OFFICIAL USE ONLY
R2018-0027/1

February 15, 2018

Closing Date: Wednesday, March 7, 2018 at 6 p.m.

FROM: Vice President and Corporate Secretary

Jamaica

Promoting Community-based Climate Resilience in the Fisheries Sector Project

Project Paper

Attached is the Project Paper regarding a proposed grant from the Pilot Program for Climate Resilience (PPCR) under the Strategic Climate Fund of the Climate Investment Funds to Jamaica for a Promoting Community-based Climate Resilience in the Fisheries Sector Project (R2018-0027) which is being processed on an absence-of-objection basis.

Distribution:
Executive Directors and Alternates
President
Bank Group Senior Management
Vice Presidents, Bank, IFC and MIGA
Directors and Department Heads, Bank, IFC and MIGA

Document of

The World Bank

FOR OFFICIAL USE ONLY

Report No: PP2520

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT PAPER

ON A

PROPOSED GRANT

IN THE AMOUNT OF
US$4.875 MILLION

FROM

THE PILOT PROGRAM FOR CLIMATE RESILIENCE
OF THE STRATEGIC CLIMATE FUND (PPCR)

TO

JAMAICA

FOR A

PROMOTING COMMUNITY-BASED CLIMATE RESILIENCE
IN THE FISHERIES SECTOR PROJECT

February 13, 2018

Environment and Natural Resources Global Practice
Latin America and the Caribbean Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective January 23, 2018)

Currency Unit =	Jamaica Dollar (JM$)
US$1 =	JM$124.43
JM$1 =	US$0.008

FISCAL YEAR
April 1 - March 31

Regional Vice President:	Jorge Familiar
Country Director:	Tahseen Sayed Khan
Senior Global Practice Director:	Karin Erika Kemper
Practice Manager:	Valerie Hickey
Task Team Leader:	Keiko Ashida Tao

ABBREVIATIONS AND ACRONYMS

BP	Bank Procedures
CBO	Community-based Organization
CCCCC	Caribbean Community Climate Change Centre
CIF	Climate Investment Funds
CPF	Country Partnership Framework
CPS	Country Partnership Strategy
EHS	Environmental, Health, and Safety
ESMF	Environmental and Social Management Framework
GDP	Gross Domestic Product
GOJ	Government of Jamaica
FY	Fiscal Year
IA	Internal Audit
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IUU	Illegal, Unreported and Unregulated
JSIF	Jamaica Social Investment Fund
M&E	Monitoring and Evaluation
MICAF	Ministry of Industry, Commerce, Agriculture and Fisheries
MOFPS	Ministry of Finance and the Public Service
Mt	Metric ton
NEPA	National Environment and Planning Agency
NGO	Non-Governmental Organization
OP	Operational Policy
PDO	Project Development Objective
pH	Potential of hydrogen
PIOJ	Planning Institute of Jamaica
PIU	Project Implementing Unit
PPCR	Pilot Program for Climate Resilience
PPCR-SC	Pilot Program for Climate Resilience Steering Committee
PSC	Project Steering Committee
SCD	Systematic Country Diagnostic
SFCA	Special Fishery Conservation Areas
SPCR	Strategic Program for Climate Resilience
SST	Sea Surface Temperature
STATIN	Statistical Institute of Jamaica
UNDP	United Nations Development Programme
US	United States
USD	United States Dollars
WBG	World Bank Group
YR	Year

BASIC INFORMATION

Is this a regionally tagged project?	Country (ies)
No	
Financing Instrument	**Classification**
Investment Project Financing	Small Grants

[ ] Situations of Urgent Need or Assistance/or Capacity Constraints

[ ] Financial Intermediaries

[ ] Series of Projects

Approval Date	Closing Date	Environmental Assessment Category
07-Mar-2018	31-Mar-2023	B - Partial Assessment
Approval Authority	**Bank/IFC Collaboration**	
CD Decision	No	

Please Explain

This small Recipient-executed Trust Fund grant is financed by the Pilot Program for Climate Resilience (PPCR), which falls under the Strategic Climate Fund (SCF). The Administrative Agreement of the SCF requires that these grants must be approved by the Board.

Proposed Development Objective(s)

The PDO is to increase the adoption of climate resilient practices among targeted fishing and fish farming communities in Jamaica.

Components

Component Name	Cost (USD Million)
1. Strengthening the Fisheries Policy and Regulatory Framework	0.57
2. Diversification and Fisheries-based Alternative Livelihoods	2.68
3. Capacity Building and Awareness Raising	0.97

4. Project Management and Monitoring and Evaluation (M&E)	0.66

Organizations

Borrower : Jamaica

Implementing Agency : Ministry of Industry, Commerce, Agriculture and Fisheries

PROJECT FINANCING DATA (US$, Millions)

[ ] Counterpart Funding	[✓] Trust Funds	[ ] Parallel Financing

Total Project Cost:	Total Financing:	Financing Gap:
4.88	4.88	0.00

Financing (in USD Million)

Financing Source	Amount
Strategic Climate Fund Grant	4.88
Total	**4.88**

Expected Disbursements (in USD Million)

Fiscal Year	2018	2019	2020	2021	2022	2023
Annual	0.50	0.50	0.90	1.00	1.00	0.98
Cumulative	0.50	1.00	1.90	2.90	3.90	4.88

INSTITUTIONAL DATA

Practice Area (Lead)

Environment & Natural Resources

Contributing Practice Areas

Climate Change

Private Capital Mobilized

No

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

Yes

b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment

Yes

c. Include Indicators in results framework to monitor outcomes from actions identified in (b)

Yes

OVERALL RISK RATING

Risk Category	Rating
Overall	Moderate

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36		✓
Pest Management OP 4.09	✓	
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12		✓
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50		✓
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description

Project Execution Generally. The Recipient declares its commitment to the objectives of the Project. To this end, the Recipient shall carry out the Project, through the Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF) as set forth in the Letter Agreement, Section 2.02.

Sections and Description

Institutional and Other Arrangements. For the purpose of carrying out the Project, the Recipient shall maintain, within MICAF, at all times during Project implementation, a Project Steering Committee (PSC) and a Project Implementation Unit (PIU) comprising of professional staff in adequate numbers and with terms of reference, qualifications and functions acceptable to the World Bank, to perform all Project related functions as set forth in the Letter Agreement, Section 2.03.

Sections and Description

Safeguards. The Recipient shall ensure that the Project is carried out in accordance with the Environmental and Social Management Framework (ESMF) as set forth in the Letter Agreement, Section 2.04.

Sections and Description

Donor Visibility and Visit. (a) The Recipient shall take or cause to be taken all such measures as the World Bank may reasonably request to identify publicly the Strategic Climate Fund's (SCF's) support for the Project; and (b) The Recipient shall, upon the World Bank's request, enable the representatives of the SCF to visit any part of the Recipient's territory for purposes related to the Project as set forth in the Letter Agreement, Section 2.05.

Sections and Description

Project Monitoring, Reporting and Evaluation. (a) The Recipient shall monitor and evaluate the progress of the Project and prepare Project Reports, and (b) The Recipient shall prepare the Completion Report as set forth in the Letter Agreement, Section 2.06.

Sections and Description

Financial Management. (a) The Recipient shall ensure that a financial management system is maintained; (b) The Recipient shall ensure that interim unaudited financial reports for the Project are prepared and furnished to the World Bank; and (c) The Recipient shall have its Financial Statements audited as set forth in the Letter Agreement, Section 2.07.

Sections and Description

Procurement. All goods, works, non-consulting services and consulting services required for the Project and to be financed out of the proceeds of the Grant shall be procured as set forth in the Letter Agreement, Section 2.08.

Conditions

Type	Description
Disbursement	No withdrawal shall be made for payments made prior to the date of this Agreement, except for retroactive financing as set forth in Section 3.02 of the Letter Agreement.

PROJECT TEAM

Bank Staff

Name	Role	Specialization	Unit
Keiko Ashida Tao	Team Leader(ADM Responsible)	Climate Change	GEN04
Luciano Wuerzius	Procurement Specialist(ADM Responsible)	Procurement	GGOPL
Shonell Jodian Robinson	Financial Management Specialist	Financial Management	GGOLF
Andrew Francis Drumm	Environmental Safeguards Specialist	Environmental Safeguards	GEN04
Gibwa A. Kajubi	Social Safeguards Specialist	Social Safeguards	GSU04
Jayne Njoki Dzowela	Counsel	Legal	LEGLE
Jody Kay Amoy Maxwell	Team Member	Climate Change	LCCJM
Mohammad Nadeem	Counsel	Legal	LEGLE

Patricia Rodrigues de Melo	Team Member	Finance	WFACS
Randall Brummett	Team Member	Aquaculture	GENGE
Staciann Natasha Cunningham	Team Member	Team Assistant	LCCJM
Tatiana Cristina O. de Abreu Souza	Team Member	Finance	WFALA
Xavier F. P. Vincent	Team Member	Fisheries	GENDR

Extended Team

Name	Title	Organization	Location

TABLE OF CONTENTS

I. STRATEGIC CONTEXT

A. Country Context

1. Jamaica is an Archipelagic Caribbean State with a population of approximately 2.7 million people and gross national income per capita of US$4,910.[1] The economy is primarily based on services, which account for more than 70 percent of the Gross Domestic Product (GDP). The key sources of foreign exchange are tourism (3.8 million tourists in 2016), remittances, and bauxite and alumina. A large portion of the productive industries and service sectors (contributing 90 percent to the GDP) is located in the coastal zone, and 60.2 percent of the population lives within 5 km of the coastline.[2]

2. The country has strong Blue and Green economic potential as it is well endowed with natural resources. The main island's irregular coastline is 1,022 km long and has diverse coastal features and ecosystems including harbors, bays, sandy beaches, rocky shores, estuaries, wetlands, mangrove swamps, seagrass beds and coral reefs. The majority of living marine resources are found on the main island shelf and nine oceanic banks, which cover an area of 274,000 km^2. The main island shelf is much wider on the south coast with a maximum width of approximately 24 km.

3. The Jamaican economy is improving with record high employment levels, but improvements fall short of expectations and poverty is still relatively high. The growth rate is estimated at 1.7 percent in 2017, but it was slowed down by weather-induced disasters during the year.[3] The current account deficit decreased by about 1.0 percent of GDP in 2016, supporting robust growth in non-borrowed reserves, which reached almost US$1.8 billion to date. The prevalence of poverty was 21.2 percent in 2015 (Jamaica Survey of Living Conditions). Employment is steadily improving reflecting increases in the employment/population ratio, but the unemployment rate remained high at 11.3 percent in July 2017.[4] Unemployment among women was estimated at 15.2 percent, compared to 8.0 percent among men. Youth have a considerably higher unemployment rate at 27.5 percent.[5] The country's Human Development Index score has increased slightly from 0.727 in 2011 to 0.730 in 2016. [6]

4. The Government of Jamaica (GOJ) has been implementing a comprehensive macro-economic and financial sector regulatory reforms program to tighten fiscal policy and achieve increased local tax revenues with continued support from the World Bank Group (WBG). As part of a comprehensive package, the WBG agreed to provide US$510 million between April 2013 and March 2017. The bulk of the program under this commitment has been delivered. The reform program is beginning to bear fruit. Institutional reforms and measures to improve the investment climate have started to restore confidence in the Jamaican economy. The country's credit rating has improved, and Jamaican bonds trade at a premium in international markets. Continued prudent macroeconomic policies and careful liability management reduced total government debt to approximately 122 percent of GDP by the end of 2016. However, continued fiscal discipline is required to reduce the public debt further to 60 percent of GDP by 2025/26 as targeted in the Financial Administration and Audit Act.

[1] Statistical Institute of Jamaica (STATIN), 2016.
[2] Jamaica Population and Housing Census, 2011.
[3] International Monetary Fund, 2017.
[4] STATIN, 2017.
[5] *Ibid*.
[6] Unite Nations Development Programme, 2016.

B. Sectoral and Institutional Context

5. In Jamaica, fisheries play an important social, economic and cultural role. Fisheries provide multiple socio-economic contributions such as income generation, food and nutrition, security, and livelihood diversification opportunities. The sector forms the backbone of the local economy in many coastal and inland communities across the island. Jamaica has one of the highest levels of fish consumption per capita in the Americas (27.1 kilograms per year in 2013), but has become highly dependent on imports, which account for about 68 percent of all fishery products consumed domestically in 2013.[7] Additionally, fisheries form part of the cultural identity in these communities. Participation in fisheries has become a tradition and the knowledge, practice, and way of life associated with fishing and fish farming have transcended many generations.

6. Poor fisherfolk are particularly vulnerable to climate change impacts because the fisheries sector is heavily climate sensitive. The social impact of the Jamaican fisheries industry is particularly evident in the fishing communities, which are mainly rural and have high rates of poverty. Those in the fisheries sector are among the poorest and most marginalized in society with little or no alternative economic activity available to them. It is important to note that many people from other sectors turn to fisheries seasonally, temporarily, or permanently when faced with periods of unemployment and poverty. Climate-related disasters and impacts will likely exacerbate existing vulnerabilities in such communities since they tend to have limited capital assets, buffers, and access to credit.

7. Marine capture fisheries and aquaculture have been highly developed and have become economically significant while inland, freshwater capture fisheries operate at a smaller scale. The marine capture fishery comprises both artisanal and industrial operators and provides employment directly and indirectly to some 40,000 fisherfolk, whilst also contributing to the livelihoods of over 200,000 people who depend on the fisheries sector.[8] At the end of 2015, there were estimated 15,000 registered fisherfolk and 4,000 registered boats operating from 187 fishing beaches and two cays.[9] The marine fishery resource in Jamaica includes those within the territorial sea and archipelagic waters which are approximately 17,995 km^2 and 22,000 km^2 respectively. This implies that upwards of 50,000 individuals (registered and unregistered) may be engaged in some form of fishing activity in Jamaica's maritime space which is estimated at 274,000 km^2.

8. Aquaculture directly employs between 800 and 1,000 people. Commercial aquaculture was first introduced to Jamaica in 1976. The main food fish produced in Jamaican aquaculture both for local consumption as well as for export is Tilapia. However, the aquaculture industry has expanded over the years to include mangrove oysters and ornamental aquatic flora and fauna species. Aquaculture in Jamaica peaked in 2006 producing up to 8,019 Metric Tonnes (Mt,) but declined to 646 Mt in 2015. The recent decline has been attributed to several factors, among them the continued scarcity of red tilapia seed stock which negatively impacted production, as well as the drought conditions during recent years which affected pond operations.[10]

9. The marine capture fisheries in Jamaica are faced with declining stocks of reef and reef-associated finfish due in part to unsustainable fishing practices (e.g., overfishing) and environmental degradation. Most economically important species, such as high-valued snapper and grouper have declined in number.

[7] Food and Agriculture Organization, 2016.
[8] Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF), 2015.
[9] Economic and Social Survey of Jamaica. Planning Institute of Jamaica (PIOJ), 2015.
[10] PIOJ, 2016.

In addition to overfishing, the depletion of the fisheries resources also derives from severe pollution and consequent destruction of coral reefs, seagrass beds, and mangrove forests, all of which are important nursery areas for marine life. Not only the fisheries sector but also tourism, a major source of the country's revenue, is largely affected by the deteriorating marine ecosystem services. Indeed, some 90 percent of the island's GDP is generated in coastal areas. Once the robustness of the ecosystem is reduced, it becomes highly susceptible to external shocks such as climate change.

10. Declining performance of the fisheries sector is, thus, further exacerbated by climate change impacts such as ocean warming, reduced rainfall, dry spells, and acidification. Significant warming of the ocean has been observed around Jamaica. Warming trends in Jamaica were found to be consistent with a warming pattern across the globe. Data from the airport stations indicate historical warming of 0.20 – 0.31°C per decade, with the greatest warming occurring between June and August. This trend is validated by recent analysis of sea surface temperatures (SST) around Jamaica where a statistically significant annual increase of +0.15°C/decade from 1980 to 2015 was observed.[11] The seasonal trends offer a better indication of the degree to which the waters surrounding Jamaica are warming. The seasonal trends in SST show that warming is occurring at rate of +0.09°C/decade for January SST and +0.17°C /decade for August SST. The annual SST is expected to increase locally by 2°C, which would warm the waters surrounding Jamaica to an annual average of +28°C with summer averages exceeding 29°C.[12] The warm waters will lead to large-scale changes to the marine ecosystems with far-reaching consequences for associated livelihood activities as well as for the coastal protection provided by healthy coral reefs. The extremely warm sea temperatures in 2005 in the entire Caribbean region caused the largest bleaching of coral reefs—an important fish nursery and habitat—in the region to date. This event wiped out as much as 70 percent of the reefs in some countries, causing the substantial decline of reef fisheries which led to appreciable losses to national economies. According to the Turn Down the Heat III report[13], the Caribbean waters may experience declines in fish catch potential in the range of 5–50 percent due to temperature warming of 2°C by 2050 and more frequent bleaching events. Also, this warming may cause a shift in the species composition of resident wild fish populations and fish species that are cultured. Changing water temperatures may necessitate the farming of other more heat tolerant species. The oxygen replenishment rate, or aeration, is also expected to decrease in response to projected decreases in rainfall.

11. Reduced rainfall could also negatively impact the amount of fresh water discharged from the local river systems, which has a direct impact on water availability for aquaculture. In addition, the warming of both air and sea and dry spells could combine to produce saltier water (by about 1 power supply unit). The potential of hydrogen (pH) is also expected to decrease dramatically along with lower concentrations of primary productivity, patterns of eutrophication and coral bleaching events. Not only does this result in the loss of fishery stock and biodiversity, but it also weakens natural barriers to hurricanes and thus increases storm surges, which causes significant loss of livelihoods for many coastal communities. Furthermore, ocean acidification aggravated by climate change is impacting calciferous marine life and is a major concern for sustaining coral structures and the fisheries industry, as exemplified by the conch industry. It is also projected that more extreme weather will occur with increased SST. During hurricanes, fishermen lose a majority of their traps, resulting in a significant loss of assets and revenue and high cost of repairs. For instance, Tropical Storm Gustav in 2008 alone destroyed 550,000 pounds of fish and fingerlings, leading to a loss of approximately US$0.89 million. There was an estimated US$1 million in

[11] Caribbean Community Climate Change Centre, 2015.
[12] *Ibid.*
[13] World Bank Group. 2014. Turn Down the Heat: Confronting the New Climate Normal. Washington, DC.

damage to the fishing industry by Hurricane Sandy in 2012 (US$0.86 million for marine capture and US$0.15 million for aquaculture).[14]

12. One effective way to build resilience to climate change in this sector is to strengthen and improve the overall health of marine and coastal ecosystems. The proposed Project seeks to manage the fisheries sustainably and at the same time, create more opportunities for fisherfolk and fish farmers. This approach would build the basis for long-term transformational change to increase the resilience of vulnerable populations in the fisheries sector. Given declining wild fish stocks due to anthropogenic and climate impacts and the rising demand for fish and fish products on the domestic and global markets, aquaculture, coastal mari-culture/poly-culture, and offshore pelagic fisheries have potential business opportunities that can be harnessed to meet those demands. Aquaculture and coastal mari-culture/poly-culture, in particular, are a means of reducing dependency on wild fish stocks and, hence, reducing their vulnerabilities to climate impacts. These opportunities will be promoted by: strengthening climate-informed regulatory/policy frameworks to allow for adaptive management of the fisheries and value chains; promoting sustainable management of the fisheries in a participatory manner; increasing efficiency of fishing and aquaculture practices as well as providing necessary training and equipment; and increasing awareness and knowledge of climate impacts on capture and culture fisheries.

C. Higher Level Objectives to which the Project Contributes

13. Jamaica is one of 18 countries participating in the Pilot Program for Climate Resilience (PPCR). The PPCR—a funding window of the Climate Investment Funds (CIF)—helps developing countries integrate climate resilience into development planning, provides incentives for scaled-up action, and initiates a shift from "business as usual" to broad-based strategies for achieving climate resilience at the national and regional levels. As part of Phase I of the PPCR, Jamaica developed its Strategic Program for Climate Resilience (SPCR) to assess sectoral vulnerabilities to climate impacts, identify priority sectors and action plans and propose investment components for PPCR finance. The Jamaica SPCR, which included the financing for these projects, was approved by the CIF in October 2011. The proposed Project is the latest of the investment projects identified under the SPCR. Other SPCR projects include the Improving Climate Data and Information Management Project (ICDIMP) (P129633) supported by the Bank (US$6.8 million grant) and the Adaptation Program and Financing Mechanism for the Jamaica PPCR Project (formerly the Institutional Mainstreaming and Sectoral Adaptation Project and the Climate Change Adaptation and Disaster Risk Reduction Financing Project) (US$17.9 million in loan and grant financing) supported by the Inter-American Development Bank (IDB). The investment plan developed under the Caribbean Regional Track of the PPCR, supported by IDB (US$10.5 million grant), provides the basis for the proposed Project interventions by developing applied adaptation measures for fisheries and marine resources and coastal communities.

14. The proposed Project seeks to increase the adoption of climate-smart practices among targeted communities to build resilience of the fisheries sector to climate change impacts. This will directly contribute to the PPCR objective of integrating climate resilience into development planning and action, and piloting innovative public and private sector solutions to pressing climate-related risks. The results of the proposed Project will be incorporated into the national level resilience outcome along with those of the complementary SPCR projects, measured through the core indicators of the PPCR (See Annex 1: Results Framework and Monitoring). The Project objective is also aligned with Vision 2030 Jamaica–National Development Plan and the Climate Change Policy Framework, both of which provide strategic guidelines

[14] PIOJ, 2013.

to facilitate and mainstream climate change issues into national policies and development activities. It also contributes to the 2015 National Fisheries and Aquaculture Policy (Fisheries Policy) aimed at improving the sustainability of Jamaican fisheries. The proposed Project directly supports SPCR which expressly speaks to vulnerability of the fisheries sector, development of appropriate adaptation strategies, and addressing food security issues. The afore-mentioned ICDIMP has the objective to improve the quality and use of climate-related data and information for effective planning and action at local and national levels. This proposed Project will benefit from that effort by utilizing the data generated for use in the design of climate resilience strategies in the fisheries sector. The proposed Project may also benefit from exchanges with the on-going Climate Change Adaptation in the Eastern Caribbean Fisheries Sector Project supported by the Global Environment Facility (GEF) through the Food and Agriculture Organization of the United Nations (FAO) and the Ocean Partnerships for Sustainable Fisheries and Biodiversity Conservation Project financed by the GEF and supported by the FAO. The proposed Project will also complement other World Bank initiatives such as the Jamaica Disaster Vulnerability Reduction Project (P146965, US$30 million loan), the Rural Economic Development Initiative (P105122, US$15 million loan), and the Integrated Community Development Project (P146460, US$42 million loan).

15. The Project will contribute to achieving the World Bank's twin goals to end extreme poverty and promote shared prosperity by directly supporting poor fishing and fish farming communities that are highly vulnerable to climate change impacts. The Project will also contribute to achieving the objectives of the Country Partnership Strategy (CPS) for Jamaica, discussed by the World Bank Board on April 29, 2014 (Report No. 85158-JM), and extended until 2019 through the Performance and Learning Review of the CPS FY2014-2017 for Jamaica (Report No. 112663-JM) discussed by the World Bank Board on June 23, 2017. The Project supports Pillar III of Improving Social and Climate Resilience which seeks to increase opportunities for the poor and vulnerable (Objective 5) and to improve institutional capacity to plan for and respond to climate change events and natural disasters (Objective 6). It is also aligned with the World Bank Group Climate Change Action Plan (WBG, 2016), specifically Priority III: Scale Up Climate Action—Climate-Smart Land Use, Water and Food Security.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

16. The Project Development Objective (PDO) is to increase the adoption of climate resilient practices among targeted fishing and fish farming communities in Jamaica.

B. Project Beneficiaries

17. The proposed Project targets the fisherfolk who are among the poorest and most vulnerable in the country. Any direct interventions to support their resilience would contribute directly to poverty alleviation. Currently, it is estimated that there are 15,000 fishers and 4,000 fishing boats currently operating from 187 beaches and two (2) cays. In terms of aquaculture, the subsector directly employs approximately 800 to 1,000 people. The fisheries sector provides a wide range of livelihood opportunities. These include fish harvesters, processors, traders, pot makers, boat builders, net makers and ice suppliers. Other sources of income for fishing communities are small-scale services and trading activities such as cook shops, shops, transportation, and sale of fish related products.

18. The Project would directly benefit approximately 1,800 members of 32 fisherfolk organizations, and make an indirect contribution to the awareness and behavior of the people who depend on the

fisheries sector. Many of the critical roles in fisheries are carried out by women. While the data indicates that a mere 6 percent of registered fishers are women, post-harvest marketing and distribution roles (e.g., fishmongers, vendors, and 'higglers' or informal traders) are dominated by women, playing critical roles in Jamaica's small-scale fisheries value chain. They are also large investors in the sector via the ownership of fishing vessels and other equipment. Specific data do not exist, but women are often paid far less than their male counterparts, sometimes not at all.[15] Because of the important role that women have relative to sustainable use of marine and coastal resources, the Project will conduct detailed baseline assessment under Component 3 which includes gender and youth analysis to collect, process and evaluate gender/youth information relevant to the Project activities. Then, gender-specific actions will be identified and taken through the community mobilization process to increase their participation in livelihood sub-projects to be supported under the Project, as guided by the CIF Gender Action Plan - Phase 2 (2016)[16].

C. PDO-Level Results Indicators

19. The key performance indicators for the proposed PDO are:

- Targeted fishers that adopt climate resilient fishing practices;
- Targeted fisher groups that adopt alternative livelihoods;
- Targeted fish farming groups that adopt climate resilient aquaculture practices;

  (These three indicators are linked to *PPCR Core Indicator #4: Extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR supported tools, instruments, strategies, and activities to respond to climate variability or climate change*.)

- Share of women among targeted fishing and fish farming groups that adopt alternative livelihoods or climate resilient practices (linked to the CIF Gender Action Plan); and
- Marine protected areas under community-led sustainable fisheries management (linked to *PPCR Core Indicator #3: Quality and extent to which climate responsive instruments/investment models are developed and tested).*

III. PROJECT DESCRIPTION

A. Project Components

20. **Component 1: Strengthening the Fisheries Policy and Regulatory Framework** (PPCR financing of US$0.57 million).

(1.a) Strengthening the policy and regulatory framework for climate resilient fisheries and aquaculture management, through, *inter alia*: (i) supporting the development of a strategy and action plan for the National Fisheries and Aquaculture Policy; (ii) supporting the development of guidelines and protocols for promoting sustainable fisheries and aquaculture practices, taking into consideration climate impacts on fisheries and aquaculture production; and (iii) providing technical assistance for the drafting of regulations on sustainable aquaculture and fisheries management, monitoring,

[15] Chris Arsenault. Consumer Products and Retail News. May 19, 2015. Thomson Reuters Foundation.
[16] CIF. 2016. CIF Gender Action Plan – Phase 2. CTF-SCF/TFC.16/6. Washington, DC.

control and surveillance;

(1.b) Promoting sustainable fisheries management, through, *inter alia*: (i) supporting the establishment of new and strengthening of existing partnerships with relevant entities to manage marine protected areas and providing training and equipment for the Fisheries Division within the Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF) and other relevant entities; and (ii) providing support in the development of new and strengthening of existing sustainable fisheries management plans for marine protected areas, including community-led water quality monitoring.

21. **Component 2: Diversification and Fisheries-based Alternative Livelihoods** (PPCR financing of US$2.68 million).

(2.a) Support for sub-projects on climate-resilient freshwater aquaculture, coastal mari-culture/poly-culture, and other alternative livelihoods, including providing support to targeted fishing and fish farming communities, through, *inter alia*, training and workshops, works, provision goods, and technical assistance;

(2.b) Providing support for the development of artisanal longline fishing for offshore pelagics through, *inter alia*: (i) conducting a baseline stock assessment to determine the seasonal availability and potential yield of each species and baits for sustainable offshore pelagic fisheries; (ii) developing a sustainable management strategy for offshore pelagic fisheries, including distributional parameters, international management standards, capacity and international safety standards for the local and export markets; and (iii) providing training and equipment to pelagic fishers.

22. **Component 3: Capacity Building and Awareness Raising** (PPCR financing of US$0.97 million).

(3.a) Supporting an expansion of the knowledge base on climate change impacts on the fisheries sector, including *inter alia:* (i) carrying out a social assessment on the impacts of climate change on gender and youth dynamics, as well as the labor standards in the fisheries sector, including the impacts to vulnerable and disadvantaged groups; (ii) developing climate projections for aquaculture, coastal mari-culture/poly-culture, and pelagic fisheries to determine the impact of climate change on these fisheries; and (iii) delivering agro-meteorological information services for fish farmers for their freshwater aquaculture and coastal mari-culture/polyculture operations.

(3.b) Supporting awareness raising and behavioral change activities, including *inter alia:* (i) carrying out an assessment on levels of awareness and knowledge about climate change impacts on capture and culture fisheries and sustainable fisheries management policies and practices; (ii) developing and implementing a strategy aimed at awareness raising and behavioral change on climate change impacts in the fisheries sector, including climate-smart fisheries practices and environmental management.

(3.c) Providing capacity building to fisheries and aquaculture organizations and the Fisheries Division, including *inter alia:* (i) providing support in the formalization and strengthening of community-based organizations to promote the empowerment of fishers and fish farmers and implementation of climate-resilient fisheries activities; (ii) carrying out training for fishers and fish farmers on fisheries practices and business management skills; (iii) carrying out learning and knowledge exchange activities in communities to share best practices and innovative livelihood options; (iv) developing a fisheries and aquaculture information management system for the Fisheries Division aimed at enhancing information sharing related to fisheries and aquaculture; and (v) providing technical assistance and equipment for the Fisheries Division and other relevant stakeholders to promote

climate resilience in capture and culture fisheries.

23. **Component 4: Project Management and Monitoring and Evaluation (M&E)** (PPCR financing of US$0.655 million). This component will provide support to the Project Implementation Unit (PIU) within MICAF and the Project Steering Committee (PSC), chaired by MICAF, in Project implementation, management, monitoring and evaluation, including audits and Operating Costs.

B. Project Cost and Financing

24. The Project will be financed by the PPCR under the Strategic Climate Fund (SCF) Grant of the Climate Investment Funds (CIF) in the amount of US$4.875 million. The GOJ will be providing in-kind support of approximately US$0.25 million.

Project Components	Project cost (US$ million)	Trust Funds (US$ million)	Counterpart Funding (US$ million)
1. Strengthening the Fisheries Policy and Regulatory Framework	0.57	0.57	0.00
2. Diversification and Fisheries-based Alternative Livelihoods	2.68	2.68	0.00
3. Capacity Building and Awareness Raising	0.97	0.97	0.00
4. Project Management and Monitoring and Evaluation (M&E)	0.905	0.655	0.25
Total Costs	**5.125**	**4.875**	**0.25**

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

25. **The Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF)** is the executing agency of the proposed Project. The Fisheries Division within the MICAF will be the main actor involved in Project implementation and is one of the main beneficiaries of the Project activities. The MICAF is responsible for all matters concerning primary production in the capture and culture fisheries and conservation of fishery resources. An interim PIU has been established within the MICAF. The PIU comprises a Project Manager, Project Officer, Administrative Officer, Procurement Officer, and Financial Management Officer. The PIU will contract dedicated personnel, including the Project Manager, Procurement Specialist, Financial Management Specialist, and Administrative Assistant for the Project's implementation and management on a daily basis. The MICAF will support and back-stop the PIU through its Project Management and Coordination Division and other relevant divisions for the coordination and management of Project activities, including supervision of consultants, financial management, procurement, environmental and

social safeguards, monitoring and evaluation, and community mobilization and stakeholder engagement.

26. **A Project Steering Committee (PSC)** has been formed to provide strategic guidance and oversight for the implementation of the Project. The Committee is chaired by the Permanent Secretary of the MICAF or his/her designee. The Committee comprises representatives of the MICAF, relevant government agencies, the private sector, non-governmental organizations (NGOs), and fisher organizations.

27. **The Planning Institute of Jamaica (PIOJ)**—the national Focal Point for the PPCR and Phase 2 of the SPCR—will be supporting the MICAF/PIU in the Project's execution in general as well as specific areas such as national budgeting, monitoring and evaluation, and environmental and social safeguards. The PIOJ is successfully managing the PPCR-ICDIMP as well as other WB-funded projects, and is capable of providing extensive support and capacity building to the MICAF.

28. The GOJ has established a PPCR Steering Committee (PPCR-SC) to serve as the main body responsible for providing technical advice and oversight to the implementation of PPCR projects including the proposed Project. PPCR-SC is chaired by the Director of the Sustainable Development and Regional Planning Division, PIOJ, who also acts as the PPCR Focal Point for Jamaica. Members of PPCR-SC are drawn from a cross-section of stakeholders, including relevant government entities, private sector bodies, academia, and civil society with technical interest in and knowledge of natural hazards, risk and climate change issues.

B. Results Monitoring and Evaluation

29. The MICAF through the PIU will be responsible for the overall monitoring and evaluation (M&E) of the Project activities. The PIU will work in collaboration with the implementation partners and local staff of the Fisheries Division who are supporting implementation in the field to ensure that the data generated from the M&E activities accurately reflects what is happening during implementation. Implementation partners include the local communities and fisheries organizations, government entities such as the National Environment and Planning Agency (NEPA), the Meteorological Service of Jamaica, and the Office of Disaster Preparedness and Emergency Management. The M&E plan will form part of the Annual Work Plan of the PIU and the implementation partners. The M&E indicators, targets, data collection methodology, etc. are presented in Annex 1 (Results Framework). These indicators are aligned with the PPCR core indicators. The information collected will be shared with the PPCR Focal Point and integrated into the national level PPCR monitoring reports.

30. An M&E Plan, to be included in the Project's Annual Work Plan, will be developed to outline responsibilities and guide the implementation of the M&E activities of the Project. One of the primary responsibilities of the PIU is ensuring that the implementation partners are familiar with the components of the M&E Plan, particularly their roles and responsibilities. The M&E Plan will describe the approach to implementing key M&E activities including: (a) a baseline assessment; (b) quarterly progress reports prepared by the PIU; (c) semi-annual progress reviews by the PSC; (d) progress reviews during World Bank implementation support missions; (e) mid-term review of Project implementation; and (f) final project evaluation to be conducted jointly by the MICAF/PIU, the PSC and the PPCR Focal Point. The Completion Report will be prepared by the MICAF within six months after the closing of the Grant based on, among other things, the final evaluation mentioned above. The M&E Plan will also include Project contributions to the country's PPCR program-level Monitoring and Reporting process.

31. Information obtained through the M&E Plan is intended to inform policy formulation and decision-making as well as to improve Project management. Therefore, the information will be regularly

shared and reviewed with the implementing partners and the relevant government entities throughout the Project life.

C. Sustainability

32. The sustainability of Project interventions will be linked to the capacity building within the MICAF coupled with the alignment of policies, public-private investments in the fisheries sector and M&E of the Project's impacts. Feedback provided at different scales (local communities, the PIU, and the PPCR-SC) will guide adaptive management to respond to changing economic, social and environmental conditions. The periodic Project evaluations will contribute to an efficient management of the Project activities, prioritize and sequence investments to secure the delivery in each Project indicator, as well as promote ownership and sustainability of Project achievements.

33. The Project will also implement activities and processes to help ensure sustainability. These include:

- Strengthening of the regulatory framework to include fisheries-related climate change issues in development plans, policies and regulations;
- Supporting private sector partnerships and the implementation of sustainable financing mechanisms for climate-smart pilot projects;
- Fostering synergies between PPCR and other related Climate Change, Fisheries and Disaster Risk Reduction programs;
- Providing capacity development for fishers and fish farmers, fishing and fish farming organizations, and the Fisheries Division staff;
- Developing a highly structured institutional framework for project monitoring and coordination to safeguard long-term impact at the community-level; and
- Establishing an exit strategy.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

34. Institutional Capacity for Implementation and Sustainability. Lack of resources and experience within the MICAF and the Fisheries Division is considered a substantial risk. The PIU will be strengthened by hiring seasoned technical and fiduciary professionals to support the implementation and management of the Project activities. The supporting roles provided by the PIOJ and the PCS will also reinforce the implementation capacity.

35. Macroeconomic. Given the high public debt, macroeconomic risk is rated substantial. The GOJ has been implementing a comprehensive macro-economic and financial sector regulatory reforms program to tighten fiscal policy and achieve increased local tax revenues with continued support from the WBG. During implementation, the fiscal allocation necessary for the planned Project activities will be assessed ahead and duly secured with the assistance of the PIOJ and the Ministry of Finance and the Public Service (MOFPS) to avoid a delay in procurement processes, and consequently in implementation progress. This is a portfolio-wide issue in Jamaica. Also, fluctuation of foreign exchange may impact the import of aquaculture inputs and fisheries equipment. The Project will monitor the market and time well to import necessary inputs to manage such an impact.

36. Overall Risk Rating Explanation. The overall risk rating is Moderate. The Project design is straightforward and would build upon the successes of the Fisheries Division in working with vulnerable communities. The Project will continue to assess the risks and identify mitigation measures during implementation.

Table 2: Systematic Operations Risk-rating Tool

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and Social	Moderate
8. Stakeholders	Moderate
9. Other (Extreme Weather Events)	Moderate
OVERALL	Moderate

VI. APPRAISAL SUMMARY

A. Economic Analysis

37. Without the Project, production in the aquaculture and capture fisheries will likely continue to decline due to climate-related impacts and anthropogenic stressors such as overfishing. Given little opportunity for alternatives, fishers and fish farmers will continue to lose livelihoods and the level of poverty among them will continue to increase.

38. A cost-benefit analysis estimates that the Project will result in a net benefit of US$6.74 million in a 10-year time horizon at a 10-percent discount rate. Sustainable fisheries management, especially enforcement of no-take zones such as Special Fishery Conservation Areas (SFCAs) in reef systems, have been scientifically proven to improve fish stocks by 3 to 21 times its original biomass. The analysis estimates that the Project will achieve US$1.22 million per year from increased fish catch. Tourism will also benefit from the increased tourists that are attracted by healthier coral reefs and abundant tropical fish. The benefit in the tourism sector is estimated at US$1.08 million per year. The Project will also support improving the production of aquaculture in the order of US$1.27 million per year. The costs comprise the expenditures of the Project and co-financing from the GOJ in the amount of US$5.125 million over five years. The result indicates that the benefits exceed the costs at either 12, 10, or 4 percent discount rates.

39. The analysis does not include the value of shoreline protection by improved reef ecosystems due to lack of specific data. The value of mari-culture supported by the Project is also not considered, because type of mari-culture investments is not known at the time of this analysis. With these values, the total benefits from the Project interventions will be more than the net benefit presented above.

B. Technical

40. The proposed Project investments are deemed technically sound. The Project design was informed by previous analyses carried out under the SPCR and a detailed assessment of the fisheries sector, based on extensive consultations and review of available information. A fisheries sector policy analysis

identified challenges and opportunities, policy gaps, and possible strategies for advancing climate change adaptation in Jamaica's fisheries sector. Assessments of community-based fisherfolk organizations around the island and of livelihoods diversification and value chain were conducted to identify capacity needs, assess the main challenges faced by the groups and document activities that the communities are interested in undertaking. A total of 26 of the 32 fisheries groups (both formally registered groups and informal groups) representing over 1,600 members, of which about 25 percent are women, as well as one fish farmers association were consulted in the process. The groups were assessed using a standard protocol focusing on: the group's current mode of operation; structure of the fishers' organizations; current initiatives/activities; financial stability and strategy; main successes and challenges; capacity development and training needs; environmental concerns connections and networks; role in monitoring control and surveillance; use of technologies; strength of conflict resolution mechanism; and possible projects. Additionally, a broad consultation for the aquaculture stakeholders was carried out. Further consultations were carried out with cross-section of stakeholders, including fisheries industries, the MICAF and the PIOJ to view the climate resilience at the local and sectoral levels in a comprehensive manner. Data from a recent (MICAF, 2016) focus group with fish farmers were also included in the analysis.

C. Financial Management

41. The Bank performed a financial management assessment of this proposed Project in accordance with the Bank Policy on Investment Project Financing and the Bank's financial management guidelines. It was assessed that the MICAF has in place a financial management system that should be able to provide, with reasonable assurance, accurate and timely information on the status of the funds as required by the Bank.

D. Procurement

42. The GOJ has a robust governance framework that is capable of managing the procurement process, adjudicating complaints, and facilitating transparency through investigating the award and termination of contracts. A major advantage has been that the GOJ Procurement Procedures are very similar to that of the World Bank's, including principles as value-for-money and fairness. The country is relatively stable economically; although there has been a slight increase in inflation, it is expected that inflation will be contained within 4-6 percent. The MICAF has had a successful track record in implementing grant projects of a similar nature and loan programs funded by international agencies, and also collaborates with the Jamaica Social Investment Fund (JSIF) for the ongoing implementation of an agricultural component. Nonetheless, given the changes in the Bank's procurement framework and the number of tenders for the beginning of the project, MICAF will need to strengthen its team with one additional staff and further training.

E. Social (including Safeguards)

43. The proposed Project will support viable alternative livelihoods for the targeted fishing and fish farming communities, including existing fishers and fish farmers, women, and youth through Component 2. This component would provide training to fisherfolk to facilitate their transition to the new fishing zones or to alternative livelihoods. Component 3 will support targeted community-to-community learning tours/visits and knowledge exchange in order to share best practices. Capacity building for fishers' and fish farming organizations would also promote empowerment of local fisherfolk and effective implementation of climate-resilient activities at community level. Moreover, awareness raising about climate resilience would increase support for sustainable capture and culture fisheries management and to promote significant behavior change among those involved in the fisheries sector.

44. Jamaica is an ethnically diverse country with people of Chinese, Indian, and Lebanese descent being among the largest minority groups. Another culturally significant group is the Maroons. However, there are no groups present in Jamaica who display the four characteristics of indigenous people as defined by OP 4.10 Indigenous Peoples. Therefore, this policy is not triggered. The proposed Project will not finance the construction or installation of facilities in locations that would require involuntary resettlement or land acquisition, as defined under OP 4.12 Involuntary Resettlement. The Environmental and Social Management Framework (ESMF) includes sub-project screening measures to ensure such impacts do not occur. The strengthening of the legislative framework anticipated under Component 1 involves the regulation of fisheries resources on a national level to promote their sustainability. The Project will also strengthen community-based monitoring, control and surveillance actions to limit illegal activities. These represent community-based natural resource management activities, where the beneficiary communities work collectively to sustainably manage access to fisheries. These community-based measures will be subject to an assessment of the adequacy of the community-based decision-making process and measures necessary to mitigate adverse impacts on vulnerable community members (if any). As such, the policy does not involve the restriction of access to natural resources in parks or protected areas as defined under OP 4.12, but rather national legislative efforts and community based measures for climate smart fisheries management. Given that the Project will not involve resettlement, land acquisition or restriction of access to parks or protected areas, OP 4.12 is not triggered.

F. Environment (including Safeguards)

45. The Project is classified as Environmental Risk Category B. The Project will enhance community-based environmental management in general. The strengthening of the policy and regulatory framework anticipated under Component 1 involves the regulation of fisheries resources at the national level to promote their sustainability. Community-based monitoring, control, and surveillance of reef-related fisheries may yield associated benefits of ecosystem restoration and preservation of high biodiversity critical natural habitats, as well as the enhanced function of ecosystem services such as coastal erosion protection and tourism value. Small patch reefs and seagrass meadows occur along many of the island's coastlines and support local fishing activity and efforts will be explored to integrate the conservation of critical habitats such as reefs and seagrass in concert with the Project to generate additional project environmental benefits.

46. The Project activities will be country-wide, including inland areas for aquaculture (e.g., Spanish Town west of Kingston where existing facilities are located) as well as coastal areas for a variety of livelihoods sub-projects in and near fishing communities. Upgrades to existing inland aquaculture facilities will include improvements to buildings, ponds, and wastewater management. Changes in facility design will be evaluated to ensure sound environmental management of wastewater discharges, to optimize water sourcing, to minimize potential release of cultured species, and to build in the international best environmental management practices for aquaculture projects. Sub-projects in coastal areas may affect a variety of environments and communities, including some with major tourist developments, sensitive environments, and protected areas near the shoreline. There are several marine parks in Jamaican waters and along the north coast (near Ocho Rios, Montego Bay, and Port Antonio) and the west coast (at Negril), and projects on the south coast may affect the Protected Areas of Portland Bight or the Palisadoes. Specific areas for intervention will be identified through community mobilization workshops, and may include Portland Cottage and Alligator Pond on the south coast for aquaculture, mari-culture, or polyculture activities.

47. Aquaculture and mari-culture sub-projects are to be defined as part of the project activity, thus an ESMF has been prepared in line with the Bank's safeguard policies and guidelines. The ESMF lays out

potential environmental and social impacts, appropriate screening, consultation, and environmental and social management actions to meet the environmental assessment requirements of OP4.01 Environmental Assessment. The Environmental Assessment was disclosed by the World Bank, MICAF and PIOJ on September 26, 2017 and is available on their respective websites. Inadequate screening or poor management practices could result in impacts to sensitive coastal or marine areas, contamination from nutrients and pest management agents, or introduction of damaging species, thus triggering OP4.04 on Natural Habitats, and OP 4.09 on Pest Management. Physical cultural resources in coastal and subaquatic areas are expected to be minimal. A screening mechanism is included in the ESMF to avoid any negative effects in accordance with OP 4.11 on Physical Cultural Resources. None of the other environmental safeguard policies apply. The ESMF also provides criteria for additional assessment or impact analysis related to introduced species, effects on coral reefs or seagrass, discharge of wastewater, or management of pest or disease control agents, as required. Also, screening measures are included in the ESMF to ensure that land acquisition, restriction of access to resources, or resettlement impacts do not occur. In addition, the ESMF provides criteria for an assessment of existing community-based decision- making mechanisms for fisheries management, potential adverse impacts of improved community-based management of fisheries on vulnerable community members, and possible mitigation measures for these adverse impacts (if any). The ESMF will guide any additional assessment needs once specific sub-projects are defined. The resulting Environmental and Social Management Plans (ESMPs) must take into account the WBG Environmental, Health, and Safety (EHS) Guidelines, in particular, the General EHS Guidelines and the Guidelines for Aquaculture.

G. World Bank Grievance Redress

48. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit *http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service*. For information on how to submit complaints to the World Bank Inspection Panel, please visit *www.inspectionpanel.org*.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework
COUNTRY : Jamaica
Promoting Community-based Climate Resilience in the Fisheries Sector

Project Development Objectives

The PDO is to increase the adoption of climate resilient practices among targeted fishing and fish farming communities in Jamaica.

Project Development Objective Indicators

Indicator Name	Corporate	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
Name: Targeted fishers that adopt climate resilient fishing practices (number of fishers)		Number	0.00	1800.00	Annual	Annual community surveys; Business plans	Fishing communities, PIU
Description: Climate resilient fishing practices include, for example, use of meteorological data; closure to non-registered vessels; observance of closed season and others. (Linked to PPCR Core Indicator #4: Extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR supported tools, instruments, strategies, and activities to respond to climate variability or climate change.)							
Name: Targeted fisher groups that adopt alternative livelihoods (number of fisher groups)		Number	0.00	12.00	Annual	Annual community surveys; Business plans	Fishing communities, PIU
Description: Alternative livelihoods including mari-culture, etc. are ways to reduce their reliance on fishing and, therefore, impacts of climate change on their livelihoods. At least one fisher group within a community is expected to adopt an alternative livelihood.							

Indicator Name	Corporate	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
(Linked to PPCR Core Indicator #4: Extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR supported tools, instruments, strategies, and activities to respond to climate variability or climate change.)							
Name: Targeted fish farming groups that adopt climate resilient aquaculture practices (number of fish farming groups)		Number	0.00	8.00	Annual	Annual community surveys; Business plans	Fish farmers, PIU
Description: Climate resilient aquaculture practices include, for example, water saving practices, use of green water, and heat tolerant species. (Linked to PPCR Core Indicator #4: Extent to which vulnerable households, communities, businesses, and public sector services use improved PPCR supported tools, instruments, strategies, and activities to respond to climate variability or climate change.)							
Name: Share of women among targeted fisher groups and fish farming groups that adopt climate resilience practices (percentage)		Percentage	0.00	25.00	Annual	Annual community surveys; Business plans	Fishing communities, Fish Farmers, PIU
Description: Share of women in targeted fisher groups and fish farming groups that adopt alternative livelihoods (PDOI 2), or climate resilient inland aquaculture practices (PDOI 3). (Linked to the CIF Gender Action Plan.)							
Name: Number of marine protected areas under community-led sustainable fisheries		Number	0.00	15.00	Annual	M&E by CBOs; Annual reporting	Participating CBOs, PIU

Indicator Name	Corporate	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
management (number)							
Description: Community-led sustainable fisheries management is the core approach to building climate resilience of marine and coastal ecosystems. The Project will establish partnerships with CBOs and increase their capacity to manage marine protected areas. Linked to PPCR Core Indicator #3: Quality and extent to which climate responsive instruments/investment models are developed and tested.							

Intermediate Results Indicators

Indicator Name	Corporate	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
Name: IR 1: Strategy and Action Plan for the National Fisheries and Aquaculture Policy submitted for approval by the MICAF		Yes/No	N	Y	Mid-term, end of Project	Policy note; Annual reporting	MICAF, PIU
Description: A Strategy and Action Plan for the National Fisheries and Aquaculture Policy will be developed to guide fisheries and aquaculture operations to incorporate climate considerations as defined in the Policy. Refer to PDOIs 1-3 for climate resilient fisheries and aquaculture practices. Linked to PPCR Core Indicator #1: Degree of integration of climate change in national, including sector, planning.							
Name: IR 2: Government personnel with increased competency in climate resilient fisheries practices and management (number of		Number	0.00	40.00	After training/workshop; Aggregated annually	Workshop evaluations; Competency assessment; Annual reporting	Trainees, PIU

Indicator Name	Corporate	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
people)							
Description: Increased competency means applying knowledge and skills gained through the Project to their duties. Intended government personnel include, but not limited to, fisheries administrators, extension officers, police, coast guards, prosecutors, and judges. Training, workshops, demonstration, and equipment all contribute to this result. Linked to PPCR Core Indicator #2: Evidence of strengthened government capacity and coordination mechanism to mainstream climate resilience.							
Name: IR 3: Targeted communities that receive training in climate resilient fisheries and aquaculture practices under the Project (number of communities)		Number	0.00	32.00	Annual	Annual community surveys; Business plans	Fish farmers, PIU
Description: Climate resilient aquaculture practices include, for example, water saving practices, use of green water, and heat tolerant species.							
Name: IR 4: Targeted people reached by awareness raising and behavior change activities supported by the Project (number of people)		Number	0.00	75000.00	Year 1, Mid-term, and End of the Project	KAP survey; Annual reporting	Communications Specialist; PIU
Description: Awareness raising, citizen engagement, and behavior change activities will influence the target audience's support for climate-smart and sustainable aquaculture and fisheries policies and practices. Target audience include members of fishing communities and fish farms and the private and public sectors related to fisheries. Linked to PPCR Core Indicator #5: Number of people supported by the PPCR to cope with the effects of climate change.							

Indicator Name	Corporate	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
Name: IR 5: Community-based fisheries and aquaculture organizations with increased capacity to implement climate resilient activities (number of organizations)		Number	0.00	25.00	Annual	M&E by CBOs, Annual reporting	CBOs, PIU
Description: Community-based fisheries and aquaculture organizations (i.e., cooperatives, associations, friendly societies, etc.) will be strengthened to effectively implement climate resilient activities. Capacity building includes areas related to business management as well as technical skills related to climate resilient practices as defined under the PDO indicators.							

Target Values

Project Development Objective Indicators

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Targeted fishers that adopt climate resilient fishing practices (number of fishers)	0.00	20.00	300.00	580.00	1000.00	1800.00	1800.00
Targeted fisher groups that adopt alternative livelihoods (number of fisher groups)	0.00	1.00	3.00	5.00	8.00	12.00	12.00
Targeted fish farming groups that adopt climate resilient aquaculture practices (number of fish farming groups)	0.00	0.00	1.00	3.00	5.00	8.00	8.00
Share of women among targeted fisher groups and fish farming groups that adopt climate resilience practices (percentage)	0.00	0.00	25.00	25.00	25.00	25.00	25.00
Number of marine protected areas under community-led sustainable fisheries management (number)	0.00	1.00	3.00	5.00	10.00	15.00	15.00

Intermediate Results Indicators

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
IR 1: Strategy and Action Plan for the National Fisheries and Aquaculture Policy	N	N	N	Y	Y	Y	Y

Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
submitted for approval by the MICAF							
IR 2: Government personnel with increased competency in climate resilient fisheries practices and management (number of people)	0.00	0.00	0.00	10.00	20.00	40.00	40.00
IR 3: Targeted communities that receive training in climate resilient fisheries and aquaculture practices under the Project (number of communities)	0.00	10.00	20.00	32.00	32.00	32.00	32.00
IR 4: Targeted people reached by awareness raising and behavior change activities supported by the Project (number of people)	0.00	0.00	0.00	25000.00	50000.00	75000.00	75000.00
IR 5: Community-based fisheries and aquaculture organizations with increased capacity to implement climate resilient activities (number of organizations)	0.00	0.00	5.00	10.00	20.00	25.00	25.00

Annex 1: Detailed Project Description

A. Proposed Development Objective(s)

1. The PDO **is to increase the adoption of climate resilient practices among targeted fishing and fish farming communities in Jamaica**. The intended outcomes are: (i) increased access among fishers and fishing farmers to climate resilient livelihoods opportunities; and (ii) improved community-led sustainable fisheries management to build climate resilience of marine and coastal ecosystems.

B. Key Results

2. The indicators to measure these outcomes include:

- Targeted fishers that adopt climate resilient fishing practices;
- Targeted fisher groups that adopt alternative livelihoods;
- Targeted fish farming groups that adopt climate resilient inland aquaculture practices;
- Share of women among targeted fishing and fish farming groups that adopt alternative livelihoods or climate resilient practices;

(These four indicators are linked to *PPCR Core Indicator #4: Extent to which vulnerable households, communities, businesses and public sector services use improved PPCR supported tools, instruments, strategies, and activities to respond to climate variability or climate change.*)

- Special Fishery Conservation Areas under community-led sustainable fisheries management.

(This indicator is linked to *PPCR Core Indicator #3: Quality and extent to which climate responsive instruments/investment models are developed and tested.*)

C. Components

3. **Component 1: Strengthening the Fisheries Policy and Regulatory Framework** (US$0.573 million). Declining performance of the fisheries sector is directly related to its vulnerability to climate change impacts coupled with anthropogenic threats such as overfishing and pollution. One effective way to build resilience to climate change in this sector is to strengthen and improve the overall health of marine and coastal ecosystems.

4. This component will provide support for the following activities:

(1.a) Strengthening the policy and regulatory framework for climate resilient fisheries and aquaculture management, through, *inter alia*: (i) supporting the development of a strategy and action plan for the National Fisheries and Aquaculture Policy; (ii) supporting the development of guidelines and protocols for promoting sustainable fisheries and aquaculture practices, taking into consideration climate impacts on fisheries and aquaculture production; and (iii) providing technical assistance for the drafting of regulations on sustainable aquaculture and fisheries management, monitoring, control and surveillance;

(1.b) Promoting sustainable fisheries management, through, *inter alia*: (i) supporting the establishment of new and strengthening of existing partnerships with relevant entities to manage marine protected areas and providing training and equipment for the Fisheries Division within MICAF and other relevant entities; and (ii) providing support in the development of new and strengthening

of existing sustainable fisheries management plans for marine protected areas, including community-led water quality monitoring.

5. Component 1 is a critical element in fostering an enabling environment for pursuing sustainable fisheries management, particularly with respect to the challenges posed by climate change. The component activities will have an impact on illegal, unreported and unregulated (IUU) fishing practices, the protection of coastal and ocean resources and the enhancement of the capture and culture fisheries value chain. The activities in this component are guided by principles such as a bottom-up approach to deliberating and formulating solutions for fisheries management challenges, collaboration with targeted fishing communities and stakeholder partner engagement.

6. Subcomponent 1.a: Strengthening the policy and regulatory framework for climate resilient fisheries and aquaculture management. This sub-component will focus on strengthening the enabling regulatory and policy environment for promoting climate-smart capture and culture fisheries activities on-shore and offshore. Specific activities include:

(i) Supporting the development of a strategy and action plan for the draft National Fisheries and Aquaculture Policy[17] to further provide guidance on climate-smart practices in line with the measures identified in the SPCR. The current draft Policy reflects climate change in a broader language only. The proposed strategy and action plan give practical and concrete guidance to be applied in the fisheries and aquaculture operations and its value chain, and in turn, promote climate resilience and sustainable growth of the sector.

(ii) Supporting the development of protocols and guidelines for promoting sustainable fisheries and aquaculture practices to take climate impacts into consideration in critical areas such as quarantine systems, food safety, quality assurance standards (e.g., management of broodstock and import and export control of live fish) and inter-sectoral spatial planning.

(iii) Providing technical assistance for the drafting of regulations to give effect to sustainable fisheries management regimes including monitoring, control and surveillance (MCS) for community participation as well as the use of seabed for mari-culture, pelagic fisheries management and potential incentive schemes for local community's long-term resources use. These regulations should also take into consideration potential impacts of such regulations on vulnerable fisher groups.

7. Subcomponent 1.b: Promoting sustainable fisheries management. The activities in this sub-component will primarily support the community-led sustainable fisheries management including monitoring, control and surveillance (MCS) to build climate resilience of marine and coastal ecosystems. One of the targeted fisheries management mechanism employed in Jamaica is Special Fishery Conservation Areas (SCFA), also known as fish sanctuaries. There are currently seventeen SCFAs including the recently declared Alligator Head in Portland and Boscobel East and West (rotational Special Fishery Conservation Areas (SFCAs)) in St. Mary. Each SFCA varies in size, ecosystems present, and management which involves different actors such as government agencies, community-based organizations, fishing organizations, and private sector. The SFCAs prohibit removal of finfish and crustacean species without special permission from the Government. This has allowed for the protection and rehabilitation of remaining fish stocks and the protection of large fish. This activity to protect and enhance the fish stock consequently promotes healthy coastal and marine ecosystems and hence, builds resilience of these ecosystems to climate impacts. Researchers found that following a major bleaching event, star coral

[17] The National Fisheries and Aquaculture Policy is pending approval by the Cabinet.

(*Montastraea faveolata*) on various reefs in Honduras and Belize were able to recover and grow normally within two to three years when the surrounding waters and reef were relatively healthy. A study (Mumby, 2006) found that reefs in Belize with healthy populations of grazers (e.g., parrotfish and surgeonfish) were far more likely to recover from hurricane damage and achieve prior levels of live coral cover than reefs whose grazers had been overfished, the latter being far more likely to undergo a phase shift to an algal dominated reef. In Jamaica, SCFAs have proven to be effective to increase fish biomass. For example, the data of the Oracabessa Bay SFCA shows a 1,313 percent increase in average fish biomass between 2011 and 2014.[18]

8. Specific activities under this sub-component include:

(i) Supporting the establishment of new and strengthening of existing partnerships with relevant entities for the management of marine protected areas through, among other things, enhancing MCS, with various entities such as community-based organizations (CBOs), fisheries associations, law enforcement entities, entities with responsibility for managing marine protected areas and other sector groups such as tourism and environmental protection. Providing training in sustainable fisheries management, MCS, including Safety of Life at Sea, to the community-based entities and the Fisheries Division, and equipment for MCS such as boats and vehicles as well as for the introduction of relevant technologies such as vessel monitoring systems and drones.

(ii) Providing support in the development of new and strengthening of existing sustainable fisheries management plans for marine protected areas such as SFCAs in a participatory approach. The plans also include community-led water quality monitoring.

9. **Component 2: Diversification and Fisheries-based Alternative Livelihoods** (US$2.68 million). Given declining wild fish stocks due to anthropogenic and climate impacts and the rising demand for fish and fish products on the domestic and global markets, aquaculture, coastal mari-culture/polyculture, and offshore pelagic fisheries have potential business opportunities that can be harnessed to meet those demands. Aquaculture and coastal mari-culture/polyculture, in particular, are a means of reducing dependency on wild fish stocks and, hence, reducing their vulnerabilities to climate impacts.

10. This component will provide:

(2.a) Support for sub-projects on climate-resilient freshwater aquaculture, coastal mari-culture/poly-culture, and other alternative livelihoods, including providing support to targeted fishing and fish farming communities, through, *inter alia*, training and workshops, works, provision goods, and technical assistance;

(2.b) Providing support for the development of artisanal longline fishing for offshore pelagics through, *inter alia*: (i) conducting a baseline stock assessment to determine the seasonal availability and potential yield of each species and baits for sustainable offshore pelagic fisheries; (ii) developing a sustainable management strategy for offshore pelagic fisheries, including distributional parameters, international management standards, capacity and international safety standards for the local and export markets; and (iii) providing training and equipment to pelagic fishers.

11. Beneficiaries would include existing fisherfolk in marine capture fisheries, aquaculture operators and those engaged in fish product processing, including women and youth. If successfully implemented,

[18] NEPA, 2014.

these activities will have an impact on the levels of production and exports, and hence, employment and income-generation of Jamaican fisherfolk and fish farmers. The design of the sub-projects will be guided by the scientific and technical information from successful examples, knowledge of local and international markets, sustainable use of available natural resources, promotion of techniques that safeguard the businesses from climate hazards and building on existing community assets.

12. Subcomponent 2.a: Support for Sub-projects on Climate-resilient Freshwater Aquaculture, Coastal Mari-culture/Poly-culture, and other alternative livelihoods. The activities in this sub-component are to develop the aquaculture, mari-culture/poly-culture and other alternative livelihood sub-projects with selected fishing and fish farming communities. The options for freshwater aquaculture production include ornamental fish, food fish and plants; while for mari-culture/poly-culture production, they include bivalve molluscs, sea cucumbers and sea moss. The support will extend to value chains, creating synergies with other private and public operations by, for example, supporting farmers in securing access to markets for their products and accessing financing. Information from the climate change studies under *Subcomponent 3.1 (b)* will be used to integrate climate information into these operations and management. The specific activities include:

(i) Developing a demonstration climate-resilient aquaculture farm. The Project will support the development of a business plan for a demonstration aquaculture farm including identification of the farm, refurbishment and training using farmer field school methodologies. The Project will work with the existing private aquaculture sector to develop buy-back or satellite farming schemes with smaller producers.

(ii) Developing climate-resilient aquaculture sub-projects for new and existing fish farmers. The Project will support fishers and fish farmers including women and youth in targeted communities to develop economically viable aquaculture businesses such as tilapia and ornamental fish and its value chain. Specifically, the support includes community mobilization workshops, development of concepts and business plans including market and cost-benefit analyses, skill-building training using farmer field school methodologies, equipment and works necessary for refurbishment, production, marketing and learning exchanges among others. The skills-building training would cover various topics such as farm site assessment and design, production planning, climate-smart techniques and tools, management of climate and disaster risk such as droughts and flooding, biosecurity and disease management, seed and feed management, sales and marketing and exporting. The Project will also promote existing fish farms to redesign and rehabilitate for climate-proofing and support all fish farms to prevent praedial larceny—the theft of agriculture produce. The criteria and process for the selection of sub-projects are stipulated in the Project's Operations Manual.

(iii) Refurbishing and upgrading the existing seed stock production and expanding local feed production—key input industries. The existing Tilapia hatchery owned by the Fisheries Division in Spanish Town would be refurbished, climate-proofed, and upgraded, including the ponds and canals and the production of quality seed stock (i.e., broodstock, advanced fry and fingerlings). The Project will support improving the operation of the other existing small hatcheries. The Project will also support the expansion of local feed production (e.g. fish meal, green water) in order to address high cost of imported feed widely currently used in aquaculture in Jamaica. In addition, the management plans for broodstock acquisition and management, seed production and local feed production would be developed. Public-private partnership opportunities would be sought extensively. Lessons from this activity would

inform *Subcomponent 1.1: Developing the policy and regulatory framework*, so as to foster an enabling environment for these seed and feed industries.

(iv) Developing a demonstration coastal mari-culture/poly-culture operation, such as oyster and seaweed and promoting value-added products (such as oyster punch, irish moss, etc.). Assistance includes technical assessment, value chain development, business development of potential value-added products, market research, economic analysis and skill-building training.

(v) Developing climate-resilient mari-culture/poly-culture and alternative livelihood sub-projects. The Project will support fisherfolk, women and youth in targeted communities to diversify their livelihoods to economically viable mari-culture/poly-culture and alternative livelihood sub-projects. In addition to the production of oyster, sea moss and seaweed, potential value-added businesses include crafts and jewelry making and conch shell recycling. Similar to the aquaculture sub-projects, the support includes community mobilization workshops, development of concepts and business plans including market and cost-benefit analyses, skill-building training, equipment and works necessary for the production, marketing and learning exchanges. The skill-building training would cover various topics such as farm site assessment and design, production planning, climate-smart production techniques and tools, management of climate and disaster risk such as hurricanes and storm surge, biosecurity and disease management, input management, sales and marketing and exporting. The criteria and process for the selection of sub-projects are stipulated in the Project's Operations Manual.

13. Subcomponent 2.b: Providing support for the development of artisanal longline fishing for offshore pelagics. The offshore pelagic fishery is currently under-utilized, particularly among small-scale artisanal fishers who would be looking to diversify livelihoods while keeping their seafaring traditions alive. These fishers are mainly located in Pedro Bank, Formigas Bank, Morant Cays, and other banks. It is a potential resource to tap into if a baseline assessment confirms enough fish stocks. The importance of large pelagic fisheries for the region is recognized by 25 countries including Jamaica that participated in the Global Environment Facility (GEF)-funded Caribbean Large Marine Ecosystem (CLME) project implemented by the United Nations Development Programme. The governance of the pelagic fishery ecosystem was endorsed by more than 25 countries including Jamaica under the Strategic Action Programme of CLME in 2013. Aligned with this strategic action, the proposed Project will support the following:

(i) Conducting a baseline stock assessment to determine the status of targeted fish stocks. The assessment will help to determine the seasonal availability and potential yield of each species and baits, and, hence, the sustainability of offshore pelagic fisheries.

(ii) If such sustainability is confirmed, developing the sustainable management strategy for offshore pelagic fisheries, including distributional impact assessment, necessary parameters such as legal size limits in accordance with international standards (e.g., the International Commission for the Conservation of Atlantic Tunas), the capacity (e.g., fishing gear, technology) and food safety standards for the export and local markets.

(iii) Providing skills-based training, equipment (e.g., longlines, fish aggregating devices (FAD)), and possible retrofitting of fishing boats, to the existing pelagic fishers (3-4 communities). Training topics include navigation, Safety of Life at Sea (SLS) and ship husbandry.

14. **Component 3: Capacity Building and Awareness Raising** (US$0.97 million) This component will provide support for the following activities:

(3.a) Supporting an expansion of the knowledge base on climate change impacts on the fisheries sector, including *inter alia:* (i) carrying out a social assessment on the impacts of climate change on gender and youth dynamics, as well as the labor standards in the fisheries sector, including the impacts to vulnerable and disadvantaged groups; (ii) developing climate projections for aquaculture, coastal mari-culture/poly-culture, and pelagic fisheries to determine the impact of climate change on these fisheries; and (iii) delivering agro-meteorological information services for fish farmers for their freshwater aquaculture and coastal mari-culture/polyculture operations.

(3.b) Supporting awareness raising and behavioral change activities, including *inter alia:* (i) carrying out an assessment on levels of awareness and knowledge about climate change impacts on capture and culture fisheries and sustainable fisheries management policies and practices; and (ii) developing and implementing a strategy aimed at awareness raising and behavioral change on climate change impacts in the fisheries sector, including climate-smart fisheries practices and environmental management.

(3.c) Providing capacity building to fisheries and aquaculture organizations and the Fisheries Division, including *inter alia:* (i) providing support in the formalization and strengthening of community-based organizations to promote the empowerment of fishers and fish farmers and implementation of climate-resilient fisheries activities; (ii) carrying out training for fishers and fish farmers on fisheries practices and business management skills; (iii) carrying out learning and knowledge exchange activities in communities to share best practices and innovative livelihood options; (iv) developing a fisheries and aquaculture information management system for the Fisheries Division aimed at enhancing information sharing related to fisheries and aquaculture; and (v) providing technical assistance and equipment for the Fisheries Division and other relevant stakeholders to promote climate resilience in capture and culture fisheries.

15. The activities in this component are geared towards improving the level of readiness of the stakeholders in the fisheries sector to drive climate change adaptation within the context of sustainable fisheries management. More specifically the activities are focused on: (i) expanding stakeholders' understanding of climate change and vulnerability impacts on fisheries livelihoods and fishing and aquaculture communities; (ii) strengthening the capacity of the community-based organizations serving fisherfolk and fish farmers; (iii) developing the skills needed by fisherfolk and fish farmers to participate in alternative livelihood enterprises, and (iv) building support for sustainable fisheries and aquaculture management approaches. The successful implementation of the activities in this component will rely on maximizing the potential existing community assets and establishing strategic partnerships.

16. Subcomponent 3.a: Supporting an Expansion of the Knowledge Base on Climate Change Impacts on the Fisheries Sector. The outputs from the activities of this sub-component will give stakeholders the information and skills needed to advance climate-smart livelihood activities. The activities under this subcomponent include:

(i) Conducting a social assessment including gender and youth dynamics in the fisheries sector in targeted communities.[19] The assessment will look at the roles of women and youth in the sector and the ways in which climate change may impact men, women, and youth differently. The information generated from this activity will inform *Component 2. Diversification and*

[19] Guided by CIF Gender Action Plan – Phase 2, 2016.

Fisheries-based Alternative Livelihoods and provide empirical data to support transitions to alternative livelihood activities at the community level.

(ii) Developing climate projection for the aquaculture, coastal mari-culture/poly-culture, and pelagic fisheries to determine the extent to which climate change impacts these fisheries (in terms of yield, distribution and seasonality for example). The assessment will examine how parameters such as eutrophication, acidification, sea surface temperature, potential of hydrogen (ph), rainfall and atmospheric temperature impact the mari-culture/poly-culture and pelagic fishing. The assessment will be informed by the near- to long-term climate projections for Jamaica under the PPCR-ICDIMP for 2015 and other existing data (e.g., SST collected by NEPA). The knowledge generated from this projection will demonstrate the ways in which climate change considerations can be integrated into ecosystem-based fisheries management regimes (*Component 1*) and development of climate-smart fisheries and aquaculture sub-projects (*Component 2*).

(iii) Delivery of agro-meteorological information services for freshwater aquaculture and coastal mariculture/polyculture operations. Climate information products can be used by fish farmers to inform their daily and long-term production decisions. Access to agro-meteorological climate services is therefore an example of assets available to fish-farmers for climate change adaptation. This activity will be carried out with the contribution of the PPCR-ICDIMP.

17. Subcomponent 3.b: Supporting Awareness Raising and Behavior Change Activities. The activities in this component are aimed at changing levels of awareness and knowledge about capture and culture fisheries in relation to climate change impacts, conditions of the ecosystem and production. The successful implementation of the sub-component activities will influence the target audience's support for sustainable capture and culture fisheries management policies and practices. Specific activities include:

(i) Conducting a Knowledge Attitudes and Practices assessment in the targeted communities. The results will be used to inform the development and implementation of awareness building and behavior change activities.

(ii) Development and implementation of an awareness raising and behavior change strategy including production and launch of key messages and campaigns for various targeted groups including private and public sectors and fisheries stakeholders, covering topics such as climate change impacts on fisheries sector, climate-smart fisheries practices and environmental management. This strategy should be aligned with the PPCR Communications for Climate Resilience 2012-2017. The results from *Subcomponent 3.1* will be used to inform this activity.

18. Subcomponent 3.c: Providing Capacity Building to Fisheries and Aquaculture Organizations and the Fisheries Division. Organizations that serve fishing and fish farming communities are ideally suited to demonstrate the leadership needed to drive climate resilience at the community and livelihood activity levels. In particular, the successful implementation of the activities in this component will help organizations to develop the capacity needed to spearhead programs and initiatives that support fishers, fish farmers and their communities in building climate resilience and in transitioning to alternative livelihoods. The specific activities include:

(i) Supporting the formalization of selected informal community-based organizations and strengthening of existing community-based organizations (i.e., cooperatives, associations,

friendly societies, etc.) to promote the empowerment of local fisherfolk and fish farmers and to effectively and sustainably implement climate-resilient fisheries activities.

(ii) Building capacity in technical skills and business management such as boat and engine repair/maintenance, financing, record-keeping, marketing, personnel management, climate change awareness, climate change and disaster risk management, resource mobilization and environmental management.

(iii) Implementing targeted community-to-community learning and knowledge exchange in order to share best practices and innovative livelihood options.

(iv) Developing the fisheries and aquaculture information management system at the Fisheries Division to enhance the efficiency and effectiveness of information sharing related to fisheries and aquaculture. Stakeholders' access to the available information will contribute to filling gaps in information sharing identified during the preparation, including MCS information.

(v) Strengthening capacity of the Fisheries Division personnel and other relevant stakeholders to promote climate resilience in the capture and culture fisheries sector.

19. **Component 4: Project Management and Monitoring and Evaluation (M&E)** (US$0.655 million). This component will provide support to the PIU within MICAF and the PSC in Project implementation, management, monitoring and evaluation, including audits and Operating Costs. The Project will fulfill the monitoring and reporting requirements of the Bank, as well as the PPCR in coordination with the PIOJ which acts as the PPCR Country Focal Point. The M&E would also incorporate targeted knowledge management activities aimed at capturing and sharing overall lessons within Jamaica and across countries under the PPCR Caribbean Regional Track. The tasks of the PIU include developing and implementing the annual work plans; providing fiduciary management including procurement, financial management, audits, and safeguards; managing implementation risks; and communications to key stakeholders on project implementation; and monitoring and evaluation (M&E) such as developing and implementing the M&E plan; and contributing to the preparation of the annual PPCR Core Indicators Monitoring and Reporting Scorecard.

20. The Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF) is the executing agency of the proposed Project. The Planning Institute of Jamaica (PIOJ), the national Focal Point for the PPCR and Phase 2 of the SPCR, will be supporting the MICAF. Key activities include:

(i) Support for the Project Implementation Unit (PIU) and Project Steering Committee (PSC);
(ii) Developing and implementing the annual work plans;
(iii) Providing fiduciary management including procurement, FM, audits and safeguards;
(iv) Managing implementation risks;
(v) Communicating to key stakeholders on project implementation including work plan, results and sustainability.

21. The Project's M&E plan will be consistent with the Project's Results Framework as well as Jamaica's PPCR Monitoring and Reporting Framework. M&E activities will not only form part of knowledge management and learning aspects of the Project implementation, but also the data collection for monitoring the progress towards achieving the Project Development Objective. The M&E process will provide the Project with information on its success in enhancing community-based climate resilience among targeted fishing and fish farming communities of Jamaica. The lessons learned from the Project will be valuable in the Jamaican context as well as for the countries under the PPCR Caribbean Regional Track. Key activities include:

(i) Developing and implementing the M&E Plan which includes baseline assessments (including gender and youth analysis to collect, process and evaluate gender/youth information relevant to the Project[20]), setting the targets where undefined, quarterly and annual progress reporting against the targets set in the Results Framework, a mid-term review and a terminal evaluation.

(ii) Contributing to the preparation of the annual PPCR Core Indicators Monitoring and Reporting Scorecard and sharing lessons learned at national and global level.

[20] CIF, *Op. Cit.*

Annex 2: Implementation Arrangements

1. **The Ministry of Industry, Commerce, Agriculture and Fisheries (MICAF)** is the executing agency of the proposed Project. **The Fisheries Division** under the MICAF is the main actor involved in the Project implementation and is one of the main beneficiaries of the Project activities. The Fisheries Division is responsible for all matters concerned with primary production in the capture and culture fisheries and conservation of fishery resources. The Fisheries Division comprises two main branches, the Marine Branch which deals with the capture fisheries, including assessments, and the Aquaculture Branch, which deals with aquaculture. The Fisheries Division has a total number of 160 staff. The offices cover the main functions such as research and development, data collection, registration and licensing of fishers and vessels, and extension services. The Division is also involved in projects related to the construction of market facilities, gear sheds, etc. subject to financing availability. The Fishery Division has 16 extension service agents around the coast of the island. The Fisheries Division is guided by the Fishing Industry Act (1975) and the Fishing Industry Regulations (1976) which regulate and monitor fishing activities in Jamaica. A new Act has been drafted which will provide legislation for the management and development of aquaculture in Jamaica. The Division is presently undergoing transformation to a Statutory Body. This will equip the Division with the required staffing and infrastructure to better serve the fisheries sector.

2. An interim **Project Implementation Unit (PIU)** has been established within the MICAF. The Project will contract dedicated personnel for the PIU, including the Project Manager, Procurement Specialist, Financial Management Specialist, and Administrative Assistant for the daily project implementation and management. The PIU personnel will report to the Director of the Fisheries Division who is responsible for the oversight of the Project implementation. The MICAF will support the PIU through the back-stopping support from the Project Management and Coordination Division and other relevant divisions for the coordination and management of the Project activities, including supervision of consultants, financial management, procurement, environmental and social safeguards, monitoring and evaluation, and community mobilization and stakeholder engagement.

3. **A Project Steering Committee (PSC)** has been formed to provide strategic guidance and oversight for the implementation of the Project. The Committee is chaired by the Permanent Secretary of the MICAF of his/her designee. The Committee comprises representatives of the MICAF, relevant government entities, the private sector, NGOs, and fisher organizations.

4. **The Planning Institute of Jamaica (PIOJ)**—the national Focal Point for the PPCR and Phase 2 of the SPCR—will be supporting the MICAF/PIU in the project execution in general as well as specific areas such as national budgeting, monitoring and evaluation, and environmental and social safeguards. The PIOJ is successfully managing the PPCR Improving Climate Data and Information Management Project (P129633) as well as other WB-funded projects and is capable of providing extensive support and capacity building to the MICAF.

5. The GOJ has established **a PPCR Steering Committee (PPCR-SC)** to serve as the main body responsible for providing technical advice and oversight to the implementation of PPCR projects including the proposed Project. PPCR-SC is chaired by the Director of the Sustainable Development and Regional Planning Division, PIOJ, who also acts as the PPCR Focal Point for Jamaica. Members of PPCR-SC are drawn from a cross-section of stakeholders including relevant government entities, private sector bodies, academia and civil society, all with technical interest in and knowledge of natural hazards, risk and climate change issues.

6. The Project will involve implementing partners from the public and private sectors. **Jamaica Defense Force (JDF), the Coast Guard, and the Marine Police** are charged with the monitoring, control and surveillance activities that are shared with the Fisheries Division. Personnel of these agencies will be key partners in strengthening the community-led sustainable fisheries management framework (Sub-component 1.2). **The Veterinary Services Division** of the MICAF provides control related to the fishery food security, sanitary subjects and for quality control related to export of fish and fish products e.g. conch and lobster. **Fishers Cooperatives:** Currently there are around 52 formal and informal fishers cooperatives or associations in Jamaica. Several of them are part of an umbrella organization, the Jamaica Fishermen Cooperative Union Ltd. The large landing sites such as Harbour Bay, White House, and Rocky Point have the largest cooperatives. Not all fisherfolk are members of cooperatives or associations. **Aquaculture Farms:** There are approximately 123 fish farms, twelve of them are large farms and the majority are small-scale. **CBOs/NGOs** play a key role in co-managing the Special Fisheries Conservation Areas (SFCAs) as well as supporting the targeted fishing communities in developing mari-culture/poly-culture or livelihoods sub-projects.

Financial Management

7. The Financial Management (FM) aspects of the Project will be undertaken by the Project Management and Coordination Division already established within the MICAF. The FM arrangements will be intertwined in the current structure of the division, which has ample experience with implementing donor funded projects. The financial management risk of the project is assessed as moderate. The FM assessment for the division is explained in the following paragraphs.

8. **Staffing**. The Project Management and Coordination Division in the MICAF will have direct oversight of the projects accounting. However, a Project Accountant will be hired to specifically fulfil the financial management requirements of the project. The Bank will provide training and continued support on World Bank's financial management and disbursement guidelines.

9. **Budgeting**. A budget for all the activities of the grant for the entire implementation period will be prepared at the beginning of the grant by the technical team of the Fisheries division, the Project Management and Coordination Division and the Project Manager. The budget will be revised each fiscal year and on an ad hoc basis based on implementation progress and will form a part of the Ministry of Industry, Commerce, Agriculture and Fisheries in the GOJ's annual budget. The steering committee will review the budget process as well as assess the risk of major areas highlighted by the monthly variance analysis.

10. **Internal Controls**. The Internal Audit (IA) department at the MICAF incorporates all projects in their annual work plan. The work plan is prepared based on the risk assessment conducted and submitted to the Internal Audit Directorate, Audit Committee and Permanent Secretary for review. The grant's documents should be shared with the IA unit to aid with the audit. The IA unit meets with management after each audit to discuss the findings and agree on a timeline to implement any recommendations made. A follow up audit is then completed and the IA unit prepares quarterly reports which are submitted to the audit committee, the Ministry of Finance and Public Service and the Permanent Secretary for review and discussions. We will review these reports once shared to aid in our supervision and institutional strengthening.

11. **Funds Flow and Disbursement Arrangements**. The Bank will disburse proceeds of the grant through advances, reimbursements and direct payments, of which advances are the primary method of disbursement. Disbursements will follow Bank's disbursement policies and procedures as stipulated in the Disbursement Letter of the Project and World Bank Disbursement Guidelines for Investment Project

Financing. The Project will report on the use of advances and process reimbursement requests, through Withdrawal Applications supported by Statement of Expenditures and reconciliation of the Designated Account, as established in the Disbursement Letter. Direct payments will be documented by records. Funds should only be used to finance eligible expenditures for implementation of the components as set out in the grant agreement and must comply with the disbursement categories. A segregated Designated Account in US Dollars will be used and held at the Central Bank, Bank of Jamaica. The Designated Account ceiling for advances will be US$500,000. A segregated local currency project bank account will also be used by MICAF. As financing is projected to be from the Bank and other counterparts, MICAF must ensure that each source of funds can be easily tracked by their system and individual cash balances identified at given periods. The Debt Management Branch in the MOFPS will maintain the US Dollars account and reviews and signs the Statements of Expenditure and Withdrawal Applications before submission to the Bank.

12. **Accounting and Financial Reporting**. The Project Management and Coordination Division will be responsible for producing the Interim Financial Reports (IFRs) on a quarterly basis and submitted no later than 45 days after the end of each reporting period to the Bank. These reports would provide required monitoring information and should be made available to both the internal and external auditors. Accounting records will be kept in the PIU's accounting system "Peachtree version 2009" and will be updated and monitored by the Finance Officer in accordance with the Project's Operations Manual. The Project Management and Coordination Division will submit monthly reports to the MICAF Finance and Accounts division so that the projects transactions may be captured in the MICAF Appropriation Accounts. The Project Management and Coordination Division should ensure that the Project's Operations Manual reflects the daily finance procedures of the unit and those that are project specific such as IFR preparation. The Project Management and Coordination Division should also ensure that they implement a monthly closing process that will ensure that the information in the accounting system is accurate and reports are produced timely and are of good quality.

13. **External Auditing**. Annual audit reports are required for the grant. The MICAF Project team should prepare the auditors' terms of reference, which will be reviewed by the Bank before the engagement of the auditor. The project's audit report should be submitted to the Bank for review no later than six months following the end of the fiscal year.

Procurement

14. The GOJ has a robust governance framework that is capable of managing the procurement process, adjudicating complaints, and facilitating transparency through investigating the award and termination of contracts. A major advantage has been that the GOJ Procurement Procedures are very similar to that of the World Bank's, including principles as value-for-money and fairness. The country is relatively stable economically, although there has been a slight increase in inflation it is expected that inflation will be contained within 4-6 percent. The MICAF has had a successful track record in implementing grant projects of a similar nature and loan programs funded by international agencies and also collaborated with the Jamaica Social Investment Fund (JSIF) for the implementation of the agricultural components of the Rural Economic Development Initiative. Nonetheless, given the changes in the Bank's procurement framework and the number of tenders for the beginning of the project, MICAF will need to strengthen the PIU with one dedicated Procurement Specialist and further training. Therefore, procurement risk is rated moderate.

15. The supply positioning assessment has revealed that most consulting contracts in the project are categorized as Strategic Security (10) or Strategic Critical (5), but all goods, works and non-consulting

services are tactical procurement. Although they are large in relation to the project amount, they are of small value in general (maximum US$250,000) and simple procurement arrangements should be used.

16. The market place has many suppliers for goods and general services contracts, but the market analysis indicated that there are few local specialized consultants, so to approach the international market is in order. This is envisaged for many consultancies.

17. The main procurement risks and respective mitigation measures are the following:

Risk Description	Description of Mitigation	Risk Owner
Insufficient number of qualified and experienced procurement personnel.	To recruit suitably qualified procurement officer to support the project.	MICAF
Insufficient experience or training in the new World Bank Procurement Procedures.	Training from the Bank as it relates to the new procurement procedures.	World Bank
Lack of qualified Consultants to bid on Consulting Services.	To seek a pool of qualified candidates from other international/regional entities.	MICAF
Delay in recruitment of Consultants in the First Year.	To prepare ToRs for all consultant assignments in the first year prior to project effectiveness.	MICAF
Delays due to time taken to regularize overseas contractors.	To identify documentation required for int'l firms have an officer to assist with the process.	MICAF
Moving exchange rate that may impact the cost of items imported for the project.	To procure goods in the first year of the project to minimize the impact.	MICAF
Insufficient and / or delay in allocation of counterpart fund.	To prepare and submit budget/request for funds in the appropriate budget cycle.	MICAF and MOFPS
Insufficient seed stock to supply to farmers for aquaculture production.	To supply required resources to hatcheries in a timely manner.	MICAF/Hatchery Operators
Variations to works contracts due to unplanned events or omitted specifications.	To sufficiently plan and detail contracts considering contractor's liability and specifications.	MICAF
Procurement of appropriate technology considering physical, environmental and technical capacities and preferences of the end users	Ensure the specifications are validated by end users and pervious experiences are also considered. Trial periods using different technologies should also be considered.	MICAF

18. The key Procurement Objectives that, if achieved, will support the delivery of the Project Development Objective and achieve Value for Money are:

a. To prepare bidding documents in such a manner that encourages responses from a range of eligible contractors, thus ensuring sufficient response and competition and avoiding unnecessary delays caused by failed tenders, thus enabling smooth project implementation.

b. Create incentives and low entry barriers to encourage the private sector to invest and participate in nursery and supply of seed stock and feed to encourage better competition in the future, thus enabling easier supply access for fisheries.

c. Ensure that works contracts capture appropriately the description of works and acceptance criteria to mitigate against variations to the contract, thus enabling smooth project implementation.

d. Include appropriate clauses in seed stock supplier contracts to mitigate the risk of non-performance of seed stock due to poor quality, thus enabling sustainability and success of fisheries.

19. Given the MICAF's experience and the small value of contracts, the procurement arrangements for the strategic consultancies were designed to provide simple processes while ensuring the core procurement principles:

Attribute	Selected arrangement	Justification/Summary/Logic
Specifications	Performance	ToRs will be administered and consultant paid upon submission of acceptable deliverables.
Sustainability Requirements	No	Not required.
Contract Type	Traditional	
Pricing and costing mechanism	Lump Sum	Fixed Cost contracts. Payments will be made as per agreed contract schedule.
Supplier Relationship	Adversarial	Most consultants will be from private sector.
Price Adjustments	None, fixed price	Short term contracts and low inflation rate.
Form of Contract (Terms and Conditions)	Payments in foreign currency	Many consultants are foreign.
Selection Method	Requests for Proposal (RFP)	Bank's standard for consultancies.
Selection Arrangement	Not applicable.	
Market Approach	Open; International; # of envelopes: N/A; Best and Final Offer: N/A; Negotiations: N/A.	MICAF will advertise request for expressions of interest internationally to attract qualified consultants, but contract amounts are small.
Pre / Post Qualification	N/A	
Evaluation Selection Method	Consultant's Qualifications Based Selection (CQS)	Assignments are small in which preparing and evaluating proposals is not justified.
Evaluation of costs	N/A	
Domestic Preference	N/A	
Rated Criteria	N/A	

20. The preferred arrangement for low value, low risk goods, works and non-consulting services contracts are: conformance specifications, limited/national market approach, fixed price, and request for quotations. The preferred arrangement for low value, low risk consultant contracts are: performance

specifications, traditional fixed-price lump-sum contracts, direct selection or individual consultants, approaching the national market.

Annex 3: Implementation Support Plan

Implementation Strategy

1. The strategy for implementation support has been developed based on the nature of the Project and its risk profile. It will aim at making implementation support to the client more flexible and efficient, and will focus on implementation of the risk mitigation measures for institutional capacity for implementation and sustainability risks (rated "moderate") and Environmental and social risks (rated "moderate").

2. *Institutional Capacity for Implementation and Sustainability Risks.* Bank missions will confirm that the PIU is fully staffed with qualified technical, procurement and FM specialists. Missions will also review the staffing and the work of consultants supporting the PIU on Project components.

3. The Bank will maintain regular contact with key officials of the MICAF and the PIOJ to exchange views on strategic issues of Project implementation and address any critical issues, e.g., potential or actual non-compliance with important Project covenants.

4. The Bank's FM and procurement specialists will provide necessary training to relevant PIU staff before commencement of the Project implementation. They will review the efforts of the MICAF in implementing financial management and procurement in accordance with agreed formats. They will monitor disclosure of Project information on the Project and MICAF websites, the effectiveness of internal control arrangements to address possible fraud and corruption and review the auditor's reports regarding weaknesses in controls and cases of fraud and corruption, if any. The FM specialist will be based in the Country Office to provide timely support. Supervision of financial management and procurement will be carried out semi-annually as part of the implementation support plan and additional support will be provided on an as-needed basis in response to client needs.

5. *Environmental risks*. The Bank's Environmental Specialist will ensure that any site specific Environmental Management Plan to be prepared is consistent with the ESMF based on detailed designs, and confirm that they are acceptable to the Bank. They will confirm that the required safeguard staffing is in place at the NEPA, and have been provided the required training to carry out their responsibilities. They will make field visits on at least an annual basis to ensure that the ESMF is being implemented in a satisfactory manner.

Implementation Support Plan

6. The table below indicates the focus areas and skills of the Bank project team to provide implementation support during the initial and subsequent periods of the Project.

Time	*Focus*	*Skills Needed*	*Resource Estimate*	*Partner Role*
First twelve months	Establishing the project management structure and getting the project implementation on track	Project management, Procurement, FM, Disbursement, Technical expertise, Safeguards	13 staff weeks	Project management, technical coordination, fiduciary management
12-48 months	Support and monitoring for achieving intended outcomes	Thematic expertise, safeguards	52 staff weeks	Project management, technical coordination, fiduciary management

7. Table below indicates the staffing needs for implementation support.

Skills Needed	*Number of Staff Weeks per year*	*Number of Trips per year*	*Comments*
• TTL/Environmental Specialist	4.0	2	
• Aquaculture Specialist	1.5	1	
• Fisheries Specialist	1.5	1	
• Environmental Management	1.0	1	
• Social Development	0.5	N/A	
• Communications	0.5	Local	
• Procurement	1.0	1	
• FM	1.0	Local	
• Disbursement	1.0	N/A	
• Legal	0.5	N/A	
• Program Assistant	2.0	Local	

Annex 4: Economic Analysis

Introduction

1. This annex seeks to demonstrate the economic benefit that will be generated as the result of the Promoting Community-Based Climate Resilience in the Fisheries Sector Project. The type of analysis used is a cost-benefit analysis. The Project focuses on climate change resilience of the local fisheries sector and more specifically on the access to improved livelihoods of local fishing and fish farming communities by assisting the development of fisheries policies and institutional capacity building among fishers and fish farmers. At the same time, institutional reforms play an important role in advancing productivity and increasing output in the aquaculture sector. As pointed out in the recent FAO study of regional trends:

> 'Until now, most regional expansion efforts have centered on the development of technologies and on environmental issues; lately it has become clear that management and governance issues, and the relations of aquaculture with local communities and populations are at the center of worries that need to be addressed to realize the full potential of this young industry.'[21]

2. Although the Project period of five years is too short to measure economic impacts, the Project intends to lay the foundation of the fisheries sector for a long-term transformation. As such, expected economic impacts of the project intervention are implicit. The rationale for the intervention is ostensibly to strengthen the capacity of the local fishers and fish farmers and by extension the fisheries sector and other sectors related to marine and coastal ecosystems, to withstand negative effects of climate change through more effective organization, increased knowledge, adoption of climate-smart practices and increased capacity to diversify livelihoods.

Methodology

3. The limited availability of data does not facilitate a cost-effectiveness analysis to measure benefits in monetary terms. A modified approach to the cost-benefit analysis is therefore used. The first task is to establish the economic benefits of the project related to production. The second task is to specify the time frame. The third task is to determine what model to apply to explain the impact of the project outputs on economic performance. This is largely theoretical and, therefore, constitutes a major assumption.

4. For fish farmers, production is especially dependent on technological knowledge and business organization. As an example, Asamoah *et al* (2012) conducted a study using the Cobb-Douglas production function to determine the inputs that affect productivity[22] of fish farmers in Ghana. This showed stocking rate as the most significant input that affected production and that aquaculture exhibited increasing returns to scale. Cooperative fisheries, involving collaboration among a number of fish farmers, provided the main means by which small producers were able to establish viable fish farms. Estimates of the marginal physical productivity of the inputs indicated stocking rate should be increased while optimizing feed rates and labor in order to increase productivity. This kind of finding supports an assumption that increased technical knowledge and organizational capacity of fishers and fish farmers, if combined with access to land and other inputs to their capture and culture fisheries enterprise, will lead directly to increased production, all things being equal. Additionally, the contribution of aquaculture production to the Ghanaian economy has grown over the past decade, with an annual average growth rate of 12.4

[21] The State of World Fisheries and Aquaculture, FAO, 2016.
[22] Eunice Konadu Asamoah, *et. al.* (2012): A Production Function Analysis of Pond Aquaculture in Southern Ghana, Aquaculture Economics & Management, 16:3, 183-20, http://dx.doi.org/10.1080/13657305.2012.704616.

percent. Fisheries is estimated to contribute 3 percent of the total national GDP and 5 percent of the agriculture GDP of Ghana. It is reasonable to assume, therefore, that the revitalization of the fisheries sector in general, could lead to incremental growth in the GDP of fisheries, agriculture and national GDP.

5. For coastal fisheries, major direct benefits are derived from increased fish catch, tourism, mari-culture and shoreline protection. Estimating the full set of these benefits is not feasible, but the analysis uses the existing literature to estimate benefits in fish catch and tourism. Given that the project will not know the nature and size of fisheries-based livelihoods, this analysis considers increased fish biomass from sustainable fisheries management as the proxy of direct benefit.

6. Externalities and internalities in the form of environmental impacts of the Project should be taken into account, although this may be difficult because of the lack of information. The reduction in fishing effort in consequence of the decreased number of artisanal fishers operating in capture fisheries, for example, will improve the prospects of regeneration of the reefs and restoration of fish stocks. The reef restoration also provides economic opportunities in terms of recreational uses including tourism. An attempt is made to combine these effects into a general economic benefit, reflected in increased production of the aquaculture and capture fisheries sector over time.

Assumptions

7. The costs include the expenditures related to the Project activities over a five-year period.

8. The benefits will start to emerge in Year and expand incrementally as a result of the adoption of climate resilient fisheries practices including improved technical, organizational and managerial capabilities of the fish farmers and fisherfolk.

9. The Project interventions in the marine fisheries is estimated to be in the order of 12 percent of the entire sector.

10. Continued support for the policy framework of the MICAF is assumed, as well as continued economic stability contingent on GOJ's fiscal programs and economic growth strategy.

Analysis of Costs and Benefits

11. **Project Costs.** The Project costs would be the financing by the PPCR grant with the co-financing from the GOJ in the amount of US$5.125 million total for five years.

12. **Project Benefits.** Component 1: Without the Project, biomass of herbivorous fish will continue to decline by 18 percent and commercially important fish by 27 percent annually.[23] The baseline average annual fish production in reef-related fisheries in 2012 is 10,943 Mt corresponding to US$37.7 million.[24] Sustainable fisheries management, especially enforcement of no-take zones such as Special Fishery Conservation Areas (SFCAs) in reef systems, have been scientifically proven to improve fish stocks by 3 to 21 times its original biomass. According to the National Environment and Planning Agency (NEPA), the Oracabessa Bay Special Fishery Conservation Area has recorded progressively increasing overall location biomass totals from 859.2 g/100 m^2 in 2011 to 5,352.2 g/100 m^2 in 2015. A study shows that reef fish biomass worldwide in the absence of fishing pressure produces averages of approximately 10,000 g/100 m^2 per site.[25] In Jamaica, the highest overall reef fish biomass reported recently is 6,680 g/100 m^2 in Bonaire. The Project will contribute to restoring fish biomass in 15 marine protected areas and to

[23] NEPA. 2016. Coral Reefs of Jamaica, An Evaluation of Ecosystem Health: 2015. NEPA. 18 pp.
[24] Caribbean Regional Fisheries Mechanism (CRFM). Statistics and Information Report for 2012.
[25] MacNeil, M. A., et. al. 2015. Recovery potential of the world's coral reef fishes. Nature 520, 341–344.

increasing fish catch, especially commercially important fish, in the adjacent fisheries. Therefore, it is estimated the base annual benefit equals to US$1.22 million starting in Year 5.

13. The tourism sector will also benefit from increased tropical fish and healthier corals that attracts tourists. Loss in value due to current rates of beach erosion is US$19.2 million. If reefs degrade further, it is estimated that the additional beach erosion will increase this loss to US$33 million annually—a 70 percent increase in the annual loss of value from the base scenario. This loss of value is projected to have knock-on impacts by reducing tourist visitation to Jamaica by 9,000–18,000 visitors annually, costing an estimated US$9 million to US$19 million per year to the Jamaican tourism industry and US$11 million to US$23 million per year to the entire Jamaican economy.[26] The annual benefit from the Project interventions to the tourism sector is estimated at US$1.08 million.

14. Component 2: There are estimated 123 active aquaculture ponds over 545 ha in about 20 communities across the parishes in Jamaica.[27] According to the MICAF, total production is approximately 646 Mt in 2015 with a value of US$2.58 million. The average production rate is between 2,700 and 3,800 kg per ha. The project will provide support for the hatchery owned by the Fisheries Division, the feed production and the operation of the fish ponds owned by small fish farmers. The Project attempts to support a total of 81 ha of ponds to increase the production in the scale of 320 Mt per year, and an estimated value of US$1.27 million.

Table 4.1 Net Present Value of Costs and Benefits in 10 Years (US$ million)

Category	Base Annual Value	NPV		
		Discount Rate		
Benefits		*10%*	*12%*	*4%*
Tourism	1.08	3.21	2.82	4.84
Fisheries	1.22	3.63	3.19	5.47
Aquaculture	1.27	3.78	3.32	5.69
Total Benefits	**3.57**	**10.62**	**9.33**	**16.00**
Total Costs	**1.03**	**3.89**	**3.69**	**4.56**
Net Benefits	**-**	**6.74**	**5.64**	**11.44**

Conclusion

15. Without the project, production in the aquaculture and capture fisheries will likely continue to decline due to climate-related impacts and anthropogenic stressors such as overfishing. Given little opportunity for alternatives, fishers and fish farmers will continue to lose livelihoods and the level of poverty among them will continue to increase.

16. As shown in Table 4.1, it is estimated that the Project will result in positive net benefit in a 10-year horizon at different discount rates. The analysis does not include the value of shoreline protection by improved reef ecosystems due to lack of specific data. The value of mari-culture supported by the Project is also not considered, because type of mari-culture investments is not known at the time of this

[26] World Resources Institute (WRI). 2015. Coastal Capital: Jamaica.
[27] Fisheries Division, 2016.

analysis. With these values, the total benefits from the Project interventions will be more than the net benefit presented above. Based on the cost-benefit analysis, the financing of the Project is justified.

Annex 5: Map of Jamaica