

# CLIMATE INVESTMENT FUNDS

PPCR/SC.12/4/Rev.1

April 15, 2013

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Meeting of the PPCR Sub-Committee

Washington D.C.

May1, 2013

Agenda Item 5

**STRATEGIC PROGRAM FOR CLIMATE RESILIENCE  
FOR HAITI**

## PROPOSED DECISION

The PPCR Sub-Committee, having reviewed the document PPCR/SC.12/4/Rev.1, *Strategic Program for Climate Resilience for Haiti*, a country participating in the Caribbean Regional Program,

- a) endorses the SPCR as a basis for the further development of the project foreseen in the strategic program and takes note of the requested funding of USD 25 million in grant funding;
- b) recognizes that the submission of a high quality project proposal will be required for PPCR funding to be approved by the Sub-Committee;
- c) takes note of the estimated budget for project preparation and supervision services for the planned projects and approves a first tranche of funding for MDB preparation and supervision services as follows:
  - i. USD 240,000 for the project, *Climate Proofing of Infrastructures in Centre-Artibonite Loop* (IBRD);
  - ii. USD 250,000 for the project, *Climate Proofing of Agriculture in the Centre-Artibonite Loop* (IDB);
  - iii. USD 250,000 for the project, *Climate Change Adaptation in the Coastal Cities of the Gulf of La Gonâve* (IBRD); and
  - iv. USD 470,000 for the project, *Strengthening knowledge management of Hydro-meteorological, Water Resources and Climate Data to Inform Decision-Making and Policy Dialogue* (IBRD).
- d) requests the Government of Haiti, the Inter-American Development Bank and the World Bank to take into account written comments submitted by Sub-Committee members by May 15, 2012, in the further development of the program.



**HAITI**

**STRATEGIC PROGRAM  
FOR CLIMATE RESILIENCE**



**CIAT**

Comité Interministériel  
d'Aménagement du Territoire



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# **Strategic Plan for Climate Resilience**

# CONTENTS

Contents.....	iv
Abbreviations and Acronyms .....	vi

## Executive Summary

<b>STRATEGIC PLAN FOR CLIMATE RESILIENCE OVERVIEW .....</b>	<b>1</b>
---	----------

<b>Part 1: Context and rationale .....</b>	<b>5</b>
1.1. The country's Current Situation .....	6
1.1.1 Physical Environment .....	6
1.1.2 Climate .....	8
1.1.3 Plant Cover .....	12
1.1.4 Socioeconomic Context .....	13
1.1.5 Natural Disasters linked to Climate .....	23
1.1.6 Institutional and Legal framework .....	28
1.1.7 Knowledge and Information Management .....	31
1.1.8 Public Education and Level of Awareness .....	32
1.2. Development Context and Risks Associated with Climate .....	32
1.2.1 The Development Context .....	32
1.2.2 Climate risks and vulnerability .....	35
1.2.3 Climate change and disaster risk reduction .....	49
1.3. Links with Development Plans, Programs and Projects .....	50
1.3.1 National Initiatives .....	50
1.4. Development Plan and Participative Process for Prioritizing Projects .....	59
1.4.1 Regional Context: Caribbean PPCR Regional Pilot .....	59
1.4.2 Process in Action .....	61
1.4.3 Main Recommendations .....	61
1.5. Rationale for Supporting PPCR .....	63
1.6. Institutional Analysis .....	63
1.6.1 Role of Government .....	63
1.6.2 Role of Private Sector .....	64
1.6.3 Role of Civil Society .....	65
1.7. Strategy and Description of Components .....	67
1.7.1 Strategy and Priority Sectors .....	67
1.7.2 Description of Components .....	70
1.8. Lessons Learned and Good Practice .....	71

<b>Part 2:</b>	<b>Components of the Investment Programme Proposed for PPCR Funding .....</b>	<b>73</b>
2.1.	Brief Overview of Priorities.....	74
2.2.	Overall Objective of the Program.....	74
2.3.	Expected Results .....	75
2.4.	Strategic Elements.....	75
2.5.	Project Information.....	77
2.5.1	Investment Project 1: Climate Proofing of Infrastructure in Centre-Artibonite loop .....	77
2.5.2	Investment Project 2: Climate Proofing of Agriculture in the Centre Artibonit Loop .....	<b>Error!</b>
	<b>Bookmark not defined.91</b>	
2.5.3	Investment Project 3: Climate Change Adaptation in the Coastal Cities of the Gulf of La Gonave .....	103
2.5.4	Investment Project 4: Strengthening Knowledge Management of Hydro Meteorological, Water Ressources and Climate Data to inform Decision-Making and Policy Dialogue.....	112
2.6.	General Budget and Management Arrangements .....	11925
2.7.	Linkage with the Regional Track of the Caribbean PPCR .....	126
2.8.	Monitoring and Evaluation, Learning and Capitalization .....	128
2.9.	Organization Chart and Project Co-ordination.....	129
2.10.	Bibliography .....	131
	Appendices .....	135
	Annex 1: PPCR Results Framework .....	136
	Annex 2 Synopsis of the Haiti SPCR Development Process .....	1455
	Annex 3: List of Stakeholders Consulted (without focal groups and sectoral reports).....	1476
	Annex 4: National and Multilateral Projects of Haiti Contributing to Climate Resilience .....	15348
	Annex 5: Activities Proposed as Part of Scientific Collaboration .....	154
	Annex 6: Haiti SPCR Independent Review and Response Matrix.....	157

# ABBREVIATIONS AND ACRONYMS

AECID	Spanish Agency of International Co-operation for Development
BD	Board of Directors
BME	Bureau of Mines and Energy
°C	Degrees Centigrade
CC	Climate Change
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CARICOM	Caribbean Community
CCCCC	Caribbean Community Climate Change Centre
CIAT	Inter-Governmental Committee for Land Planning
CIDR	Canadian International Development Agency
CNIGS	National Centre for Geo-Spatial Information
CNSA	National Co-ordination for Food Security
CS	Civil Society
CT	Local Authority/Government (Collectivité Territoriale)
DPC	Department of Civil Protection
DRM	Disaster Risk Management
DTM	Digital Terrain Model
ECLAC	Economic Commission for Latin America and the Caribbean
ENSO	El Niño Southern Oscillation
EU	European Union
FAMV	Faculty of Agronomy and Veterinary Medicine (UEH)
FAO	Food and Agriculture Organization (UN)
FSGA/UNIQ	Faculty of Sciences, Engineering and Architecture, University of Quisqueya
GCCA	Global Climate Change Alliance
GCM	General Circulation Model
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GGE	Greenhouse Gas Emissions
GOH	Haitian Government
HDI	Human Development Index
IDB	Inter-American Development Bank
IPCC	Intergovernmental Panel on Climate Change
LiDAR	Light Detection and Ranging
MACC	Mainstreaming Adaptation to Climate Change
MARNDR	Ministry of Agriculture, Natural Resources and Rural Development
MDB	Multilateral Development Banks
MDE	Ministry of Environment
MEA	Multilateral Environmental Agreement
MEF	Ministry of Economy and Finances
MICT	Ministry of the Interior and Local Authorities
MPCE	Ministry of Planning and External Cooperation
MPP	Mouvement des Paysans de Papaye

MTPTC	Ministry of Public Works, Transport and Communications
NAMA	Nationally Appropriate Mitigation Action
NAO/AO	North Atlantic Oscillation/ Atlantic Oscillation
NAPA	National Adaptation Programme of Action to Climate Change
NGO/NGOe	Non-Governmental Organization (environmental)
ONEV	Environment and Vulnerability National Observatory
ONSA	Food Security National Observatory
PAE	Action Plan for the Environment
PIF	Propagules from Stem Fragments
PNAP	National Programme for Early Warning in case of Floods
PNGDR	Disaster and Risk Management National Programme
PNSA	Food Security National Programme
PPCR	Pilot Programme for Climate Resilience
PRIGE	Project for Institutional Strengthening& Management of the Environment
PTTA	Programme for Transfer of Agricultural Technologies
REDD	Reducing Emissions from Deforestation and Forest Degradation
RB	River Basins-Watershed
RESEPA	Strengthening of Agricultural Public Service
SNGRD	National System of Risk and Disaster Management
SNRE	National Water Resources Service
SPCR	Strategic Plan for Climate Resilience
SPGRD	Permanent Secretariat for Risk and Disaster Management
TA	Technical Assistance
UEH	State University of Haiti
UNCCD	United Nations Convention to Combat Desertification
UNDH	Notre Dame University of Haiti
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UWI	University of the West Indies
WB	World Bank Group
WMO	World Meteorological Organization

**Non-SI units**

\$ US Dollars

Toe Ton of oil equivalent

# EXECUTIVE SUMMARY

## STRATEGIC PLAN FOR CLIMATE RESILIENCE

PILOT PROGRAM FOR CLIMATE RESILIENCE		
Summary of Strategic Plan for Climate Resilience		
1. Country/Region:	Haiti /Caribbean	
2. PPCR Funding Request (in USD million):	<i>Grant: USD 25 million</i>	<i>Loan: -</i>
3. National PPCR Focal Point:	Michèle Oriol, Executive Secretary, CIAT	
4. National Executing Agency (Coordination of Strategic Program):	Interministerial Committee for Territorial Management (CIAT)	
5. Involved MDB	IADB and IBRD	
6. MDB PPCR Focal Point and Project/Program Task Team Leader (TTL):	<i>Headquarters-PPCR Focal Point:</i> <i>Kanta K. Rigaud (IBRD)</i> <i>Gerard Alleng (IDB)</i>	TTL: Michel Matera (IBRD) TTL: Gerard Alleng (IDB)
<p><b>7. Description of SPCR:</b></p> <p>Haiti is under constant threat from natural events and now has the additional threat of climate change. In managing disaster risk as well as the impacts and consequences from climate change, it will be necessary to tackle the following issues and challenges: an unprecedented environmental crisis, especially regarding deforestation and the degradation of watersheds; the very difficult living conditions of the vast majority of the population that place the economy, and in particular the agricultural and rural economy at the center of all initiatives; the inadequacy of land planning and the over-exploitation of natural resources; the shortcomings of an inadequate legal and policy framework; and the failure of state structures that are particularly felt in generating reliable data on a regular and ongoing basis.</p> <p>The programs and projects proposed as part of this SPCR include actions to protect the environment in an integrated manner; to improve people’s incomes and living conditions through economically promising activities; to strengthen institutional capacity and the legal framework; and to support and consolidate progress made in the area of climate resilience, all while improving land use and making local communities more adaptable and resilient.</p> <p>The SPCR in Haiti encompasses two types of approaches to adaptation: Adaptation Type 1 involves confronting climate risks that lead to disasters with dire consequences, considering the particular vulnerability of the country today; and Adaptation Type 2 involves anticipating climate risks which will be further intensified over time as a result of climate change.</p>		

The strategy proposed will consider several elements: a pilot program with activities that will serve as a model for other interventions across the country; an Integrated Management of Watersheds (GIBV-component seeking sustainable development of watersheds), such as climate proofing measures for public investments and agriculture, mainstreaming adaptation in coastal management and land planning.. The strategy will combine areas heavily exposed to the effects of climate change and areas to some degree protected from the effects of climate change. Similarly, it will address the country's duality with coexisting realities (50% of the population living in urban areas and 50% in rural areas). Finally the strategy will address the urgent need to strengthen national institutional capacities. In particular it will target and closely monitor climate components and parameters to determine climate impacts for a better-informed decision-making process in the area of natural resource management and a sounder development of investment plans.

In light of these criteria, two geographical areas have been selected to channel the bulk of investments:

*The Gulf of Gonâve arc from Léogâne to Saint-Marc:* A particularly vulnerable area with a very high population density and an uncontrolled urbanization of a territory that is exposed to several risks (cyclones, earthquakes, flooding, sea level rise, salinization of groundwater, and pollution of the Gulf). The disorganized urbanization process leaves the population under severe threats; in addition, sanitary standards are well below normal and poor living conditions.

*The Plateau Central:* A safer area, with lower population density, larger economic potential, and more security for investments, where prolonged droughts constitute the greatest risk to be tackled. Being part of the catchment area of the Artibonite (the country's only river), the area requires water and forest management efforts and changes to existing farming systems.

On the institutional front, the focus will be to strengthen the capacities to monitor climate components and parameters and to monitor and manage water resources in different ministerial bodies and government departments.

#### **Expected Outcomes of the SPCR:**

- ▶ Increased awareness and understanding of the development challenges associated with climate change issues by decision makers and national specialists on natural resources management, within the public and private sector as well as within civil society (CS).
  - ▶ As a result of an awareness-raising campaign targeting the general public, a behavioral evolution in relation to climate risks has been triggered amongst population groups, allowing for greater consideration of climate-change issues in their short-, medium- and long-term decision-making processes.
  - ▶ Target groups and beneficiaries of the PPCR, including women and other vulnerable groups, have improved their income and living conditions, thereby enhancing their climate resilience and adaptation capacities.
  - ▶ Supply chains priority sectors and target areas have been consolidated and redirected so as to increase positive spillover effects that benefit social development and enhance communities' climate resilience.
  - ▶ Level of vulnerability of target groups in priority areas and sectors has been reduced.
- Economic and social loss and damage resulting from natural disasters related to climate change has been reduced.

#### **8. Expected Key Results from the Implementation of the Investment Strategy (consistent with PPCR Results Framework and Core Indicators):**

Expected Results	PPCR Core Indicators
(a) Level of vulnerability of target groups in priority areas and sectors has been reduced.	Number of people supported by the PPCR to cope with the effects of climate change.

(b) Behavioral evolution in relation to climate risks has been triggered amongst population groups, allowing for greater consideration to climate change issues in their short-, medium-, and long-term decision-making process.	Degree of integration of climate change in national, including sectoral planning.
(c) Target groups and beneficiaries of the PPCR, including women and other vulnerable groups, have improved their income and living conditions, thereby enhancing their climate resilience and adaptation capacity.	Extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR-supported tool, instruments, strategies, and activities to respond to CC and CV.
(d) Increased awareness and understanding of the development challenges associated to climate change issues by decision makers and national specialists on natural resources management, within the public and private sector as well as within civil society.	Evidence of strengthened government capacity and coordination mechanism to mainstream climate resilience.  Quality and extent to which climate responsive instruments/investment models are developed and tested.

### 9. Project and Program Concepts under the SPCR:

Project/Program Concept Title	MDB	Requested PPCR Amount (US\$ million)			Expected Co-financing (US\$ million)	PPG (US\$)	Total PPCR Request (US\$ million)
		TOTAL	Grant	Loan			
<b>Investment Project 1:</b> Climate Proofing of Infrastructures in Centre-Artibonite Loop	IBRD	8.0	8.0	-	50.0	-	8.0
<b>Investment Project 2:</b> Climate Proofing of Agriculture in the Centre-Artibonite Loop	IDB	4.5	4.5	-	TBD	-	4.5
<b>Investment Project 3:</b> Climate Change Adaptation in the Coastal Cities of the Gulf of La Gonâve	IBRD	7.0	7.0	-	60.0	-	7.0
<b>Investment Project 4:</b> Strengthening Knowledge Management of Hydro-meteorological, Water Resources, and Climate Data to Inform Decision Making and Policy Dialogue	IBRD	5.5	5.5	-	-	-	5.5
<b>TOTAL</b>		25.0	25.0	-	110.0	-	25.0

### 10. Timeframe (tentative) - Approval<sup>1</sup> Milestones

Investment Project 1: November 2013

Investment Project 2: June 2014

Investment Project 3: April 2014

Investment Project 4: March 2014

<sup>1</sup>Expected date of MDB Board / Management approval.

**11. Key National/Regional stakeholder Groups involved in SPCR Design<sup>2</sup>:**

CIAT, Ministry of Environment (MDE), Ministry of Agriculture, Natural Resources and Rural Development (MARNDR), Ministry of Public Works, Transport and Communications (MTPTC), Ministry of Interior and Local Authorities (MICT), Local authorities (CT)

**Main Partners involved in SPCR:** National Centre for Geo-Spatial Information (CNIGS), Environment and Vulnerability National Observatory (ONEV), Department of Civil Protection (DPC)

Haitian Universities: UEH, UNIQ, UNDH

United Nations Development Programme (UNDP), World Meteorological Organization (WMO)

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<sup>2</sup>Other local, national and international partners expected to be involved in design and implementation of the strategy.

# CONTEXT AND RATIONALE

# 1.1. THE COUNTRY'S CURRENT SITUATION

## PHYSICAL ENVIRONMENT

The Republic of Haiti occupies the western part of the island of Hispaniola, also containing the Dominican Republic in its eastern part. It is situated at the center of the Greater Antilles, between latitudes 18° and 20° north (except for Tortuga Island which slightly overruns longitudes 20° and 71.3° and 75° west). Haiti is bound by the Atlantic Ocean to the north, by the Dominican Republic to the east, and by the Caribbean Sea to the south. To the northeast, the Windward Passage separates Haiti from Cuba; to the southeast, the Jamaica Channel separates it from Jamaica. Owing to its geographical position, the country is in one of the regions of the planet most exposed to natural hazards (hydro-meteorological and geomorphological). Haiti constantly faces extreme natural events (hurricanes/cyclones, floods, droughts and earthquakes) that give rise to major catastrophes (loss of human life, loss of agricultural crops, and destruction of infrastructure).

FIGURE 1 HAITI IN THE CARIBBEAN AND THE AMERICAS



The Haitian Republic territory covers 27,750 km<sup>2</sup> and has a coastline that stretches over 1,771 km and a continental shelf of barely 5,000 km<sup>2</sup>. As well as the main territory, there are five small adjacent islands: Gonâve (670 km<sup>2</sup>), Tortuga (180 m<sup>2</sup>), Île-à-Vache (52 km<sup>2</sup>), Cayemites (45 km<sup>2</sup>) and Navase (7 km<sup>2</sup>) covering a total of 954 km<sup>2</sup>.

It is a country of rugged terrain; more than 60 percent of the land has slopes greater than 20 percent. Plains stretch out between mountainous areas and the coastline.

One of the main characteristics of Haiti is that it is mountainous.<sup>3</sup> Only one quarter of its territory is occupied by plains (altitude lower than 200 meters) more than a third lies between 200 and 500 meters high, 40 percent is over 500 meters high, and 17 percent is over 800 meters high. Four mountainous areas (mountain chains and mountain ranges) cross the country from east to west and give shape to an orology of valleys, plains, and plateaus.

FIGURE 2 RELIEF MAP OF HAITI



From an economic viewpoint, one of the most important areas of the country is the Valley of Artibonite, supplied with water primarily from the River Artibonite, with one of the largest watersheds in Haiti and covering the entire *département* of Centre. Mountains have a definite influence on the climate, and they contribute to the diversity of microclimates found throughout the country even though such orographic relief also results in geographic exposure.

<sup>3</sup>Pic la Selle (Haïtian: PikLasel) is a mountain situated in La Visite National Park and the Selle mountain range in Haiti. It is the highest point of the country at 2,680 meters altitude, higher than the peak de Macaya which rises to 2,347 meters in the Massif de la Hotte. (Wikipedia 2012)

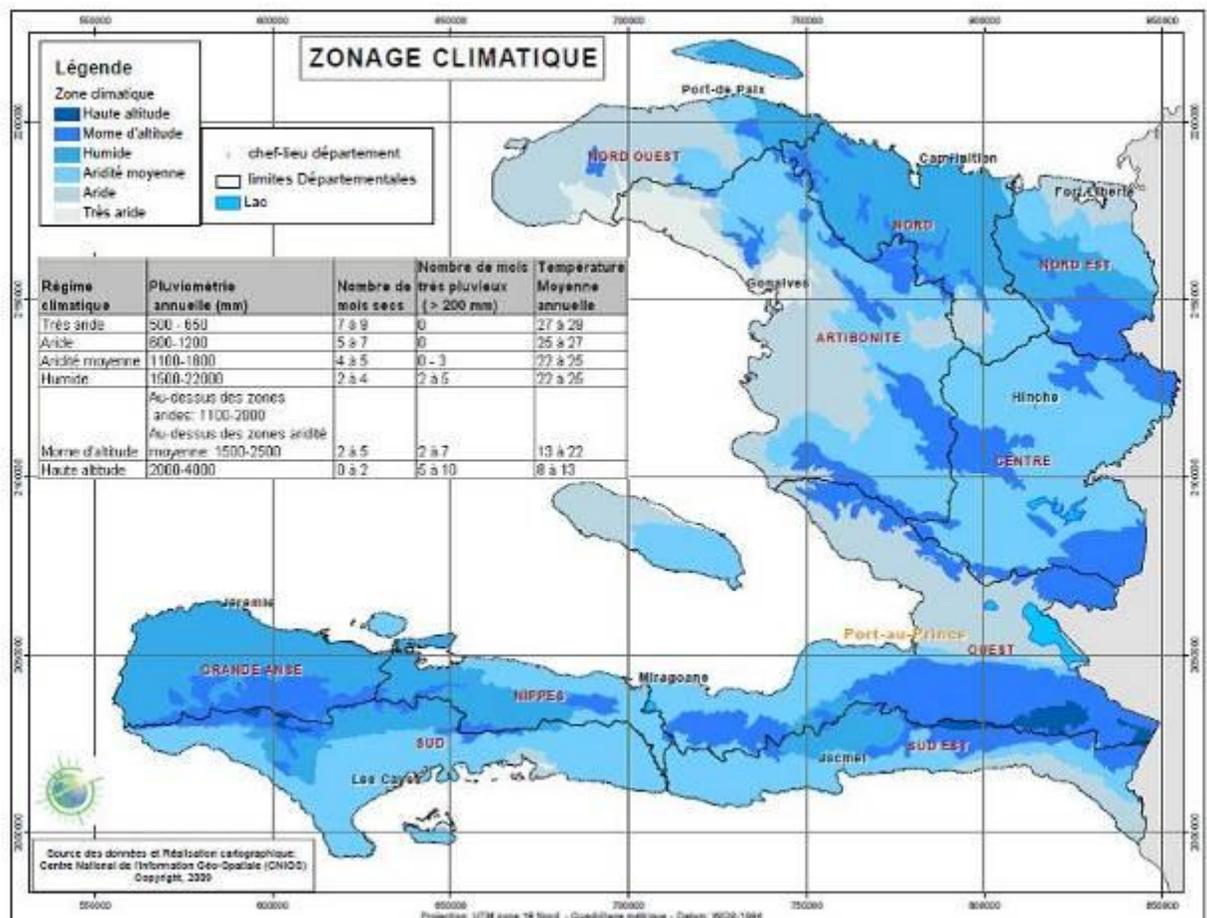
In Haiti, only 30 percent of the territory is suitable for agricultural use. Despite some efforts to build roads and transport infrastructure, many areas of the country remain largely inaccessible.

## CLIMATE

### 1.1.1.1. BACKGROUND INFORMATION

Haiti is part of the Lower Subtropical Region (Latitude 18°- 20° north), not exactly tropical but rather temperate and moderately hot, free of fog at low altitudes, and with an atmospheric temperature range significantly greater than that in the actual tropics. Haiti's climate is the result of its position in the Caribbean as well as its mountainous physiography. Hurricanes, tropical storms, and natural fires are largely influenced by Caribbean features which have shaped the country's natural ecosystems. In addition, the country's particular geographical features explain the climatic contrasts observed at times in regions only a few kilometers apart.

FIGURE 3 HAITI CLIMATE ZONING



### 1.1.1.2. TEMPERATURE

The average temperature hovers around 24°C year round. During certain periods of the year and at high altitude, temperatures as low as 12°C can be recorded and, in the dry plain areas, temperatures can get as high as 37°C. The majority of the territory is under the influence of a thermal regime ranging from hot to extremely hot.

### 1.1.1.3. PRECIPITATIONS AND WATER DISTRIBUTION SYSTEMS

Regarding rainfall, Haiti has such a contrasting spatial variation that some regions (very humid mountains in the south-east) register an annual rainfall exceeding 3,000 mm, while others (arid plains in the north-west) only register 350 mm during the same period (MDE/AGROCONSULT HAITI S.A. 2009 and MDE, 2012).

The Haitian coasts experience four (4) major winds (northerly, trade, easterly, and local) which, magnified by the relief (mountain ranges –the Föhn effect), determine the rainy season across the country. Between one and three rainy seasons per year are recorded in mountainous areas. The following table shows the main rainfall patterns across the main regions of the country.

TABLE 1 RAINY SEASONS IN HAITI’S MAJOR REGIONS

Regions	Départements	Rainy Seasons
North	<i>Nord, Nord-Ouest, Nord-Est</i>	April to June and September to December
Centre	<i>Centre, Artibonite, Nord-Ouest</i>	April - May to October
The Port-au-Prince Gulf	<i>Ouest, Grande-Anse</i>	April - May to May -June and August to October
Southeast	<i>Sud-Est</i>	April - May and August to October
South	<i>Sud</i>	April - October

Source: Mathieu et al. 2002 with adjustments

During the rainy season, each major rainfall poses great risk (mostly of flooding and landslides; but, in certain cases, of epidemics particularly in the regions with the most acute environmental degradation).

### 1.1.1.4. CYCLONES

Cyclones, storms, and hurricanes are phenomena whose destructive power is due to the combined impact of heavy rainfall, strong winds, rapid storm surges, and cyclonic swells.

In most cases, due to geographical location, these violent winds pass through the southern parts of the Caribbean, then head north, and finally hit the southern area of the country. Less frequently, major rainfall events and slow-moving storms (originating in the Gulf of Mexico)

pass through or off the coast of the southern peninsula, resulting in characteristic heavy rains that cause extensive damage across the country (Gordon).

The cyclone season lasts from June 1 to November 30, with the greatest risk between the months of August and October. Haiti is struck by storms, cyclones, or tropical depressions every two to three years.

#### 1.1.1.5. ARIDITY AND DROUGHT

Aridity is characterized by a permanent rainfall deficit. The bioclimatic aridity index ( $K=P/ETP$ ) is generally used to account for “aridity” conditions, with a level of 0,65 ( $K \leq 0,65$ ) indicating the existence of a *dry sub-humid* climate (or +/- arid climate). Haiti is currently not too much affected by the phenomenon of aridity. Indeed, within the characteristic diversity of local climates, 79% of them have an aridity index greater than 0.65 (see Table 2 below). However, this situation may well deteriorate very quickly in the next few years as a consequence of climate change (as it will be later noted).

TABLE 2 ARIDITY INDEX FOR SOME PLACES IN HAITI IN 2000

Place	Bioclimatic Area	K Index
<b>Year</b>		<b>2000</b>
<b>Port-de-Paix</b>		0.77
<b>Jean Rabel</b>	Sub-humid	0.60
<b>Limbé</b>		1.22
<b>Cap-Haitien</b>		0.93
<b>Limonade</b>		0.91
<b>Grande Rivière du Nord</b>		0.86
<b>Trou-du-Nord</b>		0.84
<b>Marmelade</b>		1.42
<b>Saint-Raphael</b>	Dry sub-humid	0.61
<b>Vallières</b>		1.65
<b>Gonaïves</b>	Semi-arid	0.32
<b>Hinche</b>		0.94
<b>Mirebalais</b>		1.65
<b>Jérémie</b>		0.80
<b>Damien</b>	Sub-humid	0.60
<b>Kenscoff</b>		2.09
<b>Beaumont</b>		1.32
<b>Seguin</b>		2.19
<b>Les Cayes</b>		1.16

Source: MDE, 2000

The country is predominately dry. With a few exceptions, rainfall patterns across the country's microclimates are marked by at least one season of water shortage (3 months long at a minimum).

Just like during the rainy seasons, periods of drought are determined by the interaction between prevailing winds and mountain ranges. This phenomenon may be analyzed taking into account three factors: spatial distribution, inter-annual fluctuations, and seasonal regimes.

### 1). Spatial distribution

While some regions in the country are naturally semi-arid, others are experiencing a considerable reduction in rainfall. The problem of drought is now relevant at the national scale: even spots situated in areas originally humid are currently affected by drought. Although this is for relatively short periods of time, the impact is enough to cause a reduction in both agricultural production and water flow. Semi-arid areas remain the most badly struck by droughts, while humid and very humid areas are clearly less affected. The following table indicates the location of the country's main dry ecosystems. Areas most exposed to annual droughts (six months per year on average) are:

- The western part of the *département* of Nord-Ouest
- The lower part of Nord-Est
- The northern part of the *department* Artibonite: from Gonaïves to Anse-Rouge
- The east of the *department* Sud-Est (from Bainet to Cotes de Fer)
- The high area between the *départements* Sud and Nippes (between Aquin and Azile)
- The area of Jérémie, in Grande-Anse
- The area stretching from Arcahaie to Cul-de-Sac Plain

TABLE 3 LOCATION OF DRY ECOSYSTEMS IN HAITI

Location		Mountain Range	Average Annual Rainfall	
Description	Reference		District	mm
Eastern end of Plaine du Nord	Fort-Liberté, Ferrier, Terrier Rouge	Northern Cordillera of the Dominican Republic	Phaéton	885
			Fort-Liberté	913
Peninsula in Nord-Ouest	Mole Saint-Nicolas	Tortuga Island, <i>Massif du Nord</i>	Sources Chaudes	355
			Mole Saint-Nicolas	562
Gonaïves Plain until the Cul de Sac Plain	Gonaïves, Arcahaie, Fonds-Parisien	<i>Massif du Nord</i> , Montagnes Noires (Black Mountains), <i>Chaine des Matheux</i> (Matheux mountain range)	Saint-Marc	943
			Gonaïves	545
			Grande Saline	624
			Arcahaie	892
			Fond-Parisien	600
Coastal strip in Sud	Plaine d'Aquin, Aquin, Cote-de-Fer	<i>Massif de la Selle</i>	La Gonâve	600
			Aquin	1082
Eastern end of Sud-Est	Belle-Anse, Anse-à-Pitre	Bahoruco	Belle-Anse	410

Source: Girault, 1985, ANDAH, 1994

## 2). Inter-annual fluctuation

Rainfall varies much from one year to the other, in some cases provoking droughts that can affect large regions and even the entire country.

## 3). Seasonal regimes

Delays, time lags, and significant decreases in rainfall can be registered at the very peak of the rainy season. These can have a significant impact on the cropping period and harvest time. In the *Plateau Central*, for example, although the rainy season goes from May to October, significant decreases in rainfall have been recorded during the last ten days of June, causing low water supply with likely impacts on agricultural production (and corn in particular).

## PLANT COVER

Current forest cover is between 1 and 2 percent, and it is composed of remnants of natural forests (largely fairly dense patches of pine). Limited stretches of woodland cover a much larger area, however: around 500,000 hectares or 15 percent of the territory (World Bank and FAO 1990). This tree cover encompasses fragmented wooded areas of both natural tree stands and tree crops. These combine fruit, coffee, and timber plantations with subsistence agriculture (AGROCONSULT HAITI S.A. 2009).

In 2005 Haiti ranked 141 out of the 146 nations in the Environmental Sustainability Index (ESI), which captures a country's ability to protect its environment.

Based on the erosion risk index featuring all of the country's watersheds, it appears that, as a whole, the country's watersheds are very fragile ecosystems that are naturally prone to degradation. The ranking of the erosion risk index by watershed shows that those in the southern peninsula are at greatest risk of erosion. This is mainly due to steep slopes, high altitudes, very heavy rainfall, and a high frequency of intense storms. Watersheds ranking at bottom of the scale are along the northern coast and are generally characterized by lower mountains and larger floodplains.

The current watersheds situation of is rather alarming. Twenty-five out of 30 watersheds are severely or completely deforested, natural forests cover just about 20,000 ha (Macaya, Parc de la Visite & Forêt des Pins), and it is estimated that erosion has gradually washed away 3m (on average) of fertile topsoil across the country over the last 4-5 decades. As much as 6 percent of the land is currently suffering from irreversible erosion (MDE/PAGE/INESA 2008). Other sources report that five large watersheds are affected by irreversible degradation (AGROCONSULT HAITI S.A 2009).



Dégradation du couvert boisé

Despite such serious and rapid decline in forest cover, Haiti's biological diversity (of both flora<sup>4</sup> and fauna<sup>5</sup>) remains vast. Environmental degradation and severe climate change, however, could rapidly and irreversibly disrupt this biological wealth.

## SOCIOECONOMIC CONTEXT

### 1.1.1.6. POPULATION AND DEMOGRAPHY

Haiti currently has a population of about 10 million inhabitants. According to the data collected during the 2003 general census on Population and Housing, Haiti had a population of 8,373,750 inhabitants. Nearly 60 percent of the country's entire population lives in rural areas (59.2%). The Haitian population is young. More than half of the population is under age 21. Those under 15 represent 36.5 percent of the population; those ages 15-64 represent 58.3

<sup>4</sup>According to the most recent source, Haiti's flora has 6,000 species, 1,284 genera, and 201 families. Species endemism is more than 34 percent (Hilaire, V. comm. Pers.).

<sup>5</sup> Knowledge of Haiti's fauna biodiversity is diverse and scattered. Data is exact for some groups whose species number is limited, such as indigenous mammals (4) and birds (245). In the case of shellfish, different estimations (Josef and Josef 2007, Kay 1995, Parkinson et al. 1989) give more than 650 species for the island of Hispaniola. Insects are even more diverse. In all these groups, including reptiles, amphibians, and invertebrates, Haiti is characterized by its high level of endemism.

percent, and the population that is 65 and above represents 5.1% (data from the Haitian Institute of Statistics and IT, IHSI). Women represent over 52percent of the population. In 2010, the rate of urbanization was estimated at 47.8 percent, and it has very rapidly increased over the last few years.

TABLE 4 TOTAL POPULATION,% URBANIZATION, AND METROPOLITAN REGION POPULATION 2003-2010-2015

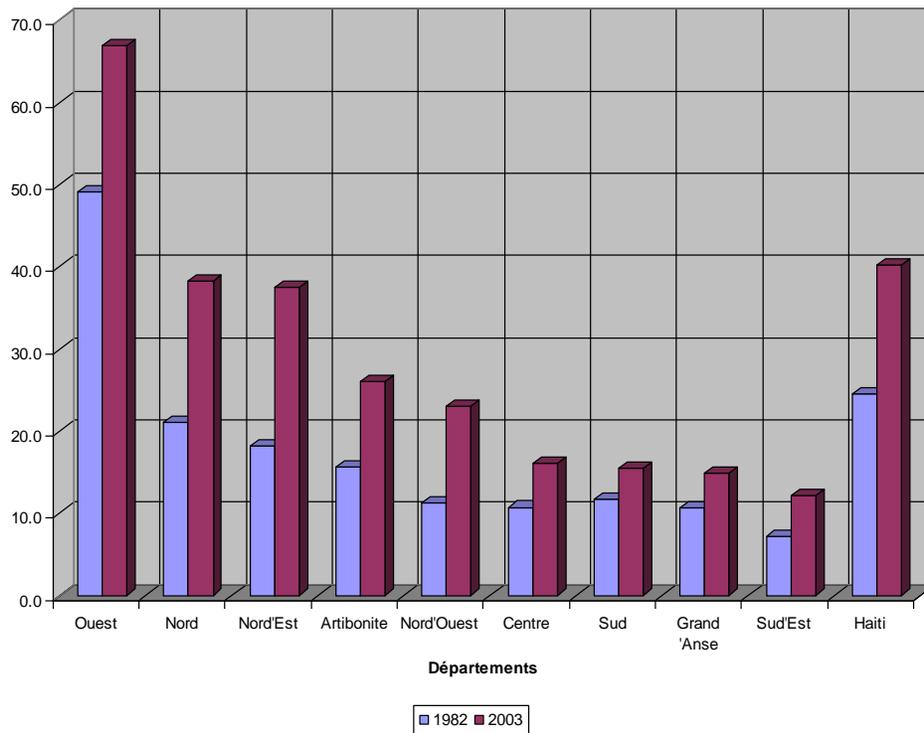
	2003	2010	2015
Total Population	9,001,471	10,085,214	10,911,819
Rate of Urbanization	41.0	47.8	51.9
Metropolitan Region Population	2,212,043	3, 724,446	4,029,705

#### 1.1.1.7. COASTAL AREA AND DEVELOPMENT OF TOWNS

The size of towns in Haiti has more than doubled from 1982 to 2003, with an increase from 1,314,811 to 3,418,508 inhabitants (i.e., a multiplying factor of 2.6). The Ouest *département* used to be unique in having an urbanization rate well above the national average (66.9% in contrast to 40.4%, representing two-thirds (67%) of urban expansion), thus hosting a very high concentration of inhabitants. This *department*, where the Metropolitan Area of Port-au-Prince is located, remains the main attraction for migration, absorbing 90 percent of the immigrants from the rest of the country. In 2008, residents around the urban area of Port au Prince were hit frequently by landslides and flooding, as their settlements were located on a watershed(a particularly fragile one, due to the anthropogenic pressure on the upper reaches of *Morne l'Hôpital*), and confronted serious problems related to lack of proper drainage.

Urban development has occurred haphazardly; with no adequate investment in infrastructure, this explains the catastrophic living conditions and very limited access to services in the majority of settlements (especially those most densely populated). The destruction of housing and infrastructure during the 2010 earthquake has, of course, aggravated the situation, especially in Port-au-Prince.

FIGURE 4 COMPARISON OF URBANIZATION RATE IN 1982 AND IN 2003



Source: IHSI

The country's main urban centers are in coastal locations (Port-au-Prince/Carrefour metropolis, Cap-Haitien, Gonaïves, Saint-Marc, Les Cayes, Port-de-Paix, Jacmel, and Jérémie), and only one of ten *départements* (Centre) does not overlook the sea. The population and infrastructure along the coastline is exposed and regularly threatened by hurricanes and tropical storms. In addition to storm surges, the presence of mountain ranges just behind the coastline favors flooding due to rapid runoff during heavy rainfall, especially as watersheds are degraded ecosystems that have lost their plant and soil cover. The increased risk of flooding as a result of sea-level rise and the potential increase in the severity of hurricanes and storms just adds to Haiti's vulnerability to climate change. The year 2008, with four hurricanes, was deadly, with 800 people killed and 800,000 more impacted. In 2004, Hurricane Jeanne resulted in 3,000 deaths, and the damage was estimated at 14.6 percent of GDP (i.e., it was the most costly disaster ever prior to the earthquake of January 12, 2010).



Ville de SAINT-MARC : Entre mer et montagne dégradées

Cities and urban areas seem locked into the new threats posed by sea-level rise/high tides and the risk of flooding due to their proximity to streams and the degradation of watersheds. In the most vulnerable island of the Caribbean, human life and public and private infrastructure – roads and housing, among others – are in more danger today than ever before.

#### 1.1.1.8. ECONOMY

The Haitian economy has dramatically declined over the last 30 years, resulting in a large rate of unemployment, falling purchasing power and increased difficulty in accessing basic services. According to the World Bank (WB, 2012<sup>6</sup>), Haiti's economy remains very weak, its living conditions very poor (GDP is \$673 per inhabitant), and its needs for essential services very pressing. With a Gini Index coefficient of 0.59, Haiti is a country with a large income inequality.

TABLE 5 SOME INDICATORS OF HAITI'S SITUATION

Indicators	Value
GDP	\$7.346 billion
Per capita income	\$700 per year
% of population living on less than \$1 per day	over 50%
% of population living on less than \$2 per day	77%
Unemployment rate 2010	40.6%
Life expectancy at birth	62 years of age
% of rural population with access to drinking water	51%

<sup>6</sup> World Bank official Website.

According to the 2011 Human Development Index, the country ranks 158 of 187 countries.

Health indicators show that the AIDS prevalence rate remains high and that cholera epidemics have been exacerbated. Some endemic diseases (such as filariasis, tuberculosis, and malaria) whose presence had been fairly controlled over the last few decades have now started to rise again. With respect to education, primary schools coverage is largely insufficient and the quality is poor.

Haiti has been a constant victim of external and political shocks. In 2008, the rise of food and oil prices triggered demonstrations that led to the fall of the government. That same year, Haiti was ravaged by tropical storms and hurricanes, with losses estimated at \$900 million (15% of GDP). Despite the shocks, Haiti experienced discrete but steady growth during the 2000s, with an average actual growth of 2.2 percent over the period 2004-2009.

Beyond its dramatically high death toll, the earthquake of January 12, 2010, caused an estimated \$8 billion in damage (120% of GDP).

Today, the Haitian economy is recovering. After an economic contraction of 5.4 percent in 2009-2010, GDP rose to 6.1 percent in 2010-2011. The projection for further increases (of up to 7% in 2011-2012), rests on key sectors, including agriculture, the garment industry, and construction. The macroeconomic situation gained momentum and the national fiscal revenue rose to 13 percent of GDP in 2011 based on an increase of imports and reconstruction efforts. Nevertheless, an increase in investment spending will be essential in order to propel recovery.

### **1) Agriculture**

According to the Inter-American Development Bank (IDB 2011), agriculture plays a major role in the Haitian economy, contributing to more than 25 percent of GDP and representing around 50 percent of total employment (66% of jobs in rural areas and 75% of jobs in low-income households). The Haitian government, the private sector, donors, and civil society all agree that the agricultural sector needs to address structural problems. The strategy for agricultural development is presented in the National Plan Agricultural Investment (PNIA), which outlines a \$800 million investment in the sector and provides a strategic framework for the World Bank in this sector.

Given its geography, with the exception of some plains and valleys, Haiti has very little land available for large-scale intensive agricultural production. Largely irrigated, the Artibonite Valley is one of Haiti's main agricultural resources and a major asset to the national economy.

Nevertheless, the overall importance of agriculture has declined, due to a loss of productivity resulting from depletion of natural resources, limited access to services, land tenure insecurity, costly access to markets, weak public institutions, and an extreme vulnerability to climate change and natural disasters.

## 2) Energy

The challenges of the energy sector (mostly related to power production, transport, and distribution) and the weakness of its institutional framework have hampered Haiti's national development for decades. Power generation is the main barrier to Haiti's economic growth and competitiveness. With only about 150 MW of installed power capacity before the earthquake, the current supply system is far from capable of responding to a national demand estimated at 500 MW.

A dreary combination of factors, including the high cost of electricity, the lack of reliability of the network (fewer than 30% of Haitians have sporadic access to electricity<sup>7</sup>; the access rate in rural areas is 5%), large technical and commercial losses,<sup>8</sup> and the well-established national culture of non-payment (exacerbated by the rise in the price of oil) result in EDH's solvency relying on annual transfers from the Haitian state of more than \$100 million (representing a serious drain to public finances). A poor governance system (with no independent formal regulatory and monitoring mechanisms, inadequate institutional management, and non-performance-based company management (IDB 2011)) is at the heart of EDH's weak operational performance.

Part of the energy produced comes from hydroelectric plants scattered throughout the country. These have difficulties in providing regular production, since their water supply is affected by increasingly frequent and severe weather events<sup>9</sup> and by the ever-increasing degradation of watersheds and the water flows that feed them. Alternative forms of electricity production, notably wind and solar energy, are currently under consideration. These two climate-based systems would need to be further studied and explored at the national level if investments in such energy sources are to be effective and sustainable. For example, the effects of strong winds during cyclones and the impact of the latter on equipment need to be anticipated when utilizing wind turbines.

Replacing firewood and charcoal as the main source of domestic and semi-industrial energy is another major challenge to Haiti's energy sector, with the reduction in the use of biomass to avoid depleting Haiti's forests being a national priority (IDB 2011). Indeed, forest depletion remains one of the major causes of environmental degradation and soil erosion affecting the country's main watersheds.

## 3) Transport and Road Infrastructure

Even though the network has limited coverage and is badly maintained, roads remain the main mode of transport for people and goods. The road network encompasses up to 950 km of main and trunk roads (linking the main urban centers), 1,315 km of minor and trunk roads, and 1,343 km of tertiary (rural) roads. Barely 5 percent of the road network is considered to

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<sup>7</sup>Current clients receive only around 10 hours of service per day.

<sup>8</sup>With combined losses of over 60 percent and Costs Recovery Index (CRI) below 30 percent since the earthquake.

<sup>9</sup>Alternating between floods/torrential tides and prolonged drought.

be in good shape, while 80 percent is considered being bad or very bad. Only 10 percent of the road network receives any kind of maintenance. The earthquake caused losses and damages to the inter-urban road networking the *départements* of Ouest, Nippes, and Sud-Est. Some large road works have been undertaken over the last decades, and the situation has improved greatly. Despite this, there is still an enormous amount of work to be undertaken to extend the network, with the view to integrate it into the national economic project.



Axe routier conduisant à la boucle Centre-Artibonite

Maintenance works still need to be systematized to effectively protect the road network. More-targeted attention should be given to roads in mountain areas that are less resilient to torrential rainwater flows, particularly during the rainy and cyclone seasons. Numerous stretches of road sometimes become inoperable because of harsh weather events. The destruction of bridges and drainage structures is excessive and need to be rebuilt over and over again to take into account extreme weather events. In addition, a number of major roads are on the coastline and thus regularly suffer the effects of tidal waves. Some are at serious risk due to sea-level rise. Innovations are greatly needed to enhance climate resilience, especially in the rural road network. Without them, local communities and entire areas are put at risk of being cut off from the rest of the country and left completely isolated. The impact on the economy and the consequences for people's living conditions could be serious.

#### 1.1.1.9. POVERTY AND INEQUALITIES IN HAITI

Beyond the income inequality noted here, it should be highlighted that over half of the Haitian population has an income of less than \$1 per day, and that 78 percent of Haitians live on less than \$2 per day (WB, 2012).

Poverty and extreme poverty are much more widespread in rural areas, where 88 percent of people live below the poverty line and 59 percent make less than \$1 per day (IDB 2011).

These observations underline the double challenge of poverty and inequality in Haiti as stated in the *National Strategy for Growth and Reduction of Poverty Document in 2007*; the document also highlights the existence of *massive poverty fostered by significant inequalities*. According to this same document, the progression of poverty in Haiti is currently marked by three major events that occurred in 2010: the earthquake of January 12, Cyclone Thomas, and the cholera outbreak (MDDHLCPE 2012).

Poverty is not evenly distributed across the country, with some regions having concentrating a higher proportion of population living below the poverty line.

TABLE 6 MULTI-DIMENSIONAL POVERTY BY GEOGRAPHICAL REGION IN HAITI

Region	% Population	Multidimensional Poverty Index (MPI)	Poverty Index	Average Poverty intensity	% of Population Vulnerable to Poverty	% of Population Living in Severe Poverty
ARTIBONITE	16.2	0.357	66.7%	53.5%	19.2%	40.3%
CENTRE	8.4	0.499	84.1%	59.4%	10.6%	61.0%
GRAND'ANSE	4.2	0.398	72.3%	55.0%	18.9%	45.4%
OUEST y compris PORT-AU-PRINCE	36.4%	0.177	36.5%	48.5%	17.8%	16.8%
NIPPES	2.7	0.349	67.0%	52.1%	24.1%	38.8%
NORD	9.8	0.343	62.3%	55.1%	19.3%	36.8%
NORD-EST	3.4	0.330	63.3%	52.2%	21.5%	34.6%
NORD-OUEST	6.0	0.345	66.9%	51.7%	20.7%	36.2%
SUD	7.2	0.310	58.8%	52.7%	24.2%	32.1%
SUD-EST	5.6	0.368	68.7%	53.5%	23.0%	39.6%

Source of Data: OPHI/ONPES

The table above shows that most people in severe poverty (61%) are concentrated within the Centre *département*, followed by Grande-Anse (45.4%), Artibonite (40.3%), and Sud-Est (39.6%). In terms of percentage of people vulnerable to poverty, the *departments* Sud, Sud-Est, and Nippes show the highest rates.

It should also be noted that, in spite of having better access to basic services and a more developed infrastructure, the urban community of Port-au-Prince has huge pockets of extreme poverty, especially in insecure neighborhoods next to the sea.

#### 1.1.1.10. GENDER ISSUES, CHILDREN AND YOUTH

The 1987 Constitution of the Republic of Haiti recognizes the equality of men and women. Haiti is a signatory to the Convention on the Elimination of all Forms of Discrimination against Women (CEDAW) since 1980 as well as a signatory to the Inter-American Convention on Violence Against Women (Belem Do Para 1997). The country's Gender Inequality Index in 2012 score is 0.592 (127 out of 146 countries).<sup>10</sup>

The Government of Haiti has a Ministry of Gender and Women's Rights (MCFDF) which is mandated to promote and defend women's rights in keeping with international human rights

<sup>10</sup>Human Development Report 2013, UNDP.

obligations and to facilitate gender mainstreaming within the country. Despite significant progress in promoting women's rights, however, considerable gender disparities persist.

Women represent more than half of all Haitians (52%) and more than 40 percent of the working population. Regrettably, in terms of education, although girls have the same level of access to school as boys, they are forced to stop their studies<sup>11</sup> during secondary school because they are required to stay at home to help their parents or because of unplanned pregnancies. In their working life, women are frequently subject to all sorts of sexual harassment and they are very often forced to accept lower salaries than men. Unemployment is very high among women.

There are no legal restrictions on women's right to own and manage land. However, in practice, it is very difficult for women to own land, given that few have the money to buy it and that so many women live in unregistered consensual unions (meaning they have no legal right to claim ownership of property accumulated jointly while the couple was together, in the event of separation, or after a partner's death).

As of 2008, the CEDAW Report notes that just over 10 percent of women in rural areas work on their own farms. Many female agricultural workers are not paid for their labor as it is seen as 'auxiliary labor supplementing that performed by male heads of family. Women have the legal right to access to property other than land, which usually includes such assets as the family home and cattle.

In rural areas, gender inequality is even more serious. In addition to domestic tasks, a large number of women carry the burden of collecting water. They are often seconded by children who, very early on, take on the complete responsibility for water provision for their families.

Despite this, women play an essential role in development, for example providing food security to their families or processing and marketing agricultural products and acquiring imported products for basic consumption and everyday needs. Women's capacity in the informal commercial sector is recognized and, in some way, they are its backbone.

The key role assumed by women within their family (providing food security, water, and firewood and leading informal trading) explains to a large extent why they are particularly vulnerable to the impacts of climate change. A negative impact can be detected in terms of slowing down and even reversing progress made in women's rights and the undermining of prospects for development. One of the most tangible pieces of evidence of this trend is the fetching of water that becomes a much more complicated and time demanding activity during times of drought. There is thus an urgent need to develop resilience for women as well as men in vulnerable communities. Women and women's organizations should be at the heart of responses to communities' problems, especially to those domains where they are already involved in mobilizing and implementing community initiatives. Women and their

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<sup>11</sup> The level of illiteracy in the population is higher among women (56.6% compared to the 51.7 illiteracy rate among men). (Data 1997 - MDE 2001).

organizations should also be at the heart of climate change adaptation strategies. For this to be effective, gender-specific aspects should be taken into account when collecting, processing, and analyzing data, and specific research should be undertaken. Oxfam has suggested that Haitian women should be helped in strengthening and/or setting up small- and medium-sized businesses.

More than half the Haitian population is under age 21, and people younger than fifteen represent 36.5 percent of the population (2003 IHSI data in MDE, 2012). Young people and children form part of the population group who will most suffer the consequences and impacts of climate change. Youth is one of the country's main assets; young people should be one of the main targets of awareness-raising programs, training, and education initiatives related to the environment generally and to climate change in particular. Domestic tasks risk becoming more arduous for children and young people, especially those related to water supply for everyday consumption and livestock watering. In the poorest smallholder families, children are the first to suffer the difficulties faced by their parents (reduction of food consumption, dropping out of school, etc.) and, in the case of a prolonged interruption in the food supply, mortality due to malnutrition. Young people suffer acutely from unemployment and often feel powerless to help their parents in recovering their potential in the aftermath of natural disasters.

Local youth organizations are known to be very active on environmental issues and in different communities throughout the country. Young people are put at the core of the Risk and Disaster Management National System, and they are involved in local civil protection committees, very often as volunteers. Youth organizations should be called upon and mobilized as part of awareness raising, training, and education with the view of developing climate resilience and adaptation strategies. Young people's potential could also be considered as part of the process of observing and collecting climate data and monitoring the evolution of climate change consequences and effects.

Behavior of vulnerable groups (including women and youth) has not been sufficiently studied. Specific data for these population groups are not available. Haiti's National PPCR will benefit from the results coming out of the study on the Effects of Climate Change on Gender and Vulnerable Groups in PPCR participating countries that will be undertaken under the project preparation grant for the Caribbean Regional Track

## NATURAL DISASTERS LINKED TO CLIMATE

Natural disasters and in particular those linked to climate are numerous in Haiti. They cause damage and entail serious consequences, particularly economic ones, from which the country struggles to recover. The following table lists the main natural catastrophes that struck the country from 1994 to 2010.

TABLE 7 MAIN NATURAL CATASTROPHES OVER THE LAST 20 YEARS IN HAITI <sup>12</sup>

DATE	NAME	AREAS AFFECTED	DEATHS	DISAPPEARED	VICTIMS	NOTES
13/11/1994	GORDON	All the country, particularly Sud-Est	1,122			
22/09/1998	GEORGES	All the country	242		385,000	
22-24/05/2004	'RAINS'	Sud-Est and Ouest (Fonds Verettes, Belle-Anse / Mapou), Haitian-Dominican Republic border (Jimani)	1,232	1,443	31,130	
18-19/09/2004	JEANNE	Haut Artibonite (Gonaïves) and Nord-Ouest	1,870	846	300,000	2,620 hurt; 5,000 houses destroyed US\$265M losses i.e. 7% of GDP <sup>13</sup>
16/08/2008	FAY	All the country Gustav=Sud, Grande-Anse, Nippes Hanna=Artibonite (Gonaïves), Nord-Ouest, Centre Ike=Nord, Nord-Ouest, Ouest (Cabaret)	793 Of which 506 in Artibonite and 77 in Cabaret/Arcahaie <sup>14</sup>	310	165,337 (families)	112,327 homes damaged and destroyed US\$897M losses i.e. 14.6% of GDP <sup>15</sup>
26/08/2008	GUSTAV					
01/09/2008	HANNA					
06/09/2008	IKE					
12/01/2010	EARTHQUAKE	Ouest (Léogane, Port-au-Prince metropolitan area); Sud-Est (Jacmel)	230,000		1.5 M	300,000 hurt, 105,000 homes destroyed and 208,000 damaged US\$7.9M losses i.e. 120% of GDP <sup>16</sup>

Own figures, from PDNA, 2010 and data provided by Direction de la Protection Civile

### 1.1.1.11. CYCLONES

Of all climate phenomena affecting Haiti, cyclones are generally the most damaging ones.

The huge downpours and violent winds brought by storms directly affect crops, cattle, housing, and infrastructure. In Haiti, given the state of river basin degradation and the levels of erosion, flooding due to heavy and exceptional rains causes the most losses. Winds

<sup>12</sup> Data taken from various documents based on information provided by DPC.

<sup>13</sup> PDNA 2004.

<sup>14</sup> Including 13 children.

<sup>15</sup> PDNA 2008.

<sup>16</sup> PDNA 2010.

particularly affect crops (e.g., destruction of banana tree fields during Tropical Storm Isaac in 2012) and destroy flimsily erected houses (destruction of roofs and collapse of fences).

#### 1.1.1.12. FLOODS

Floods and torrential flooding are regarded as disasters brought about by heavy rains, storms, and other rainfall events. It is their hydraulic effects that give them a particular status.

In this sense, the country's main streams and *ravines* (dry rivers) pose a real threat as conduits for intense flooding (torrential floods in landlocked valleys can cause the loss of human life and enormous damage, degradation to the physical environment, and progressive deterioration of the economy -- and the agrarian economy in particular).

The effect of floods is amplified by degradation of the natural environment (clearance of vegetation cover and non-sustainable agricultural practices), inadequate or obsolete drainage infrastructure, and unplanned urbanization. Such factors can aggravate the impact of floods and cause severe damage and loss of human life. It is fortunate that flooding occurrence is generally localized. Flooding and torrential floods are often associated with the storms (hurricanes and other heavy rains) that pervade the country and regularly affect specific regions, including Sud, Artibonite, and Nord.

A statistical study carried out in 2002 (Mathieu et al. 2002) shows that frequency of flooding and torrential floods is increasing. The majority of cases recorded concentrate in the last few decades (56% of cases in 2002). The enhanced availability of current data may have an influence on this, but the fact remains that, during the same period, deforestation and degradation of the environment have occurred at an unprecedented scale.

These statistics also confirm that flooding and torrential floods generally happen during the rainy season on a yearly basis (in May-June and September-October). The rains at the origin of floods recorded over the last decade, however, tend to have happened outside the "traditional" rainy seasons. This holds true in the *department* Ouest in particular (April-June and August-October). Except during the months of March, April, and December, floods were recorded practically throughout the year in this *département*.

In the metropolitan area where urbanization is unplanned and slum dwellings proliferate, one 40 mm rain shower can cause enormous damage in one day. Houses are often constructed in the middle of drainage ways, on hillsides, in areas of unstable terrain, in the channels of ravines, and in wetland areas next to the sea.

In addition, in 53 percent of cases the floods struck towns or coastal communities with a high average population density. These areas remain at high risk. All the coastal and low-lying areas are subject to a high risk of flooding. A high risk of flooding also exists in areas where the hydrographical network (streams and ravines) is wide (See Map 4: Floods). These areas are even more at risk as no forecast on 10-yearly and 100-yearly flooding exists, thus

maximum intensity and frequency (and associated destruction capacity) of major floods remains unknown.

#### 1.1.1.13. LANDSLIDES

In Haiti, landslides happen in most mountains and along riverbanks, and often extend over several hectares. Typically, these are more localized events that are rarely documented. Smallholders in Mornes experience landslides on a daily basis and claim that these are insufficiently taken into account in public policies. The most sensitive areas are undoubtedly the steepest slopes of Mornes, where water infiltration can generate considerable and rapid pressure. Areas that have been previously weakened by recent intense tectonic activity (fault lines) are also prone to landslides.

The risk of landslides is just as high in urban areas bordering river streams and ravines and along areas upstream or downstream of encased ravines. This is the case for areas such as *Plaine des Cayes* with *Ravine du Sud*, and *Plaine du Cul-de-Sac* with the River Grise and River Blanche. Considerable risk of landslides also exists in urbanized hills, particularly in Port-au-Prince and Cap-Haïtien.

#### 1.1.1.14. DROUGHTS

Droughts are generally locally or regionally localized episodes, but the country has experienced droughts on a national scale (e.g., 1974, 1975, 1977). Although less severe, episodes occurring in 1986-1987 and in 1990-1991 also affected the whole country.

The analysis studies and existing data show that over one-third of the territory is affected by drought every five to seven years. In 2002, Mathieu et al. realized that it was difficult to determine an accurate frequency, given the recurrence and disturbance of global phenomena such as El Niño<sup>17</sup> and climate change. Nevertheless, the data recorded on drought episodes in the past suggest three distinct categories with differing frequencies:

- ▶ Less than 5 years: Nord-Ouest.
- ▶ Between 5 and 7 years: Nord-Est, Nord and Sud.
- ▶ 7years and over: Sud-Est, Grande-Anse, Centre, Ouest, and Artibonite.

Regarding intra-annual variation, other than the decline in rainfall recorded even during crop seasons, in recent surveys (Bayard, B. 2011 and Bellande, A. 2012) agricultural producers have signaled that they are forced to delay crop planting due to the lack of rain at the traditional onset of the rainy season. They also report that the total volume of rains during

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<sup>17</sup>Resulting from observations made during the peaks of drought at the end and beginning of the year.

the season seems smaller and that drought intervals in the middle of the season seem to be getting longer.

#### 1.1.1.15. TIDAL WAVES

With the same characteristics as tsunamis -- a sea-level increase -- tidal waves stem from waves that are lifted up by strong winds or during cyclones (cyclonic swells and storm surges). All coastal towns are threatened by this phenomenon as well as by the energy generated through the impact of enormous waves that can measure over 2 m high. Although rare, this phenomenon represents a permanent threat for the island of Haiti given that the largest towns (population and economic investments) lie on the coast, and the plains used for agricultural production stretch near the sea. These are at risk of salinization by the large masses of seawater discharged by tidal waves.

The coastal road linking Jacmel to Marigot, in the *département Sud-Est*, has been severely affected by cyclonic swells that have come along with hurricanes over the last few years. Haitian environmentalists recommend that, as part of the recovery of the network, these roads be moved away from coastal zones; they further advise that roads already built next to the sea be properly protected. Relocating residents living next to the sea in wetland areas is also necessary. If this is done as part of a broader plan, all new settlements and constructions in these areas should be prohibited.

#### 1.1.1.16. AGGRAVATING FACTORS AND ASSOCIATED CONSEQUENCES

The implications of extreme climate events, in particular epidemics that may arise from the natural disasters described, can be as catastrophic as the impact of the disaster itself. The high level of fecal pollution and uncontrolled land use upstream of water sources rings alarm bells of a possible cholera outbreak every time there is a rain shower.

It is acknowledged today that environmental degradation and erosion is rampant in Haitian watersheds. This is one, if not *the* most important factor, amplifying the impact of disasters linked to climate. Integrated watershed management must be carefully considered when considering any strategy for climate change adaptation and directly addressed in the programs and projects being planned.

## INSTITUTIONAL AND LEGAL FRAMEWORK

### 1.1.1.17. INSTITUTIONAL AND TECHNICAL CAPACITY

Different ministries and government institutions manage the climate change agenda. Approaches to the subject have proliferated as well as the technical units required to implement programs and related projects addressing climate risks. As with several other decisions affecting the environment (PAE decree), including the creation of the post of Minister of Environment, Haiti's participation in PPCR and development of the Strategic Plan for Climate Resilience signaled some contradictions and, unfortunately, also stirred some disputes among the different entities involved.

The difficulties of putting in place a systemic and crosscutting approach for successful adaptation to climate change are aggravated by gaps and overlaps of institutional responsibility, insufficient collaboration between public sector entities, and a high degree of fragmentation in authority and roles within the vast range of environmental management bodies. In sum, these observations are similar to the ones made in 2009 that led the Government of Michèle Pierre Louis to set up the CIAT when addressing another crosscutting issue, Land Management (which could arguably be viewed as even more inclusive than the environment).

Because of its composition, CIAT represents an ideal arena<sup>18</sup> for discussion and strategic programming on climate resilience and climate-change issues. The GOH acknowledges that the existing policies, legal frameworks, institutional structures, and capacities are currently insufficient to implement climate-compatible development measures and adaptation strategies. The SPCR will seek to develop new pragmatic approaches, skills, and ways of working. Through the CIAT, the GOH will gather the inputs of the different institutions and entities involved in climate change and improve coordination for more effective joint efforts and policy coherence, strategic actions and tangible results, in line with national commitments for greater climate resilience.

The meetings held during the SPCR development process with representatives of different national and international institutions showed that managers and officials are willing to cooperate and that relevant institutions are willing to work more closely together to implement strategies and activities that aim at strengthening climate resilience.

Nevertheless, the GOH considers that domains related to compulsory, restrictive, and/or coercive measures, accountability/transparency issues, and matters lying under the authority of the State should be streamlined. The same holds true for provisions to encourage participatory orco-management approaches through different types of schemes, including private-public, private-private, and private-community partnerships. The different forms of

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<sup>18</sup>Presence of all key entities and institutions involved in the environment and climate change.

partnerships should be clearly defined. The current government has confirmed the coordinating role assigned to CIAT, and the ministers most directly involved in adaptation to climate change will work in close collaboration with the coordination unit located at CIAT. The program coordination unit will be assisted by a scientific committee composed of the heads of the different government departments, scientists from the university, and leading independent experts.

Capacity development and knowledge management at all levels (systemic, institutional, and individual) of the Haitian society is a key requirement to build resilience to climate change at the country level. In particular, the institutional capacity to monitor and validate basic scientific information and to mainstream climate change into development indicators should be strengthened. The need for adequate measuring equipment on climate, including data management and development and expansion of databases as well as capacity development for weather forecast-analysis, are concerns to be addressed.

Human resources are currently insufficient, in terms of numbers and in terms of the skill sets necessary to carry out adaptation measures. It should be acknowledged that the effective implementation of the SPCR, as well as other climate change adaptation initiatives, requires the availability of a wide range of skills, supported by adequate technological resources. A specific component will be developed in collaboration with the university and academic cooperation to upgrade the technical skills available at the national level. Sector-specific training, with a focus on developing education programs targeting key stakeholders in the development of climate resilience, will be undertaken. In addition, the SPCR will capitalize on activities implemented within the broad PPCR as a basis for peer learning and knowledge transfer. Pilot experiences will be systematized and the replication of successful initiatives and good practices will be fostered.

#### **1.1.1.18. POLITICAL AND LEGAL FRAMEWORK**

The environmental legal framework in Haiti is extremely poor. Existing legislation is relatively old and does not fully capture the new issues and challenges the country is confronting. Policy makers and, in particular, managers involved in managing this area, have done their best to address climate change within sub-sectorial policies and strategies. Yet mainstreaming climate change into state policies, programs, and action plans remains a challenge.

As part of the State's commitments to global agreements, recent policy processes have resulted in the preparation of several regulations, decrees, and laws. As of today, only PAE has been turned into a decree not ratified by the Parliament. All other legislation seems to have been put on hold and does not seem to be a parliamentary priority. The government's

authority cannot be extended without regulations and norms<sup>19</sup> (decrees and legislation development being the sole responsibility of Parliament).

The Haitian NAPA has been available since 2006; so far, it has been the benchmark for embedding action to strengthen the country's climate resilience. The plan's objectives are to (Oxfam 2009):

- ▶ Identify urgent needs for the country, in terms of adaptation, and communicate these needs to international organizations investing in environmental matters.
- ▶ Mobilize national efforts to protect the environment.
- ▶ Contribute to poverty reduction of vulnerable people with a view to improving local communities' capacity to adapt to climate change.
- ▶ Contribute to national development and, consequently, to regional and global ecological balance.

Priorities defined by the NAPA are still relevant today: management of drainage basins and conservation of soil; management of coastal zones; development and conservation of natural resources; preservation and strengthening of food security; protection and conservation of water; construction and rehabilitation of infrastructure; and waste management and environmental education and awareness-raising.

Regrettably, the NAPA has still not been implemented. The PPCR appears to be a good opportunity to help implement actions identified by the NAPA, therefore the program's Coordination Unit will work with MDE and other entities concerned with NAPA implementation. It would be advisable that strategies and mechanisms are developed at the national level for a country-led implementation of this plan as well as that those efforts involve civil society, the private sector,<sup>20</sup> political parties, and the Haitian Diaspora.

### 1.1.1.19. GOVERNANCE

After recent dictatorship, military, and populist governments, Haiti still carries the political label of a "fragile state." Parliamentary democracy in Haiti is still young and under construction. Political polarization and the predominance of legislative control on the passing of laws and regulations should help, in particular for a more responsible and effective management of the environment. Anticipating problems linked to climate change will contribute to structuring the country and improving citizens' living conditions in the long term. Pro-environment policies are a choice of the state and should be able to transcend the political divide as well as individual and private interests. The PPCR will contribute to the development of a set of laws contributing to climate resilience, along with Ministers, political parties, the private sector, civil society organizations and society as a whole. Such actions will

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<sup>19</sup>In particular for supervision.

<sup>20</sup>Haiti's National PPCR will benefit from the results coming out of the study on Private Sector Involvement in the PPCR that will be undertaken under the project preparation grant for the Caribbean Regional Track.

be propelled by a clear political commitment at the highest level (i.e., the Presidency) to invest in a substantial improvement in environmental conditions. This constitutes an excellent opportunity to mainstream climate challenges into plans, policies, and programs.

As part of the PPCR, the SPCR will also seek to involve civil society and the private sector in climate resilience and adaptation measures and, more broadly, on tackling the country's environmental challenges. Along with representatives from public institutions, business leaders and prominent figures from civil society will be invited to a consultation committee to support the Programme Coordination Unit.

As part of the SPCR, the PPCR Coordination Unit will work in a coherent and effective manner with various initiatives, programs, and projects addressing climate resilience, adaptation to climate change, and disaster risk management. The PPCR will develop links and operational partnerships with other programs in place and ensure that complementary actions and synergies are developed. The PPCR Coordination Unit will also help to strengthen and promote the structures of the DRM National System deployed by DPC/MICT. On the operational front, the Programme Coordination Unit will equally build support for the different bodies and ministerial departments and the UTE in place for an effective implementation of the program's interventions.

## KNOWLEDGE AND INFORMATION MANAGEMENT

The availability of knowledge and information on climate parameters and components and on the evolution of the consequences of climate change in Haiti is low. In particular:

- ▶ The structures for meteorological and hydrological data collection and compilation are fragmented. Indeed, equipment is found and/or managed by different centralized or decentralized government bodies, development projects funded by international agencies, the university, NGOs, producers' and farmers' organizations; and some local government offices.
- ▶ The data collection has been discontinued and, in some cases, sequencing is very erratic.
- ▶ There is an absence of measures on some critical aspects to climate change; in particular, there is no systematic reporting of sea-level rise.
- ▶ In the majority of sectors, databases are not built nor specifically developed with the view of studying and monitoring climate change and evaluating the effectiveness of adaptation measures.
- ▶ There is insufficient support for the gathering/systematization of observational data, monitoring and evaluation, research protocols related to climate change, and also for the dissemination of climatic information.
- ▶ The patchy network of meteorological stations for climate data collection is unevenly distributed across the territory, with some priority regions and ecosystems not being served and/or data not incorporated into more comprehensive systems for analysis and modeling.

The GOH will address these problems within the SPCR and it will ensure all necessary provisions to be taken so that data generation and analysis is undertaken on a regular, systematic, and sustainable manner.

## PUBLIC EDUCATION AND LEVEL OF AWARENESS

It is acknowledged that an optimal level of understanding of climate-change issues among communities cannot be reached without all relevant stakeholders being involved, sufficiently informed, and adequately trained to understand the drivers of sustainable development and for them to participate in relevant and appropriate climate action. An educated public and collective awareness are prerequisites for attitudes to evolve and to secure general public endorsement of actions to be undertaken as part of climate compatible and sustainable development.

So far, efforts made to make the Haitian people and stakeholders aware of the consequences of climate change have been very limited. Many people are caught up in the struggle for survival; it will be necessary to deploy aggressive sensitization strategies, using all the information and adaptation actions in Haiti, to strategically raise awareness and educate the society on the impact, consequences, and challenges posed by climate change. In setting up the SPCR this aspect will receive particular attention. Beyond wide-scale public campaigns, the PPCR will work with public institutions and civil society organizations and rely on them for further dissemination of information to the general public. An effective and well-conceived communication strategy will be put in place, drawing from similar activities implemented in other countries in the Caribbean region. Evaluations on the effects and impact of this strategy will be carried out on a regular basis to allow for approaches or methods to be reviewed and to ensure that the impact among the population is maximized.

# 1.2. DEVELOPMENT CONTEXT AND RISKS ASSOCIATED WITH CLIMATE

## THE DEVELOPMENT CONTEXT

Since the earthquake of January 12, 2010, the benchmark for Haiti's development has been the PARDN. The PARDN draws from the DSNCRP, but makes necessary adjustments in the wake of the earthquake. The PARDN deals with environmental issues from different angles, and the document assigns a pivotal role to the environment. Indeed, the PARDN:

- Recognizes the catastrophic state of the environment and acknowledges that the earthquake increased the pressure on the environment and natural resources (with

indicators previously on the “red”), thus exacerbating the extreme vulnerability of the Haitian people.

- Along with DRM, includes the environment as a standalone chapter and estimates that its needs (derived from a loss and damage evaluation) constitute 15 percent of total needs (i.e.,\$11.5 billion).
- Declares that long-term development needs to be harmonized with the environment as a condition for Haiti to become an emerging country before 2030.
- Proposes to systematically consider environmental concerns in every decision linked to recovery and development.
- States that without wealth and job creation, Haiti will not be able to protect its environment nor to improve social development.
- Argues that agriculture and the agricultural markets have a significant impact on the country’s environment and local people’s vulnerability. Impacts on the environment seriously compromise the route to sustainability of the Haitian state. For example, in the fishing sector, some practices encourage over-exploitation in fragile ecosystems and put at stake the natural capital.
- Positions land management at the center of the strategy to reduce vulnerability of people, the environment, and the economy. Rehabilitation of natural habitats, environmental protection, preservation of cultural and historical heritage, equality in accessing essential services, jobs and enhanced living conditions responding to the needs of local communities, and protecting and managing fertile soil for agricultural use are all mentioned as necessary measures for environmentally and economically sustainable development.
- Agrees that a territorial approach to land management should be embraced to guide policymaking and coordinate strategies in the realm of economic, social, cultural, and environmental development while acknowledging that, in the short-term, exceptional measures may be required to address pressing development problems.
- Specifies that watershed management should be addressed as part of Land Management and that watershed management, reforestation, and soil conservation initiatives should be developed in partnership with communities and in light of agriculture needs and environmental protection.
- Recognizes the need to upgrade and reinvigorate strategic thinking around territorial governance, land management, local development, the environment, urbanization, and construction.
- Suggests that reconciliation between administrative limits to the territory and the need for an integrated management of watershed is a prerequisite for climate change adaptation and environmental protection.
- Concurrs that, from a DRM point of view, public authorities will need to be prepared at all times for the different types of risks the country is facing: natural disaster, industrial, and technological catastrophes, major accidents, health crises, environmental degradation, and so forth.

President Martelly has recently put the environment at the heart of the country’s five-year program. The *General Policy* drafted by Prime Minister Laurent Lamothe and ratified by the Parliament refers to the presidential mandate and is committed to the “5 Es,”<sup>21</sup> including *Environment and Land Management*. It should be noted that this initiative encompasses four

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<sup>21</sup>(5 Es in French) = *État de droit* =Rule of law and democracy, economy and employment, environment and land management, energy, education, and human and social development.

interrelated dimensions—environment, land management, disaster risk management, decentralization—and support to regional authorities.

The government’s policy calls for a stop to environmental degradation and for restoration of the environment; achieving this will require massive investments. It proposes halting the deforestation process and initiating an era of reforestation that would deliver (at the end of the five-year presidential mandate) a substantial increase in tree cover. It also calls for restraining the expansion of slum settlements and acknowledges that the territorial approach needs to be inherent to urbanization plans if vulnerability to climate change is to be reduced.

This policy establishes three strategic priorities:

- Reorganizing environmental governance in Haiti. The decree of October 2005 created the Environment Management National System (SNGE). However, coordination mechanisms for stakeholders, as well as the setting for institutional responsibility, are not in place, which leads to confusion on implementing roles.
- Capacity development for environmental management.
- Education to shift citizens’ attitudes, beliefs, and behavior in order to support the protection of the environment and the promotion of sustainable development.

This general policy acknowledges the leading role of CIAT, in light of the current poor land management and the need to promote a new territorial vision. CIAT has been given a strategic role and, in turn, will assume the responsibility for developing a new approach to watershed management across the country.

Disaster risk management is directly linked to the environment and land management. While recognizing the effectiveness and quality of DPC and SNGRD’s work, the government wants to give further sustainability to DRM by proposing a legal framework for SNGRD and more effective monitoring of hazards (seismic and climate).

It is clear that regional authorities play a major role in implementing sectoral and sub-sectoral policies and programs, and that government policies have increased their responsibilities and hold regional authorities to account. Several mentions are made to “civic responsibility,” which is of course not possible without the active and responsible participation of civil society and the engagement of the general public.

The policy framework has been fixed and the foundations laid for developing strategies and action plans both in terms of climate resilience and adaptation to climate change. Having this legal and policy framework endorsed at the parliamentary level would contribute to the long-term standing of commitments and would facilitate the start of the implementation phase. The PPCR will provide assistance in developing, revising, finalizing, and promoting such a legal framework. A parliamentary vote will be crucial to honor international commitments and to uplift Haiti’s governance mechanisms to the level of other countries in the region in terms of setting a strong legal, regulatory, and institutional framework for climate resilience.

## CLIMATE RISKS AND VULNERABILITY

### 1.2.1.1. THE PUBLIC PERCEPTION OF CLIMATE CHANGE

Recent surveys carried out in rural areas on issues such as food security, development of supply chains, disaster risk management, and local development suggest the following observations:

- Cyclones and hurricanes are becoming increasingly frequent and violent; the four hurricanes in 2008 (Fay, Hanna, Ike, and Gustav) are still fresh in people's memory. For many, the intensity of these events was extreme and the rate has increased--people had not even finished recovering from one disaster when the next one hit.
- For some people, the rainy seasons are becoming increasingly erratic and unpredictable.
- From one year to the next, the rainy season can range from *excessive water* to *water shortage*.
- Floods are increasingly being recorded during the rainy months and are becoming more frequent.
- The rains marking the onset of the season arrive late, leading to a delay in the cropping time. This delay has a large impact on agricultural yield: wasted seedlings and lost seeds, replicated seedlings, and depletion of grain stock.
- Droughts during the dry season are longer and more acute. Producers combine cereals with different levels of drought resistance (maize and sorghum on the same plots) and/or increasingly plant shorter-cycle varieties, which can be harvested ahead of the harsh season.
- Interviewees have the impression that the hot months (in summer time) are becoming increasingly hotter and that the cold months (at the end and start of the year, in winter time) are getting colder.
- When questioned about changes in the coastline, elderly people living in coastal villages confirmed that the sea had encroached on the coastline and continues to do so. At Anse d'Ainault, tombs in the cemetery nearest the sea have been slowly disappearing over time. Other testimonies confirm this fact (See Photo 1).



PHOTO 1 COASTAL VIEW OF FORT-LIBERTÉ

These findings, however, remain anecdotal and subjective. They do not take into consideration factors and parameters that can exert great influence when it comes to observing consequences and effects. They do, however, reflect though the state of mind and the perception of a changing climate.

#### 1.2.1.2. BASIC CLIMATE TREND

On alert for more than 20 years about the impacts of climate change, Caribbean states are currently able to make climate change forecasts for the region based on data systematically collected by strong institutions (in particular, universities and institutions responsible for hydro-meteorological observation). Lacking a national record of systematic data collection, Haiti uses Caribbean climate information and analysis.

##### 1) Temperatures

According to IPCC's Fourth Assessment Report (2007), temperatures in the Caribbean region could rise from 1.4°C to 3.2°C, with a median of 2.0 °C during the 21<sup>st</sup> century; this is slightly less than the world average. Simulations carried out using GCM developed by the University of East Anglia (UK) using the IPCC-IS92a scenario predict a rise in temperatures from 0.8°C to 1.0°C for the year 2030, and from 1.5°C to 1.7°C for the year 2060.

## 2) Rainfall

According to IPCC's Fourth Assessment Report (2007), a -12-percent decrease in the median annual rainfall is expected for the Caribbean region, but within a broad range (-39% to +11%). Forecasts for Haiti made using GCM by the University of East Anglia indicate a fall in rainfall of 5.9 percent to 20.0 percent in 2030 and of 10.6 percent to 35.8 percent in 2060. The decrease in rainfall would be very evident during the summer period (JJA - June, July, August), while during the winter period (DJF - December, January, February) rainfall could increase in certain areas and decrease in others.

## 3) Cyclones

Forecasting changes in the frequency and intensity of hurricanes based on climate change is a difficult task. Global Circulation Models do not have sufficient spatial resolution to reproduce cyclones; as a result, the modeling must be done at a regional scale. Furthermore, the models present great differences regarding changes in the El Niño-Southern Oscillation (ENSO) and North-Atlantic/Arctic Indices (NAO/AO) that have a large influence on the formation of cyclones. It is not certain, therefore, that the frequency of cyclones will increase; some models even predict a reduction in frequency. Nearly all the models, however, forecast a rise in the Power Dissipation Index (i.e., the force of cyclones), which is mainly caused by the temperature increase of the ocean surface.

## 4) Sea-level Rise

Sea-level rise during the 21<sup>st</sup> century is estimated at 0.18-0.59m in IPCC's Fourth Assessment Report. However, some more recent studies suggest that the underlying assumptions in this estimation are over-optimistic, particularly concerning the evolution of Greenland's and Antarctic's ice caps. A sea-level rise of up to 32cm by 2050, and up to 124cm by 2,100, is suggested by some studies.

## 5) Ocean Temperatures

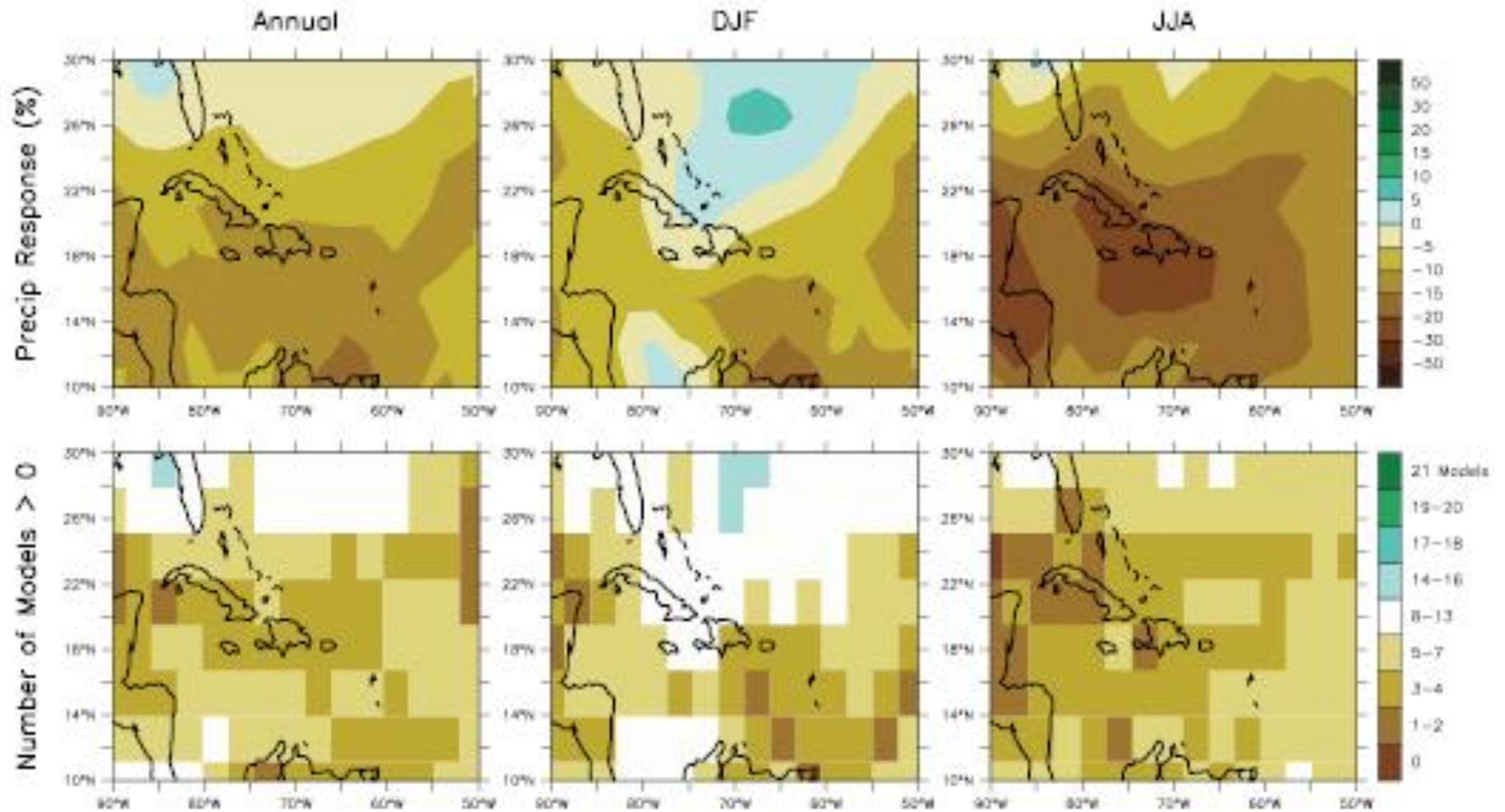
The increase in the temperature of the ocean surface will be around 1°C by 2050, according to the IPCC's IS92a scenario. In addition to fostering the formation of cyclones, the rise of oceanic temperatures threatens coastal ecosystems, like coral reefs, that are highly sensitive to temperature. Most incidents of coral bleaching during the last decade in the Caribbean have been attributed to anomalies in the ocean temperature.

## 6) Acidification of the Ocean

Ocean acidity has already increased by 30 percent (pH 8.2 - 8.1) since the beginning of the industrial period. Acidity could further increase by 30 percent during the 21<sup>st</sup> century if CO<sub>2</sub> emissions continue to increase at the current pace. Absorption of CO<sub>2</sub> and acidification are slower in the warm waters of the Caribbean than in the cold waters of high latitudes. The effects of increased acidity will be felt by all organisms with shells (or structures that are made up of carbonate, such as crustaceans, mollusks, foraminifera, and corals), but also by

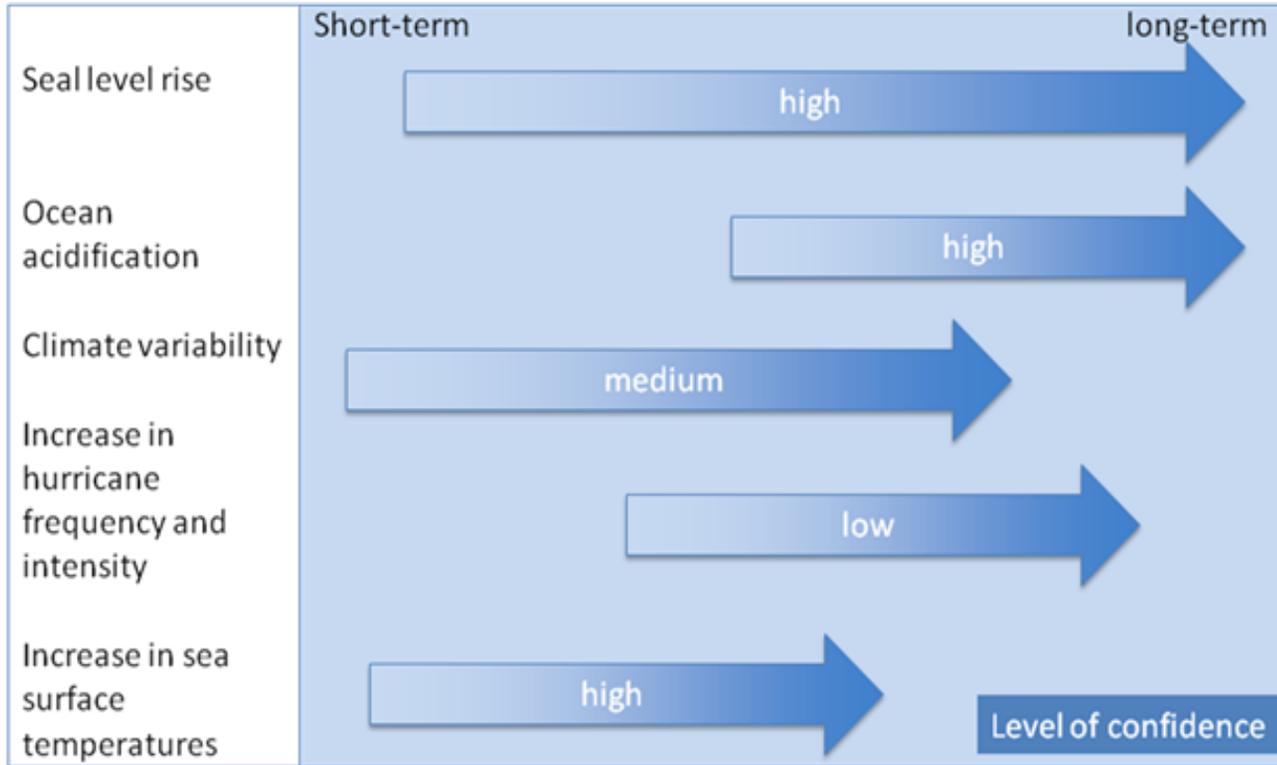
other marine organisms lacking the physiological functions and regulatory mechanisms to compensate for the environment's acidity. In the case of corals, estimates of the reduction in the calcification rate range from 10-60 percent by the end of the century.

FIGURE 5 CHANGES IN RAINFALL IN THE CARIBBEAN AREA FOR A CLIMATE-CHANGE SCENARIO.



Source: IPCC, 2007

FIGURE 6 IMPACT OF CLIMATE CHANGE ON COASTAL AREAS.



### 1.2.1.3. CLIMATE CHANGE PROJECTIONS

The following table summarizes the conclusions and projections from different studies recently carried out by various institutions (including MDE, universities, international bodies, and consultancy firms) on climate-change impacts in Haiti and the Caribbean region. Projections go until 2070.

Climate/Parameters Modifications Linked to Climate Change	Trends
<b>Cyclones</b>	Intensification of cyclone intensity: stronger winds, heavier rains
<b>Rainfall</b>	Clear downward trend MDE, 2012: -8% to -14% decrease in volume of rain
<b>Temperature</b>	Trend towards a significant increase over the coming years MDE, 2012: Maximum of 0.7°C to 1.7°C and Minimum of 0.7°C to 1.3°C between 2011 to 2070 A marked upward trend during hot months (June and July) and particularly for maximum temperatures Significant changes for September and October Slightly smaller rainfall during rainy months Slight rise in rainfall during the month of March
<b>Aridity and Crop Water Requirements</b>	Increase in water needs MDE, 2012: For maize, from 17-36%; for rice, from 0.2- 7% between 2011-70 Possible fall in crop yields
<b>Availability of Water Resources</b>	More pronounced hydrological deficit and increase in groundwater pumping, except during the months of November, December, and January
<b>Sea Level</b>	Rise in sea level
<b>Sea Surface Temperature</b>	Rise in sea surface temperature

Sources: own figures, from MDE, 2012 and interviews of key informants

### 1.2.1.4. VULNERABLE REGIONS

The country as a whole is vulnerable to natural disasters and to the impacts of climate change. Such vulnerability is exacerbated by environmental degradation and, in particular,

by erosion levels throughout the country. When anthropogenic factors add to the risk of natural disasters and climate change impacts, strengthening the capacity to effectively mitigate risks through adequate measures becomes a challenge of paramount importance. In this regard, the Haitian legal and institutional framework is rather deficient, and its flaws speak to the detriment of existing efforts for disaster risk management and prevention.

At the same time, it is important not to lose sight of the seismic risk that is also relevant all across the country and that can potentially cause major damage.

Based on these considerations and drawing from the work of Oxfam (Mathieu et al. 2002), CNIGS, MDE (Agroconsult 2009), and the track record of recent impacts from natural disasters and climate change, a *vulnerability ranking* ranging from *low* to *very high risk* was established for the country's 10 geographical *Départements*:

<b>Very High:</b>	Ouest, Artibonite
<b>High:</b>	Sud, Nord, Sud-Est, Grande-Anse
<b>Average:</b>	Nippes
<b>Low:</b>	Nord-Est, Nord-Ouest
<b>Very Low:</b>	Centre

The details of this ranking are presented in Table 8.

TABLE 8 LEVEL OF RISK IN RELATION TO THE MAIN THREATS LINKED TO CC

Level of Risk	Département	Main Threats Linked to CC	Most Exposed Communes /Districts	Observations
Very high	Ouest	Cyclones –Rains Flooding Tidal waves Rise in T° Drought Rise in sea level	From Petit-Goave to Montrouis, passing Port-au-Prince Urban Community, the main conurbations are coastal and next to water courses. The erosion level and unplanned urbanization means that the impact of cyclones, rains, and flooding is extremely serious. Fisherman in the region, in spite of a nearby market, are greatly affected by urban pollution and erosion. It is the most populated <i>département</i> of the country. The flimsily constructed conurbations next to the sea are greatly exposed to tidal waves. Agricultural lowlands found here are also coastal. Droughts and lack of water risk causing wide-scale social crises. Rise of sea level risks salinizing plains and groundwater.	Erosion, river basin degradation, and unplanned occupation of Mornes in towns increase the consequences and impact of rains and cyclones. Highly seismic area.

Level of Risk	Département	Main Threats Linked to CC	Most Exposed Communes /Districts	Observations
	Artibonite	Rains/Cyclones Flooding Rise in T° Drought Rise in sea level	Two major coastal towns, Saint-Marc and Gonaïves, are situated on water courses and are at danger of widespread flooding because of erosion levels. Towns in the valley are threatened by flooding. The major impact of climate change in the region will be on agriculture, and especially on the Artibonite Valley; this will be felt all over the country. Gonaïves and Environs severely affected. Risks of salinizing plains and valleys with a rise in sea level.	Erosion is relatively extensive in some river basins (La Quinte in particular). Land rights conflicts are widespread, in particular in high-value agricultural areas.
High	Sud	Cyclones/Rains Flooding Rise in T° Drought Rise in sea level	From Cotes de Fer to Tiburon and passing through Cayes, the main towns of the <i>département</i> are coastal and border water courses. Frequent flooding. Coastal plains with risks of salinizing land and groundwater. Road infrastructure is often severely affected.	High-risk seismic area. Erosion is relatively extensive in some river basins. Mountains are highly sensitive to erosion.
	Nord	Rains/Cyclones Flooding Rise T° Drought Rise in sea level	Cap-Haitien, the capital town of the <i>département</i> , is coastal and situated on a water course. Several towns in the <i>departement</i> are situated on the river (Great River of Nord). Eventual salinization of coastal plains(in particular Plaine du Nord). Fall in agricultural production with unpredictability of rains and drought.	Erosion is relatively widespread. High-risk seismic area with the possibility of a tsunami
	Sud-Est	Cyclones/Rains Flooding Rise T° Drought Rise in sea level	Mainly coastal towns and situated on water courses. The <i>Département</i> is heavily struck by cyclones. Fishing is the major economic activity affected. There is often significant damage caused by cyclonic swell. Coastal road infrastructure and water crossings are destroyed by swollen water.	Erosion is relatively extensive in some river basins.

Level of Risk	Département	Main Threats Linked to CC	Most Exposed Communes /Districts	Observations
	Grand-Anse	Cyclones/Rains Flooding Rise T° Drought Rise in sea level	Cyclones are frequent. The capital town, Jérémie, is a coastal town. Agriculture is essentially rain-fed, with a large impact from cyclones and the unpredictability of rains. Fishing, the major economic activity, is affected.	Erosion is relatively extensive in some river basins.
Average	Nippes	Cyclones/Rains Flooding Rise T° Drought Rise in sea level	Frequent cyclones. Few large coastal plains (except Baconnois). Major towns are coastal and/or bordered by water courses. Coastal road are threatened (Miragoane – Petit-Trou). Fishing, the major economic activity, is affected.	Erosion is relatively extensive in some river basins.
Low	Nord-Est	Drought Rains/Cyclones Flooding Rise T° Rise in sea level	Episodes of frequent prolonged droughts. The two main towns are coastal. Other towns are threatened by flooding and/or landslides. Great plains are threatened by salinization.	Erosion is relatively extensive in some river basins. High-risk seismic area with the possibility of a tsunami
	Nord-Ouest	Drought Rains/Cyclones Flooding Rise T° Rise in sea level	Main cities, including Port-de-Paix, are coastal and situated on water courses. Episodes of major drought (no water, large migration). Drought quasi-endemic in the <i>Ouest</i> . Fishing, the major economic activity, is affected.	Deforestation and extensive erosion, especially in the <i>Ouest</i> . Survival mechanisms developed for repeated droughts. High-risk seismic area with the possibility of a tsunami
Very Low	Centre	Drought Rains/Cyclones Flooding Rise T°	The main towns are bordering water courses. Rains and droughts affect agriculture. Largest part of the River Artibonite river basin. Home to hydroelectric infrastructure, the major one in country. Water resources are not very developed.	Area of great potential. Agriculture still not fully exploited

The *départements* of Ouest and Artibonite are clearly the most vulnerable, and those of Sud, Nord, Sud-Est, and Grande-Anse are highly vulnerable. The country has paid a high toll in terms of human life and social and economic costs as a result of natural disasters in these *départements*.

The extreme vulnerability of the following enclaves should also be noted:

- Areas bordering rivers and water courses with large concentrations of people, infrastructure, and economic activities.
- Coastal areas that are densely populated.

The *département* of Centre (and the high *Plateau Central* in particular) seems to be the region least threatened by climate-change impacts, except for rainfall and droughts that affect agricultural production. It should also be highlighted that this *département* is completely integrated into the River Artibonite river basin, which supplies the valley of the same name and is considered to be the most important agricultural area of the country.

#### 1.2.1.5. VULNERABLE SECTORS

Like all the natural catastrophes that have recently struck Haiti, climate-change consequences will have significant social and economic impacts on various sectors. With the increase in intensity of cyclones, rains, erratic rains, and droughts, catastrophic impacts are to be expected. The slow onset phenomena, such as rising sea levels, increasing air temperatures, and rises in sea water acidity will not be felt quite as brutally but may eventually have greater and more far-reaching impacts. With no under-estimation of the inevitable co-relations between different sectors selected, the following tables reflect the estimated impacts of climate change on the main economic and social sectors in Haiti. Adaptation strategies put in place by stakeholders (see Annex 2 for a list of stakeholders) in those sectors are also reflected.

TABLE 9 ESTIMATED LEVEL OF IMPACT OF CC FOR THE MAIN ECONOMIC AND SOCIAL SECTORS

Anticipated Climate Change	SECTORS								NOTES
	Agriculture	Fishing and Marine Biodiversity	Water	Road Infrastructure and Transport	Urban Infrastructure and Housing	Tourism	Health	Services	
High Intensity Cyclones	H	H	H	H	H	H	H	H	
Heavy and Unpredictable Rainfall	H	H	H	H	H	H	H	H	
Rise of Temperatures	H	H	M		M	M	H	L	Includes sea surface T°
Droughts	H	M	H		H	M	H	L	
Sea-level Rise	H	H	M	H	H	H	L	M	Infrastructure near coasts Towns mainly coastal

Source: own figures; H= High, M= Medium; L= Low

**TABLE 10** SECTORS AND PROBLEMS LINKED TO CLIMATE CHANGE/ADAPTATION STRATEGIES DEVELOPED BY STAKEHOLDERS

Sectors	Problems Linked to CC	Adaptation Strategies
Agriculture	<p>Variations in the rhythm of rainy seasons (significant time lags, reduction in rainfall in some cases, increase in rains during rainy seasons).</p> <p>Intensification of cyclones (intensity of rains and winds).</p> <p>More frequent flooding.</p> <p>Droughts (reduction in rainfall, shorter return times, and longer periods of drought).</p> <p>Loss of crops and animals.</p> <p>Salinization of coastal plains following tidal waves.</p> <p>Decapitalization of farms.</p> <p>Decrease in food security.</p>	<p>Change of cropping systems.</p> <p>Diversification of agricultural market supply chains and activities.</p> <p>Replicated seedlings; use on same plot of two varieties of the same species, alternating long-cycle and short-cycle (maize); introduction of new shorter-cycle crops in crop rotation; use of longer-cycle crops more likely to survive repeated droughts; use of multi-annual or perennial crops much less subject to hazards such as strong winds, flooding, and drought(cane, fruit); and reintroduction of growing crops (coffee, cocoa<sup>22</sup>) under forest cover (forest ecosystem), less affected during droughts, even relatively prolonged. It should also be noted that farmers can implement such strategies more easily when they and their smallholdings enjoy better economic conditions (better controlled production systems and cash flow guarantee for the majority of the year) and living conditions (relatively significant production means); production of charcoal; sale of cattle; sale of goods; migration of people.</p>
Fishing and marine biodiversity	<p>Cyclones and increasingly violent rains with floods carrying land into the sea following erosion.</p> <p>Rise in water surface temperature.</p> <p>Rise in sea level.</p> <p>Acidification of sea water.</p> <p>Movement of flora and fauna (disappearance of algae and reduction in the fish population).</p> <p>Destruction of coral.</p>	<p>Increase in time spent at sea and devoted to fishing..</p> <p>Fishermen going further out to sea to find fish.</p> <p>Catch of fish ever smaller, outside permitted norms.</p> <p>Over-fishing.</p> <p>Treatment of drinking water.</p> <p>Displacement of fishing communities to live elsewhere (involving change of professional activity).</p>
Water	<p>Repeated and longer droughts.</p> <p>Excessive heating of water.</p> <p>Increase in demand.</p> <p>Drying up, drying out, and salinization of water points.</p> <p>Sources contaminated following swells.</p> <p>Epidemics.</p>	<p>Research other sources of water supply.</p> <p>More and more underwater pumping.</p> <p>Construction of dams for supplying the population.</p>

<sup>22</sup>Coffee and cocoa are usually produced in wooded areas (with large tree forest cover) and in association with other fruit-trees and tubers, and yam in particular in agro-ecological conditions favorable to their production (humid and semi-humid areas). Coffee is generally produced in high altitudes with lower temperatures. It should also be recalled that humid and semi-humid areas are less prone to drought than dry areas. Therefore, coffee production ecosystems are more resilient to climate change and farmers manage to harvest their product even under harsh climate conditions.

Sectors	Problems Linked to CC	Adaptation Strategies
Road Infrastructure and Transport	Torrential swells and more frequent swells. Destruction of bridges and rapid deterioration of roads. Deterioration of coastal roads. Trunk roads cut off.	Overdesign of increasingly costly works. Erection of very large drainage structures. Displacement of roads to less-threatened places. Multiplication of water crossings. Organization of increasingly frequent infrastructure projects.
Urban and Housing Infrastructure	More-violent cyclones and rains bringing torrential swells and increasingly frequent floods. Possibility of increasingly frequent cyclonic swells. Rising sea level.	Construction of more solid infrastructure. Raising houses. Abandonment of lower floors of houses along the sea shore. Setting up early warning systems. Displacement of coastal communities.
Tourism	Rising sea level Disappearance of coral Reduction in the variety of marine attractions	Erecting protection structures for beaches and hotels. Overdesign constructions able to withstand hurricanes and cyclonic swells. Less construction next to the sea.

#### 1.2.1.6. VULNERABLE GROUPS

Beyond geographical exposure, a combination of extra factors make the large majority of Haitians at all social levels particularly vulnerable: the conditions of poverty and insecurity in which the majority of the population live; the weakness of the juridical and legal framework; the lack of capacity, structures, and institutions to which they can turn; and the absence of a plan for intervention and a specific risk and disaster prevention policy (Mathieu et al. 2003 and UNDP Haiti 2006).

The concept of social vulnerability leads to a focus on families who have little social capital, live in substandard housing, and are often located in areas at risk. The most vulnerable are the poorest people living in “survival mode” and exposed to greater risks, eroding community foundations and putting a serious strain on their future prospects.

Besides women and young people, different references consulted identify the following as the groups of stakeholders most at risk of suffering the impacts of climate change:

- ▶ Farmers and agricultural producers.
- ▶ Fishermen.
- ▶ People making a living from agricultural trade and the informal sector (notably women and small traders).
- ▶ Residents in the country’s major urban settlements.
- ▶ The most disadvantaged social strata.
- ▶ Marginalized people (disabled and the elderly).

More in-depth studies are necessary for a more precise identification of the most vulnerable groups, to anticipate the consequences of climate change and, above all, to develop targeted strategies and to develop capacities for effective adaptation of these groups.

## CLIMATE CHANGE AND DISASTER RISK REDUCTION

Haiti is a very vulnerable country. As highlighted earlier, there is a whole range of factors that predispose, aggravate, and amplify the consequences and impacts of natural disasters. Although these factors affect the society as a whole, they are particularly relevant to the most disadvantaged. The following are among of the most significant factors:

- ▶ Generalized poverty and a process of impoverishment affecting all segments of the population.
- ▶ Rapid population growth and large migratory movements.
- ▶ Low levels of information, training, and education.
- ▶ Low level of health coverage and high rates of mortality and morbidity.
- ▶ Degradation of the environment, deforestation, and erosion.
- ▶ Flawed land planning.
- ▶ Weakness of the juridical/legal framework and widespread corruption.
- ▶ Difficulty in building trust and a collective spirit and sense of responsibility.

These actual challenges have not as yet engendered a solid response from social groups, organizations, or the government. Some attempts channeled through public policies, programs, and projects have not achieved the expected results and have failed to mitigate the risks.

The impact of disasters on the different sectors and in the different regions of the country has multiplied and continues to grow. Sectors, such as agriculture and fishing, water, and urban transport infrastructures (in particular along the coastline) are particularly threatened. The anxiety felt around health issues, and the hesitation to invest in tourism, is also a symptom of this state of vulnerability.

Only comprehensive, coherent, broad-scale, and effective actions replicable at a national scale could trigger the dialogue and consensus among stakeholders that could through continuous training/education processes facilitate the smooth implementation of a strategy to address vulnerability. As long as levels of vulnerability in Haiti remain as high as they are today, the ravaging impact of weather events (extreme or slow onset) are to be expected. Promoting disaster management and climate risk resilience therefore need to happen in parallel, and both need to be integrated into land-use, planning-based development.

It is undeniable that great effort has been put into disaster management; structures are in place in many of the regions of the country, including at a scale as small as *communes*. In many of the country's districts, communities are familiar with natural hazards, vulnerability

factors, and spatial considerations affecting exposure. They are also better prepared for disasters and know better how to react to information and advice provided by the authorities and local experts. In parallel, information provided by specialized public services, authorities, and local institutions is more accurate. Some local institutions are able to evaluate risks and assess loss incurred, and are equipped to carry out training across the country to strengthen local self-reliance. Forecasting capacity, however, is still too weak mainly due to the lack of reliable data and the lack of data quality-control mechanisms.

Such problems impinge on the capacity to understand weather events and to manage their consequences. The PPCR intends to address the challenges of data collection. It will also ensure that projects and actions (referring to both sectoral and territorial policies, strategies, and plans) are implemented in an integrated manner. Targets will be properly identified and actions will be systematically monitored so as to contribute to easier replication.

## 1.3. LINKS WITH DEVELOPMENT PLANS, PROGRAMS AND PROJECTS

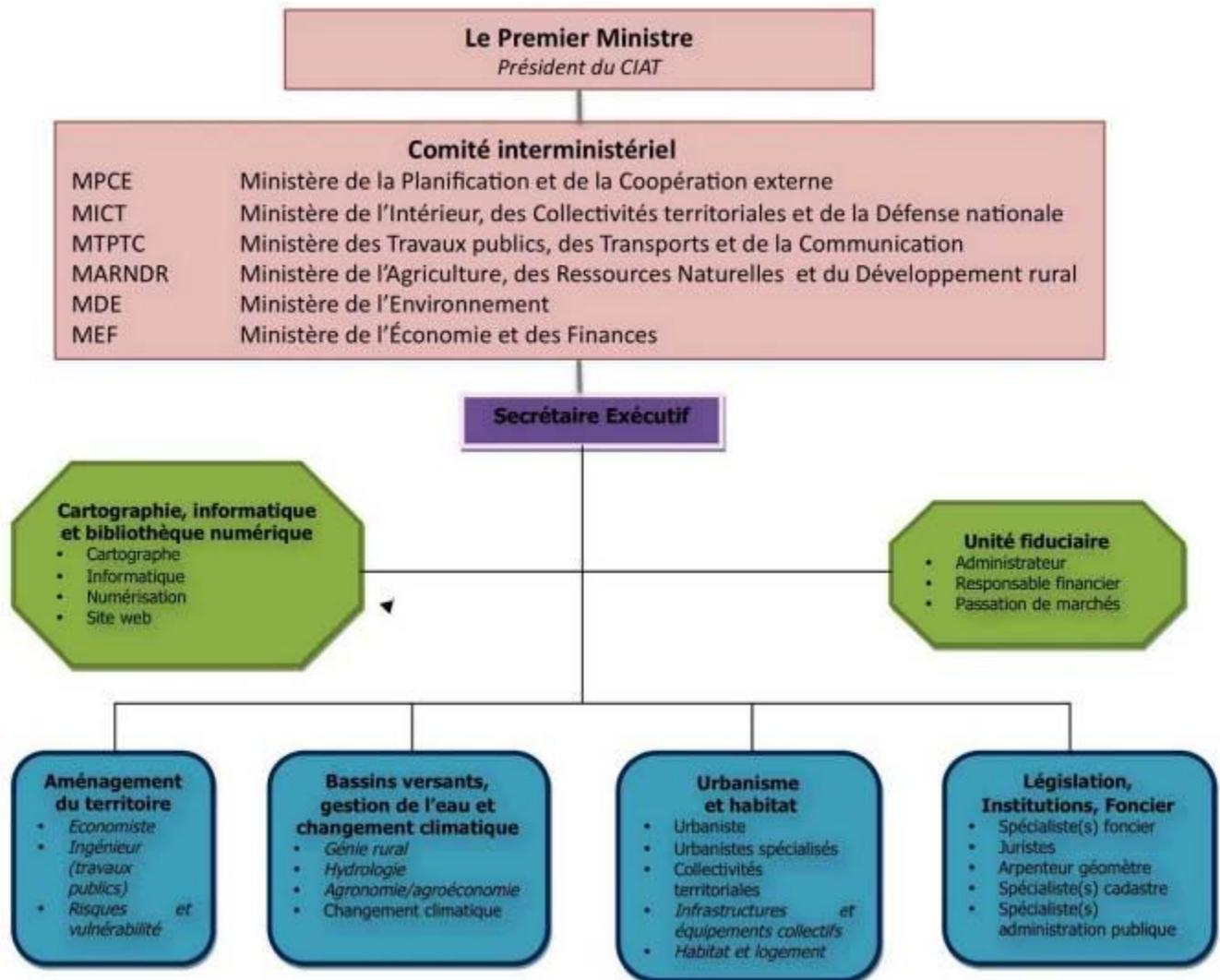
### NATIONAL INITIATIVES

Haiti is a country that has a large adaptation deficit. This means the capacity to adapt to current climatic impacts is weak. Considering the possible impacts of climate change, in the absence of climate resilience development measures the adaptation deficit will increase in the future. In practice, any action that succeeds in making up for the current adaptation deficit will contribute to increasing climate resilience in the future. In addition, triggering a process of reflection on climate resilience, such as the one fostered by the PPCR project, will enable institutional and social dynamics to be put in place to contribute to increased climate resilience in the future, all while considering the immediate climatic risks and possible evolution of Haiti's climate framework.

#### 1.3.1.1. CIAT

The Inter-ministerial Committee for Land Planning was created by mandate of the Prime Minister on January 30, 2009. It is chaired by the Prime Minister and brings together six ministries (see organizational chart). CIAT's mission is to define government policy on territorial planning, protection, and management of watershed, water management and sanitation, urbanization, and equipment. Since 2009, CIAT has been designated as the focal point for PPCR with the Haitian government.

FIGURE 7 CIAT ORGANIZATIONAL CHART



### 1.3.1.2. MDE AND CLIMATE CHANGE

The Ministry of Environment was created under the law of January 28, 1995. The MDE is a key player in climate change work and was responsible for preparing the first and second national communication as part of UNFCCC and the NAPA. The MDE suffers from weak institutional, organizational, and financial capacity, but considerable efforts are currently being implemented in these regards. The MDE is nevertheless able to carry out several programs thanks to international financial support, which unfortunately is both sporadic and not large enough (UNDP, USAID, CIDA, WB, IDB, and so forth). It should be noted that there is also a lack of qualified human resources in the areas of the environment and climate change, thus adding to the difficulties in delivering on all the mandates given to the MDE.

The MDE manages compliance with the country's international obligations. The UNFCCC was signed in 1992 in Rio and was later ratified in 1996. The Ministry of the Environment has designated focal points for the UNFCCC, CDM, and REDD/REDD+ mechanisms. The MDE has put in place a Department of Climate Change to support other government departments addressing the climate change agenda. Several framework documents related to climate change have been produced or are being drafted, in compliance with UNFCCC's requirements:

- ▶ The first National Communication on climate change was produced in August 2001 with the support of the GEF/UNEP Technical Cooperation and contributions from MARNDR, FAMV-UEH, and BME.
- ▶ NAPA was presented in October 2006 under the leadership of MDE and with the participation of MARNDR, MPCE, MTPTC, BME, UEH, UNDH, private institutions, and NGOs active in the environmental field.
- ▶ The Second Communication on climate change has been completed and the document is currently being printed.

### **The National Action Plan of Adaptation (NAPA)**

The NAPA identifies the country's main vulnerabilities to climate change and its adaptation needs. The NAPA was developed based on a series of preparatory studies and public consultation workshops. NAPA seeks to establish synergies with the major environmental agreements, including CBD, UNCCD, and UNFCCC, and with two governmental priority programs: the Action Plan for the Environment (PAE) of 1999 and the Risk and Disaster Management National Plan (PNGRD) of 2001. The prioritization of options was made by a multi-criteria analysis using six criteria (gravity of adverse effects of climate change, reduction of poverty, synergy with other MEAs, averting losses for the poor, the multiple impact of the option, and cost-effectiveness). As a result, priority options were defined. The SPCR plans to draw from some of the NAPA action points as a result of the validation exercise that took place during the regional workshops and bilateral meetings with the program's partners.

### **Climate Change Department of the MDE**

This department guarantees the implementation of the United Nations Framework Convention for Climate Change and monitors programs and projects on climate change carried out in the country. It also focuses on the design of adaptation programs and climate risk-mitigation measures. Currently, it works in conjunction with UNDP in profiling the country's climate change and land-cover mapping in coastal areas.

### **Designated National Authority of Haiti (ANDH)**

The Designated National Authority of Haiti was created within the Ministry of the Environment by presidential decree on May 24, 2010; it is in charge of implementing Clean Development Mechanisms (CDM) provisions of the Kyoto Protocol. ANDH contributes to

achieving criteria and sustainable development objectives at the national level by implementing projects that result in a reduction of greenhouse gas emissions.

### **National Observatory of Environment and Vulnerability (ONEV)**

Following the Framework Decree on Environmental Management on January 26, 2006, and as part of the National System of Environment Management (SNGE), the ONEV was set up in 2007 to address the country's increasingly extreme environmental vulnerability and lack of information for monitoring the environment. This office's mission is to promote structured and dynamic mechanisms for stimulating information exchange, production of data, and scientific analysis for rational management of the environment and for monitoring vulnerability to natural hazards. It serves as a platform for productive and mutually beneficial partnerships for the institutions concerned as part of their specific missions; acts as a catalyst for major national interests in general as part of the promotion of sustainable environmental; and provides an effective institutional and technical mechanism for the production, analysis, and dissemination of necessary environmental information for future decision making. Its mandate is the following: environmental data collection and production; creating applications to enable a good understanding of the problems on various components of the environment; setting up environmental monitoring in protected areas and areas at risk; evaluation of public policies and monitoring of the impacts of environmental projects; disseminating data and information through the use of tools for effective reporting (e.g. in the area of seism); and creating a platform of cooperation, strategic thinking, and sharing of experiences among stakeholders in the environmental sector (e.g., on the issues of pollution or rising lakes and ponds).

Since its creation, ONEV has benefited from UNDP support; in particular, through the PRIGE project also supported by IDB. ONEV has worked mainly on three resources --water, air and soil. It works in collaboration with the different departments and services involved in the collection and generation of data in these areas. ONEV has carried out quality control of hydro-meteorological data, water plans, and water quality. It owns equipment and materials that are partially installed. To date, ONEV's results remain modest and its work has been erratic. A draft organic law for ONEV has been developed and needs a Parliamentary vote to enter into force (similar to the MDE law). It has recently benefited from GEF's support through the Artibonite Project implemented by Oxfam-Quebec. ONEV will be a necessary PPCR stakeholder.

### **1.3.1.3. OTHER INSTITUTIONAL CLIMATE RISK MANAGEMENT TOOLS IN PLACE**

Several government structures are involved in climate risk management in Haiti.

### **National Service of Water Resources (SNRE)**

Created in 1980, SNRE is a department of the MARNDR. Originally, it was supposed to cover meteorology, boring<sup>23</sup>, hydrology and sedimentology, climatology and agro-climatology, and hydrogeology and geophysics. In 2003, SNRE was only responsible for the latter three groups of activities. Today, SNRE does not have a budget and apparently has no precise mission. Its staff members are aging and demotivated. SNRE has only existed through international projects and even before the earthquake, it appeared not to have the capacity to really fulfill its mandate (PIA/MARNDR, 2007 and Raymond H. et al, 1998<sup>24</sup>). After the earthquake of 12 January 2010, the situation worsened and the department found itself practically made redundant. No minimal precautionary measures were taken at the time to preserve the archives with historical data.

In mid-2010 no hydrometrical station was in use, and only 10 rain gauges still collected data as part of a contract between Christian Brothers institutions and the MARNDR. Only one agro-climatologic station is currently at working in Damien. No piezometric station is working. Data-processing and storage is no longer ensured. The forecasting system and service for users has been reduced to zero, and projects/ programs as well as the private sector take on initiatives in isolation throughout the country.

### **National Centre for Meteorology (CNM)**

The CNM was put in place in 2001 as a separate entity from MARNDR and at a higher-level than SNRE. Since its creation, CNM has come under the airfield structure (OFNAC).

In mid-2010, three (3) meteorological synoptic stations had data; two (2) or three (3) automatic climatologic stations worked and transmitted information. The CNM had no finalized production tool, no direct reception of products and data for forecasting and aeronautic assistance, no provision for verification of forecasts and also very few human resources. Nor did CNM have any reception facilities and bulletins were disseminated only via e-mail. Thanks to ONM, in an unprecedented act of solidarity, strategic collaboration was established with CNM and, from June 2010, the website [www.meteo-haiti.gouv.ht](http://www.meteo-haiti.gouv.ht) became totally operational and freely accessible.

**SNRE** and **CNM** are both essential to understanding water variability in the country and will be central to PPCR naturally. Other entities and users interested in water resources (SNRE, CNM, ONEV, CNIGS, DINEPA, OFNAC, etc.) will be involved as part of an action-oriented platform; firstly, with a view to enhance the organization of the collection, processing, and dissemination of water information and eventually, of making the best possible use of water resources. Despite an effort to quickly re-organize after the earthquake action, there is still a long way to go. SPCR will work on constructing and consolidating collective initiatives and to ensure these are institutionally viable.

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<sup>23</sup> Exploratory boring, pumping test

<sup>24</sup> Formulation of a water policy

### **Department of Civil Protection (DPC) and Early-Warning National Program in Case of Flooding (PNAP)**

The Department of Civil Protection lies within the Ministry of the Interior and Regional Authorities (MICT). It deals with risk and disaster management (DRM) across the country. As such, DPC serves as the Risk and Disaster Management National System (SNGRD), an implementing arm created in 1998. It has a decentralized structure with representatives at the *commune* level. DPC also guides all the SNGRD support projects funded by the World Bank, the European Union, UNDP, and IDB. DCP has department committees, where heads of local public institutions, representatives from international agencies, international NGOs, and local NGOs meet. They exist in all departments, they are structured as *communes* and local committees, and they are supported by evacuation site officials and by a large number of volunteers with first-aid equipment. Their local delegate is the co-coordinator of civil protection at departmental level. S/he is supported by a technical coordinator and plays a very active role in awareness-raising amongst the population before and during catastrophes and in assessing the damage caused by disasters.

### **National Coordination of Food Security (CNSA), National Observatory of Food Security (ONSA), National Plan of Food and Nutritional Security (PNSAN)**

ONSA was created in 2004. The establishment of decentralized observatories was carried out from 2006 onward and in several phases. Intervention in cases of emergency by ONSA and CNSA are complementary to those of the international organizations; in particular, FAO (which provides food aid as well as support in restoring agricultural production). Modeling potential food crises is done using hydro-meteorological data and food prices on world markets.

#### **1.3.1.4. OTHER SECTORAL ACTIVITIES LINKED TO CC**

The Global Environment Facility (GEF) and UNDP channel initiatives directly or indirectly linked to climate change and of are particular interest for the SPCR. In the case of GEF programming, relevant initiatives relate to *watershed management* and *adaptive capacity-strengthening* for coastal communities addressing climate change impacts (mostly in the south of the country), as well as to *capacity-strengthening of climate resilience and catastrophe risk reduction in agriculture to improve food security*. This last project is being developed in conjunction with FAO's *farmer field schools* program. In total, Haiti received \$4.56 million for the GEF-5 period (July 2010 – June 2014), of which \$2 million are allocated to climate change.

UNDP action in conjunction with MDE aims to increase forest cover, manage watersheds, promote reforestation and renewable energies, develop protected areas, preserve biological diversity, and develop the Haitian natural heritage. In practical terms, UNDP contributes to setting up national environment protection systems, training local capacity in the area of natural resources management, and the creation of databases to facilitate decision making

(notably an analysis of climate data from 1850-1975). UNDP also provides support for land planning in the coastal areas of the south and southeast, and support for agriculture and food security in the Artibonite watershed. UNDP Haiti received contributions of \$92.7 million in 2011-2012, of which \$7.5 million went to the environmental portfolio.

Haiti has engaged in a certain number of international or bi-national collaborations. For example, it has worked with Cuba in the area of hydro-meteorology and with the Dominican Republic on agriculture and conservation.

Haiti has signed and ratified several international conventions related to climatic aspects, including the UNFCCC, the CBD, and the UNCCD (all three ratified in 1996), as well as the Convention on the Law of the Sea and the Convention on the Conservation of Marine Life.

Several international agencies are developing programs in the area of climate change in Haiti. In conjunction with MDE, UNDP is carrying out an adaptation to climate change program on the coastal areas in the south and southeast. The EU is currently in the design phase of an adaptation program. IDB and MDE are preparing an adaptation project on the adjoining islands. All these projects and programs have been considered during SPCR formulation to avoid duplication in the areas of intervention and action proposed. SPCR is complementing some ongoing action and seeking synergies with programs in preparation.

#### **1.3.1.5. REGIONAL GLOBAL CLIMATE CHANGE ALLIANCE (GCCA):**

Haiti is a participating country in the Global Climate Change Alliance (GCCA), which is an initiative of the European Union (EU) implemented by the European Commission (EC). The objective of this program is to strengthen the dialogue and cooperation around climate change among developing countries (with a focus on least developed countries and small island developing states) that are more vulnerable to climate change and to support their efforts to develop and implement adaptation and mitigation responses. Haiti is also a participating country in the Caribbean Regional CARIFORUM GCCA, which is implemented through the Caribbean Community Climate Change Center (CCCCC) and whose objective is to support the sustainable development of the Caribbean region and preserve the progress of the countries towards the Millennium Development Goals (MDGs) by enhancing local, national, and regional capacities and resilience in ways that link sustainable development, risk management, and adaptation. In Haiti, the program will support the installation of hydrological and meteorological stations (as part of the program's goal to improve data-gathering capacity at the national level of critical meteorological and oceanic parameters such as sea surface temperature, barometric pressure, salinity, wind speed and direction, ambient air temperature, and sea level), as well as the undertaking of capacity-building actions and several studies; the results should inform the design of climate resilience and capacity-building activities across the country.

**ELEMENTS OF THE SPCR SITUATION ANALYSIS TAKEN INTO ACCOUNT BY  
OTHER PROJECTS**

Situation Analysis	Some Proposed Projects	SPCR
<i>Country's current situation</i>		
<b>Epidemics due to Heavy Rainfall</b>	<p>Health program: MSPP, joint programs from PAHO/WHO &amp; UNICEF</p> <p>Food: DINEPA &amp; WFP</p> <p>Sanitation: IOM, EU, UNOPS, UNICEF</p>	
<b>Low Forest Cover</b>	<p>PMDN (Programme de mitigation des désastres naturels/Natural Disaster Mitigation Program) from Ministry of Agriculture, with the support of IDB, which intervenes in the protection of watersheds of : Grande Rivière du Nord, Rivière de Cavaillon and Ravine du Sud (North and South of Haiti)</p> <p>Haiti Forest Initiative project from Clinton Foundation/Virgin Unite/Yunus Social Business, whose objective is, among others, to establish forest cover on 10 000 ha of land in the Artibonite and the North part of the country</p>	Project Investment 2
<b>Watershed Degradation/ Erosion/Loss of productivity of Agriculture due to Natural Resource Depletion</b>	PMDN (Programme de mitigation des désastres naturels/Natural Disaster Mitigation Program) from Ministry of Agriculture and IDB	Project Investment 2 Project Investment 3
<b>Unemployment</b>	CFI (Centre de Facilitation des Investissement/Center for Facilitation of Investments). "[From 2006 to now], CFI has helped establish 110 companies valued at \$850 million. CFI has helped create more than 60,000 jobs." (www.cfihaiti.net)	
	UCLBP (Unité de logement et de construction des bâtiments publics-ULCBP). Project valued at 30 million USD in one of the shanty	

	town named « Jalouzi », with the objective to consolidate and improve general aspect of housing	
<b>Land Tenure Insecurity</b>	A specific program from CIAT, with the support of IDB, to address land tenure informality in two pilot areas covering the Grande Rivière du Nord watershed in the north and the Ravine du Sud and Cavaillon watersheds in the south, where Haiti's Agriculture Ministry is carrying out several investment projects funded by the IDB and other donors	
<i>Development Context</i>		
<b>Poor Governance/Weak Public Institutions</b>	Creation of the « Office de Management et des Ressources Humaines/Office of management and human resources » under the leadership of the Prime Minister, in charge of the coordination of government action for improving the performance of public administration.	Investment Project 4
<b>Seismic Risks</b>	Seismic micro zoning project from the Bureau of Mines and Energy in the western and the north part of the country	
<b>Rapid Population Growth</b>	Relaunch of the family planning program by the Ministry of Health and the UNFPA, through the "Plan de Repositionnement de la Planification Familiale" (Planning Family Plan).	
<b>Flawed Land Planning</b>		Investment Project 3
<b>Education/Insufficient Coverage of Primary Schools</b>	Creation, in 2011, of the « Fonds National d'Education/National fund for education », for helping the schooling of children.	

## 1.4. DEVELOPMENT PLAN AND PARTICIPATIVE PROCESS FOR PRIORITIZING PROJECTS

### REGIONAL CONTEXT: CARIBBEAN PPCR REGIONAL PILOT

After the approval of the PPCR in 2008, in May 2009 six Caribbean countries were invited to participate in the program. In addition, a regional program named Caribbean Regional Track was approved, incorporating a support component to each country's strategic program. The Caribbean regional track of the PPCR was approved in April 2012 and was designed based on the following principles:

1. Directly support climate change adaptation per the priorities set out in the CARICOM Regional Framework for Development Resilient to Climate Change.
2. Complement ongoing measures to address the consequences of climate change in the region.
3. Be of broad benefit and applicable to the Caribbean economies.
4. Be more efficiently undertaken at a regional level in order to address issues that are common to the region and will benefit from a common approach and economies of scale.
5. Provide for better use of resources and creation of useful information on climate change adaptation through linkages between national and regional institutions.
6. Build on and/or draw lessons from existing collaborations on climate sensitive development issues and/or on prior regional programs.

In this context, the regional PPCR program was formulated following a logic structure to generate and collect climate relevant data in PPCR participating countries, improve the connectivity of regional and global observing networks, analyze the collected data and produce climate change scenarios and prediction models and, finally, utilize all generated information to identify specific adaptation initiatives that could be successfully implemented. The program comprises four components:

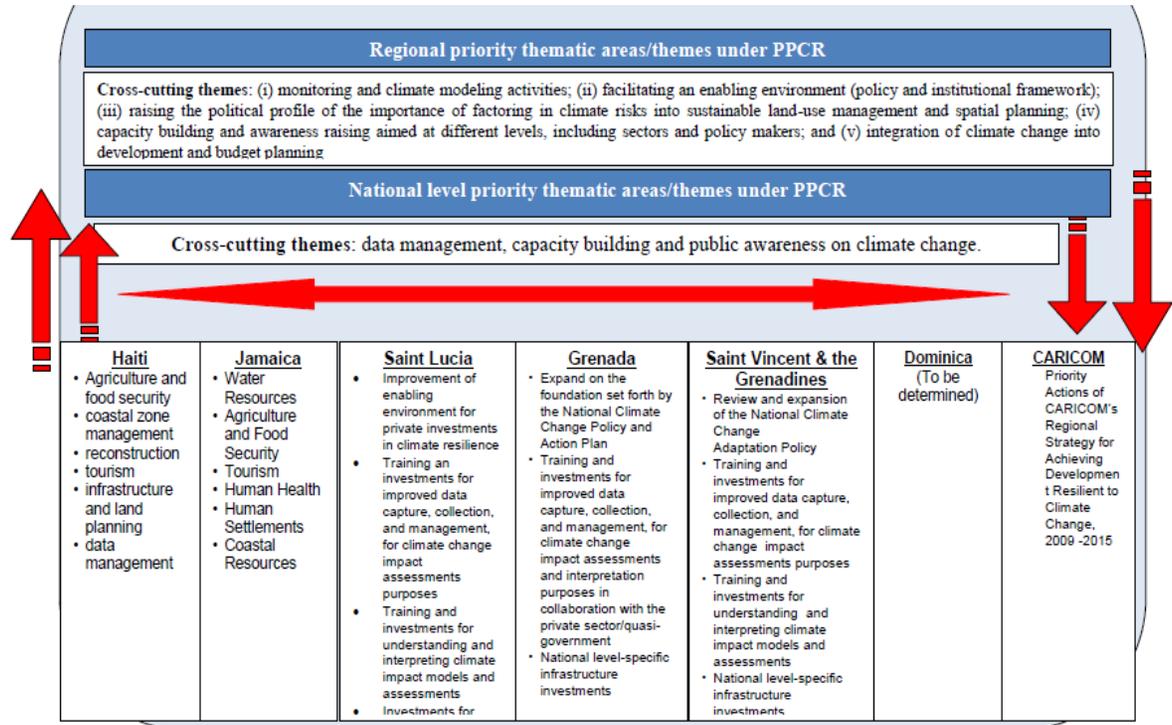
- i. Improving Geospatial Data and Management for Adaptation Planning, Sea-Level Rise, and Storm Surge Impact Analysis.
- ii. Consolidating and Expanding the Regional Climate Monitoring Network and Global Platform Linkages.
- iii. Downscaling and Expanding Climate Projection Models and High Resolution Maps.

iv. Applied Adaptation Initiatives.

The PPCR is conceived to be implemented in two phases, with the SPCR being the event that marks the end of Phase I. As part of this phase, countries identified priority areas of intervention with regard to climate-resilience building in a document called Phase I Proposal. In the context of Haiti and its national program, the areas of intervention identified in its proposal were agriculture and food security, coastal zone management, reconstruction, tourism, infrastructure and land planning, and data management.

Haiti will take the opportunity of the SPCR activity plan to strengthen its engagement with the Caribbean Regional Track. The Government of Haiti is heavily reliant on support and expertise from the Regional Track to ensure a dynamic and successful implementation of the SPCR.

FIGURE 8 PPCR CARIBBEAN REGIONAL FRAMEWORK



Source: Taken from: PPCR Caribbean Regional Tract Proposal: Draft of November 2010

## PROCESS IN ACTION

As the focal point for developing the SPCR, CIAT has held consultations of different types: working meetings and discussion with managers and representatives of various bodies and programs; broad consultation regional workshops, and a revision of the bibliography on climate change.

Beyond the constant consultation with the different ministries that compose CIAT, specific working meetings have been held with the two main ministries concerned with the program: MDE and MARNDR. In parallel, representatives of ministries, institutions, and public entities were consulted. Bilateral in-depth consultations were carried out with stakeholders from the government, international agencies, multilateral banks, and universities (see Annexes for a list of people consulted).

A series of regional workshops was organized in the 10 *départements* (see Annexes for the timetable). Based on open participation, the workshops brought together representatives from CIAT, regionally elected representatives (delegates and mayors), government stakeholders, and stakeholders representing NGOs, educational establishments, and the private sector. The objectives of these workshops were to present the PPCR; discuss with regional partners action priorities and methods of implementation; mobilize stakeholders from the regions on climate change issues and obtain a picture of the problems, solutions, and needs that the different parts of the territory felt toward issues of variability and climate change. Minutes of the workshops were written up and will be disseminated and used as part of the formulation process of a national strategy on climate resilience (to be part of SPCR Phase 2). The regional workshops helped to draw the focus on the specific needs in the different regions and in the country in general, and on the area of hydromet information and its use at the *département* and local levels.

The SPCR has drawn upon the different studies on climate change and intervention carried out by government and international experts (see Annexes for the bibliography selected)

A national validation workshop should complete the process and will be necessary for the formalization of the SPCR.

## MAIN RECOMMENDATIONS

These different discussions provided an opportunity to present the opinions of experts and representatives of institutions, bodies, and programs with the population's perceptions on climate change. The most relevant remarks and suggestions have been incorporated into this document.

The recommendations proposed by specialists and experts, as well as those formulated during the regional workshops, do not differ much and coincide with the priorities set by the NAPA and the 1<sup>st</sup> National Communication. They mainly concern adaptation to climate change and can be summarized as follows:

- Setting up interventions aimed at integrated management of watersheds<sup>25</sup>; in particular, those dominating agricultural infrastructure (irrigated areas in particular), urban infrastructure, and transport.
- Facilitating the development of crops and agricultural market supply chains<sup>26</sup> able to support the adaptation capacity of producers and other stakeholders involved in the agricultural sector.<sup>27</sup>
- Adopting a market supply chain approach which maximizes agricultural products and significantly improves the income of the population in the long term.
- Better support for farmers and other agricultural sector stakeholders, and access to secured credit.
- Putting in place in all regional authorities (mainly in *communes*) risk maps and evacuation plans, including threats linked to climate and climate change.
- Capacity strengthening for monitoring water resources and developing the means for efficient management and conservation.<sup>28</sup>
- Awareness raising, mobilizing the population on the issue of climate change and setting up a process of training/education targeting the general public and specialists.

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<sup>25</sup> Set up land-planning structures (correction of ravines, reforestation, and grafting), and involvement at all levels of stakeholders living in these spaces.

<sup>26</sup> Coffee; fruit (avocados, citrus fruit, and mangoes); tubers (longer crop cycle able to adapt to climate variations); and vegetables (high value-added crops).

<sup>27</sup> Set up processing and agro-industrial units.

<sup>28</sup> Tanks, hill reservoirs.

## 1.5. RATIONALE FOR SUPPORTING PPCR

Haiti is heavily exposed to climatic variations. Adaptation capacity is weak at several levels: financial, institutional, scientific, technical, and human resources. This results in significant vulnerability in addressing climate-change impacts. The implementation of an adaptation framework was delayed by numerous events that affected Haiti during the last decade: the earthquake of 2010, the hurricanes of 2004 and 2008, political instability, a cholera epidemic, and so forth. The PPCR program represents an opportunity for Haiti to carry out projects to improve climate resilience institutionally and in key sectors and to develop inter-sectoral strategic thinking on climate change with the goal of integrating this issue into policies and future development plans. Mainstreaming climate change into public policies for all the sectors concerned will strengthen resilience in these sectors and protect them mid and long term (as well as protect private and public investments in these sectors). This is particularly important for a small state like Haiti with limited financial resources. Through this reflection and concrete actions in the field, SPCR will have an impact that will be further expanded during the 5-year Phase 2 period of the PPCR.

## 1.6. INSTITUTIONAL ANALYSIS

The commitment needed to face the challenges and issues linked to climate change and to strengthen climate resilience will require a change of attitude and behavior on the part of the society, as well as reaching a consensus and aligning efforts/concessions made by all members of society.

### ROLE OF GOVERNMENT

Roles	Brief Description of Involvement	Institutions/Organizations and Heads
<b>General Orientation and Planning</b>	Responsibility for developing SPCR and PPCR Focal point of Convention on Climate Resilience	Governmental sub-commission on Climate Resilience
<b>Capacity Building</b>	Put in place training programs at different levels Develop curriculum and modules Training of trainers	CIAT with direct support of MDE and MARNDR Scientific Committee

Roles	Brief Description of Involvement	Institutions/Organizations and Heads
<b>Information and Education</b>	Draw up communication plan Awareness-raising and information campaigns	Sub-commission on Climate Resilience CIAT/PPCR
<b>Implementation and Monitoring /Evaluation</b>	Role as co-coordinator Co-ordination/Management of PPCR and accountability to national and international bodies Set up supervisory mechanisms in conjunction with ministries concerned Monitoring-evaluation	Government departments and ministry services involved Sub-commission on Climate Resilience CIAT CIAT/PPCR
<b>Systematization, Capitalization, and Self-learning</b>	Set up mechanisms and procedures for the systematization, capitalization and self-learning in all projects and activities implemented Production and dissemination of materials and experiments Set up a multimedia center bringing together all productions affecting and relevant to change and climate resilience	CIAT CIAT/PPCR All stakeholders involved

## ROLE OF PRIVATE SECTOR

Roles	Brief Description of Involvement	Institutions/Organizations and Heads
<b>General Orientation and Planning</b>	Advice and proposals for orientation and strategy in SPCR and PPCR frameworks Participation in commissions in charge of developing proposals for standards and regulations promoting climate resilience Opinion on public policies linked to change and climate resilience	CIAT (based on regular consultation process) PPCR Steering Committee
<b>Capacity Building</b>	Financial participation in academic programs proposed Enroll staff members of their companies on training offered	CIAT CIAT/PPCR Employers and entrepreneurs' associations and Chambers of Commerce and industries
<b>Information and Education</b>	Active participation in campaigns; taking the lead in these Set up initiatives to disseminate information within companies and institutions in the private sector Financial contribution <sup>29</sup> to increasing number of leaflets and pamphlets	CIAT MCC Employers and entrepreneurs' associations and Chambers of Commerce and industries, media owners associations

<sup>29</sup> As part of PR and with possible fiscal advantages.

Roles	Brief Description of Involvement	Institutions/Organizations and Heads
<b>Implementation and Monitoring/Evaluation</b>	<p>Specialist firms participate in calls to tender and execute contracts for PPCR as part of projects to be implemented</p> <p>As part of the Steering Committee, representatives of the private sector have their say on monitoring-evaluation reports and inform companies of the conclusions from these reports</p> <p>Participation in public-private commissions on ad-hoc evaluation of the application of standards and procedures put in place to strengthen climate resilience</p>	<p>CIAT/PPCR</p> <p>Departments and ministry services involved in implementing PPCR projects</p> <p>PPCR Steering Committee</p>
<b>Systematization, Capitalization, and Self-learning</b>	<p>Companies and enterprises; in particular the most vulnerable sectors put in place systematic data collection systems enabling the consequences and impacts of climate change to be better understood and measured, as well as gauging the effectiveness of adaptation strategies implemented.</p> <p>Companies and enterprises participate in the data collection and systematization/capitalization process incorporating other sectors of society</p>	<p>CIAT/PPCR</p> <p>Employers and entrepreneurs' associations and Chambers of Commerce and industries</p>

## ROLE OF CIVIL SOCIETY

Key Role	Brief Description	Organizations Targeted
<b>General Orientation and Planning</b>	<p>Advice, and orientation and strategy proposals in SPCR and PPCR frameworks</p> <p>Participation in commissions in charge of drawing up proposals of standards and regulations promoting climate resilience</p> <p>Opinion on public policies linked to change and climate resilience</p>	<p>CIAT</p> <p>PPCR Steering Committee</p> <p>CS groups and organizations' networks; in particular those involved in the regions where PPCR is taking place</p>
<b>Capacity Building</b>	<p>Participation of staff members of their companies in training offered</p> <p>Contribute to the program as part of other projects in conjunction with SPCR and PPCR</p> <p>CS organizations and institutions involved in change and climate resilience feed into CIAT, based on productions and scientific research carried out within their structures</p>	<p>CIAT</p> <p>CIAT/PPCR</p> <p>Groups and networks of CS organizations and institutions</p>
<b>Information and Education</b>	<p>Active participation in campaigns; leading initiatives at organizational level</p> <p>Set up initiatives for disseminating information within society<sup>30</sup></p> <p>Contribute to projects and programs to be implemented</p>	<p>CIAT</p> <p>CIAT/PPCR</p> <p>Groups and networks of CS organizations and institutions</p> <p>CS organizations and institutions' advocacy and communication teams</p>

<sup>30</sup> Including voluntary; relay platform Internet sites or organizations to disseminate information.

Key Role	Brief Description	Organizations Targeted
<b>Implementation and Monitoring/Evaluation</b>	<p>Specialist services of CS institutions and organizations selected competitively to execute work for PPCR as part of projects to be implemented</p> <p>As part of the Steering Committee, CS representatives give their views on monitoring-evaluation reports and inform CS organizations of the conclusions of these reports</p> <p>Participation in public-private commissions on ad-hoc evaluation of the application of standards and procedures put in place for strengthening climate resilience</p> <p>Regular progress reports on activities and projects linked to climate change</p>	<p>CIAT</p> <p>Groups and networks of CS organizations and institutions or their representatives</p>
<b>Systematization, Capitalization, and Self-learning</b>	<p>CS institutions and organizations networks and groups; in particular, those of the most vulnerable sectors put in place systematic data collection systems enabling better understanding and measuring of the consequences and impact of climate change, and also of gauging the effectiveness of adaptation strategies implemented.</p> <p>CS institutions and organizations networks and groups participate in the data collection and systematization/capitalization process incorporating other sectors of society</p> <p>Sharing of capitalization and systematization outputs carried out within CS networks and groups</p>	

# 1.7. STRATEGY AND DESCRIPTION OF COMPONENTS

## STRATEGY AND PRIORITY SECTORS

### 1.7.1.1. ISSUES AND CHALLENGES

Vulnerable and fragile, Haiti has faced a number of natural hazards and various threats in the past. Natural hazards studied for several years now, will certainly be amplified by climate change. In disaster risk management, as well as in the impacts from climate change, it will be necessary to address the following issues and challenges:

- Unprecedented environmental crises; notably regarding the degradation of watersheds and in relation to the thorny issue of energy supply.
- Generalized poverty that puts the economy and, in particular, the agricultural and rural economy, at the center of all initiatives.
- The absence of territorial land planning and over-exploitation of natural resources.
- The absence of an adequate legal and policy framework.
- The crumbling of state structures; this is particularly felt in the difficulties in generating reliable data on a regular and ongoing basis.

The programs and projects to be considered in this SPCR will incorporate actions to protect the environment and promote the integrated management of watersheds; to improve people's living conditions and their income through income-generating economic activities; and to strengthen institutional capacity and the juridical/legal framework to support and consolidate the progress made in the area of climate resilience--all while remodeling the space and making local communities better able to cope, adapt, and "bounce back."

### 1.7.1.2. KEY ELEMENTS OF THE STRATEGY

The development of a Strategic Plan for Climate Resilience (SPCR) is framed within the need to strengthen forecasting capacity; in particular, through territorial land management, which incorporates climate risk as an essential element. The SPCR in Haiti encompasses two types of approaches to adaptation: Adaptation Type 1 confronts climate risks that lead to disasters with dire consequences and considers the particular vulnerability of the country today; Adaptation Type 2 anticipates climate risks which will be further intensified over time as a result of climate change.

The proposed strategy will consider several elements:

- ▶ A pilot program with activities to serve as a model for other interventions throughout the country.
- ▶ Integrated Management of Watershed (GIBV), combining sustainable watershed management with the protection of the road infrastructure and reservoirs of water resources.
- ▶ Areas heavily exposed to the impact of climate change versus areas more or less protected from the impact of climate change.
- ▶ The coexistence of urban and rural realities: trying to consider that today, half of the population lives in towns, while the other half in rural areas.
- ▶ The necessity for territorial integration in maintaining inter-relations among communities and regions of the country through a network resilient to climate change.
- ▶ The urgent need to strengthen institutional capacities; in particular, to closely monitor climate components and parameters and to determine the consequences and impact for better decision making on the management of natural resources (water) and on which investments to undertake.

Consequently, two areas have been selected to concentrate the bulk of investments:

- The Gulf of Gonâve, from Léogane to Saint-Marc: this is a particularly vulnerable area with a very high population density and uncontrolled urbanization of a territory exposed to multiple risks (cyclones, earthquakes, flooding, sea-level rise, salinization of groundwater, and Gulf pollution). The disorganized urbanization process leaves the population under severe threats; in addition to poor living conditions, sanitary standards are well below normal.
- The *Plateau Central*: a safer area with lower population density, larger economic potential, and more security for investments; prolonged droughts constitute the greatest risk to be tackled. Being part of the catchment area of the Artibonite (the country's only river), the area requires water management efforts and changes to existing farming systems.

On the institutional front, the focus will be on strengthening the capacity to monitor climate components and parameters and to monitor and manage water resources in different ministerial bodies and government departments.

### 1.7.1.3. REFERENCE TO HYŌGO PRINCIPLES

In its guidelines, the SPCR incorporates the **5 Hyōgo Framework for Action principles** on resilience confronted with catastrophes:

1. **Ensure that the reduction of disaster risk is a national and local priority with a strong institutional basis for implementation.**

The SPCR promotes cooperation between national and local bodies to implement the measures proposed in Strands 1 and 2. Implementing institutional reform of the hydro-meteorology sector, as well as CIAT support to ministries and bodies responsible for implementation, aims to strengthen Haiti's institutional capacity to take action on the issue of climate change. Project 4 is essentially about this.

2. **Identify, assess and monitor risk by collecting hydro-meteorological information.**

Several early-warning programs for different types of risk (e.g., PNAP, PNSAN) exist. They rely to a large extent on the processing of hydro-meteorological data. Technical and institutional capacity building of the hydro-meteorological network will certainly allow for a better early-warning system for disasters of climatic origin; above all, however, it will enable the resumption of systematic information collection on the Haitian climate. For flood risks on the coastal area, better knowledge of topology is necessary to fine-tune flood risk forecasting.

3. **Use knowledge, innovation, and education to build a culture of safety and resilience at all levels.**

Collaboration between national and local bodies on the response in the event of floods, storms, and cyclones, coupled with an awareness-raising campaign targeting the general public, aims to motivate all stakeholders to participate in reducing coastal risk. In the area of agriculture, measures to provide farmers with better equipment and more financial autonomy will allow them to deal better with climate shocks; this will be done in cooperation with assistance programs undertaken by the government and FAO. The strengthening of links between academia and national and central government bodies proposed in Project 4, linked with other investment programs, aims to promote the acquisition and dissemination of knowledge on risk management on local and national scales and to educate the population on safe practices in vulnerable areas.

#### 4. **Reduce the underlying risk factors.**

Climate risk is still the result of climate hazards and the inherent vulnerability of the local environment. In the case of Haiti's agricultural sector, the rural population's weak bounce-back capacity, due to a generally precarious socioeconomic situation, the lack of resilience of some crop varieties cultivated, and the lack of agronomic knowledge, present significant risk factors which the program will address through the funding of project 2. In coastal areas, the key risks include uncontrolled urban development, housing, and infrastructure building too close to the coastline, with inappropriate construction techniques and land management; the degradation of natural ecosystems (e.g., mangroves) further aggravate the geographical and climatic risks faced along Haiti's coastline. Project 3 aims to reduce these risk factors with concerted efforts from the Ministries and local authorities. Upstream, the degradation of watersheds is a well-known issue and should be considered when evaluating coastal risk, even if it cannot be resolved in the short term as part of the SPCR.

#### 5. **Make land-use management the first response to the risks of natural catastrophes.**

The actions undertaken as part of investment projects 1, 2 and 3 involve all levels of government as well as the population in strengthening climate resilience. In the agricultural sector, the objective is above all to reduce long-term vulnerability and strengthen food security. In coastal areas, an effective response to climate hazards depends on a better knowledge base about conditions on the ground as well as land-use plans for watersheds and a constructed shoreline.

The contribution of the scientific sector can help design response strategies well adapted to the socioeconomic context, as well as to the geographical and climatic situation.

## DESCRIPTION OF COMPONENTS

CIAT has identified four priority investment projects:

**Investment Project 1:** Climate Proofing of Infrastructures in Centre-Artibonite Loop

**Investment Project 2:** Climate Proofing of Agriculture in the Centre-Artibonite Loop

**Investment Project 3:** Climate Change Adaptation in the Coastal Cities of the Gulf of La Gonave

**Investment Project 4:** Strengthening Knowledge Management of Hydro-meteorological, Water Resources, and Climate Data to Inform Decision Making and Policy Dialogue

## 1.8. LESSONS LEARNED AND GOOD PRACTICE

The process of drawing up the SPCR has been a major exercise in exchanging experiences, sharing information, and transferring knowledge with and among the different stakeholders, groups, organizations, and institutions, involved in adaptation to climate change and in strengthening climate resilience throughout the country. This has certainly contributed, in some measure, to strengthening human capacities to be prepared to address climate change.

International exchanges have also been beneficial and have enabled future interventions within the PPCR in Haiti to be coordinated with those under consideration or already underway in other countries, particularly those in the Caribbean. Advice from regional and international partners, as well as from financial and technical experts, has been considered in formulating the SPCR. Likewise, knowledge, strategies, and recommendations resulting from regional and international exchanges have been considered. The regional programs related to the PPCR (in particular those related to climate data management) will be used and, as such, Haiti will adhere to and further commit to the coordination and peer-learning mechanisms put in place at the regional level.

It is clear that the PPCR is a *pilot* program; as such, successful activities and interventions should be replicated on a larger scale. This will involve documenting all stages of implementation. This will be equally true for SPCR implementation, and specifically intends to:

- ▶ Put in place corrective actions when needed and in a timely fashion.
- ▶ Thoroughly analyze discussions and assess different options/recommendations that are presented.
- ▶ Ensure that the SPCR is well conceived and has a solid rationale.
- ▶ Guarantee that initiatives are implemented (in particular, as part of the PPCR) and are sustainable.

There must be no hesitation during the implementation phase of the PPCR to self-monitor progress and to evaluate achievements and interventions on a regular basis. Monitoring and evaluation efforts provide solid grounds and arguments to enable policies to evolve and to prepare for the replication of the most relevant activities and the expansion of their positive impacts.

Interactions between adaptation and disaster risk management in the context of climate change have yielded important lessons, in particular concerning the effective use of limited resources in extremely difficult contexts.

There is a pressing need to adopt measures of adaptation and to strengthen climate resilience, but there is also a need to share information and facilitate training on the issues at stake and the challenges of climate change. The next 2-3 months will be used to SPCR concepts and priority actions while also fine-tuning its formulation. This exercise is also intended to stimulate awareness of and discussion on the central issues the SPCR tackles.

# Part 2: COMPONENTS OF THE INVESTMENT PROGRAM PROPOSED FOR PPCR FUNDING

## 2.1. BRIEF OVERVIEW OF PRIORITIES

Main challenges in relation to vulnerability and climate variability:

- ▶ Infrastructure, agriculture, and coastal zones (the majority of the large towns in Haiti are situated in coastal zones) are vulnerable to extreme climate events.
- ▶ Changes in rainfall patterns have already significantly disrupted the agricultural calendar.
- ▶ An exceptionally long coastline in relation to the country's total land area and rugged terrain (less than 20% of the territory is lowlands) result in a great vulnerability to hurricanes, flooding, and sea-level rise.
- ▶ Ecosystems made fragile by human activity (deforestation, tillage, and chaotic urbanization) become even more vulnerable to the impact of climate change.
- ▶ Infrastructure (roads in particular) does not last; hence the need for safer and more resilient technical solutions.
- ▶ The hydro-meteorological measurement network is inadequate and does not allow for climate change to be forecasted or adequately monitored.
- ▶ Human resources and expertise on climate change are insufficient.

## 2.2. OVERALL OBJECTIVE OF THE PROGRAM

The overall objective of SPCR is to:

Reduce vulnerability to climate change in target regions experiencing different levels of risks while forecasting the consequences and impacts of climate change on key sectors of the national economy and strengthening the resilience of both rural and urban communities in the target regions; and involving and promoting long-term engagement of all relevant stakeholders.

The pilot nature of the program will undoubtedly lead to the setting up of mechanisms and procedures to enable the systematization and capitalization of lessons learned from all the activities carried out as part of the program.

## 2.3. EXPECTED RESULTS

The following results are expected:

- ▶ Increased awareness and understanding of the development challenges associated with climate-change issues by decision makers and national specialists on natural resources management within the public and private sectors and within civil society.
- ▶ As a result of an awareness-raising campaign targeting the general public, a behavioral evolution in relation to climate risks has been triggered among population groups allowing for greater consideration of climate-change issues in their short-, medium- and long-term decision-making processes.
- ▶ Target groups and beneficiaries of the PPCR, including women and other vulnerable groups, have improved their incomes and living conditions, thereby enhancing their capacity for climate resilience and adaptation.
- ▶ Supply chains in the program's priority sectors and target areas have been consolidated and redirected so as to increase positive spillover effects that benefit social development and enhance communities' climate resilience.
- ▶ The level of vulnerability in priority areas and sectors and within target groups has been reduced.
- ▶ Economic and social losses and damages resulting from climate-change-related natural disasters have been reduced.

## 2.4. STRATEGIC ELEMENTS

The Project will focus on the following strategic elements:

- ▶ Targeting regions and areas presenting different levels of vulnerability (given the pilot nature of the project).
- ▶ Prioritizing key sectors of the economy and the environment.
- ▶ Protecting the environment and reducing the impacts of climate change while promoting economic development and social cohesion as key elements of strengthening resilience.

- ▶ A continuous consultation process and the seeking of consensus among different institutions with a view to maximize operational effectiveness.
- ▶ Participation and accountability of all stakeholders involved at all stages, in particular private sector and civil society organizations intervening in the implementation of activities.
- ▶ Supervision of project implementation by the CIAT/PPCR task team.
- ▶ Coordination of PPCR projects by ministerial departments and services.
- ▶ Making use of existing services and existing administrative procedures, and task teams and technical implementation units, preexisting within the different ministries, to facilitate the execution of different projects.
- ▶ Establishment of effective monitoring and evaluation systems involving the ministerial bodies accountable for implementation.
- ▶ Setting up mechanisms and procedures for systematization, capitalization, and self-learning.

## 2.5. PROJECT INFORMATION

### INVESTMENT PROJECT 1: CLIMATE PROOFING OF INFRASTRUCTURES IN CENTRE-ARTIBONITE LOOP

#### 2.5.1.1. BACKGROUND AND RATIONALE

The Government of Haiti's "Boucle Centre-Artibonite" (BCA) vision seeks to contribute to a re-equilibration of regional development in Haiti by fostering opportunities for balanced and inclusive growth in regional poles of economic growth. The focus within the BCA region is to promote economic development by tapping socioeconomic potential. Beyond investments in re-launching and introducing adaptation measures in the agriculture sector (dealt with in Investment Project 2), a holistic approach to the BCA development includes better transport connectivity, networked cities, and strategic infrastructure investments to support productive areas and inclusive growth.

Despite its consideration as a relatively safe geographical enclave (especially when compared to other regions in Haiti) the Boucle Centre-Artibonite will be increasingly exposed to the effects of extreme weather events (cyclones and storms; alteration and unpredictability of rainfall patterns, and so forth), whose frequency and intensity will grow as a result of climate change. The BCA needs to reduce its vulnerability by enhancing the resilience of investments and introducing adaptation to climate-change measures in development plans. Disaster recovery and risk mitigation without a long-term climate resilience approach has all too frequently resulted in a cycle of reconstruction and destruction, leading to a waste of investments. But reconstruction and rehabilitation stages can be approached as an opportunity to correct unsuitable past designs and to prevent impacts in the future. Protecting infrastructure investments and articulating a climate-resilient development plan are both key to a "sustainable reconstruction."

In this vein, the World Bank contemplates support to national and local authorities to develop and rehabilitate infrastructures in the BCA that are strategic from an economic and/or a social perspective. In particular:

1) The Road Network: Transport connectivity needs to be improved to facilitate agricultural trade dynamics (rural secondary and tertiary roads from production to processing sites and local markets and a functioning structural network of primary roads to ensure access to internal and external markets). A reliable road network will also make social services more accessible to communities, including for the delivery of aid during emergencies (transport infrastructure connecting population to health services will be prioritized).



Piste agricole dans le plateau central

2) Structuring Poles for Investment: the BCA territorial master plan includes the affirmation of poles of economic growth (*pôles d'échanges*) that would concentrate on building such infrastructures as logistic platforms, agricultural processing sites, power stations, regional markets, and the like. These are conceived as multipurpose infrastructure investments, offering a platform for services such as trading in market weekdays, health consultation, and evacuation shelters for the population during or after extreme weather events.

Heavy rains and storms/hurricanes (and their associated flooding and landslides) are most destructive to transport and power infrastructure components such as roads, bridges, drains, culverts, pavement, peers, dams, logistic platforms, and power stations. In order to make these investments and infrastructures long lasting and climate resilient, several adaptation measures would need to be defined, from design to maintenance phase.

Investment Project 1 will seek to ensure climate proofing of existing or planned infrastructure investments from the government, in particular those supported by World Bank operations (i.e., Infrastructure Investment Project in the Boucle Centre-Artibonite, \$50 Million (IDA funding, currently under formulation and to be approved in 2013)).

## 2.5.1.2. OBJECTIVES

### 2.5.1.2.1. OVERALL OBJECTIVE

Investment Project 1 aims to promote the climate resilience of infrastructures in the BCA (including the road network and strategic poles for economic growth) and to foster the sustainability of the investments planned under the Integrated Development Project of the Artibonite Loop.

### 2.5.1.2.2. SPECIFIC OBJECTIVES

#### Objective 1: Enhancing the strategic network of secondary rural roads for transport.

Improvements to the rural network aim to make important secondary routes passable for transport vehicles in all weather conditions and to reduce the risk of interruption of road traffic when extreme climate events occur. This offers agricultural producers the possibility of increasing the volume of agricultural products marketed, diversifying cash crops, and mitigating risk by opening access to important markets.<sup>31</sup>

#### Objective 2: Improving the structural network and developing sustainable<sup>32</sup> critical trunk roads.

Rehabilitating and introducing climate resilience measures to critical points, strategic stretches and bridges in structural primary roads contributes to ensuring regional macro-connectivity and tapping socio-economic potential of the BCA. A reliable road network will also make social services more accessible to communities, including for the delivery of aid during emergencies (transport infrastructure connecting population to health services will be prioritized).

#### Objective 3: Climate-proofing investments in “poles of economic growth.”

The BCA territorial master plan includes the affirmation of “poles of economic growth,” that would concentrate critical infrastructures such as logistic platforms, agricultural processing sites, regional markets, and so forth. These are conceived as multipurpose platforms for services such as trading, health consultations, and evacuation shelters for the population during or after extreme weather events. Making these investments climate resilient and maintaining them over time is core to the BCA’s sustainable development.

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<sup>31</sup>Production of perennial and multi-annual species (fruit, bananas, cane, etc.), although potentially beneficial for the environment, is perishable and heavy to manage, thus the need for rapid consumption, marketing, and processing.

<sup>32</sup>Drainage structures, ditches, and collection of run-off water from concreted sections of rural roads.

#### Objective 4: Creating an enabling environment for sustainability of investments.

Planning, articulating, and climate proofing the investments conceived within the BCA vision will require an enabling environment for decision makers and executing partners. Adaptation strategies have a cost and require maintenance measures over time; in an uncertain economic setting, financial mechanisms and incentives need to be put in place to trigger adoption of new practices and sustainability in the long run.

### **2.5.1.3. ANCHOR INSTITUTION AND PARTNERS**

#### **2.5.1.3.1. ANCHOR INSTITUTION**

MTPTC will have responsibility for the project.

It should be noted that the activities under “Investment Project 1: Climate Proofing Infrastructures in Centre-Artibonite Loop” administered by the World Bank, has been conceived as complementary to the larger infrastructure investment operation in the BCA under development in partnership with the GoH and to be approved in 2013.

#### **2.5.1.3.2. PARTNERS**

The main stakeholders identified as able to collaborate in implementing this project are local authorities in the Centre-Artibonite, the *Fonds d'Entretien Routier*, the European Union, AfD, IDB, and WB.

Other stakeholders include NGOs involved in the development of the Centre-Artibonite Loop, women’s organizations, and community-based organizations. The private sector, in particular SMEs involved in road network maintenance, Chambers of Commerce in the *départements* of Centre and Artibonite, mutual savings banks, credit unions, and banks could also be valuable partners for this investment project.

### **2.5.1.4. VALUE ADDED AND SUSTAINABILITY**

Evidence exists, but there is a serious lack of information (historical series of meteorological data and other climate information gaps) to help planners anticipate future climate events. The difficulty in downscaling and modeling climate scenarios at regional level adds to the uncertainty of the extent of future climate-change impacts over current infrastructure investments. In light of this, decision makers will need to adopt a no-regret adaptation measures approach.

Planning and articulating the investments (infrastructure and other) conceived within the BCA vision will require that planners, decision makers, and executing partners be

well-equipped with climate vulnerability information so climate change adaptation options can be identified, weighted, prioritized, and budgeted. Soft investments, such as the generation of climate information and the development of policy and implementation tools, will be critical. Through a technical assistance component, climate information and risk and vulnerability assessments for decision making will be generated and tools to facilitate implementation of adaptation measures will be developed within the project to ensure long-term sustainability and add value to the investments in hard infrastructure.

These knowledge management and enabling environment tools will provide added value to infrastructure hard investments and contribute to the long-term sustainability of the project.

### 2.5.1.5. ACTIVITIES AND RISKS

#### 2.5.1.5.1. ACTIVITIES

Regarding hard investments, the main activities to be implemented are:

- Identification of stretches of roads in need of development and/or redevelopment.
- Drafting development and redevelopment plans for prioritized infrastructure (e.g.,: bridges, areas with steep slopes, and critical points for connectivity).
- Introduction of adaptation options for road design and new investments in repair and construction of new sections. Examples include flood estimation for drainage structures (catch drains), spot improvements in high-risk areas, promoting resilience in road design (e.g., water collectors, road/bridge drainage), use of protective nets and vegetation to counter erosion in terraced areas and slopes, and choices of construction materials and bitumen to suit the climate.
- Climate-proofing bridges, which involves re-estimating floods and return periods, reviewing design standards (designing discharge and protection of foundations), bank-slope protection, considering realignment/relocation, and so forth.
- Launch of a tender process for repair works;
- Monitoring and evaluating road works and systematizing development models for stretches of rural roads.
- Up-scaling, upgrading, and increasing the frequency of maintenance, the cleaning of drainage structures and culverts prior to the onset of rains, and the inspection of steel bridges for corrosion, as part of the climate resilience strategy.

- Introducing climate-proofing measures into existing and new infrastructure around the poles of economic growth<sup>33</sup> (e.g., multipurpose logistic platforms).
- Peri-urban areas surrounding the poles of economic growth will also benefit from further investments in urban planning infrastructure, such as contouring roads and entry points (possibly “routes à deux vitesses”), enlarged platforms in marketplaces to facilitate transit, and use as emergency shelters in case of disaster.

#### **Potential Locations for Hard Investment Activities<sup>34</sup>**

*Secondary roads in rural areas:* These are strategic areas of agricultural production that need to be connected for processing and for distribution. Critical points include around Pignon (technological pole for agricultural processing) and the diagonal section between St Michel and Hinche. In the western part of the BCA, a critical point is situated in the Marmelade-Marchand Dessalines route<sup>35</sup> (passing through Saint-Michel).

*Connecting bridges facilitating agricultural trade and/or access to social services:* These are bridges around Hinche, the bridge over the Artibonite at Petite Rivière, the Mirebalais bridges (connecting the city to the dam and connecting the city to the hospital). Some sort of connecting infrastructure (e.g., dock platforms and/or pulley systems) to link the agricultural production sites at the north of the Artibonite River to the towns of Verettes, Desarmes, and La Chapelle (at the South side of the river) could also be explored.

*Within the structural network (primary roads),* the section Marchand to St Michel de l’Attalaye and Saint Raphaël would contribute to the “closing of the loop” and to improving the wider regional roads network<sup>36</sup>. This is a mountainous area where climate-proof design and maintenance would be challenging. Investments may also be applied to transit routes between Mirebalais and Pignon.

*Investments within poles of economic growth,* potential locations could include Pont L’Estère and Pont Sondé, St. Raphaël, Hinche and Pignon.

<sup>33</sup> This activity would benefit from technical assistance provided through the World Bank’s Disaster Risk Management and Reconstruction Project (P126346).

<sup>34</sup> Preliminary identification of locations has been made after consultation with local stakeholders. Final decisions on precise locations will be made by national and local authorities in light of risk and vulnerability assessments, economic cost studies, and potential complementarities with other investment projects (such as the WB’s BCA project, EU infrastructure investment plans, and AfD future investments).

<sup>35</sup> This stretch affects access to the Estère market, the second most important in the country and a supplier to the Port-au-Prince market. For the mango trade alone, it is estimated that 50-100 tons per day pass through the St-Michel-Dalezan section. The critical point is a 5 km dirt track with no appropriate drainage that is already disintegrating three years after its repair. This stretch should be paved (or have brick track roads) and adequate drainage structures should be put in place.

<sup>36</sup> This stretch would also contribute to open up opportunities for other larger processing units in the south (Port-au-Prince and Léogâne), and those of Plaine du Nord around Cap-Haitien.

Regarding soft investments, as part of the technical assistance and capacity development for this investment project, several activities will be implemented:

*Decision-making tools: research, information, and assessments:*

- Data generation and climate modeling will be developed to improve predictions and the development of climate scenarios and, in turn, to climate-proof design and maintenance plans (e.g., rainfall data collection, river flow and variation calibration, run-off data, intensity and frequency of storms and cyclones).
- Research will also address innovations in techniques and the design of roads (e.g., studying the sustainability of local materials in use and considering climate-suitable innovations).
- Development of a risk and vulnerability assessment for the road network and strategic infrastructure (e.g., hospitals, power stations) to spot critical points, inform decisions on investments, and develop an adaptation strategy for the network.
- Development of an economic cost analysis of adaptation options to guide planners in managing investments, on time frames, and on coordinating executing partners.

*Implementation tools: standards, trainings, and incentives:*

- Development of standards and technical guidelines to enhance infrastructure design suitable to the climate and to adjust maintenance plans to assist the project's executing partners.
- Training to develop skills at the local and community levels for climate proofing and infrastructure maintenance, particularly in remote and rural areas.<sup>37</sup> Small and medium enterprises currently in charge of small-scale and medium-scale rehabilitation and maintenance of roads would also benefit from specialized training on climate-proofing techniques.<sup>38</sup> Local authorities (*communes* and *sections communales*), civil protection committees, and civil society networks (e.g., women's groups, NGOs, and community-based organizations) could also be targeted for training activities.
- Setting up incentive schemes; economic incentives to address climate-proofing measures would help trigger implementation and foster innovation:

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<sup>37</sup> A success case study that may be considered as a useful reference in such training schemes is the Management of Slope Stability in Communities approach, developed by an academic team from the University of Bristol and piloted under a World Bank vulnerability reduction program in St Lucia.

<sup>38</sup> As a co-benefit, such training schemes would also contribute to job creation, opportunities for the private sector, and inclusive growth in the BCA.

- A public-private partnership and small grants<sup>39</sup> associated with the *Fonds d' Entretien Routier* benefiting SMEs operating in the infrastructure rehabilitation and maintenance sector.
- Adaptation through microfinance: Several initiatives in Haiti are piloting microfinance schemes<sup>40</sup> to address vulnerability. Microfinance could play a larger role in areas relevant to climate risk management by funding such initiatives as early warning systems, ecosystem-based adaptation (payment for environmental services such as landslide and erosion prevention practices), livelihoods diversification, and maintenance of rural roads maintenance.

#### 2.5.1.5.2. RISKS

The following are the risks involved:

- Socio-political troubles (see the program's overall risk log).
- Climatic or major natural events that cause severe damage to infrastructure, in particular rural roads and investment poles targeted by the project.

#### 2.5.1.6. DRAFT BUDGET, FUNDING STRATEGY

##### 2.5.1.6.1. DRAFT BUDGET

Preliminary allocation of PPCR Investment Project:

Component	Cost US\$
Obj. 1: Enhancing strategic network of secondary rural roads for agricultural product transport	2,000,000
Obj.2: Improving the structural network and developing sustainable critical trunk roads	2,000,000
Obj.3: Climate proofing investments in <i>poles of economic growth</i>	1,000,000
Obj.4: Creating an enabling environment for sustainability of investments (technical assistance for decision-making tools: research, information and assessments + implementation tools: standards, trainings and incentives)	3,000,000

<sup>39</sup>Relevant experience in other vulnerable Caribbean countries facing similar challenges should be explored. For example, the St. Lucia Adaptation Financing Facility, set up through the national PPCR, plans to make available financial capital to private sector entities (from firms to communities and households) to support climate adaptation and/or disaster vulnerability reduction.

<sup>40</sup> E.g., Fonkoze is exploring investments in the BCA to contribute to disaster vulnerability reduction measures; SogeSol has adopted microfinance schemes to promote housing projects in Haiti, where financial products are packaged with technical assistance and an oversight mechanism to ensure the sustainability of investments.

TOTAL	8,000,000
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### 2.5.1.7. FUNDING STRATEGY

Activities described in this project and listed under objectives 1, 2, and 3 (corresponding to “hard investments” in infrastructure) will be primarily co-financed by World Bank operations on sustainable development in the BCA. In particular:

Activities addressing the road network and investments in “poles of economic growth” will be mostly financed through the “Boucle Centre-Artibonite Sustainable Development Project” (\$50 million IDA funded operation).

The PPCR budget allocated to such “hard investments” (\$5 Million) will serve for piloting climate-proofing activities in the road network and infrastructure investments in “poles of economic growth”.

Activities under objective 4 dealing with technical assistance and “soft investments” (\$3 million) to create an enabling environment for sustainability of infrastructure investments in the BCA will be fully funded under the PPCR budget and benefit all infrastructure-related projects in the region.

The project is expected to be implemented over a period of 5 years.

### Investment Project 1: Climate Proofing of Infrastructures in Centre-Artibonite Loop

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E Indicators	Indicators Gender
To Promote Climate Resilience of Infrastructures in the BCA and to Foster Sustainability of Investments	Enhancing strategic network of secondary rural roads for transport  (Geographical focus on areas key to agricultural product traffic, marketing and processing)	<u>Identification of stretches</u> of roads to needing new developments and/or redevelopment. Drafting <u>development and redevelopment plans</u> for stretches prioritized (E.g.: bridges, areas with steep slopes and critical points for connectivity). Introduction of <u>adaptation options for road design and new investments</u> (rehabilitation and construction of new sections), such as: flood estimation for drainage structures (catch drains), spot improvements in high risk areas, promote resilience in road design (e.g.: water collectors, road/bridge drainage) use of protective nets and vegetation to counter erosion in terraced areas and slopes, choice of	\$2MPPCR as co-finance to  WB’s sust. dev. in BCA project	Volume of agricultural product reaching the market through road network after extreme climate events	RESULT A1: Increased resilience of households, communities, businesses, sectors and society to climate variability and climate change  INDICATOR A1.2 (optional): Change in damage/losses (\$) from extreme climate events in areas at risks that are the geographical focus of PPCR intervention	
	Improving structural network and developing sustainable <sup>41</sup> critical trunk roads  (Geographical		\$2MPPCR as co-finance to  WB’s sust. dev. in BCA Project	Number of kilometers of sections and critical points in roads that incorporate climate-proofing measures	RESULT B1:	# of women and men employed in road repairs

<sup>41</sup>Drainage structures, ditches, collection of run-off water from concreted sections of rural roads.

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E Indicators	Indicators Gender
	<p>focus on strategic points and road stretches key to network connectivity and access to basic services)</p>	<p>construction materials and bitumen to suit climate. <u>Climate-proofing bridges</u> would imply re-estimating flood and return period, review design standards (designing discharge and protection of foundations), bank-slope protection, realignment/ relocation, etc.            Launch of <u>tender process</u> and development of repair works;  <u>Monitoring-evaluation</u> of works and systematization of development models for stretches of rural roads. Up-scaling, upgrading and increasing <u>frequency of maintenance</u>, cleaning of drainage structures and culverts prior to the onset of rains, supervision of steel bridges for corrosion, etc. as part of the climate resilience strategy.</p>		<p>Infrastructure maintenance upgraded, enhanced and frequency increase</p>	<p>Strengthened adaptive capacities             INDICATOR B1 (core)            Extent to which vulnerable households, communities businesses and public sector services use improved PPCR supported tools, instruments, strategies, activities to respond to Climate Variability and Climate Change.</p>	
	<p>Climate proofing investments in “poles of</p>	<p>Introducing <u>climate-proofing measures</u> into existing and new infrastructure around the</p>	<p>\$1MPPCR as co-finance to:</p>	<p>Business continuity in poles of development</p>	<p>RESULT A1.: Increased resilience of households, communities,</p>	

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E Indicators	Indicators Gender
	economic growth”	poles of economic growth <sup>42</sup> (e.g.: multi-purpose logistic platforms). Peri-urban areas surrounding the poles of economic growth will also benefit from further <u>investments in urban planning infrastructure</u> such as contouring roads and entry points (possibly “routes à deux vitesses”?), enlarged platforms in market places to facilitate transit and management of different uses within emergency plans, etc.	WB’s sust. dev. in BCA Project	(population assisted after extreme climate events)	businesses, sectors and society to climate variability and climate change  INDICATOR A1.3: (core) Numbers of people supported by the PPCR to cope with effects of climate change	
	(TA component)  Creating an enabling environment for sustainability of investments	(Decision-making tools: research, information and assessments): <u>Data generation and climate modeling</u> will be developed for enhanced prediction and development of climate scenarios and, in turn, to climate-proof design and maintenance plans (E.g.:	\$3MPPCR	Number of assessments for infrastructure development that integrate climate resilience considerations  Number of adaptation	RESULT B5: Climate responsive investment approaches identified and implemented INDICATOR B5: (core) Quality of and extent to which	

<sup>42</sup>This activity would benefit from technical assistance provided through the WB’s Disaster Risk Management and Reconstruction Project (P126346).

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E Indicators	Indicators Gender
		<p>rainfall data collection, river flow and variation calibration, run-off data, intensity and frequency of storms, cyclones, etc).  <u>Research</u> will also address innovations in techniques and design of roads (e.g.: study on sustainability of local materials in use and consider climate suit innovations).            Development of a <u>risk and vulnerability assessment</u> for the road network and strategic infrastructure.            Development of an <u>economic cost analysis of adaptation</u> options to guide investment management.  <i>(Implementation tools: standards, trainings and incentives):</i>            Development of <u>standards and technical guidelines</u> to enhance infrastructure design suit to climate  <u>Trainings to develop skills</u> for climate proofing and maintenance of infrastructures, particularly</p>		<p>measures applied to road network and infrastructure development</p> <p>Number of SME, local authorities and local communities representatives that engage in infrastructure climate proofing trainings</p> <p>Number of SMEs, local authorities and communities benefitting from financial tools to implement adaptation measures and enhance climate-</p>	<p>climate responsive instruments/ investment models are developed and tested</p> <p>INDICATOR B4: Climate responsive investment approaches identified and implemented</p> <p>INDICATOR B4: (optional)</p> <p>Leverage of PPCR funding against public and private investments in climate sensitive sectors</p>	

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E Indicators	Indicators Gender
		<p>in remote and rural areas. SMEs, local authorities and communities will be targeted.</p> <p>Setting up <u>Incentive Schemes</u>: economic incentives to trigger off adaptation measures and foster innovation:</p> <p>A <u>public-private partnership</u> and small grants schemes associated to the Fonds d' Entretien Routier benefitting SMEs operating in the infrastructure rehabilitation and maintenance sector.</p> <p><u>Adaptation through microfinance</u>: Microfinance scheme to foster climate risk management, e.g.: early warning systems, ecosystem-based adaptation (landslide and erosion prevention practices), livelihoods diversification, rural roads maintenance etc.</p>		proofing of infrastructure		

## INVESTMENT PROJECT 2: CLIMATE PROOFING OF AGRICULTURE IN THE CENTRE-ARTIBONITE LOOP

### 2.5.1.8. BACKGROUND

Agriculture is one of the sectors most at risk with regard to the impacts of climate change. Based on constant management of risk and climate hazards, farmers have developed a range of relatively complex adaptation strategies: replicated seedlings; use of two varieties of the same species on the same plot, alternating long and short cycles (maize), introduction of new shorter-cycle crops in crop rotation, use of longer-cycle crops more likely to survive during severe drought episodes, use of multi-annual or perennial crops less subject to hazards (e.g., cane, fruit-trees), and the re-introduction of growing crops (e.g., coffee, cocoa) under forest cover (forest ecosystem and agroforestry) less affected during prolonged droughts. It should also be pointed out that farmers can implement such strategies more easily when their households enjoy more economic security (some control over production systems and some cash flow guaranteed for the majority of the year) and better living conditions.

The prevailing environment in rural areas does not facilitate the implementation of adaptation strategies. In spite of some efforts to increase the production of crops in different regions of the country, farmers often experience difficulties in accessing the market—admittedly because of non-competitive prices, but also due to a lack of adequate processing facilities and the insufficiency of rural secondary roads (as noted in Investment Project 1: Climate Proofing of Infrastructures in Centre--Artibonite Loop). In several regions of the country, fruit is wasted during harvest. Processing technologies are rudimentary and do not allow farmers to take full advantage of production or potential surpluses. A supply-chain approach is necessary to manage crops more effectively and to ensure proper marketing.

Coping measures to improve climate-change adaptation and to increase crop resiliency should also contribute to reducing vulnerability, alleviating the effects of soil erosion and promoting integrated watershed management.

This project also intends to contribute to secure production and to improving the financial stability of households (particularly in the lean period from January-June) while fostering the planting of climate-resilient crops, which will also contribute to water management and soil conservation.

The options considered, after consultations with stakeholders, are:

1) Identification and promotion of climate-resilient agriculture and sustainable farming practices. Climate resilient crops, such as sugar cane, coffee, fruits, moringa, sorghum, and pigeon peas, will be carefully considered and integrated into the program. In addition, the adoption of climate-resilient farming techniques will be promoted in the project area.

Specific actions to be considered include:

- Identification, dissemination, and up-scaling of successful climate-resilient crops and sustainable cropping systems and techniques which contribute to enhance climate resilience.
- Up-scaling the provision of plant materials that are resistant to diseases (e.g., sugar cane smut disease).
- Development of an incentive scheme(s) to foster the adoption of new climate-resilient farming practices.

Investment Project 1 will contribute to the realization of those interventions; the construction of roads will improve farmers' access to internal and external markets. Those interventions mainly apply to areas near major transit routes (e.g., Mirebalais-Pignon, Saint Michel de l'Attalaye, and Saint Raphaël); this opens up opportunities for larger processing units in the south (Port-au-Prince and Léogâne) as well as those of *Plaine du Nord* around Cap-Haitien.

2) Extension of forested ecosystems and fruit trees to protect/raise forest cover and expand forest ecosystems and the production of perennial and resilient fruit crops in the Centre-Artibonite Loop. Even if coffee plantations are limited to *Plateau Central*, these are located in strategic areas for both water provision to the *Bas-Plateau* (Croix-Fer) (mainly irrigated sector) and power generation in the hydroelectric power plant of Onde Verte. These diversified ecosystems (with coffee, bananas, fruit trees, timber, and yam production) have created a microclimate, which reduces water stress, contributes to food production, staggers income generation, and allows for a more sustainable exploitation of natural resources.

For the majority of households, the necessary investments to extend such multi-crop systems in degraded areas with low soil fertility are beyond their capacity. Start-up grants for costly plant materials (notably bananas and yams) should be considered. Other sustainable practices may also be promoted to restore eroded land which has lost its productivity following decades of annual use by farmers.

Less exposed to natural disasters, *Haut Plateau* offers ecological conditions for the development of fruit crops (e.g., mangoes, citrus, and avocados) as well as other harvests with proven adaptive capacities and high nutrient values (e.g., Moringa tree). These will be identified in further studies on strategic and resilient yields that will include context-specific climate-change scenarios and information on

precipitation, temperature, and their impacts. Fruit farming can improve farmers' revenue and food security, and spread out household agricultural cash flows. Intensification of high-commercial-value species and species with days-to-maturity would be a complementary coping strategy.

3) Redirection of agricultural research to explore adaptation strategies as defined by farmers: It is essential to explore inadvertent adaptation strategies being implemented by farmers as they respond to changing climatic conditions. In addition, establishing collaboration with countries in the region with higher expertise in climate resilience in the agriculture sector will enable farmers in the Centre-Artibonite Loop to draw upon successful regional experiences. Given the lack of qualified human resources currently available, this will be a long-term enterprise that is currently being considered by other donors.

4) Strengthening of local law enforcement as it relates to environmental matters (i.e., forest rangers) through a community-based adaptation approach. Local communities will be engaged in activities under the program by giving them stronger roles and responsibilities related to sustainable forest management (e.g., giving them the responsibility to limit the damage caused by wandering livestock and bush fires during the dry season). Inadequate forest management tends to limit the possibilities of diversification, particularly for cane, fruits, and cassava, and makes crop yields more unpredictable.

5) Capacity building, research, and knowledge dissemination on climate resilience as it relates to agriculture. There is a need to strengthen local capacities and to educate communities and the population in general about climate change and how it affects the agricultural sector.

Funding for these activities can be channeled through existing programs at relevant ministries.

## 2.5.1.9. OBJECTIVES

### 2.5.1.9.1. OVERALL OBJECTIVE

As a contribution to climate resilience in the Centre-Artibonite Loop, Investment Project 2 aims to identify and promote a climate-resilient agriculture and sustainable farming practices and to significantly reduce soil erosion by improving plant cover, creating jobs and economic security, strengthening capacity, knowledge dissemination, and diversifying and increasing the income of rural communities (including vulnerable groups).

### 2.5.1.9.2. SPECIFIC OBJECTIVES

Objective 1: Increase the volume of production of climate-resilient crops and promote the adoption of climate-resilient farming techniques in the Centre-Artibonite Loop.

The focus of Objective 1 will be to promote varieties of crops that are both economically profitable and are resilient to adverse climate conditions (e.g., sugar cane, fruit, coffee, sorghum, and pigeon peas). The program will also help to pilot agricultural practices that could ensure further agricultural activity despite adverse climate conditions. Finally, the project will include the expansion of an existing agricultural voucher (grant) system that IDB is currently implementing in Haiti as part of its agricultural program to (a) incorporate newly identified crops in the menu of types and varieties of crops/trees resilient to climate variability and climate change and (b) expand sustainable farming practices. A portion of the grants will be reserved to support women farmers.

Objective 2: Enhance communities' resilience by supporting local SMEs

The aim of Objective 2 is to help the farmers to improve the quality of their production and to provide adequate assistance for agricultural processing in order to allow farmers to improve their revenues. This will involve the identification of cropping techniques and sustainable farming practices that can be applied to ensure business continuity and overall sustainability within the Centre-Artibonite Loop.

Objective 3: Protect/raise forest cover and expand forest ecosystems as well as areas of perennial and resilient fruit crops in the Centre-Artibonite Loop.

This part of the program aims to encourage farmers to keep fruit trees and long-term trees on their agricultural plots. In order to reach this objective, the program will focus on varieties with high commercial value so that farmers can earn substantial revenues from their production.

Objective 4: Redirecting agricultural research to exploring adaptation strategies. This part of the program will include identifying adaptation practices already being implemented by farmers, promoting a collaboration among Haitian farmers and farmers from other countries in the region to draw upon their experiences and knowledge with regard to climate-resilient agriculture. Different training production modules will also be developed.

Objective 5: Community based adaptation strategy engaging local communities to play a stronger role in the preservation, maintenance, and monitoring of forests and agricultural resources.

The focus of Objective 5 will be to enhance the capacity of local environment law enforcement (e.g., forest rangers) through the support and involvement of local communities; this should also help to improve livelihoods within these areas.

Objective 6: Strengthening of local capacities, knowledge creation, and sharing of information on climate resilience as it relates to agriculture.

The aim of Objective 6 is to establish and reinforce joint programs with other countries in the Caribbean region in order to share experiences related to climate-change adaptation in the agricultural field. It is also advisable to share with farmers relevant efficient practices that buffer the impacts of adverse climatic conditions.

### 2.5.1.10. ANCHOR INSTITUTION AND PARTNERS

#### 2.5.1.10.1. ANCHOR INSTITUTION

MARNDR will have the responsibility for the project.

The MARNDR programs funded by IDB (e.g., DEFI, PMDN, and RESEPAG ) will be closely involved; likewise for BON.

It should be noted that the activities under Investment Project 2 that will be administered by the IDB will be used as co-finance in a bigger program that will be approved in 2014. The objective of this operation is to support the development of a National Disaster Mitigation Program in Watershed Management. This program will involve four major watersheds in the country, including Artibonite.

#### 2.5.1.10.2. PARTNERS

The main stakeholders identified as able to collaborate in implementing this project are the UNDP, UNDP/GEF, UNIDO, IICA, ABC, Chilean Co-operation, Colombian Co-operation, IDB, WB, USAID, and CARICOM/CARDI.

Other stakeholders include NGOs involved in the development of the Centre-Artibonite Loop, UEH/FAMV,<sup>43</sup> ANATRAF, women's organizations, farmers' organizations, and OPA, ISC, and ANEM. The private sector involved in agricultural processing and exports, Chambers of Commerce in the *départements* of Centre and Artibonite, mutual savings banks, credit unions, and banks could also be valuable partners in this investment project.

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<sup>43</sup> Agro-food option.

### 2.5.1.11. ACTIVITIES AND RISKS

#### 2.5.1.11.1. ACTIVITIES

The main activities to be implemented are:

- Identification of climate-resilient crop varieties, forest ecosystems, and fruit trees that can be cultivated within the Centre-Artibonite Loop, as well as the development of incentive scheme to foster the adaptation of new climate-resilient farming practices.
- Identification of cropping techniques and sustainable farming practices that can be applied and encouraged to ensure business continuity and overall sustainability within the Centre-Artibonite Loop.
- Expansion of an existing agricultural voucher (grant) system that IDB is currently implementing in Haiti as part of the agricultural program to (a) incorporate newly identified crops in the menu of types or varieties of crops/trees resilient to climate variability and climate change and (b) expand sustainable farming practices. Once the voucher system is expanded, a portion of the grants will be reserved to support women farmers.
- Organization of campaigns for sub-grafting fruit trees with high commercial value and out-of-season varieties.
- Introduction of mini-orchards in agricultural holdings.
- Establishment of a technical cooperation program with countries in the region that have high-level expertise in growing climate resilient crop varieties (including coffee and sugar cane).
- Training in nursery practices, minisett production, the PIF technique for banana production, grafting, and other fruit farming techniques (paying special attention to women farmers). The training will include a gender module.
- Development of a community-based forest rangers program.
- Workshops to present key findings and lessons learned from program implementation.
- A climate change and climate-resilience-awareness program at the community level (i.e., workshops, surveys, data creation, and analysis).
- Training on climate resilience for stakeholders and decision makers.
- Development and implementation of communication strategies and plans for decision makers, members of civil society organizations, and the general public.

#### 2.5.1.11.2. RISKS

The following are the risks involved:

- Socio-political troubles.
- Climatic or major natural events causing severe damage to infrastructure, particularly to rural roads and areas targeted by the project.

- Dramatic drops in the sales or price of products derived from sugar cane<sup>44</sup> and fruit.

#### 2.5.1.12. GENDER ISSUES

Achieving gender equality and empowering women in agriculture is crucial for agricultural development and food security.<sup>45</sup> In Haiti, there is still a huge gender gap in the agriculture sector. Women have low levels of education, receive lower wages for their work than men, have less access to productive resources, do not receive government subsidies, and work longer hours than men in the household so that their working time on the land is limited. Furthermore, they are responsible for providing food security and fetching water.

Investment Project 2 may help to reduce some of these disadvantages by strengthening the ability of women to generate revenue and add value to the crops they grow. This requires that women are well represented in training sessions on new crop techniques and strategies for more efficient agro-food processing technologies. If women do not participate actively in training and do not start using new crops and new techniques, the gap between male and female farmers may increase -- and women may become more vulnerable than before the beginning of the project. Women should comprise at least 35 percent of training attendees.

When introducing new techniques of farming, it is also necessary to take into account the crops that women grow so that, if proven resilient, they can be included in further projects.

#### 2.5.1.13. DRAFT BUDGET, FUNDING STRATEGY

Component	Cost US\$
Identification and promotion of climate resilient agriculture and sustainable farming practices	2,000,000
Enhance communities' resilience by supporting local SMEs and strengthening local law enforcement as it relates to environmental matters	1,000,000

<sup>44</sup> Unfair competition from abroad, use of industrial ethanol for producing adulterated alcoholic beverages, absence of legislation on labelling, and traceability of popular alcoholic beverages.

<sup>45</sup>FAO 2011.

Protect/Raise forest cover and expand forest ecosystems as well as areas of perennial and resilient fruit crops in the Centre-Artibonite Loop	1,000,000
Redirect agricultural research to explore adaptation strategies	200,000
Capacity building, research, and knowledge dissemination on climate resilience as it relates to agriculture	300,000
TOTAL	4,500,000

**Investment Project 2: Climate Proofing of Agriculture in the Centre-Artibonite Loop**

Overall Objectives	Specific Objectives	Specific Activities	Funding	Success Indicators	Link to PPCR M&E Indicators	Gender Indicators
<b>Identification and Promotion of Climate-resilient Agriculture and Sustainable Farming Practices</b>	To increase the volume of production of climate resilient crops (such as cane, fruit, coffee, sorghum, pigeon peas, etc.) and promote the adoption of climate resilient farming techniques in the Centre-Artibonite Loop.	Identification of climate resilient crops varieties, forest ecosystems, fruit trees that can be cultivated within the Centre-Artibonite Loop as well as development of incentive scheme/s to foster the adoption of new climate resilient farming practices	\$4M PPCR IDB  *This component will co-finance IDB's National Disaster Mitigation Program in Watershed Management that will be approved in 2014.	# of farmers supported under incentive scheme/s  # of studies developed to identify climate resilient crops  # of adaptation measures implemented utilizing the studies and/or incentive scheme/s developed  % of agricultural production increase on farms utilizing the incentive scheme/s  % of forest cover increase in the project area	# of people supported by the PPCR to cope with effects of climate change  Extent to which vulnerable households, community businesses and public sector services use improved PPCR supported tools, instruments, strategies, activities to respond to CV&CC  Quality of and extent to which climate responsive instruments/ investment models are developed and Tested	# of women farmers supported under incentive scheme/s
	Increase communities' resilience by supporting local SMEs	Identification of cropping techniques and sustainable farming practices that can be applied and encouraged to ensure business continuity and overall sustainability within the Centre-Artibonite Loop				

Overall Objectives	Specific Objectives	Specific Activities	Funding	Success Indicators	Link to PPCR M&E Indicators	Gender Indicators
				# of tools developed to promote climate resilient cropping and sustainable farming practices		
		Expansion of existing agricultural voucher (grant) system that IDB is currently implementing in Haiti as part of the agricultural program, to incorporate newly identified crops in the menu of options of different types or varieties of crops/trees resilient to climate variability and climate change, as well as sustainable farming practices. A portion of the grants will be reserved to support women farmers.				
<b>Extend Forested Ecosystems and Fruit Trees</b>	To protect/raise forest cover and expand forest ecosystems as well as areas of perennial and	<p>Organization of campaigns for sub-grafting fruit trees with high commercial value and out-of-season varieties</p> <p>Introduction of mini-orchard</p>		<p># of campaigns organized to promoted agro-forestry</p> <p># of mini-</p>		# of women participating in campaigns

Overall Objectives	Specific Objectives	Specific Activities	Funding	Success Indicators	Link to PPCR M&E Indicators	Gender Indicators
	resilient fruit crops in the Centre-Artibonite Loop.	in agricultural holdings		orchards created		# of women trained in sustainable farming practices and resilient agriculture
<b>Redirect Agricultural Research to Explore adaptation Strategies</b>	Identification of adaptation practices already being implemented by farmers, promoting the collaboration of Haitian farmers with farmers from other countries in the region to promote south-south learning in regards to climate resilient agriculture	<p>Training in nursery practices, minisett production, PIF technique of banana production, grafting and other fruit farming techniques</p> <p>Establishment of technical co-operation programs with countries in the region that have high-level expertise in growing climate resilient crop varieties including coffee and sugar cane</p>		<p># of technical cooperation established with countries in the region</p> <p># of trainings developed under the program</p> <p># of people trained in sustainable farming practices and resilient agriculture</p>		
<b>Strengthen Local Law Enforcement as it relates to Environmental Matters</b>	Engagement of local communities to play a stronger role in the preservation, maintenance and monitoring of forest and agricultural resources.	Development of a community based Forest Rangers program.		# of community members employed under this activity		# of women within the communities employed under this activity

Overall Objectives	Specific Objectives	Specific Activities	Funding	Success Indicators	Link to PPCR M&E Indicators	Gender Indicators
<b>Capacity Building, Research and Knowledge Dissemination on Climate Resilience as it relates to Agriculture</b>	Strengthening of local capacities, knowledge creation and sharing on climate resilience as it relates to agriculture	<p>Workshops to present key findings and lessons learnt from the implementation of the component</p> <p>Climate change and climate resilience awareness program at the community level (workshops, surveys, data creation and analysis)</p> <p>Training for stakeholders and decision-makers on climate resilience Development and implementation of communication strategies and plans for decision-makers, members of civil society organizations and the general public</p>	\$ 0.5M PPCR	<p># of workshops undertaken to disseminate results from under the component</p> <p>% of awareness increase within farming communities</p> <p># of communications strategies developed</p>		# of men and women participating in workshops

## INVESTMENT PROJECT 3: CLIMATE CHANGE ADAPTATION IN THE COASTAL CITIES OF THE GULF OF LA GONAVE

### 2.5.1.14. BACKGROUND AND RATIONALE

The Disaster Risk Management and Reconstruction Project tackles four key components. Component 1 entails natural hazard risk assessment and analysis, with a strong component to strengthen the capacity of line ministries to incorporate hazard risks into planning. Component 2, enhanced disaster preparedness and emergency response, supports the extension of the network of local municipal civil protection committees and the institutional development of the Directorate of Civil Protection, coupled with the improvement of the communication network and decision-support system for the assessment and rehabilitation/construction of emergency shelters. Component 3, rehabilitation of vulnerable and damaged critical transport infrastructure, finances the rehabilitation of vulnerable and damaged critical transport infrastructure and focuses on capacity building in key governmental agencies as well as repairing damaged assets (e.g., bridges) and restoring local access to main road networks. Components 4 and 5 provide funds for emergency response and general project management and implementation support. An envelope of \$60 million is financed through IDA grant.

In previous years, risk management in Haiti has focused on disaster preparedness and response. Climate change increases the vulnerabilities of coastal cities and the Government of Haiti wants to increase its ability to do accurate hazard assessment and implement activities to reduce vulnerabilities at the source. The coastal area stretching from Léogâne to Saint-Marc is the most populated in Haiti and is extremely vulnerable to flooding. Several cities extend along this narrow strip of coastline bordered by the *Massif de la Selle* mountain range to the south and the *Chaîne des Matheux* mountain range to the north. Between these two mountain ranges lies the *Cul-de-Sac* Plain, a low-lying delta plain threatened by flooding from watersheds (in particular from the Grise river) and from storm surges. The vulnerability of this area has increased with stronger storms and shorter storm-return periods.

This chosen coastal sector includes areas that stand out for their demographic and land-use challenges. The southern slope from Carrefour to Léogâne comprises evolving residential and commercial development combined with agricultural plots. Since the 2010 earthquake, unplanned residential settlements have spread over the hills and destabilized fragile slopes. The town of Léogâne was badly affected both by the earthquake and subsequent floods (notably in 2012). The northern hills over Plaine du Cul de sac (Corail-Cesselesse) are the site of the largest land grab in the metropolitan region, with over 20,000 families staking a claim for housing. The northern slope of the *Chaîne des Matheux* less

urbanized, with the exception of the towns of Cabaret and Arcahaie. The land use pattern tends toward residential and tourism. New settlements in the *Cul-de-Sac* Plain and on its surrounding hills contribute to urban sprawl; furthermore, they lack proper infrastructure (roads, water, and sanitation) and social services. In addition, these settlements contribute to slope erosion on the hills. When located in the plain they are in flood-prone areas, in particular next to the sea.

Investment Project 3 aims to improve climate resilience by focusing on activities to reduce climate risk at the source and by paying attention to coastal management. The following proactive adaptation measures are proposed:

Risk Reduction at the Source: The degradation of watersheds reduces their capacity to retain water in cases of heavy rainfall; this is one of the main causes of severe flooding on the coastal strip. The construction of small dams on gullies enables better control of the flood risk.

Coastal Management: The vulnerability of the coastal area is aggravated by urban developments that are poorly adapted to flooding risks. An integrated management approach is proposed to encourage better-adapted land-use planning. Currently, geospatial data are only available for limited sections of the metropolitan area. The first stage of the project is to acquire basic geospatial data (land elevation model) and to revise flood maps in the targeted area. These tools will enable urban planners to revise easements, local zoning regulations, and land-use maps, and to develop evacuation plans that take into account climate change variability. Data generated under this investment project will be transferred to the Caribbean Regional Track (“Improving Geospatial Data and Management for Adaptation Planning, Sea-level Rise and Storm Surge Impact Analysis”).



Figure 18a. The coastal strip to the south of Port-au-Prince.

### 2.5.1.15. OBJECTIVES

#### OVERALL OBJECTIVE

Investment Project 3 aims to increase climate resilience in disaster planning and response by focusing on vulnerable cities in Gulf de la Gonâve coastal areas and by adopting an integrated coastal management approach aimed at integrated management of watersheds linked to the coastal zones; land use planning; infrastructure protection; and involvement and accountability of stakeholders.

#### SPECIFIC OBJECTIVES

##### Objective 1: Reducing risk factors in the watershed.

Work on the gullies of the hills surrounding the coastal cities and protect roads and other key coastal infrastructures in the cities on the Gulf of La Gonâve.

##### Objective 2: Creating decision-making tools and training materials for local authorities and stakeholders.

Increase the resilience of coastal municipalities by giving them land-use tools (i.e., land-use management plans, risk maps, and evacuation plans) based on accurate data and by conducting information campaigns and training sessions for local authorities, vulnerable groups, civil society organizations, and the private sector on the issues and challenges of climate change affecting coastal zones and on the environmental services that these communities could provide.

##### Objective 3: Producing basic data on coastal areas.

Use adequate and reliable data (LiDAR and geo-spatial analysis tools) to create maps and land-elevation models of the coastal cities on the Gulf of La Gonâve.

### 2.5.1.16. ANCHOR INSTITUTIONS AND PARTNERS

#### ANCHOR INSTITUTION

**MICT/DPC and MTPTC/SPU** will be responsible for this project, which will be carried out in collaboration with: MDE/Department of Coastal Areas, municipalities, and MPCE/CNIGS.

## PARTNERS

The main partners identified are UNDP, UNEP, neighborhood committees, universities, and civil society organizations of targeted municipalities.

### 2.5.1.17. ACTIVITIES AND RISKS

#### ACTIVITIES

It is important to highlight that all of the interventions considered in this project will involve activities to raise the awareness of both public officials and the general population to the challenges of climate change. It will also be necessary to set up or encourage initiatives designed to raise awareness, sensitize, inform, and educate citizens. Planning exercises in the field will be participatory, coordinating with all the stakeholders involved, including ministries, state services, local governance structures, and, above all, the local communities that bear the ultimate responsibility for implementing climate-risk-reduction measures. Academia, which has played a facilitating role in other coastal area initiatives seeking to implement climate-resilience measures, will also be brought into this project.

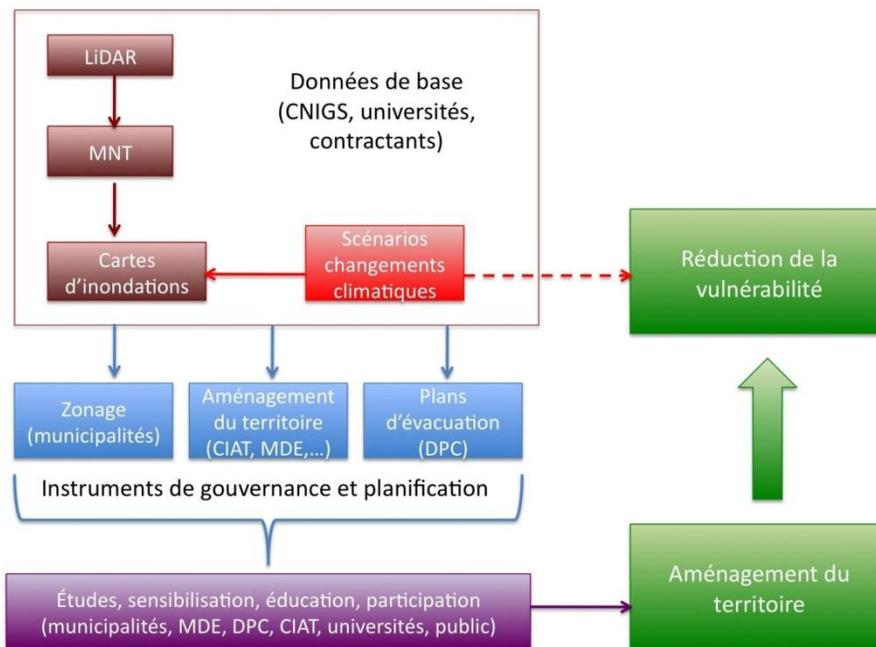
The main activities selected are the following:

- Establishment of orthonormal systems and elaboration of zone base maps (LiDAR, digital elevation model, and geospatial analysis tools– supported through the regional track activities of the Caribbean PPCR).<sup>46</sup>
- Identification of gullies to rehabilitate.
- Improvement works (e.g., construction of anti-erosion structures; construction of reservoirs in gullies).
- Execution of improvement works at targeted points along the seashore.
- Preparation of land-use plans in coastal areas.
- Development of hazard risk maps in coastal areas.
- Preparation of evacuation plans for coastal areas.

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<sup>46</sup>Data generated will be transferred to the Caribbean Regional Track (“Improving Geospatial Data and Management for Adaptation Planning, Sea-level Rise, and Storm Surge Impact Analysis”).

- Identification and prioritization of the most vulnerable points on the seashore in the targeted area in consultation with representatives of local governments and local stakeholders.
- Preparation of planning instruments for the location of protection structures at the most vulnerable points on the seashore.
- Development and launch of a communication strategy on the issues in coastal areas and the consequences and impact of climate change on these areas.
- Information and training on sustainable management of coastal areas and the issues and challenges linked to climate change.



**Figure 9** Organization of coastal management plan.

## RISKS

The following are the risks involved:

- Large-scale climatic or seismic events that completely alter the scenario and baselines (notably in conurbations next to the sea).
- Socio-political troubles.

- Lack of commitment by the authorities and/or communities leading to poor maintenance and the destruction of structures and installations undertaken by the project.

#### 2.5.1.18. GENDER ISSUES

Investment Project 3's aim to increase climate resilience of communities by adopting an integrated coastal management approach is expected to be an excellent method for empowering women to participate in the decision-making process. The participation of women in the preparation of land management plans, risk maps, and evacuation plans will contribute to improve the quality of the plans and improve women's confidence and self-esteem. Participation in public decision-making processes may increase women's participation in other aspects of the public and private sphere.

The communication strategies set up by this investment project will help women to understand the challenges of climate change in coastal zones, reducing the impact in their activities, houses, and families. Women usually live in the poorest houses, build in the worst areas, and more-often in informal settlements. Having identified the areas of greatest risk of flooding and created adequate evacuation plans, communicating this knowledge to women will help save the lives of more women and children in cases of excessive weather. Studies show that women and children are 14 times more likely than men to die during a disaster.<sup>47</sup> Having the right information may help to reduce this statistic.

Another aspect to consider: Women could be part of the workforce used to work on the execution of improvement works.

It is necessary to take into account the different roles that women and men play in the coastal ecosystems resources, especially differences in fishing activity and ownership of land.

#### 2.5.1.19. DRAFT BUDGET, FUNDING STRATEGY

##### DRAFT BUDGET

Preliminary allocation of PPCR Investment Project

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<sup>47</sup>Peterson, 2007.

Components	Cost US\$
Obj. 1: Work on gullies in the metropolitan region, enabling protection of the upstream neighborhoods designed to control floods, protect the bay, and create alternatives for people at risk living on the coastline	4,000,000
Obj. 2: Support for <i>municipalities</i> to plan for resilient coastal areas	2,500,000
Obj. 3 LiDAR survey of the Léogâne-Saint-Marc coastal sector, production of LEM, and geo-spatial analysis (e.g., flood maps)	500,000
<b>TOTAL</b>	<b>7,000,000</b>

Objective 3 will be funded out of the total envelope allocated for Haiti's national PPCR and will, therefore, complement the data to be produced under the component "Improving Geospatial Data and Management for Adaptation Planning, Sea Level Rise and Storm Surge Impact Analysis" of the Caribbean Regional Track, which is yet to be defined.

The project is expected to be implemented over a period of 5 years.

**Investment Project 3: Climate Change Adaptation in the Coastal Cities of the Gulf of La Gonâve (Léogâne - Saint-Marc)**

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Indicators M&E	Indicators Gender
<b>To Increase Climate Resilience of Communities on the Gulf of la Gonâve Coastal Area with an Integrated Coastal Management Approach</b>	to protect conurbations in the Port-au-Prince coastal zone, as well as roads and other coastal infrastructure in the project's pilot area from storm-water events	Identify gullies to rehabilitate	\$4.M	# of KM of gullies rehabilitated		
		Build of anti-erosion structures		# of structures built		
		Build reservoir in gullies		# of reservoir built Qty of water retain in storm period		
		Protect existing road infrastructures along the coastline		# of road that survive storm events		# of women and men working on the construction of the coastal infrastructures
		Identify vulnerable points and build required protection measures		Map (inventory) of vulnerable points		
	Draw land-use management plans for coastal areas of the municipalities in the Gulf of la Gonave	Elaborate risk maps & revise zoning of coastal areas	\$2.5M	#municipal decrees for coastal zoning/ plan		% of women helping to develop the management plan
		Elaborate revised land use plan		# municipal decrees for revised plan		

		Establish evacuation plan for coastal parts of the cities of the Gulf of la Gonâve		# evacuation plans elaborated		
		implement a communication strategy		Communication materials		
		Disseminate information on issues, challenges & solutions related to resilience to climate change in coastal zones		Pre/post survey on climate resilience in coastal areas		
	Complement the work under the Caribbean Regional Track to produce land elevation model and other spatial analysis product	Acquire LiDAR and geo-spatial analysis products	\$ .5M	Availability of Elevation model in public agencies (CNIGS, etc.)		

## INVESTMENT PROJECT 4: STRENGTHENING KNOWLEDGE MANAGEMENT OF HYDRO-METEOROLOGICAL, WATER RESOURCES, AND CLIMATE DATA TO INFORM DECISIONMAKING AND POLICY DIALOGUE

### 2.5.1.20. BACKGROUND AND RATIONALE

The most effective strategies for adaptation to climate change essentially stem from a greater understanding and management of climate information. Following recommendations from the World Meteorological Organization, this project will address the need to generate relevant climate information through the institutional strengthening of the hydro-meteorological network. The specific needs in terms of institutional capacity development relate to the establishment of adequate premises, effective IT, network maintenance capacity in the regions, and training for current and new staff. Furthermore, capacity gaps identified at the national level for the generation and effective management of relevant and reliable climate data that can inform end-users (in particular in the agriculture sector) and decision makers will be addressed to ensure climate-resilience measures can effectively be integrated into the country's development plans.

**Developing the institutional capacity to generate and manage climate change knowledge is an essential starting point.** The capacity to measure, process, and disseminate hydro-meteorological data is key to strengthening climate resilience. Haiti, however, has institutional gaps and the hydro-meteorological network is severely deficient. Indeed, the network is fragmented and administered at the public-sector level by several entities and organizations (CNM, SNRE, PNAP, SEMANAH, and CNIGS). Several stations managed by projects supported by NGOs, faith-based institutions/organizations, and international agencies are not connected to the national network. The meteorological network is also inadequate in the *départements* of Centre and Artibonite, which will require the installation of supplementary stations. The PPCR will contribute to strengthening the institutional capacity of the agency dedicated to managing the network of rainfall and meteorological stations (as established by Decree on Management for the Environment of 2005 (Art. 64)). Institutional reform will reduce the fragmentation of information, avoid duplication, develop operational synergies, and contribute to effective centralization/coordination/management and the harmonization and standardization of protocols and standards. As a result, climate-related primary data will be more readily available to end-users.

**Development of technical and scientific skills to generate and process knowledge on climate change is also essential to understanding and effectively responding to development challenges in a vulnerable context like Haiti.** A lack of managers and scientists with specialized training on the issue of climate change and in associated disciplines explains the difficulties experienced by Haitian universities in setting up “degree-level” training on climate change. Only with the support of

specialists from abroad and/or international cooperation can they undertake this endeavor. The wide-scale, high-level, and in-depth research work on climate change and its potential impact on different sectors and population groups that would be required in Haiti is currently sporadic and not up-to-date. It would be difficult to embed high-level academic training based on the scarce work produced to date. To address the shortage of expertise, it would be advisable to initially rely on an international academic partnership and on short courses with specialist institutions that could initiate a training program that could in turn be taken up by Haitian academic institutions. In the long term, the expectation would be to develop post-graduate programs on environmental issues and to establish an academic Chair on Climate Change at the national level. The PPCR will contribute to this goal by awarding grants, initiating joint research projects, and creating a process to progressively establish academic and professional specialists well-trained on climate change. Research programs will allow for not only the generation of new knowledge but also for helping to systematize and capitalize on experiences and initiatives aiming at strengthening climate resilience.

The fact remains that the collection, processing, and analysis of data that enable climate variables to be better captured to develop climate change forecast scenarios, vulnerability assessments, and other planning tools is missing at national level. The SPCR will seek to make a contribution to **close the climate data processing capacity gap in Haiti so that end-users and policy makers are able to factor climate resilience information into their decision-making processes**. Such predictions should be consistent with regional dynamics within the Caribbean; as a result, the project will build on existing regional efforts and will be incorporated into the Caribbean regional framework. Long term, these climate information capacity development processes should lead to enhanced climate change adaptation activities within the country and more efficient strategies to strengthen climate resilience, especially for the most vulnerable sectors.

**Dissemination of information and knowledge on climate change and dialogue on public policies linked to climate resilience will be the next step for an informed decision-making process on climate-proofing Haiti's development plans.**

The chances of successful adaptation of climate-change measures will increase when the society is cognizant and well-versed in climate-change-related issues. Local groups and organizations would then be more likely to participate actively and responsibly in the development of adaptation-to-climate-change strategies and measures. Such engagement also constitutes a guarantee for the handover and sustainability of PPCR achievements. Civil society organizations should also contribute and participate in public policies linked to resilience to climate change. The program will launch a communication plan and sensitization program to foster awareness-raising and information, and create training activities designed for decision makers, representatives of civil society organizations, and the general public.

Haiti does not have a specific policy and operational framework for adaptation to climate change, other than the general principles stated in NAPA. SPCR, in conjunction with other activities undertaken under the UNFCCC process, represents an opportunity to develop a policy framework

and to integrate climate change in public policies and development plans. To this end, preparatory studies, effectiveness evaluations, cost-benefit analyses, institutional assessments, and the involvement of the private sector and civil society, should be undertaken to develop solutions adapted to the Haitian context. These activities will be piloted by MDE in partnership with the institutions concerned. As part of this, a national conference on climate change will be organized.

**In order to ensure effective coordination of participating institutions and stakeholders in the SPCR implementation phase,** the CIAT will provide logistical and organizational support to anchor the institutions involved in the different investment projects. Such institutional strengthening will contribute to further continue the program's efforts to improve climate resilience beyond the scope and timeframe of the project. This institutional and managerial support will also provide the means to effectively execute the program and contribute to well-functioning coordination in the PPCR unit. Through this unit, the CIAT will ensure the harmonization of all the investment projects and the analysis, evaluation, and dissemination of project results. Active collaboration will be sought. These activities will be piloted by CIAT in partnership with the different stakeholders concerned.



Limnimeter on a bridge in Port-au-Prince

### 2.5.1.21. OBJECTIVES

#### 2.5.1.21.1. OVERALL OBJECTIVE

While providing the resources and means for effective and proper SPCR and PPCR coordination, the Project aims to strengthen the institutional, scientific, technical, and managerial capacity of the different stakeholders involved in the PPCR to generate, disseminate, and apply knowledge on climate change in order to create an effective policy dialogue that orientates decision making on climate-resilience issues.

#### 2.5.1.21.2. SPECIFIC OBJECTIVES

**Objective 1:** Promoting a credible and viable **institutional basis** for the collection,<sup>48</sup> archiving, processing/standardization, and analysis of data, as well as for the dissemination and provision of specific information for different users.

**Objective 2:** Closing the **technical capacity** gap to generate and process climate knowledge through the establishment of a training program and an internationally supported academic curriculum.

<sup>48</sup> Rehabilitation of stations and establishment of new stations.

**Objective 3:** Improving Haiti’s **capacity to control hydro-meteorological variables and respond to end-users** by anticipating all kinds of variations: short term and long term, linked to climate change in its territory, and in the water management and agriculture sectors in the Centre-Artibonite Loop.

**Objective 4:** Facilitating and energizing a well -informed and multi-stakeholder policy dialogue on climate resilience at the country level, ensuring participation of decision makers, vulnerable communities, and society as a whole.

**Objective 5:** Ensuring institutional articulation and effective management to systematize and capitalize on initiatives developed as part of the PPCR and to share/disseminate<sup>49</sup> relevant information and results obtained.

## 2.5.1.22. ANCHOR INSTITUTION AND PARTNERS

### 2.5.1.22.1. ANCHOR INSTITUTIONS

CIAT and MDE will be responsible for this project.

Other relevant national institutions include MEF, MPCE, MCC MTPTC, MICT/DPC, CNM, SNRE, SEMANAH, CNIGS, CNSA, ONEV, and local authorities.

### 2.5.1.22.2. PARTNERS

The partners identified to participate in the implementation of this project include WMO, UNDP, USAID/NOAA-NHC, CIDA, UK MET, Institute of Meteorology and Climatology of Cuba, Météo-France, AECID and other international co-operation agencies, AUF, UNICA, UEH, UNIQ, ONM, NMS-ONAMET/ Dominican Republic, CIMH, regional climate change initiatives in the Caribbean (CCCCC, UWI, MACC-CARICOM), Haitian and foreign universities and other training and research centers specialized in climate resilience, NGOs, civil society organizations and private-sector companies interested in climate change, potential climate information end-users, journalists and media associations, and communication companies.

## 2.5.1.23. ACTIVITIES AND RISKS

### 2.5.1.23.1. ACTIVITIES

The main activities identified are the following:

*Regarding the strengthening of institutional capacities:*

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<sup>49</sup> Workshops, training sessions, exchange visits, and information on challenges and future opportunities.

- Institutional mapping and assessment of different entities, organizations, and institutions involved in the generation, management, and use of hydro-meteorological data, with concrete recommendations and an operational implementation plan.
- Providing equipment for the institution selected.
- Strengthening hydro-meteorological and water resource management structures.
- Reorganization of the network by integrating all stakeholders.
- Setting up the operational capacity for analysis and modeling of data to anticipate variations, consequences, and impact of climate change.

*Regarding the upgrading and up-scaling of technical capacities at the national level:*

- Training technical managers and scientists while laying the foundation for a high-level academic training program in Haiti in collaboration with international academia and technical cooperation.
- Putting in place training and exchange programs between Haitian universities and academic institutions to promote scientific and technical co-operation.
- Establishing partnerships between Haitian academic institutions and universities and specialized research centers on climate resilience.
- Supporting scientists and experts on climate change and related fields with training opportunities.
- Facilitating internships, courses, and training sessions for Haitian students, managers, and scientists throughout the world.
- Putting in place specialized training programs on climate resilience for stakeholders and decision makers.
- Promoting linkages with an international network of scientists and climate-change stakeholders.

*Regarding the end-user-oriented processing of data:*

- Continuously generating high-level scientific knowledge on climate change and its impact on the different national sectors and the population as a whole.
- Strengthening the institutional capacity<sup>50</sup> of the country, and the Centre-Artibonite Loop in particular, for sustainable management of water resources and related data.<sup>51</sup>
- Integrating climate parameters and variables in the adaptation-to-climate-change process and in the different decision-making processes in different sectors.
- Establishing sustainable connections and collaborations with institutions and programs in the region involved in the management of data related to hydro-meteorology and climate change.
- Setting up a process and effective structures for the systematization, capitalization, and dissemination of information and data on climate change.
- Incorporating regional hydromet information management systems.

<sup>50</sup> Material and human (incorporating capacity strengthening and the setting up of training programs at all levels).

<sup>51</sup> This activity will build on the recent modeling exercise carried away the Canadian and Spanish co-operation agencies as well as UNDP to predict the flow of storm and water run-off in the watersheds in Artibonite.

*Regarding promotion of policy dialogue on climate change for decision making:*

- Developing and undertaking research projects on climate change and adaptation strategies.
- Organizing a national conference on the issues and challenges of climate change and climate resilience.
- Developing and undertaking communication strategies and plans for decision makers, members of civil society organizations, and the general public.
- Providing advice on participatory policy development, addressing climate change and the implementation of adaptation strategies.
- Drafting proposals with a view toward integrating climate change in policies and development plans.
- Informing and training the population on the issues and challenges of climate change and the potential impacts on Haiti.
- Ongoing policy dialogue around climate resilience.

*Regarding institutional coordination and management of the SPCR/PPCR:*

- Performing an institutional assessment of the public entities participating in the program, setting up capacity development plans, and designing targeted support based on anticipated needs (and linked to PPCR implementation challenges).
- Giving public institutions the operational means to implement and monitor the PPCR. Designing exit and handover strategies for institutions and communities for each of the projects and infrastructure investments undertaken.

#### 2.5.1.23.2. RISKS

- Socio-political troubles.
- Impromptu political changes with consequences on the currently prevailing consensus about environmental priorities at the national level and about the reorganization of data management related to climate change and water resource management.
- Lack of high-level collaboration between institutions involved in PPCR implementation or resistance from officials in the institutions concerned.
- Dispersion and fragmentation of international cooperation leading to the implementation of non-coordinated and non-complementary initiatives.
- Destruction of data collecting infrastructure, material, and equipment as a result of a disaster.
- Other external events potentially affecting implementation; in particular, training activities in the country and abroad.

#### 2.5.1.24. DRAFT BUDGET, FUNDING STRATEGY

Components	Cost US\$
Support to the modernization of <b>institutional bodies and services and linked to hydro-meteorology</b> (SNRE,	3,500,000

CNM, PNAP, SEMANAH and Climate Change Department of MDE): institutional support, equipment, and construction of hydro-meteorological stations in Haiti in general and in the Centre-Artibonite Loop.	
Up- skilling of <b>technical staff</b> and training of new staff.	750,000
<b>Energize policy dialogue.</b> Support integration of climate changes in public policies and the definition of national policy on climate change, communication and public awareness-raising around climate change (including organization of a conference on resilience to climate change in Haiti and the publication of conference proceedings; various studies and evaluations; putting in place specialist training for stakeholders and decision makers, and so forth).	500,000
<b>Coordination</b> , monitoring, and evaluation of PPCR Phase 2 activities.	750,000
<b>TOTAL</b>	<b>5,500,000</b>

This Project is expected to be implemented over a period of 5 years.

**Investment Project 4: Strengthening Knowledge Management of Hydro-meteorological, Water Resources, and Climate Data to inform Decision Making and Policy Dialogue**

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E indicators	Indicators Gender
<b>Strengthen institutional, scientific, technical, and managerial capacity of the different stakeholders involved in PPCR to generate, disseminate, and apply knowledge on climate change.</b>	Promoting a credible and viable institutional basis for collection <sup>52</sup> , archiving, processing/standardization, and analysis of data as well as for the dissemination and provision of specific information for different users	Institutional diagnosis of entities involved in the generation/management of hydro-met data with recommendations and implementation plan. Providing equipment for the institution selected. Strengthening hydro-meteorological and water resource management structures. Re-organization of network by integrating all stakeholders currently involved. Setting up the operational capacity for analysis and modeling of data to anticipate variations, consequences and	USD 3 500 000 PPCR	Number of meteorological stations put in place and/or restored and functioning adequately  Number of government institutions with an installed capacity to collect, process, standardize and share climate-related information	RESULT B2. Improved institutional framework in place  INDICATOR B2: (core) Evidence of strengthened government capacity and coordination mechanism to mainstream climate resilience	

<sup>52</sup> Rehabilitation of stations in place and establish new stations;

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E indicators	Indicators Gender
		impact of climate change.				
	Closing the technical capacity gap to generate and process climate knowledge through the setting up of a training program and <i>Academic curriculum</i> internationally supported	<p>Training technical managers and scientists whilst laying the basis for a high-level academic training program in Haiti in collaboration with international <i>Academia</i> and technical co-operation;</p> <p>To set up training and exchange programs between Haitian universities and academic institutions to promote scientific and technical co-operation;</p> <p>To establish partnerships between Haitian academic institutions and universities and specialized research centers on climate resilience;</p> <p>To put in place specialized training for stakeholders and decision-makers on climate resilience;</p>	USD 750 000 PPCR	<p>Number of technical and scientific experts and managers trained in climate resilience science and management.</p> <p>Number of participants in high-level academic programs on CC, in collaboration with international academic institutions.</p> <p>Number of scientific publications &amp; scientific studies on CC in Haiti published</p>	<p>RESULT B2. Improved institutional framework in place</p> <p>INDICATOR B2: (core) Evidence of strengthened government capacity and coordination mechanism to mainstream climate resilience</p>	

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E indicators	Indicators Gender
		To promote links with an international network of scientists and stakeholders of climate change.				
	Improving Haiti's capacity to control hydro-meteorological variables and respond to end-users by anticipating all kinds of variations; short- and very long-term, linked to climate change in its territory in general, and on the water management and agriculture sectors in the Centre-Artibonite Loop in particular	Continuously generating high-level scientific knowledge on climate change and its impact on the different national sectors and the population as a whole Integrate the climate parameters and variables in the adaptation to CC decision making process; in particular from end-users in the agricultural sector; Establishing sustainable collaboration with institutions and programs in the region involved in management of data related to hydrometeorology and CC.	See SO 1	Availability of reliable and relevant hydro-meteorological and climatic information in terms of % of data digitalized, length of historical series, % national coverage of meteo stations, time span response to users, availability of processed information according to different users Level of regional integration into hydromet information management(% of positive responses to requests for hydromet. info. from regional institutions and neighbor countries)	RESULT B3. Use of climate information in decision making routinely applied  INDICATOR B3: (optional) Evidence showing that climate information products/services are used in decision making in climate sensitive sectors	

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E indicators	Indicators Gender
		<p>Setting up a process and effective structures for the systematization, capitalization and dissemination of information and relevant data on climate change. Incorporate regional hydromet information management systems</p>				
	<p>Facilitating and dynamizing a well - informed and multi-stakeholder policy dialogue on climate resilience at country level ensuring participation of decision-makers, vulnerable communities and society as a whole.</p>	<p>To develop and undertake research projects on climate change and adaptation strategies; Organization of a national conference on the issues and challenges of CC and climate resilience; To develop and undertake communication strategies and plans for decision-makers and the general public</p> <p>To provide advice for a participatory policy development,</p>	<p>USD 500 000 PPCR</p>	<p>Level of integration of the issue of climate change in government policies, plans, programs and projects and public budgets.</p> <p>Number of public officials trained in design and implementation of adaptation to CC measures in development plans</p> <p>Number articles in mainstream media general public and the population on the issues and challenges of CC</p>	<p>RESULT A2. Strengthened climate responsive development planning</p> <p>INDICATOR A2.1: (core) Degree of integration of climate change in national, including sector planning</p>	<p># of men and women participating in training workshops</p>

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E indicators	Indicators Gender
		<p>addressing CC and implementation of adaptation strategies;</p> <p>To draft proposals with a view to integrate climate change in policies and development plans; Informing and training the population on the issues and challenges of climate change and as well as the potential impacts on the country; Ongoing policy dialogue around climate resilience</p>		<p>and its impact Number of legal initiatives related to climate resilience approved by the Parliament.</p> <p>Level of involvement and engagement of the private business sector and CSO in CC related initiatives.</p> <p>Establishment of a CC reference-group capable to produce recommendations to mainstream climate change into national dev. plans.</p>		
	Ensuring institutional articulation and effective management to systematize and capitalize on initiatives developed as part of PPCR and share/disseminate <sup>53</sup> relevant information and results obtained	To perform an institutional assessment of public bodies participating in the program and to set up capacity development plans and design targeted support based on anticipated needs	USD 750 000 PPCR	Quantity and quality of operational tools in place to facilitate local gov.'s appropriation of the PPCR project, its implementation, monitoring and evaluation		

<sup>53</sup> Workshops, training sessions, exchange visits and information on challenges and issues of future opportunities

Overall Objectives	Specific Objectives	Specific Activities	Funding	Indicators Success	Link to PPCR M&E indicators	Indicators Gender
		<p>linked to PPCR implementation challenges; Giving public institutions the operational means for the implementation, monitoring, and appropriation of developments in PPCR</p> <p>To design exit and hand-over strategies for institutions and communities for each of the projects and infrastructure investment undertaken.</p>		<p>Number of monitoring-evaluation reports, field mission reports, and impact studies carried out and disseminated.</p>		

## 2.6. GENERAL BUDGET AND MANAGEMENT ARRANGEMENTS

Project and Program Concepts under the SPCR:							
Project/Program Concept Title	MDB	Requested PCR Amount (US\$ million)			Expected Co-financing (US\$ million)	PPG (US\$)	Total PCR Request (US\$ million)
		TOTAL	Grant	Loan			
<b>Investment Project 1:</b> Climate Proofing of Infrastructures in Centre-Artibonite Loop	IBRD	8.0	8.0	-	50.0	-	8.0
<b>Investment Project 2:</b> Climate Proofing of Agriculture in the Centre-Artibonite Loop	IDB	4.5	4.5	-	TBD	-	4.5
<b>Investment Project 3:</b> Climate change adaptation in the coastal cities of the Gulf of La Gonâve	IBRD	7.0	7.0	-	60.0	-	7.0
<b>Investment Project 4:</b> Strengthening knowledge management of hydro-meteorological, water resources, and climate data to inform decision making and policy dialogue	IBRD	5.5	5.5	-	-	-	5.5
<b>TOTAL</b>		25.0	25.0	-	110.0	-	25.0

## 2.7. LINKAGE WITH THE REGIONAL TRACK OF THE CARIBBEAN PPCR

National PPCR programs and the Caribbean Regional Track have to be mutually supportive to ensure that efforts are geared towards improving climate resilience not only at the national level but also for the benefit of the entire region. The expected linkages between the national programming of Haiti and the regional track are detailed in the following table.

### LINKAGES BETWEEN THE REGIONAL TRACK AND HAITI'S NATIONAL PROGRAM

Caribbean Regional Track Activity	Haiti National Program Activity	Linkage Area(s)
<b>Improving Geospatial Data and Management for Adaptation Planning, Sea-level Rise, and Storm Surge Impact Analysis</b>	Coastal management and climate adaptation in the Léogâne - Saint-Marc coastal sector	The regional track will provide relevant topographic and bathymetric data and aerial imagery for the development of a digital elevation model (DEM). This will support Haiti in mapping and zoning areas at risk, with a view to drawing up land-use management plans and establishing evacuation plans adapted to climate risk (mainly for coastal parts of the metropolitan area). In addition, there will be sharing of information and lessons learned with other PPCR and non-PPCR participating Caribbean countries, particularly related to the protection of coastal ecosystems and coastal urban areas.
<b>Consolidating and Expanding the Regional Climate Monitoring Network and Global Platform Linkages</b>	GCCA CARIFORUM support	The GCCA program for the Caribbean is expected to finance the installation of five hydrological and five meteorological stations for Haiti, which will allow for the collection of valuable climate data to expand the Regional Climate Monitoring Network.
<b>Consolidating and Expanding the Regional Climate Monitoring Network and Global Platform Linkages</b>	Capacity-strengthening of hydro-meteorological measurements and data processing	Support for the modernization of services and bodies linked to hydro-meteorology (SNRE, CNM, PNAP, SEMANAH, and MDE's Climate Change Department), institutional support, and equipment and construction of hydro-meteorological stations in Haiti will help significantly in consolidating and expanding the regional climate monitoring network.

It is also expected that the capacity strengthening, generating, and disseminating of knowledge and the ongoing policy dialogue on climate change resilience that will be carried out under the technical assistance identified for Haiti's national PPCR will provide information and general support for envisioned activities under the Caribbean Regional Track in order to disseminate knowledge, lessons learned, and best practices and for the development of training modules and other capacity-building activities, not only for PPCR participating countries but for the region as a whole.

## 2.8. MONITORING AND EVALUATION, LEARNING, AND CAPITALIZATION

The SPCR is designed to ensure:

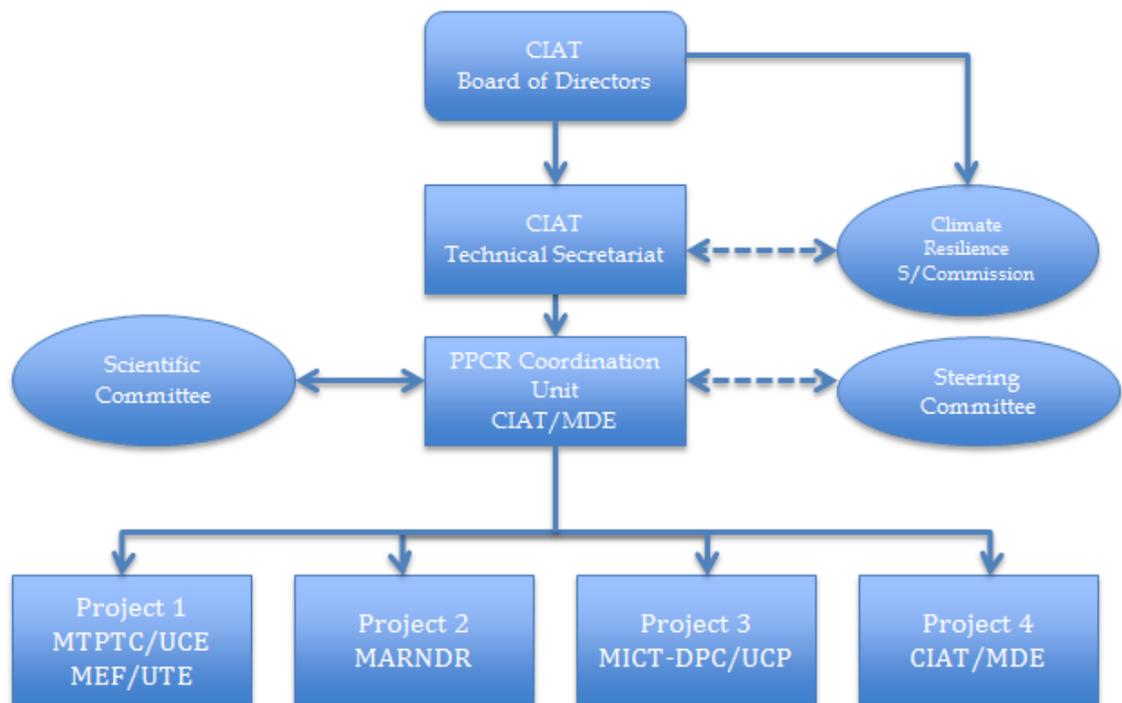
- ▶ Long-term viability of initiatives.
- ▶ Knowledge management and improved understanding of climate change phenomena.
- ▶ Learning opportunities.
- ▶ Awareness-raising within the public sector, the private sector, and civil society.
- ▶ Promotion of self-learning and a learning-by-doing approach (when possible).
- ▶ Local capacity to innovate and propose new solutions, encouraging adaptation to climate change and climate resilience.

It is also imperative to put in place mechanisms and procedures for information monitoring and gathering at all stages and levels of SPCR implementation. This is essential in order to have the data and elements necessary to systematize and capitalize on action, and also to develop models that can facilitate the replication of success stories and dissemination of best practices.

Beyond the usual monitoring and evaluation methods, time will be allocated for meetings and workshops to facilitate in-country discussion, deliberation, and drafting of conclusions/recommendations that can in turn be fed into the systematization and capitalization process. This way, opportunities for replication will be identified and the most relevant models and best practices will be widely disseminated.

## 2.9. ORGANIZATION CHART AND PROJECT COORDINATION

PPCR (CIAT /SPCR) ORGANIZATION CHART



As the designated focal point for the Convention on Climate Resilience, CIAT has the responsibility for implementing and monitoring the SPCR and, under the agreement, is accountable to its international partners.

A sub-commission on climate resilience will be put in place within CIAT. Composed of focal points from different ministries,<sup>54</sup> the sub-commission will focus on the issue of climate change and the measures to be taken in order to strengthen climate resilience in the country. Recommendations will feedback to the CIAT Board; which will recommend policies, strategic measures, and a legal framework for discussion by the Cabinet and in the Haitian Parliament. The sub-commission will work closely with the CIAT Executive Directorate,

<sup>54</sup>In particular, those more directly involved in PSRC and PPRC implementation.

which will provide technical support. In addition to its specific agenda, the sub-commission will respond to requests from CIAT Board members and questions arising from SPCR implementation.

A technical coordination unit will be put in place for the implementation of the PPCR. It will be directed by a co-coordinator, who will be responsible for daily management of the project and will report to the CIAT Executive Directorate. The co-coordinator will be seconded by a CTP (the MDE's Climate Change Department Director), who will work in close collaboration with the co-coordinator and provide opinions and recommendations on the different strategies, interventions, and activities implemented as part of the PPCR. As the depository for the Convention on Climate Change, the MDE is aware of what has been achieved and implemented through the PPCR and can ensure complementarity and synergy of interventions at all levels. The unit is supported by a small administrative and logistics staff.

The coordination unit will benefit from the support, advice, and recommendations of a Steering Committee composed of representatives of public institutions, CT representatives targeted by the program, and representatives from civil society organizations and the private sector.<sup>55</sup> Scientific support will also be provided by a Scientific Committee comprising top nationally and internationally recognized scientists in the field of climate change and climate resilience. These committees will determine the frequency of their meetings and the PPCR Coordination Unit will provide them with technical support.

The technical unit supervises the execution of the different PPCR projects that are implemented by the respective technical ministries, as identified in the technical specifications.<sup>56</sup> To facilitate dynamic and proper financial and administrative management, the projects will be implemented as part of the UTEs already established in the different ministries in accordance with the protocols agreed to by the funding institutions for each of the programs and projects. The PPCR Coordination Unit will manage the Technical Assistance Project for CIAT. Through a competitive process, different organizations and stakeholders from civil society and the private sector will participate in the execution of the activities planned within the PPCR.

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<sup>55</sup> *Agricultural companies, public works firms, and companies in the construction, tourism, communication, and information sectors.*

<sup>56</sup> *Main anchor institutions identified in bold in the technical specifications.*

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# APPENDICES

## ANNEX 1

### PPCR RESULTS FRAMEWORK

Expected Results	PPCR Core Indicator(s)	Baselines	Targets
<b>PROGRAM LEVEL</b>			
<b>Level of vulnerability of target groups in priority areas and sectors has been reduced.</b>	Number of people supported by the PPCR to cope with the effects of climate change.	0	TBD based on detailed project preparation
<b>Behavioral evolution in relation to climate risks has been triggered amongst population groups, allowing for greater consideration to climate change issues in their short-, medium-, and long-term decision-making process.</b>	Degree of integration of climate change in national, including sectoral planning.	0	3 national level planning strategies integrating CC (agriculture, transport and territorial planning)
<b>Target groups and beneficiaries of the PPCR, including women and other vulnerable groups, have improved their income and living conditions, thereby enhancing their climate resilience and adaptation capacity.</b>	Extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR-supported tools, instruments, strategies, and activities to respond to CC and CV.	0%	TBD (by August 2013)
<b>Increased awareness and understanding of the development challenges associated to climate change issues by decision makers and national specialists on natural resources management, within the public and private sector as well as within civil society.</b>	Evidence of strengthened government capacity and coordination mechanism to mainstream climate resilience.  Quality and extent to which climate responsive instruments/investment models are developed and tested.	0	Establishment and operationalization of Climate Resilience Sub-Commission under CIAT Inter-Ministerial Board

Component	Indicator	Output	Baseline data/status	Expected outcomes
<b>PROJECT LEVEL</b>				
<b>IP 1: Climate proofing of infrastructures in Centre-Artibonite Loop</b>				
<b>Enhance strategic network of secondary rural roads for agricultural product transport</b>	Volume of agricultural product reaching the market through road network after extreme climate events	Network of secondary roads improved  Transport connectivity for the agricultural supply chain improved	Agricultural pathways discontinued in weather events	Improvement of farmer's revenue and livelihood
<b>Improving structural network and developing sustainable critical trunk roads</b>	Number of kilometers of sections and critical points in roads that incorporate climate-proofing measures Infrastructure maintenance upgraded, enhanced and frequency increase	Roads' critical points in the structural road network rehabilitated  Macro connectivity in the BCA improved	Rural network in bad conditions and vulnerable to weather events	Improvement of rural population living conditions and diversification of livelihoods (access to services, access to markets and economic poles, etc.)
<b>Climate proofing investments in poles of economic growth</b>	Business continuity in poles of development (population assisted after extreme climate events)	Enhancement of safety nets in disaster situation  Diversification and intensification of economic activity in the BCA	Access to services (water, power, health, shelter etc.) discontinued after extreme climate events  Inadequate urban planning in "development poles" and exposure of investments to climate impacts	Trade volume increase  Diversification of income for rural communities  Resilience improved through enhanced safety nets
<b>(TA component) Creating an enabling environment for sustainability of investments</b>	Number of assessments for infrastructure development that integrate climate resilience considerations	Design, execution and maintenance of public infrastructure adequately informed by climate variability considerations	Climate change variables and scenarios are not assessed in infrastructure design	Long term sustainability of infrastructure investments increased

Component	Indicator	Output	Baseline data/status	Expected outcomes
	<p>Number of adaptation measures applied to road network and infrastructure development</p> <p>Number of SME, local authorities and local communities representatives that engage in infrastructure climate proofing trainings</p> <p>Number of SMEs, local authorities and communities benefitting from financial tools to implement adaptation measures and enhance climate-proofing of infrastructure</p>	<p>Local expertise on road network maintenance to suit climate</p> <p>Financial availability for adaptation measures</p>	<p>Lack of knowledge on options to climate proof investments</p> <p>Lack of capacity (Financial and technical) to assume maintenance of investments at local level.</p>	<p>Adaptation to climate change is mainstreamed in investment plans</p> <p>A local culture of climate-proofing infrastructures is strengthened and applied in the BCA</p>
<b>IP2: Climate Proofing of Agriculture in the Centre-Artibonite Loop</b>				
<b>Increasing the volume of production of climate resilient crops and promote the adoption of climate resilient farming techniques in the Centre-Artibonite Loop</b>	<p># of farmers supported under incentive scheme/s</p> <p># of studies developed to identify climate resilient crops</p>	<p>Information on climate resilient crops and vivid climate adaptation measures ; mechanisms put in place to allow farmer' s access to adaptation tools</p>	<p>Low productivity of agriculture as a result of crop systems and farming practices not adapted to climate variability and climate change</p>	<p>Increased volume of climate resilient crops and extension of forest cover</p> <p>Capacity of rural communities to cope with climate change enhanced</p>
<b>Increasing communities' resilience by supporting local SMEs</b>	<p># of adaptation measures implemented utilizing the studies and/or</p>	<p>Climate proof cropping systems</p>		

Component	Indicator	Output	Baseline data/status	Expected outcomes
	<p>incentive scheme/s developed</p> <p>% of agricultural production increase on farms utilizing the incentive scheme/s</p> <p>% of forest cover increase in the project area</p> <p># of tools developed to promote climate resilient cropping and sustainable farming practices</p>			
<b>Increasing forest cover and expand forest ecosystems as well as areas of perennial and resilient fruit crops in the Centre-Artibonite Loop</b>	<p># of campaigns organized to promoted agro-forestry</p> <p># of mini-orchards created</p>	Farmers' know-how on adaptation strategies enhanced in particular, in the sustainable management of forest, fruit and perennial crops ecosystems	Lands occupied mainly by non-perennial crops	
<b>Redirecting agricultural research to exploring adaptation strategies</b>	<p># of technical co-operations established with countries in the region</p> <p># of trainings developed under the program</p> <p># of people trained in sustainable farming practices and resilient agriculture</p>		Climate change variables are not integrated in decision making process about crop systems	
<b>IP 3: Climate Change adaptation in the coastal cities of the Gulf of la Gonâve</b>				
<b>Work on gullies of the</b>	Number of structures	Protection structures able to	Neighborhoods and roads	Safety of human lives

Component	Indicator	Output	Baseline data/status	Expected outcomes
<b>metropolitan region enabling protection of the upstream neighborhoods designed to control floods, protect the bay and create alternatives for people at risk living on the coastline</b>	built; Number of reservoir built; Qty of water retain in storm period; Number of road that survive storm events; Map (inventory) of vulnerable points.	protect neighborhoods and roads located in Gulf of La Gonâve coastal zones against flooding	regularly flooded because of degraded watershed	Security of investments
<b>Support for <i>municipalities</i> to plan for resilient coastal areas</b>	Number of municipal decrees for coastal zoning/plans;  Number of municipal decrees for revised plans;  Number evacuation plans elaborated ;  Communication materials;  Pre/post survey on climate resilience in coastal areas.	Policy framework for management of coastal areas	Non-integrated coastal management and climate vulnerability not addressed in planning	More efficient and effective of coastal management  Climate resilience factors are mainstreamed in land use and interventions in coastal areas
<b>LiDAR survey of the Léogâne-Saint-Marc coastal sector and production of LEM, products from geo-spatial analysis (flood maps),</b>	Availability of Elevation model in public agencies (CNIGS, etc.)	Flood Maps	Flood maps based mainly on observations and no possibility to make accurate predictions	Efficiency and effectiveness of decisions related to Land Use and evacuation
<b>IP 4: Strengthening knowledge management of hydro-meteorological, water resources and climate data to inform decision-making and policy dialogue</b>				
<b>Support to the modernization of</b>	Number of meteorological stations	Hydro-meteorological information is generated,	Scattered and unprocessed data for short time periods	Hydro-meteorological information available for

Component	Indicator	Output	Baseline data/status	Expected outcomes
<b>institutional bodies and services and linked to hydro-meteorology (institutional support, equipment, construction of hydro-meteorological stations) in Haiti in general and in the Centre-Artibonite Loop</b>	<p>put in place and/or restored and functioning adequately</p> <p>Number of government institutions with an installed capacity to collect, process, standardize and share climate-related information</p>	<p>processed and managed adequately</p>		<p>informed planning and decision-making process</p>
<b>Up skilling of technical staff and training of new staff</b>	<p>Number of technical and scientific experts and managers trained in climate resilience science and management.</p> <p>Number of participants in high-level academic programs on CC, in collaboration with international academic institutions.</p> <p>Number of scientific publications &amp; scientific studies on CC in Haiti published</p> <p>Availability of reliable and relevant hydro-meteorological and climatic information in terms of % of data digitalized, length of</p>	<p>National hydro-meteorological services are managed by capable technical staff</p>	<p>Weak technical and managerial capacities and organization working in the field of hydro-meteorology</p>	<p>Accurate and complete hydro-meteorological information becomes available for a better informed decision-making process</p>

Component	Indicator	Output	Baseline data/status	Expected outcomes
	<p>historical series, % national coverage of meteo stations, time span response to users, availability of processed information according to different users.</p> <p>Level of regional integration into hydromet information management (% of positive responses to requests from regional institutions and neighbor countries).</p>			
<p><b>Dynamize policy dialogue. Support integration of climate changes in public policies and definition of national policy on climate change, communication and public awareness-raising around climate change (Incl.: Organization of a conference on resilience to climate change in Haiti and publication of conference proceedings; Various studies and evaluations; Put in place specialist training for stakeholders and decision-makers, etc)</b></p>	<p>Level of integration of the issue of climate change in government policies, plans, programs and projects and public budgets.</p> <p>Number of public officials trained in design and implementation of adaptation to CC measures in development plans.</p> <p>Number of legal initiatives related to climate resilience approved by the</p>	<p>General public awareness and political commitment to mainstream climate change into development plans in Haiti.</p>	<p>Climate change issues are not addressed in relevant policies, programs and plans</p>	<p>Haiti's development plans at national, sectoral and local level mainstream climate change and contribute to mitigate vulnerability and climate-proof the country's development path.</p>

Component	Indicator	Output	Baseline data/status	Expected outcomes
	<p>Parliament.</p> <p>Level of involvement and engagement of the private sector and CSO in CC related initiatives.</p> <p>Establishment of a CC reference-group capable to produce recommendations to mainstream climate change into national dev. plans.</p>			
<p><b>Coordination and institutional management of SPCR/PPCR</b></p>	<p>Quantity and quality of operational tools in place to facilitate local gov.'s appropriation of the PPCR project, its implementation, monitoring and evaluation</p> <p>Number of monitoring-evaluation reports, field mission reports, and impact studies carried out and disseminated.</p>			

## ANNEX 2

### SYNOPSIS OF THE HAITI SPCR DEVELOPMENT PROCESS

2009: designation of CIAT as focal point for PPCR by the government of Haiti

June 2010: first joint mission with WB, IDB and UNDP

May 2011: approval of Phase 1 by the PPCR sub-committee

2011 and 2012: implementation of Phase 1 of PSCR

Spring/summer 2012: sectoral studies on

- hydrometeorology (B. Singh)
- agriculture (A. Bellande)

Summer 2012: Series of regional workshops

Date	Département	Commune
13 June	Centre	Hinche
12 July	Nippes	Miragoâne
19 July	Sud	Cayes
8 August	Sud-Est	Jacmel
14 August	Artibonite	Gonaives/Saint Marc
16 August	Nord-Est	Fort-Liberté
17 August	Nord	Cap-Haitien
31 August	Nord-Ouest	Port-de-Paix
August	Grande Anse	Jérémie
September	Ouest	Montrouis/La Gonave
11 September	Ouest	Port-au-Prince

Summer 2012: consultations with government representatives, international agencies, WB, NGOs, universities and other major stakeholders; preparation of SPCR document.

## ANNEX 3

### LIST OF STAKEHOLDERS CONSULTED (WITHOUT FOCAL GROUPS AND SECTORAL REPORTS)

#### **Gouvernement**

Dorcin Fresner/MARNDR

Brisard Daniel/MDE

Jean-Paul Dorine /MDE

Jourdain Fanfan/MDE

Georges Yvio/MDE

Bélizaire Dwinel /ONEV/MDE

Moïse Jean-Pierre/DPC

Suréna Yolène/DPC-BM/MICT

Piard Bobby/CNIGS/MPCE

Mathieu Gary/CNSA/MARNDR

Joseph Frantz/MARNDR

Semelfort Ronald/CNM/MARNDR

Chéry Yrvelt/SNRE/MARNDR

Amilcar Helliott/PNAP/MARNDR-MICT

Bretous Luc/Consultant

Saint-Vil Luc/Consultant

#### **BMD, Agences, ONGs**

Gilles Damais/BID

Marion Lepommelec/BID

Bruno Jacquet/BID

Kénel Délusca/PNUD

Sonel Ariste/FAO

Georgina Yglesias/UN Women

Steven Rault/UE

David Palacios/AECID

**Université**

Jean-Baptiste Neudy/FAMV, UEH

Audalbert Bien-Aimé/FAMV, UEH

Emmanuel Evans/UNIQ

## ANNEX 4

### NATIONAL AND MULTILATERAL PROJECTS OF HAITI CONTRIBUTING TO CLIMATE RESILIENCE

Project	Partners	Budget	Place	Time
<b>HYDROMETEOROLOGY</b>				
Analysis of historical hydro-meteorological data	UNDP, MDE			
Regional modelization of climate (GCM Hadley Center)	UNDP, MDE, Hadley			
Study of natural subsidence	MDE, UNDP, UdM			
LGL, geo-referenced (to check)	IDB, CIAT			
24 automatic hydromet stations	EU, CNIGS			Underway/to come
24 hydromet stations (automatic or semi-)	UNCDF/FENU, CNIGS		NE	
GPS network + securing and processing of data	CNIGS			Exist
Photo survey 30 cm (15 cm) US army drones	CNIGS		Mapping 1/25 000 south coast + occupation of territory	Exists, 2010
Analogue photos (film)	CNIGS	500-700 k\$		2002
104 hydromet stations	PNAP			Exist
2009 Inventory of hydromet stations geo-referenced and terrain verified				End- summer 2012
Reports on Haiti capacity and investment needs; funds pledged	WMO	6 M\$ (total 9.5 M\$)		2010/2011
<b>AGRICULTURE AND DRAINAGE BASINS</b>				
Construction of hill reservoirs	PFI		Centre	
Reforestation project	MPP, World Vision		12 communes of Plateau Central	
Food/emergency project	WFP, WINNER			
Food security	AECID (evtl UNDP)		plains	To come
Emergency response (rehabilitation, recapitalization)	FAO		Entire country	
Nat. Res. management, RB development, ravines, agro-forestry, local governance	Netherlands, FAO, CIDA		Marmelade, Plaisance	2001-2011

Project	Partners	Budget	Place	Time
Nat. Res. management, RB development, ravines, agro-forestry, local governance	FAO		Marigot/SE	To come
Sustainable management of drainage basins	GEF, IADB, other	31,5 M\$	SO	2009-
CC good practice, farmers school, risk management plan	AECID, FAO		Jacmel	
Increase resilience of vulnerable farmers, farmers school, field-testing and replication	GEF, FAO, CIAT	8M\$	Plain area: Artibonite Mountain area: Jacmel	2012-
Regional Project Haiti-Cuba-Jamaica-Dominican Rep: good practice for climate resilience	FAO			Finished 2008
Agricultural Investment National Plan	MARND	790 M\$		2012-2016
Projects of restoration	UQ,OIF			3 years
Bi-national Project, governance and practice	Oxfam QC		Artibonite	
CC Adaptation	CIDA, FSF, UNDP, CECI	4.5 M\$	Dept NE	2011, underway
<b>COASTAL AREAS</b>				
Climate adaptation of coastal communities	GEF and others	10,5 M\$	Entire country	2010-
Coastal areas	UNDP, GEF	3-4M\$	NE	underway
Coastal areas	IDB, GEF/LDCIF, MENV	6-7 M\$ IDB 8M\$ GEF\LDCI F	Adjacent islands	From the end of 2011 onwards
Marine Protected Areas and other interventions	UNDP, MDE		Northern coast (3 bays), N & NE	
Fishing, aquaculture, shoreline management; 3 cold stores (Jacmel) in 8 communes	AECID, MARND	3-4 M\$	SE, Cote de Fer - Anse à Pitre	2006-
Coastal area	UNDP		Grande Saline	
National Agenda for Protected Areas, Caracol Marine Protected Area	MENV			In place
Protection of mangroves	MENV			Advocacy stage
<b>URBAN AREA</b>				
Urban centres	CIAT			
<b>ENERGY</b>				

Project	Partners	Budget	Place	Time
Energy (charcoal) CDM/REDD+ support CIAT strengthening Urban/peri-urban areas	AMCC/GCC A EU	6M\$	Port-au-Prince	Identification 26 June 2012 operations mid-2013
Energy	MDE		MÉH Dessalines	
Energy	Biodiésel Haiti			
Biodiesel cookers	MDE/IRC			
Energy conversion of fishermen + Cold chain	MDE/WB		Belle-Anse	underway
Installation of solar panels	IBRD, GEF etc.	3M\$	Port-au-Prince	2010-
Micro-Hydroelectrical power stations	UNDP, GEF	4.6M\$		2008-
<b>RISK MANAGEMENT</b>				
SAA Project	WB, DPC	60M\$	Plateau ?	
Emergency response to climate hazards	MARND, NGOs, MPCE		Centre dpt	In place
<b>INSTITUTIONAL STRENGTHENING</b>				
MDP	MENV	5 projects 2 <sup>nd</sup> stage		underway
MDP Bureau-strengthening	IFC, GEF, MDE	100k\$/812k \$ incl. staff		1 year
REDD+ support	AECID			To come
ONEV support	IDB	1-2M\$		done
CC mainstreaming study	MDE			Preparatory phase
National CC strategy, following Rio Summit	MDE			Not yet done
CTCN Climate Technology Centre Network	UNEP, UNFCCC			In negotiation
<b>TRAINING AND AWARENESS- RAISING</b>				
Campaign for CC awareness-raising	MDE/UNDP		NE dpt (12 <i>communes</i> )	2011
Masters in Environment	UEH		Port-au-Prince	since 2011

**MANAGEMENT OF WATERSHED AND WATER RESOURCES UNIT (GBVRE)  
 INVENTORY OF WATERSHED PROJECTS AND PROGRAMMES IN HAITI**

EXECUTION ORGANIZATION	FUNDING BODY	TITLE OF PROJECT	AREA OF INTERVENTION	COST OF EXECUTION IN US\$	START DATE
CHEMONICS	USAID	Watershed Initiative for Natural Environmental Resources (WINNER)	plaine du cul de sac, cabaret montrouis,	127 M	06-09
DAI	USAID	Economic Development for Sustainable Environment (DEED)	limbe	19 m	01-08
MARNDR	IDB	Programme for Agricultural Intensification (PIA)	Ennery-Quinte	6 M	
MARNDR	IDB	Programme of Natural Disaster Mitigation (PMDN)	Grande rivière du nord, ravine du sud	30 M	10-09
MDE (Haiti & RD)	IDB	GEF-MACAYA Programme	Ravine du Sud/ Acul	3.4 M	12-09
MDE/OXFAM	FEM, UNDP	Reduction of conflict in use of water in the Artibonite RB	border area of river Artibonite		03-11
UNDP /FAO/MDE/MARNDR	UNDGHRF/ WFP/UNDP	Vulnerability of the south	Aquin-St. Louis du Sud, Tiburon Port-Salut, BV Cavaillon, BV Les Cayes	11 M	01-11
UNDP /UNEP	UNDG HRF	<i>Frontera Verde</i>	Massacre-Pedernales	2.5 M	02-11
FAO/MARNDR		Project for food security	Marigot		
ACDED and Concert-Action	EU and Welthungerhilfe	Programme for agro-forestry and organisational-strengthening of farmers in Palmes and Marigot-Haiti.	Les Palmes (west) and Marigot (south-east)	1,230,635.06 <sup>1</sup>	January 2008-
Welthungerhilfe Bureau in Ouanaminthe	BMZ	Management of Natural Resources	Jumatsy and Jassa (Ouanaminthe)	1,151,953.12	October 2010
Welthungerhilfe Bureau in Jacmel, AFAM and ACDED	BMZ	Relaunch of the local economy and prevention of catastrophes in the Gosseline Basin	Marbial (Jacmel)	1,575,107.56	August 2011

EXECUTION ORGANIZATION	FUNDING BODY	TITLE OF PROJECT	AREA OF INTERVENTION	COST OF EXECUTION IN US\$	START DATE
<b>CESVI and Cap-Haiti Welthungerhilfe Bureau</b>	European Union , CESVI, and Welthungerhilfe	Increase in agricultural production by strengthening the milk supply chain through support to local initiatives economic and natural resources management	Limonade, Roche-Plate, Saint-Raphaël	2,334,922.55	October 2010
<b>Welthungerhilfe Bureau in Jean Rabel</b>	Fli	Irrigated agriculture developmentprojecton perimetre of Nan Carré, Ti Rivière 1 <sup>st</sup> Pass at Vieille Place (Nord-Ouest, Jean Rabel).	Bay of Henne, Jean Rabel	2,	July 2010
<b>Welthungerhilfe Bureau at Jean Rabel</b>	PAM and Welthungerhilfe	Improvement of infrastructures in the lower part of Nord-Ouest	Jean Rabel	1,209,441.47	October 2010
<b>Òganizasyon Pas-a-Pas de Mulatre (OPAM)</b>	USA)	Soil and water conservation project at Chardonnières	Kalis –Mulatre Nan Jack – Belvue- Masolas -Hilaire	59511.38	November 2011
<b>Development Organization Movement of Tiburon (MODT)</b>	USAID/FFP (CRS MYAP)	Soil and water conservation project at Tiburon	Sevré	59511.38	November 2011
<b>Les Anglais development project</b>	USAID/FFP (CRS MYAP)	Soil and water conservation project at Chardonnières	Haut-Colse – Les Anglais - Mahotière	55127.63	November 2011
<b>Local organization</b>	PNUE/CRS *	Agriculture and forestry project	Rendel /Port-à-Piment	271,864	October 2011
<b>Local organization</b>	PNUE/CRS *	Agriculture and forestry project	Tiburon, Les Anglais, Chardonnières, Coteau, Roche à Bateau	281,631	October 2011
<b>Local organization</b>	CRS**	Development and management of watershed project	Tiburon- La Cahouane- Les Anglais- Beldent-Hilaire	3,105,638.63	January2012
<b>CESVI, Welthungerhilfe, KNFP, Veterimed</b>	European Commission	Reduction of vulnerability in rural areas by creating temporary jobs through works to put in place drainage basin protection structures	Limonade, Roche-Plate, Saint-Raphaël	2.300	01-10-2010

EXECUTION ORGANIZATION	FUNDING BODY	TITLE OF PROJECT	AREA OF INTERVENTION	COST OF EXECUTION IN US\$	START DATE
CESVI	ECHO	Project to reduce malnutrition through multi-sectoral approach	Sud-département	1.348.100	01/01/2011
HELVETAS Swiss Inter cooperation	Fonds d'Environnement	Bi-national Artibonite project/sustainable management of soils and sub-RB production systems project at the River Bois in Verrettes	Verrettes (Artibonite)	720.000.00	January 2011
HELVETAS Swiss Intercooperation	Chaîne du Bonheur	Post-earthquake intervention in the commune of Petit Goâve; reduction and risk mitigation component	Post-earthquake intervention in commune of Petit Goâve, reduction and risk mitigation component	1'485'000	01.01.2011
HELVETAS Swiss Intercooperation	FAO	Development of watershed works in the River Caïman	Caïman drainage basin, 11 <sup>th</sup> Section, commune of Petit Goâve, département of Ouest	185'000	16.01.2012
MPP/MLAL	Unopened (UE)	Rehabilitation of agricultural production of watershed in the centre and north-east of Haiti to support fruit and vegetable production	Jacob /Hinche Lamine/Capotille. Gens de Nantes /Ouanaminthe	1'577,420.00	October 2010
MPP	Development and Peace	Support for food security in Plateau Central	Communes of: Hinche, Thomassique, Cerca la source, Mirebalais, Saut d'Eau, Belladère, Laschobas	2,300,000.00 \$ Canadian	April 2011
MPP	Fondation de Fra	Strengthening dynamics of local agricultural development involving displaced people.	Communes of: Hinche, Maissade, Thomonde	1'042,372.5	July 2010
AVSF/CROSE	CG92E	RB rehabilitation project at Fonds Melon	Fonds Melon (Michineau), Sud-Est		2007
CECI/SOCODEVI/UPA-DI-UFRAD	IDB	Watershed protection project at Cap-Haiti	Cap-Haitien RB		August 2008

## ANNEX 5

### ACTIVITIES PROPOSED AS PART OF SCIENTIFIC COLLABORATION

#### ACADEMIC COLLABORATION ON CLIMATE RESILIENCE

##### **Mission statement**

The project aims to establish scientific collaboration (teaching and research) to strengthen the Haitian Republic's adaptation capacity to climate change. This collaboration intends to undertake research projects on Haiti's vulnerability to climate change, participate in developing adaptation plans and contribute to the Haitian Republic's human, scientific, technical and institutional capacity-strengthening through a programme involving research, advice, education and specialist training.

The collaboration will involve a foreign university providing teaching on climate, and UEH's Faculty of Agronomy (AGRO-UEH) and the Interministerial Committee for Territorial Management (CIAT) in Haiti. It will be set up for an initial duration of five years, subject to renewal at the end of the initial period of operation. The creation of a Chair in Climate Adaptation is envisaged as part of this collaboration.

##### **Areas of intervention**

Activities will be focused on three areas of activity which are all related and aim to improve Haiti's adaptation capacity to climate change: research, education and training, intervention and planning.

##### **The main activities will be:**

- ▶ To carry out interdisciplinary research work on Haiti's vulnerability to climate change;
- ▶ To create academic and public education projects, and specialist training for stakeholders on climate change, including long-distance projects;
- ▶ To create bi-lateral exchanges of experts and students, as part of exchange and training projects e.g. Masters in Environment at UEH;
- ▶ To provide training targeted at experts and managers (workshops, summer school);
- ▶ To advise CIAT and other institutions on adaptation projects and research initiatives informing decision-makers and planners; develop adaptation programmes nationally

and locally; research and advise on the use of international climate mechanisms (CDM, REDD+);

- ▶ To create a network of institutions and experts, and databank of experts on climate and adaptation;
- ▶ To organize a conference on climate adaptation in Haiti.

### **Several principles will be promoted regarding the direction of projects**

- ▶ **Inter disciplinary:** research on vulnerability, adaptation and climate resilience concerning geographical, human, social, economic aspects etc. and natural sciences. Thus, an interdisciplinary vision is essential in developing research, training and intervention projects;
- ▶ **Systemic view:** links and retroactivity which are inseparable exist between intrinsic and external elements determining climate vulnerability; the economic, social and human development of the country; and the quality as well as the evolution of the land and marine environment and ecosystems. The systemic approach is an essential tool in considering the complexity of these interactions;
- ▶ **Integrated management:** in coastal areas and watershed, integrated management has been established as the preferred paradigm of intervention at international and national, regional and local level in numerous countries. In developing research, training and intervention projects, the integration of all activities in the same geographical region with strong interaction as well as stakeholder involvement will be favoured;
- ▶ **Complementarity between research and training:** the involvement of Masters Environment programmes at ISE and the Faculty of Agronomy and others as appropriate will enable links between scientific research and the training of highly-qualified personnel to be established. This link will respond to two overarching objectives: essential scientific knowledge acquisition and capacity-strengthening of Haitian human resources;
- ▶ **Use of communication technologies:** the possibilities of long-distance communication; in particular video-conferences or platforms for exchange and long-distance training will facilitate collaboration and networking. ISE-UQAM has the relevant infrastructure and such infrastructure will be developed in Haiti as necessary. This communication capacity-strengthening will allow the institutions involved to act more effectively in an international context and have access to more academic and other resources.

## Five-year Action Plan

Year	Activity
2012	<ul style="list-style-type: none"> <li>▶ Signing of Memorandum of Understanding</li> <li>▶ Workshop with decision-makers and scientists</li> <li>▶ Establishment of Chair in Climate Adaptation for Haiti project</li> </ul>
2013	<ul style="list-style-type: none"> <li>▶ Research, intervention, and training projects, &amp; field studies</li> <li>▶ Student exchange programmes</li> <li>▶ Exchange of experts and decision-makers; face-to-face or long-distance</li> <li>▶ Organization of a conference on climate change abroad or at Port-au-Prince</li> <li>▶ Development of collaboration capacity via internet</li> <li>▶ Creation of specialist training tools for decision-makers, managers, experts and stakeholders on the ground</li> </ul>
2014	<ul style="list-style-type: none"> <li>▶ Research projects, intervention, training, &amp; field studies</li> <li>▶ Student exchange programmes</li> <li>▶ Exchange of experts and decision-makers, face-to-face or long-distance</li> </ul>
2015	<ul style="list-style-type: none"> <li>▶ Research projects, intervention, training, field studies</li> <li>▶ Student exchange programmes</li> <li>▶ Exchange of experts and decision-makers, face-to-face or long-distance</li> <li>▶ Summary report on the state of knowledge on impact and adaptation to climate change in Haiti</li> </ul>
2016	<ul style="list-style-type: none"> <li>▶ Research projects, intervention, training, &amp; field studies</li> <li>▶ Student exchange programmes</li> <li>▶ Exchange of experts and decision-makers, face-to-face or long-distance</li> <li>▶ Development of an integrated adaptation to climate change policy for Haiti</li> </ul>
2017	<ul style="list-style-type: none"> <li>▶ Research projects, intervention, training, &amp; field studies</li> <li>▶ Student exchange programmes</li> <li>▶ Exchange of experts and decision-makers, face-to-face or long-distance</li> <li>▶ Request for UNESCO Chair and UNITWIN network in climate adaptation</li> </ul>

# ANNEX 6: HAITI SPCR INDEPENDENT REVIEW

**Review**

**Draft Document – Strategic Plan for Climate Resilience**

**Republic of Haiti**

Michael A. Taylor  
Department of Physics  
University of the West Indies, Mona  
Jamaica

## **Introduction**

This review is divided into three parts. The first part offers comments related to *The Structure* of the proposal presented. This is meant to provide helpful comments about how the project has been conceived and put down on paper. It is felt that some of the concerns to be later noted about the project are in a large part a function of how the project has been articulated in the document. The second set of comments reflects general concerns about the project with a view to highlighting points/themes that need to be elaborated on or apparent gaps not addressed in the document. The final set of comments is a compilation of comments specific to each of the Investment projects proposed. Minor comments are also included after the summary.

### **PART A - Comments on the Structure of the SPCR**

1. A very useful situational analysis is provided in the first part of the document out of which some obvious priorities emerge – Livelihoods, Agriculture, Coastal Zone Management, Policy, Human and Technical Capacity, Communication. One expects to see these themes as the central foci of the projects proposed in the second section of the document. Somehow, however, a few of them get lost. The developers of the document should firstly consider changing some of the titles of the investment projects so that the priority themes being tackled are immediately evident. Project 1 could benefit from a title more suggestive of the issue being tackled i.e. making clear that the project aims at building climate resilience by considering agricultural practices and targeting rural Livelihoods in the Centre-Artibonite Loop. Similarly the Technical Assistance component could benefit from refocusing and perhaps renaming (see also additional comments in Part B, comment 3 below).
2. There is a separation of projects into Investment and Technical Assistance. Presumably this is done to highlight ‘hard’ investment (infrastructure etc.) versus funds for ‘soft’ activities including capacity building, dissemination, policy development, dialogue etc. The investment projects 1 through 3 will however need some amount of technical assistance to facilitate the realization of their stated goals (vulnerability and risk assessments, community, civil society, NGO and government engagement, dissemination, pilot-to-policy programmes, technical expertise in data management etc.). It is not clear if Technical Assistance for projects 1 through 3 is provided for in the Technical Assistance project, and if it is, whether the requested allocation is adequate to support the three projects. The developers of the SPCR may want to consider a number of options: (i) Making very clear where the allocations in the Technical Assistance project are applicable across the previous three projects. (ii) Not distinguishing between Investment and Technical Assistance and allocating funding in the projects 1 through 3 for technical assistance activities (i.e. and do away with the fourth component altogether). (iii) Doing suggestion (ii) but in addition defining a fourth Investment Project specifically targeting additional dissemination and/or strengthening of academic capacity and/or engendering resilience through targeted governmental intervention and policy.

3. The Introduction to each Investment Activity includes a background and some identified priorities (presumably from prior consultation though it is not always clear). This sets the wider context for the Objectives and Actions to be pursued. Understandably, not all priorities identified in the background are being addressed by the SCPCR. This may either be due to a limitation of resources but may also be as a result of another existing initiative already targeting a stated priority (including the regional track). The reason, however, is not always made clear. For example, it is not clear why though agricultural research and local law enforcement are identified as priority options in project 1 neither are further targeted especially since the lack of both may pose a risk to the success of the entire project. If one views the document in its broader context as a road map for approaching resilience in the chosen priority area then one suggestion may be for an initial Table to be included in each project description in which priority objectives for achieving resilience in the sector or region are provided even if they go beyond the SPCR programme. Subsequent columns in the same table would then distinguish which actions are being tackled by other projects (with reference to the Table provided in the Annex) and which ones are intended to be tackled by the SPCR programme. This Table would also serve to highlight synergies with existing programmes and later justify the choice of anchoring and partnering institutions. It would also help fit the programme in the broader resilience context previously articulated, make clearer the coordinating role of the SPCR, and highlight gaps for which additional intervention and funding (outside of the SPCR) need to be sought to achieve the intended resilience.
4. Following on from above, in outlining each Investment project, both Specific Objectives and Specific Activities (presumably now those to be tackled specifically by the SPCR) are outlined. It would be very useful if the stated specific activities could be matched to the corresponding specific objective so that quick and easy evaluation of their suitability for meeting the objectives or of gaps could be done. Again a tabular format would facilitate this.
5. Similarly, Anchor Institutions are provided for each project as well as partners. In the present format it is not always evident why the anchoring institution(s) is (are) chosen, which specific activities require the support of designated anchoring institutions or partners, and how coordination will be shared when multiple institutions are named as anchoring institutions. It may well be that some institutions and partners are required for some specific actions but not others. Here again the document could benefit from a Table. The previous Table mooted in point 4 above could be expanded so that columns for Coordination and Partnerships are included and Institutions, Agencies and programmes matched to specific activities.
6. In all instances, more detail is needed re the allocation of the funding sought (see point 3 below). Again, in the proposed table a column matching allocation to specific activity (and in turn objective) would be useful.

### **Part B - General Comments on the Programme**

The following areas need strengthening in the document.

1. **Coordination:** Notwithstanding the elaboration of a structure for project governance a number of questions arise. By the documents own admission, there is a multiplicity of agencies with an environmental mandate as well as lack of high-level cooperation and institutional will. There are also a number of international efforts with potential complementary activities. How will CIAT ensure coordination, 'buy-in' and compliance across the agencies involved? Do they already have a track record for doing so with respect to their current Land Management mandate? If yes, the provision of some examples or model would be useful. Is a committee of focal points sufficient to guarantee efficiency or to overcome bureaucracy? Will such a committee have authority to execute and coordinate across ministries and across agencies? Again are there some examples to suggest that this organizational arrangement is the most suitable? The model of coordination presented has a myriad of agencies involved (too many?). Should there be a rationalization to ensure the project is not stymied from the outset by the need to negotiate inter-agency collaboration? Some more details need to be provided about the model of coordination i.e. for overall coordination and for individual project coordination. It may be even possible that the first project of the SPCR could be devoted to development of an organizational structure to ensure viability and sustainability given that coordination is a recognized weakness.
2. **Sustainability:** It is not clear what are the specific measures being undertaken to ensure sustainability of the projects being undertaken. For example, there are a number of risks articulated for each investment project. It would be useful to indicate what approaches will be undertaken to manage the risks articulated. It would also be useful to provide a measure of the level of each risk i.e. medium, high or low. Again a tabular format may prove useful for presenting the risk, indicating a measure of its severity and providing some proposed actions to address them. Since some of the risk may cut across all projects (for example, institutional will, fragmentation of coordination etc.) it may also be useful to provide a section in the general project discussion on inherent risks and proposed actions to manage them.
3. **Allocation:** It is admittedly more difficult to estimate the cost of activities when they are non-technical and do not, for example, involve equipment procurement or hard infrastructure development. The entire programme does have a strong technical bias and so it is important that the developers look again, particularly, on the non-technical components of each project (training, studies, knowledge dissemination, etc.) and consider if they are appropriately matching resources to intent. The impression is that what is being proposed is being under resourced, though admittedly it is difficult to say if this is in fact so without a specific matching of allocation to activity (see again point A.6 of the previous section) or without a better understanding of complementary activities which may already be undertaking some of the proposed activities.

Though each project seems prone to some amount of mismatch of resource and intent (given the limited information provided), it is the Technical Assistance Programme which raises the most questions. For example, is four hundred thousand dollars adequate to support the various studies and evaluations needed

across all three investment projects as well as additional academic studies proposed or is one hundred thousand sufficient for a national conference? As another example, it is not clear how objectives 4 (water models), 6 (adaptation plans) and 8 (capitalizing initiatives) of Investment Project 3 will be met and whether it is envisioned that the amount allocated for upskilling of staff members will facilitate some of these (e.g. the ability to do the modelling). Again it is noted that a number of these ambiguities would be eliminated by matching activities to objectives for each project and adding a column indicating estimates of resources needed for each activity or group of similar activities.

4. **Duration/Schedule of Implementation:** There needs to be some indication of the duration of the entire project. Equally important, some indicative timelines need to be offered for the implementation of key components. If possible these timeline should be matched against other national non-SPCR climate change plans and activities that are expected to come on stream and which may be complementary.
5. **Gender:** Greater consideration needs to be given to integrating gender into the entire programme and its success indicators. Currently, gender is only hinted at within the context of agriculture and food security, but even in this context it is not elaborated on. Some more discussion on how vulnerable groups in sectors or regions will be impacted by the projects proposed would be useful.

### **Part C – Some Specific Comments on the Projects**

#### **Investment Project 1**

1. Consider renaming the Investment Project to make clear the emphasis on the Agriculture Sector/Livelihood/Food Security.
2. Match activities to objectives and agencies to activities.
3. There seem to be some agricultural initiatives already taking place in the region. Make clear which objectives/activities will be undertaken exclusively by the SPCR. Indicate why these are chosen and what the approach will be to dealing with the others.
4. Expand on the voucher scheme mentioned. Has it been successful? What are the modifications being proposed? How will adding more capital make for more resilient communities?
5. Isn't one probable risk that of the region becoming less suitable for agriculture due to climate change (drier conditions, warmer temperatures)? How will this risk be mitigated against?
6. Link project to regional PPCR component for modeling and downscaled projections.
7. Are urbanization and the otherwise use of agricultural lands a growing problem? How are these risks being approached?
8. Should crop insurance be a consideration? Why? Why not?
9. How will coordination be undertaken with two ministries as lead? There seems to be no allocation for project management. Is it in the one million allocated under the Technical Assistance Project?

10. This project has a lot of proposed activities besides the road infrastructure improvement. As outlined, this project will require further analysis of risk and vulnerable groupings, studies to develop appropriate adaptation strategies, community engagement initiatives, dissemination activities, expansion of a voucher incentive scheme, training in agro initiatives, and the provision of technical and financial support to entrepreneurs, among other things. Is the allocation of four million reasonable to support all these initiatives? Should there be a prioritization following study and a focusing on activities most likely to be effective? Or are these activities the results of previous studies done in the area? Can reference be made to those studies?
11. Indicators of success should be noted in the main project document and not just in the executive summary.
12. Some indication of the length of roads to be improved should be provided.
13. Should development of a marketing strategy be considered to ensure sustainability?

### **Investment Project 2**

1. Match activities to objectives and agencies to activities.
2. Make clear whether the meteorological and hydrological instrumentation and data analysis needed to support this project will be undertaken and funded through allocation listed for this project or through Project 3.
3. Though this project is largely presented as an Infrastructure project, there are cross-cutting activities/issues with Investment Project 1 (e.g. community engagement, awareness campaigns, training, etc.). Are allocations for these included in the line item entitled 'Support for communes to plan for resilient land management'? Or, is support for those kinds of activities to come from the Technical Assistance project? It is not clear. Is there room for coordination at the level of CIAT for cross-cutting activities to facilitate efficiency and saving?
4. Under which budget line item will the capacity building i.e. the training of personnel to generate the land-use and land management plans, be accommodated?
5. Will early warning systems e.g. as a tool in flood management, be a part of the overall strategy?
6. What about a unit to model and monitor storm surges, sea level rise?
7. Indicators of success should be noted in the main project document and not just in the executive summary.

### **Investment Project 3**

1. Match activities to objectives and agencies to activities.
2. This project will demand significant coordination across agencies, some of which are already functioning below capacity. There are 10 agencies noted as anchor institutions in addition to local authorities. There is significant risk of failure if coordination is not prioritized. What approaches will be undertaken to minimize this risk?

3. There seems potential for a strong link between this project and the Caribbean Community Climate Change Centre's EU/GCCA project which is accommodating the purchase of hydro-meteorological instruments for countries across the Caribbean including Haiti and also facilitating training. There needs to be indication of these kinds of complementary activities and how this project will support and not duplicate those efforts.
4. Key Indicators of success (page 14) speaks to the "development of a baseline document encompassing vulnerability assessment to the project area, a major issue at state regarding watershed management and the outcomes from consultation undertaken at local level". Make clear which project 'area' is being referred to i.e. is it the pilot locations of Investment project 1 or 2? Elaborate on who is coordinating the development of the baseline document and under which line items is it being supported?
5. Policy reform is also listed as a goal in the key Indicators of success (page 14). In general there is much mention of policy reform but not enough consideration is given to the mechanisms for achieving this policy reform.
6. One may wish to revisit the allocations for their adequacy, particularly the allocation meant to deal with modernization of services and equipment and the installing of new stations across five institutions.
7. Please break down the distribution of funds to ensure there is enough for equipment.
8. What type of 'modeling' is proposed in the list of activities? Real time forecasting? Regional modeling?
9. Indicators of success should be noted in the main project document and not just in the executive summary.
10. What plans are being suggested or need to be suggested to ensure the equipment are utilised, do not fall into disrepair, have a life span beyond the duration of this project?

#### **Technical Assistance Project 4**

1. Match activities to objectives and agencies to activities.
2. There is a need to clarify whether the activities and allocations listed in the Technical Assistance Project, in particular line items denoted as 'specialist training' and 'various studies and evaluations' are meant to support the previous Investment projects or are in of themselves separately initiated campaigns/programmes/activities. If they are meant to do the former then their budget hardly seems adequate. Some clarification is necessary.
3. Activities centered on the strengthening of scientific and academic capacity and strengthening of Haitian Universities are noted. There again needs to be further articulation of how this will be done, who will be responsible and how it is to be funded as there is no allocation provided for it in the budget line items.
4. Similarly, the key Indicators (page 15) and the activities suggest targeting policy development but there is little further articulation about how this will be undertaken, who will be responsible and what budget line items will support this.
5. Some of the expected outcomes (page 15) have no corresponding activities that would contribute to achieving these outcomes.

6. There may be need (as suggested previously) to rethink the primary focus of this project. Is it support for cross cutting areas (dissemination, training etc.) or academic strengthening or mainstreaming climate into policy or coordination? Some activities may need to be transferred to other Projects or some rationalization done to streamline the focus.
7. Indicators of success should be noted in the main project document and not just in the executive summary.

### **Summary**

The document reviewed is a reasonable initial draft of the SPCR. It benefits from a strong situational analysis and goes further to identify justifiable areas for emphasis based on the analysis. However the description of the project components is its weakest area. Insufficient detail is provided to answer inevitable questions about coordination, justification for budgetary allocation, key activities, complementarities with other projects (national and regional) and sustainability. As pointed out, some of these weaknesses may be addressed by adjusting the structure of the document to better show linkages between objectives and activities and responsibilities and budgetary allocations. This may also help focus the overall goals of the project and identify areas for which other funds may be sought outside of the PPCR. There may also be need for some additional elaboration on some issues (e.g. incorporating gender issues, process for policy development) as indicated in the comments above.

### **Minor comments**

1. Please pay close attention to the formatting and editing of the document. The version reviewed had many words joined together (every page).
2. There were a number of acronyms used that were not defined in the Table of Acronyms.
3. The numbering of the section headings (page 19 onward) is erratic and bears no relationship to the numbers in the table of contents.
4. The document reads as two documents (with different authors) stitched together. Strive for one voice and one consistent look.

## Strategic Program for Climate Resilience for Haiti

### Responses to comments received from Independent Reviewer Dr. Michael Taylor

The Government of Haiti, the Inter-American Development Bank and World Bank would like to express their sincere gratitude to Dr. Taylor for his detailed review of the SPCR document and constructive feedback, which has helped to improve the SPCR for Haiti ahead of submission to the PPCR Sub-Committee for endorsement.

Comments Received	Response
<b>PART A - Comments on the Structure of the SPCR</b>	
<p>A very useful situational analysis is provided in the first part of the document out of which some obvious priorities emerge – Livelihoods, Agriculture, Coastal Zone Management, Policy, Human and Technical Capacity, Communication. One expects to see these themes as the central foci of the projects proposed in the second section of the document. Somehow, however, a few of them get lost. The developers of the document should firstly consider changing some of the titles of the investment projects so that the priority themes being tackled are immediately evident. Project 1 could benefit from a title more suggestive of the issue being tackled i.e. making clear that the project aims at building climate resilience by considering agricultural practices and targeting rural Livelihoods in the Centre-Artibonite Loop. Similarly the Technical Assistance component could benefit from refocusing and perhaps renaming (see also additional comments in Part B, comment 3 below).</p>	<p>Thank you for your comment on the situational analysis and context. In the revision of the document, the breakdown of the projects and names have been changed to clarify the linkages between the analysis in the early part of the document and the proposed investments. The Technical Assistance project has also been reformulated, with sector-specific components of it now being integrated into respective Investment Projects (for more details, please read here below).</p>
<p>There is a separation of projects into Investment and Technical Assistance. Presumably this is done to highlight ‘hard’ investment (infrastructure etc.) versus funds for ‘soft’ activities including capacity building, dissemination, policy development, dialogue etc. The investment projects 1 through 3 will however need some amount of technical assistance to facilitate the realization of their stated goals (vulnerability and risk assessments, community, civil society, NGO and government engagement, dissemination, pilot-to-policy programmes, technical expertise in data management etc.). It is not clear if Technical Assistance for projects 1 through 3 is provided for in the Technical Assistance project, and if it is, whether the requested allocation is adequate to support the three projects. The developers of the</p>	<p>Thank for this comments and helpful suggestions of possible solutions. We have revised the breakdown of the projects accordingly have clearly identified 4 investment projects, all of which include some funding for TA activities, depending on the specific needs of each project.</p> <p>Investment project 4 now focuses on strengthening the hydro-meteorological system in Haiti, strengthening academic</p>

<p>SPCR may want to consider a number of options: (i) Making very clear where the allocations in the Technical Assistance project are applicable across the previous three projects. (ii) Not distinguishing between Investment and Technical Assistance and allocating funding in the projects 1 through 3 for technical assistance activities (i.e. and do away with the fourth component altogether). (iii) Doing suggestion (ii) but in addition defining a fourth Investment Project specifically targeting additional dissemination and/or strengthening of academic capacity and/or engendering resilience through targeted governmental intervention and policy.</p>	<p>capacity and technical skills, dissemination of information/data, and climate knowledge management so as data and scenarios generated can inform decision-making processes and policy dialogue. This same investment project will encompass support to overall PPCR coordination.</p>
<p>The Introduction to each Investment Activity includes a background and some identified priorities (presumably from prior consultation though it is not always clear). This sets the wider context for the Objectives and Actions to be pursued. Understandably, not all priorities identified in the background are being addressed by the SCPCR. This may either be due to a limitation of resources but may also be as a result of another existing initiative already targeting a stated priority (including the regional track). The reason, however, is not always made clear. For example, it is not clear why though agricultural research and local law enforcement are identified as priority options in project 1 neither are further targeted especially since the lack of both may pose a risk to the success of the entire project. If one views the document in its broader context as a road map for approaching resilience in the chosen priority area then one suggestion may be for an initial Table to be included in each project description in which priority objectives for achieving resilience in the sector or region are provided even if they go beyond the SPCR programme. Subsequent columns in the same table would then distinguish which actions are being tackled by other projects (with reference to the Table provided in the Annex) and which ones are intended to be tackled by the SPCR programme. This Table would also serve to highlight synergies with existing programmes and later justify the choice of anchoring and partnering institutions. It would also help fit the programme in the broader resilience context previously articulated, make clearer the coordinating role of the SPCR, and highlight gaps for which additional intervention and funding (outside of the SPCR) need to be sought to achieve the intended resilience.</p>	<p>Thank you very much for this observation. We have followed your guidance and have created a roadmap table for each investment project, which highlights the overall priority objectives to be achieved (beyond the SPCR), the specific objectives, activities, anchoring institutions, partners, funding, duration, expected results/indicators and links of each investment project objective to the PPCR 's revised Results Framework and core indicators. These "Roadmap" tables can be found in Part 2 of the SPCR document, at the end of each of the four investment projects concept notes.</p>
<p>Following on from above, in outlining each Investment project, both Specific Objectives and Specific Activities (presumably now those to be tackled specifically by the SPCR) are outlined. It would be very useful if the stated specific activities could be matched to the corresponding specific objective so that quick and easy evaluation of their suitability for meeting the objectives or of gaps could be done. Again a tabular format would facilitate this. Similarly, Anchor Institutions are provided for each</p>	<p>Thanks again for your suggestion. The table suggested in your comment above has been incorporated in the SPCR for each project. In addition, the project concept notes now also go into more detail on each of these specific aspects and set the correspondence between objectives and activities</p>

project as well as partners. In the present format it is not always evident why the anchoring institution(s) is (are) chosen, which specific activities require the support of designated anchoring institutions or partners, and how coordination will be shared when multiple institutions are named as anchoring institutions. It may well be that some institutions and partners are required for some specific actions but not others. Here again the document could benefit from a Table. The previous Table mooted in point 4 above could be expanded so that columns for Coordination and Partnerships are included and Institutions, Agencies and programmes matched to specific activities. In all instances, more detail is needed re the allocation of the funding sought (see point 3 below). Again, in the proposed table a column matching allocation to specific activity (and in turn objective) would be useful.

proposed.

Some of the suggestions here have also been incorporated in the roadmap table.

## Part B - General Comments on the Programme

**Coordination:** Notwithstanding the elaboration of a structure for project governance a number of questions arise. By the documents own admission, there is a multiplicity of agencies with an environmental mandate as well as lack of high-level cooperation and institutional will. There are also a number of international efforts with potential complementary activities. How will CIAT ensure coordination, 'buy-in' and compliance across the agencies involved? Do they already have a track record for doing so with respect to their current Land Management mandate? If yes, the provision of some examples or model would be useful. Is a committee of focal points sufficient to guarantee efficiency or to overcome bureaucracy? Will such a committee have authority to execute and coordinate across ministries and across agencies? Again are there some examples to suggest that this organizational arrangement is the most suitable? The model of coordination presented has a myriad of agencies involved (too many?). Should there be a rationalization to ensure the project is not stymied from the outset by the need to negotiate inter-agency collaboration? Some more details need to be provided about the model of coordination i.e. for overall coordination and for individual project coordination. It may be even possible that the first project of the SPCR could be devoted to development of an organizational structure to ensure viability and sustainability given that coordination is a recognized weakness.

Thank you for this comment. The team has worked to strengthen the area of coordination and clarify the institutional arrangements, reporting mechanisms, etc. The revised text can be found on page 129-130.

CIAT has the responsibility for SPCR 's coordination, implementation and monitoring as well as the focal point for PPCR in the Haitian Government. The CIAT (Inter-ministerial Committee for Land Planning) has a mandate to define Government policy in territorial planning, watershed management, urbanization and water/sanitation. By nature, CIAT is a coordinating body and its chairing by the Prime Minister gives it leverage capacity over implementing bodies and international partners. A Sub-Commission on Climate Resilience will be put in place within CIAT, with focal points from Ministries involved in the program 's implementation. The SPCR/PPCR will be supported with a Technical Unit within CIAT that will supervise technical implementation by line-ministries and coordinate technical assistance provision

	and support from different agencies and partners.
<p><b>Sustainability:</b> It is not clear what are the specific measures being undertaken to ensure sustainability of the projects being undertaken. For example, there are a number of risks articulated for each investment project. It would be useful to indicate what approaches will be undertaken to manage the risks articulated. It would also be useful to provide a measure of the level of each risk i.e. medium, high or low. Again a tabular format may prove useful for presenting the risk, indicating a measure of its severity and providing some proposed actions to address them. Since some of the risk may cut across all projects (for example, institutional will, fragmentation of coordination etc.) it may also be useful to provide a section in the general project discussion on inherent risks and proposed actions to manage them.</p>	<p>Thank you for this comment.</p> <p>When identifiable at this stage of project development (e.g. for Investment Project 1), approaches or specific measures favoring sustainability of interventions have been defined (e.g.: “value added and sustainability” section on p 82 for Project 1).</p> <p>Assessment of the preliminary risks identified requires in some cases a more detailed, targeted or updated analysis (e.g.1: vulnerability assessments that require climate scenarios to be generated, e.g. 2: assessment the risk of food prices fluctuation on agricultural investments).</p> <p>A more precise identification and assessment of risks and mitigation actions will be developed and integrated into a Risk Log Framework for each of the Investment Projects in the next stage of project development.</p>
<p><b>Allocation:</b> It is admittedly more difficulty to estimate the cost of activities when they are non-technical and do not, for example, involve equipment procurement or hard infrastructure development. The entire programme does have a strong technical bias and so it is important that the developers look again, particularly, on the non-technical components of each project (training, studies, knowledge dissemination, etc.) and consider if they are appropriately matching resources to intent. The impression is that what is being proposed is being under resourced, though admittedly it is difficult to say if this is in fact so without a specific matching of allocation to activity (see again point A.6 of the previous section) or without a better understanding of complementary activities which may already be undertaking some of the proposed activities.</p> <p>Though each project seems prone to some amount of mismatch of resource and intent (given the limited information provided), it is the Technical Assistance Programme which raises the most questions. For example, is four hundred thousand dollars adequate to support the various studies and evaluations needed across all three investment projects as well as additional academic studies proposed</p>	<p>In the revision of the program and breakdown of projects, allocations were revised and clarified, in particular in relation to the TA project as it was originally presented. TA allocations have now been included in the various projects. This should help to clarify the allocations. Also, the budget tables in each project concept note have more detail on the breakdown of funding by type of activity.</p> <p>As of potential underestimation of necessary investments, it should be noted that hard investments in Project 1 (infrastructures), Project 2 (agriculture) and Project 3 (urban-coastal) are conceived as <i>co-finance</i> to other operations planned in the same sector and the same location by MDBs (and other development partners in some cases) and expected to trigger implementation coinciding with the PPCR time</p>

<p>or is one hundred thousand sufficient for a national conference? As another example, it is not clear how objectives 4 (water models), 6 (adaptation plans) and 8 (capitalizing initiatives) of Investment Project 3 will be met and whether it is envisioned that the amount allocated for upskilling of staff members will facilitate some of these (e.g. the ability to do the modelling). Again it is noted that a number of these ambiguities would be eliminated by matching activities to objectives for each project and adding a column indicating estimates of resources needed for each activity or group of similar activities.</p>	<p>frame. Further explanations on “draft budget allocation and funding strategy” have been included for each Investment Project concept note in the SPCR document part 2.</p>
<p><b>Duration/Schedule of Implementation:</b> There needs to be some indication of the duration of the entire project. Equally important, some indicative timelines need to be offered for the implementation of key components. If possible these timeline should be matched against other national non-SPCR climate change plans and activities that are expected to come on stream and which may be complementary.</p>	<p>Point well noted. Each project concept now has a timeline.</p> <p>Investment Projects 1,3 and 4 are expected to be implemented over 5 years. Project 2 is expected to be implemented over 4 years. Detailed scheduling of activities is difficult to plan at this stage and this will be further developed as each team begins detailed preparation of each investment project.</p>
<p><b>Gender:</b> Greater consideration needs to be given to integrating gender into the entire programme and its success indicators. Currently, gender is only hinted at within the context of agriculture and food security, but even in this context it is not elaborated on. Some more discussion on how vulnerable groups in sectors or regions will be impacted by the projects proposed would be useful.</p>	<p>Thank you very much for these suggestions. The SPCR now includes gender considerations more explicitly, at the program level and also within the project descriptions. These can be found on pages 21, 97 and 108. Indicators specifically focused on gender have also been incorporated and will be tracked throughout the implementation of the projects/program. A more targeted analysis of expected impact on vulnerable groups will be drafted in the next stage of project development, once specific locations have been determined for each Investment Project. .</p>
<p><b>Part C – Some Specific Comments on the Projects</b></p>	
<p><b>Investment Project 1</b></p> <p>1. Consider renaming the Investment Project to make clear the emphasis on the Agriculture</p>	<p>Thank for the detailed questions and enriching suggestions to</p>

<p>Sector/Livelihood/Food Security.</p> <ol style="list-style-type: none"> <li>2. Match activities to objectives and agencies to activities.</li> <li>3. There seem to be some agricultural initiatives already taking place in the region. Make clear which objectives/activities will be undertaken exclusively by the SPCR. Indicate why these are chosen and what the approach will be to dealing with the others.</li> <li>4. Expand on the voucher scheme mentioned. Has it been successful? What are the modifications being proposed? How will adding more capital make for more resilient communities?</li> <li>5. Isn't one probable risk that of the region becoming less suitable for agriculture due to climate change (drier conditions, warmer temperatures)? How will this risk be mitigated against?</li> <li>6. Link project to regional PPCR component for modeling and downscaled projections.</li> <li>7. Are urbanization and the otherwise use of agricultural lands a growing problem? How are these risks being approached?</li> <li>8. Should crop insurance be a consideration? Why? Why not?</li> <li>9. How will coordination be undertaken with two ministries as lead? There seems to be no allocation for project management. Is it in the one million allocated under the Technical Assistance Project?</li> <li>10. This project has a lot of proposed activities besides the road infrastructure improvement. As outlined, this project will require further analysis of risk and vulnerable groupings, studies to develop appropriate adaptation strategies, community engagement initiatives, dissemination activities, expansion of a voucher incentive scheme, training in agro initiatives, and the provision of technical and financial support to entrepreneurs, among other things. Is the allocation of four million reasonable to support all these initiatives? Should there be a prioritization following study and a focusing on activities most likely to be effective? Or are these activities the results of previous studies done in the area? Can reference be made to those studies?</li> <li>11. Indicators of success should be noted in the main project document and not just in the executive summary.</li> <li>12. Some indication of the length of roads to be improved should be provided.</li> <li>13. Should development of a marketing strategy be considered to ensure sustainability?</li> </ol>	<p>this component.</p> <p>This investment project has been restructured and renamed. Interventions in the Centre-Artibonite Loop are distributed into: Investment project 1 “Climate proofing infrastructures (...)” and Investment Project 2 “Centre Artibonite Loop Integrated Development”.</p> <p>Reformulation on the infrastructure component has benefitted from further consultations with local stakeholders and development partners investing in the same region and in-site visits to potential project locations. A more detailed justification of activities proposed within this component and a more precise identification of adaptation options and priorities according to preliminary vulnerability assessment of existing infrastructures has been integrated in the document (p77 to p90).</p>
<p><b>Investment Project 2</b></p> <ol style="list-style-type: none"> <li>1. Match activities to objectives and agencies to activities.</li> <li>2. Make clear whether the meteorological and hydrological instrumentation and data analysis needed to support this project will be undertaken and funded through allocation listed for this project or through Project 3.</li> <li>3. Though this project is largely presented as an Infrastructure project, there are cross-cutting activities/issues with Investment Project 1 (e.g. community engagement, awareness campaigns, training, etc.). Are allocations for these included in the line item entitled ‘Support for communes to plan for resilient land management’? Or, is support for those kinds of activities to come from the Technical</li> </ol>	<p>Technical Assistance components, specific for this Investment Project (now number 3) have been integrated. Obj. 2 “Support for municipalities to plan for resilient coastal areas” (\$2,5M) will include assistance for land use planning and community engagement. Activities under this Objective, in particular those regarding communication strategy and information dissemination, will be carefully coordinated with</p>

<p>Assistance project? It is not clear. Is there room for coordination at the level of CIAT for cross-cutting activities to facilitate efficiency and saving?</p> <ol style="list-style-type: none"> <li>4. Under which budget line item will the capacity building i.e. the training of personnel to generate the land-use and land management plans, be accommodated?</li> <li>5. Will early warning systems e.g. as a tool in flood management, be a part of the overall strategy?</li> <li>6. What about a unit to model and monitor storm surges, sea level rise?</li> <li>7. Indicators of success should be noted in the main project document and not just in the executive summary.</li> </ol>	<p>activities plan under Obj. 4 in the new Investment Project 4 (namely “Facilitating and dynamizing a well-informed and multi-stakeholder policy dialogue on climate resilience (...) ensuring participation of decision-makers, vulnerable communities, etc.”)</p>
<p><b>Investment Project 3</b></p> <ol style="list-style-type: none"> <li>1. Match activities to objectives and agencies to activities.</li> <li>2. This project will demand significant coordination across agencies, some of which are already functioning below capacity. There are 10 agencies noted as anchor institutions in addition to local authorities. There is significant risk of failure if coordination is not prioritized. What approaches will be undertaken to minimize this risk?</li> <li>3. There seems potential for a strong link between this project and the Caribbean Community Climate Change Centre’s EU/GCCA project which is accommodating the purchase of hydro-meteorological instruments for countries across the Caribbean including Haiti and also facilitating training. There needs to be indication of these kinds of complementary activities and how this project will support and not duplicate those efforts.</li> <li>4. Key Indicators of success (page 14) speaks to the “development of a baseline document encompassing vulnerability assessment to the project area, a major issue at state regarding watershed management and the outcomes from consultation undertaken at local level”. Make clear which project ‘area’ is being referred to i.e. is it the pilot locations of Investment project 1 or 2? Elaborate on who is coordinating the development of the baseline document and under which line items is it being supported?</li> <li>5. Policy reform is also listed as a goal in the key Indicators of success (page 14). In general there is much mention of policy reform but not enough consideration is given to the mechanisms for achieving this policy reform.</li> <li>6. One may wish to revisit the allocations for their adequacy, particularly the allocation meant to deal with modernization of services and equipment and the installing of new stations across five institutions.</li> <li>7. Please break down the distribution of funds to ensure there is enough for equipment.</li> <li>8. What type of ‘modeling’ is proposed in the list of activities? Real time forecasting? Regional modeling?</li> <li>9. Indicators of success should be noted in the main project document and not just in the executive summary.</li> <li>10. What plans are being suggested or need to be suggested to ensure the equipment are utilised, do not fall into disrepair, have a life span beyond the duration of this project?</li> </ol>	<p>Thanks for these insight; the need for a more comprehensive and coherent approach has been acknowledged.</p> <p>In the programme components restructuration made as a response to remarks made by the reviewer, Investment project 3 has now been merged with the “cross-cutting” sections of the TA component (technical trainings for climate information generation and management and academic support). The merger is described in p112 (and following) as Investment Project 4: “Strengthening knowledge management of hydro-meteorological, water resources and climate data to inform decision-making and policy dialogue”.</p> <p>Specific modeling and vulnerability scenarios and sectoral adaptation strategy (mostly referring to agriculture in the Artibonite watershed) has been transferred to Investment Project 2 (agriculture).</p> <p>The new logic of this component seeks to (1) Build institutional capacity to generate and share climate data, (2) build technical capacity (upgrading staff skills, Academic <i>curriculum</i> on climate science) to produce and manage climate information, (3) build capacity to process information, analyze variables and produce climate scenarios/modeling for end-users, and (4) build capacity to interpret climate knowledge and integrate it into decision-making processes and policy dialogue. This rationale has also</p>

	<p>been reflected into a budget re-allocation according to the ambition of each sub-component under the former Investment Project 3 and the former TA component.</p>
<p><b>Technical Assistance Project 4</b></p> <ol style="list-style-type: none"> <li>1. Match activities to objectives and agencies to activities.</li> <li>2. There is a need to clarify whether the activities and allocations listed in the Technical Assistance Project, in particular line items denoted as ‘specialist training’ and ‘various studies and evaluations’ are meant to support the previous Investment projects or are in of themselves separately initiated campaigns/programmes/activities. If they are meant to do the former then their budget hardly seems adequate. Some clarification is necessary.</li> <li>3. Activities centered on the strengthening of scientific and academic capacity and strengthening of Haitian Universities are noted. There again needs to be further articulation of how this will be done, who will be responsible and how it is to be funded as there is no allocation provided for it in the budget line items.</li> <li>4. Similarly, the key Indicators (page 15) and the activities suggest targeting policy development but there is little further articulation about how this will be undertaken, who will be responsible and what budget line items will support this.</li> <li>5. Some of the expected outcomes (page 15) have no corresponding activities that would contribute to achieving these outcomes.</li> <li>6. There may be need (as suggested previously) to rethink the primary focus of this project. Is it support for cross cutting areas (dissemination, training etc.) or academic strengthening or mainstreaming climate into policy or coordination? Some activities may need to be transferred to other Projects or some rationalization done to streamline the focus.</li> <li>7. Indicators of success should be noted in the main project document and not just in the executive summary.</li> </ol>	<p>Point taken and addressed into new “Investment project 4” (see comment here above).</p> <p>Scientific and academic capacity development has been expanded, clarified and budget has been increased to respond to ambition (see p112 to p124of the revised document).</p> <p>Technical Assistance specific to each area of intervention has been integrated into its respective “Investment Project”, as explained above.</p> <p>The “policy dialogue” component was more coherent when aligned with “informing decision-making” purposes of the new “Investment Project 4” and has been transferred to it. Specific activities and related indicators have been included for more clarity (p112 to p124 of revised document).</p>