean basin according to several studies such as the IPCC (2007) report and studies conducted by CARIBSAVE (2009). However, there is general agreement among Caribbean climate scientists that the number of intense storms will increase. The Index of Coastal Vulnerability to sea level rise applied to Long Bay suggests that it is highly vulnerable, according to Jamaica's SNC to the UNFCCC. The SNC also highlights projected estimates of shoreline retreat of 10-14 m by 2015, 26-41 m by 2030 and 51-94 m by 2050. Additionally, it is expected that sea surface temperature (SST) will increase.

Human Impact

The human activities that have influenced the degradation in Negril are primarily those which have contributed to destruction of natural ecosystems. The extent of this impact is difficult to quantify. However, there is evidence to suggest that coastal development and agricultural practices have been the important drivers. Of note however, is ongoing work to reduce the negative impacts of the practices listed below:

- Destructive fishing practices – In the past, fisher-folk used several types of fishing techniques, many of which damaged coral reefs, e.g. dynamite fishing. However, the Fisheries Division and active non-governmental organizations (NGOs) such as the Negril Coral Reef Preservation Society (NCRPS)

[15]RiVAMP is Risk and Vulnerability Assessment Methodology Development Project. The study can be accessed from the following website: http://www.grid.unep.ch/product/publication/download/RiVAMP.pdf

and the Negril Area Environment Protection Trust (NEPT) have worked with fisher-folk to help them understand the need for other techniques. Many of these practices are therefore no longer being used. Efforts are on-going to ensure continued reduction in these practices.

- Unsustainable hillside farming -many farmers cultivate crops and rear livestock on hillsides that are up-stream of the Negril coastline. With regards to crop production, much of these farming practices are destructive in that trees are removed and harmful chemicals used. Following heavy rainfall events, the run-off from these activities adversely impacts the health of coastal ecosystems. The local NGO groups including NEPT are making efforts to educate farmers on the need to change these destructive practices. NEPT has developed a project for the reforestation of select degraded areas and are awaiting funding for implementation.

- Coastal development – The boom of the tourism sector in Negril has resulted in widespread development. This has increased the waste generated in the area and has posed a challenge for waste water and solid waste disposal. Whilst this remains an issue, both are being addressed. Recently, the GOJ embarked on rehabilitation of the waste water plant with assistance of the European Union. Furthermore, there is on-going plastic recycling by the Negril Chamber of Commerce and the collection of solid waste by the local authorities. The extent to which these contribute to ecosystem degradation has therefore been significantly reduced, and it is expected that these and other initiatives will continue.

Continued beach erosion has resulted in economic and social impacts. The retreating shoreline has increased the exposure of infrastructure to natural hazards. The majority of hotels are located along the Long Bay and Bloody Bay beaches and has suffered physically and financially from past hydro-meteorological events. Furthermore, there has been social dislocation from loss of income and property.

A semi-quantitative Index of Coastal Vulnerability (CVI) to Sea-Level Rise, derived from one used by the United States Geological Survey for National Parks, was applied to five study areas in Jamaica. The index indicated that Long Bay is highly vulnerable to sea-level rise (SNC 2010).

Component 2: Enhancing the climate resilience of the agricultural sector by improving water and land management in select communities

General Information:

Agriculture is the sector which employs the largest labour force. This highlights the role which the sector plays in the livelihoods of many households, particularly in the rural areas.

Human Impacts:

Traditional farming practices have been characterized largely by unsustainable farming techniques including:

- removal of tree cover on steep slopes
- “slash and burn” clearing of land
- poor agronomic techniques
- inappropriate crop selection

These have led to soil erosion, land degradation, and downstream flooding. These problems combined often pose a threat to the marine environment as they result in siltation and nutrient loading, which can lead to the degradation of coastal and marine ecosystem. The traditional practices of many

farmers have made it challenging to change behaviour in a short time. However, there is evidence that farmers are receptive to the good practices being introduced by various groups and organizations. For instance, demonstration plots have been found to be a useful tool by the Ministry of Agriculture as farmers are able to see the positive results of non-traditional techniques.

Climate Impacts:

Consultations with farmers have shown that there is growing uncertainty in determining the best planting times given the changing patterns in climate parameters, especially rainfall. This unpredictability is thought to be related to climate change and is expected to worsen over time. Among the impacts that have been experienced so far are crop losses due to the emergence of disease and pests, floods and drought. This has in turn contributed to loss of income, a situation exacerbated by the fact that many farmers do not have alternative source of income.

Small farmers have suffered the most from these climate change impacts – floods have destroyed their crops, washed away top soils and eroded river banks. In addition, increased periods of drought have caused widespread water shortages in many areas of the country, in particular the southern parishes. Weather related shocks accounted for the most significant losses in agricultural production during the period 2004–2008 with damage and losses to the agricultural sector estimated at $15 billion. In 2010, 17 000 food crop farmers and 1700 livestock farmers suffered losses of crops and animals amounting to $576.5 million during rains associated with Tropical Depression #16. In 2008, local farmers produced 58.8 per cent[15] of the total value of food consumed which is indicative of the vital role the sector plays in maintaining food stability

The impacts of climate hazards on the agricultural sector have been made worse by the sector's low adaptive capacity and low resilience to hazards related to climate change. The low capacity is influenced by such factors as high levels of poverty among farmers, low levels of technology and poor water and land management practices. The National Agriculture Sub-Sector Plan, (within the context of Vision 2030 Jamaica - National Development Plan) has identified undue reliance on rain fed agriculture insufficient harvesting of water resources for storage and conveyance to productive areas and vulnerability to natural hazards among the main constraints affecting the performance of the agricultural sector.

Several measures have been implemented and others are planned to ensure that livelihoods are protected and food security bolstered. Among them are, for example, expanded use of dry farming techniques, and changing crop species to climate resilient ones. However, a multi-faceted approach is required and additional approaches are proposed under this project.

Programme Location

Jamaica is divided into 13 administrative regions, comprising 14 parishes. The parishes of Kingston and St Andrew are joined for administrative purposes. The sites selected for programme intervention will cover 7 parishes, namely Westmoreland, Manchester, Clarendon, St. Mary, St. Ann, Trelawny and St. Thomas (Figure F).

[A]pp. US$802 million

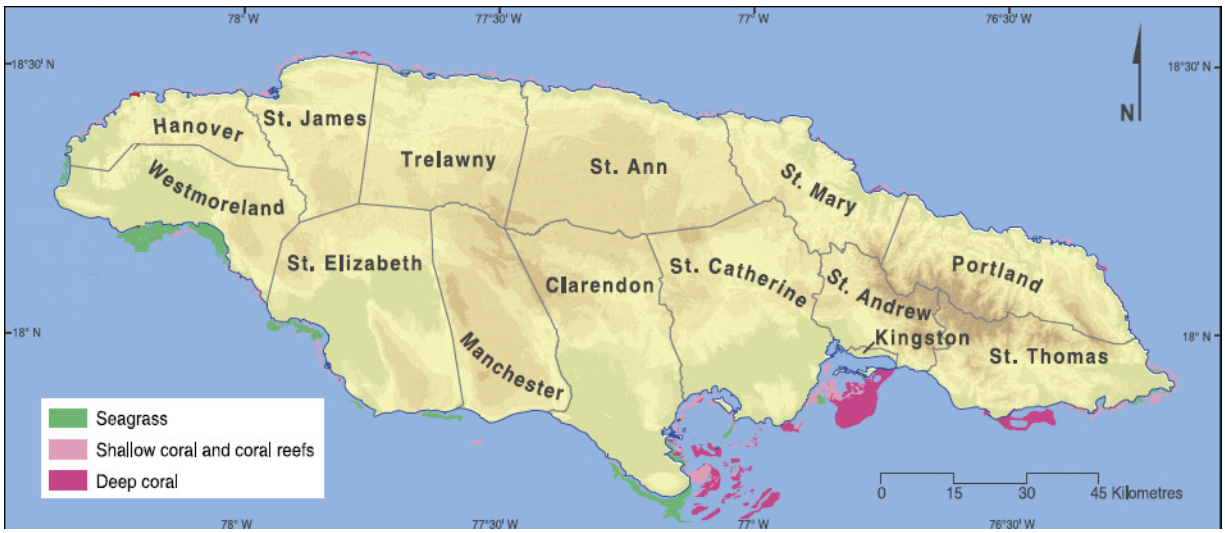


Figure E: Map of Jamaica Showing 14 Parishes (Source: UNEP, 2010)

Component 1:

Westmoreland - Negril: The wider Negril area has an estimated 2,280 households. Fishing, farming and tourism are the principal economic activities. Negril has consistently been impacted by climate related hazards, particularly, the Negril Beach area which is located along the west coast of Jamaica (Figure E).

The coastline of Negril consists of two beaches with a total length of 9.1 km (5.6 miles). The southern bay is called Long Bay and has a coastline stretching over a distance of 7 km (4.3 miles), with the beach width varying significantly from north to south. Persistent coastal erosion, leading to the narrowing of the beach at Long Bay and Bloody Bay has been one of the most challenging problems affecting Negril over the past few years. This has been documented in several studies[16], the most recent identifying that "some sites in Negril have experienced shoreline retreats of more than 55m over the period 1968 – 2008".The evidence in these studies has been corroborated by measurements undertaken by the Negril Coral Reef Preservation Society (NCRPS), a local Non-Governmental Organisation, (NGO) and beach profiling carried out by the National Environment and Planning Agency (NEPA). Projections are that unless significant work is undertaken, continued coastal flooding and beach erosion in the Negril area will be significant. Outputs based on global projection models for long term sea-level rise and local predictions for extreme storm waves and surges, indicate that "an extreme storm event with a 50 year return period will result in a total loss of about 35 per cent of the beach in terms of length while another 50 per cent of the beach will lose more than half of its present width" (UNEP 2010).

[16]See Smith Warner Study. Negril Coral Reef Preservation Society. 2007; Risk and Vulnerability Assessment Methodology Development Project (RiVAMP). UNEP/ PIOJ.2010; Second National Communication to the UNFCCC.2009; Negril Destination Profile.CARIBSAVE Climate Change, Tourism and Livelihoods Project. 2010; Report on a Survey of Elevations and Beach Changes at Negril, Jamaica. Prepared by the Marine Geology Unit, Department of Geography and Geology, University of the West Indies for Environmental Foundation of Jamaica. 2008).

Figure F: General Map of Negril (Source: UNEP, 2010)

The IPCC (IPCC 2007) suggests an increase of 10–20 per cent in the intensity of tropical cyclones under enhanced atmospheric carbon dioxide conditions. The fact that four of the Atlantic's six most intense hurricanes that have occurred over the last ten years (Mitch 1998, Ivan 2004, Wilma 2005, Dean 2007) have had a damaging impact on the Negril beach, further underscores the vulnerability of the area. In terms of human impact and the exposure of social and economic infrastructure, the projections are that for the fifty year storm surge event, 2 500 residents are exposed, as well as water and waste water treatment facilities, schools, 5 health centres, 63 hotels, one aerodrome, and a market (RiVAMP).

Given the state of degradation of coastal resources and the threats of continued climate change, the long-term solution to the problem requires an integrated approach. This includes the implementation of structural and non-structural adaptation measures while simultaneously addressing practices that result in poor coastal water quality, and deteriorating coastal ecosystems.

Component 2

Terrestrial ecosystems have seen severe degradation to watersheds due to unsustainable land management practices. Nineteen of the 26 watersheds are considered highly degraded due to: relatively high levels of soil erosion, siltation and turbidity and reduced quality of water. This is shown Deforestation for charcoal production, yam sticks and lumber, inappropriate hillside agricultural practices and poor land husbandry techniques

- Illegal settlements on hillside lands and poor construction and lack of maintenance of roads;
- Forest fires of anthropogenic origin
- Illegal quarrying and sand mining

The social, economic and ecological effects of this degradation include reduced water quality and quantity, loss of habitat for commercially and ecologically important wildlife, and reduced land productivity, all of which may be further exacerbated by the impacts of climate change.

Northern Manchester

This region is comprised of farming communities with over 2 100 households and having a poverty prevalence of 23.7 per cent[17]. It is characterized mainly by small farmers who grow irish potatoes, red peas, and other cash crops such as lettuce and tomatoes. The region produces about a third of the potatoes for the parish of Manchester and is also one of the largest suppliers of irish potato seeds. Agriculture in the region is primarily rain-fed. The 30 year mean rainfall is shown in Figure A.

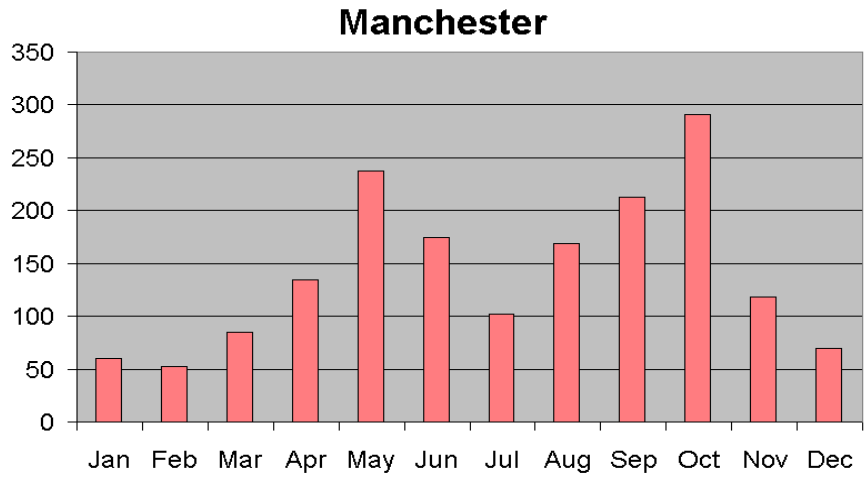


Figure G: Mean rainfall for Manchester, 1951-1980 (Source: National Met Service)

Clarendon - South Clarendon and Rio Minho Watershed

The Rio Minho Watershed extends from northern to southern Clarendon and is one of the most degraded watersheds in the country. The Bull Head region, within the Rio Minho Watershed is one of the areas to be targeted. It is within a forest reserve and is home to some 23 communities with an estimated population of 69 000. Farming is a major livelihood activity in the area where mixed cropping is practised. Both frequency and intensity of rainfall as well as prolonged droughts occurring in the Bull Head area have exacerbated the degradation of the watershed which has impacted on food security and livelihoods. Figure J shows the 30 year mean rainfall for Clarendon.

[17]PIOJ, 2008. Mapping Poverty Indicators: Consumption and Basic Needs in Jamaica, 2001/2002

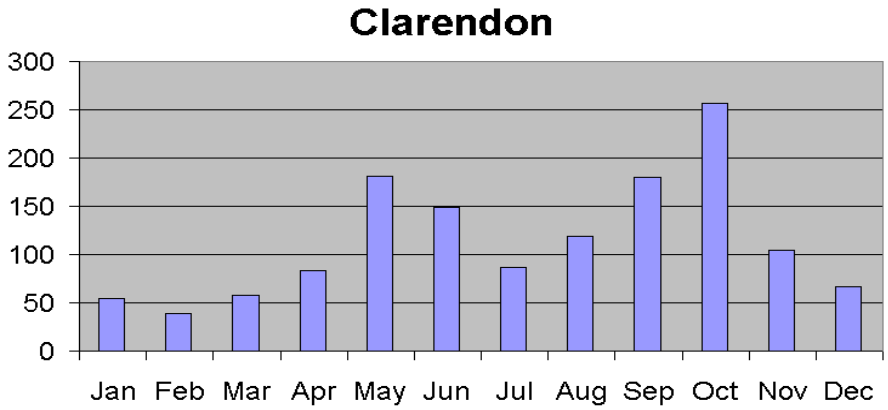


Figure H: Mean rainfall for Clarendon, 1951-1980 (Source: National Met Service)

The interventions in this area will support a "ridge to reef" approach. Infrastructure such as green gullies will be installed to reduce soil erosion and land slips within the watershed. Water catchment facilities will be established to provide a source of water during the dry periods.

Additionally, the following land husbandry techniques, to be promoted and implemented through interventions in the area, will improve soil nutrient content, infiltration and soil permeability, and help to control runoff and reduce soil erosion:

- minimum or zero tillage
- intercropping
- contour ridges and vegetative and trash contour barriers
- mulching
- composting

Water Management

Trelawny, St. Mary, St. Ann, St. Catherine and Clarendon are being targeted for the rainwater harvesting and drip irrigation sub-component of Component 2. All, with the exception of St. Catherine, rank among the top seven poorest parishes in the country according to the latest available Poverty Map. A large proportion of residents in these parishes derive their income from farming. Agriculture in these parishes experiences the greatest impact in periods of drought.

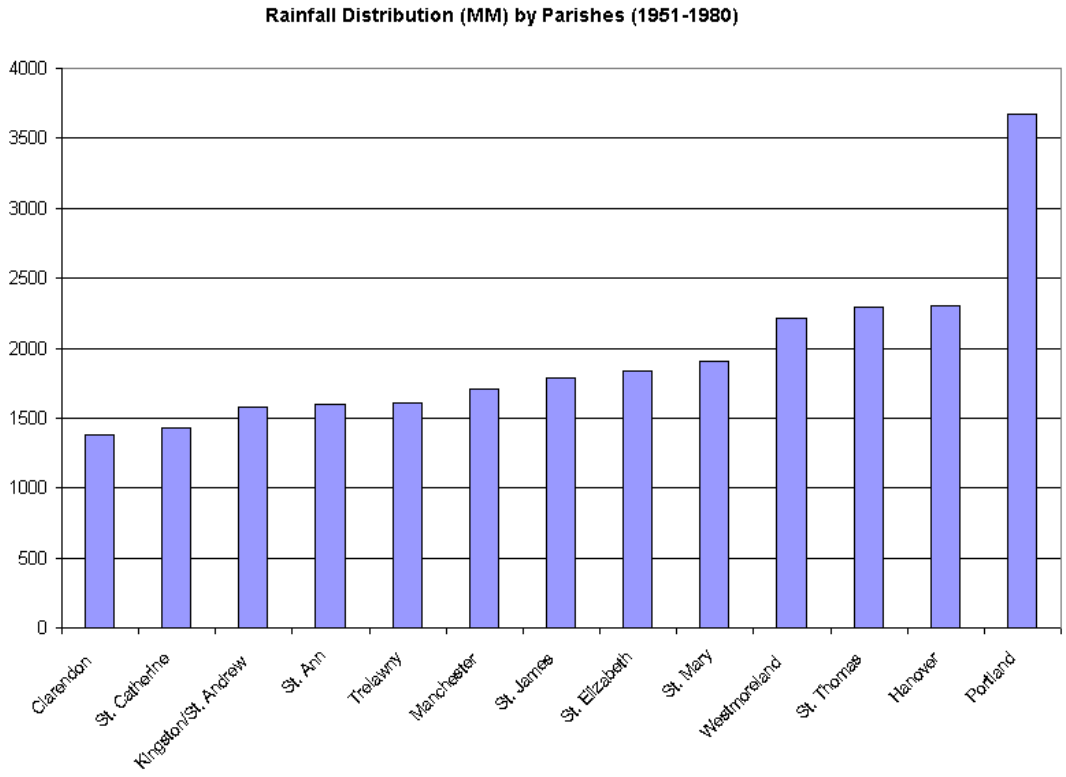


Figure I: Mean rainfall distribution by parish (Source: National Met Service)

Component 3

Component 3 will be implemented across the parishes in which Components 1 and 2 are being implemented.

A 2005 survey of Knowledge, Attitudes and Practice (KAP) towards climate change in Jamaica done under the Jamaica Climate Change Enabling Activity Project (JCCEAP) showed that the overwhelming majority of persons surveyed thought that the government should take primary responsibility for addressing issues related to climate change. In addition, the survey detected a general feeling of complacency among the public about climate change and its effects. Interestingly, the survey showed that 91.3 per cent of persons associated drought and 88.2 per cent associated floods with climate change. The majority of persons surveyed thought that their communities were only somewhat at risk from climate change, and that climate change was more important to the country in general than to their communities. The consultations with farmers highlighted the existence of some experiential knowledge of the impacts of climate change, particularly with respect to the unpredictability of the planting season and that a direct link was being made between this and livelihoods prospects. They also highlighted that there was still need to address the findings of the last KAP and particularly to empower residents to play a greater role in building capacity for adapting to climate change.

The success of the projects developed under this Adaptation Fund programme, as well as their sustainability over the long term, depend on acceptance and ownership from the targeted communities. The findings of the 2005 KAP survey suggest that there needs to be a concentrated effort at building public awareness on climate change, its effects and adaptation measures to counter

these effects, as well as the importance of the contribution of the population to the country's adaptation efforts. Component 3 of this programme seeks to build awareness, improve local level capacity and transfer sustainable natural resource management practices to the targeted communities. In addition a climate change atlas showing the coastal areas vulnerable to effects of storm surge and intense wave action will be produced.

The three components are linked by a common theme of sustaining livelihoods, improving food security and safeguarding natural resources. Whereas Components 1 and 2 involve adaptation activities directed at environmental, sectoral and livelihoods assets, Component 3 directly addresses the human dimension increasing knowledge and changing attitudes to foster ownership and sustainability. It also focuses on strengthening the local planning base through increasing technical knowledge and know and providing data to inform actions. Thus, the three components recognise the interplay between humans and the environment. Better land husbandry and soil management techniques will ultimately reduce erosion of soil and therefore decrease the turbidity in the marine environment. A better quality of coastal water will improve the marine habitat which in turn will contribute to increased fish stocks. All these loop back to improved livelihood and well-being for residents.

4. PROJECT / PROGRAMME OBJECTIVES:

The primary objective of the programme is to increase livelihoods security of the population in the targeted communities and to increase the climate resilience of sections of the Negril coastline, which will also contribute to increased security of livelihoods.

The proposed activities under this programme will help to build Jamaica's adaptive capacity in accordance with the objectives of Vision 2030 Jamaica National Development Plan and Jamaica's Second National Communication on Climate Change. The programme will involve water harvesting and management; erosion control and techniques which improve soil moisture retention. The programme will also support climate resilient coastal management in Negril. In addition, capacity building interventions will be undertaken to complement the other two sector component programmes and will involve training of communities in disaster risk management, natural resource management techniques and climate change adaptation. A 'no project option' will mean that populations in the targeted areas will be significantly impacted by climate change, given that the population and economic livelihoods in which they are involved and dependent on, are highly vulnerable to climate risks. This would translate into loss of livelihoods, loss of food security and a continuation or exacerbation of poverty (See Figure L).

Overall Objective: **To protect livelihoods and food security in vulnerable communities by: improving land and water management for the agricultural sector, strengthening coastal protection and building institutional and local capacity for climate change adaptation.**

The three components of the programme are outlined as follows:

Component 1: **Increasing climate resilience of the Negril coastline**

Component 2: **Enhancing climate resilience of the agricultural sector by improving water and land management in select communities**

Component 3: **Improving institutional and local level capacity for sustainable management of natural resources and in disaster risk reduction in the targeted vulnerable areas; and raising awareness for behaviour modification**

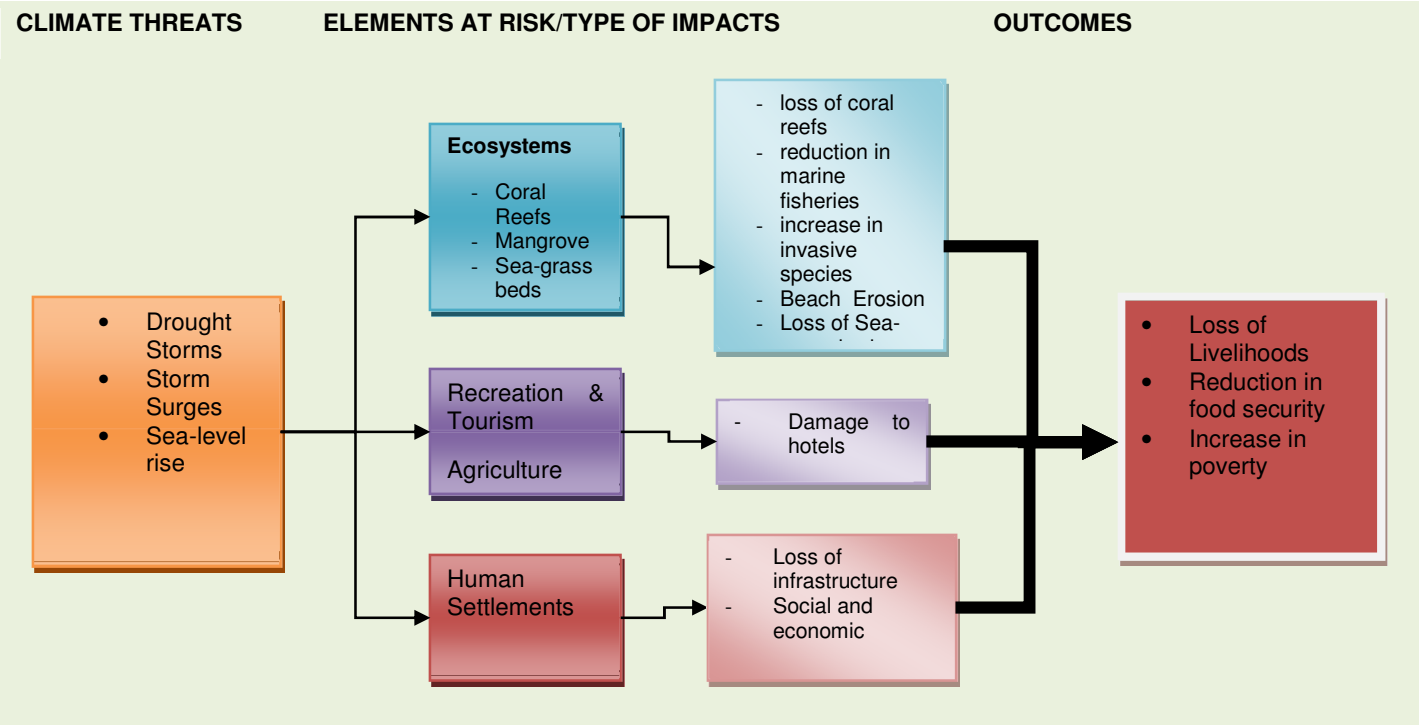


Figure J: Climate Risks, Impact, and Expected 'No-Intervention' Outcomes (Source: PIOJ)

PROJECT / PROGRAMME COMPONENTS AND FINANCING:

Programme Components	Concrete Outputs	Expected Outcomes	Amount (US$)
Component 1: **Increasing the climate resilience of the Negril coastline** **Cost including fees & permits**	Installation of breakwater structures	Slowed rate of beach erosion and longer term beach restoration; Reduced exposure of coastal, social, economic and environmental assets including the Negril Great Morass against storms and storm surges Restoration and improved hazard reduction functions/ services of critical coastal and ecosystems – seagrass beds and coral reefs Protected livelihoods – fishing, tourism interests (including farmers and locals who depend on tourism for their income)	**5,480,780.60**
Component 2: **Enhancing the climate resilience of the agricultural sector by improving water and land management in select communities** **Total**	Establishment of a micro-dam Establishment of small scale irrigation facilities and production and productivity programmes using climate-smart agriculture Implementation of 50 rainwater harvesting and 60 small scale drip irrigation systems in Trelawny, St. Mary, St. Ann, St. Catherine, St. Thomas and Clarendon. Establishment and rehabilitation of soil conservation and land husbandry infrastructure and application of suitable methodologies (eg, demonstration plots)	Increased availability of and access to domestic and irrigation water supplies leading to increased productivity and increased food security Decline in soil erosion and improved soil fertility Reduced downstream flooding and fewer landslides in upland communities. Reduced turbidity and pollution of coastal waters Protection of coastal ecosystems	**2,503,725.00**
Component 3:	Communication and	Increased knowledge of	

Programme Components	Concrete Outputs	Expected Outcomes	Amount (US$)
A. **Improving institutional and local level capacity for sustainable management of natural resources and disaster risk reduction in the targeted vulnerable areas**	awareness programme on sound environmental management, particularly to reduce risks associated with hazards Training of local communities and entities in disaster risk reduction (DRR) and natural resources management Development of guidelines/technical standards for beach restoration and shoreline protection Development of adaptation plans for the most vulnerable areas along the Negril coastline Documenting lessons learnt from the implementation Development of a climate risk atlas – storm surge, sea level rise, etc – to be used in the development planning process Building capacity of vulnerable farming communities for better land and water management by: establishing water-user groups; conducting workshops and field visits for farmer training in water and land management and climate smart agriculture Farmer field schools to develop solutions and demonstrate good practices led by farmers	climate change and adaptation options at the local level; Enhanced local capacity for sustainable use of environmental resources Increased knowledge of and participation in disaster risk management and adaptation to climate change New traditions of environmental good practices Standardized approach to beach restoration Climate resilient development planning Better informed decision-making among farmers and local residents and reduced exposure to climate-related risks	
B. Awareness Building and Knowledge	Climate change awareness and education programmes developed and	Strengthened awareness Improved buy-in and	

Programme Components	Concrete Outputs	Expected Outcomes	Amount (US$)
Management **Total** **(Component 3)**	implemented in project communities Lessons learned and good practices: documented and shared among other communities, community and trade organizations, water user groups, technical groups and agencies; incorporated in related national standards, policies and programmes; and disseminated through workshops, project reports; the print and electronic media, websites, social and economic information network (SECIN)	ownership by local stakeholders Programme Sustainability Standard approach to adaptation across communities	**785,500.00**
Total components 1,2,3			**8,770,000.00**
Management Fees			780,000.00
Programme Execution Cost			415,000.00
PFG			30,000.00
Total budget			**9,995,000.00**

PROJECTED CALENDAR:

MILESTONES	EXPECTED DATES
Re-submission of Concept to AF	May 2011
Approval of the Concept by the AF Board	June 2011
Submission of a Full Programme Proposal to AF	April 2012
Start of Project/Programme Implementation	August–September 2012
Mid-term Review (if planned)	March 2014

Project/Programme Closing	December 2015
Terminal Evaluation	February/March 2016

PART II: PROJECT / PROGRAMME JUSTIFICATION

This programme is intended to facilitate the implementation of options that are integral to the climate change adaptation initiatives for the country, particularly as it relates to livelihoods protection and food security. The activities identified in this programme are drawn from the adaptation priorities that were identified in the vulnerability and adaptation assessments for the agriculture and coastal resources sectors. A summary of the climate change-related hazards in the areas targeted for intervention is shown in Table 7.

Table 7: Climate Related Hazards in Negril and the Agriculture Sector

THEMATIC FOCUS	***LOCATION***	***HAZARD***	***INTERVENTION***
Coastal Adaptation	Negril	• Storm Surge • Sea Level Rise • Intense Storms	• Breakwaters • Local capacity building
Agricultural Adaptation	Northern Manchester	• Drought • Intense Rainfall • Pests	• Micro Dam • Local capacity building • Biological control
	Rio Minho Watershed, Clarendon	• Intense Rainfall • Drought • Bush Fires • Landslides	• Flood mitigation infrastructure • Land husbandry and soil conservation techniques • Forest management
	Trelawny, St. Mary, St. Ann, St. Thomas, St Catherine and Clarendon	• Drought • Soil erosion	• Rainwater Harvesting • Drip Irrigation • Soil conservation

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

The programme provides an integrated approach to climate change adaptation and resilience building. It focuses on environmental and natural resource management activities; namely, coastal rehabilitation, inland flood and erosion control, and land and water management. The programme has, as its long term outcome, the protection of livelihoods and natural resources for the benefit of residents of the targeted communities as well as the country.

Components 1 and 2, though distinct, are mutually reinforcing particularly with respect to the protection of livelihoods and ensuring food security, resulting in the reduction of vulnerability of the human population as well as the natural environment. The project components are linked at the policy, management and economic levels. At the policy level the two components fit into the national

goal of promoting integrated coastal zone and watershed management as articulated in **Vision 2030 – Jamaica National Development Plan**. At the management level, both components have been prioritized to complement other activities being undertaken to improve coastal zone and watershed management and strengthen the symbiotic relationship which exists between the upper watershed and coastal areas in critical sections of the country. The focus on integrated coastal zone and watershed management is significant because this approach to ecosystem management can contribute considerably to socio-economic development without compromising natural resources. In addition, Components 1and 2 have economic linkages in that the agricultural areas being targeted for intervention in Northern Manchester and Clarendon are major suppliers of agricultural produce to Negril's tourism sector which employs a significant number of persons from poor households. This link reinforces the need to implement measures to sustain livelihoods and enhance food security among vulnerable populations in both areas.

Current national agri-environmental programmes seek to promote proper agricultural practices including integrated farm management, irrigation facilities, better land husbandry techniques and incorporation of structures for better resilience. These programmes have the potential to generate a range of beneficial environmental effects including soil conservation, improved soil fertility, and improved water availability. Component 2 will seek to support this thrust by promoting sustainable practices within watersheds. It is anticipated that this will result in better soil management and increased food production. In addition, the activities in Component 2 will reduce the volume of eroded soil reaching the coast, thus contributing to better coastal water quality and decreased ecosystem degradation. As Figure E shows there are coral reefs off the coast of Clarendon, St Catherine, Trelawny and St Ann. The programme activities within these parishes, which are aimed at reducing soil loss and landslide activity, will therefore benefit the coastal ecosystems by reducing deposition of silt on coral beds which are important for sustaining fisheries. For the Negril area, stabilisation of beaches (and subsequent re-growth of seagrass meadows) will support income earning activities in both tourism and fisheries sectors while providing protection for natural assets from the impacts of climate change.

Components 1 and 2 are complemented by the capacity building focus of Component 3 which seeks to ensure that the programme outcomes are sustained through proposed capacity and awareness building interventions.

All three components of the programme address issues related to the impact of a changing climate, and will result in increased climate resilience. It should be noted that these are not stand-alone activities and will complement or be complemented by other initiatives.

Component 1: Increasing the climate resilience of the Negril coastline

Resources are being sought from the AFB to install hard engineering structures to control coastal erosion of Negril's beaches from the climate related hazards of sea-level rise, and intense storms.

Efforts are needed to reduce the human impact and to provide a means through which the ecosystems can recover and therefore become more resilient with appropriate maintenance. This programme will be necessary to provide resources to make a positive and meaningful impact.

Programme resources will be used to create a structural stabilisation solution to arrest shoreline retreat in the most vulnerable sections of the Negril coastline. One of the main factors affecting the vulnerability of Negril in this area relates to the impact of late season storms which form in the Central Caribbean during mid to late October to December. While most storms approaching from the Atlantic normally take an east to west track, these late season systems often start within the Caribbean Sea and take a northerly path and therefore have significant implications for Negril. Under these circumstances, Jamaica's south-western beaches which are normally protected from the east-west

tracking hurricanes and storms are exposed directly to the storm surges and swell waves that these late season systems generate. This problem has been exacerbated by the reduced protection of seagrass beds in the area. A recent risk analysis of the Negril area highlighted a correlation between ecological resources and shoreline retreat that was identified in the RiVAMP study. The risk analysis further indicated that the missing patches of sea-grass beds occurred 500-700 metres from the area of the Negril shoreline that is most at risk. This loss of sea-grass beds has negative implications for food security as they serve as a habitat for juvenile fish.

The objectives of this component will be achieved by installing breakwaters which will help the rehabilitation of existing seagrass beds. The endorsed activities have been adjusted to relate to the installation of the breakwater only (i.e., without the replanting of seagrass beds). This decision was arrived at after the following:

- The technical advice of the coastal engineer employed to inform on the best solutions for the area. He advised that it is more optimal to invest in the breakwater system as this will create enabling conditions to foster regrowth given the low energywave regime expected after the installation;
- The cost of rehabilitation, which was estimated at US$8m is well beyond the scope of this programme
- Restoration of seagrass beds in Negril under the Climate Change Adaptation and Disaster Risk Reduction Project (CCADRRP).
- Evidence of natural regrowth now occurring in Negril. Evidence of this is shown in Figure K below. The improved conditions created by breakwaters will further enhance this process.
- Consultation with Negril stakeholders. The Negril stakeholders indicated a preference for AF programme resources to focus on hard engineering solutions with the understanding that the seagrass beds can undergo natural regeneration or form part of the work programme of local environmental and other groups.

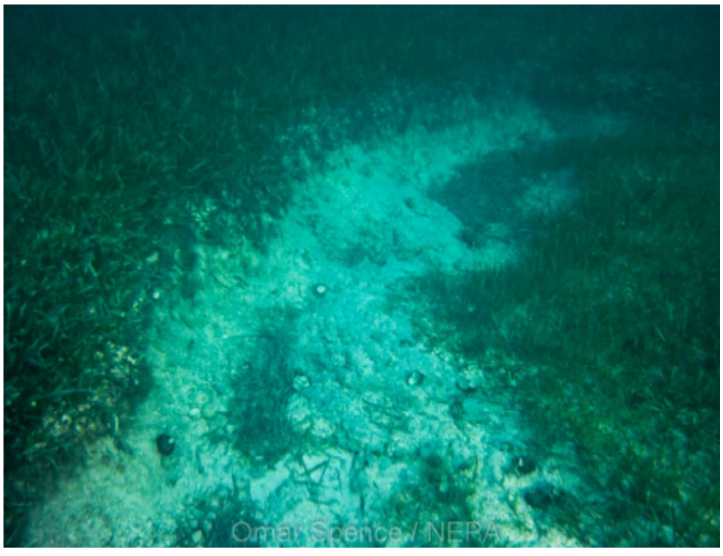


Figure K: Natural regeneration of seagrasses in a blow-out offshore Negril (Source: NEPA, 2012)

The methodology employed by the consultant engineer included: literature review inclusive of the review of recently published studies and in-house NEPA resources; vulnerability assessment; wave and sediment transport modelling; public consultation; and quantification, costing and scheduling of

activities. The consultant worked along with the technical lead agency, the National Environment and Planning Agency, the National Works Agency, The University of the West Indies, the Negril Area Environmental Protection Trust (NEPT) and the Negril Coral Reef Preservation Society (NCRPS) - local ENGOs- and other stakeholders. Among the other stakeholders consulted were local government representatives and tourism interests. The consultant was engaged by competitive process using the Consultant Qualification Selection (CQS) method in accordance with the GOJ Procurement Guidelines. Resources from the Programme Preparation Grant were used to underwrite the cost of the consultancy.

In accordance with recommendations from the engineer, two breakwater structures totalling approximately 990 metres long will be installed 1300 metres off-shore forming an extension to the natural reef (Annex 1). The crest elevation will be at mean sea-level, thus maximising the effectiveness of the breakwaters while maintaining the aesthetics of the area, a consideration which was important to local stakeholders. The breakwaters will stabilise some 2000 – 2500 metres of shoreline in the central parts of Long Bay. It is estimated that the beach directly in front of the breakwaters will commence a natural state of replenishment as it will allow for sand accretion.

One of the prevailing challenges concerning seagrass beds and coral reefs has been pollution of coastal waters from land-based sources. However, the rehabilitation of the sewage plant which was completed in 2011 will significantly reduce pollution of coastal waters. Wastewater from the Negril Area is treated by the Negril Wastewater Treatment Plant. Sewage is collected from hotels and residences and transported via pipes to the plant which consists of stabilization ponds. At the end of the process, the treated wastewater is discharged into the South Negril River.

Seagrass beds will be better able to undergo natural regeneration due to the less polluted environment, and will be less likely to be uprooted by high energy waves as the installed breakwaters will provide increased protection. The high level of confidence in this approach is grounded in empirical evidence gained from regional efforts at seagrass replanting which indicate that water quality and hydrodynamic/wave climate are important factors that determine the growth or disappearance of seagrass beds. High turbidity, poor water quality, other anthropogenic pressures and increased wave action have been noted to result in the loss of tremendous areas of seagrass beds in sections of Florida and Texas. It should be noted that the coastal engineer's report also quotes successful re-colonisation of sea-grass in Florida at a rate of 4 to 40 hectares in three years under favourable conditions – including shallow, calm and protected waters.

The final installation process and choice of breakwater structures and placement will take full account of technical expertise within and external to the public sector and may require additional studies. Ultimately, the intervention will correct the issue of beach erosion and will lay the basis for complementary future interventions when funds become available.

Data collection and monitoring to aid in future planning and project designs, including beach profiling and improvement in the geographic information systems capability, is being undertaken by NEPA as part of its routine, on-going management of Jamaica's environment. NEPA will also be responsible for monitoring environmental parameters during construction to ensure that required standards are met and that the quality of the environment is not compromised. Table 7 summarises activities under Component 1.

Table 8: Summary of activities related to Component 1 - increasing the climate change resilience of the Negril coastline

Concrete Outputs	Expected Outcomes	Activities
• Installation of	• Slowed rate of loss	Conduct Technical study to inform breakwater type and location

Concrete Outputs	Expected Outcomes	Activities
breakwater structures	beach and restored beach (over-time); • Reduced exposure of coastal, social, and economic and environmental assets including the Negril Great Morass against storms and storm surges • Restored and improved risk reduction functions/ services of critical coastal and ecosystems – seagrass beds and coral reefs • Protected livelihood – fishing, tourism interests (including farmers and locals who depend on tourism for their income)	Identify locations for installing breakwater structures and production of warning markers for sub-surface structures
		Install breakwater structures
		Document installation of breakwaters methodology and implement monitoring plan (during and after installation)
		Identify critical coastal, social, economic and environmental assets
		Identify historical storm surge heights and storm surge damage of significant proportions
		Identification of watershed management opportunities
		Identify source locations for plant material and methods to be employed in replanting, and define acceptable success rate
		Decide on feasibility of sea-grass replanting programme with NGOs
		Conduct environmental conservation programmes to inform risk reduction functions of critical coastal ecosystem
		Document seagrass replanting methodology and implement monitoring plan (during and after replanting) if replanting is done

Component 2: Enhancing the climate resilience of the agricultural sector by improving water and land management

One of the main problems affecting the agriculture sector is the high dependence on rain-fed agriculture; some 80 per cent of the small farmers depend on rainfall as their only source of water supply. Over the years, various techniques for augmenting water supply for farming have been developed, including the highly successful dry farming technique which is practiced in the parish of St. Elizabeth. However, based on historical evidence, crop production can increase significantly if dry farming systems are coupled with irrigation systems. As such, with the advent of extreme weather conditions caused by climate change, water catchments and gravity drip irrigation systems will help to ensure that water required for crops is captured in a more sustainable manner. Environmental degradation is another problem plaguing the sector. Much of the agriculture takes place in the watershed areas which are often badly degraded and in some, instances, farmers contribute to this degradation through unsustainable practices such as “slash and burn” and removal of tree cover. This problem has been exacerbated by the fact that a considerable portion of small-scaled agriculture occurs on slopes as some 80% of the land surface is hilly or mountainous. In fact, approximately 50 per cent of farming is done on lands that have slopes at or exceeding 20˚.

The problems facing the agriculture sector are being made even more challenging because of climate change. The most recent projections for the sector are that: hilly slopes will experience further degradation with increased incidence of drought and intense rainfall; crops will become more exposed to pests and diseases; water availability will be uncertain with changes in rainfall patterns; soil productivity will be reduced and traditional crops and livestock may not be able to withstand increased temperatures and other extreme climate conditions.

Investment Components: Enhancing climate resilience of the agriculture sector by improving water and land management in select communities

The Ministry of Agriculture and Fisheries (MOAF) recognizes the impact of climate variability and climate change and is exploring measures to improve the capacity of farmers adapt to these changes. One of those measures is to reduce the dependence on direct rainfall since there is a great likelihood of its increased unpredictability. Similarly, there has to be preparation for the increase in intense rainfall over short periods which can be destructive. Catchments increase storage and reduce the level of run-off, thus mitigating flooding while producing a source of irrigation to ensure crop productivity, even in dry periods.

This component will improve adaptation measures in several vulnerable areas with a view to reducing the loss of soil cover associated with extended droughts followed by increased precipitation and at the same time, improve water availability to the most vulnerable farmers. In some instances, the measures are intended to improve water storage and reduce flooding, thereby resulting in soil conservation.

The proposed beneficiaries of this component are small farmers, the majority of whom operate on small hillside farms of less than 2 hectares. The selection of the sites was based on the following criteria which were endorsed in the community consultations:

- the importance of these areas for increasing agricultural output as outlined in the National Irrigation Development Strategy and Agriculture Sector Plan
- degree of vulnerability of the areas to climate change risks
- degree of poverty among the population
- existence of complementary projects in the area
- existing initiatives in the area which would complement planned intervention
- existence of community organisations or systems able to sustain intervention
- adequacy of rainfall/availability of water

The criteria for community selection were drafted in consultation with the technical agencies, particularly the Ministry of Agriculture and Fisheries. The criteria were presented to communities as part of the discussion on the relevance of the programme and were generally endorsed. No particular weights were assigned to each criterion. Communities which met three or more criteria were given priority. Geographic areas for the interventions are shown on Map 1.

Interventions

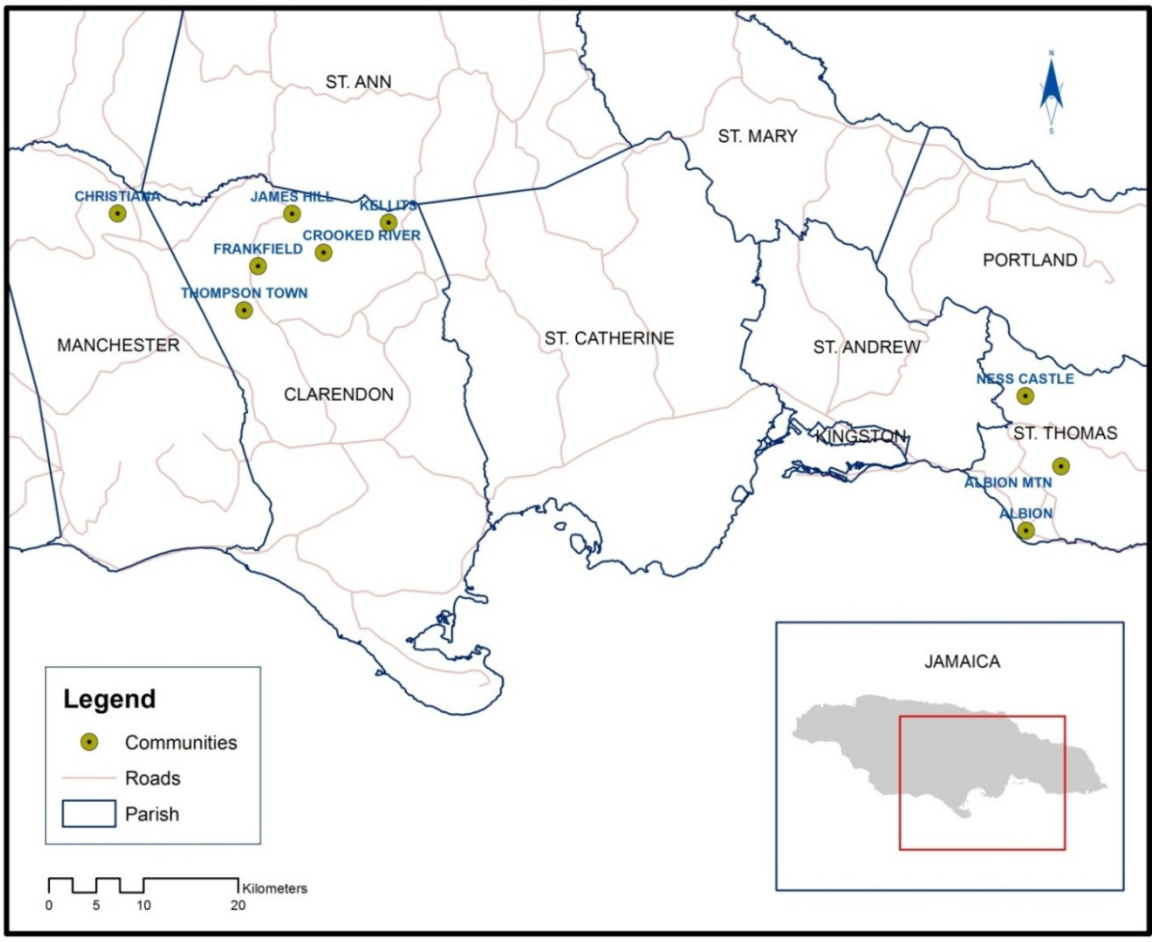
The project will make a number of interventions aimed at increasing water availability; improving use water efficiency:

- Establishment of a micro-dam in Northern Manchester
- Implementation of small scale irrigation facilities and production and productivity programmes using climate – smart agriculture
- Establishment and rehabilitation of soil conservation and land husbandry infrastructure
- Implementation of rainwater harvesting and small-scale gravity irrigation programme

Intervention 1 - The Establishment of a Micro Dam in Northern Manchester

Christiana is located in Northern Manchester and is a productive agricultural zone with a population of 2100 household and a poverty prevalence of 23.7 per cent. The area is mainly characterized by small farmers who grow Irish potato, red peas, and other cash crops such as lettuce and tomatoes. The region produces about a third of the potatoes for the parish of Manchester and is also one of the largest suppliers of Irish potato seeds to the farming landscape of Jamaica. Agriculture production in the region is primarily done under rain-fed conditions and is severely impacted by the changing climate. It receives an average rainfall of 1 600mm each year. The changing rainfall patterns coupled with high evapo-transpiration rate have led to water deficit and a reduction in the ability of the crops to withstand pests and disease conditions.

It is proposed that a micro-dam be constructed in the Christiana area in order to reduce the velocity of the downstream flow and to provide water to the small farmers during the drought period. During the community consultations, two sites were proposed as possible locations for the mini-dam, Swan River and Cave River. The choice of final location will be made prior to implementation after further site assessments of the site and rainfall analyses have been completed.



Map 1 : Communities of Intervention

Description of Micro-dam

The project is proposing the construction of a micro-dam which can store approximately 10 million gallons of water, on approximately four (4.05) hectares of land. The width of the dam is projected to be 91.44 metres, with an average depth of 1.2 metres. rock core filling and compacted soil..

A concrete spill way will be constructed of concrete to prevent erosion and scouring during periods of high rainfall and will be wide enough to accommodate storm flows.

Intervention 2: Rainwater Harvesting and Gravity Drip Irrigation Systems

In order to supplement the water supply system for agricultural purposes in Trelawny, St. Mary, St. Ann, St. Catherine, St. Thomas and Clarendon, small scale water rainwater harvesting and drip irrigation systems will be installed. These parishes were chosen based on the impact of the drought on agricultural production and productivity.

Water harvesting systems will include the entombment of ponds and springs as well as roof catchments with guttering, and tanks. Thirty rain water harvesting systems using roofs as sources of water; twenty systems, using ponds and springs and sixty drip irrigation systems, including ten which will be attached to existing sources, will be installed.

Intervention 3: Establishment of small scale irrigation and production and productivity schemes using climate-smart agriculture

The provision of water to farming communities will significantly boost production and productivity of these areas. The establishment of small irrigation schemes in selected areas coupled with targeted training in proper water use and climate smart agriculture can boost production and productivity in a more sustainable way. This proposed intervention seeks to combine all these approaches.

This intervention will, in the first instance, establish small irrigation schemes through the entombing of existing water sources, construction of earthen reservoirs and rehabilitation of existing ponds in twenty (21) communities across the parishes of Trelawny, Clarendon, St Thomas, Manchester, St Catherine, St Mary and St Ann.

The minimum storage capacity for each catchment will be approximately 1.50 million gallons of water and each system is expected to benefit 40-60 farmers. A pipe conveyance system comprising of mainlines and sub-mains will distribute irrigation water from the catchments/reservoir to the farmers. A pump system will provide the energy to dispense the water. The immediate area surrounding the reservoir will be fenced to keep out intruders and animals, with adequate signs in place.

Farmers around the specific catchments will be organized into water user groups and production units and provided with grants to establish their plots. Farmers Field Schools/demonstration plots highlighting climate smart agricultural techniques and practices will be established. Beneficiaries will be expected to adapt these climate smart techniques and practices as a part of the programme.

Intervention 4: Establishment and rehabilitation of soil conservation and land husbandry infrastructure and Demonstration plots in Northern Clarendon (Rio Minho Watershed)

The Rio Minho Watershed extends from northern to southern Clarendon and is one of the most degraded watersheds in the country. The Bull Head region which is located within a forest reserve and is home to some 23 communities with an estimated population of 69, 000 persons will be targeted. Farming is a major livelihood in the area where mixed cropping is practised. The frequency and intensity of the rainfall as well as prolonged droughts have exacerbated the loss of soil cover of the watershed which has impacted negatively on food security and livelihoods.

The interventions for the Bull Head region will support a hillside to plain approach. Infrastructure works such as diversion ditches will be installed to reduce the likelihood of soil erosion and land

slippage within the watershed. Under this component the establishment and rehabilitation of soil conservation and land husbandry infrastructure will be done. The communities selected are:

- Thompson Town Extension Area: Gloucester, Thompson Town, New Roads, Wakesfield, Red Ground, Windsor, Victoria.
- Crooked River Extension Area: Douce/Pennants, McDonald, Broadleaf, Bunkers Hill, Collington.
- Kellits Extension Area: Reckford, Sandy River, Bull Head, Red Lands, Mason River, Rhoden Hall, Broadleaf.
- Frankfield Extension Area: Morant, Grantham, Lodgi Green, Belmont, Peckham, Union, Kylsith.
- James Hill Extension Area : James Hill, Salem, Carty Hill, Desire, Fairburn

The green infrastructure to be installed includes:

Diversion/Hillside Ditches, individual basins, waterways, fruit forests, continuous mounds, check dams, drop structures and pineapple barriers.

The establishment of demonstration plots for land husbandry practices represents one of the most effective learning tools in soil conservation and land management. This measure will be a practical demonstration to farmers on the effectiveness and efficiency of sustainable farming techniques and practices (land husbandry). It is directly targeted at inspiring the farmers to adopt good agricultural practices.

Each plot will be approximately 0.4 hectare (1 acre) in size and will feature various activities based on the location, geographical features such as slope and soil types, crops to be or which are being cultivated, water needs, level of environmental degradation among others. Some options are 600m diversion and hillside ditches; 1,000 individual basins; 100m waterway (grass and ballasted); 0.1 hectare timber forest; 0.1 hectare fruit forest; 600m pineapple (vegetable barriers); 0.1 hectare or 400m continuous mounds; 0.1 hectare ginger or turmeric; and 23m3 check dams and drop structure.

The programme will be implemented in the Northern (upper) section of Clarendon with five (5) demonstration plots placed strategically to benefit the farmers. The plots will be on existing farms.

It is envisaged that these interventions will enhance the ability of the beneficiaries to practice sustainable environmental and agricultural activities as it relates to proper land husbandry practices. The beneficiaries will also be adequately provided with the knowledge and skills that are required to mitigate future natural disasters so as to minimize the effect.

An estimated sixteen thousand (16,000) male and female small hillside farmers will be sensitized regarding disaster resistant cropping systems and other farming practices which they will be able to duplicate on their holdings.

Table 9: Summary of activities related to Component 2 - enhancing the climate resilience of the agricultural sector by improving water and land management

Concrete Outputs	Expected Outcomes	Activities
• Establishment of a micro-dam • Implementation of rainwater harvesting and small scale gravity irrigation programme • Establishment and rehabilitation of soil conservation and land husbandry infrastructure • Establishment of small scale irrigation facilities and production and productivity programmes using climate smart agriculture	• Increased availability of and access to domestic and irrigation water supplies leading to increased productivity and increased food security • Reduced downstream flooding and soil erosion in upland communities • Improved soil fertility	Fieldwork and data analyses to finalise micro-dam location Install micro-dam in Manchester Conduct training workshops and field visits for farmer training in water and land management and climate smart agriculture Establishment of water user groups Establish irrigation systems Carry out training and demonstrations

Component 3: Improving institutional and local level capacity for coastal and agricultural adaptation and awareness raising for behaviour modification

Activities under this component seek to improve the capacity of key stakeholders, primarily related to agriculture and coastal resources. The interventions are aimed at improving the institutional and individual capacities of the identified stakeholders, building community awareness on climate change adaptation, and enabling communities to take ownership of the climate change adaptation activities started under the projects. It involves demonstrating best practices in climate-resilient agricultural production for sustainable improvement of food security. Farmers will be better able to understand the need to adapt and to take the necessary steps to implement sustainable farming practices.

Through the implementation of this component, the community of Negril will be empowered to integrate climate change concerns into the economic operations of the community in order to promote the area's sustainability as well as to safeguard against hazards intensified by climate change, namely sea-level rise and storm surge.

Coastal resource users will be trained on sustainable practices and replicable technical standards for beach restoration will be developed. This will create tools to improve climate resilient development planning and increase the awareness of and access to information about climate change and adaptation options.

This component is necessary for the overall success in the initiatives to be implemented in Components 1 and 2 and as such, will be implemented concurrently.

Coastal Adaptation in Negril

This component will be achieved through the activities outlined below:

Development of guidelines and technical standards for beach restoration and shoreline protection.

In the past, many entities have undertaken individual measures to reduce the beach erosion in Negril. None of these have been comprehensive or have adequately addressed the root cause of the problem. The guidelines and standards will be developed based on technical and scientific information from past and present studies, and in collaboration with scientists and key stakeholders including hotel and restaurant owners, fisher-folk and community members. In so doing, the stakeholders will have greater ownership of the developed guidelines and standards and will more likely adopt them in future development or expansion. These guidelines and technical standards can also then be adapted for other coastal areas, thus scaling up the benefits of this programme.

Development of a climate atlas for storm surge and sea level rise.

This will be based on mapping of areas adjacent to the coast to ensure land owners and regulators have the relevant information on projected climate hazards and their effects. It will address two major climate threats - sea level rise and storm surge. The atlas will be prepared at a sufficiently large scale to make it useful as a guide for development planning of the area and will guide local and national level processing of development applications. The output will show the projected impact of sea-level rise and storm surge on the natural and built environment of Negril for specific scenarios. The atlas will identify the hazards, elements at risk and projected impacts of the hazards for Negril under specific climate scenarios. Development of this atlas will take into account work done for the World Bank Risk Atlas project being coordinated by the Disaster Risk Reduction Centre of UWI, which is mapping storm surge effects on the Jamaican coastline. Where possible, data and information will be shared. It should be noted, however, that the scale of the World Bank project mapping is not appropriate for site specific planning.

Communication and awareness programme on sound environmental management practices, particularly to reduce the risk associated with climate-related hazards.

NEPA, the Ministry of Tourism and NGOs working in Negril, have facilitated stakeholder consultations related to addressing beach erosion and other issues. There is need to continue the communication and awareness efforts for Negril. Component 1 will build breakwaters and allow re-establishment of seagrass beds. The recommendations for reducing beach erosion from the Smith Warner report and this project proposal have already been introduced to the stakeholders. It is therefore important to continue to interact with the community on the activities to be undertaken and provide further details on their implementation. The likelihood of harm from the practices of users of the sea including damage to the replanted seagrass beds will be reduced through this programme. It will be undertaken in collaboration with local NGOs which are working on conservation efforts in order to create synergies with current programmes and to increase the benefits. This approach will contribute to the sustainability of the efforts of the NGOs and the government in changing destructive behaviours and practices.

Training of local communities and entities in disaster risk reduction (DRR) and natural resources management (NRM).

Training in DRR and NRM will allow residents and other stakeholders to participate in the management of the resources in Negril and in efforts to build the resilience of Negril and its residents to the impact of hazards. DRR training will include aspects of preparedness, response, risk reduction hazard mapping, hazard specific mitigation activities and business continuity planning for small businesses. The latter is seen as a way to increase the economic resilience of the community in the face of hazards, particularly for micro and small business owners. Training will target a cross-section

of vulnerable groups such as – fisher-folk, vendors, micro and small business owners as well as community-based organisations such as youth groups. The ODPEM already has an established programme for community-based disaster risk management training, and will be able to provide a standard curriculum as well as facilitators for the training. Aspects to be included are hazard mapping, preparedness, search and rescue, first aid, hazard specific mitigation activities and business continuity planning.

Development of adaptation plans for the most vulnerable areas along the Negril coastline

Despite the current interventions designed to address the impact of climate change on the Negril coastline, there is a high probability that Negril will suffer from sea level rise in the long term. It is critical that this is recognised and that long term planning commences as soon as possible. The community of Negril will have to consider a future, for example, without some of the coastal infrastructure and developments now in place. The risk atlas to be developed as part of the project will be a key resource in the future planning for Negril.

The adaptation plans will result in a long-term strategy for Negril and will ensure that future development will include climate change adaptation strategies specific to the area. These plans will be prepared using participatory methods and will be based on existing scientific studies, the risk atlas as well as local knowledge and expertise. It is important that these plans fit into national and parish policies and plans. Therefore, national agencies, as well as the Westmoreland Parish Council, the Parish Development Committee, the Parish Disaster Committee and other stakeholders will be included in plan development.

Agriculture Adaptation

Workshops and field days for farmer training in water and land management will be a critical component. The establishment of demonstration plots in proper soil conservation and land management practices will form the basis for the training of extension staff and farmers over the life of the project.

The methodology to be adopted for this section will include sensitizing and training vulnerable farming communities and community groups on better land and water management practices. Institutional strengthening of extension staff and farmer groups (Production and Marketing Organizations PMOs) will also take place. Extension Staff and PMOs are able to translate important information as well as provide on-the-ground assistance to farmers. These groups will therefore be educated and trained in sustainable practices for water and soil management including the transfer of appropriate technology and will pass this training on to farmers. This will ensure that the community benefits in the long-term and the practices are sustained in future generations of farmers.

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities.

In terms of gender, the programme targets benefits for both men and women. Both will benefit from community interventions but because women bear a greater level of the burden associated with natural disasters, they are likely to be more positively impacted by the work being done with respect to soil and land husbandry which will contribute to improved resilience especially, in upland communities and reduce downstream flooding. Similarly, women will be the primary and most direct beneficiaries of the water harvesting and storage interventions. This is because in rural Jamaica, women and children have primary responsibility for fetching water both for domestic and farming purposes (this programme addresses the latter). To underscore the point, we cite the Jamaica Survey of Living Conditions which has indicated that there is a greater likelihood of poor rural women walking to collect water from springs, rivers etc. as their “main source of drinking water” than their urban counterpart,

thus increasing their exposure to unsafe water and associated health issues. Often, women tend vegetable gardens located around the house, and would have to fetch water from spring or rivers in order to water these gardens.

The programme targets farmers as a group. Numerically, male farmers outnumber female farmers by a ratio of 2:1 and women account for 20 per cent of the agriculture work force and about 26 per cent of the production of domestic and export crops. These statistics do not however adequately reflect the role of women in the agriculture sector as they are the primary vendors of crops. The same situation exists in the fisheries sub-sector where the majority of fisherfolk – about 70 per cent[18] – are men who are mainly involved in actual fishing. Women on the other hand, are primarily responsible for fish vending and the management of operations, including vending sites. Whilst only 6 per cent of registered fisher-folk are women, they are often boat owners and active in fishing cooperatives. This programme thus has a very high relevance to and potential impact on women from the perspective of livelihood, employment, and food security, whilst also benefitting men. In the case of food security, this is particularly relevant given rural women's primary gender role as care-givers with respect to the children. Some elderly will also benefit directly from the programme as a large percentage of farmers fall within that categorization. Recent Census data show that more than 40 per cent of farmers are over 50 years. In fact, the median age of 49 years for male farmers suggests that a significant proportion is well above that age. At the same time, the programme targets younger age groups through awareness building and knowledge management through the involvement with institutions such as the 4HClubs and the College of Agriculture Science and Education, and using the Farmer Field School methodology.

Component 1 specifically seeks to arrest and reduce the level of coastal erosion in Long Bay, Negril. The area is an important source of livelihood for fishers and tourism workers most of whom reside in surrounding communities. The installation of the breakwaters and their contribution to ecosystem health will also contribute to improving the fisheries and the livelihood of the fishers. In tourism, women dominate employment in the industry, accounting for 58 per cent of jobs in the Hotels and Restaurant sub–sector. It is therefore expected that the rehabilitative work carried out will have positive impact for both sexes.

The socio-economic vulnerability of the communities, particularly those in the Upper Rio Minho is high with between 30 and 70 per cent of the population falling below the poverty line. In Northern Manchester the incidence is 23.7 per cent also well above the national mean. These communities are also characterised by high dependence on agriculture as the main source of livelihood, small holdings (mostly under 1 ha), primarily rain-fed agriculture and steep topography. See Map below:

[18] Report on Rural Women in Agriculture for the period 2002 – 2008. (July 2009) Produced by the Ministry of Agriculture and Fisheries in July 2009 for the Jamaica Bureau of Women Affairs in partial fulfillment of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) report

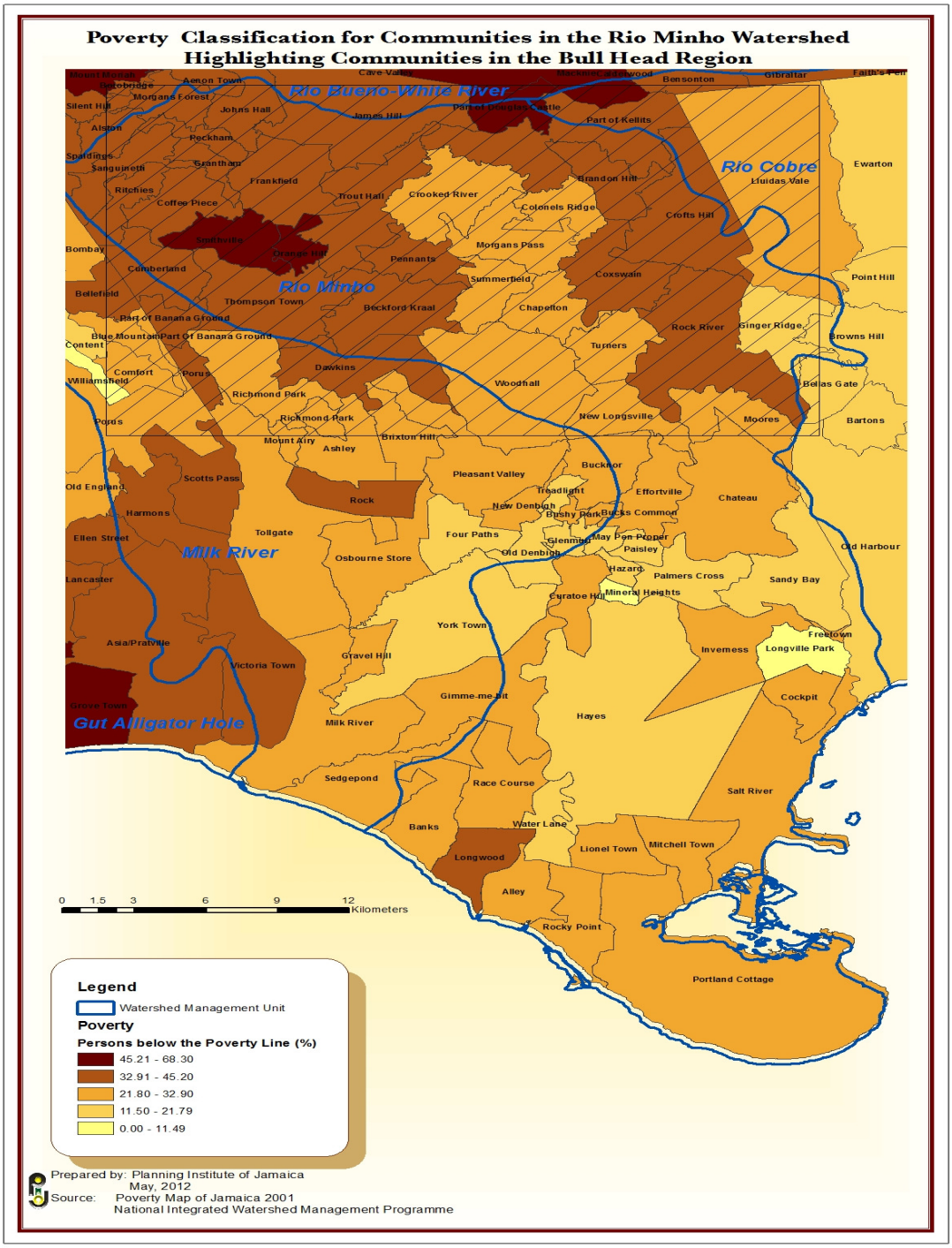


Figure L: Poverty Classification of Communities in the Rio Minho Watershed

Component 1

Part I above highlights the main attributes of Negril:

- Provision of some 9,267 jobs in 2009 related to tourism and fisheries

- 80 per cent of residents in and around Negril (mainly rural areas) depend on jobs in the tourism sector
- A fishing beach which has approximately 349 registered fisher folk who rely on fishing as their main source of income and food.
- 7 miles of a white sand beach which acts as an attraction for tourists and residents

Many of the benefits that will be derived from the programme will be through the restoration and increased protection of the natural ecosystems which support 1) healthy fisheries and 2) beach accretion attendant on the installation of the breakwater and collaboration with citizens and other projects. Rural communities will benefit significantly from the expected outcomes. On one hand, livelihoods will be protected. Protecting the beach and the natural ecosystems, particularly coral reefs, will ensure the tourism product remains vibrant, thereby securing thousands of jobs. The fisher-folk will also benefit from the increased protection of the fisheries and the potential protection of the infrastructure of the fishing beach. On the other hand, food security will improve. Fishing is an important and historic activity not only for livelihoods but also food security. Families rely on fish as a source of protein. Sea grass beds serve as nursery grounds for commercial fish species such as Snapper and Grunt, as well as provide habitat and foraging grounds for several species such as Mullet and Parrotfish, shell fish species and other marine fauna, such as sea urchins.[19]

An example from the RiVAMP project is the case of the community of Little Bay. The decline in ecosystems health and the state of the environment has forced the community to seek alternative livelihoods in the tourism sector. The once active and vibrant rural fishing community had to diversify their income opportunities and tap into jobs in the tourism sector. This was due to the decline in fisheries which may continue with the many changes in climate expected over-time. More and more communities are therefore relying on the tourism sector as previous traditional jobs are no longer viable options on their own. While Little Bay is not directly in the area of Negril to be addressed, the experiences are similar. The jobs directly in tourism provide an alternative livelihood for many. However, the opportunities for improved fisheries it is expected to improve the ability of fisher folk to sustain themselves and their families. Negril's beaches are an important asset for maintaining tourism. Beach protection and restoration are therefore important for livelihoods security for the fishing and tourism sectors.

Component 2

Beneficiaries will be rural communities which face the greatest level of risk. Farming is the main source of income for many small farmers and is also a means of securing local food security. Unfortunately, extreme weather events in the past have resulted in the loss of income, property and lives. The interventions proposed will address all these factors. Flood mitigation infrastructure will reduce the incidence of flooding and siltation; storage systems will provide adequate water storage for small farmers during drought periods and crops will be less susceptible to pest infestation and diseases.

The component will benefit from a methodology pioneered by RADA under the MAJIC programme. It allows participants to observe, analyse, experiment, and identify solutions among themselves when confronted by problems.

Component 3

Capacity building which is the intent of this component, is a critical part of the sustainability of the programme. As it relates to Component 1, it will build the knowledge base of communities, the hotel

[19]National Policy for the Conservation of Seagrasses. USAID/NRCA. July 1996.

and other business sector entities on the role that climate change has and will continue to play in their lives. All groups will also benefit from training in disaster risk reduction and natural resources management. These activities will increase their adaptive capacity. For Component 2, the capacity exercises will train local groups in good practices for farming, natural resource management and disaster risk reduction, in addition to establishing water user groups. Importantly, the component will provide for the development of guidelines and standards to aid future development planning.

An overview is given in Table 10 and Figure M below.

Table 10: Summary of Social, Economic and Environmental Benefits of the Programme

BENEFITS	PROGRAMME IMPACT
Social	• Protection of livelihoods in agriculture (including fishing) and tourism • Empowerment of communities through training and awareness building • Food Security and nutrition – fish are a protein source for many in surrounding rural communities • Improved coping strategies/capacity • Poverty reduction
Economic	• Water management systems will support farmers in water–starved communities to improve access to water supply thus contributing to increased yields. • Improved land management infrastructure, leading to reduced soil loss and increased quantity of agricultural produce. • Value added to the tourism product with the protection of coastal ecosystems (including coral reefs and beaches). • Protection of the spawning ground and habitat of the fisheries resulting from the rehabilitation of seagrass beds and installation of breakwaters which will help to protect the local economy. • Development of adaptation plans for sections of the Negril coastline will address strategies for protecting and conserving physical and natural assets in the area. • Training in DRR and natural resource management including the development of disaster risk management plans for “climate proofing” communities and entities • Development of a climate risk atlas – to be used to improve decision-making in the development planning process. This will lead to a more comprehensive site selection process for new development. • The use of demonstration plots for land husbandry will help to adopt good practices which will be maintained through continued work with community groups and also with public and private entities. • Provision of water for vulnerable rural farmers, particularly in dry periods to enable them to enhance their agricultural production.

BENEFITS	PROGRAMME IMPACT
Environmental	• Protection of existing coastal ecosystems – beach, coral reefs, sea grass beds, and the Negril Great Morass. • Protection and expansion of habitats and breeding grounds for varying marine and wetland species including fish. • Reduction in the run-off and pollution of water bodies,(fresh and marine • Increased vegetation cover • Reduced downstream flooding and sedimentation due to establishment of flood mitigation infrastructure in selected areas. • Headwaters of the Rio Minho River safeguarded through improved land management.

(Source: PIOJ,2011)

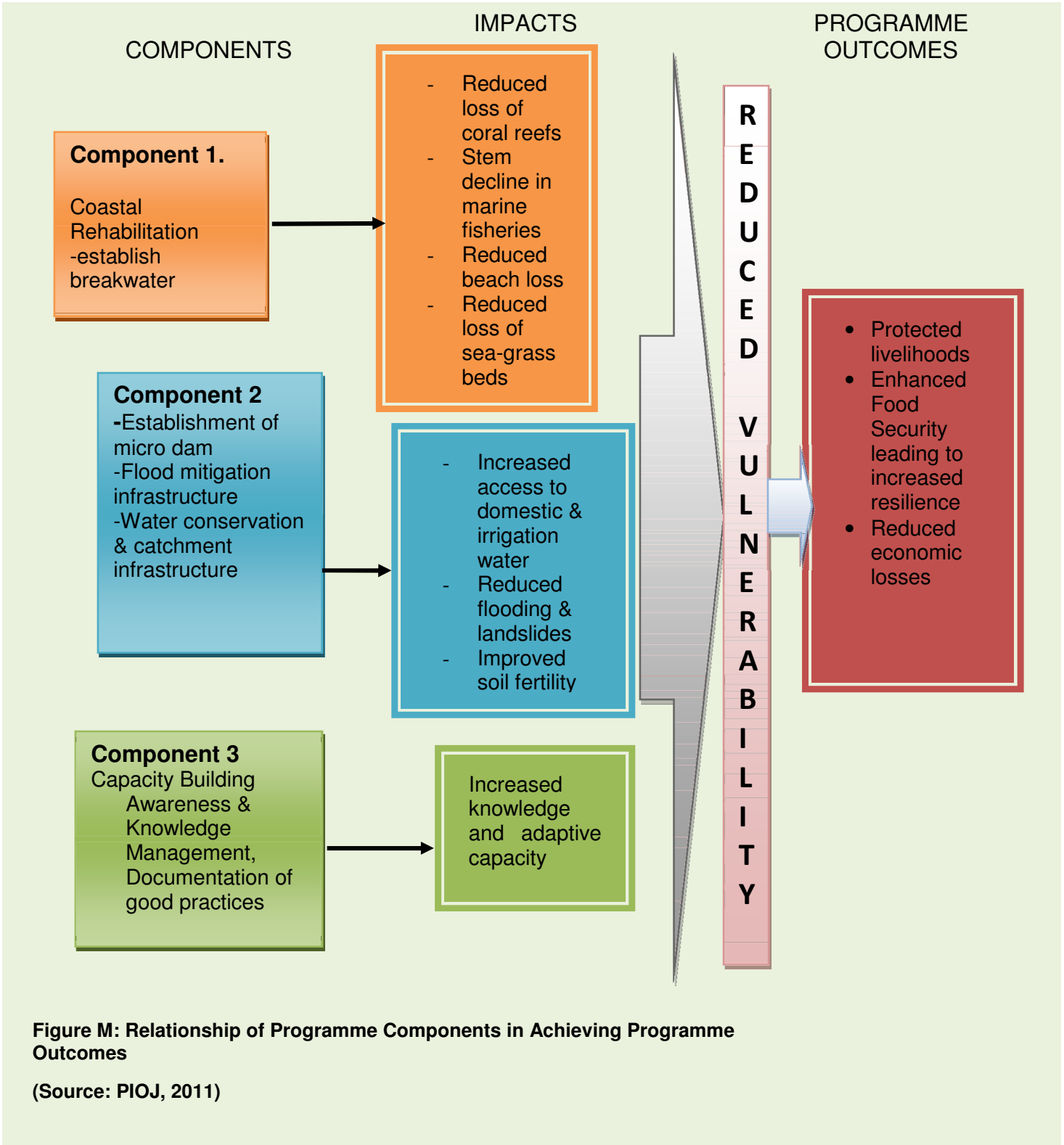


Figure M: Relationship of Programme Components in Achieving Programme Outcomes

(Source: PIOJ, 2011)

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

Several studies on the Negril shoreline have underlined the urgent need for corrective action. Three possible options are considered: no-regrets, managed retreat and business-as-usual. A "**business as usual"** approach is one in which nothing is done and the erosion of the coastline is allowed to continue unabated and eventually intensify. This would result in continued damage to beach and coral reef; damage to property due to erosion, and loss of income. In 2010 for example, severe weather associated with Tropical Depression No. 16 which became Tropical Storm Nicole negatively impacted Negril (PIOJ 2010). The damage to the tourism industry was about J$76.2 million, most of which was in Negril. Some 80-90 per cent of hotels reported severe damage. Under the **"managed retreat"** option, Negril residents and social and economic infrastructure would have to be moved further inland and outside the zone of coastal flooding and storm surge. This option brings tremendous costs related to physically uprooting long established communities; discarding expensive infrastructure built over time; relocating businesses; development associated with establishing a new town; and loss of the cultural and heritage goodwill built up in and by the area over time. In addition, such relocation would require purchase of privately owned lands would prove to be very costly or may not be available. A "no-regrets" option protects the existing structures and systems and puts measures in place to ensure the benefits are long-term.

The degraded nature of sections of Negril eliminates "managed retreat" and "business-as-usual" as viable or feasible options. In both, beach erosion would continue further exposing humans and assets. Additionally, both options would carry very large price tags in terms of damage and loss of assets, disruption of livelihoods and economic activities.

The approaches considered for effective rehabilitation of Negril coastline included:

1. dredging and beach nourishment;
2. installation of offshore structures;
3. rehabilitation of natural ecosystems; and
4. an integrated approach involving items 1-3

Given the current state of degradation, and the likelihood of this continuing, items 1-3 are not individually adequate and cannot be implemented independently to effectively address the issues. An integrated approach is therefore preferred; this is estimated to cost at least US$40.5 million.

The proposed **Component 1** is a **"no regrets"** option designed to address the most vulnerable segment of the coast using elements 2 and 3 of the integrated approach. This will involve breakwater barriers estimated to cost approximately US$5.7 million. The outcomes expected include restored ecosystems and their services, specifically their provisioning, regulating and protective services. There would be little risk of social, environmental or economic loss associated with this option. In fact, it provides an opportunity to build on previous projects, to translate research findings into actual eco-solutions for the benefit of the community, and offers value-added, e.g. dive tourism from improved reefs, while safeguarding important assets such as hotels, road networks, utilities infrastructure and the Negril Great Morass.

For **Component 2**, the cost-effectiveness of the programme derives mainly from the projected increase in agricultural productivity and potential lowering of the food import bill to be obtained from improved irrigation, improved environmental stewardship from better land management (better husbandry, reversal of soil erosion); and use of more modern and sustainable farming practices. Importantly, rain water harvesting for agriculture is a self-managed system for local farmers to gain access to water and therefore contributes to reduced cost of inputs. The use of gravity drip irrigation instead of an electrically powered pump-based system also reflects the cost-effective nature of the

interventions being pursued. In addition this option reduces the long term cost to the farmers of maintaining and fuelling pumps. The low energy cost approach is critical, as fuel and electricity costs are very high. From a sustainability point of view, the technology is simple and easy to install and maintain; is itself a good water management and conservation method; is economical to operate, is advantageous for pest and weed management and has a low carbon footprint. This particular component will build on lessons learnt from the experiences of the Ministry of Agriculture and Fisheries in water harvesting, thereby minimising associated risks of failure.

Under **Component 1,** technical support will be provided by the coastal zone experts at the National Environmental and Planning Agency (NEPA) and the engineering specialists at the National Works Agency (NWA). These are both government agencies, therefore, the cost of supervision will be minimized. Technical support for Component 2 will be provided by technical experts from the Rural Agriculture Development Authority (RADA) and the National Irrigation Commission (NIC).The involvement of these experts will ensure that the technical standards are observed and that the project is aligned to and implemented in accordance with the targets of the Agriculture Sector Plan and the National Irrigation Development Strategy, and that the project benefits from the institutional structures and knowledge of the public sector. It will also allow for the good practices developed to be incorporated in follow-on and complementary activities when adaptation efforts are scaled up in other communities.

The investment in the institutional strengthening and local capacity building component will have a positive cost-benefit ratio as it will contribute to minimising damage and losses associated with hazard events through increased awareness and know-how. Demand on the government for recurrent expenditure to manage and maintain investments will be lowered. The development and use of guidelines will provide a scientific basis for future ecosystem restoration and adaptation works in Negril and will provide a standard approach which can be replicated across the country.

Operationally, the AF resources will be carefully managed to achieve effectiveness and value for money. Products and services procured will be on this basis and follow competitive procurement rules outlined by the GOJ and the AFB. Instead of a stand-alone project management operation, the programme will benefit from a small core unit complemented by a matrix organizational structure. The project will also leverage investment in related projects, especially with respect to the knowledge management and awareness raising.

Capacity Building in Component 3 – this component is specifically geared at sustaining the outcome of the programme. In addition sustainability will be achieved through alignment to Government agenda – Government institutions including the Ministry of Agriculture and Fisheries (MOAF) and its affiliated agencies; the National Environment and Planning Agency (NEPA), and the Planning Institute of Jamaica (PIOJ) have recognized the need to adapt to climate change. The interventions of this programme are aligned to the priorities of the respective agencies and as such, will be maintained.

Capacity building for Component 1 will involve stakeholders at all levels including resource users, private sector entities and surrounding communities. This process is intended to ensure each group “owns” the programme, understands the need for sustaining it; and will play an integral role in the management and protection of Negril. Additionally, it will put adequate plans in place to guide future development in the area so that climate change adaptation factors heavily in decision-making processes. The solutions to be implemented by the Government of Jamaica are based partly on a study commissioned by an NGO, thus there is already the basis for a partnership. All these factors produce a solid platform for future interventions.

The most effective tool for sustaining the outcomes of Component 2 is ensuring the local level stakeholders are well equipped. As such, community groups, which are best able to reach famers, will be trained in water and soil management. Additionally, the establishment of water user groups will allow farmers to be more self-reliant and achieve greater efficiency with irrigation systems. The NIC has established a number of water user groups and report that these are being successfully managed

by farmers. The use of demonstration plots by the MOAF has been proven as an effective tool for changing unsustainable practices in several farming communities. It will therefore play an important part in the capacity building exercises that will be conducted.

Overall, the sustainability of the programme will be enhanced by mechanisms established for interaction and exchange with other related projects and with the Hazard Risk Reduction and Adaptation to Climate Change Thematic Working Group (under Vision 2030 Jamaica) and the Pilot Programme on Climate Resilience Task Force. The programme will thus benefit from lessons learned by these projects. Strong community involvement and an inter-ministry/inter-sectoral Programme Management Steering Committee will also positively impact its cost-effectiveness.

The lessons and experiences of this programme will be documented so that other activities of a similar nature can benefit. The knowledge management techniques to be used will also allow for replication locally and elsewhere.

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

Jamaica has prepared a sustainable development plan entitled **Vision 2030 Jamaica – National Development Plan**, a collaborative effort of stakeholders from all levels of society. The vision statement of this plan speaks to Jamaica becoming "the place of choice to live, work, raise families and do business". The plan is based on four national goals, one of which is that "Jamaica has a healthy environment". This goal and the associated national outcomes recognize the importance of the natural environment to Jamaica's socio-economic well-being.

Under the afore-mentioned goal, there are two key national outcomes:

- National Outcome 13: Sustainable Management and Use of Environmental and Natural Resources; and
- National Outcome 14: Hazard Risk Reduction and Adaptation to Climate Change.

Several strategies have been identified to achieve these outcomes. These are to develop and implement mechanisms for biodiversity conservation and ecosystems management; improve resilience to all hazards and develop measures to adapt to climate change. The Outcome also speaks specifically to increasing environmental awareness of the general population and their participation in the management of natural resources.

It has been mandated that all ministries, agencies and departments of government must align work plans, policies and activities to Vision 2030.It is within this context that this programme was developed.

As part of Jamaica's Second National Communication (SNC) to the UNFCCC, vulnerability and adaptation assessments were conducted for five priority areas – Water Resources, Agriculture, Coastal Resources and Human Settlement, Tourism, and Health. The findings of these assessments were important in selecting the components of the programme. The programme is directly linked to Jamaica's Second National Communication on Climate Change which has identified agriculture, tourism and coastal resources as being among the sectors in need of priority attention for climate change adaptation. By seeking to implement an integrated management approach (involving hard and soft engineering) to control coastal erosion of Negril's beaches from the climate related hazards of sea-level rise, and intense storms, the programme will lay the foundation for the protection of livelihoods, food and recreation for the vulnerable population in and around the Negril area.

Under the Agriculture Sector Plan, the vision is for "the dynamic transformation of the Jamaican agricultural sector through a sustained, research-oriented, technological, market-driven and private sector-led revolution, which revitalizes rural communities, creates strong linkages with other sectors and emphatically repositions the sector in the national economy to focus on production of high-value commodities and contribute to national food security". The Plan seeks to promote proper agricultural practices including integrated farm management, irrigation facilities, better land husbandry techniques and incorporation of structures for better resilience. These programmes can have a range of beneficial environmental effects including soil conservation, improved soil fertility, and improved water availability. The proposed activities touch on six of the seven main goals of the sector plan:

G1. Efficient Competitive Diversified Value-Added Agricultural Production

G3. Competent and Adequate Human Resources

G4. Enabling and Facilitating Framework, Infrastructure and Support Services

G5. Contributor to Long-Term Rural Development

G6. An Environmentally Sustainable Sector

G7. National Food Security

The programme has a direct linkage to the *Plan Of Action to Combat Negril Beach Erosion* which was developed by NEPA in March 2011. The action aims to arrest the severe beach erosion in Negril through a combination of short, medium and long term strategies as set out below:

- Short Term (within 1 Year): Environmental Education Programmes, Soft Engineering Solutions, On-going Erosion Monitoring, Sand Watch, Water Quality Monitoring, Enforcement
- Medium Term (2 - 3 years): Hard Engineering Solutions in Critical areas, Research on Sediment Pathway and Sediment Budget,
- Long Term (>3 years): Engineering Solutions for entire bay

The activities in Component 1 seek to implement elements of the short to medium term strategies of the Negril Plan of Action. They are being complemented by the CCADRR project and RiVAMP II to combat watershed degradation and coastal erosion.

The country is currently preparing a National Climate Change Policy which will be aligned to Vision 2030 Jamaica and other relevant policies. The draft policy recognizes the importance of the sectors identified in this programme as critical to the social and economic welfare of the country.

Jamaica has developed a National Ocean and Coastal Zone Management Policy which articulates five goals:

1) Promotion of sustainable development;
2) Conservation of ocean and coastal resources and ecosystems
3) Baseline Data Collection and Research
4) Utilizing the Role of Science and Traditional Ecological Knowledge for Integrated Coastal Area Management
5) Providing the Conditions of Governance Required for Effective Integrated Coastal Area Management

The programme as articulated here-in is aligned to this policy including the goals outlined above. Specifically, the programme will address strategies including the conservation of living and non-living coastal resources; protected areas and ecosystem management; conservation mechanisms; and building capacity for integrated coastal zone management in the public and private sectors.

A Draft Beach Access and Management Policy (2008) have been developed for the island. It seeks to address: the use of beaches for recreation by both locals and tourists in an environmentally sound manner; the implementation of measures to ensure the health and safety of coastal resource users; and the protection of natural resource areas that are vital to the preservation of the patrimony of the nation for future generations. The installation of breakwaters and rehabilitation and planting of sea-grass is therefore in harmony with the stated policy of protection of natural resources for the preservation of patrimony.

The National Development Plan and the Strategic Framework for Agriculture under Vision 2030 Jamaica include five major themes which address the project. They are:

- Competitive Agriculture
- Efficient Commercial Farming
- Application of Technology
- Integrated Rural Development
- Sustainable Environment

The proposed strategies under the themes above focus on the issue of infrastructure development and specifically mention irrigation and the provision of water. In addition, areas were selected based on the current thrust of the sector to improve select crops such as Irish potatoes which will contribute to increased food security and poverty reduction. The project will address unsustainable agricultural practices that can have an adverse impact on the natural environment. It is also consistent with the strategies to reverse the pollution of soil, water and air, fragmentation of habitats and loss of wildlife which can be the result of inappropriate agricultural practices and land use.

This programme is also aligned to Jamaica's Water Sector Policy. The policy recognises the need for irrigation due to several constraints including inability of the sector to provide the necessary resources for improvements to current irrigation measures. The policy therefore under-pins the need for efficiency, conservation and expansion of existing facilities to ensure the agriculture sector is adequately supplied. Similarly, the Jamaica Irrigation Act (2003) addresses, among other activities, the establishment of water user groups, drip irrigation systems and water catchment systems which will ensure that farmers benefit from greater access to water, and participate in good management practices.

The Food and Agriculture Organization (FAO) has collaborated with the Government of Jamaica (GOJ) to produce the FAO National Medium-Term Priority Framework (NMPTF). Ten priority areas have been outlined; chief among them is increased productivity through the provision of adequate water supply. Specifically mentioned are on-farm irrigation systems for small farmers.

The National Irrigation Development Strategy is intended to sustain and increase agricultural production. The main objectives are as follows:

- To increase farmers' awareness of the role of irrigation in increasing farm income and their quality of life in general;
- To motivate farmers to utilize the scarce water resources more efficiently;
- To protect, operate and maintain the irrigation hardware.

It envisages the full development of sustainable irrigation systems on the most arable and mechanizable land in Jamaica.

In addition, the Water Management Unit of RADA has been incorporated into the National Irrigation Commission (NIC) and has broadened the scope of its strategy to fulfill the needs of farmers through rain water harvesting and gravity drip irrigation systems projects for small producers. Thus, an expansion of these projects to other parishes vulnerable to drought was proposed.

The Master Plan for Sustainable Tourism Development articulates environmental sustainability as one of its goals. The preservation of the natural environment is seen as one of the ways through which sustainability of the tourism industry can be achieved, particularly as it is intricately linked to the quality of the environment. The environmental component of the Master Plan also requires the need for, *inter alia,* improved water quality and increased coral cover, as well as management of solid waste and waste water.

At the international level, the programme is aligned to Millennium Development Goals (MDG), chief among them, Goals 1 and 7 - poverty and hunger eradication and environmental sustainability.

E. Describe how the project / programme meets relevant national technical standards, where applicable

This programme will be required to comply with the appropriate regulations, national and sub-national standards as follows:

- The Natural Resources Conservation Act (1991) – This legislation allows for the management, conservation and protection of the natural resources of Jamaica. These resources are managed through the Natural Resources Conservation Authority, a body of established under the Act. This Authority has responsibility for effective management of the physical environment of Jamaica; and the management of marine parks and protected areas.

- The Beach Control Act (1956) and the Natural Resources (Marine Parks) Regulations, 1992, including the requirement for Environmental Impact Assessment (EIA). This legislation was passed to ensure the proper management of Jamaica's coastal and marine resources through a system of licensing of activities on the foreshore and the floor of the sea. The proposed coastal infrastructure will be addressed through this legislation. The Act also addresses other issues such as access to the shoreline, and other rights associated with fishing and public recreation, as well as the establishment of marine protected areas. This policy is central to the comprehensive coastal resource management strategy[20] including among others: implementation of measures for pollution control and safety for the users of coastal resources, and management of coastal resources in the light of their vulnerability to the effects of climate change and natural disasters. The NRCA, as a regulatory agency, also must ensure that all beaches are properly managed on a non-discriminatory basis, that beach regulations are adhered to and that issues of safety, waste disposal and beach maintenance are being properly addressed.

- The impact on sea grass beds falls under the Policy on Sea Grass Beds (2000)[21]. This policy provides links to the National System of Protected Areas through a network of fish sanctuaries and marine parks. The Negril area is an approved Marine Park with activities proposed under component 1. The Beach Policy[22] also identifies the coral reefs and sea grass beds for their importance in

[20]A Discussion Paper towards Developing a National Policy on Ocean and Coastal Zone Management has been prepared (July, 2000)

[21] Towards A Beach Policy For Jamaica (A policy for the Use of the Foreshore and the Floor of the Sea),

[22] Beach Policy for Jamaica – November 2000

protecting the beach and supplying sediments for the maintenance of the beach profile. Coastal vegetation such as sea grass stabilizes the beach and offers protection against erosion by waves and surface runoff. The sea grass beds policy and the beach policy require that the natural vegetation within the near shore should be preserved as a buffer. Among the various measures that can be taken in response to coastal erosion in Jamaica are: (1) Protecting natural features, such as mangroves and reefs that can retard erosion; (2) Constructing jetties, groynes, seawalls, and revetments; (3) nourishing beaches; and, (4) directing developments away from erosion hazard areas.

As part of a Coastal Zone Management Programme an inventory of areas with severe erosion was compiled with Negril being one such area, Furthermore, a comprehensive study of the causes and damage caused by coastal erosion, and the costs and benefits of implementing mitigation and control measures has been done for this area[23].

- Guidelines for Conducting EIAs (2007) - These guidelines document the present procedures for conducting an EIA in accordance with the legal and regulatory framework of Jamaica, ecological realities and development imperatives of the island nation, international agreements and standards for sustainable development. Section 9 of the NRCA Act creates a Ministerial discretion to declare parts of or the entire island a 'prescribed area', in which specified activities require a permit, and for which activities an environmental impact assessment may be required. The Natural Resources (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order, 1996 and the Permits & Licensing Regulations was passed pursuant to section 9 of the Natural Resources Conservation Authority Act, 1991. The Order provides that the entire island of Jamaica is a prescribed area and lists specified categories of enterprise, construction or development that require a permit.

- General Guidelines for Project Proponents submitting environmental Permit and Licence Applications - This relates to Permit and Licence Systems which is framed by provisions of the NRCA Act (1991), the NRCA (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order and the NRCA (Permit and Licence) (Forms, Processing and Fees) Regulations (1996) (Amended 2004). These regulations seek to effectively manage development activities and their deleterious effects (direct and indirect) in Jamaica and its Territorial Sea as it relates to the environment and human health. A Permit is required to undertake any construction, enterprise or development of a prescribed nature anywhere in the island and the Territorial Sea. The permit is intended to safeguard the various environmental/natural resources from direct damage due largely, but not exclusively, to physical development. The discharging of any sewage or trade effluent or other polluting matter to air, ground or water, or the construction, reconstruction or alteration works therefore requires the holding of a Licence.

- National Irrigation Standards – Under the Irrigation Amendment Act (1999), the National Irrigation Commission is responsible for furnishing and maintaining efficient irrigation systems throughout the declared irrigation areas in accordance with reasonable standards of dependability as required in irrigation operations. The NIC organises Water Users Association (WUA) which organizes private farmers into a cohesive self-governing unit, which manages an irrigation system or part thereof. Farmers are members and shareholders of the WUA who have the power to govern the association through democratic means. The WUAs are considered as a way to reduce public expenditures and to ensure better operation and maintenance by making users responsible for the facilities that they enjoy. They provide a mechanism: (1) to increase farmer awareness of the role of irrigation, in, (2) increasing farm income and their quality of life in general, (3) motivate farmers to utilize their scarce resource more efficiently, and (4) to protect, operate and maintain the irrigation hardware so that agricultural production can be increased and sustained.

[23] Risk and Vulnerability Assessment Methodology Development Project (RiVAMP): The Case of Jamaica.

- The Water Resources Act (1995) is a legislation geared at ensuring the proper administration, development and optimal use of the island's water resources by providing adequate water resource planning, controlling and managing water quality in aquifers and stream channels; and monitoring the interaction of surface and ground water resources. As such, it is the legal basis for management, conservation, protection and allocation of these resources. The Water Resources Authority is the mandated Authority to carry out these functions. The WRA works along with the Ministry of Agriculture and the NIC to ensure these objectives are met.

- MOAF land suitability and capability criteria which relate to hillside farming; the Land Management Policy. The Land Management Policy speaks to the several major issues, such as : (1) under-utilization of large areas of arable lands, (2) small inefficient and fragmented farms including many located on land of low capability, and (3) over-intensive cultivation and misuse of steep slopes (4) planting of crops with little regard to ecological /environmental conditions, (5) inappropriate agricultural techniques and practices, (6) accelerated erosion resulting from land degradation and abandonment of large tracts of farm lands, and (7) deforestation of many watersheds. These land management issues are proposed to be managed through this policy by: Conservation measures and better agricultural practices being implemented to reduce soil erosion, to help to maintain soil fertility and to increase productivity. Additionally, the Policy speaks to the declaration of Agricultural Zones for the preservation of the country's agricultural lands from fragmentation and uneconomic use as well as the securing of permits for all new agricultural developments (including change of agricultural use) of 10 hectares and over, from the Natural Resources Conservation Authority, with the appropriate conditions and with inputs from the Ministry of Agriculture and Fisheries. Agricultural developments of 25 hectares and over may require on Environmental Impact Assessment (EIA). The Land Development and Utilization Act (1966), addresses idle lands of twenty (20) hectares and over in an effort to encourage the use of idle lands in the country. The National Irrigation Development Program is a master plan that addresses the irrigation strategies of the country and prioritises projects for implementation with long-term objectives. These objectives include: increasing farmers' income and increasing irrigated agricultural areas by 40 per cent. The benefits to be accrued under this master plan include: an increase in crop production and productivity, farmer participation in irrigation management through the establishment of Water Users Associations (WUAs) to manage and operate the schemes, and self-sustainable irrigation systems.

- Maps and other spatial information for the risk atlas will subscribe to standards established by the Land Information Council of Jamaica

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

This AF funded programme does not duplicate any projects or programmes. However, it complements past, on-going and future activities which are all geared towards achieving the long-term goal of sustainable development for the country inclusive of those in Table 10. Where programmes bear similar names and/or objectives, the choice of project location will ensure that there is no duplication but rather an expansion and reinforcement of the project.

Table 11: Complementary Projects and Programmes

Projects and Programmes	Objectives and Outcomes	Potential Synergies overlaps with the AF Programme
Climate Change Adaptation and Disaster Risk Reduction (CCADRR) Project GOJ/EU/UNEP 2010-2013	Objective: To adapt to climate change and contribute to sustainable development in Jamaica, particularly in vulnerable communities, through increasing resilience and reducing risks associated with natural hazards Results:	Negril is one of the target areas for this project. Among the activities are installation of data loggers for monitoring important variables, restoration of seagrass beds and the laying of artificial reefs. These activities are outlined in the Negril Plan of Action. The AF Programme activities also falls under the Plan of

Projects and Programmes	Objectives and Outcomes	Potential Synergies overlaps with the AF Programme
	1. Rehabilitated watersheds through slope stabilization measures such as reforestation of denuded hillsides 2. Increased resilience of selected coastal areas against potential climate change impacts 3. Climate change capacity building and awareness raising	Action, so all the activities are complementary. RiVAMP II, an initiative under Results area 3, will seek to purchase data collection equipment, specifically for hydrology and climate data. This will be in the wetlands of the Negril watershed.
Capacity Building for Sustainable Land Management (UNDP-GEF) 2010-2012 (30 months)	Objective: To enhance effective sustainable land management (SLM) by building capacities for SLM in appropriate government and civil society institutions and user groups and mainstreaming SLM into government planning and strategy development. Outcomes: 1. SLM is mainstreamed into national institutions, policies, strategies and plans 2. Capacity for management, application and adaptation of SLM is enhanced 3. Effective management and adaptive learning is achieved.	Project will provide learning for the Ministry of Agriculture and RADA officers and guidance to the capacity building proposed under the AF programme.
Coastal Multi-Hazard Mapping & Vulnerability assessments towards Integrated Planning & Reduction of Vulnerability for Portland Cottage, Morant Bay & Manchioneal, Jamaica 2010-2011 (World Bank-GFDRR)	Objectives include: Complete Multi-Hazard Assessment & develop multi-Hazard Maps; carry out vulnerability & risk assessments; Produce disaster/Risk Management plans for three communities in Jamaica - Portland Cottage, Clarendon; Morant Bay, St Thomas; and Manchioneal, Portland	This recently concluded study focused on three communities which were severely impacted in past storm events, particularly Hurricane Dean in 2007. The project produced reports on hazard and vulnerability assessments and the final report which detailed recommendations and strategies for action. The experiences, lessons learnt, and recommendations will be important in developing the adaptation plans and risk atlas for Negril under Component 3 of the AF programme.
Reducing Climate Change-Driven Erosion and Landslide Risks through Sustainable Agriculture (JCDT)	Objective: To increase the capacity of the targeted farming communities on the slopes of the Blue Mountains to adapt to climate change. The outcomes expected are: 1. Increased agro-technical capacity for applying soil conservation techniques that are necessary in steep slope environments.	The project was completed in 2010. Outputs will be used to inform the development of Components 2 and 3. The lessons and experiences of this project can be replicated in the development of demonstration plots and also in training community-based organizations (CBOs) and/or NGOs.

Projects and Programmes	Objectives and Outcomes	Potential Synergies overlaps with the AF Programme
	2. Alternative livelihood practices promoted. 3. Forest and tree cover (with appropriate species) promoted on slopes that are vulnerable to climate-driven increases in erosion and landslide risks.	
Reforestation and Promotion of Best Farming Practices to mitigate the effects of landslides in Somerset, St. Thomas (FCF) 2010-2013	Objectives are: 1. To enhance the environmental health and living conditions in the Somerset community by addressing the problem of erosion, landslides and flood risks through mixed reforestation on erosion-prone areas of Somerset and the installation of slope stabilization mechanisms. 2. To provide local farmers with training in best farming practices most suitable for hilly areas 3. Building the capacity of the community to carry out proper environmental stewardship.	This project is being implemented by an NGO, Women's Resource and Outreach Centre over a 3 year period ending in 2013. This project complements the activities that are proposed under Components 2 and 3.
Programme on Promoting Rain Water Harvesting and Small Scale Irrigation in South St.Elizabeth (FAO/GOJ)	Objective: To enhance food security and socio-economic well-being of farmers in South St.Elizabeth by promoting increased crop production through rain water harvesting, improved water management and introduction of small scale irrigation technology.	This project is being undertaken by the Ministry of Agriculture and Fisheries (MOAF) and the National Irrigation Commission (NIC) and ended in 2011. Component 2 builds on the pilot work undertaken in this project and will provide a basis for replication and/or scaling-up.
Improving Jamaica's Agricultural Productivity (GOJ/CIDA)	Objective: To strengthen sustainable agriculture productivity in Jamaica by improving the productivity of Jamaican farmers and fisher folks, through the use of more durable greenhouses and improved environmental management in small scale fisheries. Components: 1. Green-house development 2. Beach rehabilitation component	The MOAF is implementing this project with funding from the Canadian International Development Agency (CIDA). Outputs and outcomes will be incorporated in the development of relevant components of the AF programme.
Rain Water Harvesting (RWH) (WRA)	Objective: To increase awareness of government and the public as to the potential for RWH as a sole water supply source in areas of Jamaica presently without access to water and as an augmentation source in areas	This project, which is being implemented by the Water Resources Authority (WRA), will provide useful information for Component 2 of the programme.

Projects and Programmes	Objectives and Outcomes	Potential Synergies overlaps with the AF Programme
	regularly affected by drought	
Risk and Vulnerability Assessment Methodology Project (RiVAMP) (UNEP)	Objective: The pilot testing of a methodology that takes environmental factors into account when analysing disaster risk and vulnerability, with special focus on climate change	Negril was selected for the pilot site based on the state of ecosystems, human-based activities, climate change factors, socio-economic vulnerability and environmental governance. The AF programme will implement recommendations of the RiVAMP study. Furthermore, Phase II of this project will be undertaken; the coastal ecosystems as well as the Negril/Orange River watershed will be addressed. Initial funding is made under the CCADRR Project.
Pilot Program for Climate Resilience (PPCR)	In the design stage. To establish Climate Information Platform through which range of information will be made available and facilitate awareness building and make resources available to finance adaptation at the community level	Consistent with priority sectors identified under the PPCR. Expected to produce downscaled climate scenarios that will improve climate change planning in the project areas.
Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean Countries (GOJ, FAO)	Project Goal: To contribute to community based disaster management planning and community level risk management within the agricultural sector through, among other things: i) Improvements in institutional frameworks and technical options for hurricane-related disaster preparedness. ii) Emergency response and post-emergency agricultural assistance.	The project was completed in 2008. The Rural Agriculture Development Authority (RADA) was an important partner in the project. The lessons learnt and experiences gained will be incorporated in the AF programme, particularly as RADA will be an important partner in its development and implementation.
Negril Beach Restoration Programme NEPA/GOJ	Objective: To implement measures that will mitigate against further coastal erosion of the Negril area, by implementing appropriate coastal restoration/rehabilitation works.	Comprehensive programme for the rehabilitation of the Negril Coastline inclusive of detailed sand surveys (building on previous studies); installation of hard engineering structures(including breakwaters, etc.) based on outputs of surveys; and rehabilitation of coastal and marine ecosystems (including seagrass beds, mangroves) Component 1 of the AF concept will implement an element of the programme. The remaining elements will be implemented on a phased basis as funds become available.
Rehabilitation of the Negril Wastewater	Objectives: Raising and connecting the embankments of the stabilisation	This project directly complements Component 1 as it addresses some of the

Projects and Programmes	Objectives and Outcomes	Potential Synergies overlaps with the AF Programme
Treatment Plant GOJ/EU (12-month commenced February 2011)	ponds; installing flow control devices; improving the outlet structure Outcome: preservation of the coastal, natural environment; improved quality of the sea water and beaches; growth in aquatic biodiversity; and improved sanitary condition in the local communities	human-based activities which contribute to the degradation of the ecosystems in Negril.
Increasing the Resilience of Coastal ecosystems to Climate Change	Replanting of sea-grass and mangroves Installation of data loggers to record sea surface temperatures Preparation of a management plan for the marine protected area	Reducing beach erosion Baseline data recording Sustainable natural resource management practices
Marketing and Agriculture for Jamaican Improved Competitiveness	Advancing the development of a modern, efficient and internationally competitive agricultural sector in Jamaica through support to specific crops.	Farmer Field Schools methodology Climate change awareness programme and risk reduction planning

(Source: Compiled by PIOJ from various sources)

The AF programme complements the MOU signed between the Natural Resource Conservation Authority (NRCA), Negril Area Environment Protection Trust (NEPT), and the Negril Coral Reef Preservation Society (NCRPS) which seeks to preserve coastal and terrestrial biodiversity in the protected area. In addition, the NRCA (which guides the operations of NEPA) has a regulatory role in the protection of the Negril Environment Protection Area. The NCRPS and NEPT will be involved with monitoring activities, research, public education and awareness and protection of the area.

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

This programme is being implemented as part of a suite of on-going and planned initiatives by the GOJ and its partners to facilitate climate change adaptation at the national and local levels. An important element of these programmes is awareness and capacity building. This is in response to the demonstrated gap in understanding and knowledge identified through various consultations with communities and through the Climate Change Knowledge Attitude and Practice Survey conducted in 2005.

The programme will involve documentation of:-

- good water and land management practices in project communities,
- good adaptation practices to reduce vulnerability and increase resilience,

- innovations by farmers for adaptation
- methods and techniques for beach restoration and shoreline protection
- methods for replication of relevant project elements
- adaptation plans for Negril

In the case of the land management activities, demonstration plots will serve as “laboratories” for the participating farmers and will provide opportunities for learning by doing. Capacity building and knowledge exchange will be extended to farmers from non-project communities through observation during field visitswhich will be arranged during the project phase as well as through the use of Farmer Field Schools. During the stakeholder consultations farmers mentioned that they found these types of exchanges among farmers from different communities and parishes to be very useful. Technical field staff and extension service officers will also benefit from involvement in the project, and the knowledge gained from the programme will be incorporated in the implementation of the Agriculture Sector Plan and the National Irrigation Strategy.

In the case of the adaptation plans and technical guidelines for beach restoration, guidelines, standards, and tools developed will be shared via technical workshops, with a view to integrating their use in development planning through involvement of Parish Councils and agencies such as NEPA and the Ministry of Housing. Guidelines will also be cross-posted on the websites of critical agencies and through the Social and Economic Information Network (SECIN), a library and documentation network widely accessed by researchers and university students, as well as CARDIN, the Caribbean Disaster Information Network based at the University of the West Indies, Mona. The dissemination strategy will facilitate the availability and use of the information nationally, regionally and internationally.

Documented information from the programme will be disseminated through a range of methods and media including community meetings, workshops, project reports, and electronic and print media. The information will be targeted to residents, farmers, fisher-folk, trade groups and professionals. Where possible, educational institutions will be involved in knowledge sharing activities and will be invited to do case studies in particular communities. Generally, the communication and awareness building campaign and the messages disseminated will be designed to be culturally relevant, and segmented and targeted for increased impact. Overall, the AF-funded programme will leverage the knowledge management approach and activities being undertaken by the European Union funded Climate Change Adaptation and Disaster Risk Reduction Project and the Pilot Programme for Climate Resilience. It will use materials developed under these programmes and contribute information for material development. It will also establish linkages with the on-going and planned work of NGOs such as Panos Caribbean, NEPT and NCRPS.

The involvement of schools through the Four H Clubs movement will allow transmission to the next generation of farmers, whose involvement is critical if sustainability of good natural resources management practices is to be achieved.

Hard copies of project documentation will be available at RADA offices island-wide so that farmers from parishes not involved in the project will have access to project experiences and knowledge gained. Information will also be made available through the proposed Climate Information Platform to be developed under the PPCR.

The basic features of farmer field schools (FFS) are:

- FFS facilitators undergo intensive training (TOT) to prepare them for organizing and conducting field schools.
- Farmers become experts in their own fields.

- Each Field School is field based and lasts for a full cropping season
- The primary learning material at a FFS is the field
- FFS educational methods are experiential, participatory, and learner centred
- Each FFS meeting includes at least three activities: the agro- ecosystem analysis, a "special topic", and a group dynamics activity.
- Between 25 and 30 farmers participate in a FFS.
- Participants learn together in small groups of five to maximize participation.
- Final meetings of the FFS include planning for follow-up activities.

Delivery of an FFS program varies with the target crop. Short season crops (horticulture crops) must consider the farmers‟ need to tend to their own plots and are therefore more time-sensitive, while for tree crops such as cocoa there is more flexibility in delivery, since the trees are in the ground and cultural practices are relatively less time sensitive.

An impact evaluation will be included as part of the final project evaluation and will provide an additional basis to record lessons learnt under the programme. The information and data obtained under this programme will be fed into the Climate Information Platform being developed under the PPCR and will be available in RADA offices island wide.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation.

Programme Concept Stage

The consultation process used in the development of the programme concept was two-fold. On one level, it involved calls for concept ideas issued by the Planning Institute of Jamaica to agencies which work in the areas identified as priorities under the Second National Communication (which was prepared under a participatory process). These areas were also chosen to ensure alignment with the priority areas to be supported by the AF[24]. The calls were issued via letter, in partnership with the Hazard Risk Reduction and Adaptation to Climate Change Thematic Working Group (TWG)[25]. Responses were reviewed by a technical review sub-group.

On the other level, the team preparing the programme concept reviewed recent outputs of various national and local level stakeholder consultations on climate change adaptation and disaster risk reduction. This was done to ensure that priority needs identified at the community level and by a wider cross section of stakeholder groups, (women, farmers, fishers) were in concert with those identified by the agencies and are reflected in the programme design. The outputs reviewed, included the following:

- a climate change awareness rapid assessment survey of resource users conducted to determine the level of awareness of climate change among residents of two coastal fishing communities and two farming communities in western Jamaica; their observations of any changing climatic

[24] http//www.climatefundsupdate.org/listing/adaption-fund

[25] The TWG was established under Vision 2030 Jamaica and comprises representatives from the NGO sector, IDP, community and government agencies

conditions; the impact of such conditions on their environment and livelihoods; adaptation/coping strategies used; and perceived needs and proposed strategies to improve adaptation.

- four regional stakeholder consultations (bringing together residents from all 14 parishes) held in February - March, 2011 under the Pilot Program for Climate Resilience (PPCR) to help define the priorities of the Strategic Programme on Climate Resilience; and

- the Risk and Vulnerability Assessment Methodology Development Project report from Negril

Common concerns from the two levels of consultations included the need to protect livelihoods and food security and to improve knowledge as important mechanisms in adapting to climate change and building resilience.

Programme Development Stage

Particular emphasis was placed on receiving inputs from residents and technical experts during the development of the full programme. To this end, a consultant was contracted to plan, coordinate and facilitate stakeholder consultations as part of the process of completing the document. This was facilitated with resources from the Programme Formulation Grant. A total of one national and nine community consultations were held over the period January 18 – March 16, 2012. These were originally planned to be held earlier, but heavy rains and later political activities associated with the hosting of a general elections during the last quarter of 2011 resulted in their being rescheduled. The rescheduling was necessary to ensure that the project activities were not associated with any political activities and would therefore benefit from maximum community involvement. The consultations involved a variety of stakeholders within all parishes targeted for intervention and at national level (Annex 2). The communities were initially identified to be involved in the consultations based on the broad areas to be serviced under the programme and in accordance with the Ministry of Agriculture's plans for food security. Groups recommended for participation were primarily identified by the RADA Extension Officers who work directly with the communities. The venues chosen for most of the consultation were community centres, school and church halls.

Approximately 100 women and 200 men were involved in the consultations. During the consultations the programme concept and proposed activities were outlined to the group and feedback on suitability and relevance to needs was solicited. Communities were also asked to indicate whether the programme conflicted with or complemented other projects currently being done or which had been recently completed. Concerns of the community were documented even if they did not relate directly to the project subject area.

As a result of consultations several modifications were made to the original programme concept. For example, in Component 2 following consultations and field checks, large scale reservoirs were replaced by several smaller storage areas thus covering a wider geographical area. Farmers and other residents of the communities also provided valuable information on permanent springs and ponds which would provide water continuously even during droughts. Many of these are now included in the project to support the irrigation activities in addition to rainwater harvesting systems. Residents also made recommendations on the use of bamboo and other materials in the control of erosion and flood mitigation. The Clarendon farmers stressed the need for training particularly in planting techniques, farm management and livestock rearing. Another change made, as a result of inter-agency consultation and field assessments led to a re-scoping of the works so that more residents could benefit in South Clarendon and the removal of the Caymanas Block B Reservoir from the project. It was highlighted that the intended impact would not be realised given some new and impending developments within the vicinity of the existing reservoir.

The Negril consultation was also instructive, and the final breakwater placement was informed by the preferences of the stakeholders for a more aesthetic solution. The community also recommended that they be involved in the restoration of seagrass beds. The Negril stakeholders also expressed a

willingness to be involved in the implementation of the project by forming a local monitoring committee which would provide inputs to the agencies and contractors.

A national consultation was also held which included academia, NGOs, donor agencies and public sector agencies. During this consultation the participants undertook a detailed review of the document which had been circulated prior to the meeting. The Hazard Risk Reduction and Climate Change Adaptation Thematic Working Group also undertook a detailed review of the document and provided feedback. Comments received were incorporated in the document.

The project was endorsed by all participants – it is seen as supporting national sustainable development goals, as being compatible with climate change adaptation objectives and as promoting sound conservation and environmental management principles. When asked specifically if the project was in conflict with climate change adaptation goals or with other initiatives in the country all participants answered no.

A range of methods were used in the consultative process, they include i) focus groups discussions ii) field studies/visits at the local level to gauge information on environmental and climatic conditions, community knowledge and perceptions, livelihood-related practices, coping strategies and the potential for interventions and iii) key informant interviews (community, hoteliers, academics and technical agency level).

Consultations will continue throughout the life of the programme and will involve local community based and non-government organisations such as Panos Caribbean, NEPT and NCRPS, community based disaster risk management groups as well as local government authorities. The future consultation efforts will build on the methodologies used in the programme development phase and extend to include: on-going evaluation of interventions, periodic meetings with stakeholder groups (e.g. local fishermen's cooperatives, Jamaica Agriculture Society local groups, water user groups, residents' associations) and feedback mechanisms established via the programme secretariat. These types of consultations are considered critical to the process of adaptive management and ownership building necessary for successful programme implementation. An important recommendation to build on from the consultations is the example of the merger of a Farmers' Association and Citizens' Association, to better integrate farming into community development in Boroughbridge. This will be pursued where possible during implementation.

Table 12: Some Participating Organisations - AF Programme Development and Review

Agency	**Affiliation**
Association of Development Agencies (ADA)	NGO
Panos Caribbean	NGO
Water Resources Authority (WRA)	Government
Ministry of Agriculture and Fisheries – National Irrigation Commission (NIC) , Rural Agricultural Development Authority (RADA)	Government
National Environment and Planning Agency (NEPA)	Government
Ministry of Health	Government
Ministry of Tourism	Government
Environmental Management Division of the Office of the Prime Minister	Government
Planning Institute of Jamaica	Government

College of Agriculture, Science and Education	Academia
Parish Councils	Government
University of Technology	Academia
Canadian International Development Agency	Donor Group
United Nations Environmental Programme	UN Agency
United Nations Development Programme Country Office	UN Agency
St Thomas Environmental Protection Agency	NGO

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

The resources from the AF will be used to complement Government resources which have not been adequate to finance all activities identified to advance climate change adaptation priorities outlined in the SNC.

Component 1: Increasing the climate resilience of the Negril Coastline

Baseline - without Adaptation Fund resources:

Long Bay, Negril has experienced degradation of coastal and marine ecosystems – mainly beach coral reefs and sea-grass meadows – which are responsible for the supply of biogenic sand and the protection of the coastline. The ecosystems have lost their protective and provisioning functions resulting in a decline in fish and other marine species and a corresponding disruption of the livelihoods of communities. Fishing is no longer viable as a sole source of livelihood for many households, who have been forced to seek alternative livelihoods including small-scale farming and jobs in the tourism sector. Anticipated climatic changes – storm activity, sea level rise, and sea surface temperatures – will exacerbate the existing degradation in Negril. The importance of this lies in the fact that Negril's beach sands are derived partly from the seagrass meadows in the area and any increase in wave energy will be a threat to the survival of replanted sea-grass beds, especially if the next few years produce destructive storms.

So far, a number of efforts have been made to address climate change adaptation in Negril. However, these efforts have been carried out in a fragmented manner. As such, climate change adaptation in Negril continues to face a number of challenges including:

- the uncoordinated manner in which adaptation interventions are being undertaken. This has resulted largely from the absence of (spatial) framework for climate change adaptation in Negril;
- inadequate knowledge about appropriate coastal adaptation measures;
- Limited knowledge of climate hazards and their likely impacts on businesses,
- Shortage of financial resources
- The design of coastal adaptation structures with limited scientific data.

Given these challenges, the erosion of coastal ecosystems currently being experienced will continue unabated unless appropriate measures are implemented. Other projects are implemented in an effort to streamline and maximize efforts, one being the CCADRRP which will restore seagrass beds in the

Negril area. However, threats to these ecosystems increases over the medium to long term with SLR and more intense storms and storm surges.

Adaptation Alternative – with Adaptation Fund Resources

The AF support will address one aspect of an integrated Negril Action Plan, specifically developed to increase coastal resilience to the projected impacts of climate change. This involves the installation of breakwater structures in a strategic location off-shore Long Bay (Annex 1, Figure M(iv)). These will slow the rate of beach loss (Figure N Figure O below) and reduce the exposure of coastal, social, and economic assets. Tourism in the area is heavily dependent on the beach, and fisher-folk depend on the marine environment for fish thus the intervention will help secure livelihoods of tourism sector workers and fisher folk.,. The installation of the breakwaters will also create favourable conditions for natural sea-grass bed recolonisation. This approach has been informed by the results of scientific studies which have shown that the beach degradation cannot be solved solely through ecosystems restoration but must be coupled with hard engineering structures (UNEP/PIOJ).

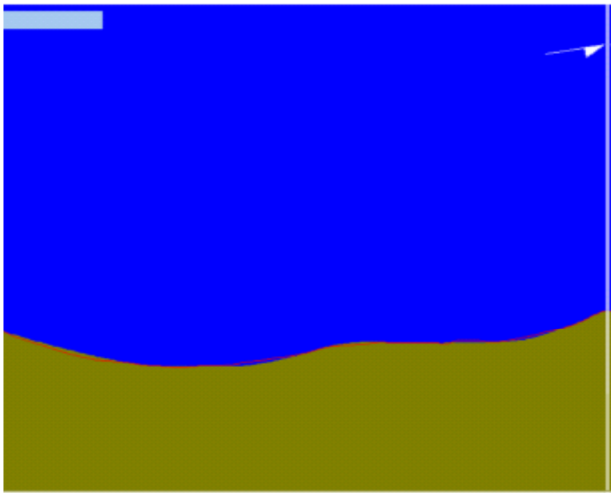


Figure N: Beach platform after 3 years with current bathymetric conditions for the pre-project calibration for a section of Negril (North arrow shown)

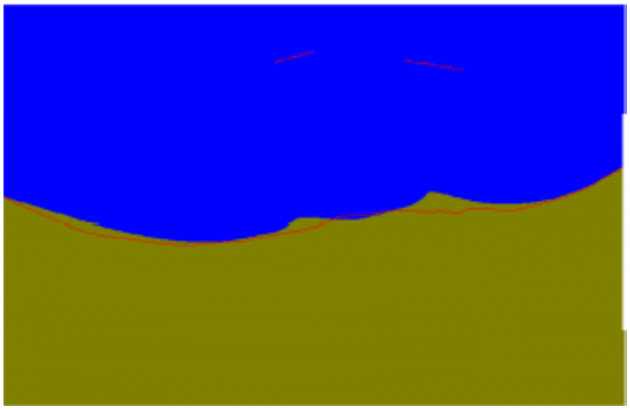


Figure O: Beach platform after 3 years of simulation for post-project scenario with breakwaters for a section of Negril

Component 3 of the programme seeks to develop appropriate adaptation measures and educational material in consultation with the stakeholders in the region. The ultimate success of the programme will be demonstrated by the long term benefits to the country gained through the adaptation processes introduced by the programme. Any positive long term impact depends on the involvement of the

stakeholders, hence Component 3 is critical to ensuring beneficial long term impact and ensuring that the benefits derived are cost effective.

Component 2: Enhancing the climate resilience of the agriculture sector by improving water and land management in select communities

Baseline - Without AF Resources:

A number of challenges to farming in Northern Clarendon has arisen due to abnormally high evapo-transpiration rate during the dry seasons (November to March and June -August), and extended periods of drought followed by intense rainfall. In other areas, increasing incidence of drought and flooding has led to loss of crops and lowering of productivity. Changing rainfall patterns coupled with high evapo-transpiration rates have led to water deficits and reduced ability of crops to withstand pests. The extreme climate conditions coupled with poor agricultural practices including hillside farming have contributed to high rates of soil erosion, also affecting agricultural productivity and environmental health.

Adaptation Alternative – With AF Resources

Alternative water harvesting methods such as mini-dams, storage systems such as entombments and tanks, rainwater harvesting as well as gravity drip irrigation systems will be developed. This will be complemented by efficient water use technologies to increase water delivery to farmers; and the introduction of technologies to improve soil moisture retention. Land management techniques to reduce erosion while pursuing hillside farming will increase sustainability.

Component 3: Improving institutional and local capacity for sustainable management of natural resources and in disaster risk reduction in the targeted vulnerable areas

Baseline – Without AF Resources

A climate change knowledge, attitude and practice (KAP) survey conducted in 2005 revealed that there were significant gaps in knowledge and that this has contributed to low adaptive capacity primarily in vulnerable communities. The results of the survey suggested that although persons recognise a threat from climate change, they believe that the government should take primary responsibility for managing its effects, and in addition there is a level of complacency surrounding climate change and its effects.

To address this, a number of climate change awareness projects including the NGO-led Voices for Climate Change have been implemented in selected parishes/communities in recent years. However, subsequent assessments including a 2009 climate change awareness rapid assessment survey and recent community consultations have indicated that there is still need for comprehensive targeted education and awareness programmes to improve knowledge in order to facilitate more sustainable practices. A related issue is the inadequate packaging of the climate change awareness information. There is a need for such information to be appropriately packaged and targeted to ensure effective communication which must result in a change in behaviour if the goal of securing livelihoods is to be achieved.

Adaptation Alternative:

The AF funds will provide for targeted training and information to assist farmers to better understand the impacts of climate hazards within **t**heir geographic areas and will expose them to site-specific techniques which they can use to adapt. This is particularly important for Component 2 where the topography and micro-climate will be considered in the design of effective adaptation strategies. Targeted communities will also be exposed to training in natural resource management and disaster risk reduction. The inter-linkages among climate change adaptation, sound environmental management and disaster risk reduction are well established among academics as well as practitioners. This multi-faceted training will expose the communities to the latest thinking on these

topics, while at the same time allowing the participants to share their experiences and observations. Documentation and sharing of community experiences and innovative adaptation and risk reduction practices will allow communities which are not included in the project to benefit from the project. This documentation will be made available through all RADA offices island-wide as well as through virtual libraries.

At the institutional level, the development and documentation of guidelines for shoreline protection are relevant and can be replicated in other areas of Negril and other coastal communities. The risk atlas developed will address a gap in development planning information and will provide technical information for the redefinition of setbacks and high watermarks. This is important, if future developments are to be more resilient to the projected effects of climate change such as increase in sea level, higher storm surges and stronger wave action. This non-structural mitigation approach will reduce future damage to coastal assets.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation

The general organizational structure for the programme is outlined below (Figure P). The PIOJ falls under the Ministry of Finance and Planning to which it reports. The Ministry of Finance maintains responsibility for budgets and will provide budgetary support, particularly for counterpart funding.

The NIE (the PIOJ) will be supported by a Programme Steering Committee drawn from a wide cross section of stakeholders in the development field with particular reference to the priority areas identified. This committee will provide oversight of the project.

The NIE will operate within a matrix organizational structure of a Programme Management Unit (PMU) comprising a core staff, drawn from three technical divisions of the PIOJ, namely (i) Sustainable Development and Regional Planning; (ii) External Cooperation Management; and (iii) Corporate Services. Expertise will be drawn from other divisions within the PIOJ to assist with the work of the NIE, as required. Day to day coordination will be maintained with the executing agencies through the Programme Management Unit. The relationship between the NIE and the executing agencies will be in accordance with regular GOJ operating standards.

The NIE will also receive technical advisory and project oversight input from the Hazard Risk Reduction and Climate Change Adaptation Thematic Working Group, a sub-set of which will be constituted as the Technical Review Committee. The Thematic Working Group is part of the monitoring framework for Vision 2030 Jamaica National Development Plan and provides a useful avenue for ensuring alignment of the programme goals with broader national development objectives.

The role of the Technical Review Sub-committee of the PSC Committee will be to ensure a high technical standard of outputs, to review and approve methods being implemented, to ensure adherence to Government of Jamaica technical standards and to ensure adherence to the project monitoring and evaluation framework.

A Programme Management Unit (PMU) will be established in the Planning Institute of Jamaica. The PMU will be responsible for the day-to-day operations of the programme, and will liaise directly with the manager within the various executing agencies.

Technical agencies of government will be directly responsible for implementation of the project components. Component 1 will be managed by NEPA and the National Works Agency. Local stakeholders will be kept updated on progress via regular meetings and workshops. Component 2 will be managed by the Ministry of Agriculture with the involvement of the National Irrigation Commission and the Rural Agriculture Development Authority.

Component 3 will be managed by NEPA and the Ministry of Tourism with inputs from several organisations, including ODPEM, UWI, Social Development Commission, as well as all GOJ entities involved in the project.

For Component 1, a committee of local stakeholders based in Negril will provide additional input and oversight.

Each executing agency will have a management system including a point person/ manager who will have the responsibility of communicating directly with the PMU. Additionally, this system will facilitate on-going internal monitoring within each agency.

Agency Responsibilities are summarised in Table 13 below:

Table 13: Stakeholder Responsibility Matrix (Selected Activities)

Component	PROGRAMME ACTIVITY	RESPONSIBLE AGENCY/GROUP
1,2,3	Project coordination and management Supervision of fiduciary standards	PIOJ Programme Management Unit
1,2,3	Technical oversight Quality control	National Implementing Entity (PIOJ) Project Management Committee Hazard Risk Reduction and Climate Change Adaptation Thematic Working Group and sub-group; PSC Technical Review Sub-Committee
1	Supervision of coastal works Monitoring of adherence to required standards Provide local knowledge	National Works Agency NEPA Westmoreland Parish Council Local (Negril) monitoring committee to be established
2	Coordination of agriculture related activities Development of water sources, Provision of storage systems, installation of irrigation systems Implementation of rainwater harvesting systems Establishment of micro-dam	Ministry of Agriculture and Fisheries National Irrigation Commission Project Communities
2	Soil conservation and water catchment infrastructure Establishment of demonstration plots with land husbandry and soil conservation techniques Establishment of small production and productivity schemes using climate smart agriculture Establishment of water users groups	RADA Project Committees Project communities
3	Training workshops and farmer field days	RADA/NIC; Communities
3	Communication and awareness programme, disaster risk reduction training Adaptation Plans Risk Atlas Climate change awareness and education Documentation of lessons learned	Ministry of Tourism and Entertainment (MOTE) ODPEM NEPA NIE and partners
3	Development of guidelines and standards for beach restoration	NEPA

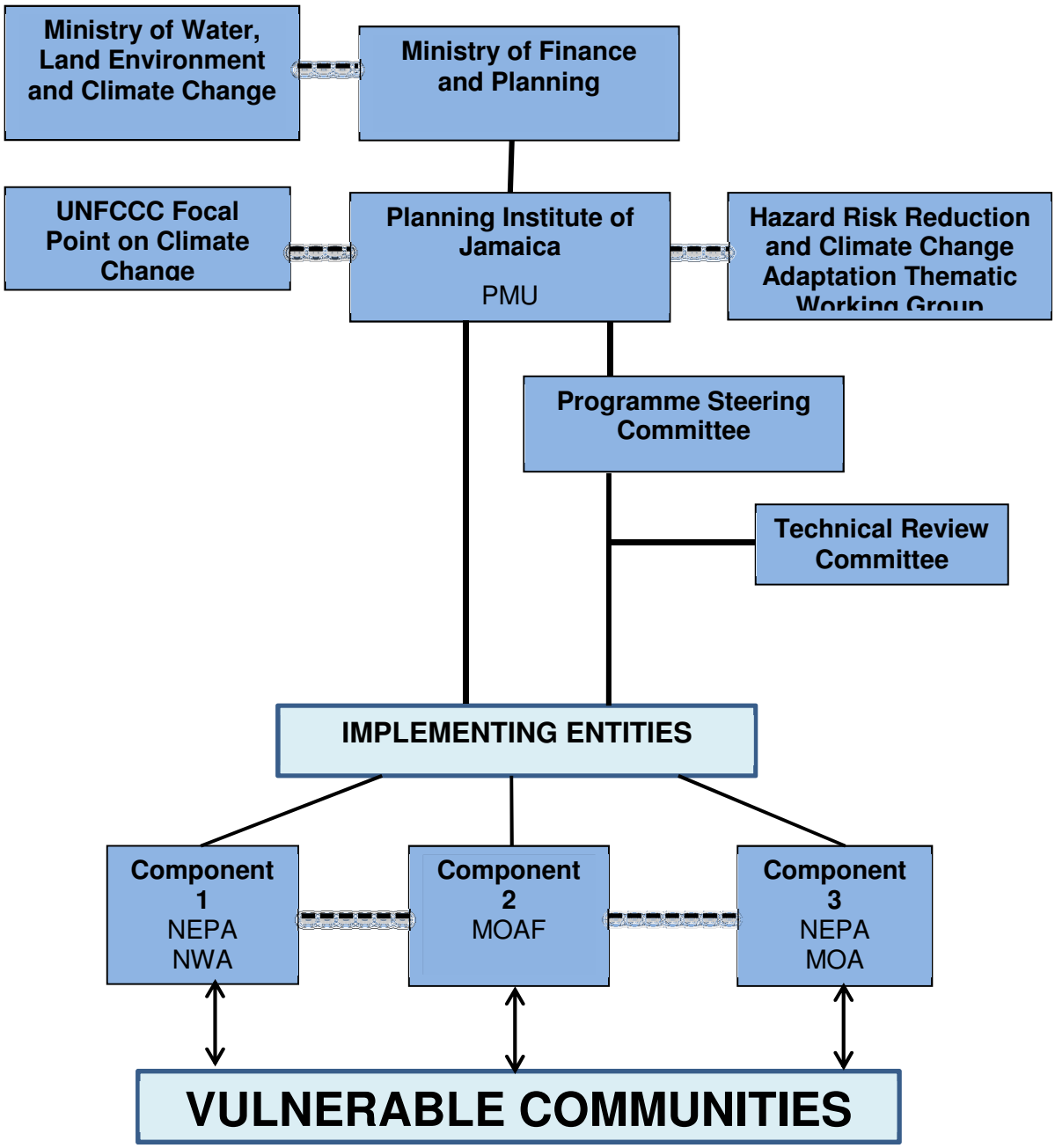


Figure P: Indicative Organizational Outline (Source: PIOJ, 2011)

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

For financial risk management the framework is expected to draw heavily on the budgetary and fiduciary management arrangements which govern the operations of the Planning Institute of Jamaica and all public sector agencies, the Government procurement policy, and the Adaptation Fund Board financial management requirements. Specific instruments to be observed will include: GOJ Financial Administration and Audit Act, PIOJ Accounting Systems and Procedures Manual: International

Financial Reporting Standard (IFRS), Generally Accepted Accounting Principles (GAAP) and the GOJ Public Sector Procurement Procedures (October 2010). All procurement of works and services under the project will be guided by the GOJ Procurement Guidelines, Policies and Procedures.

More specific risks associated with the programme are largely as follows:

Table 14: Major Risks of the Programme

Risk Class/Category	Level	Mitigation Strategies and Notes
Financial: inflation leading to increased costs for goods and services	Moderate	The government has recognized the project as important to national development. As such, it will be included in the public sector budget in the 2013/14 to 2014/15 Financial Years for additional resources to be made available, if necessary
Environmental: natural hazards (flood events, drought, storm surges, storms) hamper some efforts	Moderate to High	The programme is seeking to reduce the effect of natural hazards. However, the expected outcomes such as behavioural changes and the construction of infrastructure are at risk in the early phases of the programme.
Operational/Administrative: loss of technical staff; coordination of activities with other agencies; large number of on-going projects/programme	Low	Existing inter- and intra-agency frameworks will be incorporated in the programme to reduce competition and avoid segmentation. For example, the Vision 2030 thematic working groups (TWGs). Furthermore, each executing agency has and is incorporating the activities within their respective workplans. This will ensure that staff is assigned accordingly. The various training activities will reduce the likelihood of loss of technical capacities.
Stakeholder Buy-in: willingness of persons to understand, accept and implement the programme	Low	The development of the concept and the full programme proposal involved consensus from stakeholders at all levels – public and private sector agencies, vulnerable groups, NGOs, academia. In moving forward: • The consultation process will be on-going during the life of the programme and beyond. • Knowledge transfer and awareness building are key within this programme and also in other complementary ones. • Lessons learnt from other initiatives will be incorporated to maximize impact. • An in-depth understanding of cultural behaviours will form the basis on which consultations are conducted. Regarding political buy-in, the government is committed to climate change and has endorsed this programme.

Ranks: Low, Moderate, High

The Government of Jamaica has signalled its commitment to adapting to climate change, with the establishment of a Ministry of Water, Land, Environment and Climate Change (MoWLECC). It is therefore expected that the highest risks in the programme are related to natural hazards, and every effort will be made to reduce potential damage during the early stages of the programme (as this is the period within which the risk is greatest).

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

Monitoring and evaluation will be conducted according to the programme monitoring approach of the Planning Institute of Jamaica (the NIE) and also in accordance with the Operational Procedures and Guidelines (OPG); Results Based Management (RBM) Approach and the evaluation framework. Details on these are outlined below.

Monitoring: This will be undertaken at various levels in accordance with the Institutional Structure of the programme (see Part III, Section A). The Ministry of Finance and Planning will have general oversight of the financial aspect of the programme, particularly with respect to budget allocations within the wider government system. The PIOJ will establish a Programme Management Unit (PMU) which will have the responsibility of the day-to-day operations of the implementation process. Additionally, strategic direction will provided by the Hazard Risk Reduction and Adaptation to Climate Change (HRRACC) Thematic Working Group (TWG) of Vision 2030 Jamaica and a Programme Steering Committee (PSC), the latter to be established by the PIOJ. The TWG and PSC both will comprise members of the public and private sectors, NGOs/civil society and academia. Each executing agency will establish internal monitoring systems which will also be responsible for reporting to the PMU and subsequently the PSC.

The PMU will act as the Secretariat of the PSC. Each executing agency will be requested to provide monthly progress and financial reports. It will be proposed that the PSC meets on a monthly basis to review financial and progress reports. Also, the PSC will be charged with establishing sub-committees as the need arise. An adaptive management approach will be undertaken with due consideration to risks, progress, timelines and other relevant factors.

Monitoring mechanisms:

A combination of methodologies will be used throughout the programme including, but not limited to, site visits, interviews, focus groups, etc. Pictorial evidence will also be critical to the process:

- Programme Inception Workshop and Report – This workshop will be conducted in October 2012 to mark the start of the programme. This will be followed up with a report which will be submitted to the AF Secretariat one month following the workshop.

- Monitoring Plan – The Programme Management Unit will prepare a monitoring plan in the start-up phase of the programme using the indicators, outputs and targets identified in the programme's logical framework. The plan will detail all arrangements for monitoring of the subprojects and will also establish a methodology for tracking progress against the indicators, outputs and targets identified for the Programme. The Programme Manager will be expected to report regularly to the PSC on progress towards meeting these targets and achieving expected results as outlined in the logframe, in addition to broad reporting on progress in implementation.

- Work Plans – Annual work plans will be prepared by the project managers in order to translate the project document into operational terms. The work plans will describe in detail the intended delivery of outputs, the activities to be conducted and the results expected. In addition, they will indicate schedules and the persons/institutions assigned the responsibility for delivery results**.** The work plans will also be the basis for monitoring progress of project implementation.

    - In a deliberate attempt to keep GOJ, the AF Board and other development partners informed of the progress of programme implementation, project managers will be required to provide an abbreviated version of their work plan. These work plans will indicate critical milestones in implementation with the related time table and responsible personnel

- Field Visits – The project managers will be required to make field visits at regular intervals to the project sites. The purpose of the field visits will be inspection of the sites; physical outputs; and

the services being provided by the project. In addition, field visits will assist in facilitating the participatory process by providing opportunities for interaction with target beneficiaries, so as to get their views on how they are being affected by the project and their proposed solutions to problems that may arise. Reports emanating from the field visits will focus on relevance and performance while seeking to unearth early signs of potential problems or success areas. The reports will be enhanced where appropriate with photographs.

- Stakeholder Meeting - Stakeholders meetings will be held with the expressed purpose of involving the major stakeholders in addressing issues relating to the programme/projects. This will help to create a sense of ownership among stakeholders. Meetings with stakeholders will be conducted at different levels and with varying frequencies. For example, technical and operational issues will be handled at the programme/project level while policy issues will be discussed at a higher level e.g. Steering Committee.

- Reporting – The programmes/projects will be characterised by systematic reporting throughout the entire duration of the programme. In addition to annual reports, internal monitoring reports will be prepared on a more frequent basis – monthly, quarterly, etc.

- Periodic audits will be carried out and in accordance with GOJ requirements will address both fiduciary and value for money considerations.

- Questionnaire Survey – This option will be explored as the need arises during the implementation process. It may be used to get feedback from stakeholders.

- Interviews – Structured and unstructured interviews will be used as a means of gathering information for progress reports or for verification purposes.

- Focus Groups – This method may be used to continue the dialogue with stakeholders. Not only will they inform decisions made during the programme implementation, but will also be a means through which information is communicated.

Table 15: Monitoring and Evaluation Activities

Activities	Timelines/Duration	Cost (USD)	Responsible Parties
Programme Inception Workshop	October 2012	5,000	PIOJ
Establish Programme Steering Committee (PSC)	First quarter	0	PIOJ/ PMU
Finalize Operating Modalities	First quarter	0	PIOJ/PMU, Executing Agencies
Progress Reports	Monthly, Bi-annual	0	Executing Agencies
Financial Reports	Monthly, Bi-annual	0	Executing Agencies
Site Visits	Periodic	5,000	PMU, Executing Agencies, PSC
Programme Performance Reports	Yearly	0	PIOJ/PMU
Workshops/Consultations/Meetings on Programme Status (for wider audiences)	Yearly	8,000	PMU
Mid-term Review/Evaluation	March 2014	8,000	PIOJ/PMU, External

Activities	Timelines/Duration	Cost (USD)	Responsible Parties
			Consultants
Terminal Evaluation	February/March 2016	8,000	PIOJ/PMU, External Consultants
Financial Audits	Annually	14,000	PIOJ, External Consultants

Project Evaluation:

Evaluation: An evaluation will be conducted twice during the programme – a mid-term and final evaluation (see Table 15 above). The process will be led by an independent evaluator with the following general criteria: Relevance, Performance and Success (Table 16).

Table 16: Evaluation Criteria

Focus of Monitoring and Evaluation	Criteria
Relevance: Degree to which the objectives of the programme	• Was the programme planning process logical and complete? Is there adequacy in programme design?
Performance: the progress that is being made by the programme/project relative to its objectives	• Efficiency – Have the results been achieved at reasonable cost? Was the most appropriate activities employed for the respective outputs? • Effectiveness – How has the assumptions and risks affected implementation? Has/Will the stated outputs/activities produce the results expected? • Timeliness of inputs
Success: The extent to which the programme/project has brought about change	• Impact – What is the extent to which the programme is addressing the expressed objectives? • Sustainability – Is the programme on-track to be sustained (mid and post programme)?

D: provide a results framework for the programme proposal, including milestones, targets and indicators

The results framework is outlined in Table 17 below. The alignment of the outcome and output indicators with the Adaptation Fund Results Framework is outlined in Table 18.

Table 17: Results Framework

OUTCOME	Outcome Indicators	Baseline	Target (2014)	Target (2016)	Assumptions/Risks
Enhanced capacity to protect livelihoods and food security in vulnerable communities by: improving land and water management for the agricultural sector, strengthening coastal protection and building institutional and local capacity for climate change adaptation	i) change in beach width	Annual average rate of beach erosion app 0.5-1.0m	Reduction in the rate of coastal erosion	At least 20% increased accretion	No major natural disasters impeding progress of project and damaging infrastructure
	ii) change in percentage of communities with improved land and water management practices in the agriculture sector in the project area ii) change in agricultural output of project communities iii) change in the incidence of down-stream flooding and soil erosion	Physical evidence of land degradation, soil erosion due to removal of trees Reported incidence of downstream flooding and soil erosion (To Be Determined (TBD)	Sustainable land and water management techniques introduced in 40% of targeted communities At least 20% of targeted farmers (male/female) employing good practices 10%increase in crop yield 5% decrease in pest infestation 15%Reduction in reported incidence of downstream flooding and reduced turbidity of the rivers 15% Reduction in level of soil erosion	Sustainable land and water management practices introduced in 100% of targeted communities At least 50% of farmers (male/female) employing good practices 30%increase in crop yield 10% reduction in pest infestation 40% Reduction in reported incidence of downstream flooding and reduced turbidity of the rivers 40% Reduction in level of soil erosion	No major natural disasters Agriculture output not adversely affected by praedial larceny Soil conservation coupled with increased water access successful
	i) number of farmers (male/female) with increased access to irrigation water and production schemes	Small %age of residents (male/female) with water storage or distribution facilities	450 farmers (male/female) in 9 communities have access to irrigation water and .production schemes	1000+ farmers (male/female) in 21communities have access to irrigation water and production schemes	Good Community management of WUGs Male : female (2:1) farming ratios of the Agriculture Census maintained
	ii) number of farmers (male/female) having access to rainwater		23 farmers (15male/8female) in 6 parishes have access to	60 farmers (40male/20 female) in 6 parishes have access irrigation	

	harvesting and drip irrigation systems		water through rainwater harvesting	water and production schemes	
	iii) number of farmers (male/female) benefiting from soil conservation and land husbandry infrastructure (in Upper Rio Minho Watershed)	TBD	20 000 residents in 10 communities experience improved environmental conditions due to the establishment of land husbandry infrastructure	App. 70 000 male and female residents in 31 communities experience improved environmental conditions due to the establishment of economic live barriers, fruit trees,	Impact extends beyond the farmers
	i) change in availability (number) and quality of local planning tools for Negril, e.g., climate risk atlas, adaptation plans and the extent to which climate resilient planning development is adopted	Development planning tools not climate smart nor standardized 0 community adaptation plans available for project communities	Climate smart guidelines developed and being used in development planning 1st Draft of Risk atlas being tested and validated Community approval of draft adaptation plan	Climate smart guidelines for assessing development applications institutionalized and in use in at least 50% of development applications Beach restoration activities guided by standardized approach Climate risk information integrated into development planning CCA and DRR integrated into community plans and activities	
	% of farmers reporting reduced losses of income and increase of supplemental income	23.% of farm household in Northern Manchester below the poverty line	30% farm households have alternative sources of income	75% farm household have alternative sources of income	Increased access to water and better husbandry contributes to security of livelihood e.g. crops plus livestock
	% residents (male/female) in project communities more aware and knowledgeable of CCA and DRR issues for their community	(∽90%) Majority of residents (male/female) believe CC risks more relevant to the country than to their community	At least 50% of residents in project communities believe that climate risks are relevant to their community and are willing to accept primary responsibility for adaptation	At least 75% of residents in project communities believe that climate risks are relevant to their community and are willing to accept primary responsibility for adaptation	

OUTPUTS	Output Indicators	Baseline	Target (2014)	Target (2016)	Assumptions/Risks
Component 1: Negril Breakwaters	Length (m) of breakwater installed	No breakwater	590m of breakwater installed	990m of breakwaters installed	Raw materials for breakwater available within proximity (as indicated during consultations with local stakeholders)
Verification/Source: Engineers reports; Environmental monitoring reports, progress reports from executing agencies; site visits reports; annual reports					
OUTPUTS	**Output Indicators**	**Baseline**	**Target (2014)**	**Target (2016)**	**Assumptions/Risks**
Component 2: Land and Water Management Systems	i) number of micro dams constructed in North Manchester	0 water catchment facility in North Manchester	One micro dam partially installed	One micro dam fully installed and operational	Potential technical difficulties will be identified during the design phase and adequately addressed during implementation
	ii) number of irrigation and production schemes established in: St Thomas, St Ann, Trelawny, St Catherine, Clarendon, Manchester, St Mary	0 irrigation and production schemes in the 21 targeted communities in 6 project parishes	25 irrigation and production and productivity schemes established and operational in 9 communities serving app 450 farmers	63 schemes installed and operational in 21 communities serving over 1000 male and female farmers	A minimum of 330 female farmers expected to benefit assuming the ratio of 1female to 2 males recorded in the Agriculture Census holds
	iii) number of rainwater harvesting and gravity drip irrigation systems installed in: St Thomas, St Ann, Trelawny, St Catherine, St Mary, Clarendon	Inadequate access to irrigation facilities in selected communities in 6 project parishes	15 rainwater harvesting 8 ponds and springs 23 gravity drip irrigation systems installed and operational	30 rainwater harvesting 20 ponds and springs 60 gravity drip irrigation systems installed and operational and serving 40 male and20 female farmers directly	Storage capacity installed will be adequate to cover periods of drought *NB:10 systems to be attached to existing sources*
	iv) soil conservation and land husbandry infrastructure in Upper Rio Minho Watershed	Extensive soil erosion due to hillside farming, removal of forest cover and poor farming practices	App 8000m diversion /hillside ditches, 10500 individual basins, 1200m of waterway, 500m continuous mound , 250 check dam/drop structures installed, 8000 m pineapple (vegetable barrier) and 5ha fruit	App 18000m diversion /hillside ditches, 24600 individual basins, 3000m of waterway, 1200m continuous mound , 705 check dam/drop structures installed, 18000 m pineapple (vegetable barrier) and 13ha fruit	Benefit to app 70 000 residents in the Upper Rio Minho Watershed as well as those in communities downstream through reduced flooding and siltation Soil losses reduced

			forest and 6 ha timber planted impacting 2 Extension Areas	forest and 15ha timber planted impacting 5 Extension Areas	almost immediately after installation of infrastructure Direct economic benefits begin to accrue about year 2
Agriculture Capacity Building	i) Number of climate-smart farmer field schools established in select communities	No climate-smart field schools in select communities	Seven climate-smart farmer field schools established and 50% farmers trained to adopt climate smart agriculture practices	Seven climate-smart farmer field schools established and 90% farmers (male/female) trained to adopt climate smart agriculture practices	Assuming the ratio of 1female to 2 males recorded in the Agriculture Census holds Farmers receptive to new knowledge and techniques
	ii) Number of demonstration plots established in the Upper Rio Minho Watershed	Targeted communities do not have demonstration plots in place	At least three demonstration plots established and 25% of farmers (app 380 male/female) trained in land husbandry techniques and adopting sustainable practices	Five demonstration plots established imparting skills, knowledge and techniques to 1510 farmers (male, female) who are adopting sustainable practices	Farmers receptive to new knowledge and techniques For sustainability, Sufficient numbers of young farmers will participate in the training or older farmers will pass on knowledge to their children
	iii) Number of water user groups established	0 WUG in targeted communities	7 WUGs established and operational towards sustainable management of water resource	15 WUGs established and operational towards sustainable management of water resource	
Component 3: Awareness Building and Knowledge Management	i) Number and volume of awareness raising materials (audio visual) targeted to specific age groups, occupation groups, sex and persons with disability	No area specific public education programme	Print and electronic media messages developed to reinforce cc knowledge and promote DRR Targeted public education programmes developed and implemented in project communities and 30% of residents sensitized	Programmes adjusted based on feedback mechanism Full roll out of awareness building programme 70% of residents sensitized	Information culturally relevant and targeted on the basis of gender, age, location and area norms

	ii) Evidence of documentation and dissemination of best practices	No evidence of documented best practices in project areas	Documentation of best practices for water and land management, innovations by farmers	Information made available through virtual networks, RADA, parish libraries, College of Agriculture Science and Education, Jamaica Agriculture Society, Fishermen's Cooperative, 4H Clubs and schools	
	iii) Number of (targeted) training programmes for local entities in DRR, natural resource management	Limited training in DRR for local entities in DRR and natural resource management, except the few hotels that have green certifications. Limited exposure to training with specific focus on climate change	Training programme designed in collaboration with ODPEM; materials developed; and training of fishers (mostly male), male and female youth , micro and small business owners and other groups commenced	Training programmes targeted at fishers (mostly male), male and female youth , micro and small business owners and other groups completed	The number of training workshops/events will be determined once the project commences
Coastal Adaptation Training, Tools	i) Guidelines and standards for beach restoration, shoreline protection for Negril	No specific technical guidelines for Negril	Draft set of guidelines and standards developed	One set of guidelines and standards finalized	Planning authorities receptive
	ii) Number of climate risk atlas* for storm surge, sea level rise (specific for Negril)	0 risk atlas information for storm surge and sea-level rise for Negril	One draft of risk atlas prepared containing information on storm surge and sea-level rise	Risk Atlas completed	Data and Information not available/inadequate
	iii) Number of adaptation plans for vulnerable sections of Negril	0 Plan	Draft adaptation plan prepared with input from stakeholder groups representing farmers, fishers, tourism and commercial interests	One adaptation plan completed and in use	Community continues to be engaged
Verification/Source: Field (assessment) reports; progress reports; environmental monitoring reports, annual reports; consultation/training reports, surveys, site visits					

*A climate risk atlas is being developed for Jamaica, but details of sea level rise (SLR) and storm surges for Negril will not be available.

Table 18: Alignment of Programme with AF Objectives

Project Objective(s)[26]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator
To protect livelihoods and food security in vulnerable communities by: improving land and water management for the agricultural sector, strengthening coastal protection and building institutional and local capacity for climate change adaptation	i) change in coastal protection infrastructure in Negril	**Outcome 4:** Increased adaptive capacity within relevant development and natural resource sectors	4.1. Development sectors' services responsive to evolving needs from changing and variable climate 4.2. Physical infrastructure improved to withstand climate change and variability-induced stress
		Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	5. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress
	ii) change in land and water management practices in the agriculture sector (in select communities)	**Outcome 4:** Increased adaptive capacity within relevant development and natural resource sectors	4.1. Development sectors' services responsive to evolving needs from changing and variable climate 4.2. Physical infrastructure improved to withstand climate change and variability-induced stress
		Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	5. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress
		Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure (increased) access to livelihood assets 6.2. Percentage of targeted population with sustained climate-resilient livelihoods

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

	iii) number of capacity building initiatives integrated in national and/or local decision-making within the agriculture sector and for coastal resources	**Outcome 1:** Reduced exposure at national level to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis
		Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks 2.2. Number of people with reduced risk to extreme weather events
		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 3.2. Modification in behavior of targeted population
		Outcome 7: Improved policies and regulations that promote and enforce resilience measures	7. Climate change priorities are integrated into national development strategy
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**
Increased climate resilience of the Negril coastline	Change in width of beach (m)	***Output 4:*** Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability ***Output 5:*** Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types) 5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)
Enhanced climate resilience of the agricultural sector through improved water and land	i) number of farmers (by gender) with increased access to irrigation water and production schemes	***Output 4:*** Vulnerable physical, natural, and social assets strengthened in response to	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from

management in select communities	ii) number of farmers (by gender) having access to rainwater harvesting and drip irrigation systems iii) number of farmers benefiting from soil conservation and land husband infrastructure (in Upper Rio Minho Watershed)	climate change impacts, including variability ***Output 5:*** Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability ***Output 6:*** Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	climate variability and change (by asset types) 5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets) 6.1.1.No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or community-livelihood strategies
Improved institutional and local level capacity for sustainable management of natural resources and in disaster risk reduction in the targeted vulnerable areas; and raising awareness for behaviour modification	i) change in number of local planning tools for Negril, eg, climate risk atlas, adaptation plans ii) number of entities adopting DRR/natural resources management in operations iii) number of farmers adopting sustainable practices (through farmer field schools, demonstrations plots, etc)	***Output 1:*** Risk and vulnerability assessments conducted and updated at a national level ***Output 2.2:*** Targeted population groups covered by adequate risk reduction systems ***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	1.1. No. and type of projects that conduct and update risk and vulnerability assessments 2.1.2. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased 2.2.2. No. of people affected by climate variability 3.1.1 No. and type of risk reduction actions or strategies introduced at local level 7.1. No., type, and sector of policies introduced or adjusted to address

			climate change risks 7.2. No. or targeted development strategies with incorporated climate change priorities enforced

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

A detailed budget is outlined below in Table 19.

Table 19: Detailed Programme Budget

Investment category	**Activities**	**Total (US$)**
Component 1: Increasing the climate resilience of the Negril coastline (Negril Beach Restoration project).	1.Preliminaries	400,000.00
	2.Coastal Works-Hard Solutions	4,085,060.00
	3. Provisional Sum and Dayworks	242,500.00
	4.Environmental Monitoring and Management	236,378.00
	5. Engineering Services	280,459.00
Contingencies		236,378.00
Total: Component 1.		**5,480,775.00**
Component 2: Enhancing the climate resilience of the agriculture sector by improving water and land management in selected communities.	1.Design and construction of microdam	590,000.00
	2.Implementation of rainwater harvesting and small scale gravity irrigation programme:	
	• 30 rainwater harvesting system using roof catchment and tank	35,000.00
	• (20) Rainwater harvesting system using ponds/tanks	162,000.00
	2.1 Implementation of Sixty (60) Gravity Drip Irrigation Systems	70,725.00
	3.Establishment of small scale irrigation systems and production and productivity programmes using climate-smart	1,080,000.00
	4.Establishment and rehabilitation of soil conservation and land husbandry infrastructure	450,000.00
	5. Establishing demonstration plots applying effective land husbandry and soil conservation techniques	116,000.00
Total: Component 2		**2,503,725.00**
Investment Category	**Activities**	**Total (US$)**
Component 3	1 Training of local communities and entities in disaster risk reduction (DRR) and natural resources management	117,000.00

Investment category	Activities	Total (US$)
	2 Development of guidelines/technical standards for beach restoration and shoreline protection	70,000.00
	3 Development of adaptation plans for the most vulnerable areas along the Negril coastline	74,000.00
	4 Documenting lessons learnt from public awareness programme	3,500.00
	5 Development of a climate risk atlas – storm surge, sea level rise, etc. – to be used in the development planning process	150,000.00
	6 Conducting workshops and field days for farmer training in water and land management and climate smart agriculture	190,000.00
	7 Farmer field schools to develop solutions and demonstrate good practices led by farmers	81,000.00
	Sub total	**685,500.00**
	1B.Climate change awareness and education programmes developed and implemented in project communities	**100,000.00**
Total: Component 3		**785,500.00**
Total: Components 1, 2, 3		**8,770,000.00**
PFG		30,000.00
Programme Execution Cost (see Table 22)		415,000.00
NIE Management Fee (see Table 21 below)		780,000.00
Total budget		**9,995,000.00**

Budget Notes:

1) The budget for Component 1 reflects the low estimate costing by the engineer. The tendering process will be on a fixed cost basis.

2) Preliminaries include setting up of site office, maintenance, safety, health, welfare, supervision of works, bonds and insurance, quality control, environment and safety plans, progress reports, surveying (initial, setting out, elevations as built), testing (armour stone and fill)

3) Coastal Works-Hard Solutions **–** material and labour costs inclusive of

Material: Breakwaters: Boulders – C-1-BW1 (24,500m^3), C-1-BW2 (23,200m^3)

Geotextile to footprint C-1-BW1(11,600m^2), C-1-BW2 (8,970m^2)

4) Provisional Sum and Dayworks: Land site preparation, lease and demobilization; Day Works, Prime cost of labour, material and plant

5) Environmental Monitoring and Management – includes permit monitoring, analytical and related equipment for civil works (Components 1 and 2)

F: Include a disbursement schedule with time-bound milestones

The disbursement schedule is outlined in the table below.

Table 20: Disbursement Schedule

	Upon Agreement signature	One Year after Project Start[a/]	Year 2[b/]	Year 3*	**Total**
Scheduled Date	August/September 2012	October 2013	October 2014	October 2015	
Project Funds	3,069,500.00	2,192,500.00	2,192,500.00	1,315,500.00	8,770,000.00
Execution Costs	137,300.00	121,450.00	95,850.00	60,722.00	415,000.00
Implementing Entity Fee	245,097.00	214,513.00	203,400.00	116,990.00	780,000.00

[a/]Use projected start date to approximate first year disbursement
[b/]Subsequent dates will follow the year anniversary of project start
[c/]Add columns for years as needed
* Year ends March 2016

The budget for the NIE is indicated below.

Table 21: Indicative Budget for the NIE

Expenditure	Upon Agreement signature	One Year after Project Start[a/]	Year 2[b/]	Year 3	**Total**
	Aug./Sep 2012	October 2013	October 2014	October 2015	
Coordination and Management *	97,795.00	97,795.00	97,795.00	67,036.00	360,421.00
Oversight and management of project development and project implementation **	58,717.00	45,202.00	38,202.00	13,047.00	155,168.00
Financial Management, including auditing	12,556.00	7,293.00	9,711.00	6,700.00	36,260.00
Information and communication management ***	41,865.00	34,623.00	26,692.00	16,741.00	119,921.00
Overall Administration and support costs	34,164.00	29,600.00	31,000.00	13,466.00	108,230.00
Total (US$)	**245,097.00**	**214,513.00**	**203,400.00**	**116,990.00**	**780,000.00**

* - Project Management Unit – staff related costs
** - Monitoring and evaluation, governance, risk management
*** - Promotion and Visibility

Programme execution will be undertaken by three agencies, Ministry of Agriculture and Fisheries; Ministry of Tourism and Entertainment, and the National Works Agency. Each will have staff and other resources dedicated to the programme to ensure timely and effective implementation. Their activities will include technical supervision of the works, determination and specification of goods and services to be procured, maintaining the integrity of engineering designs and actual service delivery at the community level. See table below:

Table 22: Breakdown of Execution Costs

Agency	Activities	Upon Agreement signature	One Year after Project Start	Year 2	Year 3	Total
	Project Management (including staff)	45300	45300	45300	20900	156800
	Administrative support (including materials and services)	2400	1700	1700	1060	6860
MOAF	**Sub-Total**	**47700**	**47000**	**47000**	**21960**	**163660**
	Supervision of project site work	50000	40000	15000	8100	113100
	Professional fees (surveyors, divers, etc)	20000	20000	20000	20000	80000
	Overheads and Administration	15000	10600	10000	8000	43600
NWA	**Sub-Total**	**85000**	**70600**	**45000**	**36100**	**236378**
	Support services	4600	3850	3850	2662	14962
MOTE	**Sub-Total**	**4600**	**3850**	**3850**	**2662**	**14962**
Total		**137300**	**121450**	**95850**	**60722**	**415000**

Note: Errors due to rounding

ANNEX 1

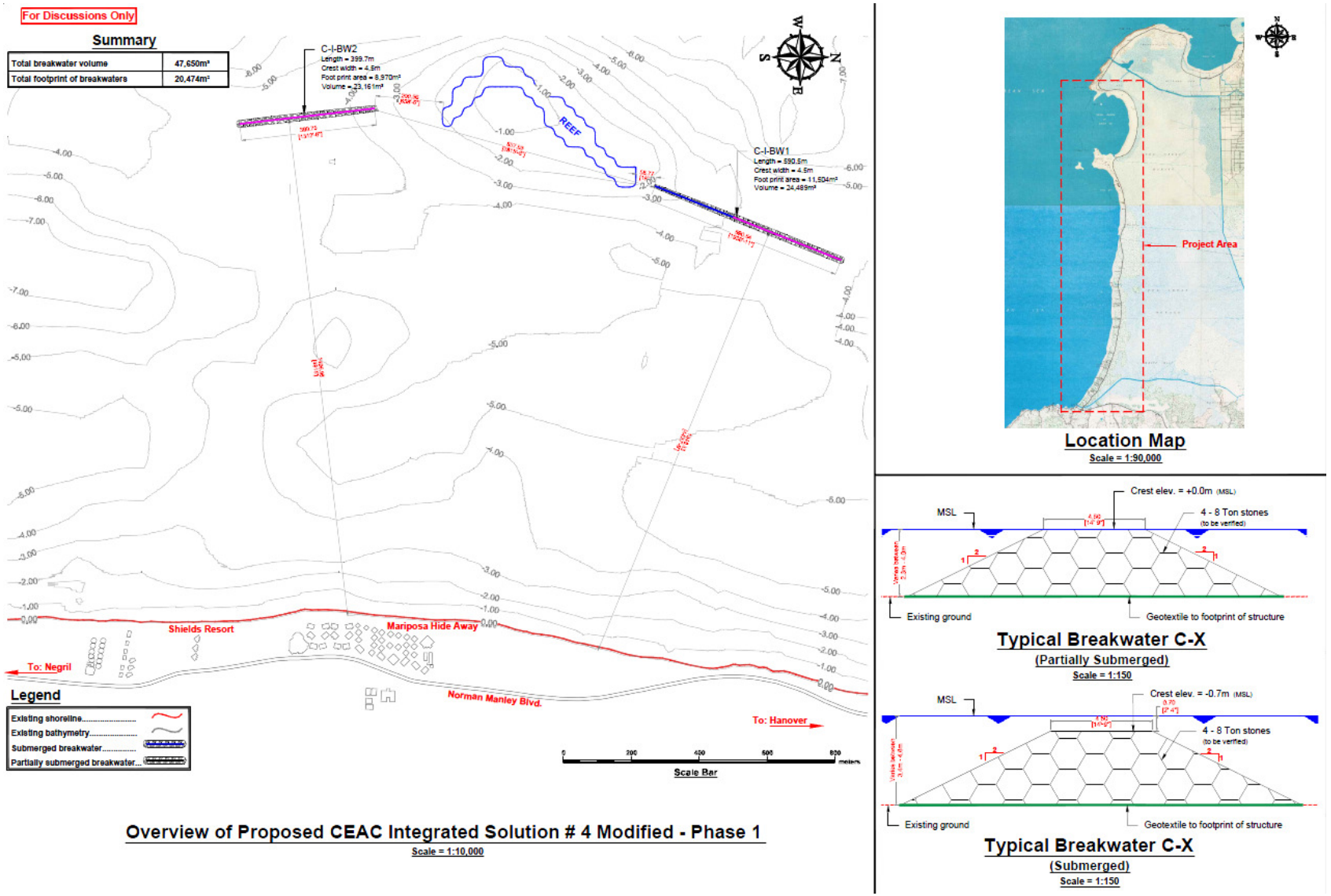


Figure Q: (i) Proposed Breakwater Structure

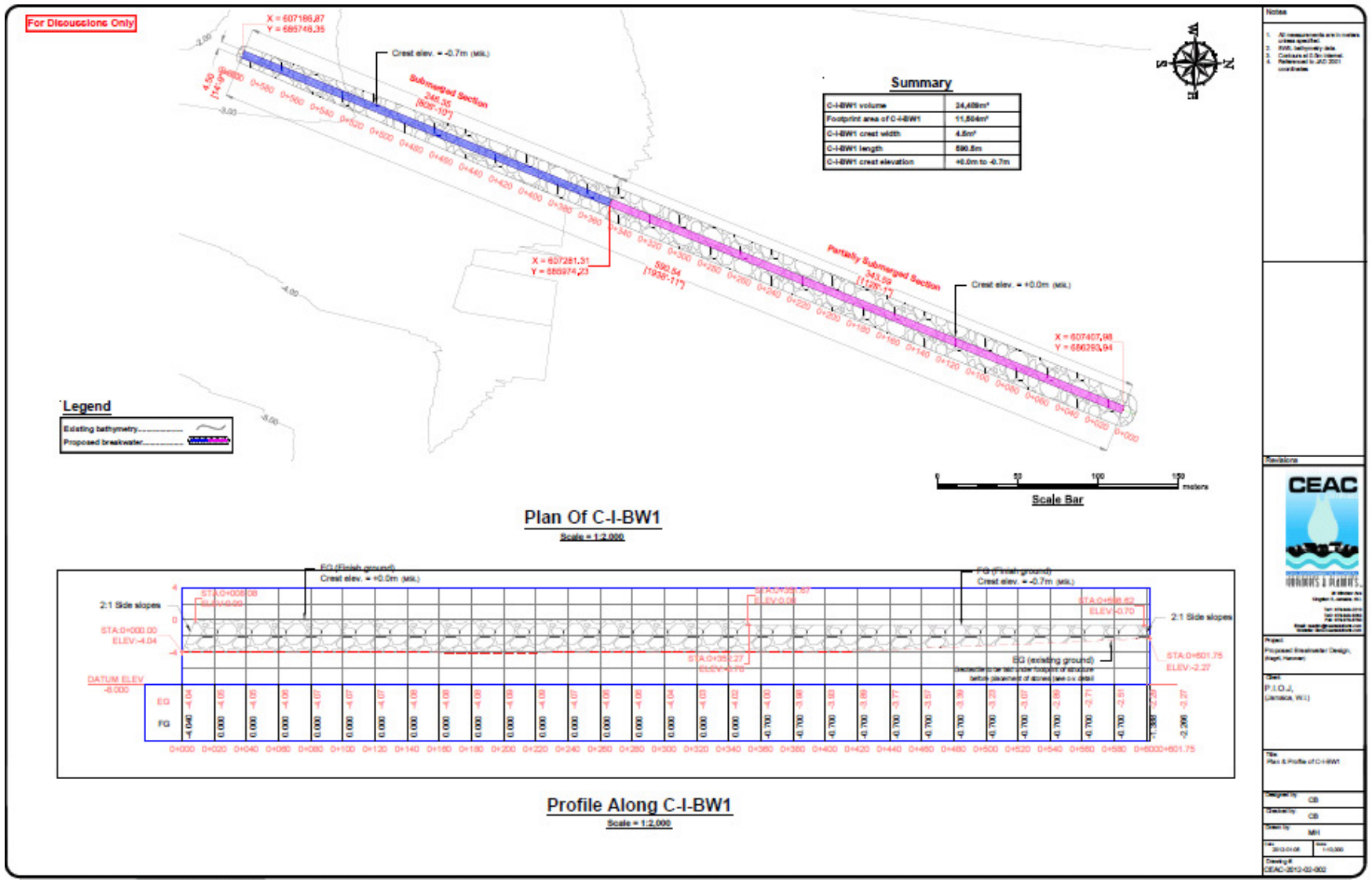


Figure M: (ii) ~590m Breakwater Structure

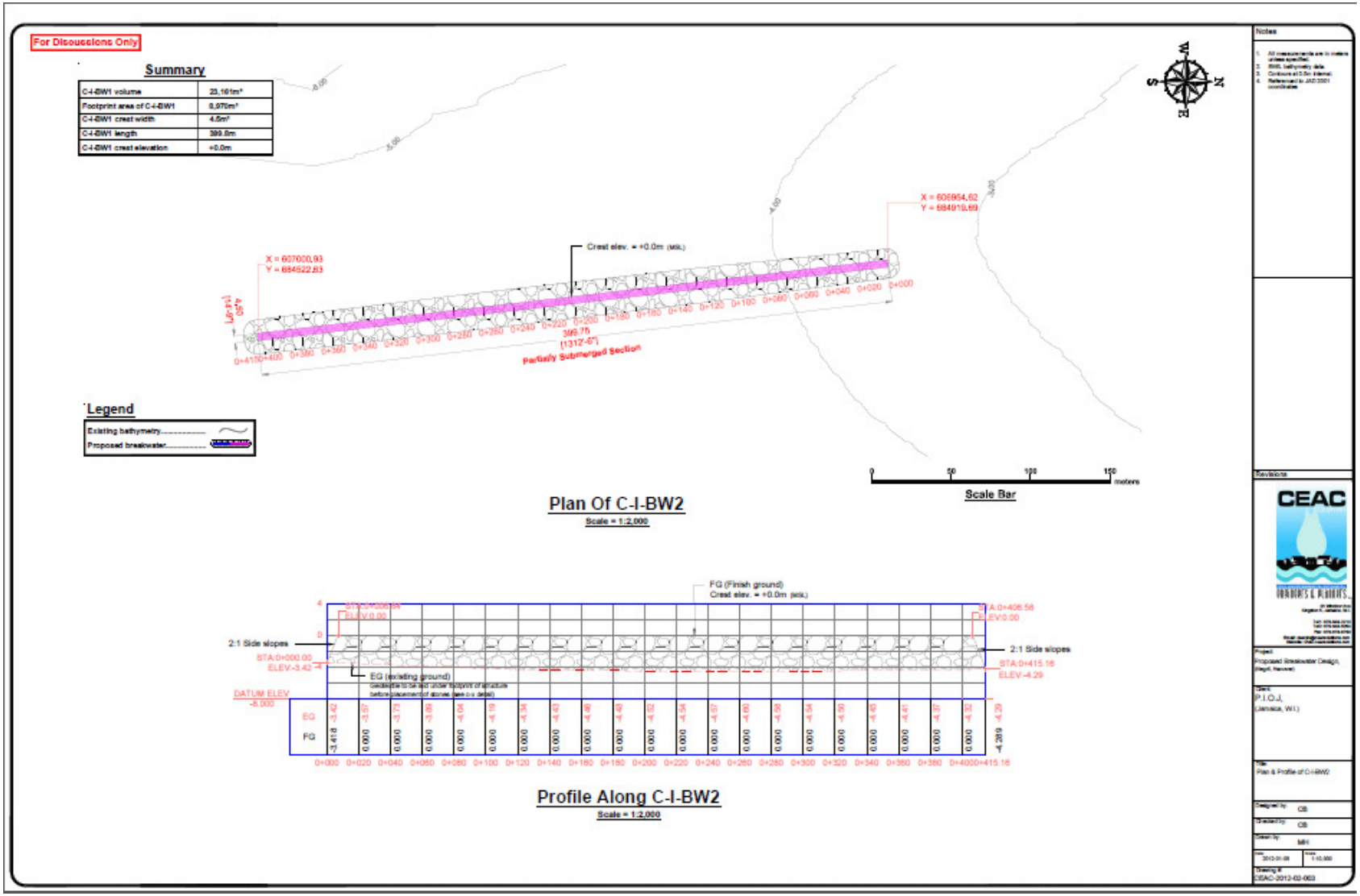


Figure M: (iii) 400m Breakwater Structure

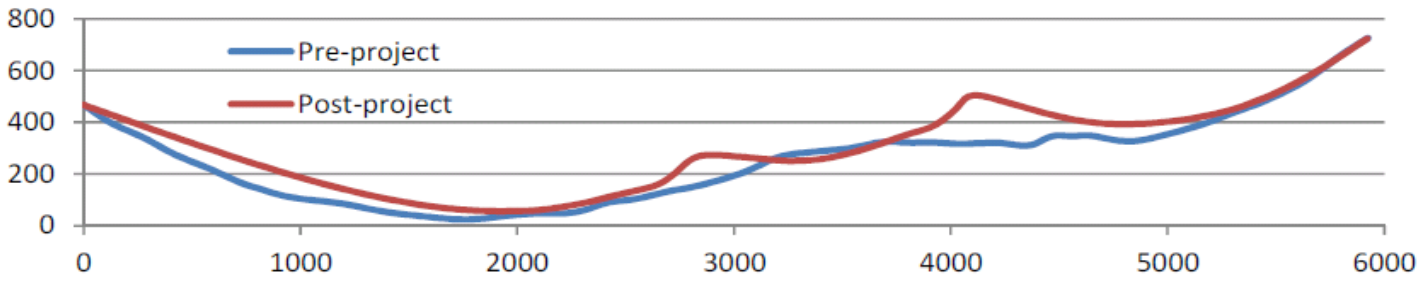


Figure M: (iv) Comparative analysis of pre- and post-project shoreline for Negril

ANNEX 2

Consultations Meetings for the Adaptation Fund Programme Proposal

ST. THOMAS, RADA OFFICE

JANAUARY 18, 2012

Name	Community/ Organization
1. Varetia Whitton	Albion Mountain
2. Wangel Spence	Albion Mountain
3. Shanise Mckenley	Yallahs High school
4. Khanise McKenley	Yallahs High School
5. Sasha-Kay Brown	Yallahs High School
6. Kyle Kmieciak	Lyssons
7. S. Nicholas	Duck Worth
8. Debbrena Walker	Ramble District
9. Monique McDonald	Heartease Distric, Yallahs High School
10. Leighton Davis	Ness Castle
11. Tilda Edwards	Ness Castle
12. Howard McLaughlin	Rowlandsfield District
13. Cyril Clarke	Rowlandsfield District
14. Clarence Thompson	Rowlandsfield District
15. Caslin Gillings	Cedar Valley
16. Patricia Greenleaf	Cedar Valley
17. *Dwight Forrester	RADA- Climate Change Project Coordinator
18. Bryan Anderson	RADA
19. Vilmore Salmon	Albion East
20. Callan Parke	RADA
21. Edwin Morrison	RADA
22. *Collin Madic	RADA
23. Tadj Barclay	RADA
24. Leroy Stewart	
25. D. Madie	Jamaica 4-H Club

CHRISTIANA
JANUARY 25, 2012

Name	Community/ Organization
1. Windel Forbes	Wilson Run - Trelawny
2. Gerald Edwards	Wilson Run - Trelawny
3. Dave Powell	Christiana Extension Area- RADA Manchester
4. Junior Gillispie	Hanson Run, Coleyville
5. Ian Davis	Hanson Run, Coleyville
6. Junior Tucker	Trelawny, RADA
7. Mervyn Green	Trelawny, RADA
8. Dainette Robe	Trelawny, RADA
9. Stephney Uter	Trelawny, RADA
10. Lenox White	Manchester
11. Carlton Mills	Manchester
12. Samuel Harris	Manchester, RADA
13. Winston Miller	Manchester, RADA
14. Clayton Milles	Trelawny
15. Gifton Griffths	Christiana
16. Vivian Forbes	Pike
17. Shelia Daines	Dobson

FRANKFIELD- GRANTHAM

JANUARY 30, 2012

Name	Community/ Organization
1. Noah Anderson	Grantham
2. Daulmay Sullivan	Union
3. Ida Christie	Hill Top
4. Derrick Douglas	Grantham
5. Cedrick Lewinson	Woodside
6. Mark Briscoe	Grantham
7. Luke McLoed	Kilsyth
8. Festus Page	Morant

9. Hubert Knight	Loggie Green
10. Shirlene Evans	Loggie Green
11. Duncan Gayle	Morant
12. Eulen Stephenson	Grantham
13. Denzil Williams	Grantham
14. Calvert Page	Grantham
15. Eric Rochester	Grantham
16. Isreal Anderson	Kilsyth
17. Vassel Jackson	Morant
18. Lincoln Weise	Morant
19. Vernal Christie	Hill Top
20. Tass Anderson	Grantham
21. Roy Myers	Morant
22. Byron Johnson	Hill Top
23. Duran McLeod	Grantham
24. Gosset Whittick	Grantham
25. Samuel Foster	Grantham
26. Pearline Thompson	Grantham
27. Wilburn Shaw	Union
28. Lorenzo Arscott	Grantham
29. Jerimiah Mckenzie	Grantham
30. Kent Briscoe	Grantham
31. Daniel Morgan	Morant
32. Scott Smikle	Hill Top

PIOJ ADAPTATION FUND PROJECT CONSULTATION MEETING- JANUARY 30, 2012

CLARENDON- BRAE HEAD

Name	Community/ Organization
1. Elizabeth Henry	Brae Head
2. Vivick Ricketts	Round Hill
3. Sonia Bonnick	Round Hill
4. Donald Chambers	Round Hill
5. Clive Beckford	Round Hill
6. Joel McKenzie	Round Hill
7. John McKenzie	Round Hill
8. Winston Chambers	Brae Head
9. Alreed Walters	Brae Head
10. Delceta Chambers	Brae Head
11. Samuel Anderson	Brae Head
12. Kaveen Barrett	Brae Head
13. Franciene Burris	Croskey River
14. Claude Gregory	Trout Hall P.O.
15. Alwyne Hall	McDonald
16. Christopher Griffths	Brae Head
17. Milton Grant	McDonald
18. Jerome Henry	Round Hill
19. Michael Howe	Round Hill
20. Patrick Morgan	Round Hill
21. Austin Anderson	Round Hill
22. Merdel Cole	Round Hill
23. Paulene Beckford	Brae Head
24. Everton Phillips	Round Hill
25. Eli Wilburn	Round Hill
26. Twong Cole	Round Hill
27. Cecil Anderson	Round Hill
28. David McKenzie	Brae Head
29. Cleveland Richards	Round Hill
30. Glendon Gray	Brae Head

31. Micheal Thompson	Brae Head
32. Errol Smith	Collington
33. Gervan Richards	Round Hill
34. Justin Mckenzie	Round Hill
35. Clerence Lewin	Brea Head
36. Carmen White	Round Hill
37. Janelle McIntosh	Round Hill
38. Newton McIntosh	Round Hill
39. Harvey Bonnick	Round Hill
40. Claude White	Round Hill
41. Cedric Bonnick	Brae Head
42. Melvin Richards	Brae Head
43. Huby Pouis	Round Hill
44. James Grant	Brae Head
45. Ovtavious Ricketts	Brae Head
46. Stanley Johnson	Brae Head
47. Norman Ricketts	Round Hill
48. Carl Chambers	Round Hill
49. Dalton Thomas	Brae Head
50. Renford Fearon	Brae Head
51. Kerry Francis	McDonald
52. Stanley Fearon	McDonald
53. Hurin Levy	Round Hill
54. Clifton Ross	McDonald
55. Godwin Tulley	Round Hill
56. O. Forbes	Brae Head

CARRON HALL

JANUARY 31, 2012

Name	Community/ Organization
1. Leroy Kennedy	St. Mary, RADA
2. Marion Dean	Carron Hall

Name	Community/ Organization
3. Ruan Smith	Carron Hall
4. Baris Walle	Carron Hall
5. Odane Edwards	St. Mary RADA
6. Micheal White	Windsor Castle
7. Stacian Grier	Windsor Castle
8. Maxine Stephenson	Windsor Castle
9. Beverly Dunbar- Williams	Windsor Castle
10. Mavis Kennedy	Carron Hall
11. Hovac Turnbull	Windsor Castle
12. Clovis Ross	Windsor Castle
13. Icylin Kilbon	Carron Hall
14. Noel Bryan	Carron Hall
15. Miguel McLean	CASE
16. Couicl Reslie	Carron Hall
17. Trevor Hunter	Carron Hall
18. Owen Clunie	Windsor Castle
19. Dozlyn Harris	Windsor Castle
20. Derrick Ellis	Windsor Castle
21. Beverly Ellis	Windsor Castle

GUYS HILL- DECOY

JANUARY 31, 2012

Name	Community/ Organization
1. R. Johnson	Decoy
2. Sedwyn Bowen	Decoy
3. Roylan McDonald	Decoy
4. Denzil Whyte	Decoy
5. Delroy Gordon	Decoy
6. Leroy Brown	Decoy
7. Carlton Kelly	Decoy
8. Everton Robbinson	Decoy

Name	Community/ Organization
9. Leroy Panton	Jeffrey Town
10. Wensworth Gordon	Jeffrey Town
11. Hinda Townsend	Jeffrey Town
12. Tempre Rose Shirley	Jeffrey Town
13. Hyacinth Hurleck	Decoy
14. Lucille Greenland	Decoy
15. Norman Baugh	St. Mary RADA
16. Leroy Kennedy	St. Mary RADA
17. Odane Edwards	St. Mary RADA
18. Miquel McLean	CASE
19. Michael Gordon Somers	Decoy
20. Doreth Gordon	Decoy
21. Kenneth Greenland	Decoy
22. Linneth Hunter	Decoy

VICTORIA

FEBRAUARY 6, 2012

Name	Community / Organization
1. Karlene Henry	Victoria
2. Peter Henry	Thompson Town
3. LurLine Carrol	Victoria
4. Leighton Davis	Thompson Town
5. Franklyn Mckenzie	Victoria
6. Desmond Dinnal	Thompson Town
7. Barrington Bailey	Elign
8. Garfield Brown	Victoria
9. Fitz Harris	Blackwood
10. Frank McFarlene	Elign
11. Leopold Fagan	Bloomwell
12. Desmond Gayle	Victoria

Name	Community / Organization
13. Dennis McPherson	Victoria
14. Roan Waugh	Victoria
15. Conrod Crown	Victoria
16. Jeptha Dinnall	Gloucester
17. Howard McPherson	Victoria
18. Percival Stone	Gloucester
19. Cyrenius Mitchell	Victoria
20. Phillip Austin	Gloucester
21. Sigismond Mills	Victoria
22. Clifford Hennigham	Thompson Town
23. Levi Dinnall	Thompson Town
24. Oral Hudson	Victoria
25. Lewis Weir	Victoria
26. Kavin Shirley	Thompson Town
27. Wilburn Mitchell	Victoria
28. Howar Robinson	Victoria
29. Patrica Mitchell	Victoria
30. Goldston Edwards	Victoria
31. Allan Hudson	Victoria
32. Kenroy Roberts	Victoria
33. Euctace Dawkins	Victoria

CAVE VALLEY

FEBRAUARY 7, 2012

Name	Community/ Organization
1. Lrica Ennos	Borobridge Farmers Association
2. Rose- marie Ashman	Borobridge Farmers Association
3. Cynthia	Cave Valley PMO
4. Gloria Moore	Cave Valley PMO

5. Julia Francis	Borobridge
6. Melissa Francis	Borobridge
7. Anthony	John Reid
8. Lynford Thompson	John Reid
9. Earle Shakespeare	Cave Valley
10. Malet Gordon	John Reid
11. Gladstone Sound	John Reid
12. Sonia Sergeant	Bohemia P.A.
13. Truman Taylor	White Sand
14. Ann- Marie Taylor	Bohemia
15. Courtney Hweitt	RADA
16. Jasmine Hyde	RADA
17. Rohan Small	RADA
18. Gary Dixon	RADA
19. Ransford Simms	Cave Valley PMO
20. Barbara Facey	Weld Cane
21. Daniel Blain	Cave Valley
22. D. Navada	Cave Valley

PIOJ ADAPTATION FUND PROJECT CONSULTATION MEETING

EWARTON

Name	Community/Organization
1. Vernon Williams	RADA
2. Tim Murray	St. Catherine
3. S. Bennett	
4. Cecil?	
5. Sebert Anderson	P.R.O
6. E. Johnson	
7. Fitzroy Laing	Charlemount
8. Clement Dawes	Linstead
9. Starrette Dobson	Ewarton

10. April Edwards	
11. M. Wheatley	Ewarton
12. Ollington Hutton	
13. Rallington Lewin	
14. Brian Perry	Ewarton
15. Nataniel Binning	Ewarton
16. Paul Wood	
17. Venar Spencer	Ewarton
18. Alma Nelson	Polly Ground
19. Nathaniel Binning	Polly Ground
20. S.G Needham	Ewarton
21. Arthur Thomas	
22. Illegible	
23. Benford Thomas	
24. Vincent Hall	Ewarton
25. Daniel Easy	Ewarton
26. Ralston Thomas	
27. Norman Morgan	
28. Fitzroy Dillion	Ewarton

Negril Consultation- Breezes Grand Resort, Norman Manley Boulevard

FEBRAUARY 28, 2012

Name	Organization
1. Opal Beharie	Secretary Manager- Westmoreland Parish Council
2. Jean Brown	President- Coral Reef Preservation Society
3. Nehru Coalsingh	Crystal Waters Villas
4. Lee Issa	Chairman- Couples Resort
5. John McIntosh	Hotel manager- Super Clubs Breezes Grand Resort & Spa
6. Brian Sang	Chairman- Jamaica Hotel and Tourist Association- Negril
7. Althea Stewart	Acting Secretary/ Manager- Negril Green Island Local Planning Authority

Name	Organization
8. Hilma Tate	Parish Disaster Coordinator- Westmoreland Parish Council
9. Winthorpe Wellington	Travellers Beach Resort
10. Carolyn Wright	Co-Chair Breach Restoration Beach Committee, Rondel Village Hotel
11. Cecel Brown	Merrils Beach Resort & Negril Water Sports Association
12. Jerron Britton	Jamaica Tourist Board
13. Merna Pusey	Negril Fishing Cooperation

PIOJ Adaptation Project Proposal

National Consultation– Friday, March 16, 2012 at 9:30am- 1:00pm

Name	Organization
1. Millicent Blake	St. Thomas Parish Council
2. Fay Neufville	St. Thomas Parish Council
3. Geoffrey Marshall	Water Resources Authority
4. Carlton Wedderburn	MOAF
5. Rae Parchment	NWA
6. Cavell Rhiney	RADA
7. Clifford Mahlung	MET Service
8. Novelette Douglas	NEPA
9. Thomas Mayne	JAS
10. Nicholette Williams	Ministry of Foreign Affairs and Foreign Trade
11. Andrea Donaldson	NEPA
12. Tina Williams	Ministry of Tourism and Entertainment
13. Patricia Lewis	St. Catherine Parish Council
14. Sherise Simpson	NEPA
15. Le-Ann Roper	PIOJ
16. Robert Logan	CASE
17. Z. Budham	MOAF

18. Winston Shaw	NIC
19. Chris Burgess	CEAC
20. Amani Ishemo	University of Technology (UTECH)
21. Stanley Rampair	NIC
22. Yolande Jankie	St. Mary Parish Council
23. Orande Pink	St. Ann Parish Council
24. La- Jean Powell	Manchester Parish Council
25. Chaleu Rafe	NEPA
26. Allan Hamilton	NEPA
27. Anthony McKenzie	NEPA
28. Sekeywi Carruthers	CIDA

ANNEX 3

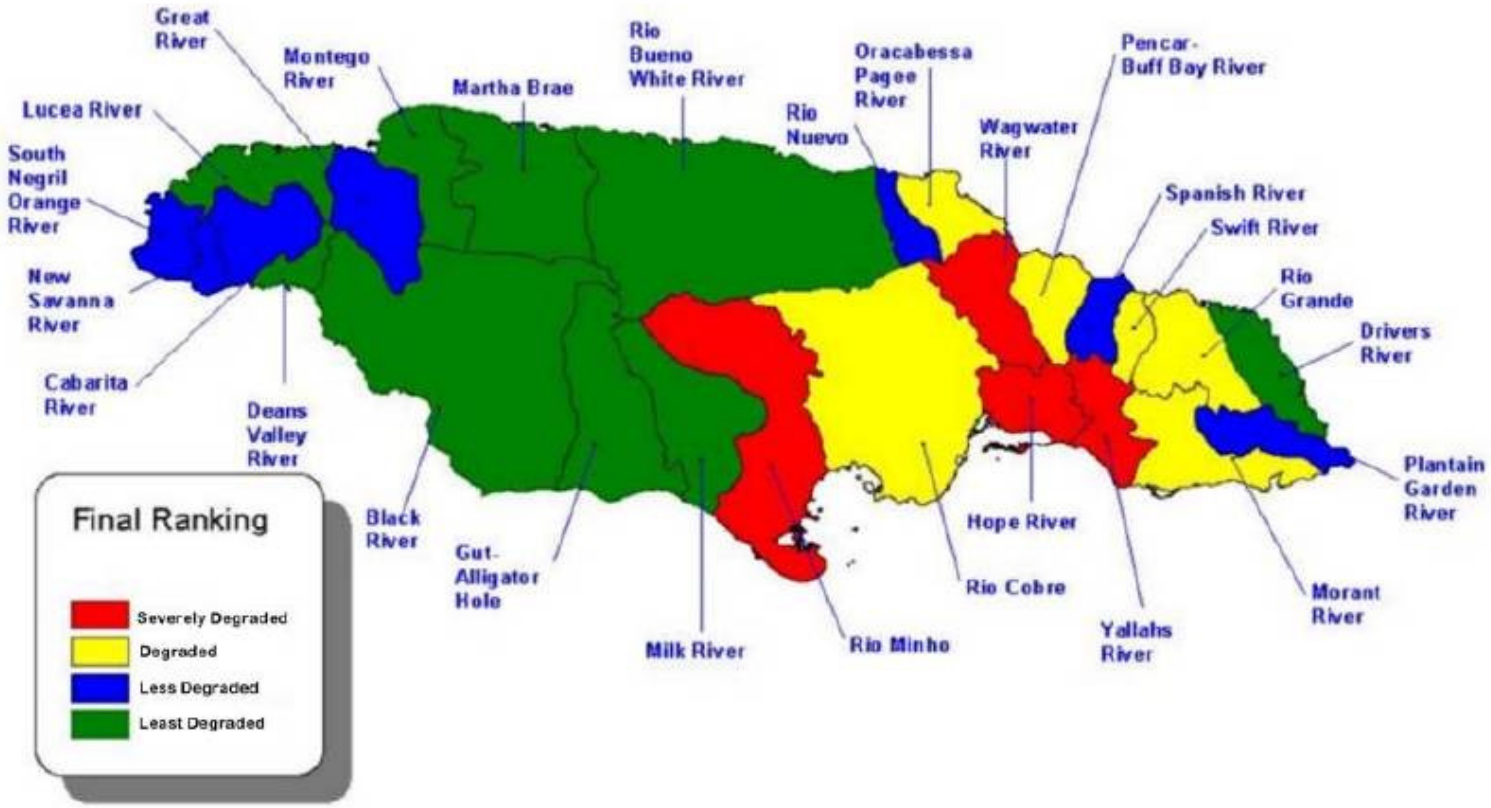

Great River
Montego River
Martha Brae
Rio Bueno White River
Oracabessa Pagee River
Pencar-Buff Bay River
Lucea River
Rio Nuevo
Wagwater River
South Negril Orange River
Spanish River
Swift River
New Savanna River
Rio Grande
Drivers River
Cabarita River
Deans Valley River
Plantain Garden River
Black River
Hope River
Gut-Alligator Hole
Rio Cobre
Morant River
Milk River
Rio Minho
Yallahs River
Final Ranking
Severely Degraded
Degraded
Less Degraded
Least Degraded

Figure R: Map of Watershed Management Units of Jamaica (Source: Water Resources Authority

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

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT[1]

See Letter attached.

Mrs Sylvia McGill *Designated Authority* *Meteorological Services* *65 ¾ Half Way Tree Road,* *Kingston 10* *Jamaica*	Date: *April 24, 2012*

B. IMPLEMENTING ENTITY CERTIFICATION

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (including Vision 2030 Jamaica – National Development Plan) and subject to the approval by the Adaptation Fund Board, understands that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this programme.	
Implementing Entity Coordinator:  *Kirk Philips* *Director, Corporate Services*	
Date: *April 24, 2012*	Tel. and email: (876) 935-5099 kphilips@pioj.gov.jm or kirk_philips@pioj.gov.jm
Project Contact Person: Claire Bernard	
Tel. And Email: (876) 935-5054 cbernard@pioj.gov.jm or Claire_bernard@pioj.gov.jm	

[1] Each Party shall designate and communicate to the Secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

Letter of Endorsement by Government of Jamaica

Tel: (876) 929-3694, (876) 929-3706
(876) 929-3700, (876) 929-7268
Fax: (876) 960-8989

METEOROLOGICAL SERVICE
P.O. Box 103,
Kingston 10
JAMAICA

Reference No: JES001AFB

April 24, 2012

ADAPTATION FUND

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement of Full Programme Proposal entitled "Enhancing the resilience of the agriculture sector and coastal areas to protect livelihoods and improve food security"

In my capacity as designated authority for the Adaptation Fund in Jamaica, I confirm that the above national programme 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 Jamaica.

Accordingly, I am pleased to endorse the above programme proposal with support from the Adaptation Fund. If approved, the programme will be implemented by the Planning Institute of

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Jamaica and executed by the National Environment and Planning Agency, National Works, Agency, Ministry of Agriculture and Fisheries, and the Ministry of Tourism and Entertainment.

Sincerely,

Sylvia McGill (Mrs.)
Designated Authority