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April 16, 2012

Ms Patricia Bliss-Guest,
Program Manager,
CIF Administrative Unit
1818 H Street NW
Washington, D.C. 20433
U. S. A.

Dear Ms Bliss-Guest,

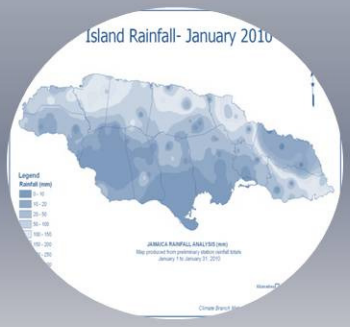
Pleased find attached for your attention, a revised copy of the Jamaica's Strategic Program for Climate Resilience.

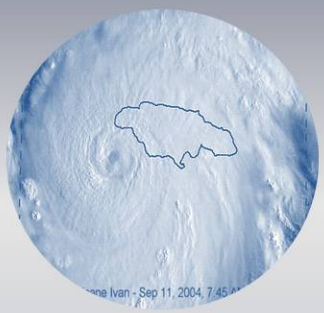
Yours sincerely,

Hopeton Peterson
Manager
Sustainable Development & Regional Planning
for Director General

Encl:

JAMAICA
STRATEGIC PROGRAMME FOR CLIMATE RESILIENCE (SPCR)





Prepared for the
Pilot Programme for Climate Resilience (PPCR)
October, 2011

NATIONAL VISION

"Jamaica, the place of choice to live, raise families, and do business"

National Strategies

- Improve Resilience to all forms of hazards
- Improve Emergency Response Capability
- Develop Measures to adapt to Climate Change
- Contribute to the effort to Reduce Global Rate of Climate Change

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Abbreviations and Acronyms

AF	Adaptation Fund
AFB	Adaptation Fund Board
CARIMAC	Caribbean Institute of Media and Communication
CC	Climate Change
CCADRRP	Climate Change Adaptation and Disaster Risk Reduction Project
CPACC	Caribbean Planning for Adaptation to Climate Change
CSGM	Climate Studies Group Mona
ESSJ	Economic and Social Survey Jamaica
EU	European Union
GDP	Gross Domestic Product
GOJ	Government of Jamaica
HDI	Human Development Index
HRRACC-TWG	Hazard Risk Reduction and Adaptation to Climate Change – Thematic Working Group
IDB	Inter-American Development Bank
IDRM	Integrated Disaster Risk Management
IMF	International Monetary Fund
JNPGE	Jamaica National Policy for Gender Equity
LDUC	Land Development Utilisation Commission
MACC	Mainstreaming Adaptation to Climate Change
MAJIC	Marketing and Agriculture for Jamaican Improved Competitiveness
MDG	Millennium Development Goal
Met	Meteorological Services Jamaica
MHEW	Ministry of Housing, Water and the Environment
MOAF	Ministry of Agriculture and Fisheries
MTF	Medium Term Socio-Economic Framework
NEPA	National Environment and Planning Agency
NGO	Non-governmental Organization
NIC	National Irrigation Commission

NIE	National Implementing Entity
NMIA	Norman Manley International Airport
NWC	National Water Commission
ODPEM	Office of Disaster Preparedness and Emergency Management
OPM	Office of the Prime Minister
PAHO	Pan American Health Organization
PIOJ	Planning Institute of Jamaica
PPCR	Pilot Programme for Climate Resilience
RADA	Rural Agricultural Development Authority
RiVAMP	Risk and Vulnerability Assessment Methodology Development Project
SDM	Statistical Downscaling Model
SIA	Sangster International Airport
SIDS	Small Island Developing States
SNC	Second National Communication
SPCR	Strategic Programme for Climate Resilience
SST	Sea Surface Temperature
TPD	Town Planning Department
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WHO	World Health Organization
NMIA	Norman Manley International Airport
WMU	Watershed Management Unit
WRA	Water Resource Authority
^{o}C	Degree Celsius

Summary Table for Strategic Programme for Climate Resilience, Jamaica

PILOT PROGRAMME FOR CLIMATE RESILIENCE **Summary of Strategic Programme for Climate Resilience**		
1. **Country/Region**:	Jamaica/ Caribbean	
2. **PPCR Funding Request (in US$ million)[1]:**	*Loan: $10.0 million*	*Grant: $15.0 million*
3. **National PPCR Focal Point**:	*Mr. Hopeton Peterson* *Manager – Sustainable Development and Regional Planning* *Planning Institute of Jamaica* *10-16 Oxford Road, Kingston 5, Jamaica*	
4. **National Implementing Agency** (Coordination of Investment Strategy)**:**	*Planning Institute of Jamaica* *10-16 Oxford Road, Kingston 5, Jamaica*	
5. **Involved MDB**	*The Inter- American Development Bank and the World Bank Group*	
6. **MDB PPCR Focal Point and Project/Programme Task Team Leader (TTL)**:	*Headquarters – Mr. Gerard Alleng IDB; Dr. Enos Esikuri – World Bank*	*TTL: Mr. Gerard Alleng – IDB; Dr. Enos Esikuri – World Bank*

[1] Jamaica is requesting US$15.0 million in grant and a US$10.0 million loan, but is interested in the uppermost available limit of funding (from an indicative range of US$11.0–15.0 million for grants and US$10.0–13.0 million in loan), with the understanding that the lower range will apply if the envelope is at the lower end.

7. **Description of SPCR:**

(a) Key challenges related to vulnerability to climate change/variability:

- Inadequate climate data and scenarios: to ascertain vulnerability nationally and at the sectoral level, and to guide the formulation/revision of policies, development plans and adaptation strategies.
- Absence of a comprehensive risk information platform with information on the types and extent of risks faced by different communities/locations across the island.
- Climate change considerations are not fully integrated in policies, legislation, regulations and sectoral plans and the general institutional framework for coordinating and leading climate change resilience-building is inadequate and fragmented.
- The various publics are generally not sufficiently aware of potential impacts of climate change, neither are they aware of the measures that they can take to build climate resilience, nor are the mechanisms in place to encourage adaptation measures.
- Significant beach erosion, damage to coastal ecosystems and other natural infrastructure, and inadequate management of coastal resources, as well as the need to revise and enforce regulations and legislation.
- Critical buildings, facilities and other important economic structures, including water infrastructure, are vulnerable to extreme weather events such as floods and hurricanes.
- The agricultural, tourism and other economic and social sectors suffer serious damage, loss of income and are challenged to maintain productivity/continuity of operations after severe weather events.
- Local Development Planning and management of coastal resources are inadequate and there is need to revise and enforce regulations and legislation.
- Inadequate capacity of the technical personnel in planning, policy formulation and infrastructure development to mainstream climate change adaptation measures into policies, plans (including spatial plans) and regulations.

(b) Areas of Intervention – sectors and themes

a) Sectors - Water Resources; Agriculture and Food Security; Tourism; Human Health; Human Settlements and Coastal Resources.

b) Themes - Strengthening institutional arrangements to ensure the effective mainstreaming of climate change; Mainstreaming Climate Change into the government's planning and policy formulation processes; Building capacity for climate data management, forecasting and planning; Facilitating sectoral adaptation measures; and Climate Change Education and Awareness.

(c) Expected Outcomes from the Implementation of the SPCR

- Increased adaptation of CC and disaster risk reduction strategies by the private sector and by communities;
- Improved integration of resilience into development plans and planning processes at all levels;
- Increased capacity to develop climate change scenarios, improved monitoring and forecasting, more accurate predictions and early warning of extreme weather events; and
- Increased awareness of the impacts of climate change and adoption of initiatives to improve resilience.

8. **Expected Key Results from the Implementation of the Investment Strategy (consistent with PPCR Results Framework):**	
Result	**Success Indicator(s)**
a) Increased capacity to develop climate change scenarios, and more accurate predictions and early warning of extreme weather events.	Number of national and sectoral CC scenarios developed Number of data gathering stations established National early warning system initialised/installed.
b) Increased awareness of the impacts of climate change and adoption of initiatives to improve resilience	Percentage of the population that is more aware of climate change impacts and adaptation options Evidence of use of knowledge & learning
c) Improved integration of climate resilience in country development strategies, plans, policies at all levels.	Change in the number of national level economic sector plans, policies and regulatory frameworks that integrate climate resiliency and vulnerability reduction considerations
d) Increased capacity of the project beneficiaries to withstand/recover from climate change or climate variability on agricultural and other economic activities.	Change in the acreage of farms with sustainable access to water for agricultural and domestic use; change in the acreage of lands in the project area where climate change considerations are integrated and being implemented in land management plans; evidence of use of knowledge and learning by project
e) Increased resilience of the private sector and communities to the impacts of CC, facilitated by the utilization of loan & grant financing	No of loans accessed and number of adaptation projects funded; $ amount of financing leveraged from other sources by PPCR funding; evidence of a fully functional Trust Fund

9. **Project and Programme Concepts under the SPCR**							
Project/Programme Concept Title	**MDB**	**Requested PPCR Amount ($)[2]**	**Grant or Loan**	**Expected co-financing ($)**	**Preparation grant request ($)**	**Total PPCR request**	**MDB Fee**
Investment Programme 1: Improving Climate Data and Information Management	WB	6.8	Grant	0.7	300,000	7.1	
Investment Programme 2: Mainstreaming Climate Change Adaptation in Local Sectoral and National Plans, and implement Integrated Adaptation Strategies in targeted River Basin Planning and Management	IDB	7.7 3.6	Grant Loan	2.5	0	7.7 3.6	0.4
Investment Programme 3: Financing Mechanisms for Sustained Adaptation Initiatives by the public and private sectors; and community-based Organizations - December 2012	IDB	6.4	Loan		0	6.4	0.4

[2] Includes preparation grant and project/programme amount

Knowledge Management	IDB	0.2	Grant		0	0.2	
Total Grant Total Loan		$14.7 $10.0	Grant Loan		0.3	$15.0 $10.0	
TOTAL		$24.7			0.3	$25.0	

10. **Timeframe** (tentative) – Approval[3] Milestones
Project 1:

Improving Climate Data and Information Management - February 2013

Project 2:

Mainstreaming Climate Change Adaptation in Local Sectoral and National Plans, and Implement Integrated Adaptation Strategies in targeted River Basin Planning and Management - February 2013

Project 3:

Financing Mechanisms for Sustained Adaptation Initiatives by the public and private sectors; and community-based Organizations – February 2013

[3] Expected signature of loan/grant agreement between government and MDB

11. Key National Stakeholder Groups involved in the SPCR Design

Planning Institute of Jamaica (PIOJ)

Environmental Management Division

Office of the Prime Minister - Department of Local Government

Ministry of Finance and the Public Service

Office of Disaster Preparedness and Emergency Management (ODPEM)

Ministry of Agriculture & Fisheries

National Environment and Planning Agency (NEPA)

Water Resources Authority (WRA)

Meteorological Services, Jamaica

Ministry of Tourism

Forestry Department

Ministry of Health

Ministry of Water and Housing

National Irrigation Commission

Rural Agriculture Development Authority (RADA)

Jamaica Agricultural Society

Parish Councils

Panos Caribbean & National Environmental Education Committee

Parish Development Committee

Jamaica Hotel & Tourist Association

Association of Development Agencies (ADA)

Civil Society Consulting Groups (ConSOC) / Kingston Restoration Company

Private Sector Organisation of Jamaica (PSOJ)

Jamaica Chamber of Commerce

University of the West Indies

Environmental NGOs, e.g. Negril Coral Reef Preservation Society

12. Development Partners involved in the SPCR

Inter-American Development Bank (IDB); World Bank Group (WBG); International Finance Corporation (IFC); United Nations Development Programme (UNDP); Canada International Development Agency (CIDA)

Executive Summary

Jamaica is among the many small island developing states located in the Caribbean, having an area of 11 000 km^2 and territorial waters of 16 000 km^2. The current population is an estimated 2.7 million, 60% of whom are within 2 km of the coast. About 52% of the population resides in urban centres. In 2009, it was estimated that 16.5% of Jamaicans are living below the poverty line, the majority of whom is in rural areas and who rely directly or indirectly on agriculture. Women account for some 46.7% of persons in poverty. The economy is heavily reliant on the climate and on natural resources and some 90% of gross domestic product (GDP) is said to be generated in the coastal areas. Tourism and agriculture are among the two sectors which contribute to the country's GDP – 6.1% and 5.8% respectively in 2010. Additionally, the majority of the labour force is within the agriculture sector. The country is divided in 26 watersheds, most of which are badly degraded. Most of the farmers plant on less than 5 hectares (ha) of land, often on steep slopes within the watersheds.

Considering these physical and socio-economic attributes, the island – both the hinterlands and coastal areas – are extremely exposed to climate change. The threats include: increases in extreme rainfall events and drought; sea level rise; storm surges; more intense hurricanes; and increased temperatures. Already these events have been adversely impacting the country. For example, damage and losses associated with natural hazards in the past decade have totalled over J$111.8 billion, and has resulted in the loss of life, injury and social dislocation; the agriculture sector has seen increases in pests and diseases; water resources are reduced in some key watersheds, and much more. Unless urgent and continued interventions are taken, these trends are likely to continue and possibly worsen. This reality has been highlighted in Vision 2030 Jamaica – National Development Plan as Jamaica's long-term sustainable development pathway. Vision 2030 Jamaica recognizes the need for a healthy natural environment and has climate change adaptation as a key outcome.

The Strategic Programme for Climate Resilience (SPCR) under the Pilot Programme for Climate Resilience (PPCR) is one of the current initiatives which will assist in climate-proofing the country's development. The SPCR is aligned to Vision 2030 Jamaica, and also builds on gaps and challenges identified in Jamaica's Second National Communication (SNC) to the United Nations Framework Convention on Climate Change (UNFCCC). The programme was developed with input from stakeholders at the national and local levels, and reflects some of the priority areas identified from consultations. The areas of focus are: Water Resources; Human Health; Agriculture and Food Security; Tourism; Terrestrial Resource and Biodiversity; Coastal Resources and Human Settlements; and Financial Resources.

Jamaica's PPCR involves two phases.` Phase I, involves the development of the SPCR in collaboration with key stakeholders from national and community (local) levels. Phase II will be the implementation of the activities identified in the SPCR.

The Government of Jamaica (GOJ) is seeking to develop and implement initiatives under five broad thematic areas in the proposed SPCR, namely:

- mainstreaming climate change into Jamaica's planning and policy formulation processes;
- strengthening institutional arrangements to ensure the effective mainstreaming of climate change;
- building capacity for climate data management, forecasting and planning;
- facilitating sectoral adaptation measures; and
- climate change education and awareness.

Through the PPCR structure, resources from the Climate Investment Fund (CIF) will be sought to implement three investment projects (Table A):

Table A: Investment Projects under the SPCR

Investment	Goals	Objectives
Investment 1	Improved quality climate information for effective planning and action at local and national levels	• Strengthen Jamaica's meteorological observation and data collection systems to enhance climate monitoring, weather forecasting and early warning systems • Enable effective planning and design of adaptation initiatives through access to climate change scenarios specific to Jamaica, including scenarios for priority sectors • Use climate scenarios generated to assess the expected consequences of climate change for each priority sector and utilize assessments to develop sector-based methodologies for climate resilient planning and decision making • Conduct detailed vulnerability assessment of the health sector to generate information needed to improve resilience of the health sector by climate proofing health care facilities • Improve knowledge, attitudes and practices of the Jamaican public on climate change
Investment 2	Climate change mainstreamed into development plans and planning processes and increased adaptation to the impacts of climate change by stakeholders in vulnerable sections of the Rio Bueno and Rio Minho river	• Create an enabling framework for mainstreaming climate change adaptation at the local and national levels • Characterize the project areas using baseline data and develop vulnerability assessments and adaptation plans for the prioritized sectors, the

Investment	Goals	Objectives
	basins	infrastructure and vulnerable communities • Develop and implement integrated adaptation strategies to address the anticipated impacts of climate change in the project areas
Investment 3	Institutionalise financing mechanisms for climate change adaptation initiatives by the private sector and community based organizations	• Establish a mechanism for the financing of adaptation initiatives for operators in the agribusiness sector • Establish a trust fund for the financing of climate change initiatives at the community level by NGOs and CBOs

Generally speaking, Investment 1 will assist in setting the framework for action and improving the systems necessary for the integration of climate change in decision-making processes. This involves the generation of data and information that will form the basis on which instruments such as policies, programmes and projects – are designed and implemented. Special attention will also be given to the health sector, which is experiencing resource and information constraints. Investment 2 will facilitate the incorporation of climate change in development planning and also the implementation of some adaptation measures in two badly degraded, yet important watersheds – Rio Minho and Rio Bueno. The capacity of the vulnerable groups within the watersheds will improve and the lessons learnt will be incorporated in other programmes or projects as appropriate. Investment 3 is intended to assist the private sector and local level groups to finance adaptation initiatives through competitive loans and trust funds.

The SPCR will be complemented by on–going and planned initiatives. It will also form the basis on which funding is sought for the country's climate change agenda as the strategies and activities contained therein are considered critical. Also, the framework established will eliminate possible duplication of projects, will identify and build on synergies.

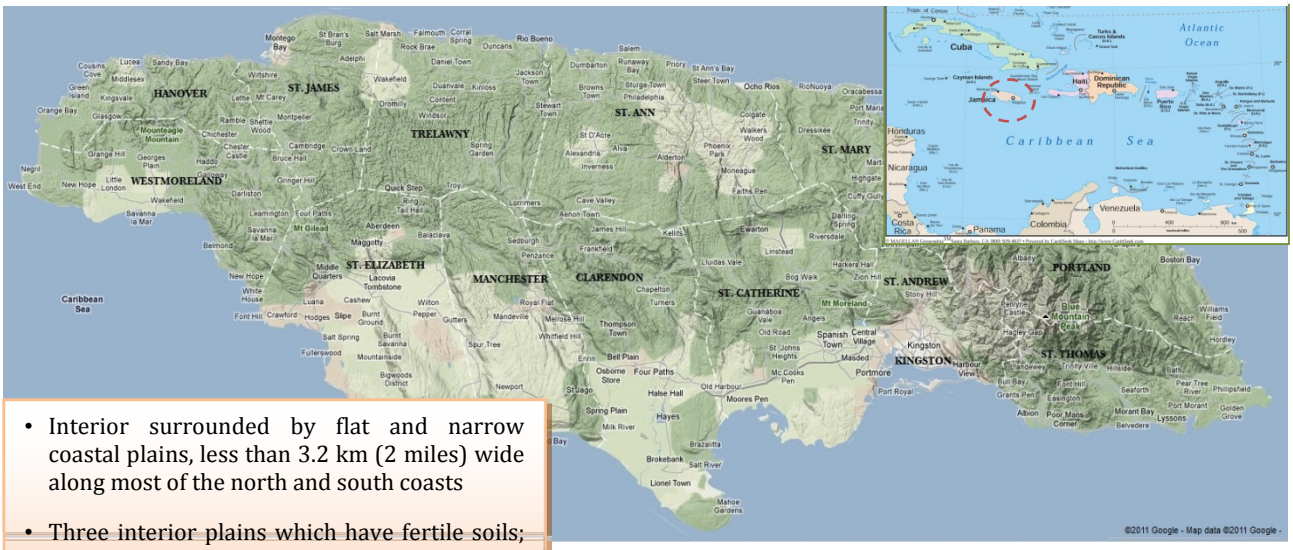
Background and Rationale

1.0 COUNTRY CIRCUMSTANCES

1.1 Location

Jamaica is a small island developing state in the Caribbean Sea located at latitude 18º 15´ North and longitude 77º 30´ West (Figure 1). The island has an area of 11 000 km^2 and territorial waters of 16 000 km^2. Jamaica's population was estimated at approximately 2.7 million in 2010, with women accounting for 50.7%. Some 52% of the population reside in urban centres and an estimated 24.7% reside in and around the Kingston Metropolitan Region. The working age population (age 15-64) is 64.1% of the total population, 50.9% of whom are female.

Figure 1: Geographical Setting of Jamaica



- Interior surrounded by flat and narrow coastal plains, less than 3.2 km (2 miles) wide along most of the north and south coasts
- Three interior plains which have fertile soils; prime agricultural lands.
- Wetlands with mangrove forests along some of the coastal plains.

1.2 Socio-economic Context

Performance of socio-economic indicators has been mixed (Table 1). In 2009, an estimated 16.5% of the population was living below the poverty line. Most (61.0%) of the poor live in rural areas, are dependent on the agricultural sector, and are therefore disproportionately at risk to climate change impacts. Women accounted for 47.6% of the poor; 45.5% of households are female headed, about 30% of which have consumption expenditure below the poverty line.

The country's total labour force is 1.25 million (2010). Women account for about 43% of the employed labour force, 20% of the agriculture work force and about 26% 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. The majority of fisherfolk – about 70%[4] – are men who are mainly involved in actual fishing. Women are primarily responsible for fish vending and the management of operations, including vending sites. Whilst only 6% of registered fisherfolk are women, they are often boat owners and active in fishing cooperatives. Women dominate employment in the tourism industry, accounting for 58% of jobs in the Hotels and Restaurant sub–sector.

Jamaica's Human Development Index (HDI) of 0.688 is that of developing countries with high human development. However, the level of poverty has been trending upwards over the past few years. See Table 1.

Box 1: Poverty and Employment

Some 12.7% of the employed labour force is below the poverty line and 41.7% of the poor are employed. The distribution of the poor by sex mirrors that of the general population with males accounting for 49.5% and females 50.5%. Despite this, 59.5% of the employed poor are men and 40.5% women. This underlines the fact that unemployment is higher among the female poor; only 33.4% are employed compared with 50.1% of their male counterparts.

Distribution of the employed poor by occupational group shows that the largest share, 36.5% are employed as agricultural and fisheries workers, followed by elementary occupations (19.2%). One in every five poor female is engaged in agricultural work and one in every four is employed in elementary occupations. Female engagement in these low wage occupations emphasizes their vulnerability and compounds the effect of poverty in female-headed households.

1.3 Macro-economic Context

The key economic sectors rely directly or indirectly on natural resources. The agricultural sector for example, contributed an estimated 5.6% of real gross domestic product (GDP) in 2009 and provided employment to 20% of the labour force. The tourism sector, the largest foreign exchange earner for the country (US$1939.7 million in 2009) attracted 1831000 stopover visitors and 922000 cruise ship passengers. Increasing visitor arrivals, and consequent increased usage of our natural resources, have the potential to negatively impact sustainable utilization of these resources. The declining state of the ecosystems

[4] 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 fulfilment of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) report

across Jamaica therefore signals a major threat to economic growth and the livelihood of a significant segment of the labour force.

Jamaica's economy has been experiencing one of the lowest rates of economic growth in the region, with no real growth in the last two years, increasing national debt and a volatile global economy. However, inflation rates have stabilised while interest rates have been steadily declining. For the fiscal year 2010/11, the total debt to GDP ratio was 131%, with the total debt servicing to total government expenditure at 47.4%. These developments have impacted negatively on the Government of Jamaica (GOJ's) tax intake, severely limiting the fiscal space required to finance critical infrastructure and institutional development. Some relief was however created in 2010, with the successful Jamaica Debt Exchange initiative between the government and holders of government bonds. This initiative resulted in interest savings to the government of J$40.0 billion and helped to pave the way for an International Monetary Fund (IMF) twenty-seven month US$1.27 billion Stand By Agreement. However, even with these developments the capacity of the GOJ to finance programmes to enhance climate resilience is severely restricted.

Table 1: Selected Socio-economic Indicators

	2008	**2009**	**2010**
Real GDP Growth (%)	-0.9	-3	-1.2
Debt/GDP (%)	116.8	129.3	131.4
Per Capita GDP (US$)	5153	4543	4962
Population (million) Total	2.692	2.698	2.705
Male	49.3	49.3	49.3
Female	50.7	50.7	50.7
Life Expectancy	74.13	74.13	74.13
Female	77.1	77.1	77.1
Infant Mortality/000 live births	16.7	16.7	16.7
Unemployment Rate	10.6	11.4	12.4
Male	7.3	8.6	9.2
Female	14.6	14.8	16.8
Poverty	12.3	16.5	n/a
Adult Literacy	86.4	86.8	91.7
Academic Year	08/09	09/10	
Net Primary Enrolment	89.9	93.7	

Source: *ESSJ 2010, PIOJ*

1.4 Environmental Context

Jamaica's environment is characterized by diverse biological and physical features which give rise to a wide range of biodiversity and coastal and terrestrial ecosystems, much of which have gained international recognition for the high levels of endemism. Terrestrial ecosystems include wet and dry forests, rivers, caves, mineral springs, herbaceous swamps, and swamp forests. Over 30% or 335 900 hectares (ha) of Jamaica's land surface is covered by natural forests. The coastal ecosystems comprise bays, beaches, rocky shores, estuaries, mangrove forests, cays and coral reefs. Both terrestrial and coastal ecosystems are very important for the country's development as they provide a variety of goods and services, which sustain livelihoods for many vulnerable households. In addition, some act as defences or buffers against storm surges and hurricanes.

Jamaica's landscape comprises 26 watershed management units (WMUs), 19 of which are considered highly degraded due to inappropriate land use practices, leading to relatively high levels of soil erosion; siltation and turbidity; and reduced quality of water. Among these watersheds are the Rio Minho, Rio Bueno, Hope River and Yallahs River WMUs. This degradation is one of the factors which influenced the selection of the Rio Minho and Rio Bueno WMUs as sites for the applied adaptation component of the SPCR.

1.5 Gender Context

Since the mid-1970s, the GOJ has made great efforts to establish a gender policy and reduce the inequalities experienced by women and men in this country. In fact, the GOJ introduced legislative reform to reduce workplace discrimination against women, established a Bureau of Women's Affairs in 1975, and enacted a raft of legislation to remove social and institutional discrimination against women. More recently, stronger emphasis is being placed on understanding and addressing the differentiated gender imperatives of women and men. Notwithstanding these efforts, women in the Jamaican society continue to experience inequality in some areas. Climate-related disasters and climate change impacts produce part of these inequalities as poor women are among the hardest hit by their effects. Data from the National Report of Jamaica on the Millennium Development Goals (MDGs), 2009, highlight the limited involvement and under-representation of women in the public and private decision–making spheres of the country. Jamaica has made an international commitment by way of the Millennium Development Goals (MDG) to increase the percentage of female parliamentarians to at least 30% by 2015; the figure currently stands at 14% in the Senate; 16% in Local Government and 13% in Parliament. This situation is further emphasized by the findings of a 2008 study which indicated that women constituted 16% of places on the boards of publicly listed companies and that 42.3% of these women reported being on multiple boards.

Women have made significant strides in education. *ESSJ 2010* shows that although the current enrolment rate of women (43.7%) in tertiary institutions is roughly twice that of men (21.3%), females out-perform males at all levels of the educational system and the job seeking rate of women (9.8%) is greater than that of men (6.0%)—the female unemployment rate stands at 16.8 compared with the male unemployment rate of 9.2%.

Healthwise, maternal mortality rates have failed to significantly improve; women and girls have higher rates of depression and women and girls between ages 10 and 29 years are more likely than their male counterparts to contract HIV/AIDS.

There are no gender-related institutional barriers to accessing education, and male and female enrolment rates are roughly similar up to first cycle secondary education (Grade 9)[5], after which male enrolment declines. A number of sociological reasons are posited to explain this phenomenon. One such is that many boys in poor female-headed households are required to share the economic burden of the household at an early age and so opt for work rather than school. The expectation is that this will change within the next couple of years as educational reform has mandated that students complete five years of secondary education.

The majority of people in conflict with the justice system in Jamaica are male; in 2010, 98.4% of the persons arrested and charged for major crimes and 91.3% of the persons admitted to adult correctional institutions were male. Meanwhile, 59.0% of the reported victims of major crimes and the majority of missing adults (63.2%) were male, and 85.7% of suicides were committed by men. In addition, males accounted for 82.9% of admissions to juvenile correctional centres. There are other vulnerabilities associated with males and their lifestyles. Men fail to report sickness and illness at an early stage and are more susceptible overall to HIV/AIDS, are more likely to be involved in traffic accidents, and in having a lower life expectancy than females. The data indicate that while the male is generally seen as experiencing more advantages in their socio-economic circumstances, there are areas in which disproportionate levels of risk, mortality and social disadvantage are faced by men and boys on a daily basis.

In 2011, the GOJ approved the Jamaica National Policy for Gender Equality that seeks to "reduce all forms of gender discrimination and promote greater gender equality and social justice". This policy is aligned to Vision 2030 Jamaica – National Development Plan which reiterates the national commitment to redress long-term systemic discrimination against women, identifying and overcoming the limitations to the empowerment of women and men, and ultimately creating a society that values gender balance, equality and equity.

1.6 Disability Context

According to the 2001 Population Census, approximately 163 000 or 6.3% of the Jamaican population have some form of disability. The numbers which were based on self-reporting comprise 50.9% female. In percentage terms, the local population of Persons With Disabilities (PWDS) is well below World Health Organization (WHO) estimates of 10% or UNESCO's 17%-20%, accounting for learning disabilities. A large percentage (29.5%) of the population of PWDs falls in the category elderly (60 and over) which increases their vulnerability, while 12.6% are in the working age group. There is no precise breakdown of disabilities by type. However, among those reporting their disability type, visual

[5] Traditionally, some schools terminate at Grade 9. These are located mostly in rural areas but are being phased out under the Reform of Secondary Education Programme and the Education Transformation Programme.

impairment at 35.9% is the most common type of disability; this is highest among the elderly and women. Some 5% of PWDs reportedly have multiple disabilities.

PWDs in Jamaica are among the most vulnerable. Vision 2030 indicates that the group is generally characterized as "persons with low levels of formal education and training who face hostile labour market conditions". PWDs are also particularly vulnerable to social isolation, poverty and disasters, all of which are mutually reinforcing. Vulnerability to disasters is highlighted by low to moderate levels of physical access to shelters; and mental acuity; as well as mobility issues, etc. But this is often exacerbated by limited access to or lack of information.

There is some level of organization among the PWD community. Much of their work is done under the auspices of the Jamaica Council for Persons with Disabilities, Abilities Foundation, societies/associations for the Deaf and Blind as well as a range of NGOs, and within the framework of the National Policy for Persons with Disabilities tabled in Parliament in September 2000. The main goal of the policy is "to improve the status and conditions of persons with disabilities so that they can enjoy a better quality of life in areas such as education, employment, health, housing, transportation, and accessibility to all areas of the society". This goal is consistent with Goal 1 of Vision 2030 and is in concert with the overall objective of the Strategic Programme for Climate Resilience to improve the resilience of all segments of the population to disaster risks. Addressing the information and communication challenge is fundamental to the empowerment of PWDs. As such, one of the communication objectives outlined in the policy, "to create an inclusive society through widespread use of alternate means of communication to reduce the level of isolation experienced by certain types of disabilities e.g., the deaf, blind and visually impaired", will be adopted to help foster inclusiveness in the SPCR.

2.0 DEVELOPMENT CONTEXT AND CLIMATE RISKS

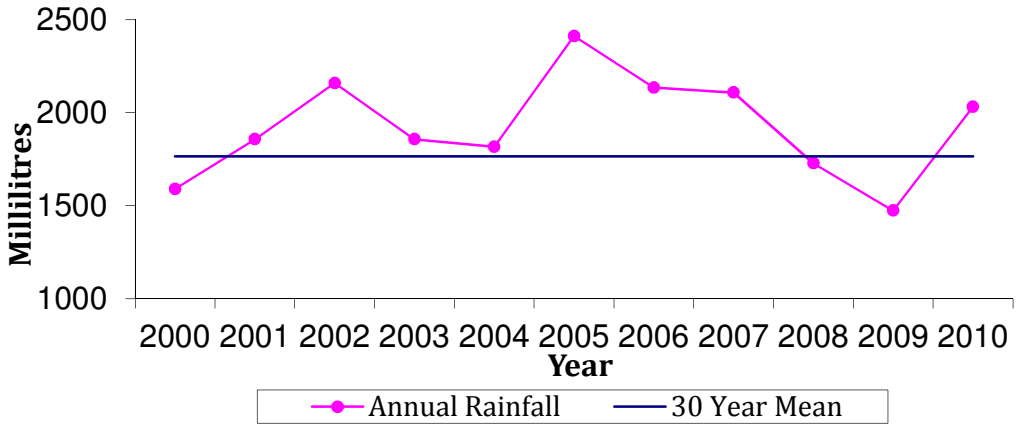
The analysis of the climate change problem to be addressed in Jamaica's SPCR adopts an approach based on the current vulnerability and risks affecting the country. Data on climate change trends and projections are examined to determine the extent to which vulnerabilities are likely to change over time. In addition, the problems affecting key sectors and vulnerable groups are assessed to determine how they are likely to be affected by climate change individually as well as the compounding effect to the economy and the society.

2.1 Climate – Characteristics, Historic Trends and Future Projections

Jamaica experiences a tropical maritime climate, characterized by year–round warm and humid conditions. Rainfall varies on timescales which range from intra-seasonal to decadal. On the seasonal scale, there is a characteristic bimodality which sees two rainfall peaks in May and October. Annual rainfall is typically 1800 mm but there is significant year to year variability as suggested below. Some of this variability can be accounted for by associations with global climatic phenomenon such as El Niño or variations in tropical Atlantic sea surface temperatures (SSTs). In recent years, in tandem with a change in phase of the Atlantic multi-decadal signal, there seems to have been a change to a much more variable

pattern, making the rainfall seemingly less predictable relative to the 30-year mean, 1971–2000. This has serious implications for agricultural production, especially in river basins that are projected to encounter water deficits by the year 2015.

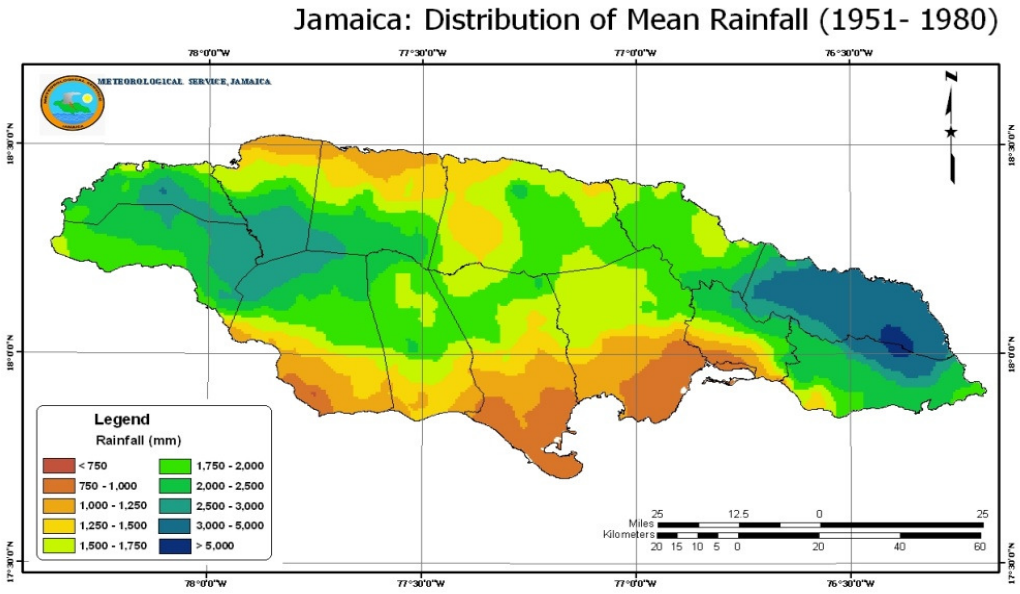
Figure 2: Annual Rainfall in Jamaica, 2000–2010



Source: Meteorological Services Jamaica

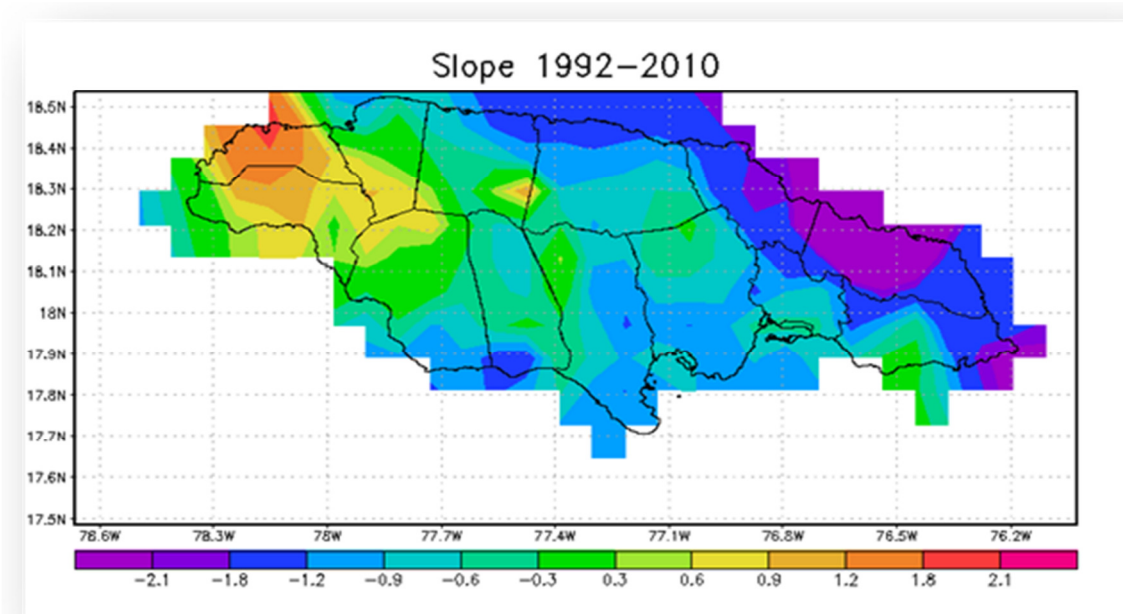
Jamaica's rainfall is also characterized by spatial variability. The mountainous interior of the island (spanning west to east) receives the most rainfall along with the far northeastern parish of St. Thomas. There is a rain shadow on the south coast which is dry. See Figure 3a. Over the past 3 decades, whereas the west has gotten wetter, the east has gotten drier (Figure 3b).

Figure 3(a): Spatial Variability of Rainfall in Jamaica, 1951-1980



(a)

Figure 3(b): Changes in Rainfall in Jamaica, 1992 - 2010



(b)

Source: MSJ, CSGM

Average temperatures have also been increasing (approximately 0.01°C/decade). Data from the country's two major international airports—Normal Manley International Airport, Kingston and Sangster International Airport, Montego Bay—from 1992 to 2008 highlight this trend. See figures below.

Figure 4(a): Temperature Trends for NMIA

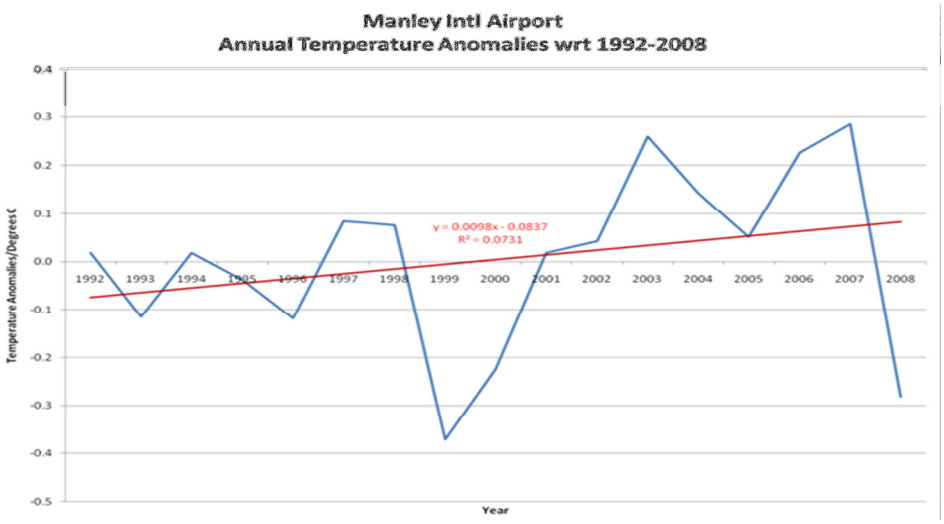
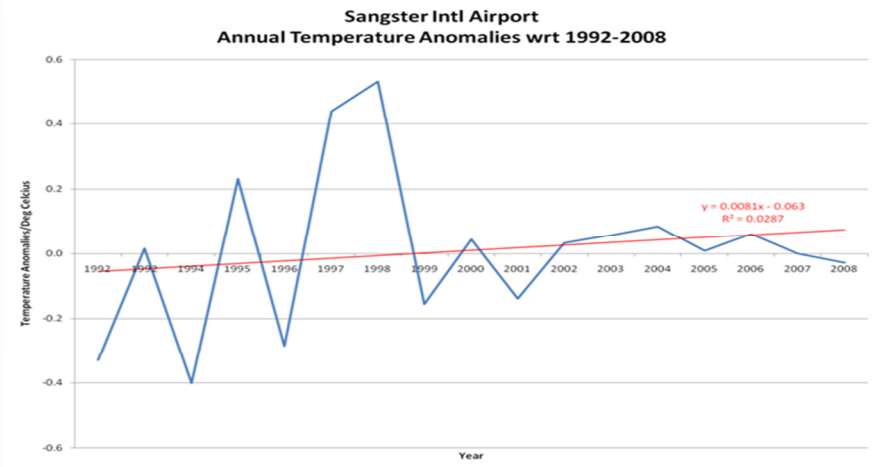


Figure 4(b): Temperature Trends for SIA

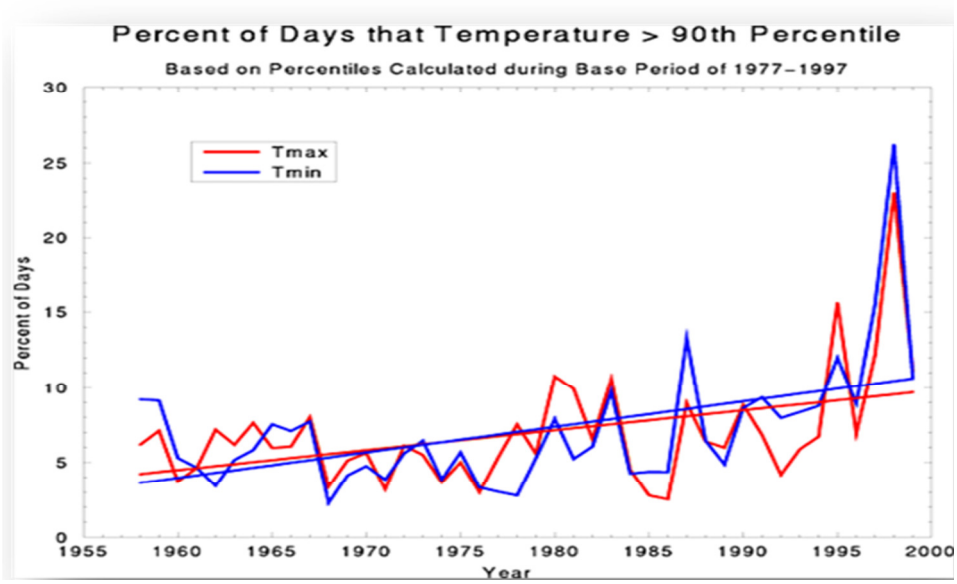


(b)

Source: Climate Studies Group Mona, UWI

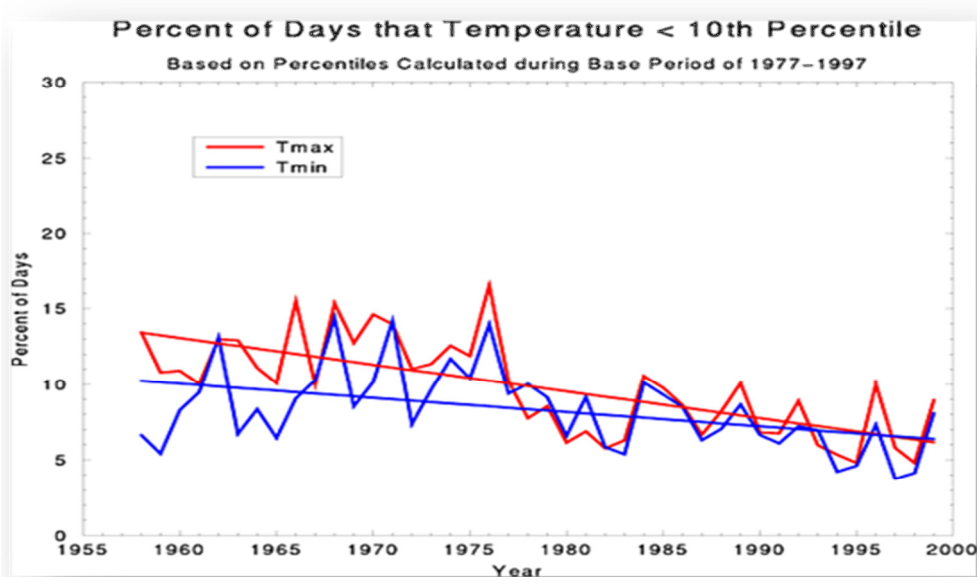
For the rest of the Caribbean region, the number of cool days and nights has also seen a decrease. Conversely, the number of warm days and nights has increased (Figures 5a and 5b).

Figure 5(a): Historic trends for warm days and nights in the Caribbean



(a)

Figure 5(b): Historic trends for cool days and nights in the Caribbean

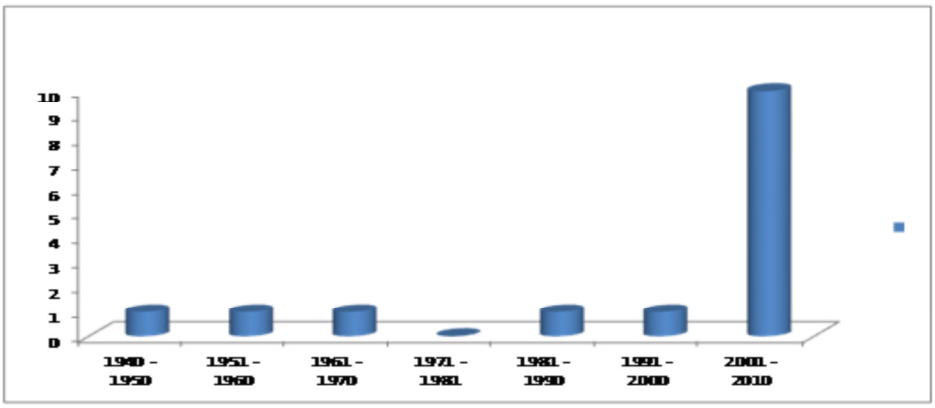


(b)

Source: Climate Studies Group Mona, 2011

Over the last decade, the country has experienced at least one major hurricane or tropical storm annually. This is a dramatic increase relative to the 1940 to 2000 period (Figure 6).

Figure 6: Frequency of Hurricanes in Jamaica, 1940–2010



Source: ODPEM, PIOJ

2.2 Climate Projections

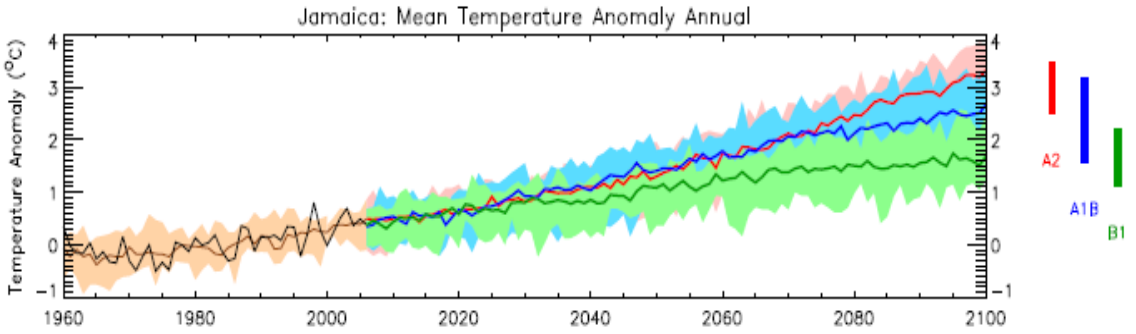
In Jamaica, by 2050, a major portion of the impacts of climate change will be manifested through an increase in climate variability and extreme weather events. Projections for climate variability include:

- a decrease in the length of the rainy season by 7-8%
- an increase in the length of the dry season by 6-8%
- a 20% increase in the frequency of intense rains and
- an increase in the frequency of more intense hurricanes.

2.2.1 Temperature

Temperature is expected to increase both globally and locally (Figure 7). Regional models are projecting that Jamaica will see these increases over the course of the present century. Models suggest that these could be as low as 0.7˚C by the mid-century, or as high as 1.8˚C; these may increase two-fold by the end of the century. The number of cool nights will decrease further and conversely, the number of hot days and nights will increase.

Figure 7: Historic and Projected Temperature for Jamaica, 1960 to 2100

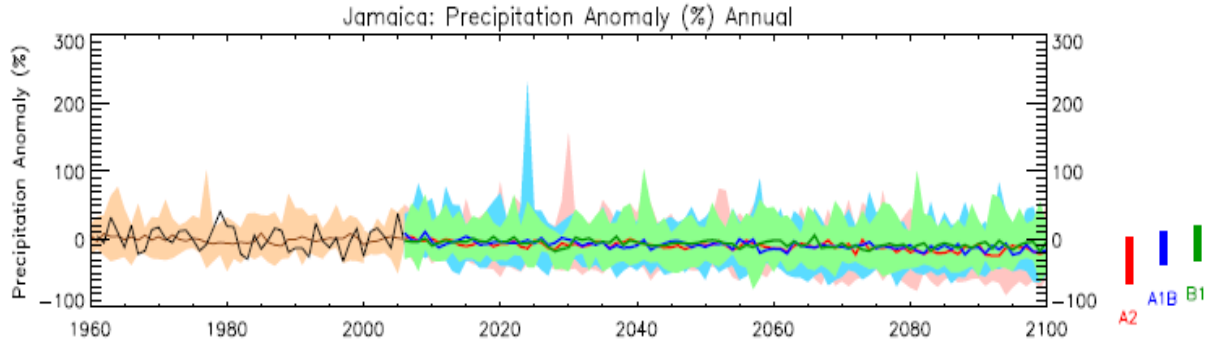


Source: McSweeney et al. 2008; CSGM, 2011

2.2.2 Rainfall

Rainfall patterns are expected to vary significantly. Models suggest that there will be increased unpredictability, with changes in the spatial and temporal distribution of rainfall across the island — the typical rainy seasons will see reduced rainfall, and the total number of wet days will decrease. There will also be increased periods of intense rainfall and drought (Figure 8). Intense rainfall could damage seedlings, and increase run-off and soil erosion. Total rainfall is expected to decrease towards the end of the century.

Figure 8 Model Projections for Rainfall in Jamaica and the Caribbean Historic and Future Trends for Annual Rainfall



Source: CSGM, 2011

Information on projected changes for rainfall can be seen in Table 2.

Table 2: Summary of Regional Climate Model Projections 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% to 40% of current rainfall levels will take place in all regions	General pattern of decreased rainfall overtime Significant decrease in rainfall starting in 2050s June - November will have most pronounced decrease Number of wet days will decrease
Other	N/A	Stream flow of some major rivers will decrease due to reduced rainfall

Source: Climate Studies Group Mona

2.2.3 Tropical storms and cyclones

Several projections have also been made regarding tropical cyclones in the Caribbean region. The outputs are inconclusive with respect to the frequency of cyclone events. However, it is likely that the North Atlantic region will experience a rise in the frequency of more intense systems (Categories 4 and 5); all with the possibility of inflicting serious economic and human costs. It is estimated that by 2025, the cost of these natural hazards for Jamaica could be 13.9% of GDP (based on 2004 GDP), 27.9% by 2050, 42.3% by 2075 and approximately 56.9% by 2100 (Bueno et al., 2008).

2.2.4 Sea-level rise

There is insufficient data on sea-level rise in Jamaica. However, the findings of recent work undertaken by CARIBSAVE are clearly applicable to Jamaica given the similarity in physical, geographic, economic and social make up. According to the study, with a 1 metre sea-level rise, the following would occur:

- 8% of major tourism resorts will be impacted
- all ports will be inundated

- tourism adversely effected, which may contribute as much as 20% of GDP
- about 20% of airport lands will be damaged
- 2% of critical road infrastructure damaged

2.3 Vulnerability Context

2.3.1 Vulnerability to hazards

Jamaica's geographical location makes the island vulnerable to multiple hydro-meteorological hazards, among them hurricanes, tropical storms, droughts, storm surges and floods (Box 2).

Box 2: **A Glimpse of Climate Risks affecting Jamaica**

The country's vulnerability has been exacerbated by growing exposure and the susceptibility of its population; physical assets and economic activities; socio-economic fragility; and inadequate social resilience. Between 2001 and 2010, Jamaica had been impacted by 10 disaster events (Table 3).

Table 3: Economic Impact of Hydro-Meteorological Events in Jamaica, 2001–2010

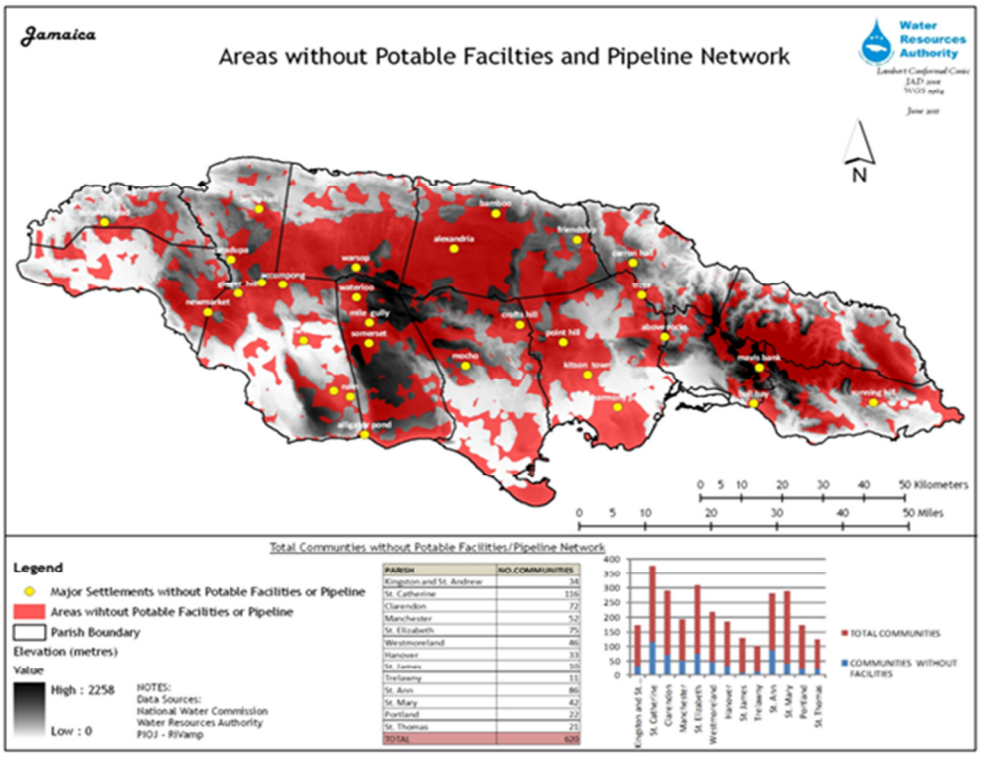
EVENT	Year	Category	Cost ($JB)	Impact (% GDP)
Hurricane Michelle	2001	4	2.52	0.8
May/June Flood Rains	2002	-	2.47	0.7
Hurricane Charley	2004	4	0.44	0.02
Hurricane Ivan	2004	3	36.9	8.0
Hurricanes Dennis & Emily	2005	4	5. 98	1.2
Hurricane Wilma	2005	5	3.6	0.7
Hurricane Dean	2007	4	23.8	3.4
Tropical Storm Gustav	2008		15.5	2.0
Tropical Storm Nicole	2010		20.6	1.9
Total			111.81	

Source: PIOJ

Floods: Floods are among the most frequently occurring hazards affecting Jamaica. Although significant amounts of flooding are created by hurricanes and storms, they are most often linked to severe weather systems, frontal systems and troughs. According to the historical record of flooding in Jamaica, the parishes of Portland, St. Thomas, Clarendon, St. Catherine, and Kingston and St. Andrew experience the greatest number of floods. These parishes are among those with the highest distribution of poverty in the country.

Droughts: Jamaica is particularly vulnerable to the drought hazard. This is significant because the country is highly dependent on rain-fed agriculture (over 80% of farmers). The situation with drought has been made even more pronounced because of the limited/poor national water storage systems (Figure 9), particularly in the upland areas including those being targeted in the SPCR project.

Figure 9 Areas without Potable Facilities and Pipeline Networks in Jamaica



Source: Water Resources Authority, 2011

2.3.2 Economic vulnerability

Hydro-meteorological hazards have caused damage and loss estimated at J$111.8 billion over the 10-year period 2001–2010. The greatest impact from storms occurred with Hurricane Ivan in 2004. This hurricane resulted in damage and loss amounting to J$36.9 billion, approximately 8% of GDP (Table 3).

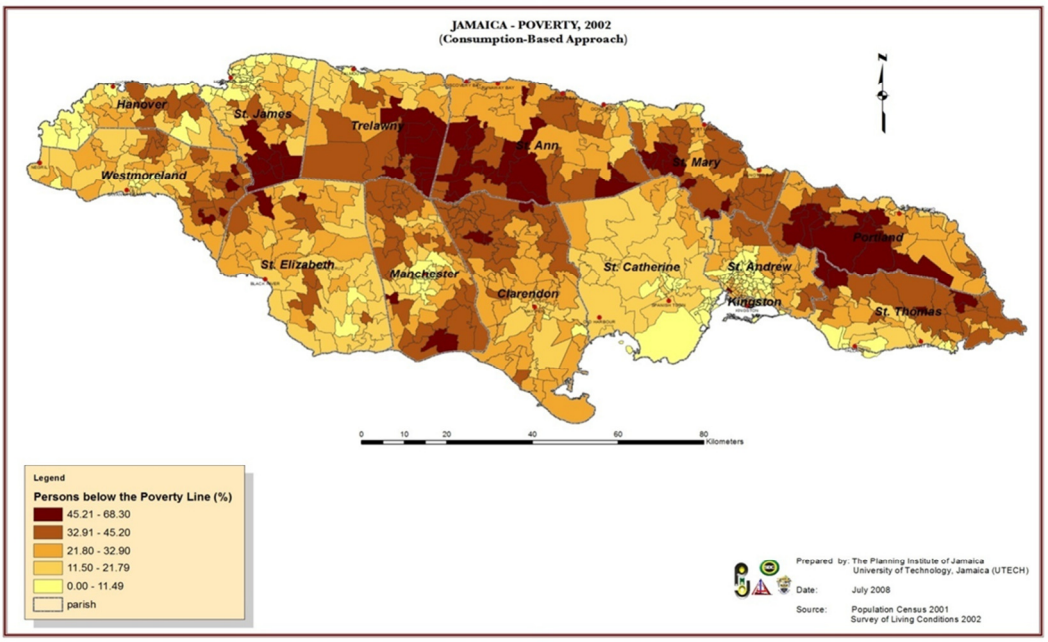
2.3.3 Social vulnerability

Jamaica's poor consist mainly of the unemployed, and persons working in low-wage employment, including underemployed persons. Persons earning low wages depend heavily on income from small-scale subsistence farming, agricultural labour, domestic services, street vending and activities in the informal sector. Livelihoods in the agriculture and fisheries sectors are the most vulnerable to natural disasters and partially explain the chronic levels of poverty observed in rural areas (Figure 10). Declining performance in the agriculture and fisheries subsectors is directly related to the sector's vulnerability to natural disasters and is exacerbated by environmental degradation from inappropriate land use and waste management practices. The vulnerability of the poor is consistently evident during and after disaster events.

The rapid pace of urbanization in Jamaica has contributed to some vulnerability. The percentage of the population living in urban areas has moved from 3% in the 1960s to 52% currently, resulting in high levels of "slum dwelling" (over 40%).

The number of persons impacted during the last decade has increased relative to previous decades. On average 25000O persons are directly or indirectly affected each year. Since 2001, fifty-eight lives were lost over the period (PIOJ 2010). Tropical Storm Nicole resulted in damage of US$94.0 million; fourteen lives were lost and 507312 persons affected.

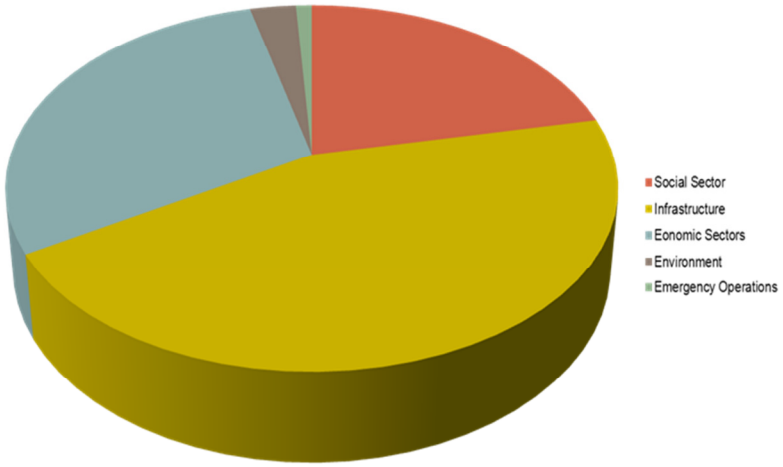
Figure 10: Spatial Distribution of Poverty in Jamaica



2.3.4 Physical vulnerability

A recent risk evaluation estimates that the value of social and economic assets (including infrastructure) exposed to hazards is US$18.6 billion. A significant portion of this exposure lies in the coastal zone where approximately 60% of the population lives. This highlights the need for incorporating climate change risk into policies and plans that impact these areas. Among the most exposed assets are major roads, bridges, hotels, settlements, and energy installations. Over the last decade, infrastructure has accounted for the largest share of the costs resulting from disaster damage and losses (Figure 11). Total costs based on nine events amounted to approximately $118.1 billion. Of this, damage to the infrastructure sector amounted to $51.7 billion or 46% of the overall costs; the transport subsector (roads and bridges) amounted to $44.4 billion, and accounted for the majority (86%) of the infrastructure damage.

Figure 11: Distribution of the Cost of Disasters by Sector (2001–2010)



2.3.5. Ecosystem vulnerability

Jamaica's ecosystems are being impacted by anthropogenic factors such as deforestation, pollution from land and sea, coastal developments and over-fishing, as well as by frequent storm events and other impacts of climate change including drought and coral bleaching. The continued degradation of these ecosystems, primarily by human-induced activities, has reduced their capacity to absorb shocks and perturbations while maintaining their functions. For example, poor farming practices on hillsides have reduced the ability of mountain forests to reduce landslides, flooding and sedimentation (Box 3). In short, the vulnerability of ecosystems to both human-induced and natural factors has been exacerbated. This increase in ecosystem vulnerability has resulted in an increased threat to livelihoods associated with both terrestrial and marine food chains.

Box 3. Some Degraded Ecosystems

3.0 SECTORAL VULNERABILITY

As a small island developing state whose socio-economic and environmental well-being are climate sensitive, Jamaica is considered to be one of the most vulnerable countries to climate change. Analytical assessments conducted for the Second National Communication (SNC) to the United Nations Framework Convention on Climate Change (UNFCCC) have demonstrated that several sectors are vulnerable to climate change, the main ones being water resources; agriculture; health; coastal resources and human settlements; and tourism.

3.1 Water Resources

Water is vital in sustaining all sectors of the Jamaican society. It is essential in maintaining health, livelihoods and recreation, and is critical to the Jamaican economy (Table 4). It is also critical to natural ecosystems which provide social and economic benefits to the country.

Table 4: Water Usage in Key Sectors, 2005

Sector	Direct Contribution to GDP	Foreign Exchange Earnings	Annual Water Use
	J$ Billion	J$ Billion	106 m3/yr
Manufacturing (including food)	125 (28%)	15 (8%)	16 (1%)
Other Services	120 (24%)	-	10 (1%)
Hotels	106 (24%)	100 (55%)	4 (0.3%)
Mining and Processing	60 (14%)	55 (31%)	60 (5%)
Irrigated Agriculture	31 (7%)	10 (6%)	439 (33%)
Residential	N/A	N/A	274 (21%)
Environment	N/A	N/A	510 (39%)

Source: Jamaica's Second National Communication (SNC) to UNFCCC

While the greatest demand for water occurs in the south of the island, most of the available water is located in the north. Jamaica, like many other Caribbean states, is increasingly vulnerable to the dual challenges of increasing demand for water and climatic variability, where even a small reduction in rainfall will have serious consequences for residents in water deficit areas such as the Rio Minho Watershed Management Basin.

Over the years, water resources have been adversely impacted by extreme events such as droughts, flooding and tropical systems as well as sea level rise. Both groundwater and streams are vulnerable as demonstrated by past events. Groundwater has been impacted by pollution and saline intrusion; stream flows have suffered from increased mud-flows or sedimentation from hillsides; eroded river beds; and, in some areas, reduced rainfall.

The distribution system for water resources is also susceptible to damage from extreme climate events because of various factors; chief among them is location. A large percentage of the intakes are located in river beds; many wells and pumping stations are in low-lying areas, and some infrastructure is within areas susceptible to landslides and flooding. Water is exposed to high turbidity and pollution from natural and human-based activities (including saline intrusion). These challenges are often compounded by the impact of natural events on electricity, which is necessary for the distribution of water in many locales. For example, many communities lacked water for several weeks as a result of high turbidity and disruption in electricity supply after Tropical Storm Gustav (Box 4).

Box 4: Impact of Tropical Storm Gustav on the Water Sector

Tropical Storm Gustav in 2008 caused blocked intakes; excessive siltation; clogging of pumping equipment; damage to several pipelines; and damage to access pathways. In more recent times, rains associated with Tropical Storm Nicole and the preceding Tropical Depression No. 16 in 2010 impacted some 70% of the National Water Commission's water supply systems, with 40% of these being damaged or rendered inoperable. Both systems caused damage and loss amounting to millions of dollars.

Climate projections suggest that rainfall pattern is expected to change during the course of the century. This has significant implications for the sector. The hardening of water supplies has already threatened water security in three southern basins. The Kingston, Rio Cobre and Rio Minho hydrologic basins will have a water deficiency by 2015, with the largest annual water deficit of 161 million cubic metres occurring in the Rio Minho basin. Without appropriate interventions, the social and economic capital of the country will be further threatened.

The distinct roles of women and men bring with them different demands for water. Women manage water resources not only for productive uses but also for domestic purposes. At the household level, they are responsible for sanitation and hygiene. Women are highly sensitive to drought and floods. In these cases, women and children have to walk to fetch drinking water which may expose them to health hazards. The Jamaica Survey of Living Conditions 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. This also increases personal and social stress for women.

Table 5 Annual Water Balance, Water Use and Future Water Demand in the Ten (10) Basins of Jamaica

	1 BLUE MT. SOUTH	2 KINGSTON	3 RIO COBRE	4 RIO MINHO	5 BLACK RIVER	6 CABARTTA RIVER	7 GREAT RIVER	8 MARTHA BRAE RIVER	9 DRY HARBOUR MT.	10 BLUE MT. NORTH	TOTAL
Rainfall	1,694	312	2,009	2,420	2,530	1,890	1,685	1,154	2,450	5,068	21,212
Evapotranspiration	912	208	1450	1,641	1,530	1,019	863	673	1,302	2,346	11,945
Surface Water Runoff	662	81	187	225	346	420	467	279	457	2,452	5,576
Groundwater Discharge	120	23	372	32	654	451	355	201	691	270	3,691
Exploitable Surface Water	113	10	15	439	49	0	65	20	28	334	666
Exploitable Groundwater	36	36	404	471.0	625	451	316	151	691	270	3,419
Total Exploitable	149.0	46.0	419.0		674.0	451.0	381.0	171.0	719.0	604.0	4,085.0
Non-Agricultural Sector											
Present Use	4	72	45	39	7	11	26	8	9	12	232
Expected Demand 2015	8	113	59	50	10	16	42	12	19	17	346
Agricultural Sector:											
Present Use	12	2	260	329	32	24	2	0	9	12	682
Possible Demands 2015	62	2	391	582	146	84	2	26	12	31	1,338
Balance											
PRESENT USE	133	-28	114	103	635	416	353	163	701	580	3,171
2015	2015	-69	-31	-161	518	351	337	133	688	556	2,401

Source: Water Resources Master Plan of Jamaica, Government of Jamaica, 1990

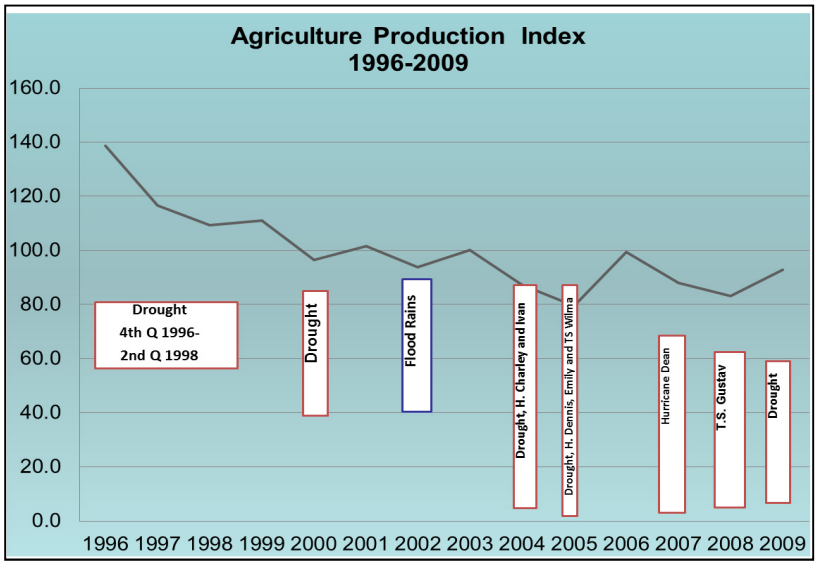
3.2 Agriculture

Jamaica's agriculture sector uses over 320 000 hectares and comprises large scale plantation production and small-scale mixed cropping. The former is often used for cultivating food for the export market — sugar cane, banana and coffee are the main products. The latter produces food items for the domestic market; these include yams, potatoes, fruits and vegetables. There are over 200 000 farmers (30% of whom are women) and 20 000 registered fishers.

Much of the small- scaled agriculture occurs on slopes as some 80% of the land surface is hilly or mountainous. About 50% of these lands have slopes at or exceeding 20˚. Much of the agriculture takes place in the watershed areas which are often badly degraded. In instances, farmers contribute to this degradation through unsustainable practices such as "slash and burn" and removal of tree cover. Furthermore, the majority of farmers use less than one hectare of land to farm.

The Agricultural Production Index has been negatively impacted by extreme climate events in the past few decades as demonstrated in Figure 12.

Figure 12 Agriculture Production Index, 1996–2009 and the Impact of Extreme Climate Events



Source: Ministry of Agriculture and Fisheries, MOAF)

In more recent times, tropical systems have resulted in substantial damage and loss to the sector (Table 6).

Table 6: Impact of Selected Meteorological Events on the Agriculture Sector, 2004–2010

Event	Estimate of Damage and Loss (J $ Million)	Select Social Impact
Tropical Storm Nicole, 2010	576.5	40% of banana production affected; 26 greenhouses damaged; 3 740 ha of crops destroyed
Hurricane Dean, 2007	7 960.5	Some 3 523 fisherfolk impacted; 80% of greenhouses islandwide destroyed; 5 453 ha of arable produce lost
Hurricanes Dennis and Emily, 2005	379.9	8 399 farmers affected; almost 1 300 ha crops lost
Hurricane Ivan, 2004	8 550.1	117 700 farmers impacted; 11 100 ha of agricultural producing lands affected; aquaculture ponds, coastal resources, and fishery fleet and equipment suffered damage; reduced fish catch due to reduced fleet and migration of fish species

Source: PIOJ

Based on the experience of the past, the projections are: agriculture on 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 overtime; traditional crops and livestock may not be able to withstand increased temperatures and other extreme climate conditions, etc.

3.3 Human Health

Jamaica's population is served by a health-care system which comprises 313 health centres and 23 hospitals as outlined in Table 7. Primary level health care takes place at the health centres and community hospitals; secondary level care is provided at parish level facilities; tertiary health care is offered at three select facilities, namely the University Hospital of the West Indies, the Kingston Public Hospital (both in Kingston and St Andrew) and the Cornwall Regional Hospital in St. James.

The sector has not been spared the onslaught of natural hazards. Table 8 below highlights some of the social impacts of select hazards. In general, these hazards have resulted in death, injury and contributed to the spread of diseases. They have also impeded the ability of many persons to seek assistance from health-care facilities. The quality of health care during and after major events has also been of concern, as in instances facilities have sustained varying levels of structural damage or have been flooded or made otherwise inaccessible.

Table 7: Population and Health Facilities per Region, 2010

Region	2010 Population	Health Centres	Hospitals
South East	1 265 100	88	10
North East	371 900	74	4
Western	477 300	78	4
Southern	591 500	73	5
TOTAL	2 705 800	313	23

Source: *ESSJ, 2010*

Table 8: Impact of Select Natural Hazards on the Health Sector, 2004–2010

Event	Estimate of Damage and Loss (J$ Million)	Select Social Impact
Tropical Storm Nicole, 2010	270.4	16 persons lost their lives (including 6 children); 39% of total damage and loss was from partial or total damage to infrastructure; 20% of costs was due to vector control activities
Tropical Storm Gustav, 2008	423.8	Several persons lost their lives; some 450 000 residents directly impacted
Hurricane Dean, 2007	298.5	Several hospitals and health-care facilities damaged, where 1 hospital unable to operate for a week; 16 child-care facilities damaged
Hurricanes Dennis and Emily, 2005	55.5	Large portion of costs for vector control
Hurricane Ivan, 2004	718.2	367 685 persons directly impacted and 17 lost their lives; 36% (or 124) of health centres were damaged

Source: PIOJ

The country has experienced many outbreaks of vector borne diseases, particularly dengue fever and malaria. Mosquitoes are responsible for the spread of these diseases. Among the contributing factors are inappropriately stored water (often for domestic uses), blocked drains and unsuitable garbage disposal, which facilitate the development of the mosquitoes and the subsequent spread of the diseases. Furthermore, the climate is conducive to the development of the larvae which require sufficiently high temperatures and rainfall. Further increases in temperature coupled with unpredictable rainfall patterns are likely to exacerbate these conditions and result in increased incidence of the disease.

Women and men are exposed in different ways to the effects of climate change in health. Women are the primary caregivers of those affected by the diseases or accidents produced by climate change. Caregiving generally restricts women's ability to pursue personal, professional and academic goals. Women and children are fourteen times more likely to die than men during a disaster (Neumayer and Plumper 2007). In Jamaica, while the incidence of death has remained relatively low, there is concern that with climate change, increasing urbanisation and increasing poverty trends, the risk for poor women and children will increase. Poverty and poor access to health care exacerbate these risks. For men, a decline in food security and livelihood opportunities can cause considerable stress given the social expectation that they will provide economically for the household. Also, the involvement of men in elementary occupations, agriculture and fisheries, construction and installation, and occupations which expose them to the elements underlines some climate change risks for them.

3.4 Coastal and Marine Resources

Jamaica has a coastline of about 1 000 km having a myriad of ecosystems including coral reefs, mangroves, beaches, estuaries and seagrass beds. They form an important part of the country's biodiversity, providing services and benefits at the national and community (local) level. The benefits of these ecosystems are such that some 90% of the island's GDP is generated in coastal areas. Also, about 60% of the population reside within 2 km of the coast.

Some of Jamaica's coastal ecosystems are already being impacted by climate change. The intensity and frequency of tropical storms and hurricanes have affected mangrove forests, seagrass beds, beaches and coral reefs. Significant sedimentation from land during flooding events has reduced seagrass meadows and smothered coral reefs. Sections of coral reefs have toppled, mangroves suffered breakage and seagrass uprooted as a result of intense weather events. In particular, coral reefs and seagrass meadows were severely and extensively impacted by Hurricane Ivan in 2004.

Several beach areas across Jamaica have experienced significant erosion. For example, beaches in Negril have been experiencing high erosion rates since 1991 and in some places the beach has retreated more than 55 metres over the last 40 years.

The coastal ecosystems are likely to be further negatively impacted by climate change due to their current state of degradation. Beaches are likely to suffer more erosion as a result of degradation of coral reefs, storm events and sea level rise. Mangroves are prone to suffer damage from wind and seagrass beds may experience more frequent uprooting and smothering events. Coral may suffer from coral bleaching due to rising sea surface

temperatures, water turbidity and breakage due to the impact of hurricanes. Climate change can therefore worsen the negative impacts on these ecosystems which are already being significantly impacted by man-made factors.

If climate change impacts the coastal and marine resources, reducing fish and marine species for local and national consumption, women and especially men, could lose their jobs and food security could be threatened. A similar scenario could be repeated in the tourism sector, which depends on beaches and coral reefs as recreational assets. The loss of jobs in the tourism sector would affect many more women than men as women dominate employment in the sector, accounting for 58% of employment.

3.5 Tourism

Tourism is one of the country's important sectors due to the contribution it makes to the economy and to social integrity. Over the past four years, the contribution of the hotels and restaurants subsector to GDP has been growing steadily (Table 9).

Table 9: Contribution of Hotels and Restaurants Sub-Sector to GDP and the Employed Labour Force, 2007–2010

Year	2007	2008	2009	2010P
Contribution to GDP (%)	5.3	5.5	5.8	6.1
Labour Force Employed in the Sector (%)	6.3	6.9	7.0	6.8

Source: *ESSJ 2010, p – Preliminary*

In addition, the sector provides a number of jobs for persons in all socio-economic brackets. On average, the subsector accounts for some 6.8% – 7.0% of the country's employed labour force.

Given the often close proximity of the hotels and other tourism infrastructure to the shoreline, as well as the tendency for beaches to be eroded during severe weather events, the tourism sector is vulnerable to substantial damage of built and natural infrastructure with the passage of each storm or hurricane. In addition, there is also significant loss of income in the period immediately following extreme weather events. Table 10 gives an indication of the nature and extent of some of the losses suffered in recent years by the tourism sector.

Table 10: Impact of Select Natural Hazards on the Tourism Sector, 2004–2010

Event	Estimate of Damage and Loss (J$ Million)	Select Social Impact
Tropical Storm Nicole, 2010	164.5	80%-90% of properties in Negril suffered structural damage; infrastructure damaged largely from flooding
Hurricane Dean, 2007	43.7	Majority of damage experienced in accommodations subsector, mainly from storm surges and strong winds
Hurricanes Dennis and Emily, 2005	2.5	Attractions damaged in Portland
Hurricane Ivan, 2004	1 590.7	Damage to infrastructure; losses from missed earnings

Source: PIOJ

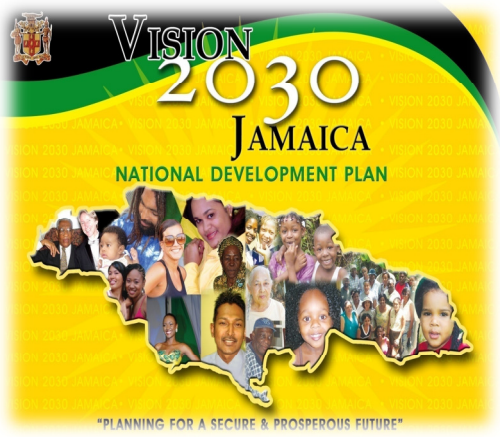
4.0 OVERVIEW AND LINKAGES TO DEVELOPMENT PLANS AND PROGRAMMES

4.1 Plans, Policies and Other Instruments

The national SPCR is developed within the context of Vision 2030 Jamaica – National Development Plan designed to guide the country towards changing its development status, and doing so in a sustainable manner. The plan benefited from wide stakeholder input — local communities, private sector, non-governmental organizations, public sector entities, and others. It forms the foundation of work now being conducted by the government. Donor agencies also are guided by the Plan as they provide resources to achieve the goals therein.

4.1.1 Key development plans

- Vision 2030 Jamaica–National Development Plan



Vision 2030 has four main goals, one being that "Jamaica has a healthy environment". A key outcome expected under this goal is Hazard Risk Reduction and Adaptation to Climate Change. This recognises the importance of managing hazards and also of putting appropriate measures in place to increase the country's resilience. A key strategy for achieving the Vision is through the development of Sector Plans, some of which relate to natural resources management, hazard risk reduction and climate change adaptation. They are used by relevant ministries, departments and agencies across all key sectors in planning for short, medium and long terms.

- Jamaica's Second National Communication (SNC) to the UNFCCC

The SNC was drafted in Jamaica as part of Jamaica's obligation under the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto protocol. Both provide an instrument for tackling climate change at the global level. The SNC report highlights the vulnerability of key sectors and the need to design appropriate interventions. These include Human Health; Water Resources; Tourism; Agriculture; and Coastal Resources and Human Settlements. The critical importance of these core areas calls for a holistic approach to addressing present and future challenges.

Following from the draft SNC, a draft National Climate Change Policy and Action Plan was developed. The policy is expected to be completed in 2012.

- Water Resources Master Plan

A Water Resources Master Plan is currently being finalized. Models are used to generate various outputs to identify optimal scenarios for the sector. The plan will form an important tool in determining the availability and demand of water and also implementing an appropriate framework for its allocation and management.

- Agriculture Sector Plan

The Agriculture sector is being guided by the Agriculture Sector Plan under Vision 2030 Jamaica and also by the Medium Term Socio-Economic Framework (MTF), 2009-2012. Among the strategies identified are strengthening research institutions; strengthening the capacity of the government; enhancing environmental sustainability; and improving the value added production of the sector.

4.1.2 Programmes and projects

Given the critical role for hazard risk reduction and climate change adaptation outlined in Vision 2030 Jamaica, and in the Growth-Inducement Strategy, the government has been aggressively pursuing a number of related programmes and projects. Some of these directly target building resilience in the built and natural environments, while others focus on improving capacity at the national and local levels through research, training and institutional strengthening. Some of the key programmes and projects are listed in Table 11.

Table 11: Select Programmes and Projects in Jamaica

Project Name	Funding Agencies	Information on Project/Programme
Risk and Vulnerability Assessment Methodology Development Project (RiVAMP)	UNEP, GOJ	Ecosystems-based approach to decision-making, with particular focus on climate change; Pilot testing in Negril Completed in 2010

Project Name	Funding Agencies	Information on Project/Programme
		Follow-up training on methodology in late 2011
Climate Change Adaptation and Disaster Risk Reduction project	EU, UNEP, GOJ	Objective is to achieve sustainable development by reducing risks and increasing resilience to natural hazards through: • the rehabilitation of degraded watersheds; • restoration of select coastal and marine ecosystems; and • enhancement of capacity of the government and local communities to adapt to climate change.
Coastal Multi-Hazard Mapping and Vulnerability Assessment Towards Integrated Planning and Reduction of Vulnerability for Portland Cottage, Morant Bay and Manchioneal, Jamaica	Global Facility for Disaster Reduction and Recovery World Bank	Focused on three vulnerable communities which experienced severe damage from Hurricane Dean in 2007 Hazards addressed include landslides, storm surge, riverine flooding, and wind; completed in 2010 with consultations on the results to local and national stakeholders in 2011 Results will be used on local planning for each community
Enhancing the Resilience of the Agriculture Sector and Coastal Areas to Protect Livelihoods and Improve Food Security	Adaptation Fund	Concept endorsed by Adaptation Fund Board (AFB) in June 2011 Development of the proposal for approval and funding ongoing Three components of the programme are related to agriculture, tourism and water resources with capacity building as over-arching principle
Marketing and Agriculture for Jamaican Improved Competitiveness (MAJIC) Project	USAID, GOJ, ACDI/VOCA	Objective is to improve capacity of local agriculture practitioners in sustainable techniques, etc. (including through Farmer Field Schools) Currently ongoing
Climate Change Adaptation in Cedar Valley, St. Thomas	USAID, Environmental Health Foundation (EHF)	Community based approach to adapting to climate change. Community is faced with high levels of poverty, low literacy, and high levels of environmental degradation. Project will address capacity building, disaster risk management Currently ongoing

Source: various

In addition to the above, Jamaica has recently completed a 5-Year Action Plan for Integrated Disaster Risk Management (IDRM) with the assistance of the IDB. The priority activities in the Action Plan will complement the 5-Year Strategic Action Plan on Climate

Change and provide a basis for financing SPCR priorities that cannot be funded under the PPCR. The GOJ and the IDB have also signalled that the priorities of the IDRM Action Plan will be incorporated in the next Country Strategy Programme.

Importantly, activities implemented under the PPCR will serve to complement and reinforce related activities under a number of on-going and planned climate change and disaster risk reduction initiatives, particularly the "Enhancing the resilience of the agriculture sector and coastal areas to protect livelihoods and improve food security project" to be funded with assistance from the AF. Both programmes focus on sectoral adaptation in the agriculture and water sectors with specific emphasis on improving land management and water harvesting. The AF programme extends to coastal adaptation in the Negril area with implications for the tourism sector. For the agriculture adaptation components each programme will target clearly identified communities/locations in the general geographic region cutting across three main watershed management units, Rio Minho and White River-Rio Bueno. These are among the most severely degraded watersheds in the island. The programmes are designed to implement complementary activities in this area which is expansive and in which there are high levels of economic, social, and environmental vulnerability. The assessment is that neither programme could fully address the level of degradation or need identified. Therefore, each programme will focus on specific communities to be chosen by an objective and transparent process. In this regard, community selection criteria are currently being developed under the AF programme and these will be used to serve both programmes. Also, the expectation is that further community consultation within the area will be used to fine-tune the intervention for specific communities within the context of the programme menu.

From a policy perspective, the Ministry of Agriculture and Fisheries (MOAF) has earmarked the project area as being strategic to the food production plan outlined in the National Food Security Strategy. Elements and activities from the programmes are thus being incorporated into the work programme of the Ministry and its agencies, namely, Rural Agricultural Development Authority (RADA) and the National Irrigation Commission (NIC). One of the benefits to be derived from the 'common' location will be a more optimal use of the extension service personnel and their equipment.

In terms of implementation schedule, the AF programme is expected to be approved mid-2012 and implementation commence shortly thereafter. The PPCR will learn from the preparatory activities now under way and also any early implementation challenges from the AF programme.

4.1.3 Regional project linkages

Jamaica's SPCR will build on and benefit from the achievements of a number of landmark regional climate change projects. Some of these projects include lessons learned:

Caribbean Planning for Adaptation to Climate Change (CPACC) – the goal of the CPACC project was to build capacity in the Caribbean region for adaptation to climate change impacts, particularly sea level rise. This was accomplished through the completion of vulnerability assessments, adaptation planning, and capacity building activities. Under this project Jamaica piloted a project for coral reef monitoring for climate change. The

methodology for vulnerability assessment will be reviewed and strengthened to address the weaknesses identified. Special attention will be paid to the policy options and instruments proposed for long-term adaptation and to promote political buy-in.

Mainstreaming Adaptation to Climate Change (MACC) – The main objective of this project was to mainstream climate change adaptation strategies into sustainable development agendas of small islands and low-lying states of CARICOM. MACC adopted a learning by doing approach to capacity building, consolidating the achievements of CPACC. The learning by doing approach will be particularly relevant in determining the strategies for mainstreaming. The work done in the water sector will be used to advance mainstreaming activities in that sector, particularly in the river basin targeted under this project.

Caribbean Climate Change Tourism and Livelihoods: A sectoral approach to Vulnerability & Resilience–The project aims to strengthen, protect, and enhance the economies and livelihoods of Caribbean nations and sectoral stakeholders, who rely directly or indirectly on Caribbean tourism industry, and to strengthen, protect and enhance the natural and built assets, and sectors on which the industry is based. The Jamaica component of this project involved vulnerability assessments of Long Bay-Negril and Rose Hall-Montego Bay. An assessment will also be done on the institutional capacity of the tourism sector to adapt to climate change.

Synergies will be explored between the livelihoods component of this project and the PPCR. This will be particularly relevant if PPCR outcomes are to be scaled to other sectors, areas and to the region. Information from the risk assessment can also be incorporated into the Risk Information Platform under Investment Project 1.

5.0 RATIONALE FOR PPCR SUPPORT

As highlighted above, there is considerable evidence that Jamaica has begun to experience the effects of climate change. Based on the most current projections, these trends are likely to continue into the foreseeable future. Without adequate adaptation to climate change, Jamaica's attempts to achieve the goals of Vision 2030 Jamaica –National Development Plan will be severely hampered. This is because some of the negative impacts associated with climate change have the potential to disrupt climate sensitive livelihoods; threaten food security; and increase poverty particularly among rural households.

A strategic evaluation of the country disaster risks profile conducted by the Inter-American Development Bank (IDB) in 2009 showed that for hurricanes—one of the hydro-meteorological hazards projected to intensify with climate change—the country faces average annual losses of approximately US$100.0 million; and probable maximum losses associated with a catastrophic event with a return period of 500 years amount to approximately US$3.0 billion (25% of GDP). In addition, the study indicated that climate change is likely to undermine the foundations of the economy by causing serious dislocations in the key climate-sensitive sectors of agriculture, tourism, health and water resources, and inflicting massive damage to the country's economic infrastructure, a large percentage of which is located within the coastal zone. A complementary IDB study on

Indicators of Disaster Risk and Risk Management shows that for a catastrophic event with a return period of 500 years, the Disaster Deficit Index is 2.4, suggesting that Jamaica has low economic resilience and lack the financial capacity to recover in a reasonable period of time and without outside help, from the event. This highlights the need for Jamaica to increase its level of performance in climate change adaptation and the core areas of disaster risk management.

The GOJ has recognised the potentially damaging impact of climate change on the nation's drive towards a more sustainable future. As such, Vision 2030 provides framework for integrating climate change in the country's development planning. This has been bolstered by Jamaica's SNC on Climate Change which has outlined strategic priorities for climate change adaptation. However, implementation of these strategic actions is being hindered by the low adaptive capacity in key sectors. A robust programme (as set out in the SPCR) will help the country to make strategic interventions towards building the country's climate resilience.

In particular, PPCR financing will be used to strengthen the institutional framework for mainstreaming climate change, which on a national scale is required to sustain the climate change adaptation measures both temporally and spatially. The enabling environment for climate change adaptation has not yet been fully created, largely because of the absence of a legislative framework to support other aspects of the overall system. Additionally, existing institutions do not have the requisite structure in place to facilitate the implementation of key climate change initiatives. Lack of financial resources, limited number of trained staff with the requisite expertise, and the absence of a strong research and development core within these institutions, have limited their overall ability to develop and expedite key programmes, projects, and plans of action to address climate change adaptation and resilience. The institutional arrangements for coordinating and implementing climate change issues/initiatives in Jamaica have at best remained fragmented. The PPCR provides a basis for establishing a coherent and multi-sectoral institutional framework for climate change and to address this gap.

Interventions to be facilitated through PPCR investments will go directly towards addressing the needs of highly vulnerable communities in Jamaica. Some areas have good agricultural potential, however, progress in expanding agricultural production is being stymied by an increase in the intensity and short duration of rainfall, soil erosion and poor land husbandry. Loss of productivity has led to a decrease in income and food security. PPCR investment will focus on providing and demonstrating technology for water adaptation strategies to enable the selected rural communities to be more resilient. Such resources will also lead to the introduction of better land and soil conservation techniques to aid in the resilience of vulnerable communities in the programme area, and more importantly to provide a template for scaling up such approaches and techniques.

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. The agricultural sector makes an important contribution to food security through domestic food production. On average, food accounts for approximately 43% 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. In addition, Jamaica's food import expenditure amounted to 11% of GDP in 2010. Given these realities, the adaptive capacity of the agriculture sector has to be boosted 'on a fast track'. Much of this will be information-driven; supplemented by increased investment. PPCR will build additionality to adaptation planning by creating and integrating robust up-to-date climate scenarios into sectoral planning. This is particularly important for the agricultural sector but also relevant to others; PPCR will therefore bridge the data and information deficiency which affects effective climate and disaster risk management and decision-making.

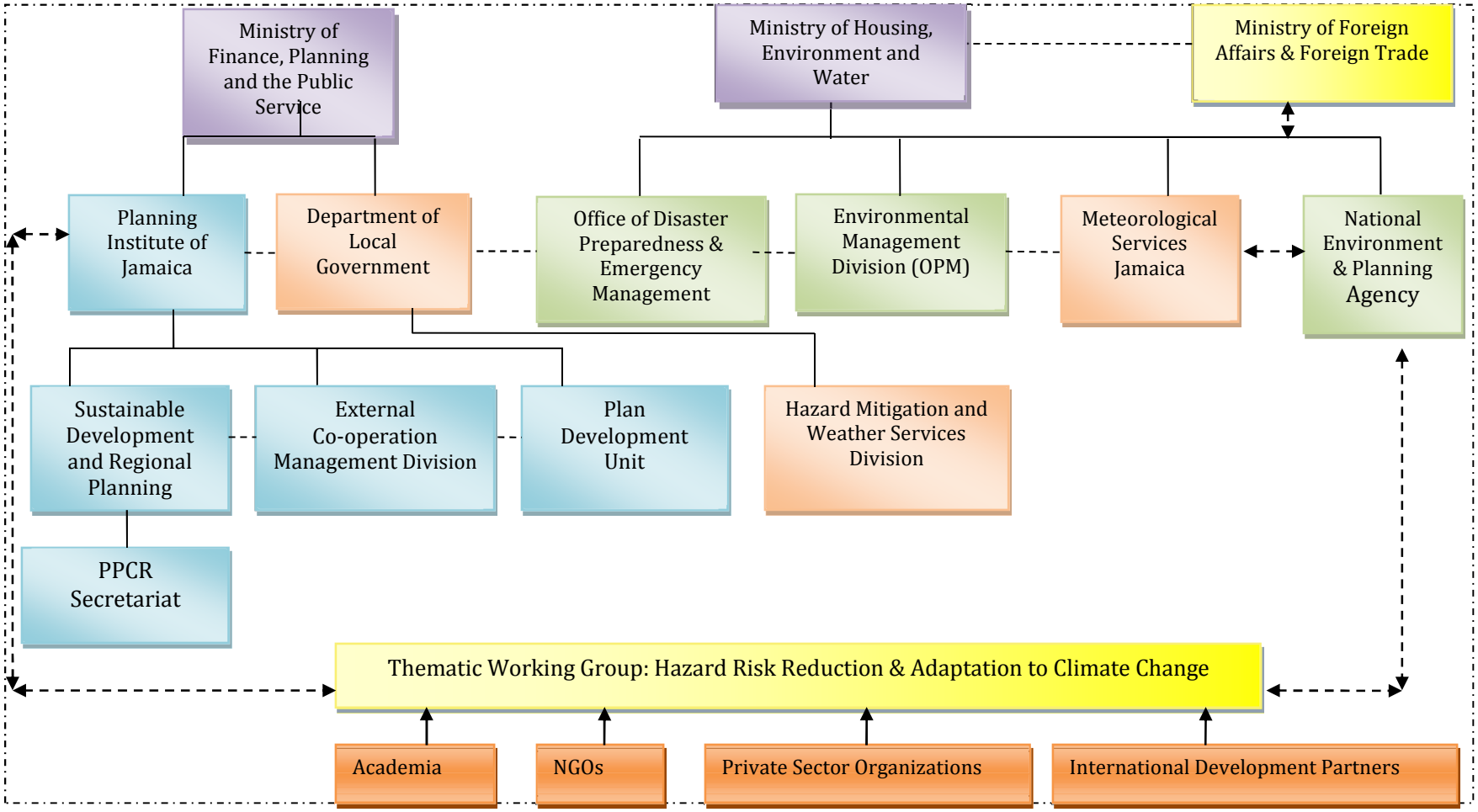
PPCR support will demonstrate how climate change scenarios can be manifested in planning at the spatial level. In so doing, it will give meaning to scenario planning as a decision-making tool with practical relevance to the lives and livelihoods of Jamaica's vulnerable groups. In addition, it will provide the opportunity to unearth innovations with multiple economic benefits along with the possibility for scaling up to other communities in Jamaica as well as other jurisdictions in the Caribbean region.

5.1 Institutional Analysis

There is no single agency with responsibility for addressing climate change issues in Jamaica, neither is there an overarching legal or institutional framework. However, the current institutional lacuna is to be addressed under the ongoing Climate Change Adaptation Disaster Risk Reduction project. That project will build on the institutional capacity assessment carried out under the PPCR, and the review of the policy and legislative framework as well as facilitate completion of the national climate change policy and confirm the definition and designation of the most appropriate institutional arrangement.

Climate change adaptation and disaster risk management are seen as development issues in Jamaica. As such, these issues are treated not only as cross-cutting but their management spans a wide cross-section of ministries, departments and agencies, local level organizations; and involves the private sector and non-government organizations. Jamaica's SPCR will be implemented through a collaborative approach. The institutional arrangements for SPCR are shown in Figure 13.

Figure 13: Institutional Arrangements for the SPCR in Jamaica



The core functions of key agencies are given below.

Table 12: Core Functions of Organizations Involved in Climate Change Related Programmes and Projects

Agency	Function
Ministry of Finance, Planning and the Public Service	• Provide leadership, promote good governance and build an inclusive, enabling environment conducive to the development, articulation and implementation of sound policies and programmes consistent with our shared goals and values, as a people
Planning Institute of Jamaica (PIOJ)	• Initiate and coordinate the development of plans and programmes to facilitate sustainable development of Jamaica • National Focal Point for Vision 2030 Jamaica – National Development Plan • National Implementing Entity (NIE) for the Adaptation Fund and the Focal Point for PPCR • Provide technical and administrative support to the Hazard Risk Reduction and Adaptation to Climate Change TWG through its Technical Secretariat • Co-manager for the GOJ/EU/UNEP CCADRRP • Conduct socio-economic and environmental assessment of disasters
Hazard Risk Reduction and Adaptation to Climate Change Thematic Working Group (HRRACC-TWG)	• Consist of up to 25 organizations and key individuals appointed by the chair under the advice of the PIOJ. Members are drawn from a cross section of stakeholders with technical interest in and knowledge of hazards, risk and climate change issues • Main mechanism for coordinating and monitoring activities related to the National Outcome Hazard Risk Reduction and Adaptation to Climate Change under Vision 2030 Jamaica - National Development Plan (NDP) and successive Medium Term Socio-Economic Policy Frameworks (MTFs)
Environmental Management Division	• Responsible for environment, planning and development and for monitoring climate change conventions at the national and international levels. Work closely with the focal points on climate change issues
Ministry of Local Government & Community Development Hazard Mitigation and Weather Services Division	• Monitor the implementation of climate change adaptation and hazard mitigation policies and initiatives at the local government planning levels
Meteorological Service, Jamaica (Met Service)	• Concerned with the observation and forecasting of weather conditions over and around the island; maintain a continuous Hurricane Watch during the hurricane season and is responsible for the issuance of severe weather warnings

Agency	Function
	• Responsible for maintaining a current database of the climate of Jamaica and for the utilization of this data in informing productive sectors of the country • Member of the Adaptation Fund Board, national Focal Point to the UNFCCC and responsible for the preparation of the National Communication for climate change
National Environment and Planning Agency (NEPA)	• Integrate environmental, planning and sustainable development policies and programmes and to improve customer service • Promote sustainable development by ensuring protection of the environment and orderly development in Jamaica • Implement measures to support the increase in the natural resilience of coastal ecosystems and biodiversity • Set standards, monitor and regulate the environment
Office of Disaster Preparedness and Emergency Management (ODPEM)	• Designated National Disaster Organization, with responsibility for disaster management • Responsible for taking action to reduce the impact of disasters and emergencies on the Jamaican population and its economy • Play coordinating role in the execution of emergency response and relief operations in major disaster events
Ministry of Foreign Affairs & Foreign Trade	• Responsible for the implementation of Jamaica's foreign policy, the management of Jamaica's international relations and the promotion of its interests overseas • Promote Jamaica's interests and the interests of Small Island Developing States (SIDS) in the areas of climate change, sustainable development and global environmental governance
Ministry of Water, Environment and Climate Change	• Policy making and regulatory responsibility for water environmental and climate change issues
Association of Development Partners	• Promote local community development with emphasis on vulnerable groups such as women and persons with disability
Environment Foundation of Jamaica	• Provide grant financing for environment and community climate change adaptation programmes • Advocate for good community-based environmental management

6.0 STRATEGIC PROGRAMME FOR CLIMATE RESILIENCE

6.1 Regional Context

Jamaica's SPCR is part of the Caribbean Regional Pilot PPCR (Figure 14). The other five countries are Grenada, St. Vincent and the Grenadines, Saint Lucia, Dominica, and Haiti. Like our Caribbean neighbours in the regional programme, Jamaica shares common climate change adaptation challenges, some of which are more efficiently and cost-effectively tackled at a regional level. These common challenges, which have been identified by the member states of the regional pilot grouping, will be addressed through the regional track of the PPCR. This regional track will include: (i) Piloting Evidence Based Climate Adaptation; (ii) Supporting the Implementation of the Global Framework for Climate Services in the Caribbean; (iii) Enhancing the Regional Climate Change Network to Facilitate Two-Tier Modelling for Climate Resilience; and (iv) Applied Adaptation Initiatives. Jamaica's SPCR will maintain strong linkages with the regional programme, particularly in the areas of climate modelling, mainstreaming climate change, health adaptation and water adaptation.

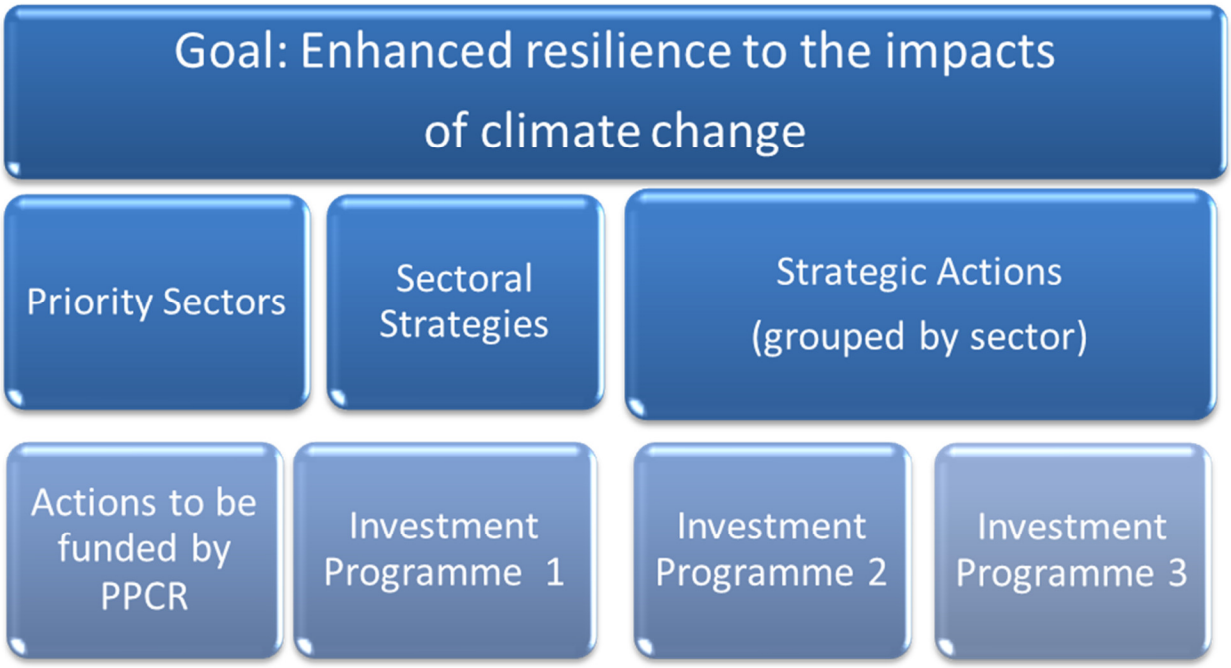
Figure 14: Regional Context for Jamaica's SPCR

6.2 Jamaica's SPCR

One of the greatest challenges to the attainment of sustainable development in Jamaica is its vulnerability to multiple natural hazards and their repeated negative and costly physical, social, environmental and economic impacts. This challenge is further compounded by social issues such as poverty, the location of human settlements in high risk areas, environmental degradation

and instances of poorly constructed infrastructure and housing. The GOJ therefore, after extensive consultations with a wide range of stakeholders, has developed a comprehensive programme of activities aimed at reducing the negative impacts of climate change and increasing resilience to these impacts. This programme of action is now being put forward as Jamaica's SPCR Figure 15 outlines the structure of the PPCR in Jamaica.

Figure 15 SPCR Structure



6.2.1 The SPCR and resilience building

At a macro level, the goal of the programme "Enhanced resilience to the impacts of climate change at all levels in Jamaica" addresses building resilience from the policy/institutional, national and sectoral perspectives. In this regard, emphasis is placed on building awareness to improve knowledge, attitudes and practices; and improve decision-making capabilities through the use of climate scenarios etc. which should redound to better planning and better results on the ground.

Within the selected river basin (geographic level), programme impacts will be both direct and indirect for families in the project communities and extend to the wider community by way of increased availability of crops, lower price of products and reduced downstream effects of environmental degradation. During a visit to the project site, the downstream environmental effects were stressed by farmers who pointed out that one of the benefits of improved land management in the upper watershed would be reduced flooding in communities like May Pen and Cave Valley; the former being a major commercial district, and the main market for their agricultural produce. Economically, the positive impacts are predicated on increased

agricultural output, influenced by greater access to and more efficient use of water; better land management practices and resultant improved soil fertility; appropriate crop selection and planting time; and general training. The expectation is that these will aid in reversing the 50%-70% decline in agricultural production recorded in 2010 and reduce the poverty incidence.

Exposing the communities to alternative livelihood opportunities such as aquaponics and extracting economic value from the vetiver and lemon grasses is another feature of expanding the economic resilience. The former can be used to make craft items and perfumes and the latter contains essential oils that can be used to make a wide variety of cosmetics and beverages. These strategies will not only increase income but also help to diversify and increase the robustness of the economy in the treatment communities. The medium to long-term outcome is expected to be a decline in the poverty incidence, and change in development indicators such as school enrolment and health status.

The rehabilitation of the physical environment (green gullies etc.) and the benefits derived from improved land use management will directly contribute to building resilience in the natural environment. Attention to disaster risk reduction under the capacity building and training programmes will yield both environmental and economic benefits, derived especially from improved preparedness and reduction in losses due to disaster impact.

The establishment of the Trust Fund and facilitating the access of community based organisation to resources for investment in the watersheds is designed as part of the sustainability feature. The intention is that these resources can be used to scale up implementation of the adaptation plans prepared for the communities.

6.3 Priority Sectors and Themes

Priority themes are aligned to and informed by National Outcome No. 14 (Hazard risk reduction and adaptation to climate change) Vision 2030 Jamaica–National Development Plan; the Second National Communication to the United Nations Framework Convention on Climate Change; the Draft Action Plan on Integrated Disaster Risk Reduction, and consensus arising from consultation with over 110 stakeholders across Jamaica. The GOJ is now seeking to develop and implement initiatives under five broad thematic areas in the proposed SPCR, namely:

a) Mainstreaming Climate Change into the government's planning and policy formulation processes

b) Strengthening institutional arrangements to ensure the effective mainstreaming of climate change

c) Building capacity for climate data management, forecasting and planning

d) Facilitating sectoral adaptation measures

e) Climate Change Education and Awareness.

The priority sectors for the application of these broad themes are:

a) Water Resources

b) Agriculture and Food Security

c) Tourism

d) Human Health

e) Human Settlements and Coastal Resources.

As shown in Figure 16, other sectors will be considered in the strategic programme to ensure its comprehensiveness. These include:

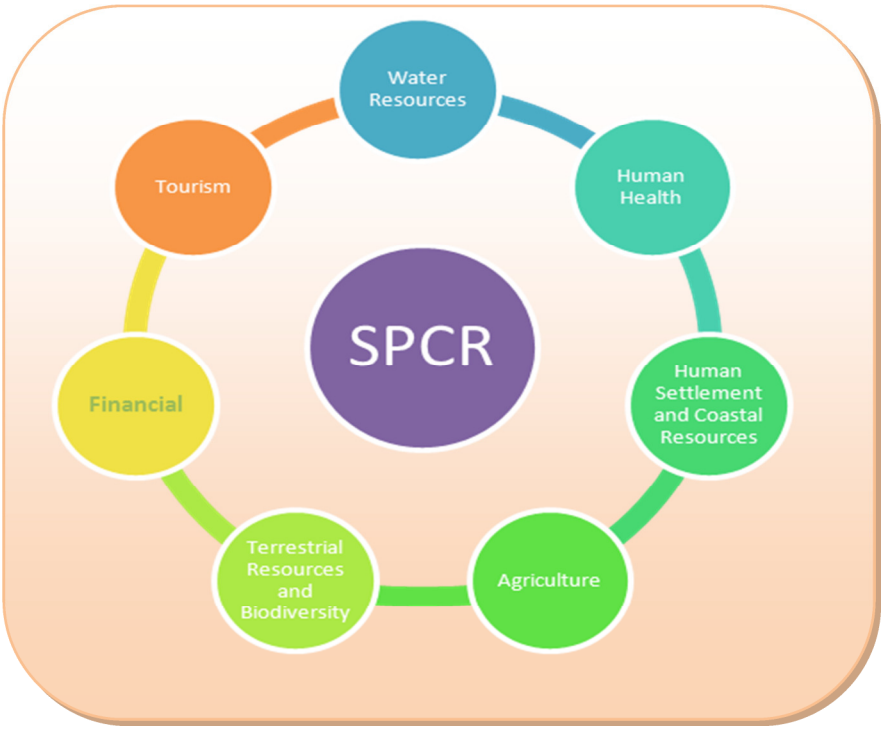
a) Terrestrial Resources and Terrestrial Biodiversity

b) Financial Sector – in relation to risk insurance and comprehensive risk assessment of projects to be financed.

6.4 Goal of the Strategic Programme for Climate Resilience

Enhanced resilience to the impacts of climate change at all levels within the country.

Figure 16: Jamaica's SPCR: Sectoral and Thematic Priorities



6.5 SPCR General Strategies

A number of general cross-cutting strategies will be pursued. These include:

- Producing improved climate change scenarios for Jamaica, by providing support to downscale regional models projections. This includes sector specific scenarios
- Development of the capacity of a range of professionals to interpret high resolution climate change scenarios and translating them into the various sectoral planning processes
- Developing mechanisms to bridge the gap between research and policy
- Reviewing all key government policies and plans (by sector) to ensure that they take full account of climate change and its impacts
- Mainstreaming climate change in national, sectoral and spatial development planning and ensuring that impacts on vulnerable groups and women are prioritized in plans
- Building the institutional capacity of key government ministries and agencies to take forward climate change adaptation
- Creating and introducing economic and financial market instruments for risk transfer
- Setting up mechanisms for inter-ministerial and inter-institutional coordination of climate change function/initiatives at various levels of the government, and for managing new adaptation and planned mitigation funds

6.6 SPCR Sectoral Strategies and Action Plan

Water Resources Strategies

- Model the likely hydrological impacts of climate change on the major water resource systems, to assess likely future system discharges and river levels in order to derive design criteria for flood protection embankments.
- Facilitate the development and use of micro-scale water harvesting technologies such as ponds, wells, roof collection systems, and land surface catchment systems to enhance the utilization of rainwater as a water resource in both urban and rural areas.
- Implement strategies and programmes for the effective management and efficient use of water (including reuse), in view of the anticipated impact of climate change on the water resources sector.
- Improve the management of watersheds through reforestation and other methods such as relocation of settlements to increase the resilience of the watersheds and reduce soil erosion.
- Expand basic hydrological data collection network; monitor quality and quantity of water and forecast future changes due to climate change.
- Address water storage and distribution needs to minimize impacts during periods of drought and promote the use of new storage modalities.

The priority short to medium-term strategic actions within the water resources sector will be centred on:

- Improving the data collection network and the system of monitoring water quantity and quality; improving predictions of the impact of climate change on the water resources sector and the mainstreaming of climate change consideration in sectoral plans and infrastructure designs
- The design and implementation of community education and awareness programmes for water resources protection, and water harvesting and conservation
- The establishment of water harvesting, conservation, storage and distribution systems to demonstrate adaptation strategies for meeting the agricultural and domestic need for water.

The strategic actions proposed in Table 13 will utilize information gained from pilot projects implemented in all three categories across the island, including the Voices for Climate Change Awareness Project and Promoting Rainwater Harvesting and Small Scale Irrigation in the South St. Elizabeth project. The PPCR will collaborate with the ongoing Climate Change Adaptation and Disaster Risk Reduction Programme with respect to the public awareness initiatives. The PPCR also proposes to be the main funder of the short-term strategic actions, with the expectation to facilitate improved public awareness and action, and the mainstreaming of climate change adaptation in development policies, regulations and plans governing the water resources sector.

Over the medium to long term it is proposed that much of the capital expenditure to implement water harvesting, storage and distribution systems will be made in vulnerable communities to

meet the needs of those which are likely to be most affected by the impacts of climate change. In the river basins targeted by this programme, an Artificial Aquifer Recharge project is proposed to be implemented with PPCR funding (a mixture of grant and loan financing). Additionally, reservoirs, and other water harvesting, storage and conservation initiatives will be financed by the PPCR in that area. This will complement work proposed under Jamaica's programme, to be financed by the Adaptation Fund. The objectives include to enhancing climate resilience in the agriculture sector by, among other things, establishing micro dams, rehabilitating reservoirs, implementation of water harvesting and a small-scale gravity-fed irrigation programme in select vulnerable communities. Other investments in infrastructure to benefit a wider cross section of vulnerable communities across the island will require funding from other sources.

Table 13: SPCR Strategic Action for Water Resource

Strategic Action	**Linked/Associated Programmes**	**Implementing Agencies**	**Funding Agencies**	**Time Frame**
Expand the hydrological data collection network and improve systems for monitoring quality and quantity of water and forecast changes due to climate change	Water Programme for Environmental sustainability Climate Change Modelling for Sea Level Rise on Water Resources in the Clarendon Plains	WRA, MHEW, NWC, NIC	WPA II –GOJ & Italian Ministry of Environment CCCCC	Short term
Develop and implement projects to address water storage and distribution needs, and promote the use of new storage modalities and strategies to minimize impact of anticipated changes	Concept- Artificial Aquifer Recharge Project for the Rio Minho Hydrologic Basin for PPCR consideration NWC/ IDB project	WRA, NIC, Rural Water	PPCR – CIF IDB	Short to medium term
Design and implement community education and awareness programmes for water resources protection, water harvesting and conservation; using demonstration projects, where feasible	Climate Change Adaptation and Disaster Risk Reduction Programme (2010-2013)	MHEW, WRA, NIC, RADA, NEPA	PPCR-CIF; EU, GOJ, UNEP	Short to medium term
Develop a flood master plan; develop and implement 'drought and flood strategies' in long-term hydrological basin plans. Incorporate climate change considerations in all water sector plans and policies		WRA, NIC, RADA, Meteorological Services		Medium to long term

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
Based on predicted scenarios for rainfall, identify areas where rainwater harvesting will be most feasible. Review and amend rainwater harvesting guidelines and modify building codes. Facilitate the development and use of micro- scale water harvesting technologies to enhance the use of rain water in urban and rural areas	Rain Water Harvesting Project (2010) Enhancing the resilience of the agriculture sector and coastal areas to protect livelihoods and improve food security (2012–2016)	WRA, NEPA, MHEW	GOJ PPCR-CIF Adaptation Fund	Medium to long term
Increase investment in micro-irrigation systems; and develop innovative mechanisms and give greater responsibility for the management of these systems to farmers and communities	Enhancing the resilience of the agriculture sector and coastal areas to protect livelihoods and improve food security (2012-2016)	NIC, MOAF, RADA	Adaptation Fund	Medium to long term

Agriculture and Food Security Strategies

- Develop climate resilient cropping systems with a focus on agricultural research (including soil research); to develop crop varieties, tolerant to flooding, drought and salinity, and based on indigenous and other varieties suited to the needs of resource poor farmers.
- Strengthen the pest management unit and the veterinary services to facilitate research into development of new or alternative pest management/health practices and techniques aimed at reducing the spread of diseases and losses of crop, livestock and fisheries, due to the impacts of climate change.
- Conduct vulnerability assessment for the fishing sector and develop appropriate adaptation strategies.
- Mainstream climate change adaptation strategies across all agricultural subsectors, including fisheries and horticulture.
- Enhance land husbandry programme to incorporate climate change adaptation.
- Strengthen the watershed management capabilities of service providers within the sector.
- Ensure that individuals within the sector are exposed to workshops, seminars etc., focusing on climate change and its potential impact to the sector, and adaptation strategies.
- Map areas baseline prone to various types of disasters associated with climate change.
- Update the Agricultural Disaster Risk Management plan to incorporate climate change adaptation and updated data.
- Use climate scenarios to guide the diversification/location of agricultural production.
- Identify the differentiated needs and vulnerabilities via gender mapping and other gender sensitive tools to guarantee the effectiveness of the strategic actions.

Table 14 provides details of the priority actions for this sector. Over the period, short to medium term, special attention will be given to activities focused on mainstreaming climate change adaptation concerns into all the significant development plans and policies within the agricultural sector. Attention will also be given to equipping the organizations with responsibility for policy formulation and regulation, with the required institutional capacity to do so. Emphasis will be placed on the education of key stakeholders, including subsistence and commercial farmers, professionals and students in the sector regarding current adaptation technologies and strategies, and how they may effectively implement these strategies. Demonstration plots, demonstration projects, and the creative sharing of lessons learnt by farmers, fishers etc., will be utilized in the education and communication processes. Added emphasis will be placed on engaging females, in education and adaptation initiatives, given their important roles in the sector and in households.

The funding of these activities during this phase will be primarily by the PPCR and the Climate Change Adaptation and Disaster Risk Reduction project (CCADRRP), funded by the EU/UNEP/GOJ. Both programmes have components focusing on mainstreaming climate change concerns into sectoral policies and plans, climate change capacity building and awareness raising.

Strategic actions related to the development and implementation of climate change adaptation strategies for the agricultural sector will be implemented over the medium to long term. These actions include research into the use of climate change resilient cropping systems and food crop varieties, as well as the control of pests whose life cycle would have been significantly impacted by climate change. Some PPCR funding is expected to be utilized to demonstrate proven adaptation strategies for the agricultural sector. This is an area where significant additional technical assistance and funding is required.

Table 14: Strategic Actions for Agriculture and Food Security

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
Assess the predicted impacts of CC on the agricultural sector & mainstream climate change considerations in agricultural plans and policies	Climate Change Adaptation and Disaster Risk Reduction Programme (2010–2013)	PIOJ, Cabinet Office, MOAF, RADA, ODPEM, Local Authorities	PPCR-CIF: EU/UNEP/ GOJ	Short term (0–2 years)
Develop and implement integrated, sustainable and coordinated public awareness and education programmes relating to the impacts of CC on terrestrial resources including biodiversity and agriculture, for men & women	Climate Change Adaptation and Disaster Risk Reduction Programme (2010-2013)	MOA, MHEW, PANOS; NEEC, RADA	PPCR-CIF; EU-UNEP, GOJ	Short to medium term
Develop and implement CC adaptation strategies for the agricultural sector	Improving Jamaica's Agricultural Productivity (2009–2011; funded by CIDA); Assistance to improve Local Agricultural Emergency Preparedness in Caribbean Countries. (completed in 2008) Jamaican Adaptive Agriculture Program (2010–2013: Marketing and Agriculture for Jamaican Improved Competitiveness	MOAF, RADA, WRA, MET, CARDI	PPCR-CIF; USAID FAO USAID	Medium to long Term (3–5 Years medium)
Support the development of research capacity: a) Develop climate resilient cropping systems with focus on developing varieties tolerant of flooding, drought & salinity and suited for resource poor farmers. b) Facilitate research into reducing the population of pests, the spread of diseases, the loss of crops, livestock, and fisheries due to CC impacts.		MOA, RADA, CARDI		Long term (Over 5 years)

Human Settlement and Coastal and Marine Resources Strategies

- Implement structural and non-structural physical planning strategies for adapting to climate change.
- Enforce modern building codes and the use of modern coastal engineering technologies.
- Develop and implement integrated coastal management plans which incorporate climate change adaptation and risk reduction strategies.
- Integrate regional disaster mitigation strategies with national physical planning.
- Identify and declare "No build/settlement" zones.
- Implement wetland ecosystem management.
- Construct groynes, sea walls, revetments and breakwaters to protect against storm surges and coastal erosion.
- Expand a 'greenbelt' coastal afforestation programme with mangrove planting along the shoreline of all the major coasts in Jamaica.
- Implement beach nourishment initiatives and appropriate coastal infrastructure, to protect natural and manmade assets.
- Use market-based incentives to promote sustainable economic development; eliminate subsidies and incentives that continue to promote development in fragile and hazardous coastal areas.
- Increase the provision of human, financial and other planning resources and materials, so as to strengthen national and local planning and regulatory capacities.
- Increase citizen/community participation in the local and national planning process.
- Identify and facilitate the implementation of interventions to increase the resilience of poor and vulnerable households, especially female headed households, to climate change.
- Long-term plans for the relocation of vulnerable communities.

The main thrust of the SPCR over the short to medium term will be to focus on:

- Identifying vulnerable communities and providing the leadership to develop and implement climate change; adaptation initiatives
- Initiating discussions on adaptation strategies
- Integrating climate change concerns in risk reduction strategies, parish development plans and development planning generally
- Strengthening the legislative framework and general institutional capacity for marine and coastal resources management

- The collection and analysis of data on coastal resources to determine vulnerability and guide development of management plans
- The development and implementation of a comprehensive education programme.

A significant component of these activities is proposed to be funded by the PPCR (Table 15), with support from the CCADRRP. The latter will contribute more to the increased resilience of selected coastal areas against potential climate change impacts and climate change capacity building and awareness building.

Over the medium to long term, substantial resources will be required to build the physical infrastructure required to mitigate beach erosion, to stabilise shorelines, protect against storm surges, minimize coastal flooding, etc. Most of the funding required for these initiatives will be secured through co-financing. Some resources are expected, from a proposal to the Adaptation Fund, for restoration works to assist in mitigating beach erosion in Negril. The strategic actions for the coastal and marine resources are outlined in Table 16.

Table 15: SPCR Strategic Actions for Human Settlement

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
Identify settlements vulnerable to the impacts of climate change Declare 'no settlement zones'	Building Disaster Resilient Communities Project (2008–2011)	ODPEM, NEPA, Parish Councils, MHEW	CIDA	Short term
Provide leadership in developing and implementing climate change adaptation strategies for the most vulnerable households, and communities	Building Disaster Resilient Communities Project (2008–2011). Risk and Vulnerability Assessment Methodology Development Project (Completed)	ODPEM, NEPA, Local Planning Authorities, UTECH	CIDA UNEP	Medium to-long term
Develop and implement sustainable public awareness and education programmes addressing risks to human settlements	Climate Change Adaptation & Disaster Risk Reduction (2010–2013)	UTech, MSJ, OPM, Information Portfolio	PPCR-CIF; EU, GOJ, UNEP	Short to medium term
Integrate climate change adaptation and risk reduction strategies in parish development plans and encourage compliance	Coastal Multi-Hazard Mapping & Vulnerability Assessment towards integrated planning & Reduction of Vulnerability (2010–2011)	PIOJ, NEPA, Local Government Dept., Parish Council	PPCR-CIF World Bank-GFDRR	Medium term

Table 16: SPCR Strategic Actions for Coastal and Marine Resources

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
Improve the existing systems for collecting data and monitoring coastal and/or marine resources for climate change impacts		NEPA, Fisheries Department, Centre for Marine Sc.(CMS)-UWI, MOH		Short to medium term
Identify a Unit to coordinate activities relating to monitoring and data collecting including climate projections		NEPA, MOA-Fisheries, MHEW, MET, CSG-UWI		Short to medium Term
Review and update existing institutional and legislative frameworks relating to marine and coastal resources management	Risk and Vulnerability Assessment Methodology Development Project (Completed)	Attorney General's Dept., relevant ministries and agencies	PPCR-CIF UNEP	Short to medium term
Develop and implement an integrated, sustainable and coordinated programme for educating the Jamaican public; improving awareness on the management of coastal and marine resources and implications of climate change	Climate Change Adaptation and Disaster Risk Reduction Project (2010–2013)	NEPA, Fisheries, MHEW	PPCR-CIF; GOJ/EU/ UNEP	Short to medium term
Conduct vulnerability assessment for the fisheries sector and integrate climate change adaptation and risk reduction strategies in fisheries plans as well as the integrated coastal management plans	Natural Hazard Management in Urban Coastal Areas (Mar. 2008–2011)	MOA, NEPA, Parish Councils, Fisheries Division	PPCR-CIF IDB	Short to medium term
Conduct islandwide analysis of shoreline stability – to assess vulnerability to coastal erosion and make recommendations in light of predicted climate scenarios, for corrective measures		NEPA, UWI- CMS, Geology & Geography Dept.	PPCR-CIF	Short to medium term
Examine the parameters that influence beach formation and transgression at sites around Jamaica, and develop a methodology to aid in forecasting beach destruction,		NEPA, UWI- CMS, Geology & Geography Department	PPCR-CIF	Short to medium term

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
given predicted climate changes				
Construct groynes, sea walls, revetments, breakwaters, and other appropriate coastal engineering structures to protect against storm surges, and to protect and preserve beaches, and other economic infrastructure	Palisadoes Peninsular Shoreline Protection and Rehabilitation (2010–2012) Enhancing the resilience of the agriculture sector and coastal areas to protect livelihoods and improve food security (2012–2016)	NWA, NEPA, MHEW	China EXIM Bank Adaptation Fund	Medium to long term

Terrestrial Resources and Terrestrial Biodiversity Strategies

- Promote better understanding of the linkage between climate change and natural resource management in relevant institutions.
- Implement integrated sustainable land management measures and strengthen existing soil conservation practices.
- Upgrade/expand protected areas to increase the resilience of terrestrial resources.
- Expand 'greenbelt' coastal afforestation programme and ensure proper management.
- Develop and implement a comprehensive management plan for land use that incorporates climate change concerns, the suitable location of settlements, urban development with adequate supplies of water and other required amenities.
- Develop climate change scenarios for the forestry sector, and incorporate adaptation strategies for climate change into the forestry management plan.
- Develop strict zoning standards and enforcement of land use planning standards such as coastal setback distances.
- Conduct islandwide analysis of shoreline stability and develop corrective measures to arrest coastal erosion.

This component of the SPCR will, over the short to medium term, focus on mainstreaming climate change concerns in plans and policies which guide and regulate the management and use of terrestrial resources. These activities, as well as public awareness and education initiatives, will be largely financed by the PPCR and the Climate Change Adaptation and Hazard Risk Reduction projects. The restoration of degraded ecosystems and the establishment of mechanisms to ensure effective management of the terrestrial resources are medium to long-term activities which will be affected through increased awareness and action by resource users,

and commitment of resources on an ongoing basis. Other locally based funding agencies such as the Forest Conservation Fund, the Environmental Foundation of Jamaica and the GEF Small Grants Programme are expected to play significant roles in facilitating the implementation of some of these actions as outlined in Table 17.

Table 17: **SPCR Strategic Actions for Terrestrial Resources and Terrestrial Biodiversity**

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
Establish or improve systems for monitoring and research of terrestrial processes and predicting of CC impacts		MOA, NEPA, CARDI, IICA		Short term
Establish conservation and protected areas and ensure mechanisms are in place to enable effective management		NEPA, MHEW,		Medium to long term
Implement integrated sustainable land management measures and strengthen existing soil conservation practices	Climate Change Adaptation: Disaster Risk Management in Cedar Valley, St. Thomas Climate Change Adaptation and Disaster Risk Reduction Project (2010–2013) Capacity Building for Sustainable Land Management in Jamaica (2010–2012)	RADA, MOAF, Forestry Dept., NEPA	PPCR- CIF; USAID; GOJ,JCDT GOJ/EU/ UNEP GEF, UNDP, JCDT	Medium to long term
Restore degraded ecosystems; including the planting of mangrove along sections of the shoreline, as necessary	Climate Change Adaptation and Disaster Risk Reduction Project (2010-2013 – funded by GOJ/EU/UNEP)	NEPA, Forestry Department, CBOs, NGOs, MOA	GOJ, EU, UNEP	Long term
Use consultative strategies to manage existing systems		Forestry Dept., NEPA CBOs, NGOs		Medium to long term
Develop a comprehensive National Land Use Management Plan which incorporates climate change concerns		MOA	PPCR-CIF	Short term
Develop and implement a formal mechanism to allow CC considerations to be included into policies and plans – including Forestry Action Plans	Climate Change Adaptation and Disaster Risk Reduction Project (2010–013) Capacity Building for Sustainable Land Management in Jamaica	PIOJ, MHEW, Cabinet Office	PPCR- CIF GOJ, EU, UNEP GEF, UNDP, JCDT	Short term

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
	(2010–2012) Update of Forestry Policy		FAO	
Integrate climate change considerations into spatial planning (zoning) and land use processes	Enhancing the resilience of the agriculture sector and coastal areas to protect livelihoods and improve food security (2012–2016)	MOA, MSJ	PPCR-CIF Adaptation Fund	Short term
Develop and implement a sustainable and integrated training and sensitization programme in land management for community groups and other key stakeholders	Capacity Building for Sustainable Land Management in Jamaica (2010–2012)	Forestry Department, RADA	GEF, UNDP, JCDT	Shortterm

Tourism Strategies

- Develop integrated strategic plans that incorporate climate change considerations and appropriate measures such as water conservation, coastal protection and disaster risk management.
- Make mandatory the need for large-scale hotels to develop and implement rainwater harvesting, resource and waste management, and disaster risk management plans.
- Facilitate workshops, seminars and training sessions on climate change to raise awareness in the sector, and train persons in implementing adaptation responses for the risks identified.
- Encourage financial institutions to consider climate change impacts in credit risk and project finance assessments.
- Encourage adjustment of insurance premiums for players in the industry who adhere to building and land use planning standards, environmental regulations and standards and other regulatory measures applicable to the sector.
- Strengthen land use planning and land use and environmental laws and review them periodically.

The primary strategic focus of the SPCR for the Tourism sector is to sensitize the key players in the sector, as well as local development authorities and the general public to the current and anticipated impacts of climate change and the appropriate adaptation strategies to be adopted. Of equal importance is the mainstreaming of climate change concerns in tourism sector plans,

policies and regulations. These will be the focus of the PPCR project, with significant support expected from the Climate Change Adaptation and Disaster Risk Reduction project (Table 18).

Long-term initiatives, such as funding for businesses in the tourism sector to implement adaptation strategies, will be needed. Most likely, this will be in the form of loans through local development banks, or directly from the private sector financing arm of the multilateral development banks.

Table 18: SPCR Strategic Actions for Tourism

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
Sensitize the key stakeholders in the tourism industry of the effects of CC in the language they understand	Climate Change Adaptation and Disaster Risk Reduction Project (2010–2013)	MOT, TPDCo, JHTA, Insurance Industry	GOJ/EU/ UNEP	Medium to long term
Develop and implement integrated, sustainable and coordinated public awareness and education programmes relating to the impacts of CC on the tourism sector	Climate Change Adaptation and Disaster Risk Reduction Project (2010–2013)	MOT, MHEW	PPCR-CIF; GOJ/EU/ UNEP	Long term
Mainstream climate change considerations in tourism sector strategic plans and policies, for example, in comprehensive resort upgrading plans	Caribbean Climate Change Tourism & Livelihoods: A Sectoral Approach to Vulnerability and Resilience	PIOJ, MHEW Cabinet Office, MOT, TPDCo., Tourism Enhancement Fund	FCO CCCCC OUCE PPCR-CIF; EU, UNEP, GOJ	Short term
Enforce physical planning guidelines such as coastal setbacks for all new tourism developments	Enhancing the resilience of the agriculture sector and coastal areas to protect livelihoods and improve food security (2012–2016)	NEPA, Parish Council	Adaptation Fund	Short to medium term
Implement adaptation strategies by hoteliers and other players in the tourism sector		NEPA, MOT Private Sector Organizations		Medium to long term
Sensitize banking and other financial institutions to include sectoral climate change scenarios in evaluation of credit risks		PIOJ, Environmental Management Division	PPCR- CIF	Short to medium term

Human Health Strategies

- Research the impact of climate change on health (including the incidence of malaria, dengue, diarrhoeal diseases, and heatstroke) and the cost to society of increased mortality, morbidity and consequent fall in productivity.
- Develop adaptive strategies against outbreaks of malaria, dengue and other vector-borne diseases and invest in preventive and curative measures and facilities
- Develop adaptive strategies against diarrhoeal and other diseases, which may increase due to climate change, and invest in preventive and curative measures and facilities
- Promote and foster development in the capacity of the relevant institutions to better understand how climate change impacts human health, through exposure of personnel to workshops and seminars dealing with comprehensive assessments of climate change impacts on human health
- In collaboration with WHO/PAHO, sensitize and educate health personnel and the public about climate change related health matters
- Implement initiatives to ensure that health facilities are resilient to the impacts of climate change.

This sector of the SPCR will over the short to medium term focus on:

- Mainstreaming climate change concerns in the health sector plans and policies
- Educating health professionals on the potential impact of climate change and appropriate adaptation strategies in collaboration with Pan American Health Organization /World Health Organization (PAHO /WHO)
- Developing and implementing public awareness and education programmes relating to the impacts of CC on human health
- Conducting assessment of critical health facilities to determine vulnerability to extreme weather events and develop and cost a plan of action for making facilities resilient
- Development of a business continuity plan for the health sector.

These activities will be implemented largely with funding from PPCR. Over the medium to long term, the following strategic actions will be executed:

- Development of an early warning system for dengue, air and water-borne diseases and other climate-sensitive illnesses
- Implementation of plans to make health facilities climate resilient
- Incorporate activities to reflect priorities of relevant regional health organizations.

The Caribbean Regional Track of the PPCR is expected to finance the implementation of a regional dengue early warning system. Additional funding will therefore be required to

implement plans to make the key health facilities climate resilient. The strategic actions for the human health sector are outlined in Table 19.

Table 19: SPCR Strategic Actions for Human Health

Strategic Action	Implementing Agencies	Funding Agencies	Time Frame
Update national health plans and policies, and fully integrate climate change concerns.	MOH, PIOJ, MHEW, Public Health Department	PPCR, EU, UNEP, GOJ	Short term
Educate health professionals on the predicted impacts of climate change on the health sector and appropriate adaptation strategies.	MOH, UWI, MSJ, OPM	PPCR-CIF	Medium term
Develop and implement sustainable public awareness and education programmes relating to the impacts of CC on human health	MOH, MET, MHEW	PPCR, EU, UNEP, GOJ	Short to medium term
Develop a proactive early warning system for dengue and other illnesses impacted by climate change in collaboration with CEHI	MOH, UWI-Climate Studies Group; CEHI	PPCR-local & regional	Medium term
Develop climate resilient health facilities — conduct vulnerability assessment of critical facilities to determine vulnerability to extreme weather; ascertain the cost of the adaptation measures; and implement plans to make health facilities climate resilient	MOH, MOF	PPCR-CIF	Medium to long term
Develop a business continuity plan for the health sector	MOH, MOF	PPCR-CIF	Medium to long term

Data Management and Risk Information Strategies

- Updating and improving national and sectoral climate scenario modelling for Jamaica to provide more realistic projections of future climate conditions.
- Developing methodologies and guidelines for different sectors in how to interpret the available climate data and scenarios and to translate the scientific data into information and design standards for sectoral and project planning and practice.
- Developing the capacity of a range of professionals in interpreting high resolution climate change scenarios and translating them into the different sectoral planning processes and design standards.
- The strengthening of the capacity of the Meteorological Service to collect and analyse required weather data, and forecast the weather.
- The strengthening or establishment of cyclone, storm surge and flood early warning systems to enable more accurate short, medium and long-term forecasts.

While the PPCR at both the national and regional level is expected to play the lead role in financing these initiatives, ongoing operational funding from the GOJ will be used to supplement the activities necessary to operate and maintain the data management systems (Table 20).

Table 20: SPCR Strategic Actions for Data Management and Risk Information

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
Strengthen the capacity of the Meteorological Service to collect required weather data; to analyse data, and to forecast the weather		MSJ	PPCR-CIF	Medium to long term
Establish Sea Level Gauge Network to secure reliable data on the changes in sea level etc.		NEPA, UWI- CMS, MSJ	Regional PPCR-CIF	Short to Medium term
Develop climate change scenarios for Jamaica, with focus on identified priority sectors		UWI Physics Dept-Climate Studies Group, MSJ	PPCR-Regional	Medium to long term
Develop a comprehensive climate-risk information framework based on national and sectoral climate scenarios developed and risks identified	Hazard Mapping Disaster Vulnerability and Risk Assessment (2009-2011) Coastal Multi hazard Mapping & Vulnerability Assessment towards Integrated planning and Reduction of Vulnerability for 3 communities in	MOAF, ODPEM, WRA	PPCR –CIF (for initial phase) World Bank IDB, WB	Short to medium term

Strategic Action	Linked/Associated Programmes	Implementing Agencies	Funding Agencies	Time Frame
	Jamaica (2008–2010)			
Strengthen or establish cyclone, storm surge and flood early warning systems to enable more accurate short, medium and long-term forecasts		Met. Service Jamaica, WRA, NEPA		Short to medium
Implement improved methods of disseminating information to the general public		MSJ UWI-CSG PANOS NEEC		Short to medium term

Given the challenges and constraints currently being faced, there is an urgent need to:

- Compile comprehensive vulnerability/risk information for each priority sector based on the climate scenarios developed
- Mainstream climate change considerations into all the sectoral, disaster risk management plans, local development plans, as well as policies and regulation
- Develop the capacity in public and private sector organizations for mainstreaming climate change and develop and implement adaptation projects and programme
- Build the level of public awareness of the impacts of climate change and encourage appropriate actions
- Demonstrate climate change adaptation strategies appropriate for individuals, communities, businesses, other organizations and at the sectoral level
- Strengthen the climate data collection and management systems and the organizations with responsibilities in these areas.

These activities and those closely related will be the focus of attention over the next five years, that is, the short to medium term. PPCR funding will be focused mainly on these activities. The major physical infrastructure activities will be implemented over the medium to long term, and other financing will be sought for those purposes.

Complementary Initiatives

A number of climate change and disaster risk reduction projects are currently being implemented or will shortly commence implementation, both locally and regionally. Many of the activities complement initiatives proposed for funding under the PPCR, or provide the

opportunity to build on work being done. Every effort will therefore be made to work closely with project implementation teams to strengthen collaboration, avoid duplication and maximize efficiency and effectiveness in the utilization of resources. The most significant projects are listed in Table 21.

Table 21: Complementary Climate Change and Disaster Risk Reduction Projects

Title & Funding Source	Objective/Summary Activities	Linkage
Climate Change Adaptation and Disaster Risk Reduction (EU)	The project seeks to: rehabilitate and improve management of selected watersheds to reduce downstream run-off and associated pollution and health risks; restore and protect coastal ecosystems to enhance natural buffers and increase resilience; integrate climate change mitigation and adaptation into relevant national policies and plans and enhance institutional capacity and facilitate awareness building amongst Jamaica's population to better adapt to climate change	Facilitating policy mainstreaming while PPCR to focus on mainstreaming at the sectoral and planning levels Learning from watershed management interventions to be applied in IP2 Implement complementary elements of public education and awareness building
Jamaican Adaptive Agriculture Program (USAID)	The goal is to increase the adaptive capacity of Jamaican farmers and fishers to respond to climate change while developing a resilient and sustainable form of agriculture-based micro enterprise and providing economic opportunities for youths. The programme will introduce aquaponics/fish farming and hydroponics (soil-less crop production) at 5 schools and 20 small farms and fishing communities (2010–2013)	PPCR to learn from adaptive agriculture component
Capacity Building for Sustainable Land Management in Jamaica (GEF)	To enhance 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	Will contribute to PPCR objectives in demonstrating good land management practices
Hazard Mapping, Disaster Vulnerability & Risk Assessment: Caribbean Risk Atlas (World Bank)	The two main components of the project are: a) A regional Risk Atlas that contains spatial data on risk from hurricanes and earthquake in the Caribbean and b) High Resolution risk maps for selected territories within the Caribbean. The project will also carry out training courses and workshops for professionals employed in the field	To feed into the development of the PPCR Risk Information Platform
Enhancing the resilience of the Agriculture sector and coastal areas to protect livelihoods and improve food security (Adaptation Fund Project Concept)	To protect livelihoods and food security in vulnerable communities by: improving land and water management for the gricultural sector; strengthening coastal protection; and building institutional and local capacity against climate change risks. The three main components of this project are: a) Increasing the climate resilience of the Negril coastline; b) enhancing the climate resilience of the agricultural sector by improving water and land management in select communities; c) Improving institutional and local level capacity for	Both programmes address strategic priorities of the Agriculture Sector Plan, addressing climate risks for agriculture, the water sector and land management in contiguous areas within high priority watersheds allow for

Title & Funding Source	Objective/Summary Activities	Linkage
	sustainable management of natural resources and in disaster risk reduction in the targeted vulnerable areas	leveraging and optimizing the use of resources
EU Project — Support to the Global Climate Change Alliance (GCCA) under the 10th EDF Intra-ACP financial framework	The objective of the project is to enhance local, national and regional capacities and resilience in ways that link sustainable development, risk management, and adaptation for a win-win-win situation. The main components of the project include: Refining vulnerability and risk assessment methodologies of specific states and communities within those states; reducing the states' vulnerability to climate change through embarking on adaptation pilots; improving Climate Monitoring, Data Retrieval and Space-based tools for Disaster Risk Reduction	Support climate data and information management objectives of the PPCR
Building Disaster Resilient Communities Project (CIDA)	Support the establishment of disaster resilient communities, empowered to minimize the impact of natural and man-made disasters on men and women on a sustainable basis, through effective Community Emergency Response Teams (CERTs)	Will build capacity at the community level
Crop Suitability Modelling for Future Climates University of the West Indies – Geography & Geology Department	The project estimates the effect on crop production and farmers' income of climate variability using crop suitability modelling	Complements the use of climate scenarios in IP2, output can be used to inform crop choice in project area

6.7 SPCR Priority Areas for Investment

Of the range of actions proposed for implementation under the SPCR, the most critical may be summarised as:

- Updating and improving climate scenarios for Jamaica to provide descriptions of future climate conditions, by supporting the downscaling of regional model projections
- Compiling comprehensive vulnerability/risk information for each priority sector, based on climate scenarios developed
- Mainstreaming climate change considerations into all the sectoral, disaster risk management plans, local development plans, as well as the policies and regulations
- Developing the capacity in public and private sector organizations for mainstreaming climate change and developing and implementing adaptation programmes and projects
- Building the level of public awareness of the impacts of climate change and encouraging appropriate actions from the various segments of the population

- Demonstrating climate change adaptation strategies appropriate for individuals, communities, women, farmers, fishers, businesses and other organizations, as well as at the sectoral level
- Strengthening the climate data collection and management systems and the organizations with responsibilities in these areas.

These key initiatives are condensed into three priority Investment Programmes for PPCR funding, namely:

- Improving Climate Data & Information Management
- Integrating adaptation into sectoral plans and selected river basin planning & management
- Sustainable financing mechanisms for adaptation initiatives by private sector and community based organizations

The SPCR is aligned to the country's overall development framework (Figure 17).

Figure 17: Linkages with Existing Climate Change Planning Framework

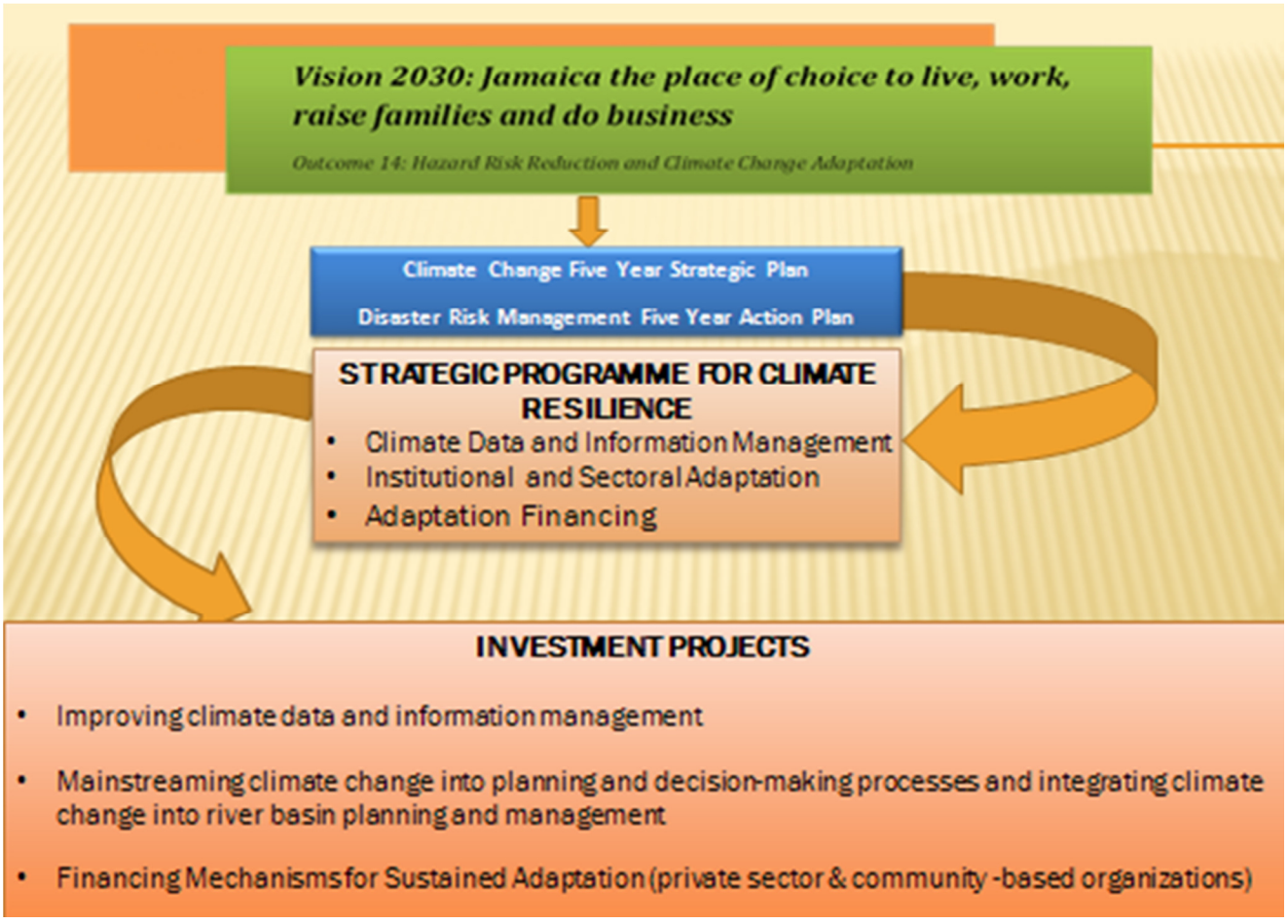


Figure 18 provides a summary of the programme intervention logic. The underlying logic of these investment programmes is that Investment 1 will support the data collection and modelling exercises to produce the climate predictions which will enable more realistic vulnerability assessments of the priority sectors. It will also develop methodologies and train personnel in interpreting high resolution climate change scenarios and translating them into sectoral planning; as well as building awareness of the likely impacts of climate change. This information will then be used to inform Investment Programme 2 – which will establish a coherent and multi-sectoral institutional framework for addressing climate change issues in Jamaica; use the information generated in Investment Programme 1 to mainstream climate change into development plans; and design and implement integrated climate change adaptation strategies for the priority sectors in the targeted project area. This project area (Upper Manchester, North West Clarendon, Southern Trelawny and South West St. Ann) was selected because of its vulnerability, its productivity and the likely significant impact of climate change on communities, livelihoods as well as on the priority sectors.

Investment 3 focuses on institutionalising mechanisms for the sustained financing of climate change adaptation initiatives by the private sector, NGOs and community based organizations.

The impact of the SPCR should be realized at the national, sectoral and local levels (Figure 19).

Figure 18: Programme Intervention Logic

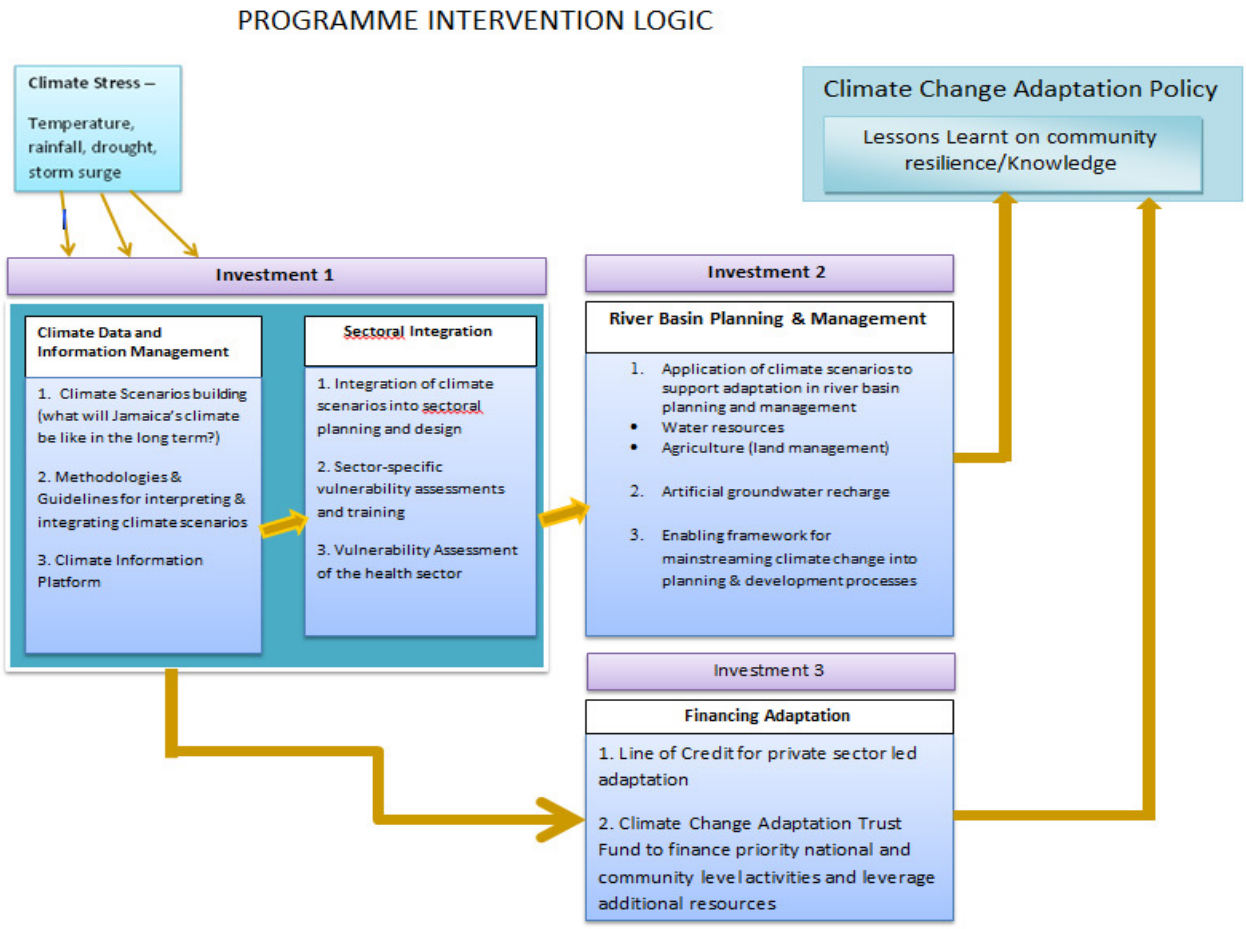
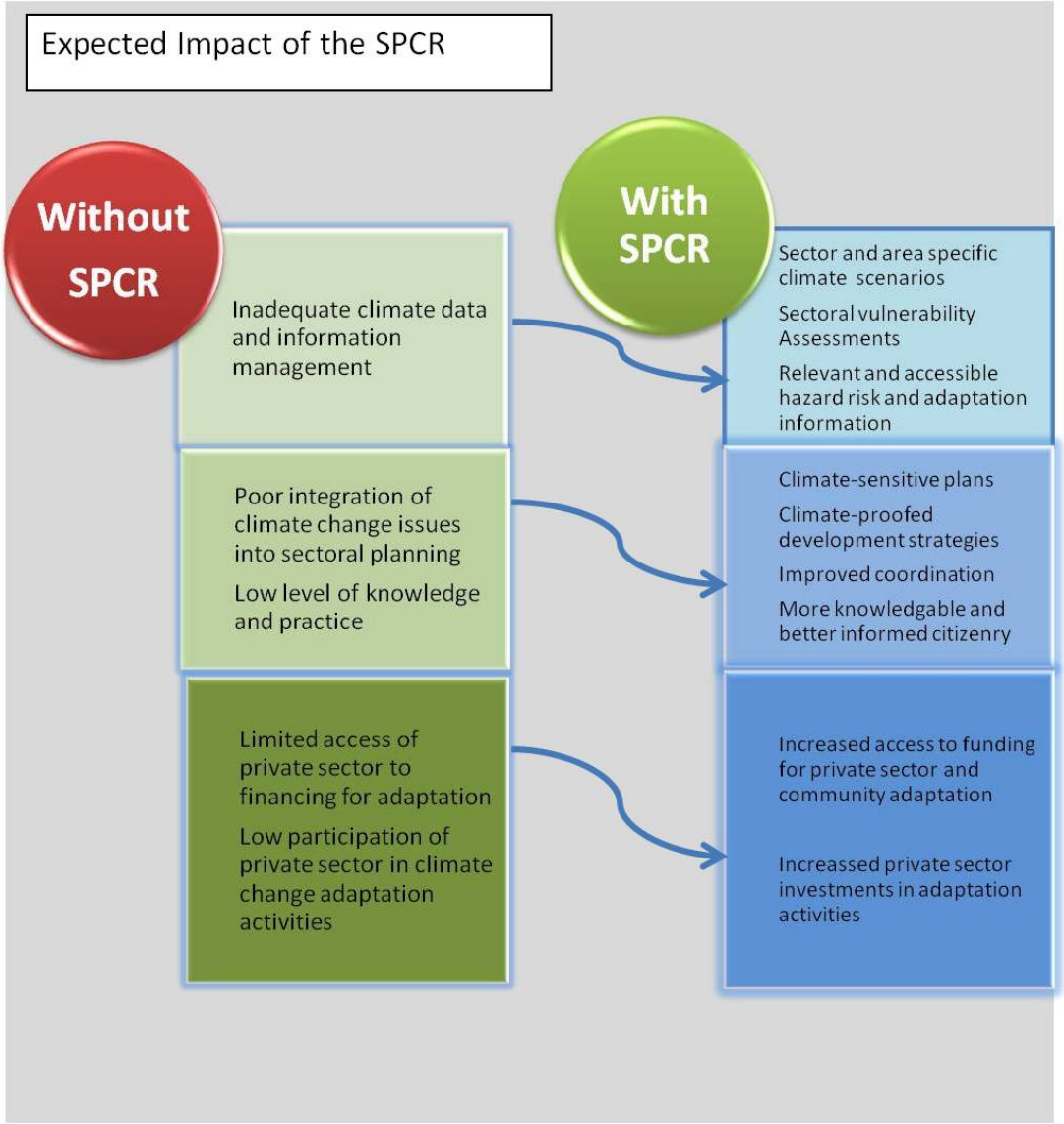


Figure 19: Expected Impact of the SPCR



Grant funding estimated at US$15.0 million, and loan funding of US$10.0 million will be required to implement these programmes. A brief summary of these are outlined in Tables 22 to 24.

Table 22: Investment Project 1

Investment Project 1	Climate Data & Information Management	Financing
GOAL	Improved quality climate information for effective planning and action at local and national levels.	
OBJECTIVES	Strengthen Jamaica's meteorological observation and data collection systems to enhance climate monitoring, weather forecasting and early warning systems.	
	Enable effective planning and design of adaptation initiatives, through access to climate change scenarios specific to Jamaica, including scenarios for priority sectors.	
	Use climate scenarios generated to assess the expected consequences of climate change for each priority sector and utilize assessments to develop sector-based methodologies for climate resilient planning and decision making.	
	Conduct detailed vulnerability assessment of the health sector to generate information needed to improve resilience of the health sector by climate proofing health care facilities.	
	Improve knowledge, attitudes and practice of the Jamaican public towards climate.	
1.	Upgrading of the data collection and processing and forecasting system of the Meteorological Services: Upgrade the data gathering network /infrastructure of the Met. Service Jamaica and the production of weather monitoring products in response to needs expressed by climate data users.	**Grant $2.3m**
2.	Development of CC Scenarios: Update and improve climate scenarios for Jamaica by supporting the downscaling of regional models projections. This activity will be implemented in collaboration with the Regional SPCR. Methodologies will then be developed and mechanisms instituted to train personnel in interpreting high resolution climate change scenarios and translating them into the different sectoral planning processes.	**Grant $0.8m**
3.	Vulnerability Assessments and Risk Information Platform: Conduct specialized vulnerability assessments using climate scenarios generated to assess the expected consequences of climate change for each priority sector. A detailed vulnerability assessment of the health sector will be conducted. A costed plan of action will also be developed outlining the actions necessary to make the key health facilities climate resilient. Low cost but critical actions to enhance resilience in pilot facilities will be implemented. Develop risk information platform	**Grant $0.5m** **Grant $1.2m**

Investment Project 1	Climate Data & Information Management	Financing
		Grant $0.3m
4.	CC Education & Awareness: This component seeks to establish mechanisms for local and national access to, and for dissemination of climate information; and the implementation of a comprehensive public awareness and education programme. The awareness programme will use proven innovative approaches including the use of demonstration projects, and the creative arts.	**Grant $1.0m**
5.	Programme Management, Monitoring, Evaluation and Auditing	**Grant $ 0.7m**
	Programme Preparation Grant	**Grant $0.3m**
		Grant$7.1.m
TOTAL COSTS OUTCOMES	More accurate predictions and early warning of extreme weather events	
	Increased capacity to interpret climate change scenarios and translate them into the sectoral planning processes	
	Improved understanding of the vulnerability of health facilities and the cost of making them climate resilient	
	Increased awareness of the impacts of climate change and adoption of initiatives to improve resilience	

Table 23: Investment Project 2

Investment Project 2	Institutional Mainstreaming and Sectoral Adaptation	Financing
GOAL	CC mainstreamed into development plans and planning processes; and increased adaptation to the impacts of climate change by stakeholders in vulnerable sections of the Rio Bueno and Rio Minho river basins.	
OBJECTIVES 1.	Create an enabling framework for mainstreaming climate change adaptation at the local and national levels.	
2.	Characterize the project area using baseline data and develop vulnerability assessments and adaptation plans for the prioritized sectors, the infrastructure and vulnerable communities in the project area.	
3.	Develop and implement integrated adaptation strategies to address the anticipated impacts of climate change in the project area	
COMPONENTS **1.**	The enabling framework for mainstreaming climate change adaptation in local, spatial, sectoral and national planning processes will be created by: Establishing a coherent and multi-sectoral institutional framework for addressing climate change issues in an efficient and effective manner	**Grant $1.5m**

Investment Project 2	Institutional Mainstreaming and Sectoral Adaptation	Financing
	Utilizing methodologies developed under Investment 1 to mainstream climate change in development planning processes, as well as local, sectoral and national plans. This includes incorporating climate change considerations in investment and infrastructure design standards. Utilizing climate scenarios developed, and based on expected climate change impacts; assist in the mainstreaming of climate change in development policies, regulations and legislation. The EU/UNEP/GOJ Adaptation and Risk Reduction project will play the lead role in this area	
2.	The project area will be characterized, using available baseline data. Vulnerability assessments of the prioritized sectors in the project area (the priority sectors are water resources, agriculture & food security, and land use and environmental management) will be developed, based on the scenarios produced in Investment I. Adaptation plans for the prioritized sectors, the infrastructure and the vulnerable communities in the project area will then be developed	**Grant $0.5m**
3.	Implement the adaptation options formulated. The likely adaptation options, subject to feasibility assessments, include: Water Harvesting & Management – Reservoirs, mini-dams, rehabilitation /construction of water tanks and gravity drip systems Pilot a managed artificial recharge scheme within the Rio Minho hydrologic basin to address the anticipated deficit as of 2015, in water quantity and quality in the river basin, based on projected demand. This deficit is accentuated by the impacts of climate change. The grant component of US$1.0 million will be spent on feasibility studies and the loan of US$3.6 million on civil work and operation of the project's pre-construction actions. Sustainable Land Management – Facilitate sustainable farming in a selected watershed through adoption of appropriate land husbandry measures, including soil conservation methods and reforestation measures Agricultural risk Management–Climate change risk management strategies for the agricultural and agro-processing sectors in the project area will be adapted. Emphasis will be placed on addressing challenges faced by women, youth and persons with disabilities	**Grant $2.0m** **Grant $1.0m** **Loan $3.6m** **Grant $1.0m** **Grant $1.0m**
4.	Programme Management, Monitoring, Evaluation and Auditing	**Grant $0.7m**
TOTAL COSTS		**Loan $3.6m** **Grant $7.7m**
OUTCOMES	Climate change considerations fully incorporated in development plans and the development planning processes	

Investment Project 2	Institutional Mainstreaming and Sectoral Adaptation	Financing
	Climate resilient river basin planning and management	
	Reduction in losses suffered by farmers and vulnerable groups due the impacts of climate change	
	Increased stocks and improved quality of groundwater in the Rio Minho hydrological basin	
	Enhanced learning and knowledge sharing on integration of climate resilience into development, at the national and regional levels	
	Improved water use efficiency	

Table 24: Investment Project 3

Component 3	Climate Adaptation and Disaster Risk Reduction Financing	
GOAL	Institutionalise mechanisms for financing climate change adaptation and disaster risk reduction initiatives at the national, regional and community levels	
OBJECTIVES		
1.	To improve access by small and medium-scale operators in the agribusiness and related sectors to resources for financing adaptation initiatives	
2.	To establish a dedicated pool of resources and use it to leverage additional resources for sustainable financing of climate change and disaster risk reduction initiatives	
COMPONENTS **1.**	Establishment of a Line of Credit through the Development Bank of Jamaica and the National People's Cooperative Bank network to provide loan financing to farmers and other businesses in the agricultural and related sectors. Financing will be made available to enable the implementation of climate change adaptation and disaster risk reduction initiatives, to improve resilience in the agricultural and related sectors, protect livelihoods and increase incomes. To ensure that funds are appropriately utilized in a timely manner, the necessary studies will be conducted to ascertain the nature and extent of demand for financing and approaches to be adopted to maximize uptake.	**Loan $1.4m**
2.	Establishment of a Climate Change Adaptation Trust Fund with seed capital of US$5.0 million to ensure that grant financing is available to finance disaster risk deduction and adaptation initiatives islandwide. The fund will be used to leverage additional resources from other funding sources. The income generated from the funds invested will be	**Loan $5.0m**

	utilized to finance adaptation and disaster risk reduction projects and cover administration charges. Grants from the trust fund will be accessed by community based organizations, other civil society groups and selected public sector agencies, for clearly defined high priority activities. To ensure efficiency and effectiveness, the implementers of the grant programme will collaborate with existing agencies engaged in climate change adaptation at the national, regional and community levels.	
TOTAL COSTS		**Loan $6.4m**
OUTCOMES	Sustainable source of financing for climate change adaptation and disaster risk reduction initiatives	

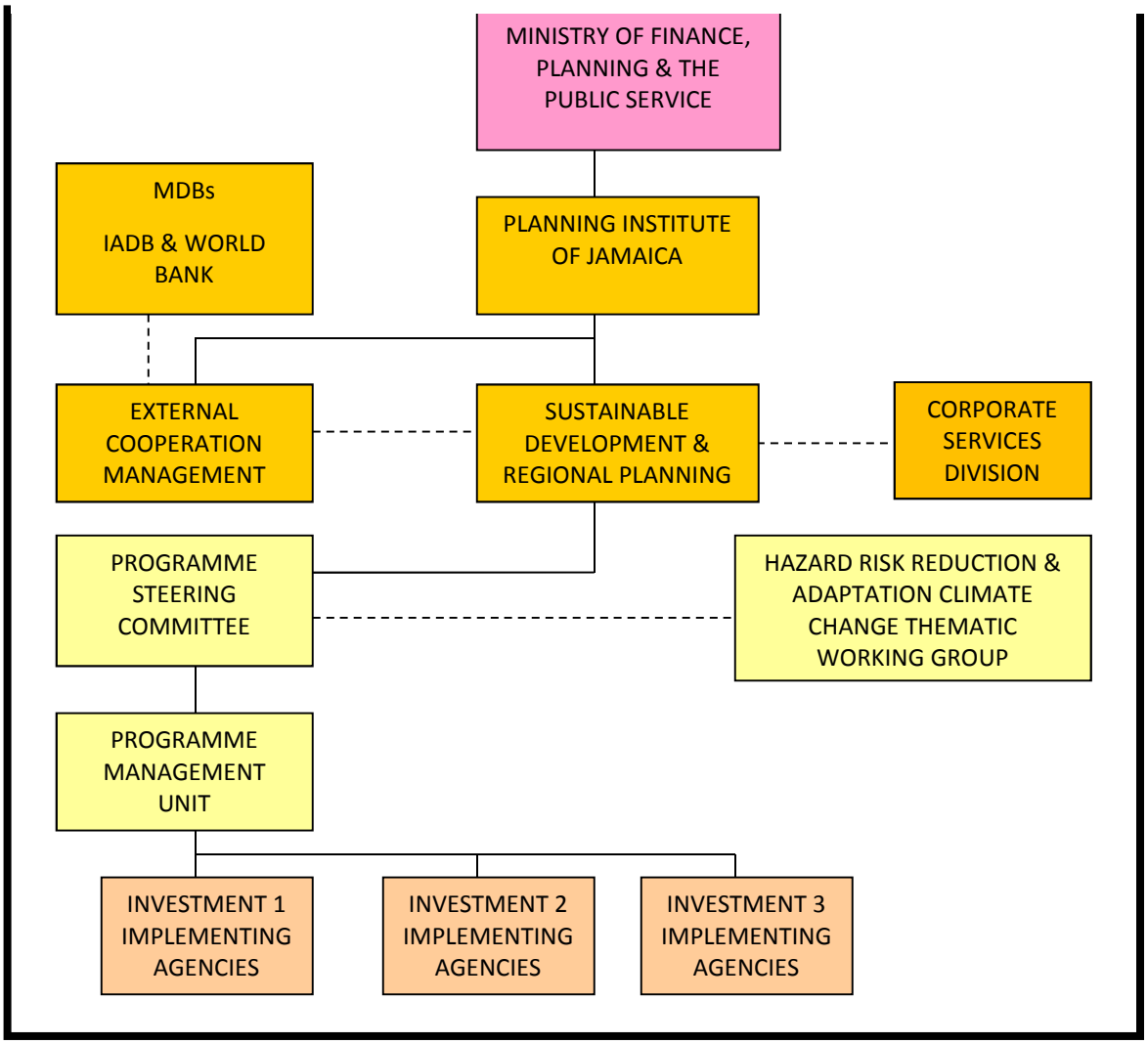
7.0 PROGRAMME IMPLEMENTATION AND SUPERVISION

The programme management framework is outlined in Figure 20. PIOJ, which is currently the national PPCR Focal Point, will provide supervision for the programme. As the development agency with responsibility for the implementation of Vision 2030, the PIOJ is well suited for coordinating the implementation of PPCR Phase 2 activities. PIOJ is also in charge of the External Co-operation Management and is currently managing a number of Climate Change Adaptation and Disaster Risk Reduction (CCADRR) related projects which complement the objectives of the SPCR. It is also the Secretariat for the HRR and CCA Thematic Working Group established under Vision 2030, a wide cross section of stakeholders . An interagency Steering Committee will be established, comprising representatives from PIOJ and organizations with policy, regulatory, programme implementation, data management and forecasting roles/functions. The main purpose of the Steering Committee will be to provide quality control, technical input and advice in support of the development and implementation of the SPCR. See Annex 5 for the details of the Terms of Reference and composition of this committee.

The Director General or his nominee will chair the Steering Committee and will also give oversight to the team that will be contracted to develop the investment projects. The Programme Implementation Unit will coordinate implementation of the PPCR-financed projects and also take responsibility for knowledge management and the preparation and dissemination of lessons learnt. The PIU will include a programme coordinator, a climate change specialist, an accounting officer and an administrative assistant. Consultants and other technical specialists will be contracted as needed to facilitate implementation.

The three programmes to be implemented under the PPCR will be implemented over a five-year period. See Annex 6.

Figure 20: Programme Management Framework



7.1 Project Cost

Jamaica is making a request for US$15.0 million in grant and US$10.0 million loan, but is interested in the uppermost available limit of funding (from an indicative range of US$11.0-15.0 million for grants and US$10.0-13.0 million in loan), with the understanding that the lower range will apply if the envelope is at the lower end (Table 25).

Table 25: PPCR Phase II Project Cost (US$ Million)

ITEM	PPCR GRANT	PPCR LOAN	TOTAL
Investment Programme 1 - Climate Data & Information (Including Programme Preparation Grant)	6.4	0	**6.4**
Investment Programme 2 – Mainstreaming Climate Resilience River Basin Planning & Management	7.0	3.6	**10.6**
Investment Programme 3 – Sustainable Financing Mechanisms	0	6.4	**6.4**
Knowledge Management/ Preparation & Dissemination of Lessons Learnt	0.2	0	**0.2**
Sub-Total Investment Programmes	13.6	10.0	**23.6**
Total Project Management for Investment Programmes 1, 2, and 3	1.2	0	**1.2**
Total Project Auditing & Evaluation	0.20	0	**0.20**
Sub-Total	1.40	0	**1.40**
TOTAL (US$)	**15.0**	**10.0**	**25.0**

The amount being requested will complement the direct climate change adaptation investment activities financed by the European Union (€4.13 million); an anticipated US$10.0 million from the Adaptation Fund in 2012; and over US$3.0 million through the Global Environmental Facility (GEF). Combined, these resources will meet a small portion of the country's adaptation needs. These needs derive from the level of physical assets exposed (conservatively estimated at approximately US$18.6 billion; average annual loss of US$100.0 million for hurricane related disasters (from the IDB study); the incipient stage of adaptation across the key sectors; and the country's heavy dependence on environmental resources for economic activities. Furthermore, the estimates referred do not include the cost of ecosystem losses and their associated effect. For example, research shows that over the ten- year period 2000–2009, the annual loss due to beach erosion was estimated at US$19.2 million.

7.2 Monitoring & Evaluation

Project outputs and outcomes will be monitored and reported on a regular basis using the key indicators established in the results framework. The PIOJ through the local PPCR Implementation Unit will undertake this effort. Responsibilities in relation to project monitoring will include:

- Coordinating the integration of the PPCR results framework into the national M&E system
- Managing the assessment of current M&E capacity and gap analysis in terms of baselines, targets, technology (IT support) and HR capacity
- Managing the progress reporting in implementing the SPCR

- Preparing annual progress reports on SPCR implementation
- Monitoring the implementation of project/programme implementation and request regular project performance updates from the relevant government agencies.

The PIOJ in collaboration with the MDBs will conduct the mid-term and end of project reviews, while the ex-post evaluation will be conducted by an independent evaluation team
Knowledge management activities will be developed out of the monitoring and evaluation activities of the PPCR. These will involve identifying, creating, organizing, sharing and using lessons learned and good practices in Jamaican and Caribbean PPCR programmes and projects.

7.3 SPCR Results Framework

At the SPCR Programme Level, the following indicators have been formulated:

1. Change in number of national level economic sector and development policies and regulatory frameworks that integrate climate resilience and vulnerability considerations

2. Effective National Early Warning Systems (including accurate weather forecasts and lead time for response)

The results framework for the individual investment programme is outlined in Table 26.

Table 26: SPCR Results Framework

IP 1: Improving Climate Data & Information Management – responding to climate information needs

Component	Indicator	Output	Baseline data/status	Expected outcomes
Develop high resolution national and sectoral CC scenarios and upgrading of the data gathering network/infrastructure of the Met. Service, Jamaica	Number of national and sectoral CC scenarios developed based on local data and downscaled regional and other appropriate climate models; Number of data gathering stations established Effective national early warning system initialised/installed	CC scenarios for 2030–2050, 2080 and for EOC[6] Modern weather data collection system	CC scenarios available at a "coarse" resolution; inadequate and/or outdated climate data collection equipment	Increased capacity to develop climate change scenarios; more accurate predictions and early warning of extreme weather events

[6] EOC, End of century, 2090 –2100

Component	Indicator	Output	Baseline data/status	Expected outcomes
Conduct vulnerability assessments based on scenarios developed; develop and document sector based methodologies for climate resilient planning using CC scenarios, and develop the technical capacity to do so in the public and private sectors; **Develop a climate change information platform**	Number of comprehensive risk and vulnerability assessments, completed based on quality data and high resolution national and sectoral climate change ; number, relevance and quality of knowledge assets created; number of persons trained, by gender and age group. Evidence of a comprehensive set of climate change risk and other information;	Vulnerability assessments; information on the climate change risks & vulnerabilities faced by women, youth and persons with disabilities; Manuals and guidance documents; training courses conducted Climate change information platform	Limited number of professionals trained in interpreting high resolution climate change scenarios; Project M&E	Increased capacity to interpret high resolution climate change scenarios and apply them in the planning process; greater availability of information on the risks and vulnerabilities faced by the general population , especially women, youth and persons with disabilities;.
Establish mechanisms for access to, and for dissemination of climate information; and implement a comprehensive public awareness and education programme	Percentage change in climate change knowledge attitudes and practices of the Jamaican public and in particular vulnerable groups; evidence of use of knowledge & learning	Mechanisms in place to increase access to climate change information; Knowledge assets; Public awareness campaigns	2012 Knowledge Attitudes and Practice Survey Project M&E	Increased awareness of the impacts of climate change, especially among the vulnerable groups and adoption of initiatives to improve resilience

IP 2: Mainstreaming CC Adaptation in Local Sectoral and National Plans, and decision-making processes and Implementing Integrated CC Adaptation Strategies in Targeted River Basins

Component	Indicator	Output	Baseline data/status	Expected outcomes
Creation of enabling framework for mainstreaming climate change adaptation	Change in the number of national and sector level plans and development policies & regulatory frameworks that integrate climate resilience & vulnerability reduction considerations; Change in global adaptation index; evidence of a functioning cross sectoral coordinating mechanism for CC ; number of plans adjusted to incorporate climate change risks; Evidence of CC consideration in budget prioritization framework	Climate change policy document to establish enabling framework Key national sectoral and local plans adjusted to include climate considerations	CC- related responsibilities are dispersed among agencies Project M&E	Institutional framework established to enable effective coordination implementation and regulation of CC matters across the public sector. Improved integration of climate resilience in country development strategies, plans, policies at all levels
Development of (location specific) vulnerability assessments of the prioritized sectors in the project area ; develop adaptation plans for the prioritized sectors, the infrastructure and the vulnerable communities in the project area	Number of vulnerability assessments and CC adaptation plans of prioritized sectors in the project area	Vulnerability assessment of priority sectors in the project area; comprehensive adaptation plans for the project area	Preliminary assessments	Improved integration of climate resilience in the development strategies and plans for the project area
Detailed vulnerability assessment of the health sector	Comprehensive health sector vulnerability assessment and investment plan	Health sector vulnerability assessment report and investment plan	Preliminary assessments Project M&E	Improved understanding of the vulnerability of health facilities and the cost of making them climate resilient
Implementation of the climate adaptation options formulated for the project area	Change in the acreage of farms with sustainable access to water for agricultural and domestic use Change in the acreage of	Water harvesting & management infrastructure; sustainable land management measures	Baseline study conducted; Project M&E	Increased capacity of the project beneficiaries to withstand/recover from climate change or climate variability on

Component	Indicator	Output	Baseline data/status	Expected outcomes
	lands in the project area where climate change considerations are integrated and being implemented in land management plans; change in the real cost of climate change related losses/damage suffered by agribusiness operators in the project area; evidence of use of knowledge and learning by project beneficiaries	implemented; agricultural risk management/ adaptation practices adopted		agricultural and other economic activities
Artificial aquifer recharge	Change in water volume and quality in aquifer	Artificial aquifer recharge system in place	Available data on the aquifer	Increased stocks and improved quality of ground water in the Rio Minho hydrological basin

IP 3 Financing Mechanisms for Sustained Adaptation Initiatives by the Public and Private Sectors and Community Based Organizations

Component	Indicator	Output	Baseline data/status	Expected outcomes
Establishment of a Line of Credit to provide loan financing to the private sector, with emphasis on agribusiness	Number of adaptation projects funded; Line of Credit for MSMEs established; the dollar amount of financing leveraged annually from other sources by PPCR funding; reduction in the real cost of losses/damage suffered by loan beneficiaries, due to climate change.	Operational Line of Credit ;Loan agreements; adaptation initiatives implemented	Preliminary demand study Project M&E	Increased resilience of the private sector to the impacts of climate change
Establishment of Trust Fund **Leveraging of additional funding and provision of financing to implement community climate change adaptation and disaster risk reduction initiatives**	Number of vulnerable communities and groups benefiting from grant funding; dollar amount of financing leveraged annually from other sources by PPCR funding; reduction in the real cost of climate change related losses or damage suffered by	A viable trust fund; Grant agreements Adaptation initiatives implemented	Preliminary need assessment Project M&E	Increased resilience to the impacts of climate change at the community level Reduction in the level of damage and loss suffered

	beneficiaries of the projects financed.			

7.4 Programme Sustainability

The SPCR will implement a number of transformational activities and processes which will help to ensure sustainability. These include the generation of climate scenarios; sectoral vulnerability assessments; the integrating of climate change issues in development plans, policies and regulations, the development of climate sensitive adaptation initiatives in vulnerable communities; and the implementation of sustainable financing mechanisms for private sector and vulnerable communities, all of which will fundamentally change the approach to national and local development planning. All of these will be underpinned by the development of a highly structured institutional framework for the monitoring and coordinating of climate change to increase the transformational impact of these in advancing climate resilience in Jamaica spatially and temporally. As such, sustainability of Jamaica's SPCR will be achieved through the following:

- Capacity building (training of sector specialists): to ensure that the climate change scenarios can be adequately interpreted and applied to key sector plans. The training will be ongoing and advances are being made to two of the main Universities to institutionalise scenario modelling, using data developed under the programme in relevant disciplines

- Development of Governance framework: Development of institutional framework for climate change; mainstreaming of climate change adaption; resilience in development plans, policies and regulations. Training of technocrats in the climate proofing of development plans, policies and regulations will be instutionalised in the government operated Management Institute for National Development.

- Building on and improving Information Management:

    - The SPCR will support a programme to improve knowledge, attitude and practices of Jamaicans towards climate change. This will largely be facilitated through the scaling up of the "Voices for Climate Change" education programme, development of cultural, relevant audio-visual materials and the implementation of the national Climate Change communication strategy targeting stakeholders both at national and community level.

    - Development of a risk information platform which will ensure that stakeholders have access to high quality, relevant data which they can use to improve decision-making. Most importantly, communities will be involved in the identification of data and information requirements for the platform. The upgrading of the capacity of the Meteorological Services, Jamaica through the provision of a new radar will

be accompanied by a rigorous maintenance programme and the training of technicians and engineers to operate and maintain the system. Also, a study will be undertaken to determine what climate related income earning products and services can be provided by Met Services locally and regionally, and then develop and offer these services and products. The resources generated will be ploughed back to support continuous maintenance and upgrade of the system.

- Development of demonstration plots for promoting climate sensitive adaption measures such as soil and land management practices; and water management practices in vulnerable communities within the project area and other strategic locations. This will be complemented by training of community members in cost effective and affordable adaptation measures in order to build expertise in sustainable climate change adaptation strategies. These efforts will combine to transform the lives of vulnerable groups by improving livelihoods, security and reducing poverty.

- Promoting flexibility and innovation in the implementation of the various components and establishing direct linkages to alleviate livelihoods promotion, for example, the SPCR will pursue the likely spill-over effects of the programme particularly through the development of alternative livelihoods

- Promoting wide participation by taking the views of stakeholders in the development of the SPCR programme

- Development of self-sustaining financing mechanisms, which will make loan financing available to the private sector, both from the initial loan disbursement and from repayments received. Additional loan financing will be leveraged based on demand to ensure that all te needs are satisfied.
- Establishment of a Trust Fund such that grants can be made from the interest generated from the trust funds invested. Grant financing will be made available to targeted vulnerable communities and vulnerable groups , through community groups and selected public sector agencies, for climate change adaptation and disaster risk reduction initiatives. The financial base of the Trust Fund will be strengthened by promoting the diversification of funding sources including leveraging funds from other donors. This is important because the cost of implementing Jamaica's SPCR is substantial and PPCR financing will only be able to address a small part of the programme. Through this mechanism therefore, financing will be available to sustain the implementation of critical climate adaptation initiatives island-wide over the foreseeable future.

- Knowledge Management (include evaluation of data emerging from the project). This will include:

  - Documentation of methodologies and techniques as well as good practices for scaling up other communities and countries

- Development of a PPCR webpage on the PIOJ website.

- Social marketing - communications strategy; promotional events

- Facilitating learning by building flexibility into the SPCR where new ideas will be accommodated based on the feedback from programme evaluation by focusing on project objectives and outcomes rather than project outputs (Learning by doing).

- Creating synergy between PPCR activities and related Climate Change and Disaster Risk Production programmes.

7.5 Participatory Processes followed to prepare the SPCR

The participatory process that led to the development of the Strategic Programme for Climate Resilience (SPCR) began in earnest with a meeting of the PPCR focal point with the key stakeholders on July 2, 2010, to identify priority sectors for attention under the PPCR and to identify a small programme of activities to be carried out in the short term. Having achieved the objectives of that meeting, the process of consultation was further advanced when the first joint IADB/World Bank mission for the PPCR was held on 12th–16thJuly, 2010. The mission team which also included representatives of other donor agencies, such as the Canadian International Development Agency (CIDA), Department for International Development (DFID), Japan International Cooperation Agency (JICA) and UNDP, held consultations with key stakeholders, including representatives of key government agencies, civil society, private sector and Caribbean-wide entities. The main objectives of the Mission included stocktaking on previous, ongoing and pipeline climate change projects and programmes; and confirming the priority sectors previously identified, and possible preliminary actions and activities through consultation meetings. The objectives also included providing support to the GOJ in the formulation of the funding proposal for Phase 1. Among the issues discussed and agreed on were the extent to which Climate Change issues were mainstreamed into the policy and development plans at the sector level and nationally; the issues that needed to be addressed in order to enable greater resilience to climate change; the sectors to be given priority in use of PPCR funding; and the thematic areas that were deemed to be most critical in the process of mainstreaming climate change in Jamaica. Subsequent to the Joint Mission, the PIOJ held consultations with a number of additional stakeholders to inform/update them on the PPCR and to ascertain initiatives being undertaken as well as initiatives planned with respect to climate resilience. These include the Disaster Risk Reduction Centre, the Institute of Sustainable Development of the UWI, the Environmental Foundation of Jamaica, the Tourism Enhancement Fund, the Forest Conservation Fund (FCF),

Negril Coral Reef Preservation Society, Christian Aid, GEF Small Grant Programme, the Community Based Adaptation Programme, National works Agency, the Fisheries Division of the Ministry of Agriculture & Fisheries, and the National Irrigation Commission.
The actual development of the SPCR was further advanced by four regional workshops at different locations around the island during the months of January and February 2011. The first was held in Portland for participants from the parishes of Portland, St. Mary and St. Thomas; the second was held in Manchester, for participants from the parishes of Clarendon, Manchester, Southern Trelawny, St. Elizabeth; the third was held in Westmoreland for the parishes of Westmoreland, Hanover and St James; and the final workshop was held in Kingston for Kingston and St. Andrew, St. Catherine and sections of St. Thomas. These workshops involved representatives from: community based organizations including women's organizations; environmental and other NGOs, private sector organizations; local government organizations; agricultural and fishing organizations; academic institutions; indigenous local groups; and public sector organizations. A summary of the groups that participated in each of the four workshops is shown in Table 27.

The objectives of the workshops held were:

- To secure feedback from participants as to how they were being impacted by climate change; what they are doing currently to cope with the impacts of climate change at the community/parish levels

- To review the strategies and actions being implemented at the parish level, and receive recommendations for strategies and actions to be implemented at the national levels to improve resilience to the impacts of climate change.

Table 25: Organizations that Participated in Workshops

Type of Organization	**Organizations That Participated**
Community Based Organisations	National Association of Parish Development Committee; Cockpit country south–east Forest Management Committee; Manchester Parish Development Committee; Dolphin Head Local Area Forestry Management Committee; Hanover Parish Development Committee; Westmoreland Parish Development Committee; Portland Parish Development Committee; St. Mary Parish Development Committee; Buff Bay Local Forest Management Committee; Clarendon Parish Development Committee
Environmental NGOs	Jamaica Conservation Development Trust; Caribbean Coastal Area Management (CCAM); Fletchers Grove Environment Group; Negril Environmental Protection Trust; Portland Environmental Protection Association
NGOs	Combined Disability Association, Association of Development Agencies, PANOS Caribbean; Women Resources & Outreach Centre; Construction Resource & Development Centre; Peoples Action for Community Transformation; Jamaica Agricultural Society; Caribbean Christian Centre for the Deaf
Private Sector	Jamaica Hotel & Tourist Association-Negril Chapter; Private Sector Association of Jamaica; Jamaica Institute of Environmental Professional; Manchester Chamber of Commerce;

Type of Organization	Organizations That Participated
Organisations	Canadian Urban Institute; Negril Chamber of Commerce
Local Government Organizations	St. Thomas Parish Council; Kingston & St. Andrew Corporation (KSAC), St. Elizabeth Parish Council; Westmoreland Parish Council; Manchester Parish Council; Negril-Green Island Area Local Planning Authority; St. Mary Parish Council;; Portland Parish Development Committee; Portland Parish Council; Parish Disaster Committees
Agricultural & Fishing Organizations	Jamaica Agricultural Society, Jamaica Fishermen Co-operative, Farmers; White House Fishermen Co-operative; Banana Board
Indigenous Groups	Moore Town Maroon Council; Maroon Indigenous Women Circle
Academic Institutions	UWI- Climate Studies Group, Physics Department, CARIMAC, College of Agriculture Science & Education;
Public Sector Organizations	Social Development Commission; Urban Development Corporation, National Environmental Education Committee; Rural Agricultural Development Authority (RADA), National Environment and Planning Agency (NEPA), Meteorological Service, Jamaica (MSJ); PIOJ; Dept. Of Local Government; National Solid Waste Management Authority.

Following the workshops, organizations playing leadership roles in the priority sectors were invited to submit project concepts to address the most critical needs as agreed from previous consultations. After receipt of the project concepts, further consultations were held with the proposing organizations to review and strengthen them.

Based on the information gathered through the various consultations, from the Second National Communication and the draft climate change policy, the first draft of the SPCR was developed by the consultant contracted to co-ordinate its development along with officers of the Sustainable Development & Regional Planning Division of the PIOJ. This draft was then submitted to the IDB, the World Bank, and other key local private sector, public sector, NGO and academic institutions for review and feedback (including those organizations that submitted investment proposal concepts). The feedback received was subsequently used to revise the SPCR including the investment proposals.

The revised SPCR and investment proposals were then presented for review, discussion and amendment at the Second Joint Mission of the PPCR held on September 19 and 20, 2011. The objectives of the Joint Mission, which was held over two days, were to:

i) present the SPCR and the investment programmes to key public sector and NGO stakeholders for their information discussion and recommendations

ii) present the SPCR and the investment programme to the private sector, consultancy organizations, and the development banking sector for their information and feedback

iii) present the SPCR to the international development partners, for information and feedback regarding possible support.

The private sector, the public sector, environmental and other NGOs, local government, agricultural and academic institutions attended and participated in the review of the SPCR and made recommendations of changes. These recommendations, in addition to those made by the IDB and the World Bank, were included in the revised SPCR document which was later sent to the External Reviewer to be reviewed.

On Wednesday, October 5, 2011, the Ministry of Agriculture & Fisheries in conjunction with the Rural Agricultural Development Authority (RADA) hosted a site visit to sections of the project area for the investment project component of the SPCR. The site visit focused on the north-eastern Manchester and north-western Clarendon areas (Two Meetings River Watershed) and sought to:

i) verify the appropriateness of the area for climate change resilience activities being proposed in the SPCR

ii) identify the actual area on the site map

iii) discuss with local RADA personnel and residents of the area, issues related to the project

The WRA was invited to ascertain any need for the establishment of flow gauges in existing streams in the area to monitor flooding potential which may possibly be sourced under the SPCR. Due to inaccessible roadways and intense rainfall, the visits to the streams were not possible. However, two domestic water treatment stations were visited and the negative impact of practices in the watersheds on them noted.

PART II PROPOSED INVESTMENT COMPONENTS FOR PPCR FINANCE

8.0 INVESTMENT PROJECT 1

Project Title:	Improving Climate Data and Information Management
Lead MDB:	World Bank
Estimated PPCR Financing:	US$6.4 million (Grant)

9.1 Background

Due to its geographical, geological and socio-economic characteristics, Jamaica is among the countries most vulnerable to the impacts of climate change in the Caribbean region. Notwithstanding, the country has insufficient capacity to generate, disseminate and use climate data and information to formulate robust strategies to adapt to these changes.

A major area of deficiency is the lack of high resolution climate scenarios that are geographically relevant. While climate scenarios currently exist, they are for the most part based on global and regional models which do not accurately reflect Jamaica's unique conditions and specific vulnerabilities. Thus, downscaled regional climate data models that better reflect Jamaica's conditions in the development of scenarios at the national and sectoral levels, is urgently needed. These scenarios will form the basis of sectoral vulnerability assessments thus improving the understanding of how climate change can affect key sectors and vulnerable populations; and guide the development of strategies necessary to increase resilience to the impacts of climate change. The SPCR investments will support the preparation of guidelines and training on how to use climate change scenarios to inform the formulation of adaptation strategies and decisions.

An added area of concern is the vulnerability of the health sector, one of the early responders after extreme weather events. To ensure that this sector is not overly devastated and has the capacity to adequately respond, there is the need to make key health facilities resilient to the impacts of climate change. A critical first step along this path is to conduct a detailed vulnerability assessment (including the use of climate scenarios); an outline of the necessary actions to be taken; and the estimated costs.

Another key problem constraining the development of appropriate adaptation measures in Jamaica is the limited capacity of the Meteorological Services, Jamaica to make the weather forecasts and provide the early warnings desired to enable vulnerable populations in particular, to make adequate preparations. From a network of about 250 manual rainfall stations, 23 climatological stations, rainfall data loggers and five automatic weather stations, the network has declined to less than 180 rainfall stations and only six climatological stations. Other limitations

include the fact that for most locations islandwide, rainfall is the only climate parameter measured. Though important, rainfall alone cannot define the climate of the country. Additional parameters are therefore needed for regional model validation, to assess future climate change impacts and to adequately quantify sectoral responses to cope with the vagaries of climate variability and change. Additionally, the Met Services, Jamaica operates a Doppler Weather RADAR which is over twenty years old. While it can still perform the minimum required tasks, there is the need for it to be replaced as soon as possible as the technology has advanced considerably, making this equipment almost obsolete, to the extent that any replacement part must be specifically manufactured, at great cost.

Based on the potential for climate change to negatively impact the socio-economic development of the country, the need also exists for a comprehensive database of the range of risks faced by vulnerable communities/locations around the island. This will, among other things, facilitate the development of realistic strategies and plans to minimize disaster risks and increase resilience. The development of a risk information platform through PPCR financing will help to address this need.

There have been some successes but significant gaps remain in mainstreaming climate change issues into planning as well as in helping Jamaicans adapt to the impacts. Capacity and awareness remains limited among critical groups and there is limited sharing of information. The public needs more information on how to identify, cope with and respond to climate risks. The "Voices for Climate Change Education project" implemented in Jamaica, found that there is a need for more information by the public on what they need to do to adapt and how can they do it. Some adaptation actions can be taken at the individual level, but increasingly the links at the community, sectoral and national levels also have to be addressed to foster an enabling environment. There is therefore the need to share information and to do so in a way that it results in action on the part of the recipients. SPCR financing will support the development of a climate change information platform.

Improved quality climate information for effective planning and action at local and national levels

SPECIFIC OBJECTIVES

1. Strengthen Jamaica's meteorological observation and data collection systems to enhance climate monitoring, weather forecasting and early warning systems.
2. Enable effective planning and design of gender sensitive adaptation initiatives, through access to climate change scenarios specific to Jamaica, including scenarios for priority sectors.
3. Use climate scenarios generated to assess the expected impact of climate change for each priority sector and utilize assessments to develop sector-based methodologies for climate resilient planning and decision-making.
4. Conduct detailed vulnerability assessment of the health sector to generate information needed to improve improve resilience of the health sector by climate proofing health care facilities.
5. Develop and operationalize a comprehensive risk information platform.
6. Improve the knowledge, attitudes and practices of the Jamaican public towards climate change by 50%.

9.2 Investment Components

9.2.1 Upgrading of the data collection, processing and forecasting system of the Meteorological Services

This component seeks to:

i) improve the capacity of the Met. Service, Jamaica to more effectively forecast weather and provide early warning, by replacing the current almost obsolete RADAR with one that will enable more accurate weather forecasting. It involves the acquisition of the RADAR system including the associated hardware, spare parts and software, as well as installation, calibration of equipment and training of technicians and engineers.

ii) upgrade the data acquisition network of the Met Service by replacing over 40 manually read rain-gauges with automatic recording systems fitted with satellite interface or data transmission modems capable of transmitting data real-time into its newly installed CliData archiving system.

iii) review and update the business processes, technical expertise of key personnel, and formulate strategies for greater sustainability and more effective customer service.

iv) determine the feasibility of developing climate goods and services for private sector clients.

9.2.2 Development of climate change scenarios –

This component seeks to:

i) downscale regional climate data models to develop high resolution climate change scenarios at the national and sectoral levels.
ii) develop sector specific methodologies for climate resilient planning and design—develop manuals and guideline documents.
iii) develop the capacity of professionals to apply the scenarios in development planning.

9.2.3 Vulnerability assessment & risk information platform-

This component will seek to:

(i) conduct specialized vulnerability assessments using climate scenarios generated, to assess the expected consequences of climate change for each priority sector. The vulnerability assessments will improve the understanding the impacts of climate change on other risks and vulnerabilities within the sectors, for example, the relationship between future rainfall changes and rain-fed agriculture. Further, the vulnerability assessments will enable the convergence of socio-economic data and climate data to more meaningfully devise adaptation strategies.
(ii) conduct a detailed vulnerability assessment of the health sector. A costed plan of action will also be developed outlining the actions necessary to make the key health facilities climate resilient. Low cost but critical actions to enhance resilience in pilot facilities will be implemented.

9.2.4 Develop climate information platform

As climate change evolves there is a need to increase access to knowledge of its risks and the necessary adaptation approaches. This requires readily available and accessible information about climate change data, knowledge and good practices. However, such information is often either unavailable or available in formats that are not readily understood or usable by the various end-users. This problem is further exacerbated by the absence of a designated co-ordination mechanism for communicating climate change information, and the dispersed manner in which such information is now stored. The development of a risk information platform aims to address this problem.

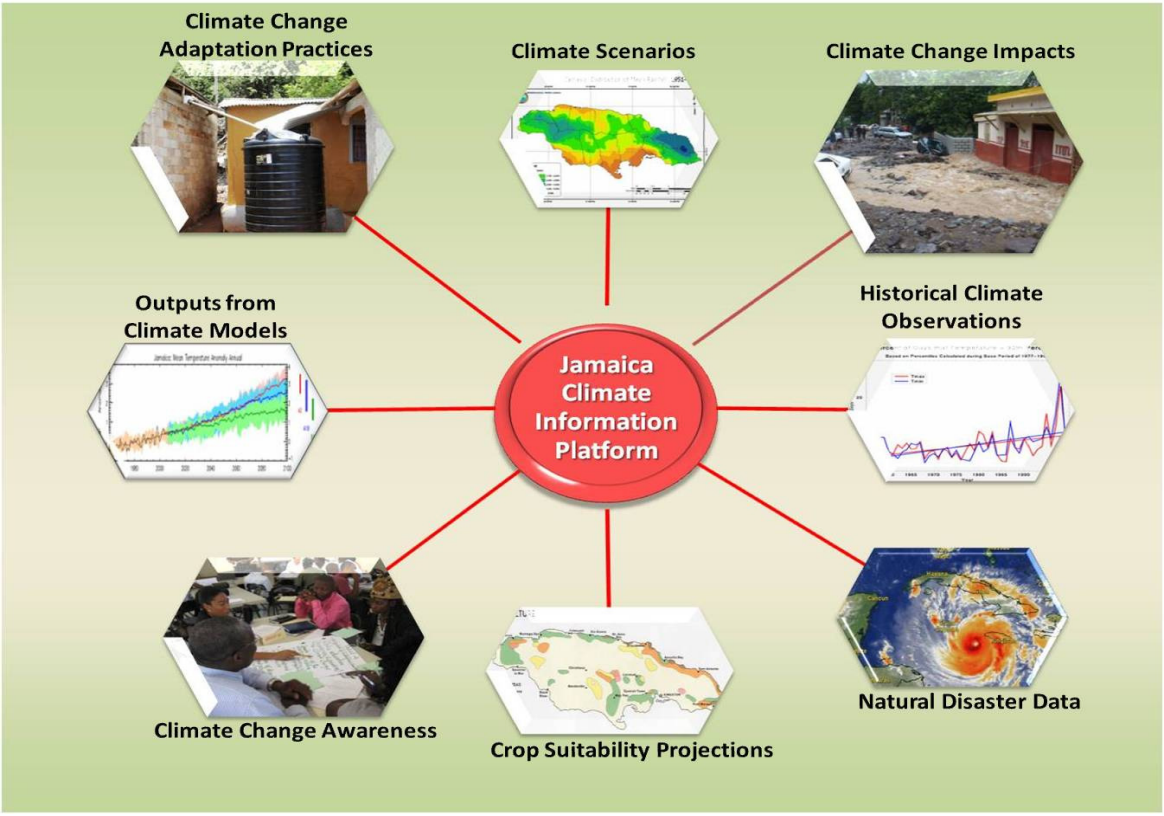
The main objective of the platform is to provide Jamaicans with access to a common medium for accessing climate risk, and vulnerability and other climate information and learning, in order to facilitate better adaption to climate change risks. In addition to providing information about climate change to the general public, the platform will provide guidance for decision-makers/planners; and serve as a tool for awareness building and decision-making at national, sectoral and local levels (see Box 5).

The development of the platform will be based on intensive assessments of end-user needs and updated climate scenarios. The platform will allow users to access information/data related to:

- Climate scenarios –developed with SPCR support including changes in the climate parameters
- Climate models' outputs
- Historical climate observations – rainfall, temperature, sea-level rise
- Natural disaster data – frequency, magnitude, geographic location, impact (social, economic, environmental)
- Crop suitability projections
- Adaptation practices
- Level of awareness
- Climate change impacts, sectoral and spatial impacts – agriculture, water resources, coastal and marine ecosystem, etc.

The design of the portal will be based on the experiences gained by working with target communities in Investment Project 2. In particular, the assessment of the vulnerability of the agriculture, water and infrastructure sectors based on current and future scenarios will provide critical inputs based on a stakeholder engagement process. Importantly, the platform will build on and draw from existing climate and disaster-related data and information systems. To facilitate easy access to the information, the establishment of nodes with existing networks —such as the post offices, public libraries, People's Co-operative Banks, ODPEM telecommunication network; the Public Broadcasting Services, mobile phone providers and the Jamaican Information Service—is planned.

Box 5: Jamaica – Climate Information Platform



9.3 Institutional Arrangements

Sub-Component I will be implemented by the Meteorological Service, Jamaica in collaboration with the Climate Studies Group, based in the Physics Department and the Computer Sciences Department of the University of the West Indies. Sub-Component 2 will be led by the Climate Studies Group, Physics Department UWI, while Sub-Components 3 and 4 will be implemented by the Office of Disaster Preparedness & Emergency Management, in collaboration with the Ministry of Agriculture & Fisheries, the Ministry of Health, the Geography and Geology Department, UWI, Met Services Jamaica, the Climate Studies Group, Mona, UWI, RADA, Disaster Risk Reduction Centre, and WRA.

The fifth component will be implemented by Panos in collaboration with the MHEWLG, NEPA, MOA, MSJ, Caribbean Institute of Media and Communication, and a number of NGOs, CBOs and Parish Councils. Rainwater harvesting demonstration projects, to be used to facilitate the education and awareness initiatives, will be implemented by the schools and communities in which they will be located.

9.4 Risks

The main risks associated with this investment project are outlined below.

No	RISKS	LEVEL OF RISK	APPROACH TO MANAGING RISK
1	Low levels of community /stakeholder participation	Medium	▪ Establish demonstration projects to reduce the misgivings from moving from traditional non-sustainable practices to new sustainable practices. ▪ Conduct project sensitization meetings. ▪ Utilize community mobilization and participatory approaches, during the project formulation and implementation stages.
2	Imposed limits on programme expenditure by the GOJ, or inability to source all the funding required	Medium	Submit to the Ministry of Finance Planning & the Public Service the information required to ensure that provision is made in the budget for the programme cash inflow and expenditures. Identify high level advocate; DG, FS for the programme
3	Natural disasters	Medium	Encourage implementing agencies to adopt disaster risk reduction and climate change adaptation strategies.
4	Extended delays in the programme design, appraisal , approval and implementation phases of the SPCR Investment Programme	Medium	Regular meetings between with Development Partners, GOJ agencies, Programme Manager and Programme Steering Committee Chairman to address project design , appraisal and implementation challenges.
5	Late disbursement of project funding	Medium	Ensuring that all pre-disbursement conditions are met in a timely manner.

INVESTMENT COSTING

This is as follows:

Table 28: Investment Costing for Investment Project 1 (US$)

	ITEM	PPCR GRANT	PPCR LOAN	Co-financing	
1	Climate Data Collection Systems				
	Radar System & Spares	2,300,000			**2,300,000**
	Automated Weather Station (40)	300,000			**300,000**
	Capacity development at the Met Service	100,000			**100,000**
2	Climate Change Scenarios	500,000			**500,000**
	Vulnerability Assessment of the	1,200,000			**1,200,000**

	Health Sector				
3	Risk Information Platform	700,000			**700,000**
4	Scaling up of Voices for Climate Change & Implementation of Climate Change Communication Action plan	600,000		700, 000	**1, 300,000**
5	Demonstration Projects	400,000			**400,000**
6	Project Management, Monitoring, Evaluation and Auditing	700, 000			**700 000**
7	Programme Preparation Grant	300,000			**300,000**
	TOTAL (US$)	**7,100,000**		**700, 000**	**7,800,000**

(i) Downscale regional climate data models to develop high resolution climate change scenarios at the national and sectoral levels.

(ii) Develop sector specific methodologies for climate resilient planning and design

- develop manuals and guideline documents.

Develop the capacity of professionals to apply the scenarios in development planning

The results framework for IP 1 is given in Table 29.

Table 29: **Results Framework for IP 1: Improving Climate Data & Information Management - Responding to Climate Information Needs**

Sub-Component	Indicator	Output	Baseline data/status	Expected outcomes
Upgrade the data gathering network/infrastructure of the Met. Service, Jamaica	Number of data gathering stations established;effective national early warning system initialized /installed	Modern weather data collection system	Inadequate and/or outdated climate data collection equipment	More accurate predictions and early warning of extreme weather events.
Development of high resolution national and sectoral climate change scenarios	Number of high resolution national and sectoral climate change scenarios developed based on local data and downscaled regional and other appropriate climate models; Institutional assessment completed and implemented for the	Climate change scenarios for 2030s, 2050s, 2080s and 2090-2100	Climate change scenarios available at a "coarse" resolution; Monitoring & Evaluation (M&E)	Increased capacity to develop and fully utilize high resolution climate change scenarios

Sub-Component	Indicator	Output	Baseline data/status	Expected outcomes
	Met Services			
Conduct vulnerability assessments based on scenarios developed; develop and document sector-based methodologies for climate resilient planning using climate change scenarios, and develop the technical capacity to do so in the public and private sectors. **Develop climate change Information platform**	Number of comprehensive risk and vulnerability assessments, completed based on quality data and high resolution national and sectoral climate change ; number, relevance and quality of knowledge assets created; number of persons trained, by gender and age group Evidence of comprehensive set of climate change risk and other information;	Vulnerability assessments; information on the climate change risks & vulnerabilities faced by women, youth and persons with disabilities; Manuals and guidance documents; training courses conducted Climate change information platform	Limited number of professionals trained in interpreting high resolution climate change scenarios; Project M&E	Increased capacity to interpret high resolution climate change scenarios and apply them in the planning process; greater availability of information on the risks and vulnerabilities faces by the general population , especially women, youth and persons with disabilities;.
Establish mechanisms for access to, and for dissemination of climate information; and implement a comprehensive public awareness and education programme	Percentage change in climate change knowledge attitudes and practices of the Jamaican public and in particular vulnerable groups; evidence of use of knowledge & learning	Mechanisms in place to increase access to climate change information; Knowledge assets; Public awareness campaigns	2012 Knowledge Attitudes and Practice Survey Project M&E	Increased awareness of the impacts of climate change, especially among the vulnerable groups and adoption of initiatives to improve resilience

10.0 INVESTMENT PROJECT 2

Mainstreaming CC Adaptation in Local Sectoral and National Plans, and implementing Integrated CC Adaptation Strategies in targeted River Basin planning and management.

Leading MDB: IDB

Estimated Amount: US$7.0 million (Grant); US$3.6 million (Loan)

Priority Sector Addressed: Institutional and sectoral adaptation

10.1 BACKGROUND

Some of the issues highlighted in Investment Project 1 namely, limited climate data and information have resulted from the absence of a coherent institutional framework for climate change in Jamaica. This has placed a constraint on the ability of the country to integrate climate change considerations into the development planning process.

Currently, many of the country's policies, sectoral plans, local development and other plans, regulation, and legislation do not adequately address the issues related to climate change risk reduction or provide the incentives and the framework for climate change adaptation. Additionally, the risk assessment data required to inform the local planning and development processes as well as the capacity of many public sector agencies to mainstream climate change, is totally inadequate. Consequently, the recent extreme weather events have resulted in significant social dislocation and monumental economic losses and damage, a significant proportion of which could have been avoided if the country's policies, regulation and plans provided the guidelines and incentives for all to adapt to climate change at all spatial levels. The lack of climate change integration is also evident at the river basin level, where in some cases, climate change is disrupting the water supply-demand balance with significant implications for agriculture and the food security of the country.

An important step towards effective adaptation is to ensure that all our key policies, plans regulations and legislation, and regulatory institutions, provide the framework for individuals, communities, businesses, civil society and government agencies to deliberately incorporate climate change risk reduction/adaptation strategies as a normal part of their planning, decision-making processes. This needs to be complemented by adaptation interventions (based on future climate scenarios developed in Investment Programme 1) at the river basin level.

Another issue which deserves urgent attention is the reduction of water supplies which has already threatened water security in three southern basins — the Kingston, Rio Cobre and Rio Minho. These hydrologic basins are projected to have a water deficiency by 2015, with the largest annual water deficit of 161 million cubic metres occurring in the Rio Minho basin. The Rio Minho Basin's total exploitable surface water yield is 32 MCM/Year, and its total exploitable

groundwater yield is 439 MCM/year, for a total exploitable yield of 471 MCM/year. This means that over 92% of the exploitable water in this basin comes from groundwater. Groundwater occurs within the Limestone and Alluvium Aquifers. However, the Clarendon Limestone Aquifer constitutes the only significant source of groundwater within the Lower Rio Minho sub-basin.

Agriculture has the greatest demand on water resources in this basin, with 294.8 MCM/Year for 2005 (NWC Corporate plan). Other significant demands included non-agricultural (domestic) demand with 53.8 MCM/year in 2005. Continued over-pumping and excess abstraction have led to saline intrusion of the Limestone Aquifer and there has been degradation in water quality over time. This degradation will be exacerbated by rising sea levels/decreasing groundwater levels caused by climate change. These factors will have a strong negative impact on economic development, which is inextricably linked with accessible and suitable water resource availability.

In spite of demand-side interventions in the Rio Minho hydrologic basin such as a moratorium on the establishment of new wells in the Lower sub-basin, a more sustainable response to water management against the backdrop of climate change lies in increasing the groundwater stocks of the Lower Rio Minho Basin.

Given that the priority sectors for consideration include water resources, Agriculture & Food Security, Settlement and Terrestrial Resources, the stakeholders selected an area comprising Southwest St. Ann, Upper Manchester, South Trelawny, and Northwest Clarendon for demonstrating the integrated approach to river basin planning and climate change adaptation (Figure 21). This area was seen as one in which the greatest impacts from the project could be achieved and will be used to demonstrate adaptation measures which could later be scaled up in other vulnerable areas as well as to other Caribbean countries. As such, focus will be placed on the rural communities situated within the vicinity of Southwest St. Ann, Upper Manchester, South Trelawny, and Northwest Clarendon.
In order to address the links between climate change and livelihoods, an integrated approach to river basin planning and management is proposed to demonstrate the viability and effectiveness of adaptation measures that incorporate climate change scenarios. In this regard, climate scenarios will be combined with existing conservation methods being used by vulnerable communities in order to better cope with the climate variability in the project area. The project will focus on adapting water management options including:

- Water conservation techniques
- Upgrading of existing water storage facilities
- Diversification of livelihoods options
- Research on drought resistant crops

SPCR resources are being requested to:

(i) mainstream climate change concerns in the country's development policies, plans regulations, and legislation, where this is required
(ii) pilot river basin planning and management approaches that include climate change

(i) develop the capacity of community groups, local government and central government agencies to mainstreaming climate change in their plans, policies and regulations.

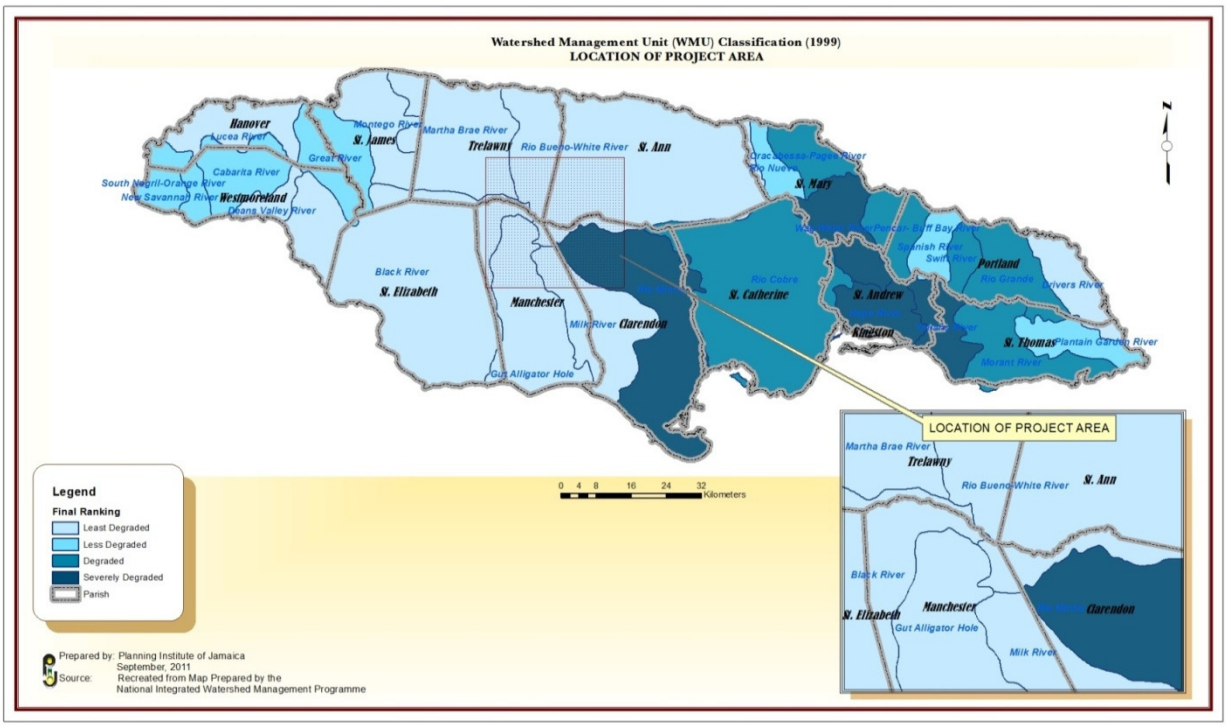
10.2 DEVELOPMENT OBJECTIVE

Climate Change mainstreamed into development plans and planning processes; and increased adaptation to the impacts of climate change by stakeholders in vulnerable sections of the Rio Minho and Rio Bueno River Basins

SPECIFIC OBJECTIVES

1) Create an enabling framework for mainstreaming climate change adaptation at the local and national levels.
2) Characterize the project area using baseline data and develop vulnerability assessments and adaptation plans for the prioritized sectors, the infrastructure and vulnerable communities in the project area.
3) Improve river basin planning and management to protect the recourse base of the area and safeguard livelihoods, through vulnerability assessment and integrated planning
4) Develop and implement integrated adaptation strategies (water, land, and infrastructure) to address the anticipated impacts of climate change in the project area.

Figure 21: Location of project area



10.3 Mainstreaming Climate Change Adaptation (CCA) and Disaster Risk Reduction (DDR) at National, Sectoral, and Local Levels.

This component seeks to integrate Climate Change Adaptation and Disaster Risk Reduction into policy, planning, legislation, fiscal, and budgetary processes at all three levels. There will be strong links between this component and the information platform being developed in Investment Project 1, which will provide appropriate information on future climate change and its impacts on sectors and regions. Specific activities for mainstreaming climate change adaptation in local, spatial, sectoral and national planning processes will include:

(i) Establishing a coherent and multi-sectoral institutional framework for addressing climate change issues in an efficient and effective manner. This will ensure that roles and responsibilities and the lead organization on climate change matters are efficiently and effectively structured to ensure that the country's goals, strategies and actions in relation to climate change issues are adequately coordinated, supported and directed. This component will also include the development of tools and instruments to facilitate the integration of climate change into key national, sectoral, and local policy and planning processes.

Although the need for mainstreaming climate has been recognized as a priority by the GOJ as well as stakeholders, it is also accepted as being potentially complex. As such it is proposed that workshops be conducted, specifically to get a national consensus on how best to proceed with

climate change mainstreaming in Jamaica. The climate change mainstreaming workshops will be conducted as part of SPCR Phase 1 activities with specific objectives to:

(a) Identify concrete ways to mainstream climate change considerations into the policies, plans, regulations, and legislation

(b) Develop indicators for monitoring the climate change mainstreaming efforts

(ii) Using the methodologies developed under Investment 1 to mainstream climate change concerns in development planning processes, and the local, sectoral and national plans formulated. This includes incorporating climate change considerations in investment and infrastructure design standards. Utilizing climate scenarios developed, and based on expected climate change impacts, the PPCR will assist in the mainstreaming of climate change in development policies, regulations and legislation. The EU/UNEP/GOJ Adaptation and Risk Reduction project will play the lead role in this area

(iii) Conducting training, or other capacity development initiatives necessary to develop expertise and ensure effectiveness and sustainability in integrating climate resilient measures in the development planning processes.

10.4 Integrated River Basin Development Planning

This component seeks to implement climate sensitive adaption strategies in river basin planning and management. The project area covers three main watershed management units; however, the main focus will be placed on the Rio Minho WMU which is classified as one of the most degraded watersheds in the island (Figure 22). The project will affect some 20 communities with an estimated population of approximately 65 000. Some of these communities include: Freeman's Hall, Litchfield, Wait-A-Bit, Lowe River, Spalding, Cascade, Aenon Town, Alston, James Rivers, Chudleigh and Frankfield. The main economic activity in the project area is agriculture and a majority of the farms are small scale, situated on the hillside with slopes ranging between 10 and 30 degrees, with a predominantly clay-loamy soil. As is the case for the island generally, the majority of the farmers practise rain-fed agriculture. This has caused large surpluses of food in the rainy season, and shortages and high prices in the dry season. The predominantly clay-loam soils are highly fertile, and with three main water streams the area could potentially be high yielding.

The area is highly vulnerable to excessive soil erosion and run-off in the rainy season which leads to degradation of the fertile top soil, and decrease in food productivity. Although adequate water resources exist, in the dry season, farm productivity is severely affected due to the lack of technology in harvesting and utilizing the existing water resources. The increase in the intensity and short duration of rainfall has exacerbated these conditions. In addition, the area also experiences high evapo-transpiration rates and with projected increases in temperature, this is

likely to get worse. The project area is also characterized by high levels of poverty. Based on the latest poverty assessments, poverty ranged between 30% and 60% (Figure 23). Recent assessment of the area by the MOAF has indicated evidence of field degradation, crop damage and reduced yields caused by increased erosion, flooding, decrease in soil fertility and pests. Persistence of the conditions without corrective interventions will further reduce rural communities' livelihood and lead to increase in food insecurity for the whole island. These factors combined have been impacting significantly on agriculture in the area. According to data produced by RADA, agricultural production has fallen between 50% and 70% as a result of the drought experienced in 2010 (see Table 30). Climate change manifestations such as, extended periods of drought and flooding, changes in rainfall and wind patterns lead to worsened soil erosion and degradation, and affect the recharge capacity and water quality in groundwater aquifers (Figure 24).

Figure 22: Location of Watersheds

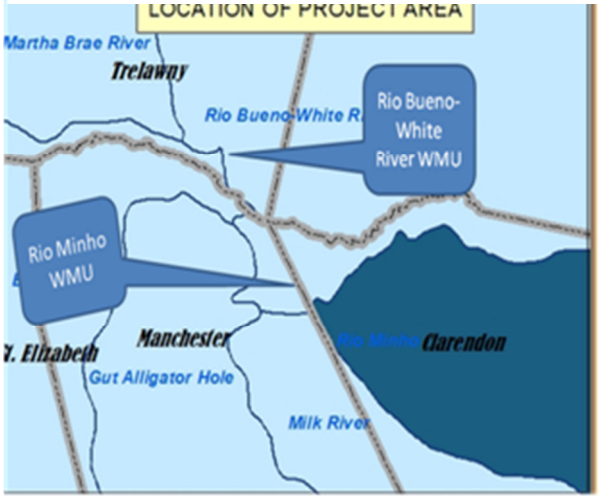


Figure 23: Distribution of Poverty in the Project Area

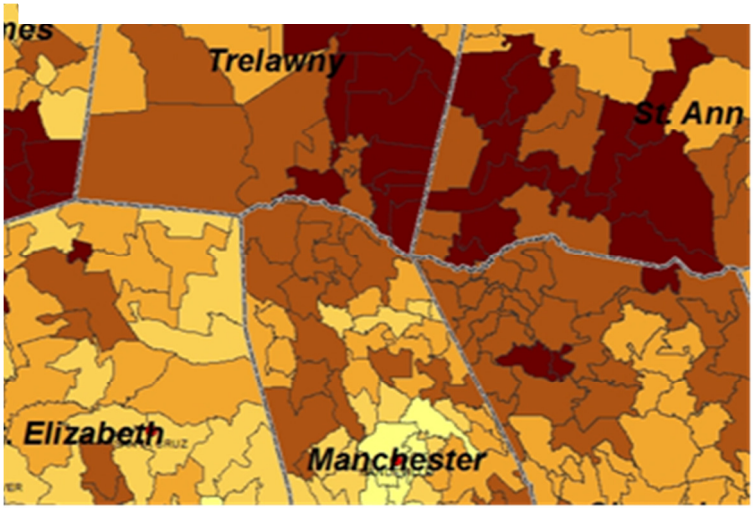
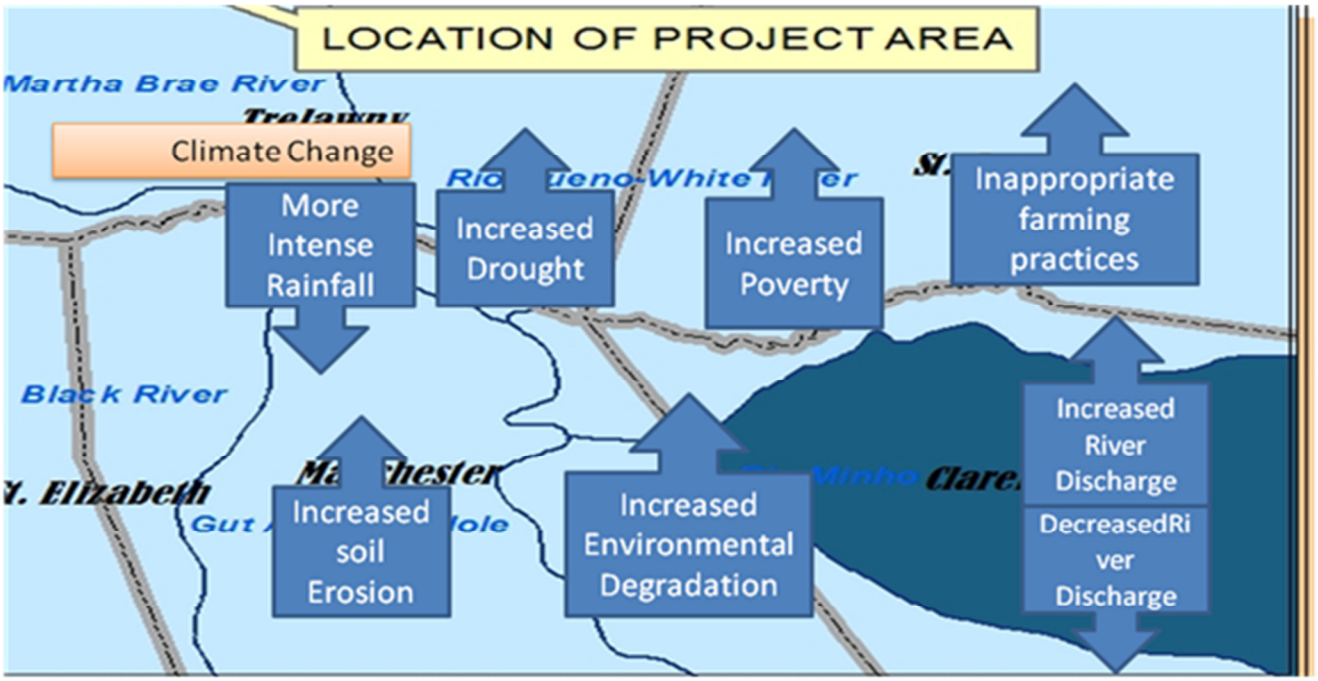


Table 30: Effect of Drought on Agriculture Production by Parish, 2010

Parish	Estimated Ha. under Production	Estimated Ha. Affected by Drought	Expected Yield (t)	Range % Reduction in Crop Yield
St. Ann	370.4	130.3	1,452.0	25 - 50
St. Catherine	301.3	159.4	1,709.0	18 - 50
Clarendon	607.7	160.4	2,656.7	10 - 30
Manchester	1,126.3	282.2	4,080.4	25 - 70
St. Elizabeth	1,328.3	789.3	9,644.1	29 - 40

Source: Ministry of Agriculture and Fisheries - RADA

Figure 24: Climate Risks and other problems affecting the Project Area



These challenges overall, could curtail the sustainable development of these vulnerable farming communities. The introduction of better water, land and soil conservation techniques will aid in the resilience of the communities in this area against the factors identified and ensure the sustainable livelihood of the area's rural population.

Sub-Component 1 will comprise three main elements as highlighted below:

(i) As a first step, the project will undertake a characterization of the project area using available baseline data. This will be supplemented by assessments conducted by technical personnel in the field.

(ii) The characterization of the project area will be followed by risk and vulnerability assessments of the prioritized sectors in the project area (the priority sectors are water resources, agriculture & food security, and land use and environmental management) which will be developed, based on the climate scenarios produced in Investment I. The vulnerability assessment will help to determine the added risk of climate change to the economic, social, and infrastructure of the area for incorporation into an adaptation plan for the area. This is important given the area's fragility, including the fact that the economy of the area is largely dependent on rain-fed agriculture. The vulnerability assessments undertaken under Investment Programme I will provide risk and vulnerability assessments at the sectoral and broad regional level within the island, however the assessments done at the targeted project area will be more precise and detailed. They will provide risk profiles for use in the selection of sites for Climate Change Adaptation and Disaster Risk Reduction interventions with the expectation of scaling up and replicating to other parts of the country and the Caribbean region. Adaptation plans for the prioritized sectors, the infrastructure and the vulnerable communities in the project area will then be developed.

(iii) Once developed, the climate change adaptation and disaster risk reduction plans will be implemented in close collaboration with the communities, including the private sector and the relevant government agencies. This phase includes the training and awareness building activities necessary to empower the project beneficiaries to develop crop resilience, improve their well-being and to share lessons learnt. In addition, working with RADA and the University of the West Indies, Geology and Geography Departments farmer field schools will be established in the project (Investment Project 2) to help build the adaptive capacity of farmers to cope with the impacts of climate variability and change.

The adaptive strategies will involve the development of alternative water harvesting methods such as:

- mini-dams
- reservoirs
- rainwater harvesting

- gravity drip irrigation systems
- training
- efficient water use technologies to increase water to farmers
- scaling up of successful practices

The establishment of a managed artificial recharge system in Sevens, South Clarendon will also be supported. It is anticipated that this approach can be usefully applied with the primary benefits of: a) buffering the impacts of climate extremes (droughts and floods) in particular augmenting water supply during the dry season; b) reversing the deterioration of water quality within the basin due to saline intrusion; and c) regulating variability on the temporal aspects.

Management of artificial water recharge is a key water resources adaptation strategy being promoted by the GOJ. The Rio Minho River Basin was one of three potential candidates for a managed artificial recharge scheme, the others being the Rio Cobre hydrologic basin and the Kingston and St. Andrew hydrologic basin. All three basins are located along the south coast of the island in the rain shadow area which receives less than 1 500mm of rainfall per year. The underground resources in Kingston and St. Andrew are highly polluted, and thus that aquifer would not be a good candidate for artificial water recharge. Of the remaining two basins, the Rio Minho aquifer was selected for piloting under the SPCR because an artificial aquifer recharge project will be supported in the Rio Cobre Basin under the NWC/IDB Kingston Metropolitan Area Water Supply Improvement Project Programme.

The selection of the Rio Minho hydrologic basin is further justified on the following grounds:

(i) Contribution to agricultural production/water supply

The basin historically has been a major agricultural area with large public and private irrigation systems. The groundwater flow is to the south where the water is needed (reservoir area with wells) but where the salinity is elevated

(ii) Current Status

The basin was over-pumped in the pre-1961 period when no legislation governing the level of abstraction was in place. The over abstraction has led to significant seawater intrusion into the limestone aquifer of the basin with the closure of several wells.

(iii) Water demand

Due to demographic changes, water demand within the basin is increasing and by 2025 the basin will be in stress as the large and increasing withdrawal of groundwater is unsustainable. The Rio Minho now recharges the aquifer in the low to medium flow rate periods, but in the rainy

seasons there are significant high flows that flow directly to the sea. Trapping a part of these high flows for recharge will lead to increased groundwater storage and improved water quality.

(iv) Availability of land

The proposed site has sufficient land for implementing the project and the river flows less than 100m to the east of the site.

The WRA has indicated that recharge water will undergo treatment prior to injection in the aquifer for turbidity and bacterial contamination. Additionally there are no major industries that are located up gradient of the site to contaminate the river flow. The high river flows carry a high sediment load from the upper watershed which is in a degraded condition due to poor farming practices and informal settlement with the clearing of land. The preliminary design of the MAR system includes a settlement basin where the water will be treated with Alum to remove the particulate material and with granular chlorine to kill the bacteria before injection. It is not expected that any bacteria remaining after chlorination and entering the aquifer will survive in the anaerobic conditions that exist in the aquifer. Water quality conditions will be maintained at a high level to avoid clogging the aquifer and contaminating the existing groundwater resources.

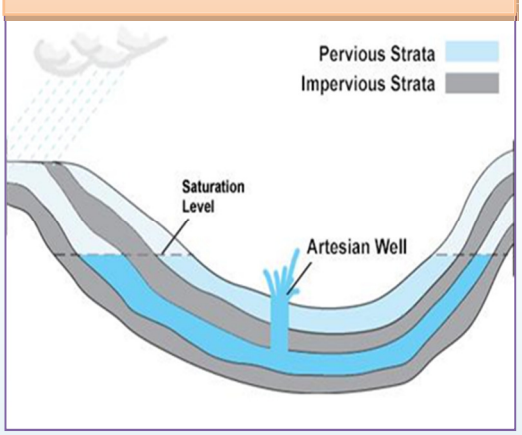
PPCR resources will be used to conduct test drilling to determine the most appropriate siting of the artificial aquifer within the designated area.

In addition, the activities include enhanced resilience of watersheds through the use of technologies to improve soil moisture retention; sustainable farming practices, reforestation of denuded hills, and community involvement in climate change adaptation. Other activities include: establishment of green gullies in selected areas; and improvement of drainage systems in selected farming communities. Combined, these activities will contribute to the alleviation of poverty and will help to ensure sustainable livelihoods in the context of current and emerging climate change challenges.

Some of the strategies will include innovative and transformational changes including the use of vetiver (*Vetiveria zizanoides*) grass as part of the soil conservation efforts in the Rio Minho and Rio Bueno-White River WMUs (Box 7). This grass can also be used to make craft items; and an essential oil for the making of perfumes. Another grass that will be promoted for soil conservation is the lemon grass (*Cymbopogon marginatus*), which also contains essential oils that can be used to make a wide variety of cosmetics and refreshing beverages; the use of mined bauxite pits for water storage and aquaponics will also be explored.

Box 7: Water Harvesting Innovations

ARTIFICIAL GROUNDWATER RECHARGE



SOIL CONSERVATION

WATER STORAGE IN MINED BAUXITE PITS

10.5 Institutional Arrangements

The development of the climate change policy and action plan, as well as the mainstreaming of climate change adaptation/resilience in development policies and public sector corporate plans will be led by the Environmental Management Division (EMD) of the MHEW. This will be done in collaboration with the Cabinet Office and the relevant government ministries and their agencies. With respect to the mainstreaming of climate change adaptation/resilience in local, sectoral and other development plans, this initiative will be led by the PIOJ in collaboration with the Ministry of Local Government, NEPA, as well as other central government ministries and their agencies.

The vulnerability assessment component will be led by ODPEM in collaboration with the MOA, Local Government and the Ministry of Housing, Environment & Water.

The Water Resources Authority will be responsible for piloting the artificial recharge of the limestone aquifer project. Other stakeholder agencies such as the National Irrigation Commission (NIC), National Water Commission (NWC), Sugar Company of Jamaica and Local Government, will be incorporated in the implementation of this component.

The Ministry of Agriculture & Fisheries, through its agencies: Rural Agricultural Development Authority (RADA), the Forestry Department, the National Irrigation Commission as well as the Water Resources Authority, will coordinate the implementation of activities related to sustainable land management, agricultural risk management, and adaptation strategies. With respect to the aquaponics element, the project will benefit from an ongoing USAID financed initiative in Westmoreland and Trelawny.

10.6 Risks

The main risks associated with this investment project are:

No	RISKS	LEVEL	APPROACH TO MANAGING RISKS
1	Technical difficulties in operationalizing the Artificial Aquifer Recharge component – high turbidity, increasing cost of pre-injection treatment and clogging injection wells/sinkholes; poor water quality being injected due to treatment being inadequate and lack of water to maximize recharge especially during the dry season	Medium to High	Construct, monitor and maintain pre-injection water treatment facilities
2	Low levels of community participation	Medium	Establish demonstration plots to demonstrate new sustainable practices. Organize project sensitization meetings and adopt community participatory approaches in the project formulation stages.
3	Imposed limits to expenditure by the GOJ	Medium	Focus available funding on the key activities; extend the life of the project to allow more time for implementation.; maximize value received for all project expenditures
4	Natural disasters	Medium	Implement adaptation strategies by all the key implementing agencies..
5	Late disbursement of project funding	Medium	Ensuring that all pre-disbursement conditions are met in a timely manner.
	Extended delays in the implementation of important components to be led by partner implementing agencies	High	Ensure the provision of adequate human resources and organizational support required for timely implementation of programme components.
6	Interagency coordination and implementation challenges	High	Clearly defined and fully agreed roles and responsibilities for each implementing agency; adequate resourcing of implementing agencies for tasks assigned.

INVESTMENT COSTING (US$)

The investment cost for IP 2 is given in Table 31.

Table 31: Investment Costing for Investment Project 2

No	ITEM	PPCR GRANT	PPCR LOAN	CO-FINANCING	TOTAL
1.	Mainstreaming climate resilience in development plans, regulations & legislation	1,500,000		**100, 000**	**1,500,000**
2	Vulnerability Assessments & Adaptation plan for Project Area	500,000			**500,000**
3	Artificial Aquifer Recharge	1,000,000	3,600,000		**4,600,000**
4	Land Management Measures	1,500,000		**1, 250, 000**	**2,750,000**
5	Water Harvesting and Management Infrastructure	2,500,000		**1, 250, 000**	**3,750,000**
6	Project Management, Monitoring, Evaluation and Auditing	700, 000			**700, 000**
	TOTAL (US$)	**7,700,000**	**3,600,000**	**2, 500,000**	**13, 800, 000**

The results framework for IP2 is given below.

Table 32: Results Framework for IP 2: Mainstreaming climate change adaptation in local sectoral and national plans, and decision-making processes and implementing integrated climate change adaptation strategies in targeted river basins

Component	Indicator	Output	Baseline data/status	Expected outcomes
Creation of enabling framework for mainstreaming climate change adaptation	Change in the number of national and sector level plans and development policies & regulatory frameworks that integrate climate resilience & vulnerability reduction considerations; change in global adaptation index; evidence of a functioning cross sectoral co-ordinating mechanism for CC;	Climate change policy document to establish enabling framework Key national sectoral and local plans adjusted to include climate considerations	CC- related responsibilities are dispersed among agencies Project M&E	Institutional framework established to enable effective coordination implementation and regulation of CC matters across the public sector. Improved integration of climate resilience in country development strategies, plans, policies at all levels

Component	Indicator	Output	Baseline data/status	Expected outcomes
	evidence of CC consideration in budget prioritization framework			
Development of (location specific) vulnerability assessments of the prioritized sectors in the project area; development of adaptation plans for the prioritized sectors, the infrastructure and the vulnerable communities in the project area	Vulnerability assessments and CC adaptation plans of prioritized sectors completed	Vulnerability assessment of priority sectors in the project area; comprehensive adaptation plans for the project area	Preliminary assessments	Improved integration of climate resilience in the development strategies and plans for the project area
Detailed vulnerability assessment of the health sector	Comprehensive health sector vulnerability assessment and investment plan,	Health sector vulnerability assessment report and investment plan	Preliminary assessments Project M&E	Improved understanding of the vulnerability of health facilities and the cost of making them climate resilient.
Implementation of the CC adaptation options formulated for the project area	Change in the acreage of farms with sustainable access to water for agricultural and domestic use; number of farmers using sustainable farming techniques; reduction in the real cost of climate change related losses/damage suffered by agribusiness operators in the project area; evidence of use of knowledge and learning by project beneficiaries	Water harvesting and management infrastructure; sustainable land management measures implemented; agricultural risk management/ adaptation practices adopted	Baseline study conducted Project M&E	Increased capacity of the project beneficiaries to withstand/recover from climate change or climate variability on agricultural and other economic activities

11.0 INVESTMENT PROJECT 3

Mechanisms for the Sustained Financing of Climate Change Adaptation Initiatives

Leading MDB: IDB

Estimated Amount: US$6.4 million

Priority Sector Addressed: Adaptation Financing

11.1 BACKGROUND

Over the ten year period 2001-2010, hydro-meteorological hazards have caused damage and losses estimated at J$111.8 billion. In 2004, one hurricane alone resulted in damage and losses amounting to J$36.9 billion, or 8% of GDP. On average over the ten year period 2001-2010, the damage and loss suffered due to these hydro- meteorological events, amounted to approximately 2% of Jamaica's GDP. The PPCR was therefore developed with a view to among other things, pilot initiatives that can help countries like Jamaica to increase their resilience to the impacts of these hydro-meteorological hazards.

Having recognized from the outset that the financing available under the PPCR will not be sufficient to implement all the components of any strategic programme formulated to address climate change, a key objective of the PPCR is to leverage the financing required to ensured that Jamaica will be in a position to implement the key elements of its strategic programme for climate resilience. To this end Jamaica is seeking through this investment programme to put in place self-sustaining financing arrangements, that will enable the ongoing funding of climate change adaptation projects long after the PPCR would have been fully implemented. The mechanisms proposed will.

i) enable the private sector , especially those operators who are least able to access loan financing to climate proof their businesses or income generating activities, to do so through a revolving loan programme
ii) Provide the opportunity to community based organizations island wide to access grant financing for the implementing of climate change adaptation and disaster risk reduction initiatives that will enhance their resilience to the impacts of climate change.
iii) Provide the opportunity for selected public sector entities that are better equipped to effectively implement adaptation initiatives in a particular community or a number of communities to access grant financing from the trust fund mechanism to do so.

While there are development loan programmes available through the local development banking structure, none is focused on climate change adaptation. Given the risks and likely modest returns to the early adapters to these adaptation initiatives, the cost of funds must provide an

incentive to stimulate demand. A loan programme therefore that will incentivise businesses to borrow to invest in improving their resilience and reducing their losses due to the impacts of climate change should prove attractive. The nature and extent of the demand for these specialized loans have not yet been verified, therefore during the detailed project development phase a survey of potential borrowers will be undertaken to assess the likely demand for this facility. Since the likely extent of uptake has not yet been verified, a limited line is proposed initially, targeting businesses in the agribusiness sector and other related sectors.

Grant funding is available locally through the Environmental Foundation of Jamaica, the Forest Conservation Fund, and the GEF Small Grants Facility, for environmental projects. However, funding for community based climate change adaptation and disaster risk reduction projects is generally very limited, and the funding base of these grant making entities are not sustainable. Therefore, the magnitude of the work to be done island-wide under the SPCR, points to the need for a larger more sustained source of funding. Consequently, for continued implementation of the critical components of the SPCR and climate change programmes to be developed thereafter, the GOJ proposes to access PPCR loan funds to provide seed funding for a Trust Fund. This fund will then be used to leverage additional funding. The interest generated from the funds, will then be used to provide grant funding for climate change adaptation and disaster risk reduction projects and programmes.

As in the case of Community based organizations, many public sector entities charged with the responsibility to implement strategic adaptation and disaster risk reduction activities (which are beyond the scope and mandate of CBOs), have not been able to implement these critical actions due to lack of access to the financial resources required. Hence the clear need for a sustainable source of financing.

Another area of need identified by individuals and businesses that have been adversely affected by extreme weather event is the lack of access to financial resources to enable them to recover from damage and loss suffered and to re-establish their economic activities. Weather related insurance is thus being considered to be a very effective mechanism for transferring some of the climate change risks. The Munich Climate Insurance Initiative (MCII), the Caribbean Catastrophe Risk Insurance Facility (CCRIF), MicroEnsure and Munich Re have recently formed a team which is developing a Climate Risk Adaptation and Insurance programme for the Caribbean, to offer parametric insurance products targeting medium - level weather extremes (such as heavy rainfall and wind events) that are likely to occur once every ten or more years. The programme will target two major groups of customers - individuals through its Livelihood Protection Policy, and loan finance institutions that serve medium, small and micro enterprises through its Loan Portfolio Cover. Given that this initiative is set to commence in June 2012, the PPCR will seek to collaborate with the programme to promote and further strengthen the grant and loan programme and encourage more investment in climate change adaptation initiatives. This is an issue that will be explored more fully during the design and development phase of IP 3.

11.2 DEVELOPMENT OBJECTIVE

Institutionalize mechanisms for financing climate change adaptation and disaster risk reduction initiatives at the national, regional and community levels.

SPECIFIC OBJECTIVES

- To establish a mechanism for the financing of adaptation initiatives for operators in the agribusiness and related sectors.
- To establish a trust fund for the financing of climate change initiatives at the community level by NGOs and CBOs.

11.3 Line of Credit for Private Sector

This component seeks to establish a line of credit through the Development Bank of Jamaica (DBJ) to provide loan financing to small and micro enterprises for climate change adaptation and disaster risk reduction projects. The DBJ a wholesale development financing institution will in the first instance retail funds through the National People's Cooperative Bank (NPCB) network of thirty branches island-wide. The funds will, if deemed desirable, be retailed through other financial institutions approved by the Development Bank of Jamaica. The priority sector for the loan financing will be the agribusiness sector.

The DBJ currently wholesales a number of lines of credit each targeting different segments/sectors. The climate change adaptation loan facility will thus be another specialized line of credit available through the development banking network.

It is proposed that the PPCR funds will be made available by the GOJ to the DBJ, which will then lend to the NPCB and any other agreed approved institution. These institutions will then lend to businesses at approximately 6 % p.a. The NPCB will bear the risk of lending to the customer; hence they will get the largest spread. They will be expected to repay the DBJ whether or not they are repaid by their customers. The DBJ will then use the funds collected to make new loans to the NPCB. The GOJ will repay the IADB in keeping with the loan repayment terms agreement.

To ensure that funds are made available under terms and conditions desirable to all parties and utilized in a timely manner, a survey will be conducted during the design phase of the project to ascertain the nature and extent of demand for financing and approaches to maximizing uptake.

11.4 Establishment of Trust Fund

This ensures that grant financing is available to finance community based adaptation initiatives islandwide. The trust fund will be established with seed financing of US$5.0 million, and a target

to leverage an additional US$15.0 million over a five year period. The Trustees of the Fund will be guided by an approved investment policy that will seek to maximize income generated, without exposing the funds to above normal risks.

Although other development partners have not yet been approached, consideration is being given to use PPCR seed funding to leverage additional funds from Jamaica's bi-lateral development partners. This could be in the form of grants, or possibly a 'debt for climate change swap' with one of our key development partners. Consideration is also being given to leveraging funding from the GEF, Adaptation Fund, and the Green Fund, when it is established. Another option being contemplated is collaborating with public sector agencies with responsibility in the natural resources management sectors, to solicit contributions on a regular basis from persons who use or benefit from the services provided by these natural resources. Other possibilities include fees from large companies emitting greenhouse gases, as well as proceeds from the carbon market.

It is anticipated that by the fifth year of the establishment of the Fund it will have the potential to generate the target income of US$500 000 – US$1 000 000 per annum.

The income generated from the funds invested will be utilized to finance adaptation and disaster risk reduction projects and cover costs associated with the day to day operation of the fund or programme management charges. Grants from the trust fund will be accessed by community based organizations, other civil society groups and selected public sector agencies, for clearly defined high priority activities, particularly related to building the resilience of the natural environment and contributing to livelihoods protection and poverty reduction. Strategic priorities will be identified for funding and appropriate limits will be set for grant amounts and proportion of funds available to community based/civil society organizations. To ensure efficiency and effectiveness the fund will collaborate with existing agencies engaged in climate change adaptation at the national, regional and community level.

11.5 Institutional Arrangements

The line of credit for the private sector will be managed by the Development Bank of Jamaica and disbursed through its network of NPBC and other approved institutions if deemed necessary.

Since the DBJ and the NPCB already have an administrative machinery in place to administer a number of lines of credit/loan portfolios, it is anticipated that the spread agreed and received will cover the marginal cost of administering the programme. Provision will however have to be made for promoting the line of credit to potential borrowers. Provision will be made under the programme to the DBJ with the financial support to implement a promotional campaign, and the DBJ will also be required to provide periodic progress reports on the performance of the line of credit.

With respect to the Trust Fund, an independent but fully accountable board will be established to guide the direction of the Trust Fund. The Board will be made up of:

- representatives of public sector entities with responsibility for water, environment, finance & planning (2)
- representatives of civil society; (2)
- development bank (1)
- development partners that contributed to the fund (2)
- private sector (2)

The Board may be chaired by a government representative or other board member. Subject to further refinements, the proposed management structure and arrangements for the Trust Funds are as follows:

1. Board of the Trust Fund – It will:
   - oversee high level activities of the Trust Fund, including policy and operational guidelines, strategic direction and reporting (including the development of criteria for accessing funding and ensuring access by targeted/vulnerable groups for priority activities)
   - oversee the investment and management of the fund held
   - make decisions about operation of the Fund

At least two sub-committees of the board will be established, these are the Finance and Investment Committee and the Grants Committee

a) The Finance & Investment Sub-committee: This Sub-committee will

   - manage/ oversee the transfers of funds to the Trust Fund accounts
   - manage investment of funds, or contract professional fund managers to invest and manage funds in keeping with investment and fund management policy
   - Recommend the annual amount that will be available for grant making activities (from income generated by the fund);
   - manage transfer of funds from the Trust Fund's bank account

b) Grants sub-committee: This Sub-Committee will
   - make decisions on allocation of grant to projects and the disbursement of funds. Grant requests above a predetermined dollar value will be presented to the full board for decision
   - make request of the Trustees to disburse funds to the implementing organizations approved for grant funding

2. A Technical Group that provides substantive reviews of projects – this group made up of appropriately qualified persons, will provide support to the Grants Sub-committee and the secretariat, in the assessment of projects submitted.
3. A Secretariat – that manages the day to day operation of the Trust Fund, including the processing and appraisal of applications and monitoring of projects being implemented.

The PIOJ in collaboration with the MDB will coordinate the implementation of this component.

11.6 Risks

The main risks associated with this investment project are outlined below:

No.	Risks	Level of Risk	Approach to Managing Risks
1	The inability of the GOJ to access the PPCR loan financing due to limited 'fiscal space' or unavailability of anticipated loan funding under PPCR	Medium	Delay implementation of project or seek to access funding that may become available under other projects/programmes
2	Limits to public sector expenditure imposed by the GOJ under the IMF agreement	Medium - High	Focus on the most critical projects submitted for funding; extend the life of the PPCR project.
3	The unwillingness or inability of the private sector to access loan financing	Medium	Based on survey conducted and information gleaned, implement strategies to address constraints to the uptake of funds.
4	Inability to leverage additional grant financing through regular mechanisms, to strengthen the Trust Fund	Medium	Explore other creative options or partnerships for establishing the Fund.
5	Late disbursement of project funding	Medium	Ensure that all pre-disbursement conditions PPCR and leveraged financing are met in a timely manner.

INVESTMENT COSTING (US$)

The investment costing for IP3 is given in Table 33.

Table 33: Investment Costing for Investment Project 3

No	Item	PPCR Grant	PPCR Loan	Total
1.	Line of Credit for the Private Sector	0	1,400,000	**1,400,000**
2	Seed Funding for the Trust Fund	0	5,000,000	**5,000,000**
	TOTAL (US$)	**0**	**6,400,000**	**6,400,000**

The results framework for IP3 is given below.

Table 34: Results Framework for IP 3: Mechanisms for the Sustained Financing of Climate Change Adaptation Initiatives

Component	Indicator	Output	Baseline data/status	Expected outcomes
Establishment of a Line of Credit to provide loan financing to the private sector, with emphasis on agribusiness	Number of adaptation projects funded; Line of Credit for MSMEs established; the dollar amount of financing leveraged annually from other sources by PPCR funding; change in the real cost of losses/damage suffered by loan beneficiaries, due to climate change.	Operational Line of Credit Loan agreements; Adaptation initiatives implemented	Preliminary demand study Project M&E	Increased resilience of the private sector to the impacts of climate change Reduction in the loss of income suffered by small and micro business operators.
Establishment of Trust Fund; Leveraging of additional funding and provision of financing to implement community climate change adaptation and disaster risk reduction initiatives	Number of vulnerable communities and groups benefiting from grant funding; dollar amount of financing leveraged annually from other sources by PPCR funding; change in the real cost of climate change related losses or damage suffered by beneficiaries of the projects financed. (especially female headed households)	A viable trust fund; Grant agreements; Adaptation initiatives implemented;	Preliminary need assessment Project M&E Damage reports	Increased resilience to the impacts of climate change at the community level Reduction in the level of damage and loss suffered

PART III: PROGRAMME PREPARATION GRANT

PILOT PROGRAMME FOR CLIMATE RESILIENCE **Project Preparation Grant Request[7]**			
1. **Country/Region**:	Jamaica	2. **CIF Project ID#**:	(Trustee will assign ID)
3. **Project Name:**	Improving Climate Data and Information Management		
4. **Tentative Funding Request (in USD million total) for Project[8] at the time of SPCR submission (concept stage):**	*Loan: 0*	*Grant: US$7.1 million*	
5. **Preparation Grant Request (in USD):**	*US$30 000*	*MDB: World Bank (IBRD)*	
6. **National Project Focal Point**:	*Mr. Hopeton Peterson* *Manager- Sustainable Development Regional Planning* *Planning Institute of Jamaica*		
7. **National Implementing Agency (project/programme):**	*Planning Institute of Jamaica*		
8. **MDB PPCR Focal Point and Project/Programme Task Team Leader (TTL)**:	*Headquarters–PPCR Focal Point:* *Kanta Kumari Rigaud* *kkumari@worldbank.org*	*TTL:* *Enos E. Esikuri* *eesikuri@worldbank.org*	

[7] A separate template needs to be presented for each project and programme preparation grant request listed in the SPCR.

[8] Including the preparation grant request.

9. **Description of activities covered by the preparation grant:**

- Undertake due diligence activities (technical, economic, social, environmental, risk, etc.) to prepare the PPCR full project proposal document (including preparation of the Project Appraisal Document (PAD), Operations Manual, and related Annexes) and any necessary workshops, consultations, for PPCR-SC and World Bank Board consideration;

- Stocktaking and assessment of the existing technical, institutional and human resources capacity of the national meteorological services and national hydrological services and identify modernization investments and outline measures to ensure sustainability;

- Review existing information and determine current and future user needs (including consultations on how best to communicate targeted information to users, how to build in-country ownership of hydromet services, etc.). Consultations will be held with stakeholders and sectors consuming meteorological, climatic, and hydrological information (e.g., local authorities, energy, insurance, transport, civil aviation, agriculture, tourism, etc.);

- Securing short-term technical support for project preparation and implementation readiness including preparation of detailed TORs for activities outlined, and oversight and management of activities undertaken in project preparation phase.

10. **Outputs:**

Deliverable	**Timeline**
(a) Inputs to the Project Appraisal Document	Throughout the grant execution period
(b) Environmental and Social Impact Assessment and associated Management Framework/Plan	4 months from start of grant effectiveness
(c) Technical reports and system modernization and sustainability plans	3–7 months from start of grant effectiveness
(d) Institutional capacity strengthening and client communication plans	Throughout the grant execution period

11. **Budget (indicative):**

Expenditures[9]	**Amount (USD) -** estimates
Consultants	200,000
Equipment	30,000
Workshops/seminars	20,000
Travel/transportation	15,000
Others (admin costs/operational costs, PIU project-support staff)	25,000
Contingencies (max. 10%)	10,000
Total Cost	**300,000**
Other contributions:	
• Government	5,000 (in-kind)
• MDB	

[9] These expenditure categories may be adjusted during project preparation according to emerging needs.

• Private Sector	
• Others (please specify)	

12. **Timeframe** (tentative)

Submission of pre-appraisal document for PPCR Sub-Committee Approval: December 2012
Expected Board/MDB Management[10] approval date: February 2013

13. Other Partners involved in project design and implementation[11]:

The Climate Studies Group of the University of the West Indies (Physics Department and the Computer Sciences Department); the Office of Disaster Preparedness & Emergency Management; the Ministry of Agriculture & Fisheries; the Ministry of Health; Panos and the Caribbean Institute for Media & Communication.

14. **If applicable, explanation for why the grant is MDB executed:** Not applicable.

15. **Implementation Arrangements** (includes procurement of goods and services)**:**

The PPG will be implemented by the Government of Jamaica through the Planning Institute of Jamaica which is the Project's focal point, in collaboration with the Meteorological Services, Jamaica. All PPG activities would be supervised by the World Bank in order to ensure compliance with its operational policies and procedures, including procurement and financial management guidelines.

[10] In some cases activities will not require MDB Board approval

[11] Other local, national and international partners expected to be involved in design and implementation of the project.

ANNEX 1: PROGRAMME LOG FRAME

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Risks and Assumption
Programme Goal: Enhanced resilience to the impacts of climate change at all levels in Jamaica	• Per cent reduction in communities and population adversely affected by climate change impacts • Number of communities in which climate change programmes are implemented • Number of policies and national plans incorporating climate change considerations and with emphasis on vulnerable groups, particularly women, children and persons with disability • Ratio of climate related disaster damage and loss to GDP • Average number of days for restoration of life line amenities after climate related disasters	Reports from key agencies, for example, ODPEM Initial Damage Assessment Reports Policies and plans with climate change considerations Socio-economic and Environmental Impact Assessment Reports Socio-economic and Environmental Impact Assessment Reports	Climate change adaptation measures are incorporated into broad development planning, and incorporated in local level planning Adequate funding is available to implement climate change adaptation strategies Adaptation to climate change is a national priority and incorporated in the budget prioritization framework Increased incidence of extreme events stymie adaptation efforts
Outcomes for each Component: ***Component 1: Improved climate data and information Management*** • Climate data and information management improved • More accurate predictions and	• Climate data collection, analysis dissemination system in place • Standardized data and information • Improved early warning systems in place. Number of	Project Monitoring Reports Documented systems and procedures Reports from key agencies Project Reports, Reports from key agencies, KAP surveys	Climate data is available and accessible Sectors use scenarios to design and implement measures for climate change adaptation Persons want to be

early warning of extreme weather events • Greater awareness of the impacts of climate change and increased capacity to interpret climate change scenarios and translate them into the sectoral planning processes ***Component 2: Climate change Adaptation in local, sectoral and national plans mainstreamed and integrated climate change Adaptation strategies in targeted river basins implemented*** • Incorporation of climate change considerations into policy and development planning	weather stations and radar system installed • Number of persons (male and female) aware of climate change impacts • Number of high resolution national and sectoral climate change scenarios developed • Number of persons trained in developing and interpreting climate change scenarios in the public and private sectors • Number of sector-based vulnerability assessments undertaken • Degree to which climate change considerations and adaptive strategies are incorporated into policies and programmes and development plans • Number of agencies sharing information on climate resilience • Number of river basin management initiatives with climate	Climate change scenarios in hardcopy and electronic format Project Reports, Reports from key agencies Project Reports, Sectoral Reports Policies and programme with climate change considerations Policies, programmes and plans at all levels showing climate change considerations; stakeholder assessment reports Project Report, Reports from key agencies Project reports, Rural Agricultural Development Authority (RADA) Reports, KAP	trained in developing and utilizing climate change scenarios Private sector interested in using climate change scenarios to aid in planning for climate change Climate change considerations are incorporated in national policies and programmes Climate change considerations are incorporated into river basin management plans Demonstration projects serve to reverse traditional husbandry practices and farmers adopt adaptation measures External factors such as disaster events and pollution do not hamper project

processes and development plans • Enhanced learning and knowledge sharing on integration of climate resilience into development, at the community, national and regional levels • Improved climate resilient river basin planning and management in targeted river basins • Increased capacity of farmers to practise climate sensitive farming • Increased stocks & improved quality of groundwater in the Rio Minho hydrological basin	change considerations and adaptation measures • Number of farmers with increased capacity to adapt to climate change • Number of farms showing climate change adaptation practices • Change in average crop yield and production in the project area • Percentage increase in groundwater yield in the Rio Minho hydrological basin • Degree to which quality of groundwater is improved in the Rio Minho hydrological basin • Funding mechanism(s) is/are operational and accessible • Number of funding source(s) and line(s) of credit established for private sector and community based adaptation initiatives • $ amount of funding	surveys Site visits and spot surveys Regional Agriculture Production Index Project Report, Water Resources Authority (WRA) Reports Reports of funding source(s), Project Reports, Reports from loan beneficiaries Administrative and financial reports	Loan facility is utilized by private sector Capacity exist in community based organizations and groups to manage grants and loans

***Component 3: Financing mechanisms for sustained adaptation initiatives by private sector and community based organizations i**nstitutionalised* Sustainable mechanisms for financing of private sector and community based climate change adaptation initiatives developed	available • Number of adaptation initiatives financed through established funding sources • Number of grants and loans disbursed		

ANNEX 2: BROAD COMPONENTS AND PRIORITY AREAS FOR THE PPCR IN JAMAICA IDENTIFIED IN THE PHASE 1 PROPOSAL

Components	Priority Areas				
	Water Resources	**Agriculture & Food Security**	**Tourism**	**Health**	**Human Settlements & Coastal Resources**
1. Mainstreaming Climate Change (CC) into Sectors		1. Agricultural risk management as it relates to CC		1. Vulnerability assessment of the sector to climate related hazards	1. Integration of multiple climate related hazards into parish disaster plans
Cross-Sectoral	**National Climate Change Policy & Action Plan; Disaster Risk Management**				
2. Facilitating sectoral adaptation measures	1. Scaling up of rainwater harvesting programme	1. Expansion of watershed management programme. 2. Diversification of fisheries – increased promotion of freshwater fishery 3. Irrigation	1. Product diversification	1. Implementation of Water storage management programme 2. Early Warning system – response mechanism to climate sensitive diseases; can be scaled up to regional level. 3. Renewable energy systems; enhanced response to disasters	
3. Strengthening policy / institutional arrangements	1. Development of a flood master plan			1. Data management systems	1. Enhance strategic environmental assessment mechanisms
Cross-Sectoral	**Development of a National Land Use Policy Framework**				
4. Building capacity for planning and	1. Enhanced water modelling capacity and	1. Strengthening the capacity of community groups to adopt land	1. Increased institutional capacity within		1. Improvement to beach management – monitoring,

forecasting, including the use of appropriate tools	monitoring e.g. replicate the Yallahs project 2. Quantification and quality analysis of water resources	management practices related to CC 2. Improved management of coastal and marine ecosystems that support fisheries	the ministry (and its entities) for tracking climate change issues		implementing best practices, addressing setbacks, etc. 2. Strengthening of local authorities – a. Parish Disaster Comm.; Local Dev. Planning 3. Strengthening national authorities for planning
Cross- Sectoral	**National Risk Information Platform – hazard mapping; vulnerability and risk evaluation tools; business continuity planning; improved data management systems**				
5. CC education and awareness		1. Increased use of demonstration plots	1. Translating CC information into language that is understood by all stakeholders		1. Increased support to ongoing and potential programmes
Cross-Sectoral	**Broad programme of knowledge enhancement and awareness building across sectors and stakeholders including MOF and other GOJ staff; Climate change communication strategy; translation of climate change information into economic terms**				

Regional Linkage					
Data Management	**Water Resources**	**Agriculture & Food Security**	**Human Settlements & Coastal Resources**	**Health**	**CC communication**
6. Improvement in data modelling / monitoring	Formation of a water managers forum	Research on climate resilient crops – e.g. expand work of UWI/CARDI	UWI to look at climate resilient buildings	Early warning dengue platform - responsive mechanisms to climate sensitive diseases	Dissemination of information to promote greater awareness and the use of best practices

ANNEX 3 – Lists of participants consulted during the development of Jamaica's SPCR

List of Participants – Kingston Workshop

NAME	ORGANIZATION
Abrahams, Donna	People Action for Community Transformation
Amsale, Maryam	ADA
Beale, Marlon	JCDT
Bernard, Claire	PIOJ
Brown, Philbert	Department of Local Government
Brown, Ronald	UDC
Creary, Marcia	JIEP
Daley, Albert	PIOJ
Dattendean, Merrick	St. Thomas Parish Counsel
Davis, Steven	PSOJ
Donaldson, Andrea	NEPA
Emanuel, Collet	JAS St. Catherine
Griffith, Carmen	CRDC
Harrison, Claudette	Womens Resource & Outreach Centre
Hyman, Tracy-Ann	University of Tokyo
Lafayette, McLymont Indi	Panos Caribbean
McLaren, Andrine	KSAC
McLean, Eistein	RADA
Meikle, Michelle	Jamaica Fishermen Co-operative
Milbourn, Maureen	NEPA
Morris, Hyacinth	PIOJ
Peterson, Hopeton	PIOJ
Pullen, Jannett	JAS, St. Catherine
Reid, Wayne	RADA

Roper, Le-Anne	PIOJ
Spence, Trevor	Participatory Planning Specialist –Facilitator
Swaby, Stacy	NEEC / Voices for Climate Change
Taylor, Michael	Climate Studies Group, UWI
Thorney, George	Association of Development Agency
Williams, Kemesha	Rapporteur

List of Participants - Mandeville

NAME	ORGANIZATION
Bellonfante, Rickey	RADA, St. Elizabeth
Brown, Delroy	St. Elizabeth Parish Council
Dale, Albert	PIOJ
Douglas, Eurica	National Association of Parish Development Committees (PDC)
Foster, Herbert	Chairman, Cockpit Country Southeast Forestry Management Committee
Gunning, Gary	RADA, St. Elizabeth
Harris, Samuel	RADA
James, L Duane	Manchester Chamber of Commerce
Johnson, Rupert	National Solid Waste Management Authority
Lafayette, McLymont Indi	Panos Caribbean
Lee, Maro	RADA, St. Elizabeth
Legg, Andrea	RADA,Clarendon
Mahlung, Clifford	Met. Service, Jamaica - Presenter

Miller, Samuel	Manchester PDC
Panton, Hopeton	RADA, Manchester
Peart, Michael	Member of Parliament
Peters, Morgan	National Association of Parish Development Committees
Peterson, Hopeton	PIOJ
Powell, La-jean	Manchester Parish Council
Rodriques, Phil	Canadian Urban Institute
Sutton, Ann	Clarendon Coastal Area Management (CCAM)
Taylor, Cecil	RADA, Clarendon
Williams , Kemesha	Rapporteur
Wright, Lora	Caribbean Christian Centre for the Deaf

List of Participants – Negril Workshop

NAME	ORGANIZATION
Artley Muir	Fletchers Grove Environment Group
Barnes Ransford	RADA , Hanover
Bisasor Mashario	Social Development Commission
Brown Yalthise	AOC
Campbell Eric	Dolphin Head Local Forest Management Committee
Daley, Albert	PIOJ
Daley Robert	Fletchers Grove Environment Group
Daley Ron	Social Development Commission
Diana McPherson	NEPA
Drummond Evernette	AOC
Evans Kirk	RADA, St. James
Haye Angela	Hanover Parish Development Committee

Holt Recorgo	RADA, Hanover
Honegghon Hayden	Fishermen Co-operative White House
Lee Grace	Negril Chamber of Commerce
Lorene Holness- Muir	Fletchers Grove Environment Group
Mahlung Clifford	Met Service
McKenzie Anthony	NEPA
Moore Burtel	Mayor– Savanna-La-mar
Morrison Ryan	Negril Cluster
Myrie Nigel	PDC– Westmoreland Cluster of Commerce
Peterson Hopeton	PIOJ
Reid Kareen	Social Development Commission
Simms Doneika	Negril Environment Protection Trust
Smith Evelyn	JHTA, Negril Chapter
Stennett Norman	Dolphin Head local Forrest Management Committee
Stewart Linton	Social Development Commission
Swaby, Stacy	NEEC
Taylor Barrington	NEPA
Vassel Roan	RADA Hanover
Wallace Carey A.M	Negril Chamber of Commerce
White John	Social Development Commission
Whittley Grace	Westmoreland Parish Council
Wilks Ray	RADA St. James
Williams Kemesha	Rapporteur
Williams Lambert	Negril Cluster
Williams St. John	RADA
Wilson Carlton	Westmoreland Parish Development Committee
Woodit Tamara	Negril-Green Island Area Local Planning Authority

NAME	ORGANIZATION
Alvaranga, Denton	Rural Agricultural Development Authority
Baugh, Norman	Rural Agricultural Development Authority
Benjamin, Jaya	Portland Environmental Protection Association
Bennett, Cleo	Social Development Commission
Brown, Marcia	Portland & Boundbrook Parish Development Committees
Condappa, Nicole	St. Mary Parish Council
Cousins, Francine	Portland Environmental Protection Association
Daley, Albert	PIOJ
Doyley, Omar	Drivers River District Area Council
Hartley, Dorrel	St. Mary Parish Development Committee
Hoffard, Angela	Portland Environmental Protection Association (Peace Corp)
Hope, Ishiwawa	Social Development Commission
Howard, Kavil	Rural Agricultural Development Authority
Jankie, Yolande	St. Mary Parish Council
Lafayette – McLymon, Indi	Panos Caribbean
Lawes, Stanford	Rural agricultural Development Authority (St. Mary)
Lawrence, Doreen	Boundbrook Community Development Committee
Lewis, Denise	Portland Parish Council
McKenzie, Anthony	National Environment & Planning Agency
McKenzie, Burchell	Moore Town Maroon Council
McPherson, Diana	National Environment & Planning Agency
Miller, Ewart	Rural Agricultural Development Authority
Morgan, Delford	College of Agriculture, Science and Education
O'Hare, Howard	Rural Agricultural Development Authority (Portland)
Parks, Everton	Banana Board
Protz, Maria	CARIMAC & Food and Agricultural Organization/ CSDI Project

Richards, Talman	(Not stated)
Richardson, Barabra	Balcarres Community Development Committee
Simms, Gloria	Maroon Indigenous Woman Circle
Spence, Trevor	Independent consultant - Facilitator
Sterling, Col. Wallace	Moore Town Maroon Council
Taylor, Michael	University of the West Indies
Thompson, Phillip	Buff Bay Local Forest Management Company
Walker, Uriah	Community Development Committee
Wilks, Lennette	Portland Parish Development Committee
Williams, Kemesha	Rapporteur

ANNEX 4: Selected complementary climate change projects being implemented

	PROJECT TITLE	OBJECTIVE/DESCRIPTION	IMPLEMENTING AGENCY	FUNDING AGENCIES	STATUS
1.0	**TERRESTRIAL RESOURCES**				
	Climate Change Adaptation and Disaster Risk Reduction	The project seeks to: rehabilitate and improve management of selected watersheds to reduce downstream run-off and associated pollution and health risks; restore and protect coastal ecosystems to enhance natural buffers and increase resilience; it seeks to integrate climate change mitigation and adaptation into relevant national policies and plans; enhance institutional (human and technical) capacity and facilitate awareness-building amongst Jamaica's population to better adapt to climate change.	PIOJ	EU, UNEP, GOJ €4.5m	Implementation commenced, it will contribute to PPCR objectives & PPCR will build on its outputs.
	Jamaican Adaptive Agriculture Program	The goal is to increase the adaptive capacity of Jamaican farmers and fishers to respond to climate change while developing a resilient and sustainable form of agriculture-based microenterprise and providing economic opportunities for youths. The programme will introduce aquaponics/fish farming and hydroponics (soiless crop production) at 5 schools and 20 small farms and fishing communities (2010-2013).	INMED Partnerships For Children	USAID $745,482	Being Implemented
	Capacity Building for Sustainable Land Management in Jamaica	To enhance 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	Forestry Department	GEF	Implementation commenced, it will contribute to PPCR objectives

	PROJECT TITLE	OBJECTIVE/DESCRIPTION	IMPLEMENTING AGENCY	FUNDING AGENCIES	STATUS
		strategy development.			
	Hazard Mapping, Disaster Vulnerability & Risk Assessment: Caribbean Risk Atlas	The two main components of the project are: a) A regional Risk Atlas that contains spatial data on risk from hurricanes, and earthquake in the Caribbean; b) High Resolution risk maps for selected territories within the Caribbean. The project will also carry out training courses & workshops for professionals employed in the field.	Disaster Risk Reduction Centre	World Bank	Ongoing; PPCR will build on this project, possibly developing on the Risk Atlas for Jamaica.
	Enhancing the resilience of the agriculture sector and coastal areas to protect livelihoods and improve food security	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 against climate change risks. The three main components of this project are**:** a) Increasing the climate resilience of the Negril coastline; b) enhancing the climate resilience of the agricultural sector by improving water and land management in select communities; c) Improving institutional and local level capacity for sustainable management of natural resources and in disaster risk reduction in the targeted vulnerable areas.	PIOJ	Adaptation Fund	Concept approved
	WATER RESOURCES				
	Rain Water Harvesting (RWH)	Objective: To increase awareness of government and the public 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	Water Resources Authority	GOJ	Completed

	PROJECT TITLE	OBJECTIVE/DESCRIPTION	IMPLEMENTING AGENCY	FUNDING AGENCIES	STATUS
	(WRA)	areas regularly affected by drought			
	Water Programme for Environmental Sustainability (WPA II): Towards Adaptation Measures to Human and Climate Change Impacts	This regional project will develop and implement a Groundwater Management Model to assess and manage the aquifer system on a continuous basis. It will make recommendations on best practices for the protection and development of those sites and other similar aquifer systems in the project countries, and within the region using the opportunity to also build capacity. The demonstration project site in Jamaica will be in the Yallahs River Watershed.	Water Resources Authority	The Italian Government	Ongoing; potential for scaling up under the SPCR
	Kingston Metropolitan Area (KMA) Water Supply Improvement Programme	Objective: To optimize water infrastructure performance, reduce no-revenue water levels and strengthen the NWC's performance in terms of operation and maintenance practices. The project has four components. Component 1 includes the construction of an aquifer recharge system designed to sustain the water resources capacity in Spanish Town	National Water Commission	IDB	Project in the pipeline
	AGRICULTURE & FOOD SECURITY				
	FAO Technical Cooperation Programme on	The project will enhance food security and socio-economic well-being of farmers in South St. Elizabeth by promoting increased crop production through rain	MOA&F, NIC	FAO	Ongoing; scope for wider application of lessons learnt island-

	PROJECT TITLE	OBJECTIVE/DESCRIPTION	IMPLEMENTING AGENCY	FUNDING AGENCIES	STATUS
	Promoting Rain Water Harvesting and Small Scale Irrigation in South St. Elizabeth	water harvesting, improved water management and introduction of small-scale irrigation technology			wide.
	TOURISM				
	Caribbean Climate Change Tourism & Livelihoods: A Sectoral Approach to Vulnerability & Resilience	To strengthen, protect, and enhance the economies and livelihoods of Caribbean nations and sectoral stakeholders, who rely directly or indirectly on Caribbean tourism industry; and to strengthen, protect and enhance the natural and built assets, and sectors on which the industry is based. The Jamaican component of this regional project is focused primarily on assessing the vulnerability, resilience, and adaptive capacity of the tourism sector to climate change, in selected destinations in Jamaica. Vulnerability assessments of Long Bay- Negril and Rose Hall- Montego Bay are done. An assessment to be done on the institutional capacity of the tourism sector to adapt to Climate Change.	CCCCC	FCO, CCCCC	Ongoing; the PPCR will build on the outputs of this project.
	HUMAN SETTLEMENTS & COASTAL RESOURCES				
	Building Disaster Resilient Communities Project	Support the establishment of disaster resilient communities, empowered to minimize the impact of natural and man-made disasters on men and women on a sustainable basis, through effective Community	ODPEM	CIDA	Ongoing

	PROJECT TITLE	OBJECTIVE/DESCRIPTION	IMPLEMENTING AGENCY	FUNDING AGENCIES	STATUS
		Emergency Response Teams (CERTs).			
	Natural Hazard Management in Urban Coastal Areas	The objective of this Technical Cooperation is to strengthen disaster risks management in towns and cities located in coastal areas in Jamaica. Activities include Improving Communities' Resilience; 28 communities risk plans will be developed, including risk assessment for Black River, Savanna-la-mar & Ocho Rios.	ODPEM	IADB	Ongoing
	Coastal Multi-Hazard Mapping & Vulnerability assessments towards Integrated Planning & Reduction of Vulnerability for Portland Cottage, Morant Bay & Manchioneal, Jamaica	This project aims to 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, Morant Bay & Manchioneal	PIOJ	World Bank	Project completed; PPCR will build on the progress made under this project
	The Caribbean Community Climate Change Centre (CCCCC) and the Caribbean Catastrophe Risk Insurance Facility (CCRIF) MOU	The Caribbean Community Climate Change Centre (CCCCC) and the Caribbean Catastrophe Risk Insurance Facility (CCRIF) signed an MOU in August 2011.The MOU is designed to assist the governments of Caribbean States in understanding the risks of climate change to their economies and to the peoples of the region, and will help to identify cost-effective adaptation measures to support greater climate change resilience at the local, national and regional level.	CRIF & CCCCC		

	PROJECT TITLE	OBJECTIVE/DESCRIPTION	IMPLEMENTING AGENCY	FUNDING AGENCIES	STATUS
	The Palisadoes Peninsula Shoreline Protection and Rehabilitation	Immediate repair and protection of the extensively degraded shoreline of the Palisadoes Peninsula. This includes raising the road from its existing levels to 2.4 –3.2 metres above sea level.	National Works Agency	The People's Republic of China	Ongoing
	PLANNING FOR CLIMATE CHANGE ADAPTATION & INCREASED KNOWLEDGE AND AWARENESS OF CLIMATE CHANGE				
	The Risk and Vulnerability Methodology Project (RiVAMP)	This project sought to assist decision-makers at the national and local levels to consider risks in future planning, paying particular attention to the potential threats posed by climate change. The project was completed and lessons extracted.	PIOJ	UNEP	Consideration is now being given for training of regional professional in the use of the methodology.
	EU Project - Support to the Global Climate Change Alliance (GCCA) under the 10th EDF Intra-ACP financial framework	The objective of the project is to enhance local, national and regional capacities and resilience in ways that link sustainable development, risk management, and adaptation for a win-win-win situation. The four main components of the project are focussed on: Refining vulnerability and risk assessment methodologies that are more contextually relevant, and build local capacity to better assess the current and future vulnerabilities and risks of specific states and communities within those states; reducing the states vulnerability to climate change through embarking on adaptation pilots; building Regional /National Capacity for Carbon Financing; improving Climate Monitoring, Data Retrieval and Space-based tools for Disaster Risk Reduction;	CCCCC	EU €8.0m	Project approved

	PROJECT TITLE	OBJECTIVE/DESCRIPTION	IMPLEMENTING AGENCY	FUNDING AGENCIES	STATUS
	Voices for Climate Education: A national climate change communication strategy	To develop and implement a national communication strategy on issues related to climate change. Activities will focus on public awareness, on the threats posed by climate change, and strategies to reduce social and economic impact. The communication strategy will utilize popular artists, and sectoral workshops, targeting sectors such as tourism, insurance, agriculture and health.	NEEC, Panos	EFJ, UNDP	Ongoing. PPCR will seek to further develop and implement a national communication strategy for CC.
	Communication for sustainable Development Initiative(CSDI) - Caribbean Programme	The goal of the CSDI Global programme is to help mainstream Communication for Development (ComDev) thinking, planning and communication activities within government agencies that work in the areas of agriculture, natural resource management, food security and climate change. The specific mandate of the CSDI-Caribbean programme is to provide communication, technical assistance and training to FAO initiatives in Jamaica that are engaged in these same areas. The Programme is working in Jamaica, Saint Lucia and Dominica.	Caribbean Institute of Media and Communication (CARIMAC)'s Centre for Communication for Development at UWI.	FAO	Project is ongoing

ANNEX 5: Draft Terms of Reference PILOT PROGRAM FOR CLIMATE RESILIENCE STEERING COMMITTEE (PPCR-ST)

Background

In May 2009, Jamaica accepted the offer extended by the Sub-Committee of the Pilot Program for Climate Resilience (PPCR) to participate in the Pilot Program for Climate Resilience, as one of the six countries in the Caribbean regional pilot programme. The other five countries are Grenada, St. Vincent and the Grenadines, Saint Lucia, Dominica, and Haiti.

The PPCR is among a number of programmes developed to assist developing countries and Small Island Developing States in particular, in their efforts to stave off and minimize the negative aspects of climate change. It aims to pilot and demonstrate ways in which climate risks reduction and resilience building may be integrated into core development policies and plans at the national and local levels. It also seeks to provide incentives for the scaling up of climate resilient actions, building on other ongoing initiatives and the initiation of transformational change.

The pilot programmes and projects to be implemented under the PPCR in Jamaica will be led by the Planning Institute of Jamaica, a statutory body within the Ministry of Finance, Planning and the Public Service. The local PPCR is informed by the national strategies towards Hazard Risk Reduction and Climate Change Adaptation enunciated in Outcome 14, Vision 2030 Jamaica–National Development Plan; the Second National Communication to the UNFCCC, and the draft National Climate Change Policy and Action Plan.

The PPCR is being implemented on a phased basis. At the end of Phase I, Jamaica will have a fully developed Strategic Programme for Climate Resilience to support Vision 2030; and would have reviewed its key sectoral policies and plans with a view to climate-proofing these plans. Phase II will see implementation of selected activities identified under the SPCR in Phase 1. These will focus on three broad areas ***viz.,*** climate data and information management; institutional and sectoral adaptation; and adaptation financing. The programme will complement and reinforce other ongoing and planned CCA and DRR activities. It will also be directly linked to the Caribbean Regional Pilot PPCR particularly in the areas of climate modelling, mainstreaming climate change, health adaptation and water adaptation.

Overall responsibility:

The PPCR Steering Committee will serve as the main mechanism for the provision of technical advice and oversight to the programme management team with responsibility for the implementation of the PPCR. It will seek to ensure that the programme is effectively and expeditiously implemented in keeping with the agreed goals, objectives, outputs and outcomes.

Specific responsibilities

The responsibilities of the PPCR-ST are as follows:

a. Provide technical advice to the programme management team to ensure the effective implementation of the PPCR in keeping with the programme goal, objectives, outputs, budget and implementation schedule.

b. Assist with resolving inter-agency and strategic level issues and risks that may adversely affect the implementation of the programme.

c. Receive reports on programme implementation and report to the Hazard Risk Reduction and Climate Change Thematic Working Group (HRRACC-TWG) on progress being made towards agreed indicators and targets, and constraints to this progress.

d. Use knowledge, influence, authority and resources available to member organizations to assist the programme in achieving its outputs and outcomes.

e. The PPCR-ST will provide input for the finalization of the SPCR and other important strategy or policy related documents prepared under the PPCR.

f. Review, make input as appropriate, and endorse programme deliverables that meet programme specifications.

Procedures

Chair

The PPCR-ST will be chaired by the Director General, Planning Institute of Jamaica or his designate, a vice chair will be elected from the membership.

Term duration

The execution of the programme will be over a four to five year period. Membership of this PPCR-ST will be reviewed after the first two years of its establishment by the PIOJ.

Meeting schedule

The PPCR Steering Committee will meet quarterly or when necessary to perform their duties. An annual calendar of meetings will guide the convening of meetings.

Composition and participation

1. The PPCR-ST will consist of no more than fifteen representatives nominated by their organizations.

2. Members shall be drawn from a cross section of stakeholder groups with interest in and technical knowledge of natural hazards, and climate change risks and issues, including relevant government ministries, departments and agencies, private sector bodies, academia, civil society, and international development partners.

3. The membership of the steering committee will include: Ministry of Finance; Meteorological Services, Jamaica; Association of Development Agencies; Environmental Foundation of Jamaica, UWI –Disaster Risk Reduction Centre, The Climate Study Group, UWI; Planning Institute of Jamaica – Plan Development Unit and PPCR Focal Point; PANOS Caribbean;

Ministry of Housing, Environment and Water, Office of the Prime Minister; Office of Disaster Preparedness and Emergency Management, National Environment and Planning Agency, a private sector umbrella organization, representative from two Local Authorities and the IADB.

4. The Committee may invite the participation of any person(s) whose participation may be critical to any agenda item.

5. Members should be willing to share information with other Committee members about potential resources and opportunities related to the advancement of the PPCR and adaptation to climate change generally.

Decision-making

1. The quorum to take decisions should comprise seven (7) organizational representatives, inclusive of the chair and/or vice-chair.

2. Decisions of the PPCR-ST will be determined by majority vote. In the event that there is a split vote the chair has the deciding vote.

Use of Sub-committees/Technical Working Groups

1. Small sub-committees/technical working groups may be convened by the chair as deemed appropriate to carry out the work of the PPCR-ST.

2. Provisions will be made for persons with special expertise/information to be co-opted from time to time to contribute to the work of these groups.

3. Sub-committees/technical working groups will be disbanded by the chair following successful completion of their work.

Records

1. Detailed Minutes shall be kept of each meeting. This shall include a record of persons present, a concise summary of matters discussed, conclusions reached, timelines for actions and the person responsible for implementing the decision. The PPCR-ST Chair, Working Group Chairs and the PPCR Secretariat shall ensure the accuracy of the Minutes prepared.

2. The records of the PPCR-ST shall consist of all papers and documents pertinent to its operations, including the Terms of Reference, agendas, minutes, reports, and determinations for its proceedings. All unclassified records shall be made available by the PPCR Secretariat for public inspection to the extent required by the Access to Information Act.

Administrative support to the PPCR-ST

The Programme Implementation Unit will provide administrative support to the PPCR-ST. This includes:

1. Disseminating notifications (regarding meetings, etc.) to members of the PPCR-ST.

2. Drafting Agenda for PPCR-ST meetings in consultation with chair; and circulate accordingly

3. Preparing and circulating Minutes of all PPCR-ST meetings on a timely basis (determine timeframe)

4. Circulating working papers for meetings prior to the date of the meetings (determine timeframe)

5. Providing quality control of all technical reports prior to submission to the PPCR-ST.

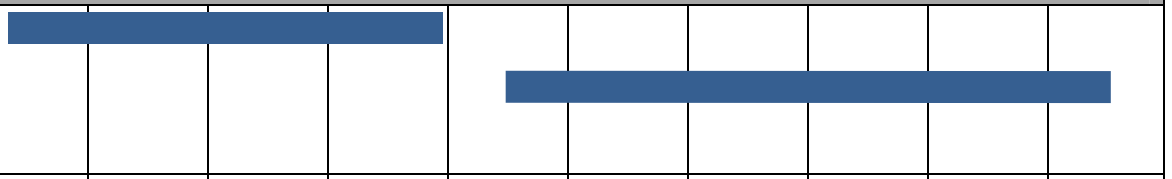
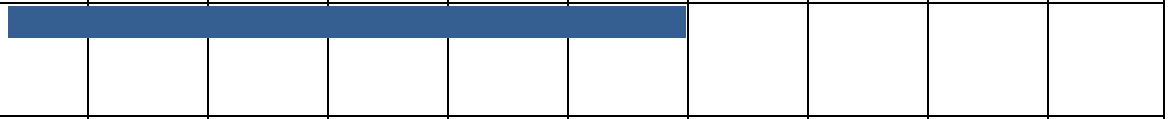
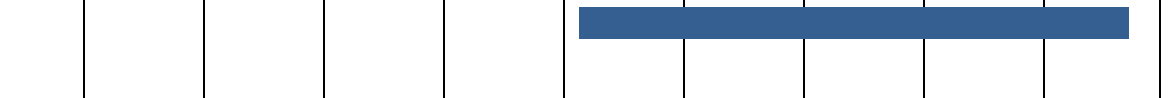
6. Providing regular updates on activities and appropriate follow-up support (determine timeframe).

7. Maintaining communications with the PPCR-ST members and other stakeholders through email etc.

The Sustainable Development and Regional Planning Division will provide technical and backstopping support.

ANNEX 6: PROGRAMME IMPLEMENTATION PLAN

	MAIN ACTIVITIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
1	INVESTMENT COMPONENT 1					
	Improve capacity of MSJ to forecast weather and provide early warning					
	Develop climate change scenarios Develop the capacity of technical personnel					
	Vulnerability Assessments					
	Develop Risk Information Platform					
	Climate Change Education & Awareness					
2	INVESTMENT COMPONENT 2					
	Establish a coherent and multi-sectoral framework for addressing climate change issues					
	Mainstream climate adaptation in the planning framework at the national, sectoral and local levels					
	Characterize project area Conduct risk and vulnerability assessment					
	Develop and implement climate change adaptation and risk reduction plans					

3	INVESTMENT COMPONENT 3	
	Establish line of credit for the private sector Operationalize line of credit	
	Support initiatives to make crop insurance more available to small farmers	
	Establish Trust Fund	
	Operationalize Trust Fund	

ANNEX 7: References

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Table 26: SPCR Results Framework

IP 1: Improving Climate Data & Information Management - responding to climate information needs

Component	Indicator	Output	Baseline data/status	Expected outcomes
Develop high resolution national and sectoral CC scenarios and upgrading of the data gathering network/infrastructure of the Met. Service, Jamaica	Number of national and sectoral CC scenarios developed Number of data gathering stations established Effective national early warning system initialised/installed	CC scenarios for 2030-2040 and for EOC[12]	CC scenarios available at a "coarse" resolution Monitoring and evaluation (M&E)	Increased capacity to develop climate change scenarios; more accurate predictions and early warning of extreme weather events

[12] EOC, End of century, 2090 - 2100

Component	Indicator	Output	Baseline data/status	Expected outcomes
Conduct vulnerability assessments based on scenarios developed; develop and document sector based methodologies for climate resilient planning using CC scenarios, and develop the technical capacity to do so in the public and private sectors	Number of completed vulnerability assessments Coverage (comprehensiveness) of climate risk analysis and vulnerability assessments Number, relevance and quality of knowledge assets created Number of persons (males and females) trained % change in climate change knowledge, attitude and practice	Vulnerability assessments Manuals and guidance documents; training courses conducted	Not available Limited number of professionals trained in interpreting high resolution CC scenarios Project M&E	Increased capacity to interpret high resolution CC scenarios and apply them in the planning process
Establish mechanisms for access to, and for dissemination of climate information; and implement a comprehensive public awareness and education programme targeting all social groups including men, women the sight and hearing impaired	Percentage of the population (male and female) that is more aware of climate change impacts and adaptation options Evidence of use of knowledge & learning Evidence of use of diverse communications tools including braille and sign language to reach special needs groups	Mechanisms in place to increase access to climate change information Knowledge assets targeted to special needs, vulnerable and other groups	Knowledge Attitudes and Practice Survey (disaggregated by gender, location, social and economic vulnerability, disability etc.) Project M&E	Increased awareness of the impacts of climate change and adoption of initiatives to improve resilience

IP 3 Financing mechanisms for sustained adaptation initiatives by the public and private sectors and community based organisations

Component	Indicator	Output	Baseline data/status	Expected outcomes
Establishment of a Line of Credit to provide loan financing to the private sector, with emphasis on agribusiness	No of loans accessed and number of adaptation projects funded Line of Credit for MSMEs established $ amount of financing from other sources by PPCR funding	Operational Line of Credit Loan agreements Adaptation initiatives implemented	Preliminary demand study Project M&E	Increased resilience of the private sector to the impacts of climate change
Establishment of Trust Fund **Leveraging of additional funding and provision of financing to implement community climate change adaptation and disaster risk reduction initiatives**	Functional Trust Fund $ amount of financing leveraged from other sources by PPCR funding	A viable trust fund; Grant agreements Adaptation initiatives implemented	Preliminary need assessment Project M&E	Increased resilience to the impacts of climate change at the community level