



ADAPTATION FUND

AFB/PPRC.22/4
11 March 2018

Adaptation Fund Board
Project and Programme Review Committee
Twenty-Second Meeting
Bonn, Germany, 20-21 March 2018

REQUEST FOR CHANGE OF PROGRAMME OUTCOME, OUTPUT AND RELATED INDICATORS: JAMAICA (PIOJ)

Background

1. The Adaptation Fund Board (the Board) at its eighteenth meeting, approved the programme titled “Enhancing the Resilience of the Agricultural Sector and Coastal Areas to Protect Livelihoods and Improve Food Security” submitted by the Planning Institute of Jamaica (PIOJ) for a requested amount of US\$ 9,965,000 (decision B.18/9). The overall objective of the programme is to protect livelihoods and food security in vulnerable communities by improving land and water management for the agricultural sector, strengthening coastal protection and building institutional and local capacity for climate change adaptation. As mandated by the decision, an agreement was prepared and signed between the Board and PIOJ.

2. The first tranche of disbursement for the implementation of the programme was released following signature of the agreement in July 2012, with the total amount of US\$ 3,451,897.

3. The first programme performance report (PPR) for the programme was submitted in January 2014 and cleared by the Adaptation Fund Board Secretariat (the secretariat) in February 2014. The second PPR was submitted in December 2014 and cleared by the Adaptation Fund Board Secretariat (the secretariat) in January 2015, the third PPR was submitted in January 2016 and cleared by the secretariat in March 2016, and the fourth PPR was submitted by the secretariat in January 2017 and cleared the same month. The fifth fourth PPR was submitted by the secretariat in December 2017 and is currently under review. As of December 2017, a total amount of US\$ 5,980,360 was disbursed to the programme by the Board’s Trustee. The programme went through a mid-term evaluation (MTE) process, with an MTE report finalized in February 2016.

4. The official expected completion date of the programme was March 2016. As outlined in the Adaptation Fund project delay policy, a request for an extension of programme completion date must be submitted by the implementing entity at least six months prior to the official completion date. PIOJ had submitted such request through the Secretariat in January 2016, hence in compliance with the policy, for an extension of the completion date until September 2017 (see Annex 1). The reason for such request was a number of unforeseen issues that had negatively impacted implementation, including delays in the start of the construction phase of component 1 due to issues encountered in the consultation process in the target area for that component. The request was approved through Decision 27-28/1.

5. In July 2017, PIOJ had submitted another request through the Secretariat, hence at a date less than six month prior to the official completion date, for an extension of the completion date until March 2019 (see Annex 2). The request was approved through Decision 29-30/11. The reason for such request was a number of unforeseen issues that had negatively impacted the progress of implementation necessitating this request for additional time so as to ensure completion of the approved programme and achievement of the agreed objectives. These issues included:

- The discontinuation of Component 1 in June 2016 after a 2-year implementation delay associated with protracted opposition from some members of the Negril community;

- Arising from this situation, and in line with the Cabinet's direction, the NIE has been in consultation with a number of partners regarding the next steps; the conclusion was reached to develop a revised component focused on coastal protection in another location as there is a great need for such intervention across the country. The NIE has since engaged a consultant to prepare the revised component with focus on climate change adaptation through coastal protection. The revised programme should be ready for submission to the Adaptation Fund for technical review by mid-September;
- Receipt of request from the Agriculture Ministry outlining several persistent challenges with the water harvesting/distribution sub-component of Component 2 and applying for additional time to complete the agreed project scope. These challenges which include difficulties with the contracting process for the design and installation of the distribution networks have been compounded by weather conditions of both extremes; the most recent being flood rains over the period March to June 2017. These rains have impacted the completion of the installation of some water harvesting infrastructure with the Ministry of Agriculture having to halt and/or delay excavation of ponds because of too much moisture in the soil.

6. In relation with the issues encountered by the programme and mentioned above, PIOJ had submitted on February 9, 2018 a request for change of programme outcome, outputs and related indicators (see Annex 3). Following unsuccessful attempts at mediation with some of the stakeholders in the originally proposed location for the project, PIOJ sought the intervention of the Cabinet which gave approval for discontinuation of the original Component 1 and related elements of Component 3. The Cabinet also directed PIOJ to seek approval from the Board to revise these components in order to build the resilience of other badly eroded areas of the island.

7. Such request is in compliance with Annex 7 of the Operational Policies and Guidelines of the Fund (OPG), as approved in October 2017, as follows:

“10. For changes in project outcomes, including introductions, modifications and deletions, on the understanding that such changes would only be accepted in exceptional circumstances, the implementing entities should:

- (i) obtain prior approval from the Board following a full technical review of the revised fully-developed project/programme document by the Project and Programme Review Committee;*
- (ii) communicate such changes to the secretariat; and*
- (iii) submit a letter from the designated authority endorsing such changes to the secretariat, for the purposes of such technical review and approval; and*

11. For changes in project output or outcome indicators and/or associated targets, including modifications and deletions, on the understanding that such changes would only be accepted in exceptional circumstances and up to the submission of the first Project Performance Report for the project/programme, the implementing entities should:

- (i) *obtain prior approval from the Board following a full technical review of the revised fully-developed project/programme document by the Project and Programme Review Committee;*
- (ii) *communicate such changes to the secretariat; and*
- (iii) *submit a letter from the designated authority endorsing such changes to the secretariat, for the purposes of such technical review and approval.”*

8. The communication from PIOJ was submitted on February 9, 2018, the letter of endorsement of the Designated Authority of Jamaica was submitted on January 15, 2018 (see Annex 4), and the revised fully-developed programme document was first submitted on January 15, 2018 (see Annex 5 for the latest version cleared by the secretariat following its final technical review).

Secretariat's review of the request

9. Component 1 of the programme had been revised to still address the same objective as in the original project design, while targeting another area. The towns of the north-eastern coast, like most of Jamaica's urban areas are low lying and susceptible to the impacts of storm surges during hurricanes and the passage of tropical systems and are extremely vulnerable to rising sea levels. The frequency and extent of these events are increasing with climate change, putting the towns' occupants and infrastructure at significant risk. Ongoing monitoring of the towns along the north-eastern coast, namely, the communities of Annotto Bay, Orange Bay and Buff Bay by the National Environment and Planning Agency (NEPA) has shown that significant erosion is occurring along the coast.

10. The major problems to be addressed are i) the retreat of the coastline towards major, critical, physical assets within these towns which results in personal physical vulnerability, disruption of livelihoods, significant economic losses as a result of infrastructural damage ii) coastal and riverine flooding iii) deforestation iv) reducing vulnerability of critical assets and v) limited community resilience. Addressing these issues with shoreline protection and ecosystems restoration (reforestation), drainage system outfall upgrade, and capacity building should augment the climate change adaptive capability of the citizenry and the natural environment, improve disaster management, and enhance the livelihood of the community members. Component 1 of the project will therefore be implemented along the coastline in general and along the existing coastal main road in some locations as well as in the denuded hillsides.

11. In addition, it is proposed that the relevant capacity building activities under Component 3 be updated accordingly for the new target area and communities. The suggested changes in outcome, outputs and activities are reflected in the revised proposal attached as Annex to this document. The implications on cost effectiveness, environmental and socio-economic benefits, programme risks including environmental and social risks in compliance with the Environmental and Social Policy of the Fund, implementation arrangements and budget are also explained in the revised proposal. Lastly, a revised disbursement schedule is provided. It should be noted that the proposed change does not constitute a material change as outlined in Annex 7 of the OPG, i.e. “any cumulative total budget change at output-level between the revised budget and the original budget that involves ten per cent (10%) or more of the total budget of the project/programme”.

12. The initial technical review, focusing mainly on aspects of the proposal related to Component 1 and relevant activities under Component 3, found that the updated proposal included a new component addressing coastal erosion that was consistent with the programme objective, although targeting a new area. A few clarification requests were made, related among other issues to the nature of the proposed interventions, their cost effectiveness and compliance with the Environmental and Social Policy (ESP) of the Fund.

13. The final technical review finds that PIOJ had adequately addressed the issues raised.

Recommendation

14. Therefore, the Project and Programme Review Committee (PPRC) may wish to recommend the Board to:

- a) Approve the change in outcome, outputs and related indicators for the programme “Enhancing the Resilience of the Agricultural Sector and Coastal Areas to Protect Livelihoods and Improve Food Security”, as requested by the Planning Institute of Jamaica (PIOJ) and contained in the revised proposal presented as Annex 5 of document AFB/PPRC.22/4; and
- b) Request the secretariat to draft an amendment to the agreement between the Board and PIOJ to reflect changes made under a).

Annexes

- 1. The first request for an extension of the completion date until September 2017, submitted by PIOJ through the secretariat;
- 2. The second request for an extension of the completion date until March 2019, submitted by PIOJ through the secretariat;
- 3. The request for changes in outcome, outputs and related indicators, submitted by PIOJ through the secretariat;
- 4. Letter by the Designated Authority for Jamaica endorsing the proposed changes in outcome, outputs and related indicators, dated January 15, 2017;
- 5. Revised proposal document with tracked changes addressing comments made by the secretariat in its initial review.

Annex 1: request for an extension of the completion date until September 2017, submitted by PIOJ through the secretariat

Annex I: Request for extension

Request for extension of project/programme completion date

AF Project/programme ID: JAM/NIE/Multi/2011/1			
Project/programme Title: Enhancing the Resilience of the Agricultural Sector and Coastal Areas to Protect Livelihoods and Improve Food Security			
Country: Jamaica			
Project/Programme Approval (date)	July 2012		
Expected Project/programme Completion (date)	March 2016	Proposed Revised Completion (date):	December 2017

Reasons/justifications for the extension of project/programme completion:

- Lower than required level of project-readiness by Executing Entities. Generally, this was quite low in the first year of the implementation cycle, leading to several iterations of work plans, procurement delays and a longer than intended start-up phase.
- Delays in the start of the construction phase of component 1. While the necessary preliminary work and preparatory activities - detailed designs, Environmental Impact Assessment, and prequalification of contractors - have been completed, belated and ongoing opposition to the intervention from a group of Negril stakeholders has effectively stalled implementation leading to negligible progress over the past 18 months. A lot of the NIE and PMU's time and energies have had to be dedicated to seeking resolution to this issue. The delay in Component 1 has had a ripple effect on Component 3 and an overall delaying impact on the programme. Component 1 is allocated \$5.4M - approximately 55% of the programme budget.
- Scope change and small adjustments in programme design. A relatively significant element of Component 2 (installation of micro dam), required adjustments due to geo-technical and socio-political challenges which emerged in the project area after implementation commenced. The process of identifying alternative interventions and sites was time- and labour-intensive and further affected project performance.
- Back to back periods of severe and prolonged drought contributed to extended delays on some agriculture activities, notably the agro-forestry sub-component.
- Realization of some probable risks at levels above those anticipated. These include the readiness of some communities for the project, demands on staff resources of partner agencies, especially field staff, and generally low absorptive capacity.

Implementing Entity certification

This request has been prepared in accordance with Adaptation Fund policies and procedures, has been agreed by participating executing entities, and the designated authority (DA) has been notified. YES

Name & Signature



*Kirk Philips
Corporate Governance & Management
for Director General
Planning Institute of Jamaica*

Project/programme contact person

Date: January 19, 2016

Tel. and Email: (876)935-5099

Annex 2: Request for an extension of the completion date until March 2019, submitted by PIOJ through the secretariat

Request for extension of project/programme completion date

AF Project/programme ID: JAM/NIE/Multi/2011/1			
Project/programme Title: Enhancing the Resilience of the Agricultural Sector and Coastal Areas to Protect Livelihoods and Improve Food Security			
Country: Jamaica			
Project/Programme Approval (date)	July 2012		
Expected Project/programme Completion (date)	March 2016	Proposed Revised Completion (date):	December 2017

Reasons/justifications for the extension of project/programme completion:

- Lower than required level of project-readiness by Executing Entities. Generally, this was quite low in the first year of the implementation cycle, leading to several iterations of work plans, procurement delays and a longer than intended start-up phase.
- Delays in the start of the construction phase of component 1. While the necessary preliminary work and preparatory activities - detailed designs, Environmental Impact Assessment, and prequalification of contractors - have been completed, belated and ongoing opposition to the intervention from a group of Negril stakeholders has effectively stalled implementation leading to negligible progress over the past 18 months. A lot of the NIE and PMU's time and energies have had to be dedicated to seeking resolution to this issue. The delay in Component 1 has had a ripple effect on Component 3 and an overall delaying impact on the programme. Component 1 is allocated \$5.4M - approximately 55% of the programme budget.
- Scope change and small adjustments in programme design. A relatively significant element of Component 2 (installation of micro dam), required adjustments due to geo-technical and socio-political challenges which emerged in the project area after implementation commenced. The process of identifying alternative interventions and sites was time- and labour-intensive and further affected project performance.
- Back to back periods of severe and prolonged drought contributed to extended delays on some agriculture activities, notably the agro-forestry sub-component.
- Realization of some probable risks at levels above those anticipated. These include the readiness of some communities for the project, demands on staff resources of partner agencies, especially field staff, and generally low absorptive capacity.

Implementing Entity certification

This request has been prepared in accordance with Adaptation Fund policies and procedures, has been agreed by participating executing entities, and the designated authority (DA) has been notified. YES

Name & Signature



*Kirk Philips
Corporate Governance & Management
for Director General
Planning Institute of Jamaica*

Project/programme contact person

Date: January 19, 2016

Tel. and Email: (876)935-5099

Annex 3: Request for changes in outcome, outputs and related indicators, submitted by PIOJ through the secretariat



THE PLANNING INSTITUTE OF JAMAICA

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February 9, 2018

Mr. Mikko Ollikainen
Adaptation Fund Manager
Adaptation Fund Board Secretariat
1818 H Street NW
Washington DC 20433
USA

Dear Sir,

Re: Government of Jamaica/Adaptation Fund Programme (GOJ/AFP) "Enhancing the Resilience of the Agriculture Sector and Coastal Areas to Protect Livelihoods and Improve Food Security Programme" -- Request for Material Change

We refer to the above Programme and the associated grant agreement entered into between the Planning Institute of Jamaica as National Implementing Entity (NIE) and the Adaptation Fund Board (AFB). As previously informed, a material change has occurred in relation to Component 1 (Negril breakwater project).

Following unsuccessful attempts at mediation with some of the stakeholders in the originally proposed location for the project, the NIE sought the intervention of the Cabinet which gave approval for discontinuation of the original Component 1 and related elements of Component 3. The Cabinet also directed the NIE to seek approval from the AFB to revise these components in order to build the resilience of other badly eroded areas of the island.

To replace the aborted elements of the GOJ/AFP, the NIE and partners have now developed a revised Programme which maintains the original emphasis; however, the new Component 1 will focus on climate change adaptation through coastal resilience building in the north eastern section of the country. Accordingly, we now write to seek technical review by the Secretariat and approval of the AFB for Jamaica's revised Programme.

In order to facilitate the AFB approval, we submit for your review the following documents:

1. The revised Programme Proposal with annexes
2. Letter from the Designated Authority endorsing the revisions to the GOJ/Adaptation Fund Programme

The Planning Institute of Jamaica hereby requests that the associated documents be presented to the Adaptation Fund Board at the 31st meeting in March 2018 for consideration.

Thank you for your collaboration.

Yours truly,


 Claire Bernard (Ms)
 for Director General

DIRECTORS: Dr. Wayne Henry, Director General/Chairman, Mr. Collin Williams, Mr. Mark Tracey, Mr. Everton McFarlane, Professor David Tennant, Ambassador Dr. Richard Bernat, Professor Alvin Wint, Ms. Merle Donaldson, Ms. Erica Anderson

Annex 4: Letter by the Designated Authority for Jamaica endorsing the proposed changes in outcome, outputs and related indicators, dated January 15, 2017



MINISTRY OF ECONOMIC GROWTH & JOB CREATION

THE TOWERS, 25 DOMINICA DRIVE, KINGSTON 5, JAMAICA, W.I.
TELEPHONE: (876) 926-1590, (876) 926-1690-3 FAX: 906-1214

ANY REPLY OR SUBSEQUENT REFERENCE TO
THIS COMMUNICATION SHOULD BE
ADDRESSED TO THE PERMANENT
SECRETARY AND THE FOLLOWING
REFERENCE NUMBER QUOTED:

January 15, 2018

Mr. Mikko Ollikainen
Manager
Adaptation Fund Board Secretariat
1818 H Street NW
Washington DC 34033
USA

Dear Mr. Ollikainen

Endorsement for Revised Proposal: Enhancing the Resilience of Agricultural Sector and Coastal Areas to Protect Livelihoods and Improve Food Security

In my capacity as Designated Authority for the Adaptation Fund in Jamaica, I confirm that the above-mentioned revised project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Jamaica.

Accordingly, I am pleased to endorse the revised project proposal for technical review by the Adaptation Fund Board Secretariat and submission to the 31st Board Meeting in March, 2018.

Sincerely

A handwritten signature in black ink, appearing to read 'Una May Gordon'.

Una May Gordon
Principal Director
Climate Change Division and
Designated Authority

Annex 5: Revised Programme Proposal document



PROGRAMME PROPOSAL



PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:

REGULAR

COUNTRY/IES:

JAMAICA

TITLE OF PROJECT/PROGRAMME:

**ENHANCING THE RESILIENCE OF THE AGRICULTURE
SECTOR AND COASTAL AREAS TO PROTECT LIVELIHOODS
AND IMPROVE FOOD SECURITY**

TYPE OF IMPLEMENTING ENTITY:

NATIONAL IMPLEMENTING ENTITY

IMPLEMENTING ENTITY:

PLANNING INSTITUTE OF JAMAICA

EXECUTING ENTITY/IES:

**NATIONAL ENVIRONMENT AND PLANNING AGENCY,
NATIONAL WORKS AGENCY, MINISTRY OF AGRICULTURE AND
FISHERIES, MINISTRY OF TOURISM**

AMOUNT OF FINANCING REQUESTED:

US\$9,995,000 (In U.S Dollars Equivalent)

List of Acronyms

<u>ABCDEA</u>	<u>Annotto Bay Community Development & Environmental Association</u>
AF	Adaptation Fund
AFB	Adaptation Fund Board
<u>BUR</u>	<u>Biennial Update Report</u>
CARDIN	Caribbean Disaster Information Network
CBO	Community based Organization
CCADRR	Climate Change Adaptation and Disaster Risk Reduction
CC	Climate Change
CIDA	Canadian International Development Agency
CVI	Coastal Vulnerability Index
DRR	Disaster Risk Reduction
EFJ	Environmental Foundation of Jamaica
EIA	Environment Impact Assessment
EU	European Union
FAO	Food and Agriculture Organization
FCF	Forest Conservation Fund
FFS	Farmers Field School
GAAP	Generally Accepted Accounting Principle
GCM	Global Circulation Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Risk Recovery
GOJ	Government of Jamaica
HDI	Human Development Index
IDB	Inter- American Development Bank
IDP	International Development Partners
IFRS	International Financial Reporting Standards
IPCC	Intergovernmental Panel on Climate Change
<u>JaREEACH</u>	<u>Jamaica Rural Economy and Ecosystems Adapting to Climate Change</u>
<u>JCCCP</u>	<u>Japan Caribbean Change Climate Partnerships</u>

JCCEAP	Jamaica Climate Change Enabling Activity Project
JCDT	Jamaica Conservation and Development Trust
<u>JDVRP</u>	<u>Jamaica Disaster Vulnerability Reduction Project</u>
MAJIC	Marketing and Agriculture for Jamaican Improved Competitiveness
MDG	Millennium Development Goal
<u>MEGJC</u>	<u>Ministry of Economic Growth and Job Creation</u>
<u>MLSS</u>	<u>Ministry of Labour and Social Security</u>
MOAF	Ministry of Agriculture and Fisheries
NCRPS	Negril Coral Reel Preservation Society
NEPA	National Environment and Planning Agency
NEPT	Negril Area Environment Protection Trust
NGO	Non- Governmental organization
NIC	National irrigation Commission
NIE	National Implementing Entity
NMTPF	National Medium-Term Priority Framework
NRCA	Natural Resources Conservation Authority
NRM	Natural Resource Management
NWA	National Works Agency
ODPEM	Office of Disaster Preparedness and Emergency Management
PIOJ	Planning Institute of Jamaica
<u>PIMSEC</u>	<u>Public Investment Management Secretariat</u>
<u>PSIP</u>	<u>Public Sector Investment Programme</u>
PPCR	Pilot Programme for Climate Resilience
RADA	Rural Agricultural Development Authority
RiVAMP	Risk and Vulnerability Assessment Methodology Project
<u>RCP</u>	<u>Representative Concentration Pathways</u>
RWH	Rain Water Harvesting
SDM	Species Distribution Model
SECIN	Social and Economic Information Network
SLM	Sustainable Land Management
SLR	Sea Level Rise

SNC	Second National Communication
SST	Sea Surface Temperature
<u>TNC</u>	<u>Third National Communication</u>
TOT	Training of Trainers
TWG	Thematic Working Group
UNDP	United Nations Development Programme
UNEP	United Nation Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UWI	University of the West Indies
<u>WAD</u>	<u>Wave Attenuation Device</u>
WMU	Watershed Management Unit
WRA	Water Resources Authority
WUA	Water Users Association
WUG	Water Users Group

Table of Contents

PART I: PROJECT/PROGRAMME INFORMATION	1
PROJECT / PROGRAMME BACKGROUND AND CONTEXT:.....	14
Country Context	14
PROBLEM STATEMENT	22
Climate Variability	25
Climate Change Impacts.....	25
Programme Location	44
Component 1:.....	44
Component 2.....	46
Component 3.....	49
4. PROJECT / PROGRAMME OBJECTIVES:.....	51
PROJECT / PROGRAMME COMPONENTS AND FINANCING:	54
PART II: PROJECT / PROGRAMME JUSTIFICATION.....	59
<i>A: Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.</i>	59
Component 1: Increasing the climate resilience of the North Eastern Coastline	60
1. Buff Bay and Orange Bay will be protected by shoreline protection work.....	66
2. The town of Annotto Bay will be protected by shoreline protection works by:.....	66
Component 2: Enhancing the climate resilience of the agricultural sector by improving water and land management	70
Intervention 1 - The Establishment of a Micro Dam in Northern Manchester	71
Component 3: Improving institutional and local level capacity for coastal and agricultural adaptation and awareness raising for behaviour modification.....	75
<i>B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.</i>	77
<i>C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme</i>	90
<i>D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national adaptation plan (NAP) or sub-national</i>	

<i>development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. Is there a poverty reduction strategy?</i>	93
<i>E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.</i>	97
<i>F. Describe if there is duplication of project / programme with other funding sources, if any.</i>	100
<i>G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned</i>	107
<i>H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation</i>	108
<i>I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning</i>	114
<i>J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.</i>	119
<i>K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.</i>	121
PART III: IMPLEMENTATION ARRANGEMENTS	129
<i>A. Describe the arrangements for project / programme implementation</i>	129
<i>B. Describe the measures for financial and project / programme risk management</i>	133
<i>C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.</i>	135
<i>D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan in compliance with the ESP and the Gender Policy of the Adaptation Fund</i>	148
<i>E: Include a results framework including milestones, targets and indicators</i>	152
<i>F: Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund</i>	160
<i>G: Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and breakdown of the execution costs</i>	167
<i>H: Include a disbursement schedule with time-bound milestones</i>	169
Annex 1	i
Annex 2. Preliminary Designs – Component 1	xviii
annex 3 - scoring mechanism for choosing projects	xxiv
PART I: PROJECT/PROGRAMME INFORMATION	1
PROJECT / PROGRAMME BACKGROUND AND CONTEXT:	9
Country Context	9

Environmental Context	13
PROBLEM STATEMENT	14
Climate Variability	15
Climate Change Impacts	16
4. PROJECT / PROGRAMME OBJECTIVES:	32
PROJECT / PROGRAMME COMPONENTS AND FINANCING:	34
PART II: PROJECT / PROGRAMME JUSTIFICATION	38
A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.	38
Component 1: Increasing the climate resilience of the Negril coastline	39
Component 2: Enhancing the climate resilience of the agricultural sector by improving water and land management	42
Intervention 1 – The Establishment of a Micro Dam in Northern Manchester	44
Component 3: Improving institutional and local level capacity for coastal and agricultural adaptation and awareness raising for behaviour modification	47
B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities	49
C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme	56
D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. Is there a poverty reduction strategy?	58
E. Describe how the project / programme meets relevant national technical standards, where applicable ..	61
F. Describe if there is duplication of project / programme with other funding sources, if any	63
G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned	67
H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation	69
I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning	72
PART III: IMPLEMENTATION ARRANGEMENTS	76
A. Describe the arrangements for project / programme implementation	76
B. Describe the measures for financial and project / programme risk management	78
C. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan	80

D: provide a results framework for the programme proposal, including milestones, targets and indicators	82
E: Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and breakdown of the execution costs	93
F: Include a disbursement schedule with time-bound milestones	95
Annex 1	97
Annex 2	101
Annex 3	113

LIST OF FIGURES

Figure 1: Plot of 30 Yr. Mean Rainfall (1951-1980 and 1971- 2000) for Jamaica (Source: Meteorological Services)	9
Figure B: Poverty Map of Jamaica (Source: PIOJ, 2001).....	11
Figure C: Per capita Expenditure and Population Density of Jamaica (Source: World Bank).....	12
Figure D: Agriculture Production Index, 1996 - 2009 and the Impact of Extreme Climate Events	22
Figure E: Map of Jamaica Showing 14 Parishes (Source: UNEP, 2010).....	26
Figure F: General Map of Negril (Source: UNEP, 2010)	27
Figure G: Mean rainfall for Manchester, 1951-1980 (Source: National Met Service)	28
Figure H: Mean rainfall for Clarendon, 1951-1980 (Source: National Met Service)	29
Figure I: Mean rainfall distribution by parish (Source: National Met Service).....	30
Figure J: Climate Risks, Impact, and Expected 'No-Intervention' Outcomes (Source: PIOJ).....	33
Figure K: Relationship of Programme Components in Achieving Programme Outcomes.....	55
Figure L: Indicative Organizational Outline (Source: PIOJ, 2011)	78
Figure M: (i) Proposed Breakwater Structure	97
Figure M: (ii) ~590m Breakwater Structure	98
Figure M: (iii) 400m Breakwater Structure.....	99
Figure N: Map of Watershed Management Units of Jamaica (Source: Water Resources Authority..	114

LIST OF TABLES

Table 1: Summary of climate model predictions for Jamaica	22
Table 2: Climate change threats and potential impact on Jamaica.....	28
Table 3: Agriculture-related losses / damage from climate-related hazards, 1994-2008 (Selected Years).....	31
Table 4: Population of Targeted Communities	41
Table 5: Climate Related Hazards in North Eastern Coast and the Agriculture Sector.....	59
Table 6: Number of Registered Fishers and Vessels, 2017	63
Table 7: Summary of activities related to Component 2 - enhancing the climate resilience of the agricultural sector by improving water and land management.....	75
Table 8: Proportion of Buildings that are located in storm surge zone.....	82
Table 9: Expected Losses Based on Storm Surge Scenario	84
Table 10: Summary of Social, Economic and Environmental Benefits of the Programme	86
Table 11: Complementary Projects and Programmes.....	100

Table 12: Some Participating Organisations - AF Programme Development and Review	111
Table 13: Environmental and Social Safeguards Checklist	122
Table 14: Stakeholder Responsibility Matrix (Selected Activities)	131
Table 15: Major Risks of the Programme.....	134
Table 16: Measures for Environmental and Social Risk Management	137
Table 17: Categorisation of Risks	147
Table 18: Risk Identification and Assessment Template	147
Table 19: Monitoring and Evaluation Activities.....	151
Table 20: Evaluation Criteria.....	152
Table 21: Results Framework of the Adaptation Fund	153
Table 22: Alignment of Programme with AF Objectives	160
Table 23: Alignment Table with Core Indicator of AF	166
Table 24: Detailed Programme Budget.....	167
Table 25: Disbursement Schedule	169
Table 26: Indicative Budget for the NIE	170
Table 27: Breakdown of Execution Costs	170
Several projections have also been made regarding the impact of climate change on tropical cyclones in the Caribbean Region. While these are inconclusive with respect to the overall frequency of cyclone events for the sub region, the forecast is that the North Atlantic region will likely experience an increase in the frequency of more intense systems (Categories 4 and 5). Insufficiency of data has made it difficult to adequately project SLR for Jamaica but it is assumed that it will follow the trend of global means. Given the projections, Jamaica's vulnerability to changing climatic conditions is likely to increase unless early and comprehensive intervention is introduced to reduce and adapt to such impacts. Table 1 provides a summary of climate model predictions for Jamaica.....	
Table 1: Summary of climate model predictions for Jamaica	14
Table 2: Summary of climate model predictions for Jamaica	15
Table 3: Climate change threats and potential impact on Jamaica.....	17
Table 4: Agriculture-related losses / damage from climate-related hazards, 1994-2008 (Selected Years).....	19
Table 5: Storms Passing Close to Negril 1998 – 2007	20
Table 6: Impact of selected events on beach erosion in Negril	21
Table 7: Climate Related Hazards in Negril and the Agriculture Sector	38
Table 8: Summary of activities related to Component 1 – increasing the climate change resilience of the Negril coastline	41
Table 9: Summary of activities related to Component 2 – enhancing the climate resilience of the agricultural sector by improving water and land management.....	47

Table 10: Summary of Social, Economic and Environmental Benefits of the Programme	53
Table 11: Complementary Projects and Programmes	63
Table 12: Some Participating Organisations - AF Programme Development and Review	71
Table 13: Stakeholder Responsibility Matrix (Selected Activities)	77
Table 14: Major Risks of the Programme	79
Table 15: Monitoring and Evaluation Activities	81
Table 16: Evaluation Criteria	82
Table 17: Results Framework	83
Table 18: Alignment of Programme with AF Objectives	89
Table 19: Detailed Programme Budget	93
Table 20: Indicative Budget for the NIE	95
Table 21: Breakdown of Execution Costs	96

LIST OF FIGURES

Figure A: Comparison of 30-year means, 1951-1980 and 1971-2000.....	15
Figure B: Poverty Map of Jamaica	18
Figure C: Number of bush fires and rainfall volume, 2010 to 2016.....	30
Figure D: Motherford Drain backed up at outfall to the sea	34
Figure E: Community main access road exposed to the sea.....	35
Figure F: Denuded slopes in Watershed above Annotto Bay (Forty Acres and Fort George).....	36
Figure G: Annotto Bay Health Centre in close proximity to the shoreline due to coastal erosion.....	37
Figure H: Agriculture Production Index in Relation to Extreme Climate Events	38
Figure I: Population distribution according to Polling Stations in Annotto Bay	42
Figure J: Mean rainfall for Manchester, 1951-1980 (Source: National Met Service).....	47
Figure K: Mean rainfall for Clarendon, 1951-1980 (Source: National Met Service)	48
Figure L: Mean rainfall distribution by parish (Source: National Met Service).....	49
Figure M: Climate Risks, Impact, and Expected 'No-Intervention' Outcomes (Source: PIOJ).....	52
Figure N: Project activity site distribution in Northeast Jamaica	66
Figure O: Erosion hotspots in Annotto Bay	67
Figure P: Area for protective work in line with erosion hotspot in Annotto Bay	68
Figure Q: Poverty Classification of Communities in the Rio Minho Watershed.....	80
Figure R: Buildings located in Storm Surge zone (Source: ODPEM)	84
Figure S: Relationship of Programme Components in Achieving Programme Outcomes.....	89
Figure T: Damage to infrastructure and property in Wharf Lane, Orange Bay.....	114
Figure U: Heritage site in Annotto Bay – in close proximity to coast.....	117
Figure V: Schematic of the near term and long term expectation of the programme implementation	121
Figure W: Indicative Organizational Outline (Source: PIOJ, 2017)	133
Figure X: Environmental Permit and Licence Process, Jamaica	xxvi

LIST OF MAPS

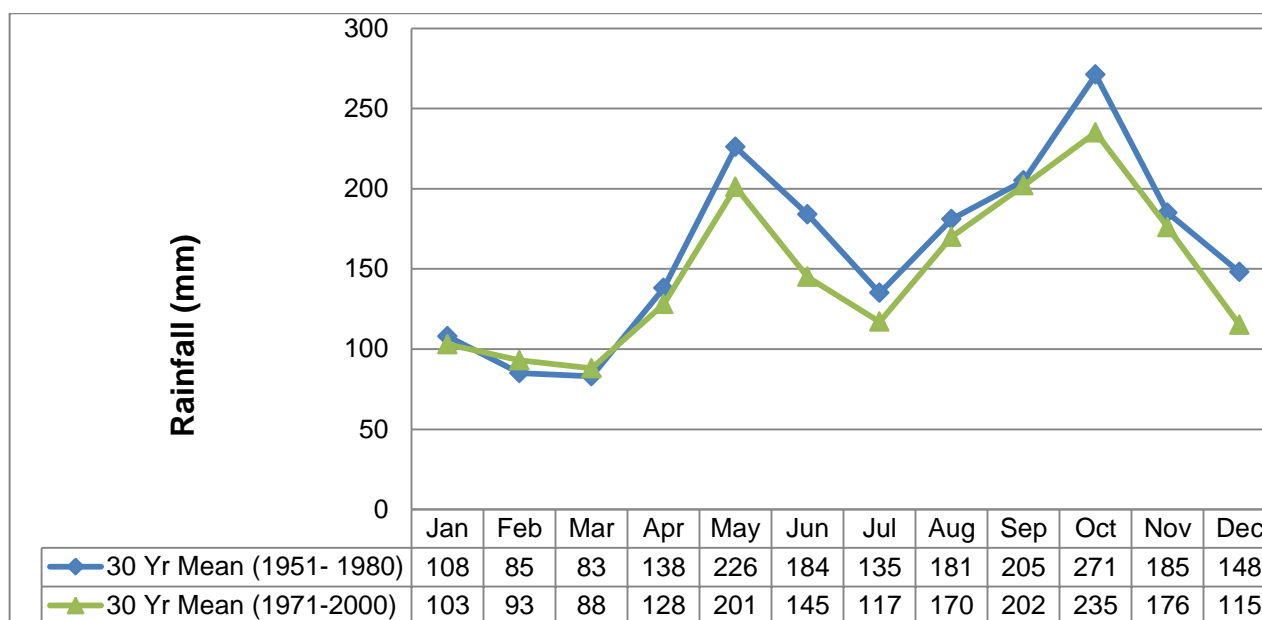
<u>Map 1: Watershed Management Units of Jamaica. Source: Water Resources Authority</u>	<u>21</u>
<u>Map 2: Map of Jamaica Showing 14 Parishes (Source: UNEP, 2010)</u>	<u>44</u>
<u>Map 3: Target communities (Component 1).....</u>	<u>46</u>
<u>Map 4: Communities of Intervention</u>	<u>72</u>
<u>Map 5: Location of Component 1 Activities relative to Protected and Sensitive Areas</u>	<u>126</u>
<u>Map 1 : Areas of Intervention.....</u>	<u>44</u>



PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

Country Context

Jamaica, 18N 77W, is a Caribbean small island developing state with a land area of approximately 11,000 km² and territorial waters of approximately 16,000 km². The island's topography is characterised by an east-west trending mountainous interior surrounded by narrow discontinuous coastal plains. The Blue Mountains, the highest mountain chain, peaks at 2,256 metres above sea-level. Many inland upland areas are susceptible to soil erosion and landslides while for the lowland areas, flooding is the predominant hazard. Jamaica experiences a tropical maritime climate characterised by year round warm and humid conditions. ~~On average~~ Traditionally, Jamaica receives on average 1,980 mm of rain each year. Rainfall pattern is highly influenced by the island's topography which has created a range of micro-climates. As such there are wide variations of rainfall throughout the island. ~~Rainfall~~ is generally more abundant in north-eastern Jamaica but the southern sections of the island, lying in the rain shadow of the mountains, have a semiarid climate and receive less than 1,500 mm of rainfall annually. The country has a bimodal rainfall pattern with the primary rainfall in October and secondary in May.



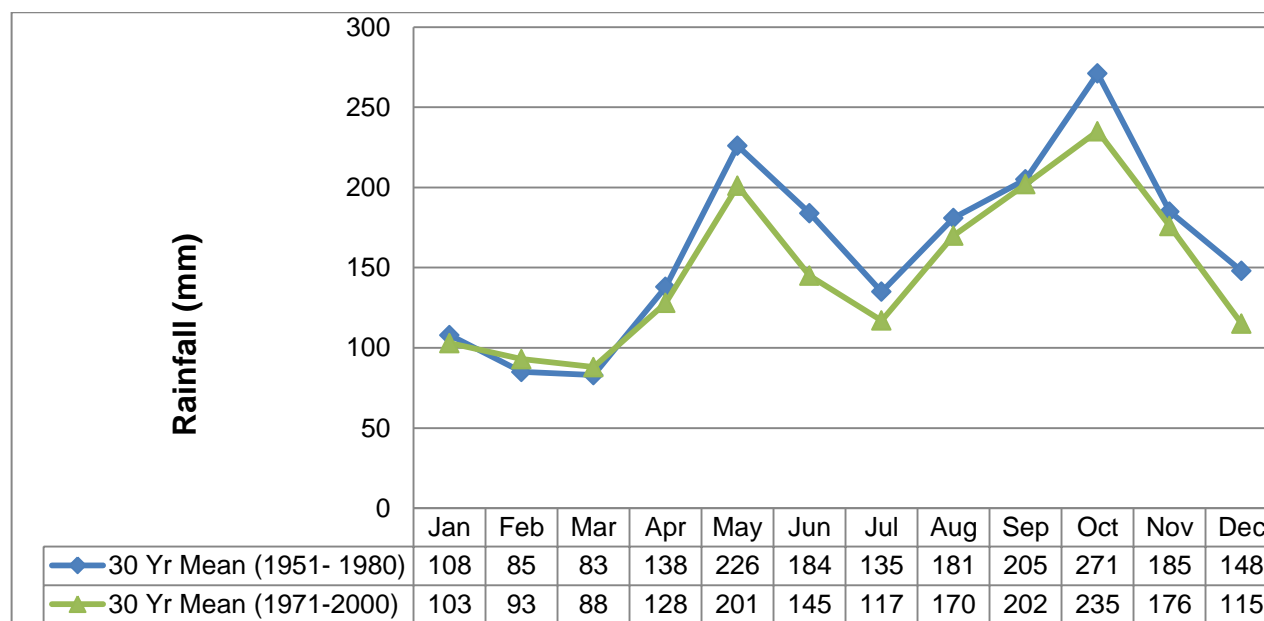


Figure A: ~~Plot~~Comparison of 30-Yr. Mean Rainfall (~~-year means,~~ 1951-1980 and 1971-2000) for Jamaica (Source: Meteorological Services)

~~Figure A~~Figure A shows a comparison of the thirty year mean for 1951-1980 and 1971-2000. ~~Analyses to determine whether the difference shown is significant are not yet complete. However, the graphs~~The graph as well as observations made by farmers ~~indicates~~ that there is less rainfall now than before, ~~might well be valid.~~ Data from the 2015 State of the Jamaican Climate also point to a lessening of overall rainfall volumes with average rainfall over the period 1981-2010 falling to 1710.6 mm per annum. Temperatures vary from 26⁰ C in February to a high of 30⁰ C in August.

The latest Population Census (~~2001~~-has2011) estimated the population at approximately 2.7 million of which ~~7060~~ per cent live in communities within 5km of the ~~coastal zone~~coast. The highest agricultural development and industrial and urban centres (highest water demand centres) lie along the south coast of the island within or adjacent to the coastal zone. A ~~recent~~2009 risk evaluation¹ estimates that the value of social and economic assets and infrastructure exposed to hazards is US\$18.6 billion. A significant portion of this exposure is located in the coastal zone, highlighting the need for incorporating climate change risk management into policies and plans that impact on these areas.²

Jamaica's economy is primarily dependent on goods and services which, to a large extent, are derived from the natural environment. The two key areas to be addressed by the AF programme are agriculture, including fisheries and forestry management and rehabilitation of coastal resources with spin-off benefits for the tourism sector. Agriculture and fisheries rely directly and heavily on natural resources. The agricultural sector contributed an estimated 5.87.3 per cent of real Gross Domestic Product (GDP) in ~~2009~~2016 and provided employment to 20.216.6 per cent of the labour force. It

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

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

continues to be an important contributor to GDP, food security, employment, foreign exchange earnings and the livelihood of the predominantly rural population (which represents approximately 48 per cent of the total population (ESSJ 2010). ~~The tourism sector, the largest foreign exchange earner for the country (US\$2001.2m in 2010), employed approximately 131 000 and contributed 7.3 per cent of GDP. 2016).~~

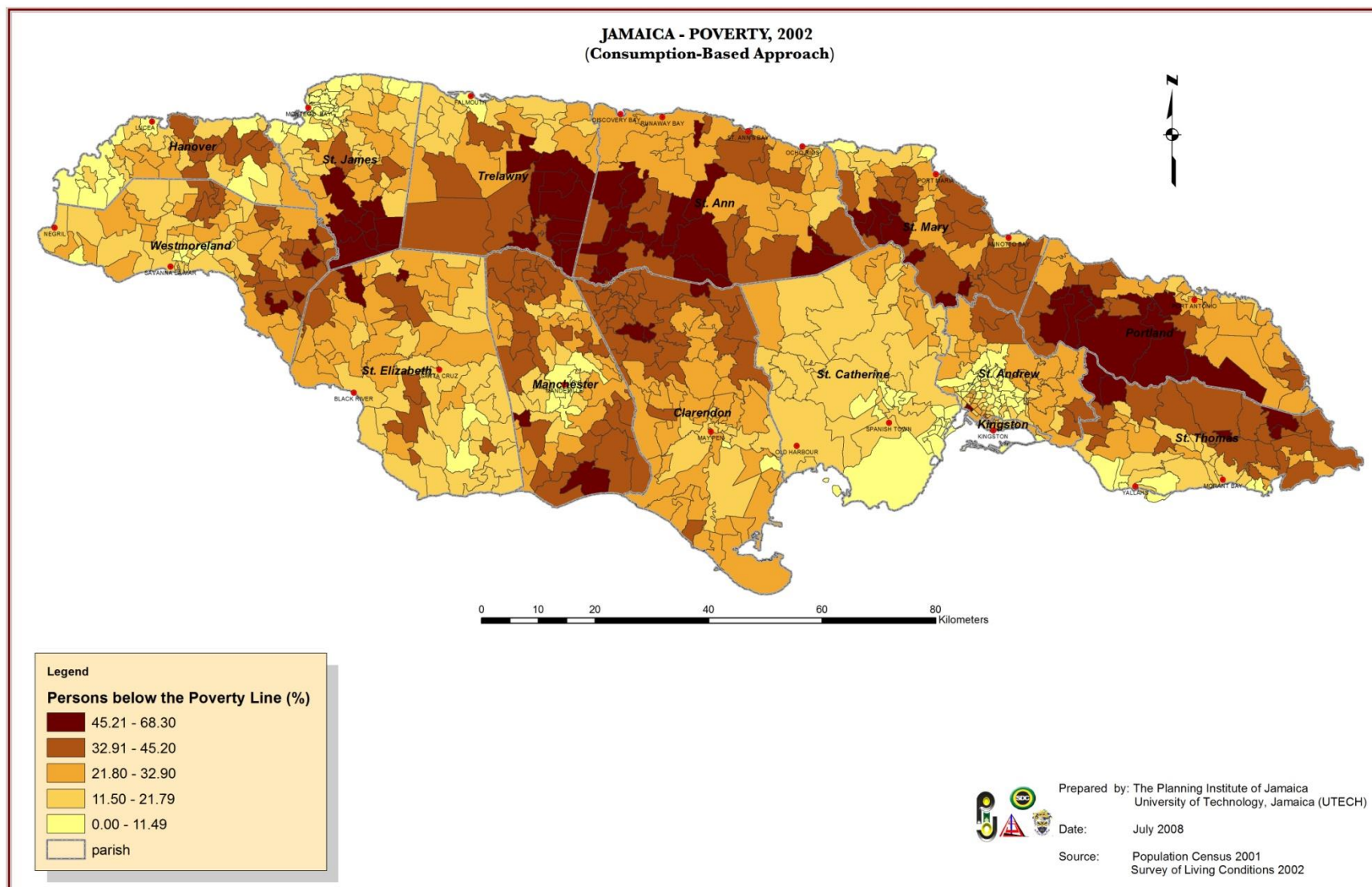
Jamaica's total labour force was 1.4935 million in 2010-2016, with 46.1 per cent being female. Overall, women account for 43.9 per cent of the employed labour force but 2031.6 per cent of the agriculture work force and about 26 per cent of the production of domestic and export crops. They are however, the primary vendors of crops, and are most likely to be directly impacted by food security issues. Of the 2015,000 registered fishers in Jamaica, about 70 per cent³ are men who are mainly involved in going to sea. Women are primarily responsible for vending and the management of operations, including vending sites. Whilst only 6 per cent of registered fisherfolk are women, they are often boat owners and are active in fishing cooperatives. Women dominate the employment in the tourism industry, accounting for 58.7 per cent of jobs in the Hotels and Restaurant sub-sector.

While Jamaica's Human Development Index (HDI) of 0.727730 in 2010-2016 puts it among the category of developing countries with high human development, there remains an issue with the increasing level of poverty which has been trending upwards ~~over the last three years.~~ The country ~~has had~~ a national poverty rate of 47.521.2 per cent in 2010 (JSLC 2015). Women accounted for 47.650.1 per cent of the poor; 45.5 per cent of households ~~are were~~ female headed, about 3016.6 per cent of which had consumption expenditure below the poverty line in 2009-2015. Most (64.5 per cent) of the poor lived in rural areas. Generally, these households are dependent on agriculture and are therefore disproportionately at risk to climate change impacts. The most recently available geographical distribution of poverty is shown in Figure B. The PIOJ Poverty Map ranks communities into five categories (quintiles), each representing 20.0 per cent of the population. Quintile 1 is the poorest and Quintile 5 the least poor. For the consumption-based approach, the ranking is based on mean per capita annual consumption expenditure.

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

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

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



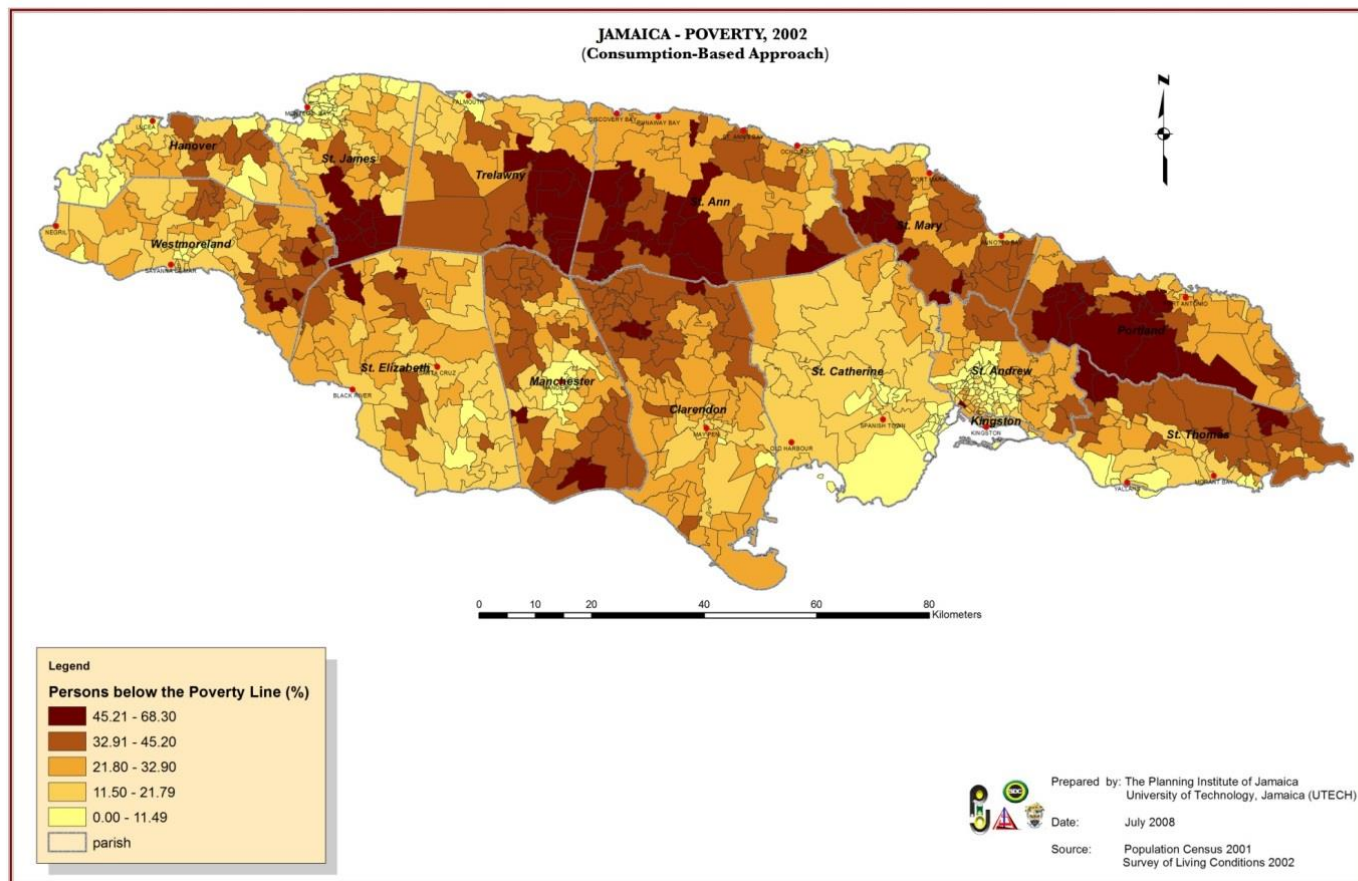


Figure B: Poverty Map of Jamaica⁴ (Source: PIOJ, 2004)

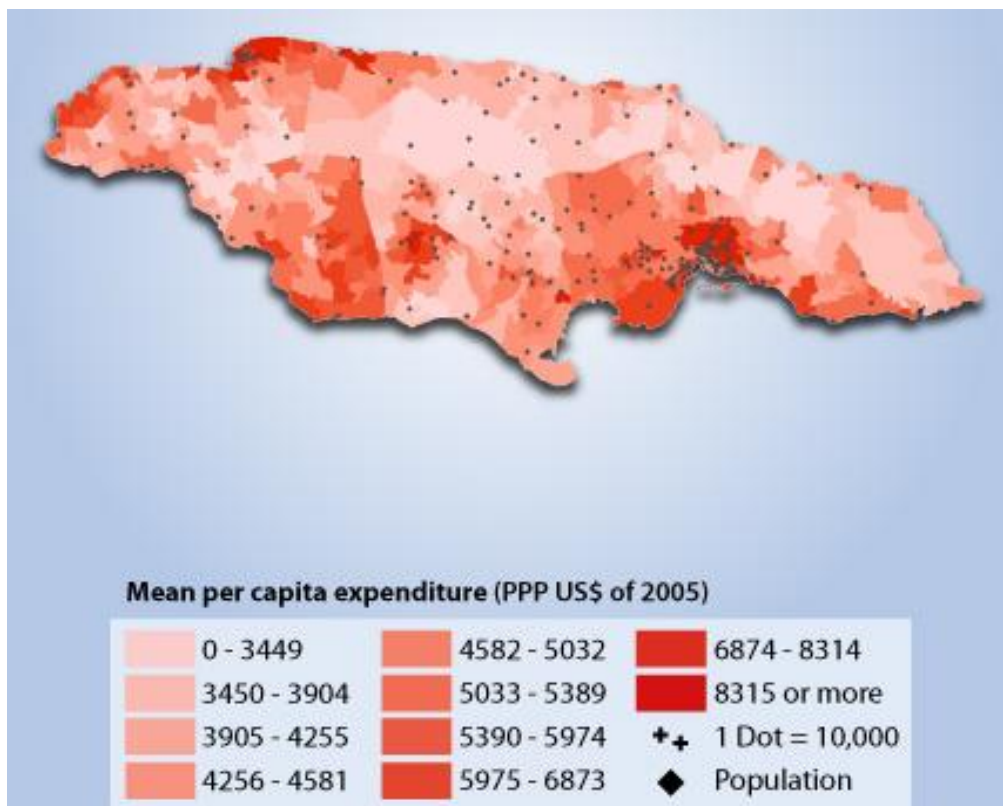


Figure C: Per capita Expenditure and Population Density of Jamaica (Source: World Bank⁵)

Jamaica has approximately one million hectares of land, of which 270,000 hectares are arable. Jamaica has approximately one million hectares of land. The 2007 Agriculture Census identified approximately 326,000 hectares being used in farming; 202,730 hectares of which were categorized as active farmlands, that is being used for crop production or as pastureland. Of the 228,683 farms, about three quarters account for some 15 per cent of area in farmland, with 151,929 of these being smaller than 1 hectare and the average farm size being 1.42 hectare. Forty seven per cent of farms are less than 0.81 ha and 93 per cent are less than 4 hectares.

Of the arable lands only 18 per cent are flat mechanizable land. The use of these arable lands is characterized by two very distinct categories of farmers: a small number of large scale producers of export crops and a large number of very small farms producing mainly for the domestic market and home consumption. ~~Forty seven per cent of farms are less than 0.81 ha and 93 per cent are less than 4 hectares (Agricultural Census 2007).~~ Vegetables, legumes, fruits, plantain, roots and tubers, cereals and condiments are the main categories of domestic crops ~~produce~~produced by the small farmers. As such, it is these farms that provide the foundation to the country's food security. However, these are the farms which are most vulnerable to the impacts of climate change. Females account for 30.2 percent of farm-holders.

⁵World Bank, 2009. Reshaping Economic Geography in Latin America and the Caribbean. Washington D.C.

The need for food security has emerged as a national priority, as global economic and environmental forces combine to threaten long-term food supply and prices. On average, food ~~accounts and non-alcoholic beverage accounted~~ for approximately ~~4331.1~~ per cent of the consumption expenditure of Jamaicans;⁶ which means that food accounts for the greatest proportion of national consumption and leaves consumers vulnerable to price ~~shocks~~⁷ ~~shocks~~⁸. The agricultural sector makes an important contribution to food security through domestic food production. Despite local production, Jamaica's food import expenditure amounted to ~~116.0~~ per cent of GDP in ~~2010~~²⁰¹⁶.

Water demand for agricultural (irrigation) has increased steadily from an average of 268 million gallons per day in 2005 to about ~~315~~^{405.32} million ~~gallons~~^{M³} per day in ~~2010~~²⁰¹³⁹. While there is adequate water to meet existing demands, uneven rainfall distribution causes water supply problems in the drier areas of the island, and during the dry season. Jamaica is heavily dependent on ground water which accounts for an estimated 92 per cent of water supplied to all sectors (domestic, industrial and agricultural), most of which is used for irrigation.¹⁰ ~~—~~ Agriculture in Jamaica is mainly rainfed.

Environmental Context

Jamaica's environment is characterized by a high degree of biodiversity with a variety of coastal, freshwater and terrestrial ecosystems. The country has gained international recognition for its biodiversity and high levels of endemism of flora and fauna species. Rated fifth among islands of the world in terms of endemic plants, roughly 1/3 of the estimated 3,304 species of vascular plants occurring in Jamaica are endemic. There are also high levels of endemism for many species of animals including crabs, birds and reptiles. 98.2 per cent of the 514 indigenous species of land snails and all of the 22 occurring species of amphibians are endemic to the island¹¹.

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

The island's terrestrial ecosystems include wet and dry forests, rivers, caves, mineral springs, rocky shores, herbaceous swamps, mangrove swamps, marsh wetlands and swamp forests. Over 30 per cent or 335 900 hectares (ha) of Jamaica's land surface is covered by natural forests. These include lower montane mist forest, montane mist forest, dry limestone forest, wet limestone forest, mangrove woodland, herbaceous swamp and marsh forest. Notable forested regions include the Blue and John Crow Mountains, and Hellshire Hills in south-eastern Jamaica, and the Cockpit Country in central Jamaica. These forests are the most important repositories of Jamaica's biodiversity, especially of

⁶ [Jamaica Survey of Living Conditions 2015](#)

⁷ [Ministry of Agriculture, \(2008\). Food Security in Jamaica.p. 20.](#)

⁸ [Ministry of Agriculture \(2008\). Food Security in Jamaica. P 20](#)

⁹ [State of the Environment, 2013 report](#)

¹⁰ [US Army Corps of Engineers \(2001\). Water Resources Assessment of Jamaica.](#)

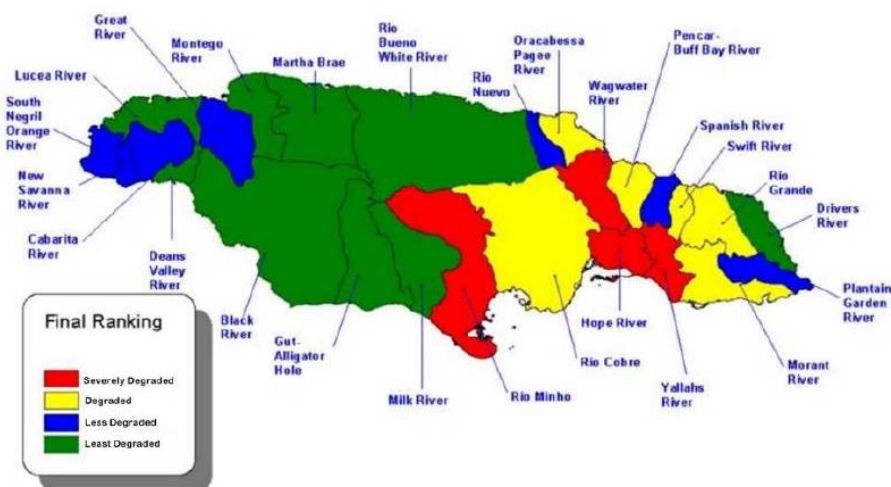
¹¹ National Environment and Planning Agency, 2003. National Strategy and Action Plan on Biological Diversity in Jamaica

endemic plants and animals. They are also essential for national development as they provide goods and services which sustain livelihoods for many households, including the following: fuel wood; medicinal plants; yam sticks; lumber for construction and furniture; fence-posts; wood for fish pots; and wicker and other materials for craft items¹².

The major wetlands in Jamaica include the Upper and Lower Black River Morass, the Negril Morass, the Mason River, West Harbour, and Cockpit-Salt River wetlands in Clarendon, Cabarita Swamp, Great Salt Pond and Manatee Bay in St. Catherine. With an area of an area of 2,289 hectares (5,657 acres), the Negril Morass is among the largest wetlands accounting for approximately one fifth of all wetland areas in Jamaica. The Negril Morass consists of herbaceous marshlands, mangrove forests, swamp forests, and lowland forests and supports several species of animals, including tree crabs, birds, and several species of fish.¹³

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

The island is divided into twenty-six (26) Watershed Management Units (WMUs) comprising all the land from the mountains to the sea and containing over 100 streams and rivers (Map 1)-(Figure D). These WMUs are comprised of watersheds which fall within ten (10) hydrological basins. The land in the upper part of the WMUs is characterized by steep slopes usually in excess of 20 degrees. Limestone derived soils cover about 65 per cent of the watersheds and the remaining areas are composed of soils derived from weathered igneous and metamorphic rocks.



Map 1: Watershed Management Units of Jamaica. Source: Water Resources Authority

Given the socio-economic and environmental challenges facing Jamaica, urgent interventions are needed to promote sustainable livelihoods, improve agricultural practices and production for food

¹²National Environment and Planning Agency, 2003. National Strategy and Action Plan on Biological Diversity in Jamaica

¹³Mangroves and Coastal Wetland Protection Draft Policy: Annex 1: General Information on Jamaica's Mangrove Wetland Resources. www.nrca.org.

security and enhance management of natural resources, especially the coastal and marine resources. Also, the vulnerability of Jamaica to the impacts of climate change warrants the implementation of effective measures to adapt to climate change.

PROBLEM STATEMENT

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

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

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

Several projections have also been made regarding the impact of climate change on tropical cyclones in the Caribbean Region. While these are inconclusive with respect to the overall frequency of cyclone events for the sub region, the forecast is that the North Atlantic region will likely experience an increase in the frequency of more intense systems (Categories 4 and 5). Insufficiency of data has made it difficult to adequately project SLR for Jamaica but it is assumed that it will follow the trend of global means.⁴⁴ Given the projections, Jamaica's vulnerability to changing climatic conditions is likely to increase unless early and comprehensive intervention is introduced to reduce and adapt to such impacts. ~~Table 1~~ Table 1 provides a summary of climate model predictions for Jamaica.

Table 12: Summary of climate model predictions for Jamaica

<u>Climate Parameter Variable</u>	<u>PRECIS Model Current Situation</u>	<u>SDM Projection</u>
Temperature	<p>Increase of:</p> <p>-0.4-0.9°C by 2015</p> <p>-0.5-1.0°C by 2030s</p> <p>-0.7-1.8°C by 2050s</p> <p>-1.8-3.5°C by 2080s</p>	<p>Increase of:</p> <p>0.5-0.7°C by 2015</p> <p>0.8-1.3°C by 2030s</p> <p>1.1-1.8°C by 2050s</p> <p>1.9-2.6°C by 2080s</p>

⁴⁴This assumption is derived from evidence quoted by Chen et al. (2008) that the Caribbean has experienced changes similar to that of the global mean.

<u>Climate Parameter Variable</u>	<u>PRECIS Model Current Situation</u>	<u>SDM Projection</u>
	<p>South-western Jamaica will experience the greatest change in the 2050s</p> <ul style="list-style-type: none"> The latter half of the year will experience the greatest increase in the 2050s. <u>Maximum and mean, minimum temperatures show upward (linear) trend.</u> <u>Minimum temperatures are increasing faster (~0.27°C/decade) than maximum temperatures (~0.06°C/decade). Mean temperatures increasing at a rate of 0.16°C/decade.</u> <u>Increases in temperature are consistent with global rates.</u> Daily temperature range has decreased. 	<ul style="list-style-type: none"> March – May will see greatest increase <u>Min, max and mean temperatures increase irrespective of scenario through the end of the century.</u> <u>The mean temperature increase (in °C) from the GCMs will be 0.49°–0.57°C by the 2020s; 0.65-0.84 °C by the 2030s, 0.85°-1.80°C by the 2050s and</u> <u>0.82-3.09°C for 2081-2100 with respect to a 1986-2005 baseline over all four RCPs</u> <u>RCMs suggest higher magnitude increases for the downscaled grid boxes –up to 4 °C by end of century.</u> <u>Temperature increases across all seasons of the year.</u> <u>Coastal regions show slightly smaller increases than interior regions.</u> <u>Mean daily maximum temperature each month at the Norman Manley International Airport station is expected to increase by 0.8-1.3°C (1-2-2.0°C) across all RCPs by early (mid) century.</u> The annual frequency of warm days in any given month at the Norman Manley International Airport station may increase by 2-12 (4-19) days across all RCPs by early (mid) century.

<u>Climate Parameter Variable</u>	<u>PRECIS Model Current Situation</u>	<u>SDM Projection</u>
<u>Precipitation</u> <u>Rainfall</u>	<p>Rainfall decrease in most regions by the 2050s</p> <p>By 2080s, decrease ranging from 25 per cent to 40 per cent of current rainfall levels will take place in all regions</p> <ul style="list-style-type: none"> Significant year-to-year variability due to the influence of phenomenon like the El Niño Southern Oscillation (ENSO). Insignificant upward trend Strong decadal signal. With wet anomalies in the 1960s, early 1980s, late 1990s and mid to late 2000s. Dry anomalies in the late 1970s, mid and late 1980s and post 2010. Four rainfall zones. Interior, West and Coasts co-vary on decadal time scale. The East is least well correlated with other rainfall zones. Intensity and occurrence of extreme rainfall events increasing between 1940 and 2010. 	<p>General pattern of decreased rainfall over time</p> <p>Significant decrease in rainfall starting in 2050s</p> <p>June – November will have most pronounced decrease</p> <ul style="list-style-type: none"> Number of wet days will decrease 0 to 2 % less rainfall in the annual mean by mid 2020s; up to 4% drier by the 2030s; up to 10% drier by the 2050s; up to 21% drier by the end of the century (the most severe RCP scenario (RCP8.5)) The change in summer rainfall is the primary driver of the drying trend. Dry season rainfall generally shows small increases or no change RCM projections reflect the onset of a drying trend from the mid-2030s which continues through to the end of the century. Spatial variation (across the country and even within Blocks) with the south and east showing greater decreases than the north and west. The decreases are higher for the grid boxes in the RCM than for the GCM projections for the entire country <p>-</p>
<u>Other Hurricanes and Storms</u>	<ul style="list-style-type: none"> Dramatic increase in frequency and duration of Atlantic hurricanes since 1995. Increase in category 4 and 5 hurricanes; rainfall intensity, associated peak wind intensities, mean rainfall for same period. South more susceptible to hurricane influence. 	<ul style="list-style-type: none"> Stream flow of some major rivers will No change or slight decrease due in frequency of hurricanes. Shift toward stronger storms by the end of the century as measured by maximum wind speed increases of +2 to reduced +11%. +20% to +30% increase in rainfall rates for the model hurricane's inner core. Smaller increase (~10%) at radii of 200 km or larger. An 80% increase in the frequency of Saffir-Simpson category 4 and 5 Atlantic hurricanes over the next 80 years using the A1B scenario
<u>Sea Level Rise</u>	<ul style="list-style-type: none"> SLR at Port Royal, Jamaica ~ 1.66 mm/year A regional rate of increase of 0.18 ± 0.01 mm/year between 1950 and 2010. Higher rate of increase in later years: up to 3.2 mm/year between 1993 and 2010. 	<ul style="list-style-type: none"> For Jamaica, mean projected SLR over all RCPs for the north coast is 0.58 - 0.87 m by the end of the century. Maximum rise is 1.04 m. SLR rates are similar for the south coast. For the Caribbean, the combined range for projected SLR spans 0.26-0.82 m by 2100 relative to 1986-2005 levels. The range is 0.17-0.38 for 2046 – 2065. Other recent

<u>Climate Parameter Variable</u>	<u>PRECIS-Model Current Situation</u>	<u>SDM-Projection</u>
	<ul style="list-style-type: none"> Caribbean Sea level changes are near the global mean. 	studies suggest an upper limit for the Caribbean of up to 1.5 m under RCP8.5

(Source: State of the Jamaican Climate Studies Group (Mona) Report, 2015)

Climate Variability

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

- Decrease in the length of the ~~rainy~~late rainfall season -by ~~7-~~almost 2 per cent in the 2020s, 8 per cent in the 2050s and up to 20 per cent by the end of the century;
- Increase in the length of the dry season by ~~6-8~~up to 4 per cent;
- ~~A-20~~ by the 2020s and 2030s and up to 3 per cent by the 2050s;
- An increase in the frequency of intense ~~rains~~rainfall.

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

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

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

Climate Change Impacts:

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

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

Over the last 20 years, ~~14668~~ lives have been lost to weather related events. Since ~~1988~~2001, ~~for example~~, the cumulative economic impact of damage and losses due to ~~storm~~hydro-met events has been estimated at ~~\$111.84J~~\$128 billion. The impact has been heightened by the level of social dislocation to communities and families, especially the poor. This has included the disruption of schools, health services, transportation and loss of shelter. Environmental damage since ~~1988~~2001 is reflected in the destruction of terrestrial, coastal and marine ecosystems leading to a reduction in the level of goods and services they provide. Examples include reduced fish catches, impacting livelihoods and food, soil loss leading to reduced agricultural productivity and pollution of coastal ecosystems, decline in the health of coral reefs and loss of sea-grass beds. (See Table 2)

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

|

Table 23: Climate change threats and potential impact on Jamaica

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

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

Some of these effects are already being felt. Productive sectors of the economy, such as agriculture and tourism, have been particularly hard hit¹⁵. In the former, both domestic and export agriculture have been affected. —The impact extended not only to the short-term availability of food items, but also influencing food prices, the country's earnings from food export and the food import bill. —For the tourism sector, damage to beaches and other coastal ecosystems and infrastructure have affected that sector with the potential to have long term and long lasting impact on Jamaica's competitiveness.

At the local level, climate change has the potential to impact the livelihoods of over 200,000 farmers (30 per cent of whom are females¹⁶) and an estimated 2015,000 registered fisher-folk. Small farming is highly dependent on rainfall intensity and regularity and anecdotal data indicate that reduced rainfall in some areas has had a significant impact on both. In addition, during the dry spells, access to water for farming and domestic use is severely curtailed. There has been observed increase in the incidence of intense rainfall, an example of which occurred between March and June 2016, resulting in loss and damage totalling approximately US\$31 million¹⁷.

Bush fires also pose a problem, particularly during the dry season, causing losses of crops, livestock and sometimes housing in farming areas. Table 4 shows losses from fires and weather-related impacts to agriculture from 1994 to 2008, estimated at \$7.5 billion Figure C highlights changes in rainfall and the number of fires over a seven year period. With the projections for changes in rainfall patterns, particularly an increase in drought, the impact of fires may be even greater without appropriate measures.

¹⁵ The banana and coffee industry have been repeatedly impacted. In 2007 Hurricane Dean destroyed 85% of banana crop. Also, approximately two-thirds the total hectareage of vegetables was lost. In 2008, 80% of the banana crop was destroyed due to Tropical Storm Gustav.

¹⁶ Agriculture Census 2007

¹⁷ Using an exchange rate of US\$1:J\$129.38 based on Bank of Jamaica monthly average for June 2017.

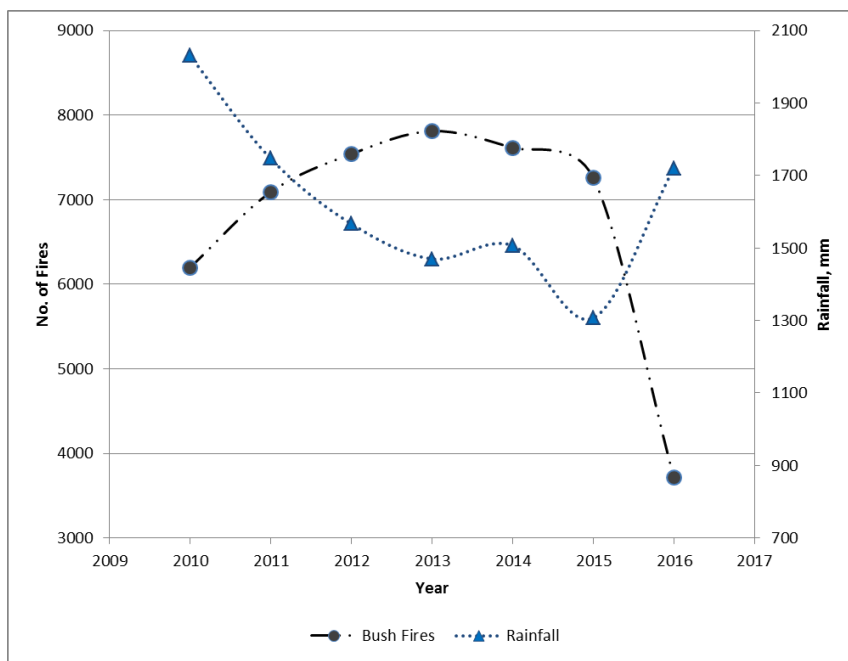


Figure C: Number of bush fires and rainfall volume, 2010 to 2016

Table 34: Agriculture-related losses / damage from climate-related hazards, 1994-2008 (Selected Years)

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

(Source: Rural Agricultural Development Authority, RADA)

Intervention Target: ~~North Eastern Coastal Area – Negril~~Resilience Building

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

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

~~Table 5: Storms Passing Close to Negril 1998–2007~~

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

Dean	August 20, 2007	Category 4	50-60 miles south and west	Strongest tropical cyclone of the 2007 Atlantic hurricane season. Reached category 5 status.
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(Source: National Environment and Planning Agency (NEPA))

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

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

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

Source: NEPA (n.d.)

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

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

The towns of the north eastern coast, like most of Jamaica's urban areas are low lying and susceptible to the impacts of storm surges during hurricanes and the passage of tropical systems and are extremely vulnerable to rising sea levels. The frequency and extent of these events are increasing with climate change, putting the towns' occupants and infrastructure at significant risk. Ongoing monitoring of the towns along the north-eastern coast, namely, the communities of Annotto Bay, Orange Bay and Buff Bay by the National Environment and Planning Agency (NEPA) has shown that significant erosion is occurring along the coast.

The vulnerability of the people and infrastructure in the three towns can be assessed by using the data available for Annotto Bay as a proxy as the geography and experiences are similar. Annotto Bay is a low lying town at an elevation which varies between 1m and 3m above mean sea level. The community has been severely impacted by frequent hurricanes, tropical depressions and associated hazards such as landslides, flooding and infrastructure damage. The ODPEM disaster profile for the area indicates that in the period 1901-2009, there were 35 riverine flood events and 6 storm surge events between 1980 and 2012. The former resulted in 10 deaths and the latter in over 160 buildings destroyed. Almost all the infrastructure in this town is within the storm surge run up distance.

The flooding of the town is also linked to poor farming practices and improper land management which have led to the degradation of hillside areas in the vicinity of the town. These areas are now sources of sediment/silt that are transported to the town and coastline during rainfall events. Additionally, the main drain is also often blocked by sand due to deposition caused by tidal action. This blockage is exacerbated during storms and extreme events as high tide, silt in runoff in the drain and wave action, limit the discharge from the drain resulting in flooding in the town (Figures D,E and F).



Figure D: Motherford Drain backed up at outfall to the sea

The significant erosion along the coastline and the flooding of Annotto Bay in the vicinity of the town center (with the highest population and most of the infrastructure being concentrated,) are putting a number of residences, critical buildings such as schools, health centres and roadways at risk. The residents of Annotto Bay have highlighted that Hurricane Allan in 1980 was the catalyst for the extensive coastline loss being observed, however flooding in the town has been an issue “as far back as everyone can remember”. In most areas, sea side properties which were once significantly removed from the shoreline are now within 30 m of the high water mark along the coastline. Figure E shows the road infrastructure and the Health Centre along the coast in the community of Annotto Bay. Loss of this road (by flooding or erosion) during a storm event will impact community access and livelihoods, however, this road is within a few feet of the high water mark and there appears to be no significant protection for this crucial infrastructure. It is therefore important for coastal protection to be installed at this location and wherever along the coastline that these situations exist.



Figure E: Community main access road exposed to the sea

Economic activities in this area are severely impacted during these events. The climatic impacts are exacerbated by and contribute to a number of other environmental problems including deforestation and erosion of hillsides, deterioration of water quality (due in part to sediment transport from the hills), reduction in coral reef coverage, and coastline erosion. The communities also show evidence of improper development planning and high levels of poverty. The damage to infrastructure such as roadways sustained during these events not only affects the communities but also cuts off the flow of goods and services on a national scale as the Northern Coastal Highway, the main road through Annotto Bay, is one of the main routes for farm produce from the north-east to the markets in Kingston and hotels along the north coast. For example, in May 2017, Buff Bay and sections of the parish of Portland were inaccessible by road as a result of the impact of storm surge on the coastal road^{18,19}.

The major problems to be addressed are i) the retreat of the coastline towards major, critical, physical assets within these towns which results in personal physical vulnerability, disruption of livelihoods, significant economic losses as a results of infrastructural damage ii) coastal and riverine flooding iii) deforestation iv) reducing vulnerability of critical assets and v) limited community resilience. Addressing these issues with shoreline protection and ecosystems restoration (reforestation), drainage system outfall upgrade, and capacity building should augment the climate change adaptive capability of the citizenry and the natural environment, improve disaster management, and enhance the livelihood of the community members. The project will therefore be implemented along the coastline in general and along the existing coastal main road in some locations as well as in the denuded hillsides.

The concerns in Annotto Bay are expected to be similar for other small rural towns along the coast of the northeast. Livelihood enhancement initiatives are therefore important in any intervention in areas such as these, where there is high poverty, for the sustainability of the intervention The towns are typically one main road small towns meaning that the businesses (which facilitate the livelihood of towns) and the residences are concentrated along the arterial main road and the road in most cases is adjacent to the shore.

¹⁸ <http://www.nwa.gov.jm/news/orange-bay-windsor-castle-main-road-portland-be-reopened-today> - Accessed July 23,2017

¹⁹ <http://jamaica-gleaner.com/article/news/20170307/buff-bay-main-road-portland-reopen-single-lane-traffic> - accessed July 23,2017

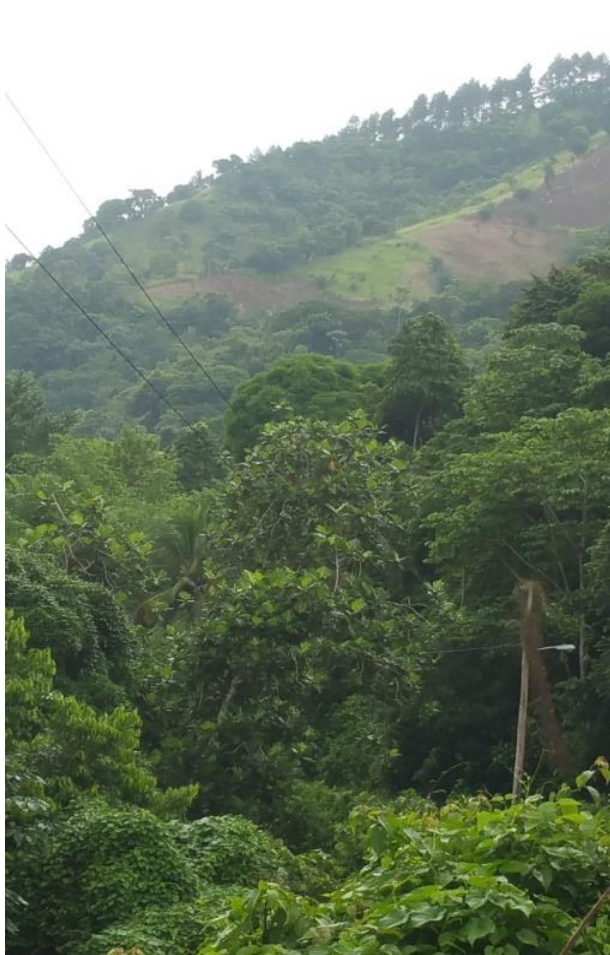


Figure F: Denuded slopes in Watershed above Annotto Bay (Forty Acres and Fort George)

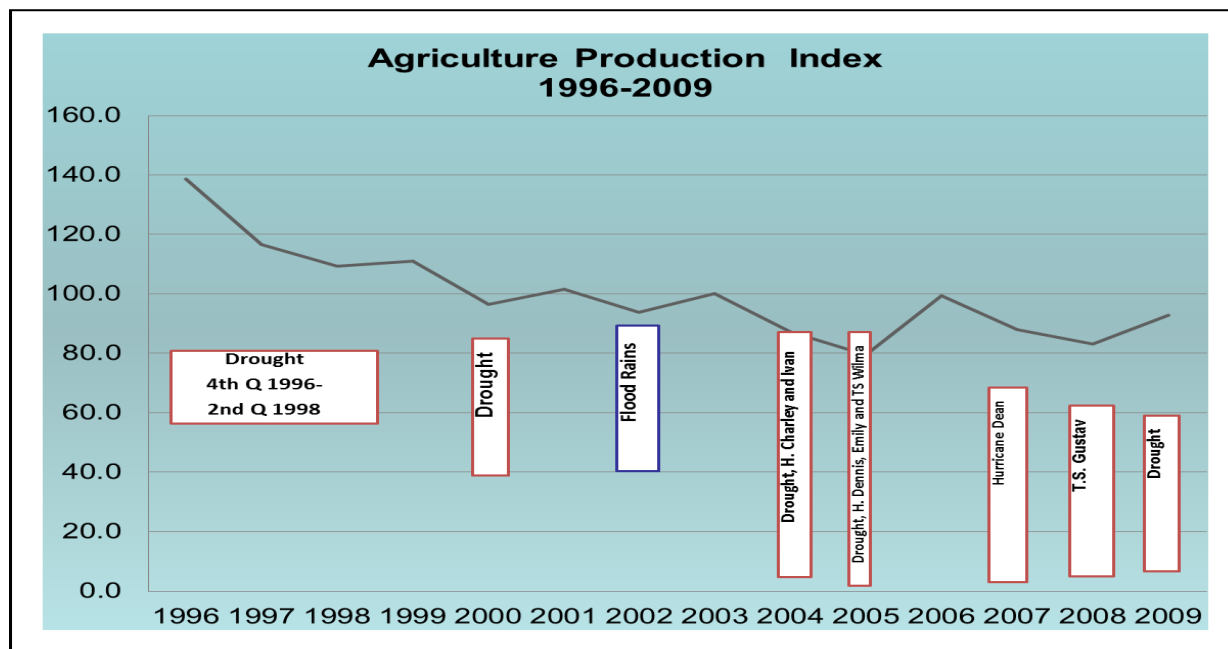


Figure G: Annotto Bay Health Centre in close proximity to the shoreline due to coastal erosion

Intervention Target: Agriculture

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

Figure E **Figure H** shows the historical impact of climate related events on agricultural production.



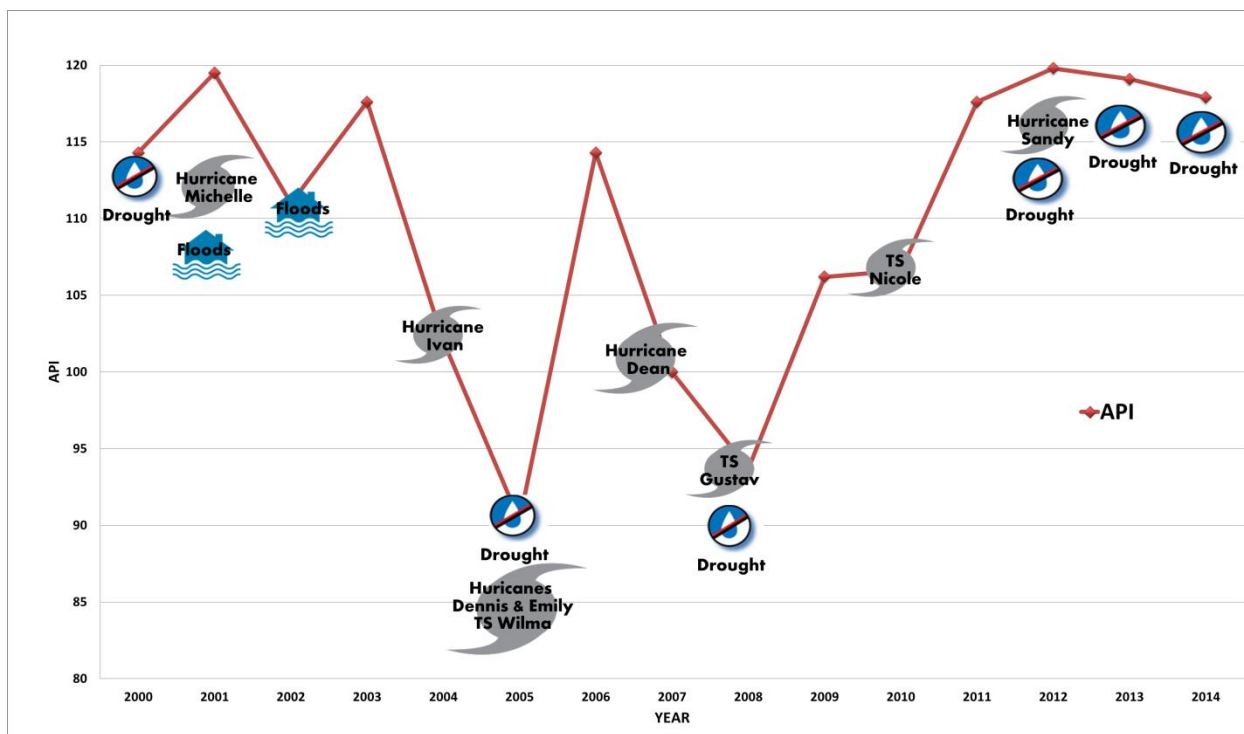


Figure HD: Agriculture Production Index, 1996 – 2009 and the Impact of in Relation to Extreme Climate Events

(2000-2014) (Source: Ministry of Agriculture and Fisheries, MOAFPIOJ, 2015)

Projections are that climate change will exacerbate the impacts observed over the last two decades. Thus, it is estimated that the economic impact from climate-related disasters will increase from 2-3 per cent of GDP annually to 13.9 per cent by 2025 (based on 2004 GDP), 27.9 per cent by 2050, 42.3 per cent by 2075 and approximately 56.9 per cent by 2100.²⁰ Should these projections be realized, they would significantly alter the country's current and planned development path, reduce food security and further marginalise the poor, thereby increasing their vulnerability.

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

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

²⁰Bueno et al, (2008)

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Component 1: Increasing the climate resilience of the Negril coastlineNorth Eastern Coastal Resilience Building

General Information:

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

Climate Impacts:

According to the United Nations Environment Programme (UNEP) 2010 report entitled "Linking Ecosystems to Risk and Vulnerability Reduction: The Case of Jamaica" under a project called RiVAMP²⁴, the beaches in Negril have been eroding at a rate of 0.5m/year and 1.0 m/year in Bloody Bay and Long Bay respectively over the past 40 years. Some sections of the beach have retreated more than 55m during that period. Evidence suggests these trends were likely due to:

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

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

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

Human Impact

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

²⁴RiVAMP is Risk and Vulnerability Assessment Methodology Development Project. The study can be accessed from the following website: <http://www.grid.unep.ch/product/publication/download/RiVAMP.pdf>

~~*Destructive fishing practices — In the past, fisher-folk used several types of fishing techniques, many of which damaged coral reefs, e.g. dynamite fishing. However, the Fisheries Division and active non-governmental organizations (NGOs) such as the Negril Coral Reef Preservation Society (NCRPS) and the Negril Area Environment Protection Trust (NEPT) have worked with fisher-folk to help them understand the need for other techniques. Many of these practices are therefore no longer being used. Efforts are on-going to ensure continued reduction in these practices.~~

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

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

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

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

The 2011 census estimated the population of the three towns at approximately 12,000, of which about 50.0 percent live in Annotto Bay. The number of females (50.8 percent) is marginally higher than males. See Table 4.

Table 4: Population of Targeted Communities

Community	Male Population	Female Population	Total Population	No of households
Buff Bay	2,210	2,468	4,678	1,525
Orange Bay	665	615	1,280	214
Annotto Bay	3,011	2,992	6,003	2,038
Total	5,886	6,075	11,962	3,777

Source: Population Census 2011

The prevalence of poverty in the communities ranges from 21.7 per cent in Anno Bay, 26.4 per cent in Orange Bay and 44.6 per cent in Buff Bay. The parish of St Mary (where Annotto Bay is located) has a poverty prevalence of 9.4 per cent, with the average size of the poorest quintile being 3.9 persons and an age dependency ratio of 62.6 per cent. In Portland, (in which Orange Bay and Buff Bay are located), 21.5 per cent of persons were living below the poverty line relative to 19.9 per cent

nationally. The size of the average poor household was 4.2 persons and there is an age dependency ratio of 66.4 percent; some 48.9 per cent of the households were headed by females.

The economy of the towns is primarily based on agriculture with a focus on fishing, sugar, coffee and banana. These economic drivers are insufficient to adequately address the developmental needs of the communities since, for example:

1. The agricultural based economy of Annotto Bay has been hard hit over the last decade with the downsizing of the banana industry due to the frequency of storms and the damage to plantations which have led to a reduction in agricultural production in this section of the island.
2. The repeated climate shocks and their impact on coastal resources have served to reduce the income earning potential of the fishers and farmers.

Therefore, any effort to support their resilience would contribute directly to poverty reduction and strengthened capacity to withstand climate shocks.

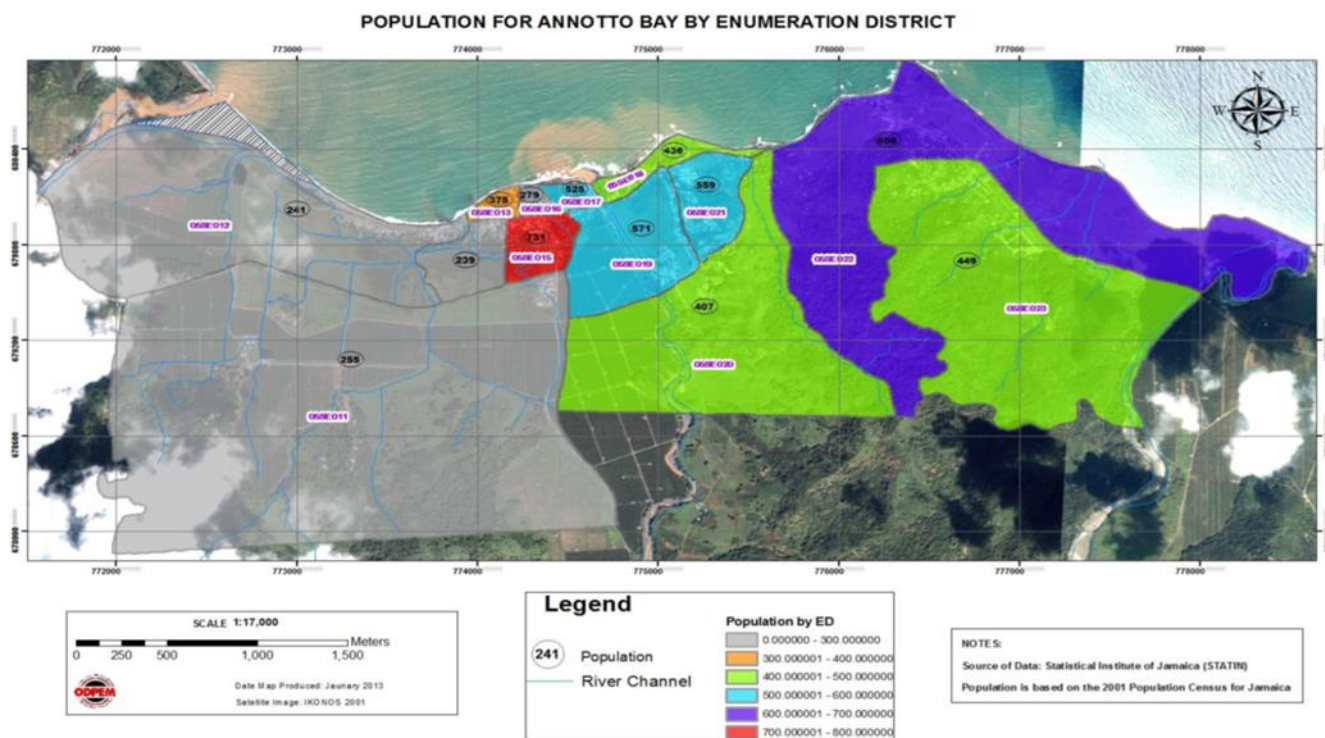


Figure I: Population distribution according to Polling Stations in Annotto Bay

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

General Information:

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

Human Impacts:

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

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

These have led to soil erosion, land degradation, and downstream flooding. These problems combined often pose a threat to the marine environment as they result in siltation and nutrient loading, which can lead to the degradation of coastal and marine ecosystem. The traditional practices of many farmers have made it challenging to change behaviour in a short time. However, there is evidence that farmers are receptive to the good practices being introduced by various groups and organizations. For instance, demonstration plots have been found to be a useful tool by the Ministry of Agriculture as farmers are able to see the positive results of non-traditional techniques.

Climate Impacts:

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

Small farmers have suffered the most from these climate change impacts – floods have destroyed their crops, washed away top ~~soils~~soil and eroded river banks. In addition, increased periods of drought have caused widespread water shortages in many areas of the country, in particular the southern parishes. Weather related shocks accounted for the most significant losses in agricultural production during the period 2004–2008 with damage and losses to the agricultural sector estimated at \$15 billion. In 2010, 17 000 food crop farmers and 1700 livestock farmers suffered losses of crops and animals amounting to \$576.5 million during rains associated with Tropical Depression #16. In 2008, local farmers produced 58.8 per cent²² of the total value of food consumed which is indicative of the vital role the sector plays in maintaining food stability.

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

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

^App. US\$802 million

Programme Location

Jamaica is divided into 13 administrative regions, comprising 14 parishes. The parishes of Kingston and St Andrew are joined for administrative purposes. The sites selected for programme intervention will cover 7 parishes, namely Westmoreland, Manchester, Clarendon, St. Mary, Portland, St. Ann, Trelawny and St. Thomas (**Figure E**)-(Map 2).



Figure EMap 2: Map of Jamaica Showing 14 Parishes (Source: UNEP, 2010)

Component 1:

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

~~The coastline of Negril consists of two beaches with a total length of 9.1 km (5.6 miles). The southern bay is called Long Bay and has a coastline stretching over a distance of 7 km (4.3 miles), with the beach width varying significantly from north to south. Persistent coastal erosion, leading to the narrowing of the beach at Long Bay and Bloody Bay has been one of the most challenging problems affecting Negril over the past few years. This has been documented in several studies²³, the most recent identifying that “some sites in Negril have experienced shoreline retreats of more than 55m over the period 1968 – 2008”. The evidence in these studies has been corroborated by measurements~~

²³ See Smith Warner Study. Negril Coral Reef Preservation Society. 2007; Risk and Vulnerability Assessment Methodology Development Project (RiVAMP). UNEP/ PIOJ.2010; Second National Communication to the UNFCCC.2009; Negril Destination Profile.CARIBSAVE Climate Change, Tourism and Livelihoods Project. 2010; Report on a Survey of Elevations and Beach Changes at Negril, Jamaica. Prepared by the Marine Geology Unit, Department of Geography and Geology, University of the West Indies for Environmental Foundation of Jamaica. 2008).

undertaken by the Negril Coral Reef Preservation Society (NCRPS), a local Non-Governmental Organisation, (NGO) and beach profiling carried out by the National Environment and Planning Agency (NEPA). Projections are that unless significant work is undertaken, continued coastal flooding and beach erosion in the Negril area will be significant. Outputs based on global projection models for long term sea-level rise and local predictions for extreme storm waves and surges, indicate that “an extreme storm event with a 50 year return period will result in a total loss of about 35 per cent of the beach in terms of length while another 50 per cent of the beach will lose more than half of its present width” (UNEP 2010).



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

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

The area is low lying on the north eastern coast cutting across the parishes of St Mary and Portland. The largest of the three towns, Annotto Bay, is at an elevation which ranges between 1m and 3m above mean sea level. That town is traversed by four rivers and their tributaries; Annotto River, Pencar River, Mother Ford River (which has been converted to a concrete drain at some points) and Crooked River. The town is bordered by Crooked River to the east, the Wagwater to the west, Foryland Pen to the south and the sea to the north.

The three towns selected -- Annotto Bay, Buff Bay, and Orange Bay (Map 3) -- are typically impacted by wave action during adverse weather conditions such as hurricanes and tropical storms. The Office of Disaster Preparedness and Emergency Management (ODPEM) highlights that Annotto Bay has been impacted by 35 flood events over the last 100 years. Almost all the infrastructure in this town is within the storm surge run up distance. Component 1 proposes to install revetments along the shoreline in these towns for the protection of the shorelines during storm events. This will protect against shoreline retreat and loss of infrastructure.



Map 3: Target communities (Component 1)

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

Component 2

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

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

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

Northern Manchester

This region is comprised of farming communities with over 2 100 households and having a poverty prevalence of 23.7 per cent²⁴. It is characterized mainly by small farmers who grow irish potatoes, red peas, and other cash crops such as lettuce and tomatoes. The region produces about a third of the potatoes for the parish of Manchester and is also one of the largest suppliers of irish potato seeds. Agriculture in the region is primarily rain-fed. The 30 year mean rainfall is shown in [Figure A: Figure J\).](#)

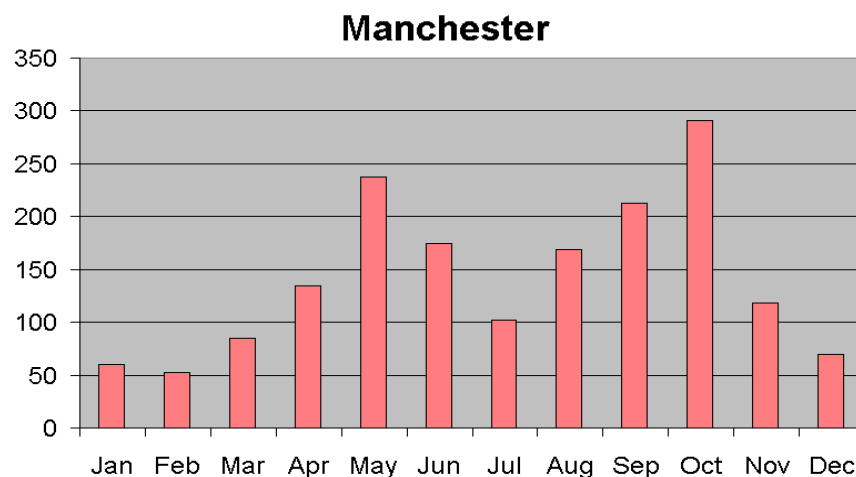


Figure JG: Mean rainfall for Manchester, 1951-1980 (Source: National Met Service)

Clarendon - South Clarendon and Rio Minho Watershed

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

²⁴PIOJ, 2008. Mapping Poverty Indicators: Consumption and Basic Needs in Jamaica, 2001/2002

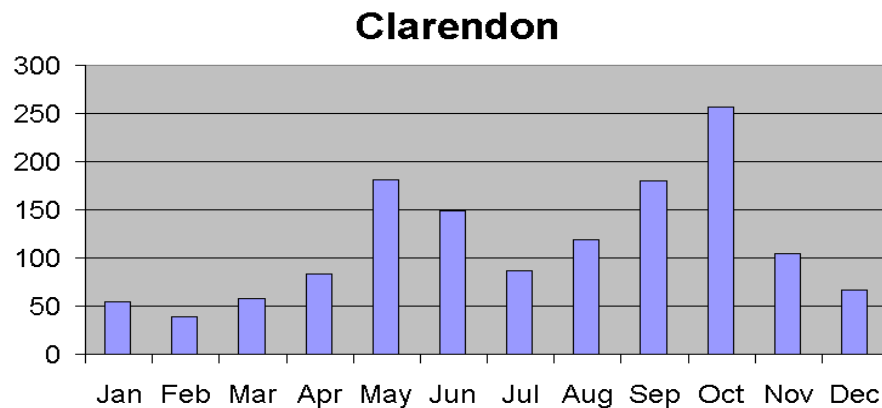


Figure KH: Mean rainfall for Clarendon, 1951-1980 (Source: National Met Service)

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

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

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

Water Management

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

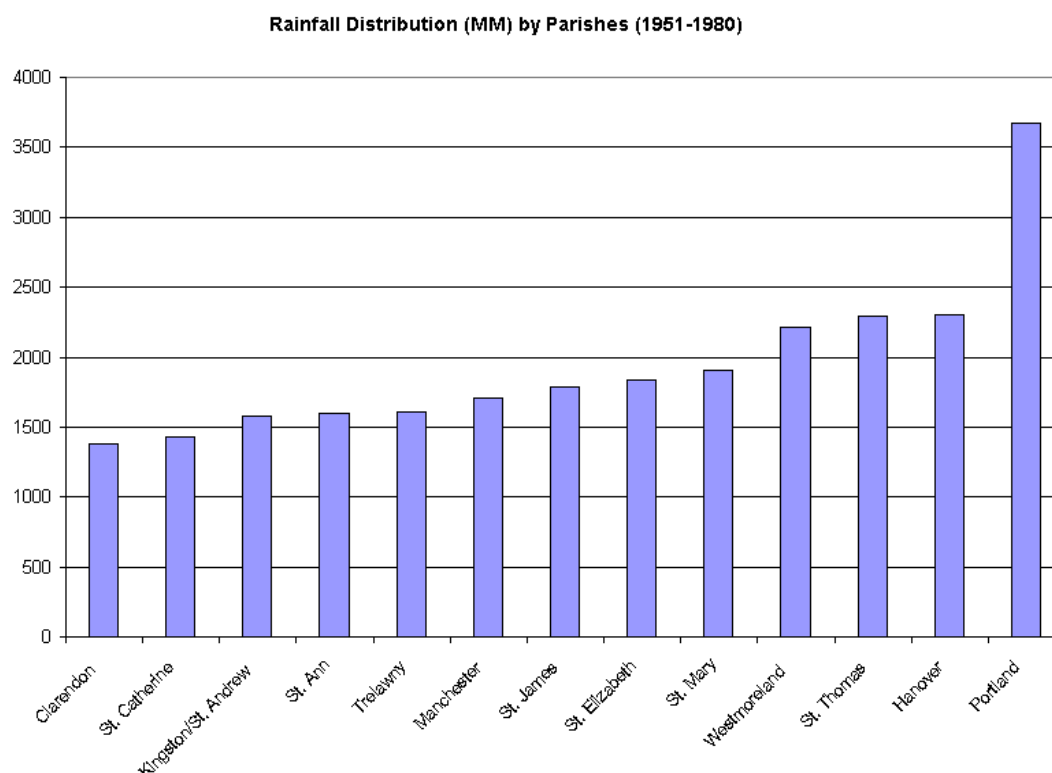


Figure 1.1: Mean rainfall distribution by parish (Source: National Met Service)

Component 3

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

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

The success of the projects developed under this Adaptation Fund programme, as well as their sustainability over the long term, depend on acceptance and ownership from the targeted communities. The findings of the 2005 KAP survey suggest that there needs to be a concentrated

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

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

■ 4. PROJECT / PROGRAMME OBJECTIVES:

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

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

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

The three components of the programme are outlined as follows:

- | | |
|--------------|---|
| Component 1: | Increasing climate resilience of the Negril coastline <u>North Eastern Coastal Resilience Building</u> |
| Component 2: | Enhancing climate resilience of the agricultural sector by improving water and land management in select communities |
| Component 3: | Improving institutional and local level capacity for sustainable management of natural resources and in disaster risk reduction in the targeted vulnerable areas; and raising awareness for behaviour modification |

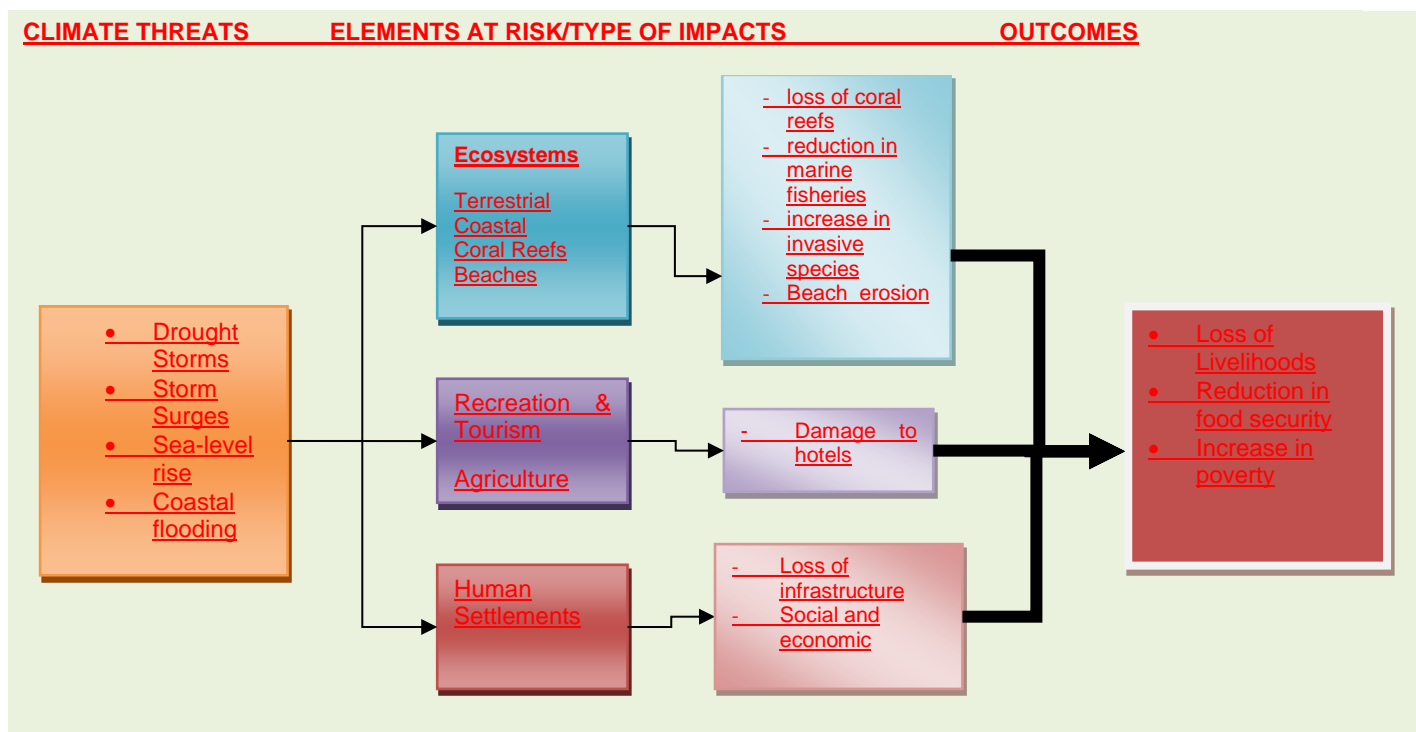
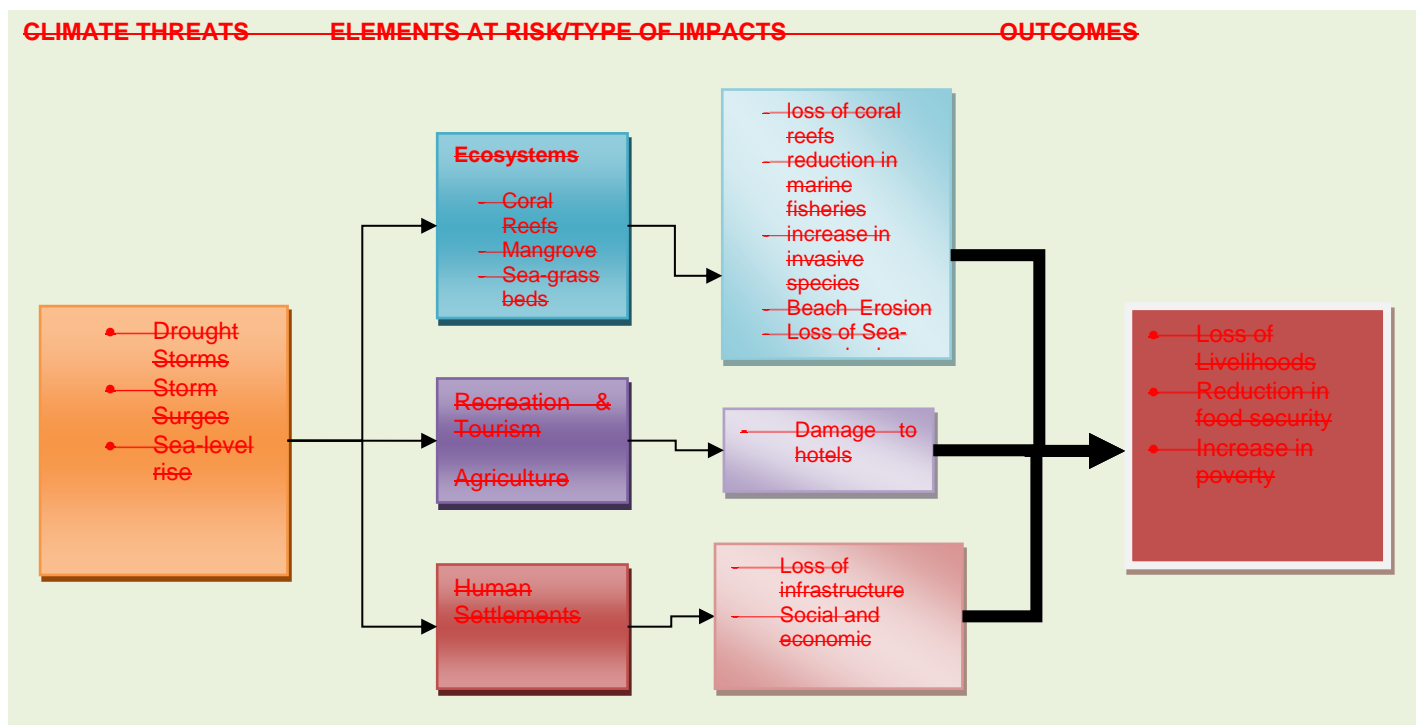


Figure MJ: Climate Risks, Impact, and Expected 'No-Intervention' Outcomes (Source: PIOJ)

54

		<u>Reduction in Flooding in Annotto Bay</u> <u>Enhanced opportunities for livelihoods</u>	
Component 2: Enhancing the climate resilience of the agricultural sector by improving water and land management in select communities	<p>Establishment of a micro-dam</p> <p>Establishment of small scale irrigation facilities and production and productivity programmes using climate-smart agriculture</p> <p>Implementation of 50 rainwater harvesting and 60 small scale drip irrigation systems in Trelawny, St. Mary, St. Ann, St. Catherine, St. Thomas and Clarendon.</p> <p>Establishment and rehabilitation of soil conservation and land husbandry infrastructure and application of suitable methodologies (eg, demonstration plots)</p>	<p>Increased availability of and access to domestic and irrigation water supplies leading to increased productivity and increased food security</p> <p>Decline in soil erosion and improved soil fertility</p> <p>Reduced downstream flooding and fewer landslides in upland communities.</p> <p>Reduced turbidity and pollution of coastal waters</p> <p>Protection of coastal ecosystems</p>	
Total			2,503,725.00
Component 3: A. Improving institutional and local level capacity for sustainable management of natural resources and disaster risk reduction in the targeted vulnerable areas	<p>Communication and awareness programme on sound environmental management, particularly to reduce risks associated with hazards</p> <p>Training of local communities and entities in disaster risk reduction (DRR) and natural resources</p>	<p>Increased knowledge of climate change and adaptation options at the local level;</p> <p>Enhanced local capacity for sustainable use of environmental resources</p> <p>Increased knowledge of and participation in disaster risk</p>	

	<p>management</p> <p>Development of guidelines/technical standards for beach restoration and shoreline protection</p> <p>Development of adaptation plans for the most vulnerable areas along the Negril<u>north-eastern</u> coastline</p> <p>Documenting lessons learnt from the implementation</p> <p>Development of a climate risk atlas – storm surge, sea level rise, etc – to be used in the development planning process</p> <p>Building capacity of vulnerable farming communities for better land and water management by:</p> <p>establishing water-user<u>users</u> groups;</p> <p>conducting workshops and field visits for farmer training in water and land management and climate smart agriculture</p> <p>Farmer field schools to develop solutions and demonstrate good practices led by farmers</p>	<p>management and adaptation to climate change</p> <p>New traditions of environmental good practices</p> <p>Standardized approach to beach restoration</p> <p>Climate resilient development planning</p> <p>Better informed decision-making among farmers and local residents and reduced exposure to climate-related risks</p>	
B. Awareness Building and Knowledge Management	<p>Climate change awareness and education programmes developed and implemented in project</p>	<p>Strengthened awareness</p> <p>Improved buy-in and ownership by local</p>	

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

PROJECTED CALENDAR:

<u>ORIGINAL</u> MILESTONES	EXPECTED DATES
Re-submission of Concept to AF	May 2011
Approval of the Concept by the AF Board	June 2011
Submission of a Full Programme Proposal to AF	April 2012

Start of Project/Programme Implementation	August–September 2012
Mid-term Review (if planned)	March 2014
Project/Programme Closing	December 2015
Terminal Evaluation	February/March 2016
<u>REVISED MILESTONES</u>	<u>EXPECTED DATES</u>
<u>Submission of Revised Proposal to AF</u>	<u>January 2018</u>
<u>Approval by the AF Board</u>	<u>March 2018</u>
<u>Start of Project/Programme Implementation</u>	<u>Quarter 2, 2018</u>
<u>Project/Programme Closing</u>	<u>Quarter 2, 2019</u>
<u>Terminal Evaluation</u>	<u>September 2019</u>



PART II: PROJECT / PROGRAMME JUSTIFICATION

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

This programme is intended to facilitate the implementation of options that are integral to the climate change adaptation initiatives for the country, particularly as it relates to livelihoods protection and food security. The activities identified in this programme are drawn from the adaptation priorities that were identified in the vulnerability and adaptation assessments for the agriculture and coastal resources sectors. A summary of the climate change-related hazards in the areas targeted for intervention is shown in ~~Table 7.~~~~Table 5~~Table 5.

Table 57: Climate Related Hazards in ~~Negri~~North Eastern Coast and the Agriculture Sector

THEMATIC FOCUS	LOCATION	HAZARD	INTERVENTION
Coastal Adaptation	Negri <u>North Eastern Coast</u>	<ul style="list-style-type: none"> Storm Surge Sea Level Rise <u>Intense Storms</u> <u>Coastal Flooding</u> <u>Soil Erosion</u> <u>Riverine Flooding</u> 	<ul style="list-style-type: none"> Breakwaters <u>Local capacity building</u> <u>Revetments</u> <u>Land reclamation</u> <u>Artificial reefs</u> <u>Reforestation</u>
Agricultural Adaptation	Northern Manchester	<ul style="list-style-type: none"> Drought Intense Rainfall Pests 	<ul style="list-style-type: none"> Micro Dam Local capacity building Biological control
	Rio Minho Watershed, Clarendon	<ul style="list-style-type: none"> Intense Rainfall Drought Bush Fires Landslides 	<ul style="list-style-type: none"> Flood mitigation infrastructure Land husbandry and soil conservation techniques Forest management
	Trelawny, St. Mary, St. Ann, St. Thomas, St Catherine and Clarendon	<ul style="list-style-type: none"> Drought Soil erosion 	<ul style="list-style-type: none"> Rainwater Harvesting Drip Irrigation Soil conservation

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

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

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

Current national agri-environmental programmes seek to promote proper agricultural practices including integrated farm management, irrigation facilities, better land husbandry techniques and incorporation of structures for better resilience. These programmes have the potential to generate a range of beneficial environmental effects including soil conservation, improved soil fertility, and improved water availability. Component 2 will seek to support this thrust by promoting sustainable practices within watersheds. It is anticipated that this will result in better soil management and increased food production. In addition, the activities in Component 2 will reduce the volume of eroded soil reaching the coast, thus contributing to better coastal water quality and decreased ecosystem degradation. As ~~Figure EMap 1~~ shows, there are coral reefs off the coast of Clarendon, St Catherine, Trelawny and St Ann.

The programme activities within these parishes, which are aimed at reducing soil loss and landslide activity, will therefore benefit the coastal ecosystems by reducing deposition of silt on coral beds which are important for sustaining fisheries. ~~For the Negril area, stabilisation of beaches (and subsequent re-growth of seagrass meadows) will support income earning activities in both tourism and fisheries sectors while providing protection for natural assets from the impacts of climate change.~~

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

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

Component 1: Increasing the climate resilience of the ~~Negril coastline~~North Eastern Coastline

Resources are being sought from the AFB to install hard engineering structures ~~to control and implement bioengineering solutions upstream to reduce~~ coastal erosion ~~of Negril's beaches from the along the north eastern coast caused by~~ climate related hazards of sea-level rise, storm surges and intense storms.

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

support capacity building among the target population to build personal capacity and sustain the investment.

~~Programme resources will be used to create a structural stabilisation solution to arrest shoreline retreat in the most vulnerable sections of the Negril coastline. One of the main factors affecting the vulnerability of Negril in this area relates to the impact of late season storms which form in the Central Caribbean during mid to late October to December. While most storms approaching from the Atlantic normally take an east to west track, these late season systems often start within the Caribbean Sea and take a northerly path and therefore have significant implications for Negril. Under these circumstances, Jamaica's south-western beaches which are normally protected from the east-west tracking hurricanes and storms are exposed directly to the storm surges and swell waves that these late season systems generate. This problem has been exacerbated by the reduced protection of seagrass beds in the area. A recent risk analysis of the Negril area highlighted a correlation between ecological resources and shoreline retreat that was identified in the RiVAMP study. The risk analysis further indicated that the missing patches of seagrass beds occurred 500-700 metres from the area of the Negril shoreline that is most at risk. This loss of sea-grass beds has negative implications for food security as they serve as a habitat for juvenile fish.~~

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

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



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

The methodology employed by the consultant engineer included: literature review inclusive of the review of recently published studies and in-house NEPA resources; vulnerability assessment; wave and sediment transport modelling; public consultation; and quantification, costing and scheduling of activities. The consultant worked along with the technical lead agency, the National Environment and Planning Agency, the National Works Agency, The University of the West Indies, the Negril Area Environmental Protection Trust (NEPT) and the Negril Coral Reef Preservation Society (NCRPS) – local ENGOs – and other stakeholders. Among the other stakeholders consulted were local government representatives and tourism interests. The consultant was engaged by competitive process using the Consultant Qualification Selection (CQS) method in accordance with the GOJ Procurement Guidelines. Resources from the Programme Preparation Grant were used to underwrite the cost of the consultancy.

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

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

Seagrass beds will be better able to undergo natural regeneration due to the less polluted environment, and will be less likely to be uprooted by high energy waves as the installed breakwaters will provide increased protection. The high level of confidence in this approach is grounded in empirical evidence gained from regional efforts at seagrass replanting which indicate that water quality and hydrodynamic/wave climate are important factors that determine the growth or disappearance of seagrass beds. High turbidity, poor water quality, other anthropogenic pressures and increased wave action have been noted to result in the loss of tremendous areas of seagrass

beds in sections of Florida and Texas. It should be noted that the coastal engineer's report also quotes successful re-colonisation of sea-grass in Florida at a rate of 4 to 40 hectares in three years under favourable conditions—including shallow, calm and protected waters.

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

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

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

The towns of Annotto Bay, Buff Bay and Orange Bay are important fisheries areas (Table 6). However, the exposure and sensitivity of the fisheries sector to climate hazards coupled with the prevailing socio-economic conditions renders the area and its population highly vulnerable. The residents of the area, in response to their plight, have repeatedly sought assistance to reduce the vulnerability and help them to cope. The fishers have highlighted training in offshore fishing as a capacity need recognizing that the near shore fisheries stock is inadequate to sustain their livelihoods.

Table 6: Number of Registered Fishers and Vessels, 2017

Concrete Outputs	Expected Outcomes	Activities
Parish	Landing Site	<ul style="list-style-type: none"> Slowed rate of loss beach and restored beach (over-time); Reduced exposure of coastal, social, and economic and environmental assets including the Negril Great Morass against storms and storm surges Restored and improved risk reduction functions/ services of critical coastal and ecosystems—seagrass beds and coral reefs
		<ul style="list-style-type: none"> Installation of breakwater structures
		Number of Fishers
		Protected livelihood—

Concrete Outputs	Expected Outcomes	Activities	
			<p>fishing, tourism interests (including farmers and locals who depend on tourism for their income)</p> <p><u>Number of Vessels</u></p> <p>Conduct Technical study to inform breakwater type and location</p>
<u>Portland</u>	<u>Buff Bay</u>	Identify locations for installing breakwater structures and production of warning markers for sub-surface structures <u>87</u>	<u>32</u>
<u>Portland</u>	<u>Orange Bay</u>	Install breakwater structures <u>69</u>	<u>35</u>
<u>St. Mary</u>	<u>Annotto Bay</u>	<p><u>189</u></p> <p>Document installation of breakwaters methodology and implement monitoring plan (during and after installation)</p>	<u>40</u>
		Identify critical coastal, social, economic and environmental assets	
		Identify historical storm surge heights and storm surge damage of significant proportions	
		Identification of watershed management opportunities	
		Identify source locations for plant material and methods to be employed in replanting, and define acceptable success rate	
		Decide on feasibility of sea-grass replanting programme with NGOs	
		Conduct environmental conservation programmes to inform risk reduction functions of critical coastal ecosystem	
		Document seagrass replanting	

Concrete Outputs	Expected Outcomes	Activities
		methodology and implement monitoring plan (during and after replanting) if replanting is done

Source: Fisheries Division

The component includes a set of concrete adaptation activities along with capacity building initiatives that will reduce the vulnerability of the coastal towns and their inhabitants along the North Eastern Coast of Jamaica to the continued and increasingly more devastating impacts of climate change. The activities identified for implementation are in line with the needs/requests of the target communities. The component is developed using the ridge to reef approach, especially in the case of Annotto Bay.

The main activities include:

1. Watershed rehabilitation through reforestation for flood risk reduction and land husbandry improvement in the Watersheds surrounding Annotto Bay
2. Reclamation of shoreline of at least 30 m for a length of approximately 600 m of coastline in Annotto Bay
3. Installation of revetment for shoreline protection along this 600 m of reclaimed area
4. Installation of revetment and seawall at some sections of the main road in Buff Bay and Orange Bay
5. Installation of 300 m of Artificial Reef in the form of Wave Attenuation Devices (WADs) for ecosystem enhancement and shoreline protection in Annotto Bay
6. Incorporation of a groyne feature in the reclaimed area and protective works in Annotto Bay to upgrade the drainage system of the Motherford Drain outfall in order to reduce the flooding risk within the town of Annotto Bay
7. Capacity building and training for improving:
 - a. Land management
 - b. Entrepreneurial skills
 - c. Natural resource management for enhancing natural resource development
 - d. Management of shoreline protection infrastructure

The component will result in improved biodiversity within Annotto Bay with the installation of artificial reef structures (WADs) in the bay. This is expected to improve the fish stock. These artificial reef structures will increase sand accretion and facilitate the formation of beaches along the coast over time. These structures will reduce wave action and provide calm conditions for bathing. This will facilitate community access to areas for recreation and spur economic activities in the vicinity of the WADs and the improved beaches. WADs are durable, productive and stable, concrete, pyramidal-based, structures for wave attenuation and marine life habitat production placed offshore that aids in the beach formation process. Similar structures have been placed in Old Harbour Bay and Negril and have been very successful in achieving the goals of beach accretion and biodiversity enhancement. The WADs can dissipate as much as 95% of wave energy with sand accretion shoreward. Installation in Old Harbour was facilitated under a climate change project in 2013, where 150 WADs were installed 25m off-shore. This resulted in accretion of the beach of up to 26% over a 3-year period

compared with 7% at the control site (Climate Change Adaptation and Disaster Risk Reduction Project (CCAP) Monitoring Report, Status and Trends 2013-2016). In Negril, WADs were installed in the northern section of the Long Bay beach in 2009. In selected areas, accretion of up to 30m was recorded over a 21 month period (Cocoplum Development Ltd. Monitoring of Coastal Accretion, Erosion of Beach Front report, 2010). These can be moved to different areas of the bay as time progresses to improve the status of the bay.

The image in Figure N shows the site of proposed project implementation along the North Eastern Coast and within the Buff Bay/Pencar watershed.

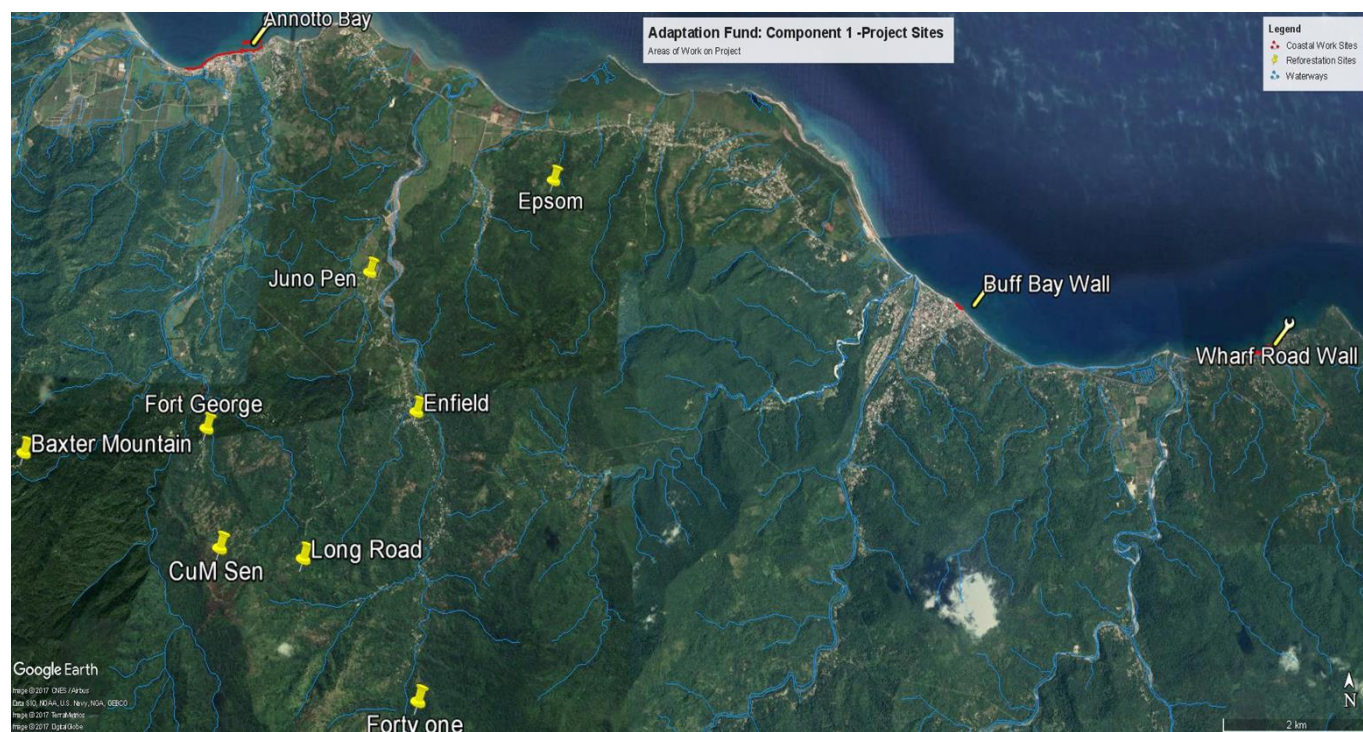


Figure N: Project activity site distribution in Northeast Jamaica

The details of the conceptual designs for the structural elements are presented in Annex 2. The details of the activities for each location include:

1. Buff Bay and Orange Bay will be protected by shoreline protection work.

The protection includes the installation of retaining walls and boulder protection along the coastline in these towns. See Annex 2. The project will install retaining walls to protect infrastructure in the most vulnerable areas along the coastline. These infrastructure include roads and government buildings. The retaining wall will be at least 2 m high. A total length of 250 m of retaining wall will be installed (50 m in Buff Bay and 200 m in Orange Bay). The retaining walls will then be protected with boulders of varying sizes for varying distances seawards based on the results of modelling and best engineering practice in the detail design phase of the project. The length of the protective structure is preliminarily estimated at 250 m with a minimum width of about 6 m from the wall.

2. The town of Annotto Bay will be protected by shoreline protection works by:

Reclaiming areas of land lost to the sea over the last 40 years. This involves the placement of geotextile on the seafloor and the placement of boulders along with specified fill materials on top of

the geotextile. The reclaimed area will extend for at least 30 m from the shoreline into the sea. The reclamation will be done for at least 600 m along the shoreline (critical for the areas with the highest potential of erosion during storm events). The land reclamation area will start in the vicinity of the Pencar River mouth and extend west to the existing Fire Station. The ODPEM has identified the areas in red in Figure O as most vulnerable to erosion during storm events. Figure P shows the area of intervention in Annotto Bay.

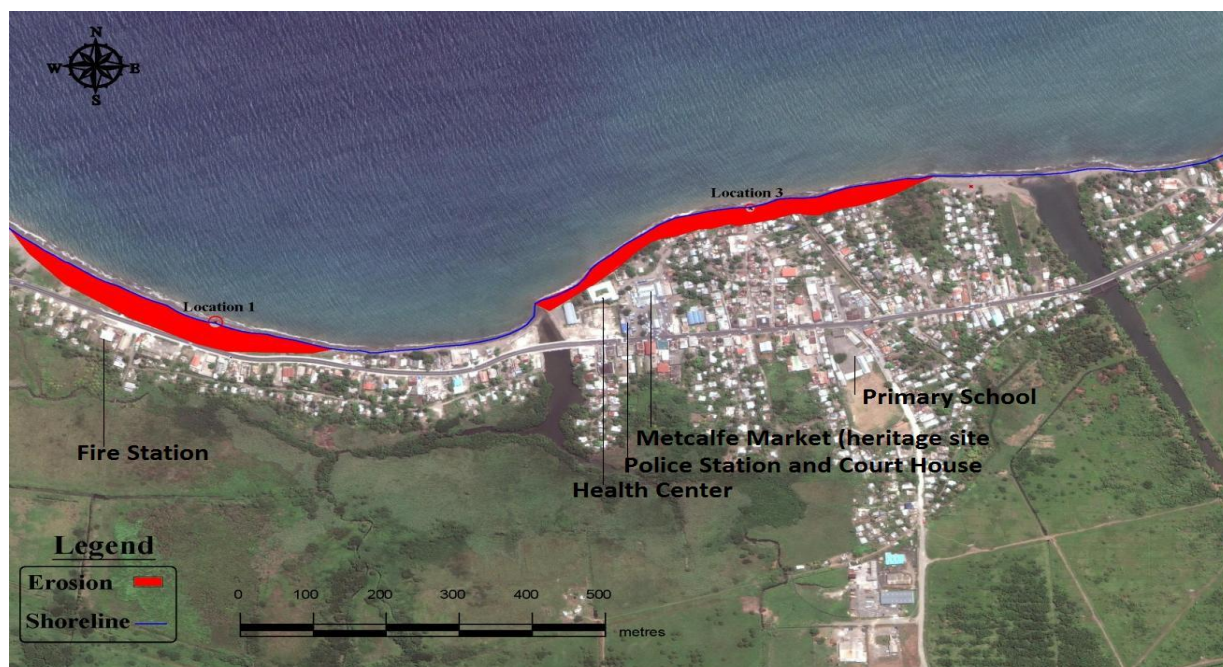


Figure O: Erosion hotspots in Annotto Bay

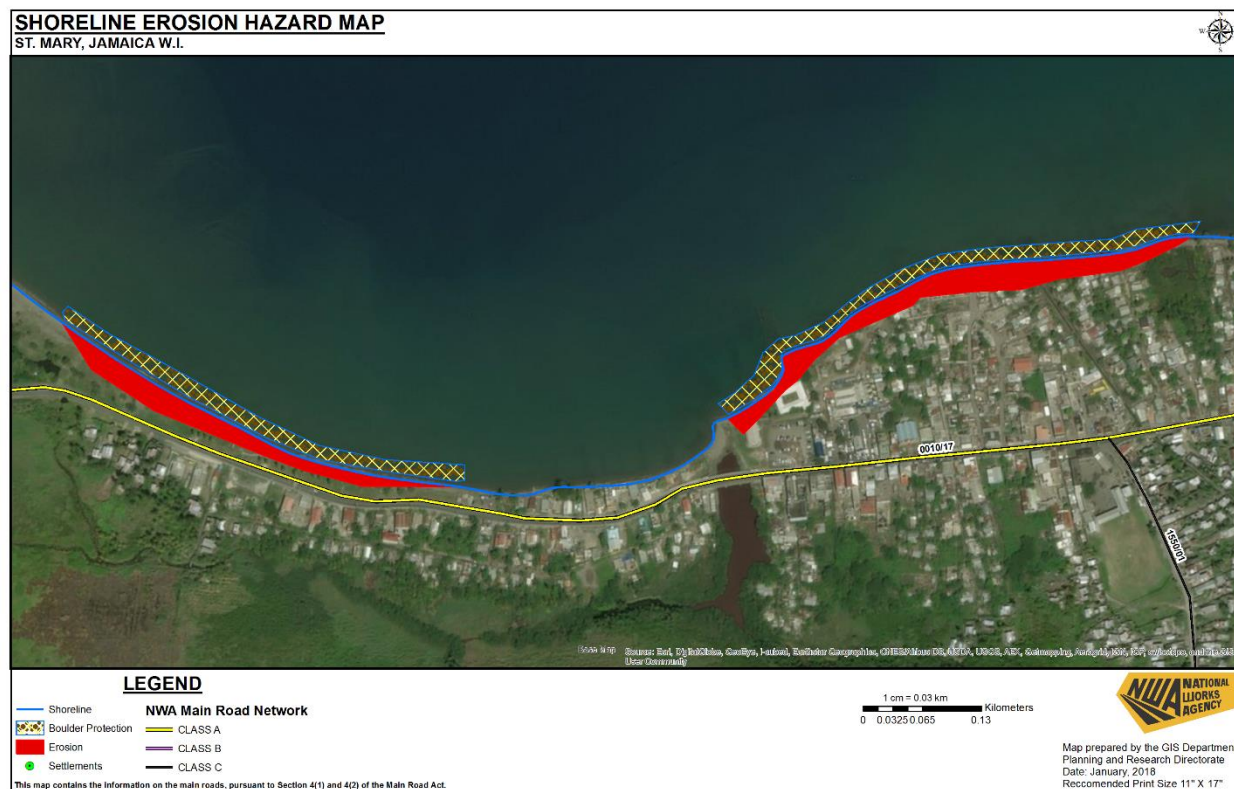


Figure P: Area for protective work in line with erosion hotspot in Annotto Bay

Boulders of varying sizes will be placed along the edge of the reclaimed area extending seawards for varying distances. The boulder sizes and the placement distances will be finalized in the engineering design phase for the project.

The outfall of the Motherford Drain will be realigned to reduce the conflict between its discharge and wave action of the ocean during storm events. The re-alignment will be incorporated into the reclaimed area.

The derelict existing jetty/docking facility will be covered in the reclaimed area. A new jetty will be constructed at the edge of the reclaimed area and rock revetment to improve access for stakeholders include fisherfolks, boat owners and tourists.

Wave Attenuation Devices (artificial reef structures) will be installed in the north-eastern part of the bay to provide further protection for the shoreline. However, consideration for movement of the WADs will be done only after analysis of level of the coral encrustment at the location and other environmental and biodiversity factors. These artificial reef structures will be prepared on-land using reinforced concrete and placed at specified locations based on the designs to be completed in the engineering design phase. It is estimated that at least 200 WADs will be required to produce a structure in length of 300 m. The preliminary size of each WAD is: base length of 3 m and height of 1.5 m weighing approximately 1 tonne. The manufactures provide a 3 year warranty for the structures which are able to withstand the wave force associated with a Category 4 hurricane.

The non-structural element of the component involves:

1. Reforestation of the slopes surrounding Annotto Bay that supply runoff to the bay. There are 6 areas to be targeted totalling approximately 150 acres of denuded land. Thirty thousand

trees will be planted including fruit trees, lumber and ornamental trees. These will be done in conjunction with land owners with the assistance of the Forestry Department and the Rural Agricultural Development Authority (RADA).

The waves breaking farther away from housing stock and critical infrastructure increases the safety of the assets and reduces the likelihood of damage to these assets during storm events. This would reduce recovery costs for the community, allowing the household to improve their livelihoods over the longterm.

The lost land has resulted in higher population densities in the remaining areas. The ODPEM predicts that the shoreline will erode between 24 and 38 metres during a 10 year storm from the north eastern and northerly directions in locations one (1) and three (3), respectively shown in Figure O. This report highlights that the erosion expected for the 10 year return period storm is greater than the 100 year due to the characteristics of the bay. These predictions are based on the use of SBEACH models for shoreline dynamics. Locations 1 and 3 are densely populated with houses and other infrastructure within the predicted erosion area. The possibility of storms with 10 year return period and greater has increased as predicted by climate change scenarios putting these infrastructure at greater risk presently and into the future. For this reason, significant land reclamation will be required to ensure the optimum protection of the community. This is expected to be realized with reclamation activities and the use of permeable rock revetment for shoreline protection described previously. The most vulnerable areas highlighted in red in Figure O will be protected in this component. Figure P shows the area proposed for installation of protective works, hashed in yellow adjacent to the erosion hotspots.

The coastal protection of Annotto Bay proposed for this project is expected to be two fold:

1. the on-land protection of shoreline (revetments) at the end of reclaimed shoreline; and
2. the reduction of wave energy reaching the shoreline with the installation of Wave Attenuation Devices (WADS). This will be implemented in Annotto Bay and should have the added benefit of improving the biodiversity of the marine environment. In this regard, WADS will be used to enhance the resilience of the coastline. The WADS will act as wave breakers to reduce the energy of waves reaching the shore.

This wave breaking action is expected to result in accretion of sand and calmer beaches in the vicinity of the structures. This adaptation measure will provide resilience of the coastline and make it safer for community activities along the shore. The WADs, which have cavities, should also function as a habitat for biodiversity and improve the biodiversity of the marine environment in the area. The fishers of the area should benefit from the increased biodiversity as they will be able to improve catch over time. The introduction of these new structures into the space will require some training of the stakeholders to be impacted by their presence. Impacted stakeholders include fisherfolks, beach users and community residences and the government agency with responsibility for coastal defence management and coastal resource management. The component will also seek to use capacity building techniques to improve fishers' technique for offshore fishing.

Riverine flooding is another hazard that exists in the Annotto Bay area. This is partially caused by blockages of river and drain outfall by sediment from the sea (sand) and silt from land based erosion. Reducing storm surge impact with the revetments and associated land reclamation will be insufficient to address the overall problem, therefore other interventions are needed. One such intervention is the re-orientation of the drainage outfalls included in the designs to reduce the conflict between discharge from the outfalls and the ebb and flow of the sea.

Another important adaptation intervention is the reduction in the source of silt from the land. The sediment load in runoff is amplified by deforestation in the watershed surrounding the town.

Interventions are therefore necessary, away from the coast, to protect the town from the many hazards that cause adverse impacts. Reforestation of denuded slopes within these watersheds should over time reduce the sediment loading of runoff and reduce the risk of flooding in the town. The first obvious improvement is the enhancement of terrestrial biodiversity associated with fruit trees and lumber trees. Protecting the hillsides and watershed areas will improve soil quality in the area and improve farming practices within the watershed. These interventions will improve community safety and protect the most vulnerable in these areas. A mix of lumber and fruit trees will be used for reforestation and is expected to add economic value to the communities. This activity will be linked to the National Forest Management and Conservation Plan. The agro-forestry business is therefore another value chain that will be enhanced by Component 1. Both males and females are land owners in the areas and the project will ensure that there is gender equity in accessing the resources of the project for planting and training.

Entities within the Government of Jamaica have the expertise to oversee the implementation of the interventions that are needed. The NWA has overseen the implementation of many coastal projects for hard engineering works and was a part of the development of the original proposal for the original Component 1 (Negril Breakwater). The lessons learnt from that project can be transferred and best practice to address the shortcomings encountered during the planning of Negril proposal, documented and used to build capacity for future projects of this nature. NEPA has significant experience and expertise in ecosystems restoration and artificial reef construction and implementation. The lessons learnt in previous endeavours can be brought to this project for successful implementation.

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

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

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

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

The Ministry of Agriculture and Fisheries (MOAF) recognizes the impact of climate variability and climate change and is exploring measures to improve the capacity of farmers to adapt to these changes. One of those measures is to reduce the dependence on direct rainfall since there is a great

likelihood of its increased unpredictability. Similarly, there has to be preparation for the increase in intense rainfall over short periods which can be destructive. Catchments increase storage and reduce the level of run-off, thus mitigating flooding while producing a source of irrigation to ensure crop productivity, even in dry periods.

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

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

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

The criteria for community selection were drafted in consultation with the technical agencies, particularly the Ministry of Agriculture and Fisheries. The criteria were presented to communities as part of the discussion on the relevance of the programme and were generally endorsed. No particular weights were assigned to each criterion. Communities which met three or more criteria were given priority. Geographic areas for the interventions are shown on ~~Map 1~~Map 4.

Interventions

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

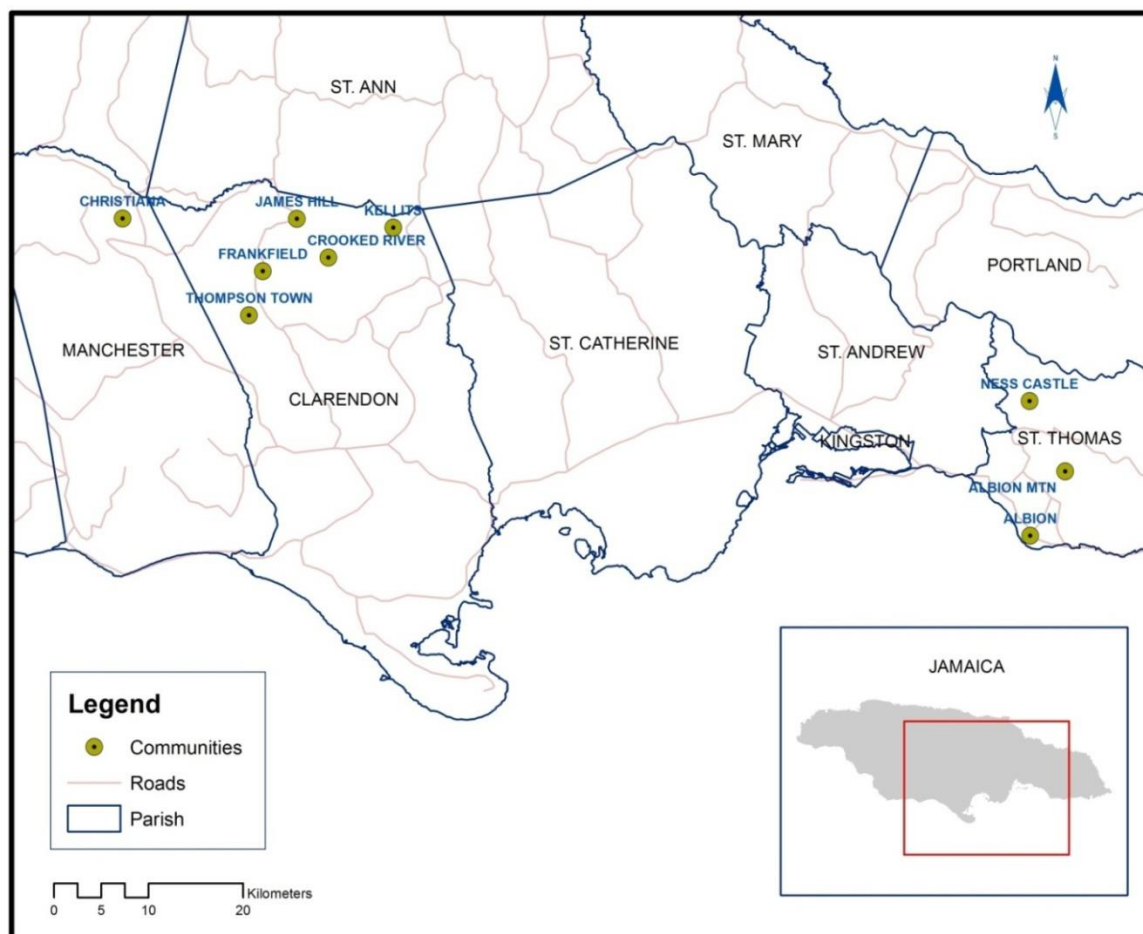
- Establishment of a micro-dam in Northern Manchester
- Implementation of small scale irrigation facilities and production and productivity programmes using climate – smart agriculture
- Establishment and rehabilitation of soil conservation and land husbandry infrastructure
- Implementation of rainwater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

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

Christiana is located in Northern Manchester and is a productive agricultural zone with a population of 2100 household and a poverty prevalence of 23.7 per cent. The area is mainly characterized by small farmers who grow Irish potato, red peas, and other cash crops such as lettuce and tomatoes. The

region produces about a third of the potatoes for the parish of Manchester and is also one of the largest suppliers of Irish potato seeds to the farming landscape of Jamaica. Agriculture production in the region is primarily done under rain-fed conditions and is severely impacted by the changing climate. It receives an average rainfall of 1 600mm each year. The changing rainfall patterns coupled with high evapo-transpiration rate have led to water deficit and a reduction in the ability of the crops to withstand pests and disease conditions.

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



Map 44: Communities of Intervention

Description of Micro-dam

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

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

Intervention 2: Rainwater Harvesting and Gravity Drip Irrigation Systems

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

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

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

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

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

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

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

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

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

The interventions for the Bull Head region will support a hillside to plain approach. Infrastructure works such as diversion ditches will be installed to reduce the likelihood of soil erosion and land slippage within the watershed. Under this component the establishment and rehabilitation of soil conservation and land husbandry infrastructure will be done. The communities selected are:

- Thompson Town Extension Area: Gloucester, Thompson Town, New Roads, Wakesfield, Red Ground, Windsor, Victoria.
- Crooked River Extension Area: Douce/Pennants, McDonald, Broadleaf, Bunkers Hill, Collington.

- Kellits Extension Area: Reckford, Sandy River, Bull Head, Red Lands, Mason River, Rhoden Hall, Broadleaf.
- Frankfield Extension Area: Morant, Grantham, Lodgi Green, Belmont, Peckham, Union, Kylsith.
- James Hill Extension Area : James Hill, Salem, Carty Hill, Desire, Fairburn

The green infrastructure to be installed includes:

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

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

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

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

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

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

A summary of the activities are found in Table 7.

Table 79: Summary of activities related to Component 2 - enhancing the climate resilience of the agricultural sector by improving water and land management

Concrete Outputs	Expected Outcomes	Activities
<ul style="list-style-type: none"> Establishment of a micro-dam Implementation of rainwater harvesting and small scale gravity irrigation programme Establishment and rehabilitation of soil conservation and land husbandry infrastructure Establishment of small scale irrigation facilities and production and productivity programmes using climate smart agriculture 	<ul style="list-style-type: none"> Increased availability of and access to domestic and irrigation water supplies leading to increased productivity and increased food security 	Fieldwork and data analyses to finalise micro-dam location
		Install micro-dam in Manchester
	<ul style="list-style-type: none"> Reduced downstream flooding and soil erosion in upland communities Improved soil fertility 	Conduct training workshops and field visits for farmer training in water and land management and climate smart agriculture
		Establishment of water user groups Establish irrigation systems Carry out training and demonstrations

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

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

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

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

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

Coastal Adaptation in Negril

~~This component will be achieved through the activities outlined below:~~

~~Development of guidelines and technical standards~~To complement coastal adaptation initiatives, Component 3 will facilitate:

Capacity building for beach restoration and shoreline protection.

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

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

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

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

1. NEPA, the Ministry of Tourism and NGOs working in Negril, have facilitated stakeholder consultations related to addressing beach erosion and other issues. There is need to continue the communication and awareness efforts for Negril. Component 1 will build breakwaters and allow re-establishment of seagrass beds. The recommendations for reducing beach erosion from the Smith Warner report and this project proposal have already been introduced to the stakeholders. It is therefore important to continue to interact with the community on the activities to be undertaken and provide further details on their implementation. The likelihood of harm from the practices of users of the sea including damage to the replanted seagrass beds will be reduced through this programme. It will be undertaken in collaboration with local NGOs which are working on conservation efforts in order to create synergies with current programmes and to increase the benefits. This approach will contribute to the sustainability of the efforts of the NGOs and the government in changing destructive behaviours and practices reforestation initiative. The plan is to train at least 50 land owners in land husbandry and agroforestry.
2. Training of local communities and entities in disaster risk reduction (DRR) and fishers in deep sea fishing techniques.

3. Training of residents in natural resources management (NRM) and disaster risk reduction

~~Training in DRR and NRM will allow residents and other stakeholders to participate in the management of the resources in Negril and in efforts to build the resilience of Negril and its residents to the impact of hazards. DRR training will include aspects of preparedness, response, risk reduction hazard mapping, hazard specific mitigation activities and business continuity planning for small businesses. The latter is seen as a way to increase the economic resilience of the community in the face of hazards, particularly for micro and small business owners. Training will target a cross-section of vulnerable groups such as fisher folk, vendors, micro and small business owners as well as community-based organisations such as youth groups. The ODPEM already has an established programme for community-based disaster risk management training, and will be able to provide a standard curriculum as well as facilitators for the training. Aspects to be included are hazard mapping, preparedness, search and rescue, first aid, hazard specific mitigation activities and business continuity planning.~~

4. ~~Development of~~ Training of fishers and other interested stakeholders in entrepreneurship.

5. Climate change awareness of residents and fishers.

An adaptation plans for the most vulnerable areas along the Negril coastline

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

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

Agriculture Adaptation

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

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

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

will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.

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

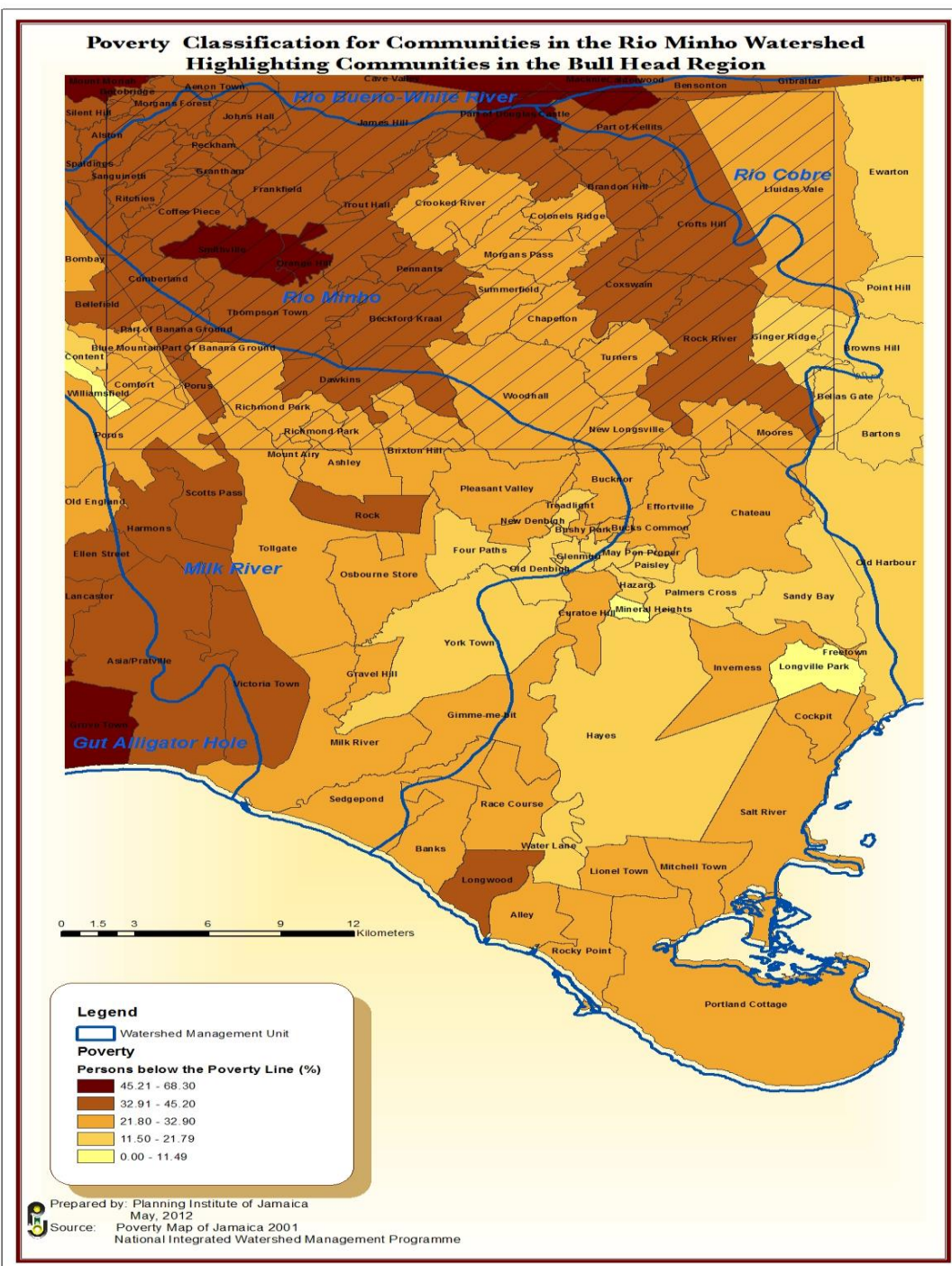
The programme targets farmers as a group. Numerically, male farmers outnumber female farmers by a ratio of 2:1 and women account for 20 per cent of the agriculture work force and about 26 per cent of the production of domestic and export crops. These statistics do not however adequately reflect the role of women in the agriculture sector as they are the primary vendors of crops. The same situation exists in the fisheries sub-sector where the majority of fisherfolk – about 70 per cent²⁵ – are men who are mainly involved in actual fishing. Women on the other hand, are primarily responsible for fish vending and the management of operations, including vending sites. Whilst only 6 per cent of registered fisher-folk are women, they are often boat owners and active in fishing cooperatives. This programme thus has a very high relevance to and potential impact on women from the perspective of livelihood, employment, and food security, whilst also benefitting men. In the case of food security, this is particularly relevant given rural women’s primary gender role as care-givers with respect to the children. Some elderly will also benefit directly from the programme as a large percentage of farmers fall within that categorization. Recent Census data show that more than 40 per cent of farmers are over 50 years. In fact, the median age of 49 years for male farmers suggests that a significant proportion is well above that age. At the same time, the programme targets younger age groups through awareness building and knowledge management through the involvement with institutions such as the 4H Clubs and the College of Agriculture Science and Education, and using the Farmer Field School methodology.

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

The socio-economic vulnerability of the communities, particularly those in the Upper Rio Minho is high, with between 30 and 70 per cent of the population falling below the poverty line. In Northern Manchester the incidence is 23.7 per cent also well above the national mean. These communities are

²⁵ Report on Rural Women in Agriculture for the period 2002 – 2008. (July 2009) Produced by the Ministry of Agriculture and Fisheries in July 2009 for the Jamaica Bureau of Women Affairs in partial fulfillment of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) report

also characterised by high dependence on agriculture as the main source of livelihood, small holdings (mostly under 1 ha), primarily rain-fed agriculture and steep topography. ~~See Map~~ See Figure Q below:



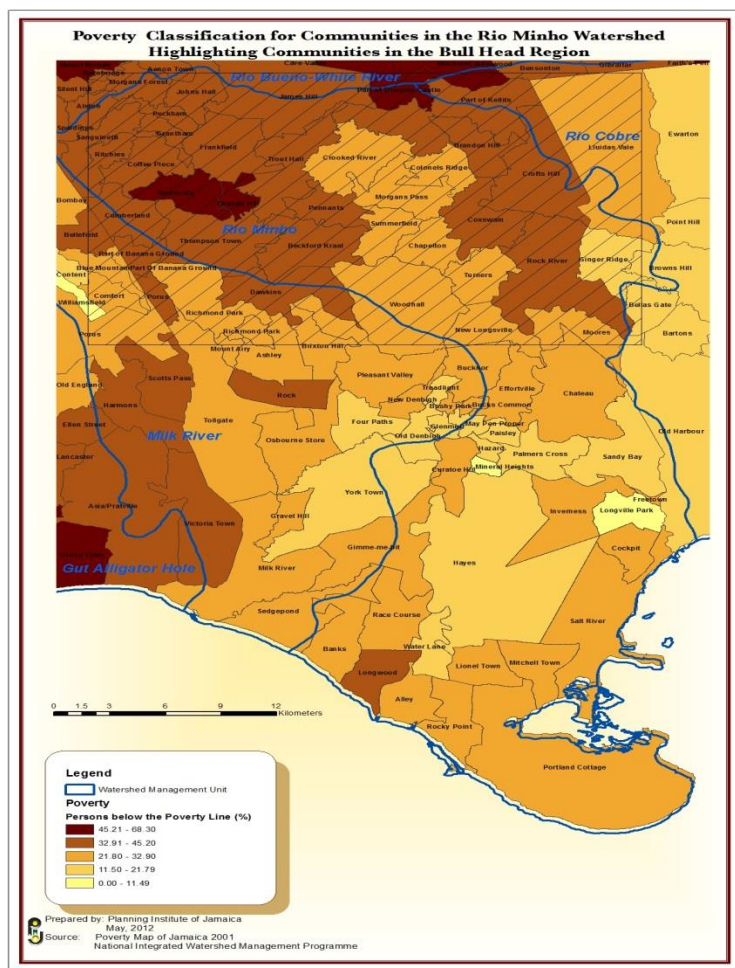


Figure QL: Poverty Classification of Communities in the Rio Minho Watershed

Component 1

Part I above highlights the main attributes of Negril:

- Provision of some 9,267 jobs in 2009 related to tourism and fisheries
- 80 per cent of residents in and around Negril (mainly rural areas) depend on jobs in the tourism sector
- A fishing beach which has approximately 349 registered fisher folk who rely on fishing as their main source of income and food.
- 7 miles of a white sand beach which acts as an attraction for tourists and residents

Many of the benefits that will be derived from the programme will be through the restoration and increased protection of the natural ecosystems which support 1) healthy fisheries and 2) beach accretion attendant on the installation of the breakwater and collaboration with citizens and other projects. Rural communities will benefit significantly from the expected outcomes. On one hand, livelihoods will be protected. Protecting the beach and the natural ecosystems, particularly coral reefs, will ensure the tourism product remains vibrant, thereby securing thousands of jobs. The fisher-folk will also benefit from the increased protection of the fisheries and the potential protection of the infrastructure of the fishing beach. On the other hand, food security will improve. Fishing is an

important and historic activity not only for livelihoods but also food security. Families rely on fish as a source of protein. Sea grass beds serve as nursery grounds for commercial fish species such as Snapper and Grunt, as well as provide habitat and foraging grounds for several species such as Mullet and Parrotfish, shell fish species and other marine fauna, such as sea urchins.²⁶

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

The main vulnerabilities being addressed by Component 1 are environmental and socio-economic, the latter being directly related to the former as hazard events have historically negatively affected livelihood in the region. These have included the devastation of the agriculture sector, primarily banana production and export in the area. The consultations targeted the community as a whole but because of the proposed coastal interventions, special efforts were made to meet with fishers along the beach.

Approximately 12, 000 residents (50.8 per cent female) in the 3 north eastern towns are exposed to storm surge, coastal erosion and riverine flooding. This was indicated in the ODPEM Multi Hazard Assessment Report of Annotto Bay and confirmed in the community consultations. The report indicates that in Annotto Bay, of the 1349 residential structures, approximately one-third are located within the storm surge zone and exposed to surges with return periods of between 25 and 50 years and 35 per cent are exposed to events with a 100 year return period (Table 8). These units are exposed to flooding with maximum flood heights of 1.9m, 2.1m and 2.3m, respectively. The physical vulnerability is amplified by the fact that over 50 per cent of the houses are considered informal structures, some of which are "located on the seafront with a distance of approximately 17.5 m from the high water mark". At the same time, some 44.0 percent of the residential units are said to be exposed to riverine flooding. At the time of the vulnerability assessment in 2012, it was concluded that 2010 and 2740 residents were exposed to storm surge and riverine flooding, respectively.

²⁶National Policy for the Conservation of Seagrasses. USAID/NRCA. July 1996.

Table 8: Proportion of Buildings that are located in storm surge zone

Number of Structures		25 YR RP	% in Hazard Area	50 YR RP	% in Hazard Area	100 YR RP	% in Hazard Area
Residential	<u>1349</u>	<u>411</u>	<u>31</u>	<u>438</u>	<u>33</u>	<u>468</u>	<u>35</u>
Commercial	<u>146</u>	<u>93</u>	<u>64</u>	<u>103</u>	<u>71</u>	<u>105</u>	<u>72</u>
Industrial Light	<u>12</u>	<u>7</u>	<u>58</u>	<u>7</u>	<u>58</u>	<u>7</u>	<u>58</u>
Educational	<u>8</u>	<u>4</u>	<u>50</u>	<u>4</u>	<u>50</u>	<u>4</u>	<u>50</u>
Office	<u>10</u>	<u>8</u>	<u>80</u>	<u>8</u>	<u>80</u>	<u>9</u>	<u>90</u>
Public Assembly	<u>19</u>	<u>13</u>	<u>68</u>	<u>13</u>	<u>68</u>	<u>14</u>	<u>74</u>
Public Buildings	<u>6</u>	<u>5</u>	<u>83</u>	<u>5</u>	<u>83</u>	<u>5</u>	<u>75</u>
Recreational	<u>2</u>	<u>0</u>		<u>0</u>		<u>0</u>	
Derelict Building	<u>1</u>	<u>1</u>	<u>100</u>	<u>1</u>	<u>100</u>	<u>1</u>	<u>100</u>
Vacant Buildings	<u>76</u>	<u>8</u>	<u>11</u>	<u>8</u>	<u>11</u>	<u>10</u>	<u>13</u>
Land Use	<u>1632</u>	<u>548</u>	<u>34%</u>	<u>585</u>	<u>36%</u>	<u>621</u>	<u>38%</u>

Source: Multi Hazard Assessment Report of Annotto Bay, ODPEM

Apart from the residential units exposed in Annotto Bay, close to two-thirds of all buildings are located in the storm surge zone. This has potential implications for employment as well as for the provision and access of services in the area. Critical facilities like the health centre are also located in the zone

In terms of vulnerable groups, the livelihood of close to 250 fishers and their families are most at risks in the three target communities. National data indicate that the fishing industry has a multiplier of approximately five times the number of persons directly employed. This suggests that the livelihoods of approximately 1,250 are dependent of the industry and would be adversely impacted without the necessary intervention. The gender breakdown was not available, however, national data suggest that while women make up a small percentage of fishers, they are actively involved in all aspects of the industry especially vending and are predominantly the boat owners. For children, 50.0 per cent of educational facilities are in the coastal zone and exposed to storm surge with return period of 25-50 years.

According to the Jamaica Survey of Living Conditions Parish Report, 2012 (latest available data), 21.5 per cent of persons in Portland (in which Orange Bay and Buff Bay are located) were living below the poverty line relative to 19.9 per cent nationally and the size of the average poor household was 4.2 persons. The parish had an age dependency ratio²⁷ of 66.4 percent and 48.9 per cent of the households were headed by females. The disparity in mean per capita consumption expenditure between female-headed and male-headed households was largest in Portland, the former being 30.0 lower than the latter, compared with a differential of 19.8 per cent nationally. The level of poverty in Portland was more severe than in all Jamaica as indicated by the squared poverty gap index—Portland recorded 0.035 compared with 0.024 nationally.

For St. Mary, where Annotto Bay is located, the prevalence of poverty at 9.4 percent was lower than in the other parishes. The average size of households in the poorest quintile was 3.9 persons and there was an age dependency ratio of 62.6 per cent. Some 46.4 per cent of household were female

²⁷ Ratio of the economically dependent section of the population (0–14 years) to the economically active section (15–64 years old)

headed compared with 46.9 per cent nationally. Female-headed households recorded 21.1 per cent lower mean per capita consumption expenditure than those headed by males.

The prevalence of poverty rates in the three towns is relatively high. Gender disaggregation of the poverty data was not available for the towns. However, using the disparity in consumption for the parishes, it can be assumed that the prevalence of poverty is higher among the women in the project area than among men. The dependency of these rural towns on agriculture and fisheries and the low level of land ownership, (nationally women are 30.2 percent of farm-holders in Portland they are 23.0 per cent and in St. Mary 26.3 percent) (Agriculture Census, 2007) contribute to this.

Component 1

The coastal protection in the towns of Buff Bay, Orange Bay will secure the main infrastructure for the movement of goods and people in the north-eastern section of the country. These towns depend heavily on agriculture and the movement of their produce is of utmost importance to the inhabitants. The communities depend on the delivery of critical goods and services from the larger towns and urban areas to sustain them. If these roads are damaged the flow of these good and services are impacted on a national scale. Securing these routes will:

1. Improve community safety and disaster response mechanisms
2. Ensure that the produce from the areas (coffee, bananas, other food produce) can be traded efficiently
3. Ensure easy movement of people for work, school, worship and socialization and emergency services.
4. Enhance the availability of the tourism product – Rio Grande Rafting, beaches of the north-eastern coast, community tourism, etc. Annotto Bay also has tourism products which need to be developed and the project can be a catalyst for this development.
5. Provide access to the capital of the parish which houses the seat of justice and other social amenities.
6. Ensure that waste collection is effective in the towns reducing the possibility of improper dumping and environmental degradation
7. Provide jobs for locals during implementation

The coastal protection works planned for Annotto Bay will be more significant than for the smaller towns as the vulnerability in Annotto Bay is much greater. These have been highlighted in a number of studies that have been cited earlier. In Annotto Bay, the housing stock of the community is densely concentrated along the strip of land between the main road through the town and the coastline. ODPEM indicates that 54 per cent of the housing stock is vulnerable to the impacts of storm surge and flooding. The 2011 Community Profile indicates that 50 per cent of these households are headed by women with a higher number of occupants than other major town and cities in Jamaica. This increases the vulnerability of the women and children occupying them. The development being proposed will reduce the risk of loss and damage to the homes of the community.

The major impacts of this flooding is the lack of access to the town and surrounding communities during the storm events and also the economic losses as a result of infrastructure damage and facility and building damage.

Table 9 shows the anticipated cost of flooding associated with storm surges, associated with varying return periods, in the towns of Annotto Bay, Orange Bay and Buff Bay. These costs however, do not include loss of revenue as a result of disruption to business, impact of riverine flood or loss of life. The

costs would be significantly higher if these were included. The probability of a 100 year return period storm is expected to increase as climate change becomes more evident.

Table 9: Expected Losses Based on Storm Surge Scenario

<u>Scenario</u>	<u>Return Period</u>	<u>Annual Probability (PT)</u>	<u>Expected Losses (V*A) \$JMD millions</u>
<u>Storm surge 5y6</u>	<u>5</u>	<u>0.2</u>	<u>0</u>
<u>Storm surge 10y</u>	<u>10</u>	<u>0.1</u>	<u>57.4</u>
<u>Storm surge 25y</u>	<u>25</u>	<u>0.04</u>	<u>114.8</u>
<u>Storm surge 50y</u>	<u>50</u>	<u>0.02</u>	<u>158.8</u>
<u>Storm surge 100y</u>	<u>100</u>	<u>0.01</u>	<u>167.6</u>

Source: ODPEM 2013

The exposure of the coast is presented in Figure R.

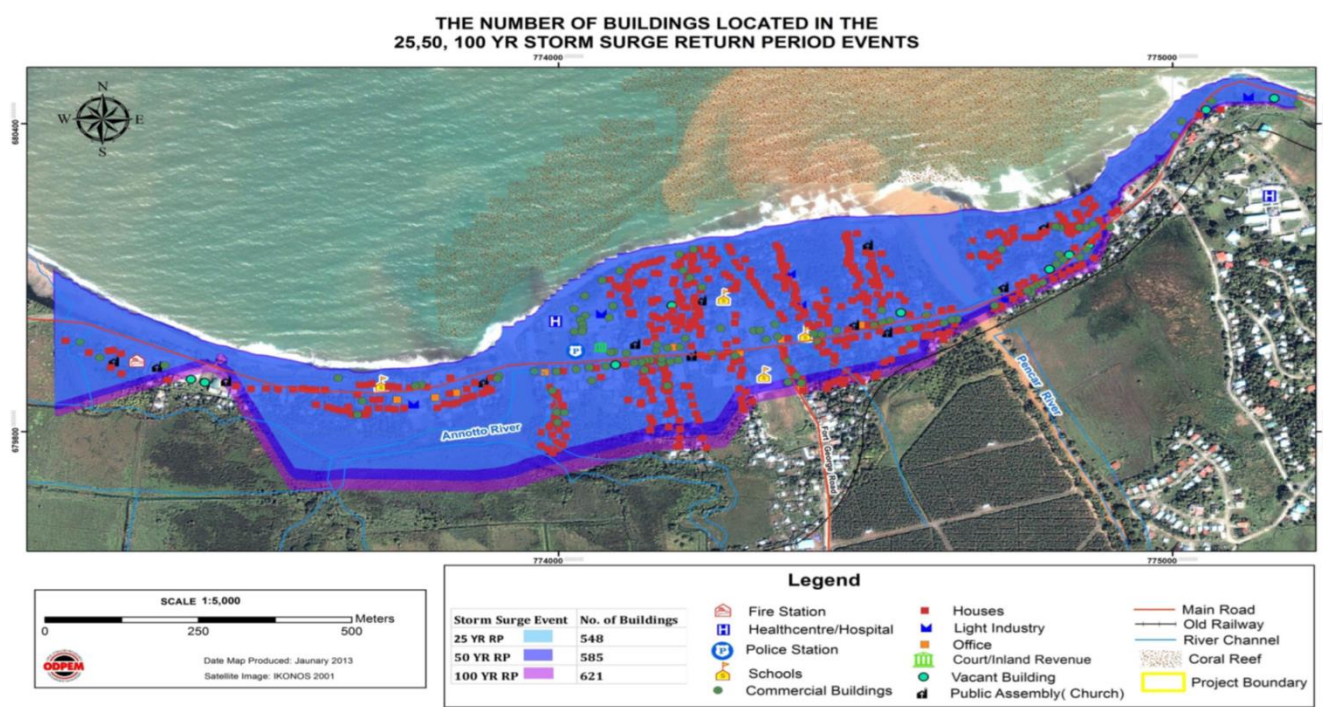


Figure R: Buildings located in Storm Surge zone (Source: ODPEM)

Annotto Bay's flooding during storm events is exacerbated by the drainage system of the town which is rendered ineffective in a storm event by a number of factors. These include:

1. Storm surge blocking the mouth of the drain due to the low elevation of the drain outfall, resulting in retardation of flow of storm-water which then backs up in the town.

2. Sediment being transported in runoff reduces the capacity of the drain and causes overflow in the town and in residences along the drain.
3. Storm surge floods the beaches and increases the level of water in the wetlands which in turn floods the town and the residences.

Addressing this aspect of the flooding of the town is tied in with addressing the erosion along the coastline. A higher elevation at the shoreline will protect the lower lands behind the protective works from storm surges. The drainage of the town will be upgraded by fixing the orientation and capacity of the drains at some locations (while installing the protective works) and this will address the riverine and drainage related flooding of the town. Orientating the drain so that the discharge and storm surge are not conflicting should keep the channel clear and reduce the sand build up during storm events.²⁸ This should result in effective discharge of runoff during storm events.

The positives of these interventions are:

1. Reduction in economic losses for residents and businesses in the Annotto Bay area during extreme storm events.
2. Faster recovery from storm events for the entire community.
3. Availability of effective access to all amenities during and after storm events. This continued access will ensure emergency services can be deployed improving the safety of residents.
4. Improvement will also be seen in the environment of the drains outside of storm events. The effective draining of the area will reduce stagnation of water in the drain that occurs as a result of the natural build-up of sand that occurs from the ebb and flow of the sea. The stagnant water in the drain presently poses health risks to the communities around the drain as these are breeding ground of disease-bearing vectors for mosquitoes and flies, bacteria and viruses. A foul odor is also present, with the stagnation.

The sediment load of runoff entering the Annotto Bay drainage network, during storm events, is very high. This sediment is deposited presently in the drain due to ineffective discharge into the bay as a result of the state of the drain outfalls. This sediment can also have a detrimental impact on water quality and the bay's ecosystem if it contains high amounts of fertilizers and pesticides as it emanates from farming areas in the watershed above Annotto Bay. To reduce the sediment content of runoff the areas providing the material for erosion need to be stabilized. It is accepted that as sediment loading increases so does the erosive power of the runoff. The project will facilitate the re-vegetation of slopes and hillsides upstream that will serve to:

1. Reduce loss of topsoil in many areas of the watershed
2. Provide additional economic activities for the farmers and inhabitants of these slopes/Livelihood enhancement for the communities involved.
3. Reduce sediment loading of runoff to the bay.
4. Reduce drain blockages in the drainage network of the town thereby reducing flooding.
5. Improve water quality in the bay – leading to improved biodiversity and improvement in fish stock.

²⁸ National Works Agency, Comprehensive Drainage and Flood Control Scheme for Annotto Bay.

6. Improve land husbandry practices

7. Improve community viability to attract and sustain eco-tourism initiatives.

8. Reduce risk of landslides and loss of property.

Enhancing vegetative cover will foster environmental protection/conservation (AF ESP Principle 9) and enhance local biodiversity (Principle 10). It will also reduce the degradation of hillsides and slopes and the associated sedimentation (Principle 15). The use of invasive species will be avoided, and preference given to native trees as appropriate. The vegetation that will be used will be finalised in consultation with the residents and responsible State entities, thereby amplifying the potential for buy-in and sustainability.

Component 2

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

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

Component 3

Capacity building which is the intent of this component, is a critical part of the sustainability of the programme. As it relates to Component 1, it will build the knowledge base of communities, ~~the hotel and other business sector entities~~ on the role that climate change has and will continue to play in their lives. All groups will also benefit from training in disaster risk reduction and natural resources management. These activities will increase their adaptive capacity. For Component 2, the capacity exercises will train local groups in good practices for farming, natural resource management and disaster risk reduction, in addition to establishing water user groups. Importantly, the component will provide for the development of guidelines and standards to aid future development planning.

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

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

BENEFITS	PROGRAMME IMPACT
Social	<ul style="list-style-type: none">• Protection of livelihoods in agriculture (including fishing) and tourism• Empowerment of communities through training and awareness building• Food Security and nutrition – fish are a protein source for many in surrounding rural communities• Improved coping strategies/capacity• Poverty reduction
Economic	<ul style="list-style-type: none">• Water management systems will support farmers in water-starved communities to improve access to water supply thus contributing to increased yields.

BENEFITS	PROGRAMME IMPACT
	<ul style="list-style-type: none"> Improved land management infrastructure, leading to reduced soil loss and increased quantity of agricultural produce. Value added to the tourism product with the protection of coastal ecosystems (including coral reefs and beaches). Protection of the spawning ground and habitat of the fisheries resulting from the rehabilitation of seagrass beds and installation of breakwaters which will help to protect the local economy. Development of adaptation plans for sections of the Negril coastline will address strategies for protecting and conserving physical and natural assets in the area. Training in DRR and natural resource management including the development of disaster risk management plans for “climate proofing” communities and entities Development of a climate risk atlas – to be used to improve decision-making in the development planning process. This will lead to a more comprehensive site selection process for new development. The use of demonstration plots for land husbandry will help to adopt good practices which will be maintained through continued work with community groups and also with public and private entities. Provision of water for vulnerable rural farmers, particularly in dry periods to enable them to enhance their agricultural production.
Environmental	<ul style="list-style-type: none"> Protection of existing coastal ecosystems – beach, coral reefs, sea grass beds, and the Negril Great Morass. Protection and expansion of habitats and breeding grounds for varying marine and wetland species including fish. Reduction in the run-off and pollution of water bodies, (fresh and marine) Increased vegetation cover Reduced downstream flooding and sedimentation due to establishment of flood mitigation infrastructure in selected areas. Headwaters of the Rio Minho River safeguarded through improved land management.

(Source: PIOJ, 2011)

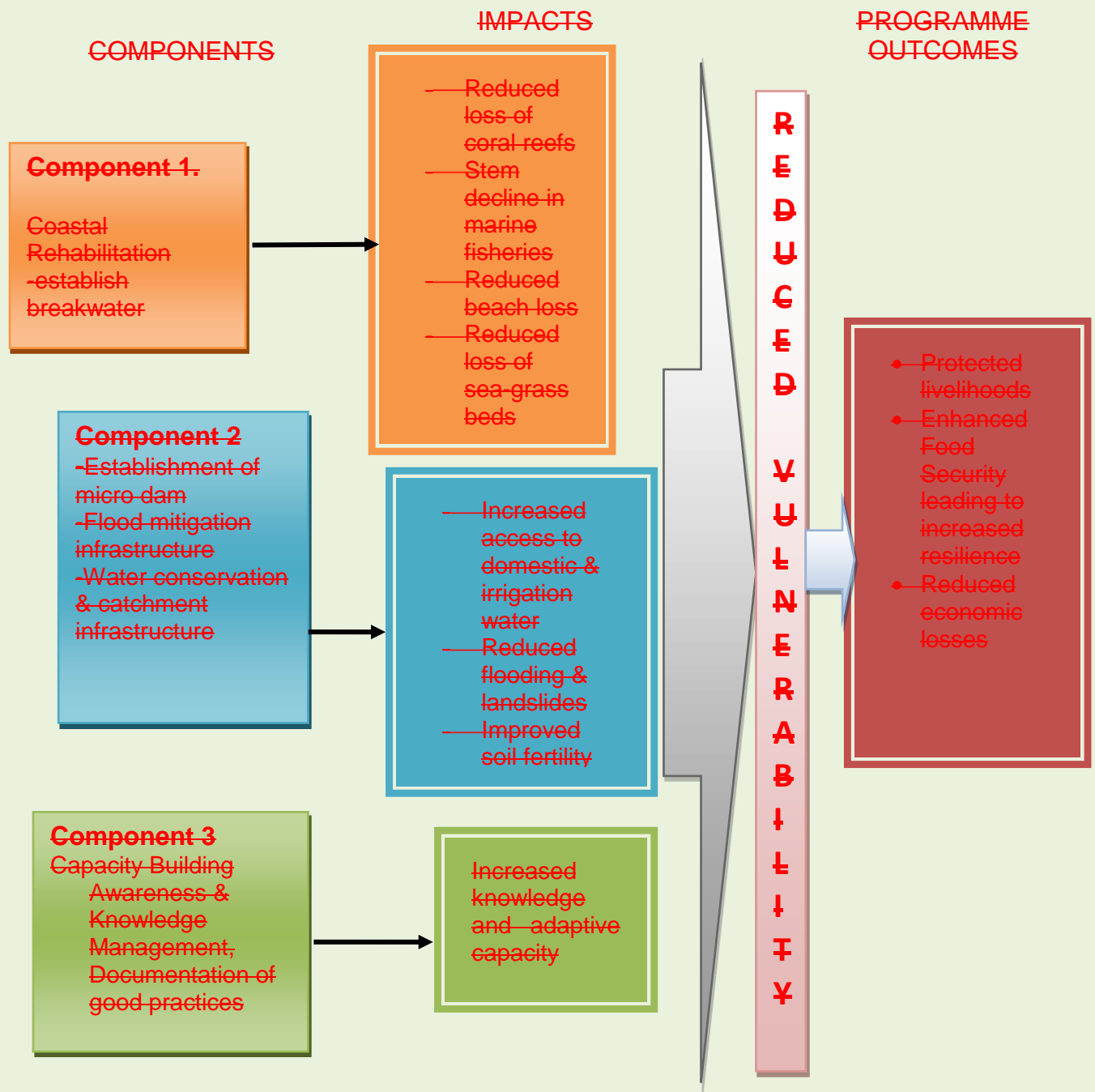


Figure M: Relationship of Programme Components in Achieving Programme Outcomes

(Source: PIOJ, 2011)

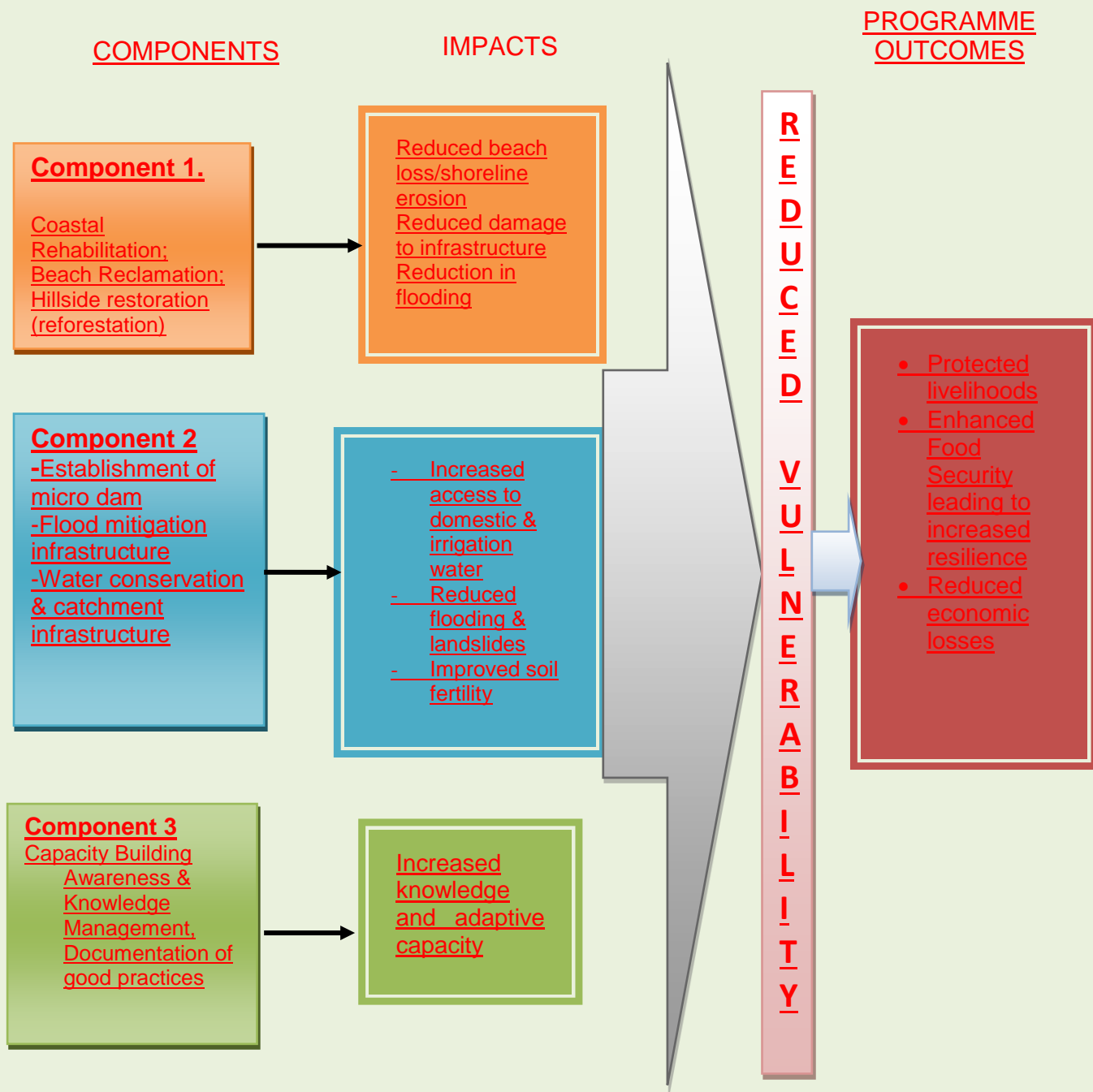


Figure S: Relationship of Programme Components in Achieving Programme Outcomes

Source: PIOJ, 2011/2017

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

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

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

~~The approaches considered for effective rehabilitation of Negril coastline included:~~

- ~~1. dredging and beach nourishment;~~
- ~~2. installation of offshore structures;~~
- ~~3. rehabilitation of natural ecosystems; and~~

~~an integrated For **Component 1**, the hazard and risk analysis carried out in Annotto Bay by ODPEM highlights the need for immediate intervention to address the impacts being experienced in the town and its surrounding communities. Based on the risk analysis, the three most relevant of the options for disaster risk reduction associated with riverine flooding, sea level rise and storm surges were:~~

- ~~1. The relocation of structures falling within the setback from the shoreline or relocation of communities~~
- ~~2. Shoreline protection in vulnerable areas along the existing coastline in the form of buried revetments~~
- ~~3. Installation of groynes (revetments) along the outfall of the major rivers and drains~~

~~Other possible options, not recommended in the hazard risk analysis include business as usual (“doing nothing”) or managed retreat as recommended by one environmental NGO.~~

~~The costs for engineered hard structures (shoreline protection, groynes), at the time of the ODPEM study, were estimated at approximately US\$6 million. The report also highlighted that the possible cost for property damage due to flooding by storm surge associated with one 100 year event storm, was approximately US\$1.7 million. Damage to infrastructure and coastline and losses due to business disruption were not included.~~

None of the recommended options by themselves would however provide the adaptation value that is needed for sustainable adaptation for the area. The approach is to ensure that the economic, social and environmental aspects are justifiable and all these aspects be integrated to provide an outcome that is sustainable with or without climate change, but with hazard management intrinsic in the development. The revised Component 1 of this programme proposes to implement activities at a cost of approximately US\$5.3million which should minimize the coastal erosion and protect community infrastructure and assets, reduce soil erosion and downstream flooding, reduce disruption of lives and livelihoods due to hazard event and build community resilience.

The ‘do nothing option’ is one in which the erosion of the coastline is allowed to continue unabated with eventual intensification and resulting in more damage to infrastructure and property and disruption of life and livelihood along the entire north eastern belt as the climate change impacts become more pronounced. The “do nothing” alternative is also not viable due to the already significant levels of erosion that have occurred overtime which have brought the coastline into communities that were once reasonable distances from the shoreline.

Based on the limited success with relocating communities in Jamaica, the relocation option has a low feasibility. The literature has shown that relocated communities often return to their original locations because of strong sociological ties. The example of Newmarket and Lewisville, St. Elizabeth is a case in point. The former was severely flooded in June 1979 remaining under water for more than 6 months. This necessitated the establishment of a new town on higher ground nearby complete with critical community infrastructure, schools, market, police station etc. However, the reality is that the residents gradually moved back to Newmarket in the 1980s after the waters subsided. Newmarket has repeatedly experienced extensive flooding, the most recent being in 2010 (Tropical Storm Sandy) but it remains home for much of the population who are said to hold properties in both locations.

Secondly, the relocation of the town and communities away from the coastline would involve significant amounts of financial resources and disruption to communities and families. The establishment of new areas requires significant capital investments which the Government is unable to provide at this time. In terms of relocating within Anotto Bay, for example, feasibility is also low unless protection works were carried out as the entire town is currently vulnerable to flooding. The latter point is borne out by the fact that some relocation have been initiated, however, the relocated residences are still vulnerable to riverine flooding from the Crooked River which traverses east of the town.

- 4.—The protection of infrastructure and access along with bioengineering and community capacity building is critical to sustainability of the project and forms the core of the **No Regrets** resilience-based approach involving items 1-3

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

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

For **Component 2**, the cost-effectiveness of the programme derives mainly from the projected increase in agricultural productivity and potential lowering of the food import bill to be obtained from improved irrigation, improved environmental stewardship from better land management (better husbandry, reversal of soil erosion); and use of more modern and sustainable farming practices. Importantly, rain water harvesting for agriculture is a self-managed system for local farmers to gain access to water and therefore contributes to reduced cost of inputs. The use of gravity drip irrigation instead of an electrically powered pump-based system also reflects the cost-effective nature of the interventions being pursued. In addition this option reduces the long term cost to the farmers of maintaining and fuelling pumps. The low energy cost approach is critical, as fuel and electricity costs are very high. From a sustainability point of view, the technology is simple and easy to install and maintain; is itself a good water management and conservation method; is economical to operate, is advantageous for pest and weed management and has a low carbon footprint. This particular component will build on lessons learnt from the experiences of the Ministry of Agriculture and Fisheries in water harvesting, thereby minimising associated risks of failure.

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

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

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

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

Capacity building ~~for relating to~~ Component 1 will involve stakeholders at all levels including resource users, private sector entities and surrounding communities. This process is intended to ensure each group “owns” the programme, understands the need for sustaining it; and will play an integral role in the management and protection of ~~Negril. Additionally, it will put adequate plans in place to guide future development in the area so that climate change adaptation factors heavily in decision-making processes. Annotto Bay.~~ The solutions to be implemented by the Government of Jamaica are based

partly on a study commissioned by an NGO, the ODPEM, and requests from community groups led primarily by the Annotto Bay Community Development Association and supported by the Member of Parliament and thus there is already the basis for a partnership. All these factors produce a solid platform for future interventions.

The most effective tool for sustaining the outcomes of Component 2 is ensuring the local level stakeholders are well equipped. As such, community groups, which are best able to reach farmers, will be trained in water and soil management. Additionally, the establishment of water ~~user~~users groups will allow farmers to be more self-reliant and achieve greater efficiency with irrigation systems. The NIC has established a number of water user groups and report that these are being successfully managed by farmers. The use of demonstration plots by the MOAF has been proven as an effective tool for changing unsustainable practices in several farming communities. It will therefore play an important part in the capacity building exercises that will be conducted.

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

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

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

Jamaica has prepared a sustainable development plan entitled **Vision 2030 Jamaica – National Development Plan**, a collaborative effort of stakeholders from all levels of society. The vision statement of this plan speaks to Jamaica becoming “the place of choice to live, work, raise families and do business”. The plan is based on four national goals, one of which is that “Jamaica has a healthy environment” – Goal 4. This goal and the associated national outcomes recognize the importance of the natural environment to Jamaica’s socio-economic well-being.

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

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

Several strategies have been identified to achieve these outcomes. These are to develop and implement mechanisms for biodiversity conservation and ecosystems management; improve resilience to all hazards and develop measures to adapt to climate change. ~~The~~National Outcome 13 also speaks specifically to increasing environmental awareness of the general population and their participation in the management of natural resources.

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

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

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

- G1. Efficient Competitive Diversified Value-Added Agricultural Production
- G3. Competent and Adequate Human Resources
- G4. Enabling and Facilitating Framework, Infrastructure and Support Services
- G5. Contributor to Long-Term Rural Development
- G6. An Environmentally Sustainable Sector
- G7. National Food Security

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

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

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

~~The country is currently preparing~~prepared a National Climate Change Policy Framework which ~~will be~~is aligned to Vision 2030 Jamaica and other relevant policies. The ~~draft~~ policy highlights that “With increased development activities taking place within the coastal zone, the risk posed to human settlements from disasters has been heightened significantly”. The policy framework emphasizes the need for, inter alia, Special Initiative for Ecosystem Protection; it also ~~recognizes the importance of the~~

~~sectors identified in this programme as critical to that actions geared toward facilitating climate resilient housing and infrastructure are important for~~ the social and economic welfare of the country. It further recognises the threats of sea level rise, storm surges and hurricane, among others and the need for adaptation measures. The programme therefore meets the objectives of and will support the further implementing of the policy framework.

The Forest Policy for Jamaica, 2016 and the Forest Act, 1996 – both governance instruments are aimed at improving, conserving and protecting Jamaica's forest resources. The Programme will support the overall objectives of the policy and comply with the Act, particularly the reforestation activities (Component 1).

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

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

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

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

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

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

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

strategies to reverse the pollution of soil, water and air, fragmentation of habitats and loss of wildlife which can be the result of inappropriate agricultural practices and land use.

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

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

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

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

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

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

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

The NEPA in its development policy and guidelines stipulates a 30m setback from the high water mark for permanent development. Importantly, this project aims to establish a setback of at least 30m for a buffer between infrastructure, homes and the eroding coastline. This would in essence be "new land." Once this is established and mechanisms for its maintenance are developed the proper planning of development critical for effective adaption of the community will be facilitated.

The National Forest Management and Conservation Plan, 2017 recommends investment in forest eco-systems in maintaining nature's capacity to buffer the impacts of climate change at a least cost and more efficiently than the utilization of heavy infrastructural technology²⁹. The overall goal of the Plan is

²⁹ Jamaica National Forest Management And Conservation Plan Draft, Forestry Department of Jamaica, 2017

to sustainably manage, protect, conserve, restore and utilize Jamaica's forest resources to enhance social and economic development and build climate resilience for current and future generations. This project is fully in line with the scope of the initiative and will ensure that all policies associated with the Forestry Sector are adhered to. The programme will engage the Forestry Department's private planters in the watershed initiative to assist with the execution of this deliverable.

The programme aligns with National Policy on Poverty, 2017 and the National Poverty Reduction Programme. Both the policy and the programme seek to "implement, coordinate, and monitor measures to address poverty and vulnerability".

The local environmental group, the Annotto Bay Community Development and Environmental Association has had a long standing plan of developing a beach park within the vicinity of the town. The beach park would enable various recreational activities, public beach, a nature walk, and children's playground. Component 1 will facilitate the development of such a park by providing the area for development in the reclaimed area. The area of which is approximately 2 hectares. The St. Mary Parish Development Plan has this activity on its agenda and the ABCDEA is actively pursuing its development.

At the international level, the programme is aligned to the 2030 Agenda for Sustainable Development. Agenda 2030 envisions a better world, free of poverty and 'seeks to strengthen universal peace' by achieving 17 Sustainable Development Goals (SDGs) translated into 169 targets and measured through 231 indicators³⁰. This new Component 1 is aligned closely to twelve (12) SDGs with primary focus on Goals 13 & 14. These SDGs are geared towards poverty elimination and hunger eradication (by spurring economic development), gender equity, good health and well being (recreation and access of resources to all), sustainable communities and sustainable climate action with interventions for improving aquatic life in the ocean and in rivers and terrestrial ecosystems enhancement. This continues on the Millennium Development Goals (MDGMD), chief among them, Goals 1 and 7 - poverty and hunger eradication and environmental sustainability which were at the forefront of the development of the original Component 1.

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

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

- The Natural Resources Conservation Act (1991) – This legislation allows for the management, conservation and protection of the natural resources of Jamaica. These resources are managed through the Natural Resources Conservation Authority, a body of established under the Act. This Authority has responsibility for effective management of the physical environment of Jamaica; and the management of marine parks and protected areas.
- The Beach Control Act (1956) and the Natural Resources (Marine Parks) Regulations, 1992, including the requirement for Environmental Impact Assessment (EIA) (see). This legislation was passed to ensure the proper management of Jamaica's coastal and marine resources through a system of licensing of activities on the foreshore and the floor of the sea. The proposed coastal infrastructure will be addressed through this legislation. The Act also addresses other issues such as access to the shoreline, and other rights associated with fishing and public recreation, as well as the establishment of marine protected areas. This policy is central to the comprehensive coastal resource

³⁰ A Road Map For SDG Implementation In Jamaica, GOJ/UNDP, April 2017

management strategy³¹ including among others: implementation of measures for pollution control and safety for the users of coastal resources, and management of coastal resources in the light of their vulnerability to the effects of climate change and natural disasters. The NRCA, as a regulatory agency, also must ensure that all beaches are properly managed on a non-discriminatory basis, that beach regulations are adhered to and that issues of safety, waste disposal and beach maintenance are being properly addressed.

~~• The impact on sea grass beds falls under the Policy on Sea Grass Beds (2000)³². This policy provides links to the National System of Protected Areas through a network of fish sanctuaries and marine parks. The Negril area is an approved Marine Park with activities proposed under component 1. The Beach Policy³³ also identifies the coral reefs and sea grass beds for their importance in protecting the beach and supplying sediments for the maintenance of the beach profile. Coastal vegetation such as sea grass stabilizes the beach and offers protection against erosion by waves and surface runoff. The sea grass beds policy and the beach policy require that the natural vegetation within the near shore should be preserved as a buffer. Among the various measures that can be taken in response to coastal erosion in Jamaica are: (1) Protecting natural features, such as mangroves and reefs that can retard erosion; (2) Constructing jetties, groynes, seawalls, and revetments; (3) nourishing beaches; and, (4) directing developments away from erosion hazard areas.~~

~~As part of a Coastal Zone Management Programme (CZMP) - an inventory of areas with severe erosion was compiled with Negril a number of areas along the north-eastern coast of the island being one such area. Furthermore, a comprehensive study of the causes and damage caused by coastal erosion, and the costs and benefits of identified among the list. The CZMP has stipulated a required setback from the high water mark. Component 1 is geared towards implementing mitigation and control measures has been done for this area³⁴.~~

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

▪ ~~General~~The NRCA has developed general Guidelines for Project Proponents submitting environmental Permit and Licence Applications - This relates to Permit and Licence Systems which is framed by provisions of the NRCA Act (1991), the NRCA (Prescribed Areas) (Prohibition of Categories of Enterprise, Construction and Development) Order and the NRCA (Permit and Licence) (Forms, Processing and Fees) Regulations (1996) (Amended 2004). The Natural Resources Conservation (Permits and Licences) (Amendment) Regulations, 2015. These regulations seek to

³¹ A Discussion Paper towards Developing a National Policy on Ocean and Coastal Zone Management has been prepared (July, 2000)

³² ~~Towards A Beach Policy For Jamaica (A policy for the Use of the Foreshore and the Floor of the Sea),~~

³³ ~~Beach Policy for Jamaica - November 2000~~

³⁴ ~~Risk and Vulnerability Assessment Methodology Development Project (RiVAMP): The Case of Jamaica.~~

effectively manage development activities and their deleterious effects (direct and indirect) in Jamaica and its Territorial Sea as it relates to the environment and human health. A Permit is required to undertake any construction, enterprise or development of a prescribed nature anywhere in the island and the Territorial Sea. The permit is intended to safeguard the various environmental/natural resources from direct damage due largely, but not exclusively, to physical development. The discharging of any sewage or trade effluent or other polluting matter to air, ground or water, or the construction, reconstruction or alteration works therefore requires the holding of a Licence. The areas in which programme activities will be carried out are primarily brownfield sites. The shoreline protection activities will take place adjacent to main roads, commercial and residential developments while the areas for reclamation had housing and other structures in the near past.

- NRCA Guidelines for the Planning, Construction and Maintenance of Facilities for Enhancement and Protection of Shorelines: These guidelines as well as the standards of the construction industry for the development of hard engineering in the coastal zone will be adhered to. In addition, the Design Engineer's TORs will reflect and be guided by these requirements. All standards will be incorporated in the finalization of the design to ensure the maximum protection for the target communities.

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

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

- MOAF land suitability and capability criteria which relate to hillside farming; the Land Management Policy. The Land Management Policy speaks to the several major issues, such as : (1) under-utilization of large areas of arable lands, (2) small inefficient and fragmented farms including many located on land of low capability, and (3) over-intensive cultivation and misuse of steep slopes (4) planting of crops with little regard to ecological /environmental conditions, (5) inappropriate agricultural techniques and practices, (6) accelerated erosion resulting from land degradation and abandonment of large tracts of farm lands, and (7) deforestation of many watersheds. These land management issues are proposed to be managed through this policy by: Conservation measures and better agricultural practices being implemented to reduce soil erosion, to help to maintain soil fertility and to increase productivity. Additionally, the Policy speaks to the declaration of Agricultural Zones for the preservation of the country's agricultural lands from fragmentation and uneconomic use as well as the securing of permits for all new agricultural developments (including change of agricultural use) of 10 hectares and over, from the Natural Resources Conservation Authority, with the appropriate conditions and with inputs from the ~~Ministry of Agriculture and Fisheries~~.MOAF. Agricultural developments of 25 hectares and over may require on Environmental Impact Assessment (EIA). The

Land Development and Utilization Act (1966), addresses idle lands of twenty (20) hectares and over in an effort to encourage the use of idle lands in the country. The National Irrigation Development Program is a master plan that addresses the irrigation strategies of the country and prioritises projects for implementation with long-term objectives. These objectives include: increasing farmers' income and increasing irrigated agricultural areas by 40 per cent. The benefits to be accrued under this master plan include: an increase in crop production and productivity, farmer participation in irrigation management through the establishment of Water Users Associations (WUAs) to manage and operate the schemes, and self-sustainable irrigation systems.

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

~~▪ The PIOJ Environmental and Social Framework – The NIE's ESF will be used to complement the AF's Environmental and Social Safeguards Policy. This will ensure that all activities proposed and implemented meet the required level of assessment, mitigation or avoidance.~~

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

This AF funded programme does not duplicate any ~~projects other project~~ or ~~programmes programme~~. However, it complements ~~past, on-going and future activities which are all other projects~~ geared towards giving effect to Outcome 14 of Vision 2030 Jamaica (Hazard Risk Reduction and Adaptation to Climate Change) and achieving the long-term goal of sustainable development for the country inclusive of those in Table 10. Where ~~programmes bear similar names and/or there are similarity of objectives and activities~~, the choice of project location ~~will ensure ensures~~ that there is no duplication but rather an expansion and reinforcement of the project impact. Table 11 provides a list of complementary/ related ongoing, completed and planned projects.

Table 11: Complementary Projects and Programmes

Projects and Programmes	Objectives and Outcomes	Potential Synergies overlaps with the AF Programme
<u>Coastal Multi-Hazard Mapping & Vulnerability assessments towards Integrated Planning & Reduction of Vulnerability for Portland Cottage, Morant Bay & Manchioneal, Jamaica 2010-2011 (World Bank-GFDRR)</u>	<u>Multi-Hazard Assessment & development of multi-Hazard Maps; vulnerability & risk assessments; disaster/Risk Management plans for three communities in Jamaica</u>	<u>This study focused on three communities which were severely impacted in past storm events, particularly Hurricane Dean in 2007. The project produced reports on hazard and vulnerability assessments and the final report which detailed recommendations and strategies for action. The experiences, lessons learnt, and recommendations will be incorporated during implementation</u>
<u>Pilot Program for Climate Change Resilience (PPCR):</u> <u>1) Improving Climate Data and Information Management Project, 2015-2020</u> <u>2) Adaptation and Disaster Risk Reduction (CCADRR) Project Program and Financing Mechanisms, 2015 – 2020</u> <u>GOJ/EU/UNEP 2010-2013</u> <u>3) Promoting Community-</u>	<u>Objective: To adapt to climate change and contribute to sustainable development in Jamaica, particularly in vulnerable communities, through increasing resilience and reducing risks associated with natural hazards</u> <u>Results:</u> <u>4. Rehabilitated watersheds through slope stabilization measures such as</u>	<u>Negril is one of the target areas for this project. Among the activities are installation of data loggers for monitoring important variables, restoration of seagrass beds and the laying of artificial reefs. These activities are outlined in the Negril Plan of Action. The AF Programme activities also falls under the Plan of Action, so all the activities are complementary.</u> <u>RiVAMP II, an initiative under Results area 3, will seek to purchase data</u>

Projects and Programmes	Objectives and Outcomes	Potential Synergies overlaps with the AF Programme
<p><u>Based Climate Resilience in the Fisheries Sector Project, expected start date 2018 (to 2023)</u></p>	<p>reforestation of denuded hillsides</p> <p>2. Increased resilience of selected coastal areas against potential climate change impacts</p> <p>Climate change capacity building and awareness raising</p> <p>1) To improve the quality and use of climate related information for effective planning and action at local and national levels through, inter alia: expansion of climate data networks; establishment of Climate Information Platform; awareness building etc.</p> <p>2) To increase Jamaica's resilience to climate change, through enhancing adaptive capacity across priority sectors through: i) mainstreaming climate change into development planning; (ii) providing information on novel approaches, including climate financing, to overcome the challenges of climate change; and (iii) disseminating lessons learned from adaptation interventions</p> <p>3. 3) To enhance community-based climate resilience among targeted fishing and fish farming communities of Jamaica through: (i) increased access among fishers and farmers to climate-smart livelihoods opportunities; (ii) improved community-based management of fisheries to withstand climate impacts; and (iii) increased capacity of fisheries organizations to implement climate-resilient activities.</p>	<p>collection equipment, specifically for hydrology and climate data. This will be in the wetlands of the Negril watershed. Downscaled climate scenarios and expanded climate data network will improve climate change planning in targeted project areas. Projections of climate parameters across the island provide locational information for planning. Climate change public education campaign will impact targeted project area.</p> <p>Sector strategies and action plans to be developed will include human settlements and coastal resources, among others, which will benefit from and provide benefit to the AF programme.</p> <p>The fisheries sub-industry (and consequently communities) will benefit from improvements to the legislative and regulatory framework; strengthening of community-based organisation; expansion of aquaculture using climate-smart techniques; and training and awareness for climate change among fisheries organisation (community-level).</p>
Capacity Building for Sustainable Land Management	Objective: To enhance effective sustainable land management (SLM) by building capacities for SLM in	Project will provide learning for the Ministry of Agriculture and RADA officers and guidance to the capacity building

<p>(UNDP-GEF) 2010-2012</p> <p>(30-months)</p>	<p>appropriate government and civil society institutions and user groups and mainstreaming SLM into government planning and strategy development.</p> <p>Outcomes:</p> <ol style="list-style-type: none"> 1. SLM is mainstreamed into national institutions, policies, strategies and plans 2. Capacity for management, application and adaptation of SLM is enhanced 3. Effective management and adaptive learning is achieved. 	<p>proposed under the AF programme.</p>
<p>Coastal Multi-Hazard Mapping & Vulnerability assessments towards Integrated Planning & Reduction of Vulnerability for Portland Cottage, Morant Bay & Manchioneal, Jamaica 2010-2014</p> <p>(World Bank-GFDRR)</p>	<p>Objectives include: Complete Multi-Hazard Assessment & develop multi-Hazard Maps; carry out vulnerability & risk assessments; Produce disaster/Risk Management plans for three communities in Jamaica- Portland Cottage, Clarendon; Morant Bay, St Thomas; and Manchioneal, Portland</p>	<p>This recently concluded study focused on three communities which were severely impacted in past storm events, particularly Hurricane Dean in 2007. The project produced reports on hazard and vulnerability assessments and the final report which detailed recommendations and strategies for action. The experiences, lessons learnt, and recommendations will be important in developing the adaptation plans and risk atlas for Negril under Component 3 of the AF programme.</p>
<p>Reducing GOJ/EU/UNEP Climate Change-Driven Erosion Adaptation and Landslide Risks through Sustainable Agriculture (JCDD) Disaster Risk Reduction project (CCADRRP), 2010-2013</p>	<p>Objective: To increase the capacity of the targeted farming communities on the slopes of the Blue Mountains to adapt to climate change. The outcomes expected are:</p> <ol style="list-style-type: none"> 1. Increased agro-technical capacity for applying soil conservation techniques that are necessary in steep slope environments. 2. Alternative livelihood practices promoted. 3. Forest and tree cover (with appropriate species) promoted on slopes that are contribute to sustainable development in Jamaica, particularly in vulnerable to climate-driven increases in erosion communities, through increasing resilience and landslide reducing risks associated with natural 	<p>The project was completed in 2010. Outputs will be used to inform the development of Components 2 and 3. The lessons and experiences of this project can be replicated in the development of demonstration plots and also in training community-based organizations (CBOs) and/or NGOs. Lessons from the ridge-to-reef approach adopted for the project will be brought to bear on the AF programme.</p>

	<u>hazards.</u> <u>Outcomes included:</u> <u>rehabilitated watershed;</u> <u>resilient coastal areas</u> <u>(selected sites, management</u> <u>systems); and increased</u> <u>climate change capacity and</u> <u>awareness</u>	
Reforestation and Promotion of Best Farming Practices to mitigate the effects of landslides in Somerset, St. Thomas (FCF) 2010-2013	Objectives are: <u>1.</u> To enhance the environmental health and living conditions in the Somerset community by addressing the problem of erosion, landslides and flood risks through mixed reforestation on erosion-prone areas of Somerset <u>4.</u> and the installation of slope stabilization mechanisms. <u>2.</u> <u>2.</u> To provide local farmers with training in best farming practices most suitable for hilly areas <u>3.</u> <u>3.</u> Building the capacity of the community to carry out proper environmental stewardship.	This project is being implemented by an NGO, Women's Resource and Outreach Centre over a 3 year period ending in 2013. This project complements the activities that are proposed under <u>Components 2 and 3.</u> <u>The reforestation aspect of the new</u> <u>Component 1</u>
Programme on Promoting Rain Water Harvesting and Small Scale Irrigation in South St.Elizabeth (FAO/GOJ)Jamaica Disaster Vulnerability Reduction Project (JDVRP), 2016-2022	Objective: To enhance food security and socio-economic well-being of farmers in South St.Elizabeth by promoting increased crop production through rain water harvesting, improved water management and introduction of small scale irrigation technology.To enhance Jamaica's resilience to disaster and climate risk	This project is being undertaken by the Ministry of Agriculture and Fisheries (MOAF) and the National Irrigation Commission (NIC) and ended in 2011. Component 2 builds on the pilot work undertaken in this project and will provide a basis for replication and/or scaling up.The project produced the Coastal Management and Beach Restoration Guidelines for the island which will be applicable to the AF programme, specifically Component 1. It will also facilitate a sub-project that will value mangroves for their coastal protection services, and produce a disaster risk information platform for enhanced resilience planning.
Improving Jamaica's Agricultural Productivity (GOJ/CIDA)GOJ/EU Addressing Environmental and Climate Change challenges through Improved Forest Management in Jamaica	Objective: To strengthen sustainable agriculture productivity in Jamaica by improving the productivity of Jamaican farmers and fisher folks, through the use of more durable greenhouses and improved environmental	The MOAF is implementing this project with funding from the Canadian International Development Agency (CIDA). Outputs and outcomes will be incorporated in the development of relevant components of the AF programme.The IFMJ, once commenced, will improve on current initiatives in

<p><u>(IFMJ).</u> <u>Expected start date 2018 (to 2022)</u></p>	<p><u>management in small-scale fisheries.</u></p> <p><u>Components:</u></p> <p><u>1. Green-house development</u></p> <p><u>2. Beach rehabilitation component</u></p> <p><u>To assist the Government of Jamaica (GoJ) in implementing the Forest Policy of 2017 (and supporting the National Forest Management and Conservation Plan (NFMCP 2016-2026)), to sustainably manage and utilise Jamaica's forest resources to enhance social and economic development and contribute to building the country's climate resilience</u></p>	<p><u>participatory planning to protect, conserve and manage forests as well as improve the legislative framework and enforcement capabilities of relevant entities. The AF programme includes a ridge-to-reef element which seeks to reduce sedimentation from upstream sources that adversely affects coastal waters, thereby creating synergies between the two initiatives.</u></p>
<p><u>Rain Water Harvesting (RWH) (WRA)</u></p>	<p><u>Objective: To increase awareness of government and the public as to the potential for RWH as a sole water supply source in areas of Jamaica presently without access to water and as an augmentation source in areas regularly affected by drought</u></p>	<p><u>This project, which is being implemented by the Water Resources Authority (WRA), will provide useful information for Component 2 of the programme.</u></p>
<p><u>Risk and Vulnerability Assessment Methodology Project (RiVAMP)</u></p> <p><u>(UNEP)Jamaica Rural Economy and Ecosystems Adapting to Climate Change Phase II (JaREEACH II), 2015-2018</u></p>	<p><u>Objective: The pilot testing of a methodology that takes environmental factors into account when analysing disaster risk and vulnerability, with special focus on climate change</u></p> <p><u>To increased climate change resilience for targeted livelihoods and ecosystems by: protecting livelihoods & investments, combating land and water degradation and mainstreaming climate change in decision making tools</u></p>	<p><u>Negril was selected for the pilot site based on the state of ecosystems, human-based activities, climate change factors, socio-economic vulnerability and environmental governance. The AF programme will implement recommendations of the RiVAMP study. Furthermore, Phase II of this project will be undertaken; the coastal ecosystems as well as the Negril/Orange River watershed will be addressed. Initial funding is made under the CCADRR Project. JaREEACH II engaged farmers and local communities in building their understanding of climate change and also training them in climate change adaptation techniques. Lessons learnt and best practices will complement work to be completed under the AF programme.</u></p>
<p><u>Pilot Program for Climate Resilience (PPCR)</u></p>	<p><u>In the design stage. To establish Climate Information Platform through which range of information will be made available and facilitate awareness building and make resources available to finance</u></p>	<p><u>Consistent with priority sectors identified under the PPCR. Expected to produce downscaled climate scenarios that will improve climate change planning in the project areas.</u></p>

	adaptation at the community level	
<p>Assistance to Improve Local Agricultural Emergency Preparedness in Caribbean Countries</p> <p><u>(GOJ, FAO) Japan Caribbean Change Climate Partnerships (JCCCP), 2016-2018</u></p>	<p>Project Goal: To contribute to community-based disaster management planning and community-level risk management within the agricultural sector through, among other things:</p> <p>i) Improvements in institutional frameworks and technical options for hurricane-related disaster preparedness. To support countries across the Caribbean in advancing the process of low-emission risk-resilient development by <u>improving energy security and integrating medium to long-term planning for adaptation to climate change, through the development and implementation of Nationally Appropriate Mitigation Actions (NAMAs) and National Adaptation Plans (NAPs).</u></p> <p>ii) Emergency response and post-emergency agricultural assistance.</p>	<p>The project was completed in 2008. The Rural Agriculture Development Authority (RADA) was an important partner in the project. The lessons learnt and experiences gained will be incorporated in the AF programme, particularly as RADA will be an important partner in its development and implementation. <u>The use of climate smart technologies will have synergies with those being applied under the AF programme, particularly in scaling up climate smart agricultural techniques for land and water management.</u></p>
<p>Negril Beach Restoration Programme</p> <p><u>NEPA/GOJ Preparation of the Third National Communication and Biennial Update Report for submission to the UN Framework for Climate Change, 2014-2017</u></p>	<p>Objective: To implement measures that will mitigate against further coastal erosion of the Negril area, by implementing appropriate coastal restoration/rehabilitation works. To assist Jamaica in the preparation of its <u>Third National Communication (TNC) and First Biennial Update Report (BUR)</u> for the implementation of the obligations under the <u>United Nations Framework Convention for Climate Change</u></p>	<p>Comprehensive programme for the rehabilitation of the Negril Coastline inclusive of detailed sand surveys (building on previous studies); installation of hard engineering structures (including breakwaters, etc.) based on outputs of surveys; and rehabilitation of coastal and marine ecosystems (including seagrass beds, mangroves)</p> <p>Component 1 of the AF concept will implement an element of the programme. The remaining elements will be implemented on a phased basis as funds become available. <u>Data and information prepared under the project will have relevance to the AF programme, particularly reports prepared for Agriculture, Human Settlement and Coastal Resources in Jamaica.</u></p>
<p>Rehabilitation of the Negril Wastewater Treatment Plant</p>	<p>Objectives: Raising and connecting the embankments of the stabilisation ponds; installing flow control devices;</p>	<p>This project directly complements Component 1 as it addresses some of the human-based activities which contribute</p>

GOJ/EU (12-month commenced February 2011)	improving the outlet structure Outcome: preservation of the coastal, natural environment; improved quality of the sea water and beaches; growth in aquatic biodiversity; and improved sanitary condition in the local communities	to the degradation of the ecosystems in Negril.
Increasing the Resilience of Coastal ecosystems to GOJ/GEF/IDB Integrated Management of the Yallahs and Hope River Watershed Management Areas Project, 2015-2019 Climate Change	Replanting of sea-grass and mangroves Installation of data loggers to record sea surface temperatures Preparation of a management plan for the marine protected area To improve the conservation and management of biodiversity and the provision of ecosystem services on the Yallahs and Hope River Watershed Management units (WMUs) through: i) Institutional strengthening and capacity building for integrating biodiversity and watershed management; (ii) Creating economic and financial incentives to support sustainable biodiversity and watershed management and (iii) Implementing sustainable agriculture, forestry and land management practices by local communities	Reducing beach erosion <u>The project addresses watershed degradation (in the contiguous watersheds) through, among other things, working with farmers to improve climate-smart and sustainable farming techniques. The lessons and best practices will be applied to the AF programme as appropriate. Baseline data recording</u> Sustainable natural resource management practices
Marketing and Agriculture for Jamaican Improved Competitiveness	Advancing the development of a modern, efficient and internationally competitive agricultural sector in Jamaica through support to specific crops.	Farmer Field Schools methodology Climate change awareness programme and risk reduction planning

(Source: Compiled by PIOJ ~~from various sources~~)

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

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

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

The programme will involve documentation of:-

- good water and land management practices in project communities,
- good adaptation practices to reduce vulnerability and increase resilience,
- innovations by farmers for adaptation
- methods and techniques for beach restoration and shoreline protection
- methods for replication of relevant project elements
- adaptation plans for Negril/Annotto Bay
- lessons and experiences throughout the project cycle

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

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

Documented information from the programme will be disseminated through a range of methods and media including community meetings, workshops, project reports, programme website, and electronic and print media. The information will be targeted to residents, farmers, fisher-folk, trade groups and professionals. Where possible, educational institutions will be involved in knowledge sharing activities and will be invited to do case studies in particular communities. Generally, the communication and awareness building campaign and the messages disseminated will be designed to be culturally relevant, and segmented and targeted for increased impact. Overall, the AF-funded programme will leverage the knowledge management approach and activities being undertaken by the ~~European Union funded Climate Change Adaptation and Disaster Risk Reduction Project and the Pilot Programme for Climate Resilience~~and related projects. It will use materials developed under these

programmes and contribute information for material development. It will also establish linkages with the on-going and planned work of NGOs such as Panos Caribbean, NEPT and NCRPS and the Annotto Bay Community Development & Environmental Association.

The involvement of schools through the Four-Jamaica 4-H Clubs movement will allow transmission to the next generation of farmers, leaders whose involvement is critical if sustainability of good natural resources management practices is to be achieved.

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

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

- ~~FFS facilitators undergo intensive training (TOT) to prepare them for organizing and conducting field schools.~~
- ~~Farmers become experts in their own fields.~~
- ~~Each Field School is field based and lasts for a full cropping season~~
- ~~The primary learning material at a FFS is the field~~
- ~~FFS educational methods are experiential, participatory, and learner centred~~
- ~~Each FFS meeting includes at least three activities: the agro-ecosystem analysis, a “special topic”, and a group dynamics activity.~~
- ~~Between 25 and 30 farmers participate in a FFS.~~
- ~~Participants learn together in small groups of five to maximize participation.~~
- ~~Final meetings of the FFS include planning for follow-up activities.~~

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

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

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

Programme Concept Stage

The consultation process used in the development of the programme concept was two-fold. On one level, it involved calls for concept ideas issued by the Planning Institute of Jamaica to agencies which

work in the areas identified as priorities under the Second National Communication (which was prepared under a participatory process). These areas were also chosen to ensure alignment with the priority areas to be supported by the AF³⁵. The calls were issued via letter, in partnership with the Hazard Risk Reduction and Adaptation to Climate Change Thematic Working Group (TWG)³⁶. Responses were reviewed by a technical review sub-group.

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

- a climate change awareness rapid assessment survey of resource users conducted to determine the level of awareness of climate change among residents of two coastal fishing communities and two farming communities in western Jamaica; their observations of any changing climatic conditions; the impact of such conditions on their environment and livelihoods; adaptation/coping strategies used; and perceived needs and proposed strategies to improve adaptation.
- four regional stakeholder consultations (bringing together residents from all 14 parishes) held in February - March, 2011 under the Pilot Program for Climate Resilience (PPCR) to help define the priorities of the Strategic Programme on Climate Resilience; and
- ~~the Risk and Vulnerability Assessment Methodology Development Project report from Negril~~

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

Programme Development Stage

Particular emphasis was placed on receiving inputs from residents and technical experts during the development of the full programme. To this end, a consultant was contracted to plan, coordinate and facilitate stakeholder consultations as part of the process of completing the document. This was facilitated with resources from the Programme Formulation Grant. A total of one national and nine community consultations were held over the period January 18 – March 16, 2012. ~~These~~ were originally planned to be held earlier, but heavy rains and later political activities associated with the hosting of a general elections during the last quarter of 2011 resulted in their being rescheduled. The rescheduling was necessary to ensure that the project activities were not associated with any political activities and would therefore benefit from maximum community involvement. ~~The~~ consultations involved a variety of stakeholders within all parishes targeted for intervention and at national level (~~Annex 2~~)-Annex 1). The communities were initially identified to be involved in the consultations based on the broad areas to be serviced under the programme and in accordance with the Ministry of Agriculture's plans for food security. Groups recommended for participation were primarily identified by the RADA Extension Officers who work directly with the communities. The venues chosen for most of the consultation were community centres, ~~schools~~schools and church halls.

Approximately 100 women and 200 men were involved in the consultations. During the consultations the programme concept and proposed activities were outlined to the group and feedback on suitability

³⁵ <http://www.climatefundsupdate.org/listing/adaption-fund>

³⁶ The TWG was established under Vision 2030 Jamaica and comprises representatives from the NGO sector, IDP, community and government agencies

and relevance to needs was solicited. Communities were also asked to indicate whether the programme conflicted with or complemented other projects currently being done or which had been recently completed. Concerns of the community were documented even if they did not relate directly to the project subject area.

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

~~The Negril consultation was also instructive, and the final breakwater placement was informed by the preferences of the stakeholders for a more aesthetic solution. The community also recommended that they be involved in the restoration of seagrass beds. The Negril stakeholders also expressed a willingness to be involved in the implementation of the project by forming a local monitoring committee which would provide inputs to the agencies and contractors.~~

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

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

A range of methods were used in the consultative process, they include i) focus groups discussions ii) field studies/visits at the local level to gauge information on environmental and climatic conditions, community knowledge and perceptions, livelihood-related practices, coping strategies and the potential for interventions and iii) key informant interviews (community, hoteliers, academics and technical agency level). Some participating entities consulted are listed in Annex 1.

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

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

Agency	Affiliation
Association of Development Agencies (ADA)	NGO
Panos Caribbean	NGO
Water Resources Authority (WRA)	Government
Ministry of Agriculture and Fisheries – National Irrigation Commission (NIC) , Rural Agricultural Development Authority (RADA)	Government
National Environment and Planning Agency (NEPA)	Government
Ministry of Health	Government
Ministry of Tourism	Government
Environmental Management Division of the Office of the Prime Minister	Government
Planning Institute of Jamaica	Government
College of Agriculture, Science and Education	Academia
Parish Councils	Government
University of Technology	Academia
Canadian International Development Agency	Donor Group
United Nations Environmental Programme	UN Agency
United Nations Development Programme Country Office	UN Agency
<u>Annotto Bay Community Development & Environmental Association</u>	<u>Community Group</u>
St Thomas Environmental Protection Agency	NGO

The main takeaways from the consultations in 2012 were:

1. the need to protect livelihoods and food security
2. need to improve knowledge as important mechanisms in adapting to climate change and building resilience
3. addressing aggressive coastal erosion using hard and soft engineering

The priorities remain relevant to the replacement Component 1 but further consultations were held to expand input and gauge need and expectations. Notwithstanding and having regard to the impending expiry of GoJ/AFP, the NIE determined that it would seek to pursue another shoreline protection activity. This, it was felt would maintain the integrity of the GOJ/AF Programme as originally designed and address a priority adaptation need in the country. Accordingly, the NIE issued written invitations to select government agencies to submit projects that were ready for implementation. Readiness in this case meant that the concepts were already developed and submitted to the Public Investment

Management Secretariat (PIMSec) for screening³⁷ and approval which therefore meant they satisfied the established criteria/alignment with national priorities. Such projects are included in the Public Sector Investment Plan (PSIP) for funding. Three entities supplied project concepts and discussions were subsequently held with them. The entities were:

- The National Works Agency
- The Urban Development Corporation
- National Environment and Planning Agency

A scoring mechanism for choosing which projects to pursue was prepared (see Annex 3). The projects with the highest scores were further analysed with the respective entities and their commitment to project implementation and the availability of human and physical resources to execute the project, sought.

The NIE engaged a consultant, via limited tender, to assist with the process. The consultant and NIE team held meetings with the NEPA and NWA to discuss elements of the concept including proposed location, the North Eastern Coast. A number of studies produced under the Disaster Vulnerability Reduction Program, community requests to the NWA, ODPEM studies and reports from NEPA's monitoring were reviewed and formed part of the basis of the further conceptualization of the possible interventions.

A range of methods were used in the consultative process, they included:

- i) focus groups discussion (GOJ entities and Community Group)
- ii) field studies/visits at the local level to gauge information on environmental and climatic conditions, community knowledge and perceptions, livelihood-related practices, coping strategies and the potential for interventions and
- iii) key informant interviews (community, academics and technical agency level, fisher folk).
- iv) Large community meeting

Once the broad revised Component 1 was outlined, community and NGO stakeholders were consulted. See Annex 1. Four stakeholder consultations were held. There were also community visits with impromptu discussions with community members early in project development to assess the state of the community's infrastructure and the environmental setting. The first formal meeting with the community was initiated with the ABCDEA to inform the community of the proposed project to assist their community and to outline the consultation process. This meeting was held on the 13th September 2017 – 32 persons were in attendance (16 males and 16 females). The feedback from this special interest group was that protection was critically needed and hard solutions would be the preferred method for shoreline protection. The community also indicated a need for development opportunities and the willingness of the community members to participate in the development of their community.

The second meeting, a public consultation, was held on September 20, 2017 in Annotto Bay to which the entire community was invited (mobilization was with the assistance of the SDC, distribution of printed flyers, ABCDE and a town crier) to elicit their views on the solutions to be implemented, to get their buy-in for the project and chart the way forward. Eighty-four (84) persons were in attendance (37 males and 47 females). The community highlighted the need for full coastline protection with hard engineering solutions. A very detailed description of the needs and solution was put forward by the community members in both consultations. They indicated that hard engineering structures were required based on their experience in the community, indicating examples of such interventions which had been successful, on private property, at the most western section of the town's coastline. The

³⁷ Involves analysis for economic, financial and developmental viability, relevance and social and environmental implications

members also indicated the need for recreational areas and catalysts for business development in the town.

The concept of the project for Annotto Bay and adjoining towns was presented and endorsement was obtained from the community participants. The concept developed through consultation with Government entities appeared well aligned with the communities' needs.

The discourse with the fisherfolk yielded information on the status of biodiversity within the bays especially in the areas of the protection work being proposed. Residents highlighted that significant damage occurred to the reef system during Hurricane Allen in 1980 and they surmise that this has resulted in the high level of erosion along the coast in the town of Annotto Bay. One fisher in particular, Mr. Daniel Gayle, highlighted that there are no healthy reefs in the bay and that he encounters reef about 20 chains out (approximately 400 m). Due to the heavy siltation of the bay, by the Wag Water and the Pencar Rivers, the seafloor is mostly mud in this area.

The stakeholder consultation with the non-State actors took place on November 24, 2017 at the PIOJ – eleven persons attended (9 females and 2 males). The purpose of the meeting was explained as being to share information on the revised project being developed for submission to the AF and to solicit feedback thereon. The NIE emphasized the importance of ensuring that the non-State organisations were provided with the opportunity to share any concerns in relation to the proposal and to make recommendations to address identified or anticipated issues. Jamaica Environment Trust (JET) agreed that the north eastern coastline is badly degraded but are opposed to a hard solution approach for Annotto Bay; instead, the organisation indicated a preference for managed retreat. This would require the removal and relocation of people and assets. The feedback from the representative from the University of the West Indies, (UWI) (Department of Geography and Geology) emphasized the need to ensure the permeability of the structures to be constructed.

Follow-up discussions were held with stakeholders directly involved in the fisheries sector regarding the project and its possible impact on their operations. The project proponents were initially of the view that there may be need for temporary relocation of the fishers' operations while the shoreline protection (specifically land reclamation) work was ongoing; and agreement was reached with them as to how this could be facilitated (see Annex 4).

At a meeting held on February 12, 2018, details of project activities were again provided and it was emphasized that no existing infrastructure would be negatively impacted; maps highlighting the specific location of the proposed works were also presented/explained to the group. Having reviewed this information, the fishers clarified that based on their existing points of operations, no relocation would be necessary. The fishers, however requested an assurance that they will be able to maintain access to the fuel house during the construction phase of the project. Currently, the fishermen have the option to obtain fuel for their boats using two access points to the gear/fuel house: (i) from the sea/beach; and (ii) via the coastal road which serves the community. During the construction of the revetment, there will be some disruption of access to the fuel house by the sea route, but the road access would remain unhindered.

It was agreed in the discussions with the fishers that: (a) access using the sea would be temporarily interrupted, however, access via the road would not be disrupted; ; (b) during the design phase discussions will be held between the fishers and the consultant to ensure that the design of the revetment is done in a manner which facilitates continued ease of access to the fuel house, and (c) an interim structure will be constructed from which they will operate in the event that temporary relocation becomes necessary. Twenty persons were present at this consultation (17 males and 3 females).

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

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

Component 1: Increasing the ~~climate resilience~~ Climate Resilience of the ~~Negril~~ North Eastern Coastline

Baseline - without Adaptation Fund resources:

Long Bay, Negril has experienced degradation of coastal and marine ecosystems—mainly beach coral reefs and sea-grass meadows—which are responsible for the supply of biogenic sand and the protection of the coastline. The ecosystems have lost their The north-eastern coast is one of the most impacted areas by storms as, historically, many storms have approached the island from the north east. Climate change research reported in the 2015 State of the Jamaican Climate indicates that based on assessment of hurricane tracks between 1950 and 2015, there is a 57 percent probability of a hurricane passing within 50 km of the north east coast. This area has the second highest probability of impact in an island which is located in the North Atlantic Hurricane Belt. The report further indicates there is a tendency for storms affecting Jamaica to be either Category 3 or 4. Given the projections for storm activity and the current state of the environment and of the protective infrastructure along the coast there is need for urgent attention.

Coastal erosion and flooding of the north eastern towns, especially the more densely populated Annotto Bay and Buff Bay, by storm surge and the rivers are concerns that need to be addressed to improve the safety of the communities and improve their resilience to the impacts of increased sea-level rise and projected extreme events. Various studies including a UWI study reported on by ProVention Consortium identifies that some areas of Annotto Bay coastline had eroded by as much as 47 m over the 40 year period up to 2006 when the study was completed. The evidence of broken seawall along the coast in Orange Bay (Figure T) and damage to infrastructure and property in Buff Bay and Annotto Bay also underline the need for urgent intervention.



Figure T: Damage to infrastructure and property in Wharf Lane, Orange Bay

With respect to the reef system, the community indicated a high level of destruction by Hurricane Allen. This damage has contributed to the ecosystems losing its protective and provisioning functions resulting in a decline in fish and other marine species and a corresponding disruption of the

livelihoods of communities. Fishing is no longer viable as a sole source of livelihood for many households, who have been forced to seek alternative livelihoods including small-scale farming and jobs in the tourism sector. Anticipated climatic changes—storm activity, sea level rise, and sea surface temperatures—will exacerbate the existing degradation in Negril. The importance of this lies in the fact that Negril's beach sands are derived partly from the seagrass meadows in the area and any increase in wave energy will be a threat to the survival of replanted sea-grass beds, especially if the next few years produce destructive storms.

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

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

Given these challenges, the erosion of coastal ecosystems currently being experienced will continue unabated unless appropriate measures are implemented. Other projects are implemented in an effort to streamline and maximize efforts, one being the CCADRRP which will restore seagrass beds in the Negril area. However, threats to these ecosystems increases over the medium to long term with SLR and more intense storms and storm surges.

Deforestation in the hillsides above the coast is likely to worsen if left unaddressed further contributing to riverine flooding, sedimentation of the waters and negatively affecting marine life and the livelihoods of approximately 350 registered fisherfolk operating in the bays. While there is some level of environmental awareness and activism in the communities, there is demonstrated need for improved climate change adaptation capabilities among residents, especially the fishers and farmers. The ODPEM and other state agencies have carried out a number of initiatives especially in Annotto Bay, these have been small community implemented projects which proved inadequate to address the major need for a combination of structural and non-structural adaptation.

While there have been complaints from the communities and plans by the Government to address the problem in the area, the state of the economy and the limited availability of financial resources have impeded the efforts. The Government is therefore constrained in its ability to provide the funding needed to effectively address the detrimental impacts of the consequences of climate change on the people and infrastructure that are exposed in its coastal zones. In many cases, these developments were established at least 50 to 60 years ago and have not been properlyadequately maintained thus they now have reduced capacity to adapt to the new level of risks associated with climate change.

The request of approximately US\$5.35 million dollars will have significant positive impacts on the lives of at least 12,000 persons in the direct vicinity of the works and indirectly impact on the lives of tens of thousands in the north eastern section of the island.

Without the intervention of the Adaptation Fund, the areas along the coastline will continue to erode with uncoordinated attempts to fix the worst affected areas after significant catastrophes such as road loss and home and facility loss. A number of the coastline business enterprises have closed over the years resulting in decline of economic activities in these areas. This decline will continue as people

migrate to other urban centres which are ill-equipped to manage the influx, leading to further marginalization of the rural poor. The most vulnerable will be the elderly, children and women.

Adaptation Alternative – with Adaptation Fund Resources

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

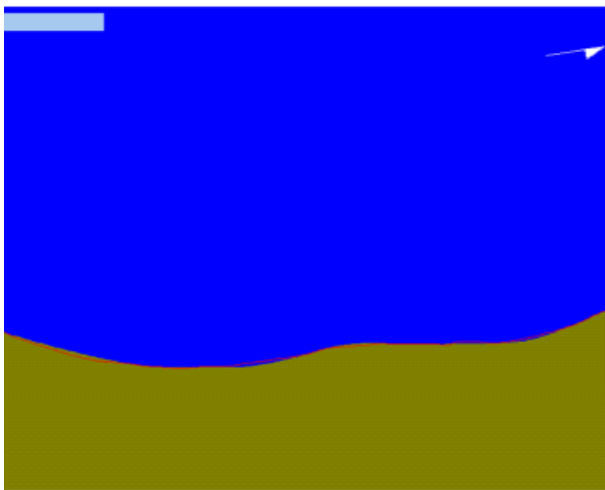


Figure N: Beach planform after 3 years with current bathymetric conditions for the pre-project calibration for a section of Negril (North arrow shown)



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

Component 1- Building the Resilience of the North Eastern Coast

The Adaptation Fund intervention will halt coastal erosion and provide hazard mitigation for the beneficiary communities. Specifically, Component 1 will have positive impacts on:

1. Shoreline protection - the component will provide an increased level of protection from storm surge and flooding. The waves will be breaking 30 m from existing structures and storm surge

can dissipate over that distance. The installation of this protective buffer between the sea and the most vulnerable sections of the community will enhance resilience of homes, business and heritage sites.

2. Reduce coastal and riverine flooding
3. Protection of natural habitat – reforestation will enhance the bio-diversity of the watershed while artificial reefs will improve habitat for fishes and other species in the marine environment.
4. Pollution prevention and resource efficiency – reforestation is expected to reduce erosion in the watershed thus reducing the silt and sediment reaching the bays. This should reduce pollution of the bays by the sediments and their associated nutrient loads. The capacity building for land husbandry is also expected to assist in reducing erosion thereby enhancing activities in the watershed. The re-use of river cleaning material and the mix of sources of material for the protection of the coastline will enhance the efficiency of use of available resources.
5. Improved resilience of the communities through training in climate smart techniques and awareness raising.
6. Public Health – the project will provide protection for the only existing health centre in Annotto Bay. The erosion of the shoreline has resulted in the Health Centre being precariously perched on the shoreline (see Figure G). The project will re-instate the setback and provide improved protection for the facility. This infrastructure proposed will facilitate the Health Centre operations during storm events.
7. Physical and Cultural Heritage - the community has been established for at least a hundred years and critical infrastructure exists in the area. The heritage site -- the Metcalfe Market -- established 1896 is part of the significant history of the Annotto Bay area. It is within 100 m of the rapidly eroding coastline. Other heritage sites (old churches, etc. are also in close proximity).
8. Provide additional lands for the management of the Parish Council to begin to order the development of the waterfront of the town.
9. Provide improved access for the fishers and private boat owners to enter and exit the water with their vessels during adverse weather conditions and disaster and emergency situations.



Figure U: Heritage site in Annotto Bay – in close proximity to coast

~~Component 3 of the programme seeks to develop appropriate adaptation measures and educational material in consultation with the stakeholders in the region. The ultimate success of the programme will be demonstrated by the long term benefits to the country gained through the adaptation processes introduced by the programme. Any positive long term impact depends on the involvement of the stakeholders, hence Component 3 is critical to ensuring beneficial long term impact and ensuring that the benefits derived are cost effective.~~

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

Baseline - Without AF Resources:

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

Adaptation Alternative – With AF Resources

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

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

Component 3 of the programme seeks to develop appropriate adaptation measures and educational material in consultation with the stakeholders in the region. The ultimate success of the programme will be demonstrated by the long term benefits to the country gained through the adaptation processes introduced by the programme. Any positive long term impact depends on the involvement of the stakeholders, hence Component 3 is critical to ensuring beneficial long term impact and ensuring that the benefits derived are cost effective.

Baseline – Without AF Resources

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

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

Adaptation Alternative:

The AF funds will provide for targeted training and information to assist farmers to better understand the impacts of climate hazards within their geographic areas and will expose them to site-specific techniques which they can use to adapt. This is particularly important for Component 2 where the topography and micro-climate will be considered in the design of effective adaptation strategies. Targeted communities will also be exposed to training in natural resource management and disaster risk reduction. The inter-linkages among climate change adaptation, sound environmental management and disaster risk reduction are well established among academics as well as practitioners. This multi-faceted training will expose the communities to the latest thinking on these topics, while at the same time allowing the participants to share their experiences and observations. Documentation and sharing of community experiences and innovative adaptation and risk reduction practices will allow communities which are not included in the project to benefit from the project. This documentation will be made available through all RADA offices island-wide as well as through virtual libraries.

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

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.

Under Component 1, protection works will be designed with climate change considerations and to withstand the 100-year return storm. Because of the built-in robustness of the structures, they should require minimum maintenance over their lifetime. The combination of the shoreline protection [CB1] and artificial reef installation is synergistic, as the installed reef structure will, over time, increase the accretion of sand along the shoreline adding to the protection of the protected shoreline.

The Government entities involved in the project design (NWA, NEPA, Forestry Department and Municipal Corporation) will continue to be involved during implementation and in monitoring and maintaining the facilities after project completion, in accordance with their mandates. Under the implementation framework, the communities through their environmental groups are expected to provide on the ground monitoring of the Component as well as post implementation oversight. Recognising that an important characteristic of sustainability is community ownership, under the capacity building element of the component, the Social Development Commission, ODPEM and the Climate Change Division will be engaged to work with the communities for continued environmental education and to promote climate change and disaster resilience, and assist in group strengthening or formation as necessary. This is intended to assist in building empowerment and social capital in the area. Examples from the Water Users Group under Component 2 will be used.

The reclaimed lands under the revised Component 1 will, in time, provide the basis for environmentally compatible economic activities; for example, recreational facilities. The Municipal Corporation will be able to generate revenue from these activities. Accordingly, the design consultant will be tasked to develop a maintenance plan for the structures and generate preliminary costs for maintenance. These costs will form part of the fees and charges to be levied by the Municipal Corporation when the area starts to develop. Figure V shows the Component activities/developments

and the likely impact on the sea and the coast over the medium to long term. The emergence of new beach areas and development of economic activities are among the expected long term outcomes. This outcome is consistent with plans by the Parish Development Committee and Chamber of Commerce for St Mary. These organisations envisage the establishment of a Beach Park as part of the guiding principles for the development of the Parish. These plans will be adjusted to incorporate the implementation of the Adaptation Fund programme and the changes in seascape anticipated from its implementation.

The incorporation of 'private planters' in the reforestation programme and the inclusion of fruit trees in the programme are designed to contribute to sustainability of this programme element. Traditionally, residents tend not to remove or destroy fruit and food trees. At the same time, the Forestry Department and the Scientific Research Council will be engaged to manage seedling production and monitoring, with the former designed to have an integral role in the roll-out of the component and to link it to its Sustainable Forest Management Programme (SFMP). The SFMP is targeted for strengthening and expansion under a management programme being developed for funding under the European Union funded 11th EDF.

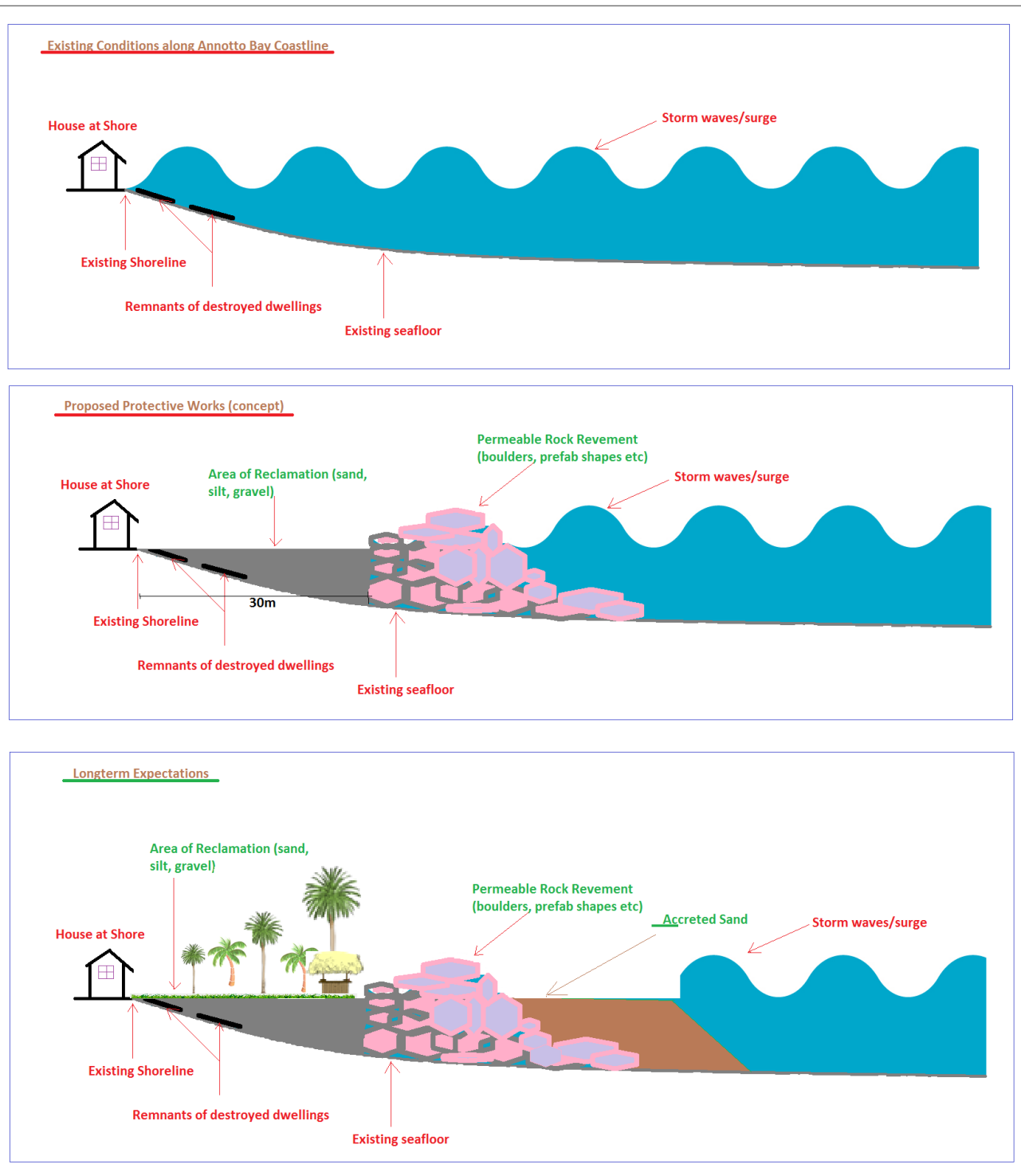


Figure V: Schematic of the near term and long term expectation of the programme implementation

K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

The project seeks to fully align with the Adaptation Fund's Environmental and Social Policy (ESP). Project activities were screened against the ESPs for potential risks; based on the preliminary screening and assessment carried out, five (5) of the 15 ESPs have been rated as 'low' and one (1)

as 'low to moderate'. In light of this assessment, the project falls into 'Category B' since the possibility exists for some negative social and environmental impacts. These can however be mitigated with proper planning and risk management during the design and implementation phases. To ensure that identified risks are properly managed in compliance with the Adaptation Fund ESPs, an Environmental and Social Management Plan (ESMP) has been developed (Part III, section C).

The project will comply with all local and international laws and regulations by ensuring that all required approvals are obtained before construction begins. These include all permits and licences for environmental management and safety of workers and work sites. (See Table 13)

Table 13: Environmental and Social Safeguards Checklist

<u>Checklist of environmental and social principles</u>	<u>No further assessment required for compliance</u>	<u>Potential impacts and risks – further assessment and management required for compliance</u>
<u>Compliance with the Law</u>	<u>X</u>	
<u>Access and Equity</u>		<u>X</u>
<u>Marginalized and Vulnerable Groups</u>	<u>X</u>	
<u>Human Rights</u>	<u>X</u>	
<u>Gender Equity and Women's Empowerment</u>		<u>X</u>
<u>Core Labour Rights</u>	<u>X</u>	
<u>Indigenous Peoples</u>	<u>X</u>	
<u>Involuntary Resettlement</u>	<u>X</u>	
<u>Protection of Natural Habitats</u>		<u>X</u>
<u>Conservation of Biological Diversity</u>		<u>X</u>
<u>Climate Change</u>	<u>X</u>	
<u>Pollution Prevention and Resource Efficiency</u>		<u>X</u>
<u>Public Health</u>		<u>X</u>
<u>Physical and Cultural Heritage</u>	<u>X</u>	
<u>Lands and Soil Conservation</u>	<u>X</u>	

Compliance with the Law: The activities will be undertaken in compliance with the laws of Jamaica and with the international laws and conventions to which the country is party. Please see Section E for further details.

Component 1 of the project involves shoreline protection measures including the modification of the beach; no work can proceed without all the relevant permits and licenses under NRCA Act, the Beach Control Act, and the Natural Resources (Marine Parks) Regulations, including the Guidelines for Environmental Impact Assessment (EIA). The EIA provides information on the potential impact of activities and is used by the regulatory authority in the granting of permits and licences and specifications for conditions governing the permits. The decision-making process is outlined in Section Part II, Section E.

The Public Procurement Act will govern all procurement activities of the project, including goods, services and works. Procurement is also guided by the Contractor General Act where responsibility is designated to Contractor General to investigate compliance of contracts awarded by the Government.

Once the project has been approved by the AF, the final designs will be prepared and submitted to the regulatory authority as part of the application process for all relevant permits. A number of licensed, approved quarries within proximity to the project site have been identified by the NWA as potential sources of construction material. In keeping with the Quarries Control Act and Regulations, the project can and will only utilise material from such quarries to supply the relevant material needed. Civil engineering professionals to be engaged will be in accordance with the stipulations and requirements of the National Contract Commission (NCC), an independent Parliamentary Commission of the Contractor General.

Access and Equity: The project will not generate nor exacerbate inequities, particularly among the vulnerable. It will ensure fair, inclusive and equitable access to project benefits. However, it is recognised that there is a low risk associated with Component 1 where trees will be distributed and under Component 3 where capacity building initiatives (eg, training exercises) will be conducted. Mitigating this risk will involve establishing appropriate criteria for selecting the beneficiaries. These will be fair and impartial to ensure that there is equity in the selection of beneficiaries. In the context of shoreline protection measures for Component 1, the targeted communities, by virtue of their location on the eroding coastline and dependence on the coast for livelihood security are considered the most vulnerable. The project beneficiaries will therefore include all the residents of the communities with specific attention to fisherfolk who rely on the integrity of the coastline to be able earn an income and provide food for their families and communities.

Marginalised and Vulnerable Groups: The project will avoid imposing any adverse impacts on vulnerable populations, including fisherfolk, women and children, older persons, people living with disabilities and/or HIV/AIDS. Under Component 1, the fisherfolk are among the targeted beneficiaries of the project; the wider community are also beneficiaries as the project will reduce exposure of their residences and important infrastructure to natural hazards (storm surges, etc). As has been the case thus far, there will consultations with all key stakeholders (particularly fisherfolk) to ensure that their needs are being addressed and that they are not facing undue pressures as a result of the project activities. Part II, section B provides more information on the vulnerability of the targeted communities.

Human Rights: The Project will respect international human rights. It will respect the rights of all citizens in line with Constitution of Jamaica, and also those articulated in the Universal Declaration of Human Rights. Furthermore, it will contribute to the achievement of selected human rights. The reduced exposure of residential buildings and the Health Centre will improve access to property and health care, respectively.

Jamaica is a party to the Universal Declaration of Human Rights, the tenets and principles of which are enshrined in the Jamaican Constitution, specifically CHAPTER III Charter of Fundamental Rights and Freedoms. The Charter prescribes that “all persons in Jamaica are entitled to preserve for themselves and future generations the fundamental rights and freedoms to which they are entitled by virtue of their inherent dignity as persons and as citizens of a free and democratic society; and all persons are under a responsibility to respect and uphold the rights of others recognized”. The Constitution protects a range of rights: personal, religious, political, economic, social and environmental. Among these, it upholds the right of the citizen “to enjoy a healthy and productive environment free from the threat of injury or damage from environmental abuse and degradation of the ecological heritage”. This is an area directly related to the project goals and which the project is seeking to secure through reduced exposure of residential buildings, the Health Centre, other critical infrastructure, and through arresting deforestation and the related biodiversity loss and loss of ecosystem services.

Human rights monitoring is done not only by state agencies but by a network of Civil Society groups and quasi- Government agencies including Jamaicans for Justice, Jamaica Council for Persons with Disabilities, Jamaica Environment Trust, Independent Commission of Investigations, Office of the Public Defender, and the Jamaica Federation of Lesbians and Gays. Jamaica provides annual reports to the Office of the United Nations High Commissioner for Human Rights (OHCHR). For example, in

response to RESOLUTION A/HRC/RES/30/15 - RIGHT TO WORK, the GOJ in 2016, identified a raft of legislative and policy measures being undertaken to address the right to work, especially that of women and persons with disabilities. Jamaica has the support of a Human Rights Advisor through the UN Country Office who assists the country in mainstreaming human rights issues throughout various thematic areas.

Gender Equality and Women's Empowerment: There is a low risk associated with this Principle. The risk is that fewer women than men will be engaged in labour activities for Component 1 as the construction industry and agriculture and fisheries sector in Jamaica are male dominated. Nonetheless, efforts will be made to facilitate the full and equitable participation of both male and female in activities and distribution of benefits. This will include rating criteria in the procurement process (bid documents) for the contractor that addresses gender equity. The NIE has a gender specialist (focal point) on staff. The Bureau of Gender Affairs will be consulted for support and guidance where necessary. Methodologies used by a sociologist previously contracted under this project (Component 2) ~~A sociologist will be hired to~~ will be adopted and built on to (i) contribute to the identification of risks of creating or maintaining gender-based inequalities, and (ii) facilitate integration of gender considerations in the climate change adaptation and disaster risk management initiatives. The Project will be implemented in accordance with the National Policy for Gender Equity, 2011 and with the guidance of the Gender Mainstreaming Manual, 2016. It will also be aligned with the Gender Policy of the Adaptation Fund (approved March 2016).

Core Labour Laws: The Project, including contractors and sub-contractors, will be required to observe core labour standards as identified by national labours laws and practices and the International Labour Organization (ILO). Jamaica is a member of the ILO and subscribes to international labour standards as a party to a number of conventions including those related to Freedom of Association, Collective Bargaining, Tripartite Consultation, Forced Labour, Child Labour, Equality of Opportunity and Treatment, Occupational Safety and Health, Social Security, Working Time, Maternity Protection, among others. In evidence of the practise of freedom of association and collective bargaining, the country has a number of trade unions and staff associations, 12 of which are affiliated to the Jamaica Confederation of Trades Unions (largest single grouping) with membership of approximately 150,000. Jamaica reports to the ILO on an annual basis. The last report was in 2017 and records no major issues or breaches signalling that the country is generally adhering to the labour laws and standards. The tripartite report reflects the input of employers, government and the unions. An ILO Desk is maintained in the Ministry of Labour and Social Security (MLSS).

The Child Care and Protection Act prohibits any form of child labour for children under 13 years and restricts employment to "light work" for those over 13 years. The Act also specifically indicates that for children under 18, work should not be harmful to the child's health and safety or interfere with his/her education. The permissible areas of work are defined in the Act; none of the project activities falls within those allowable areas. All forms of forced labour are prohibited by The Charter of Fundamental Rights and Freedoms (Constitutional Amendment) Act.

Mechanisms for labour related disputes resolution exist under the Labour Relations and Industrial Disputes Act (LRIDA) which is actively used. This is in addition to conciliation services provided through the MLSS. In 2016, 390 industrial disputes and work stoppages were handled under the LRIDA. Other relevant labour laws to this project include the Employment (Equal Pay for Men and Women) Act. Should the implementation of the physical works extend beyond 52 weeks and there are female workers of child bearing age who are employed continuously for no less than 52 weeks, the Maternity Leave Act - an act to provide for the right of female workers to be granted maternity leave by their employers and to be paid maternity pay - becomes relevant. In the case of occupation health and safety, the Factories Act, mandates the MLSS to conduct routine site visits and inspections of "factories, docks, cargo ships, ports and building sites ... to ensure the safety of workers through maintenance of at least minimum safety and health standards". Data on the inspections and on investigation of complaints received are published annually. The Economic and Social Survey

Jamaica, 2016 reported that there were 2,423 inspections, approximately 200 more than the previous year. There were 347 complaints related to accidents; this included 206 that qualified for investigation, of which 87% were investigated. which the number of 347 complaints related to accidents, 87 per cent of those qualifying for investigation were investigated. In terms of wages and related conditions, the construction and building industry, apart from having to meet the requirements of the National Minimum Wage Act, observe Joint Industrial Council rates which are agreed by the major trades unions and the Incorporated Master Builders Association of Jamaica.

The project, including contractors and sub-contractors, will be required to observe these core labour standards which are subject to the monitoring mechanism established by the State. The required action is consistent not only with national laws but with the PIOJ's Environmental and Social Framework, specifically ESS 7- Labour and Working Conditions. Accordingly, the NIE and the NWA will undertake regular site visits to monitor compliance with the relevant statutes.

Indigenous Peoples: There are no indigenous people in or within vicinity of the project sites. There are no indigenous groups in Jamaica as per the working definitions/principles of international agencies such as the United Nations, International Labour Organisation, nor in keeping with the definition below:

"Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal system".³⁸ According to the 2011 Population and Housing Survey, the ethnic breakdown of the population is: Black 92.1%, Mixed 6.1%, East Indian 0.8%, Chinese 0.19%, White 0.16%, Other 0.07% and Unspecified 0.65%. In the Jamaican context, blacks not only make up the largest portion of the population, but also the largest percentage of the poor. The ethnic make-up in the project area is not expected to deviate from that of the national; besides, the project focus on addressing environmental and socio-economical vulnerability while potentially benefiting those in the entire project area, will be of greatest significance to the poorest who are least able cope with and bounce back from hazard events.

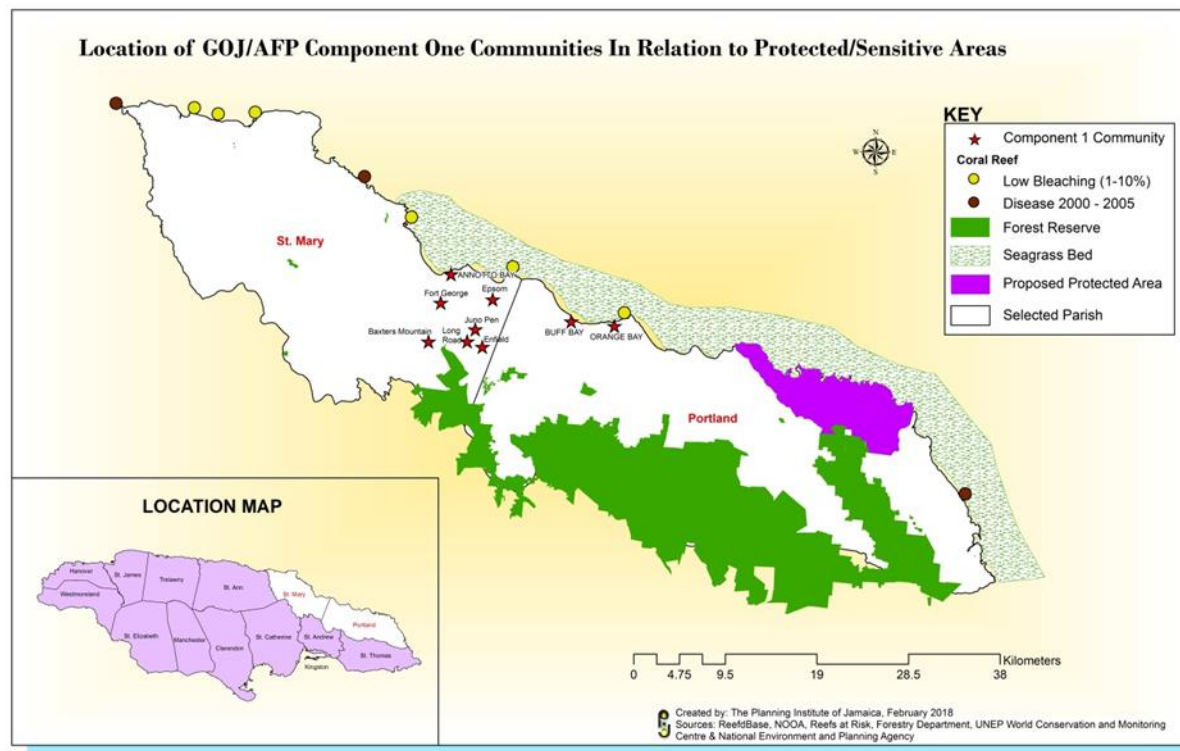
Involuntary Resettlement: The project will not cause involuntary resettlement. There will be no relocation of operations; however, access to the fuel house will be somewhat curtailed on the seaward side during the construction phase, but full access will remain from the road. In consultation with the fishers, it was agreed that the design of the revetment would facilitate continued ease of access to the fuel house further away (access ramp). See Annex 4.

Protection of Natural Habitats: The Project will not impose unjustified conversion or degradation of critical natural habitats, including those that are legally protected or proposed for protection. Shoreline protection measures under Component 1 will be implemented in Annotto Bay, St Mary, and Buff Bay and Orange Bay, Portland. None of these sites are within existing or proposed protected areas (cultural or natural) (Map 5). An assessment of coral reefs³⁹ which was conducted in the early 2000s points to a low coral cover in the northeastern coast, averaging less than 12% coral cover for deep reefs and less than 5% for the island. Anecdotal evidence from the fishers suggests that the degraded state of coral reefs remains. The current state of seagrass beds is unknown. Given this, a potential

³⁸ https://en.wikipedia.org/wiki/List_of_indigenous_peoples.

³⁹ [Coral Reefs of Jamaica's Northern Coast: Assessment of Condition and Key Threats](#)

(low) risk is identified. During the scoping exercise of the permitting process, a further assessment will be undertaken and measures to mitigate against damage or harm will be accounted for in the EIA, if and as necessary. This is also addressed in the ESMP. It should also be noted that the measures to be implemented, particularly the WADs, have been proven in other instances to encourage natural regeneration of ecosystems. The reforestation of denuded hillsides under Component 1 will be implemented in communities upstream from Annotto Bay and are not located within protected areas (forest management areas or reserves). See Map 5. This will benefit the agro-ecosystems of these communities, and also the coastal ecosystems from reduced sedimentation.



Map 5: Location of Component 1 Activities relative to Protected and Sensitive Areas

Conservation of Biological Diversity: The Project will avoid any significant and/or unjustified reduction or loss of biodiversity or introduction of known invasive species. The project is not located within any of Jamaica's four Ramsar sites and does not have documented sightings of IUCN Red List Species. Nonetheless, there is a low risk associated with biodiversity conservation. The installation of the shoreline protection measures may have a temporary negative effect on the coastal biodiversity; the extent to which this is possible will be determined during the scoping exercise of the permitting process (specific to shoreline measures of Component 1; refer to "Compliance with the Law" above). Information provided for Principle 9 – Protection of Natural Habitats also applies. All associated risks for this will be managed during the permitting process and are addressed in the ESMP.

Climate Change: The Project will not result in any significant or unjustified increase in greenhouse gas emissions or other drivers of climate change. It will, however, result in mitigation (in the form of carbon sequestration) through reforestation activities which will be supported by Forest Wardens and extension officers who will provide the necessary technical support.

Pollution Prevention and Resource Efficiency: The Project will meet applicable international standards for maximizing energy efficiency and minimizing use of material resources, waste production and the release of pollutants. However, there is a low risk associated with pollution. The

shoreline protection measures will likely result in air pollutants from the material to be used. There will also be waste associated with the construction of WADs which are concrete structures. It is also possible for human waste to be generated by workers during the construction phase. All necessary measures will be taken to reduce incidence of pollution and the potential impact on human and environmental health (refer to the ESMP).

Public Health: There is a low to moderate risk to public health. Construction activities may temporarily lead to dust exposure and noise nuisance during the transportation of materials and execution of works which can trigger respiratory illnesses. There may also be occupational health risks associated with construction activities. These will be mitigated as much as possible, for example, contractors will be required to provide protective gears to workers -(see ESMP); the appropriate plans (eg, traffic management, occupational health and safety, etc) will be developed and implemented as appropriate. The adjustments to be made to the outfall of the Motherford Drain effective draining of the target area in Annotto Bay will reduce stagnation of water in the Motherford Drain which presently poses health risks; the project therefore has the potential to reduce vectors and pests. In addition, the modules for the natural resources management training will include information on measures that can be taken by the community. The project will propose community education and awareness measures aimed at behaviour change for the reduction of public health to reduce vector-borne and other hazards related to bacteria, flies, viruses and vectors.

Physical and Cultural Heritage: The Project will not interfere with the existing use of and access to physical and cultural resources and will avoid alteration, damage or removal of any historic/cultural sites and artefacts. Two heritage sites located in the town of Annotto Bay -- Metcalf Market and the Annotto Bay Baptist Church -- are not directly in the project activity sites, but will be among the cultural assets/ infrastructure to benefit from the reduced exposure of the coast from the interventions proposed.

Land and Soil Conservation: The Project activities will not lead to the conversion of wetlands, waterways or the clearing of natural vegetation and/or forests. The project is not expected to cause any land degradation or soil damage but will improve soil conservation through reforestation activities.

Reforestation activities will be conducted in line with the National Forest Management and Conservation Plan prepared by the Forestry Department to ensure activities are aligned with national planning systems and procedures. Improved land husbandry practices will be implemented to further reduce the risks of landslides and loss of property. At the same time, the use of composting, organic fertilizers and the techniques of Integrated Pest and Disease Management (IPDM) currently used by RADA will continue to be promoted as a pillar of agriculture contributing to sustainable agriculture practices by the programme. Reforestation activities will be conducted in line with the National Forest Management and Conservation Plan prepared by the Forestry Department to ensure the sustainable management of the forest sector.

General:

The major possible impact for consideration is that on biodiversity during the land reclamation process. The reclamation activities will involve laying geotextile and fill material in an area of approximately 18,000 m². The impact on biodiversity for such a large area could be significant in a pristine greenfield area which the project location is not. The area under consideration for the reclamation is along the coastline in a built up area where the impacts of unplanned urbanization on the coastal waters are very evident. It is also important to note that this area had habitable real estate up to 30 years ago as depicted by the remnants of buildings in the schematic in Figure V. This is indicating that biodiversity would be sparse if not non-existent in the shallow waters just off the present coastline. The impacts of urbanization on the marine environment and the structures

described by stakeholders and those observed are strong indicators that the possibility of impacting significant biodiversity is very low. However, the laws of Jamaica require that Environmental Permits and Beach Licences are obtained for enterprises of this magnitude and potential impacts. These conditions will be adhered to during finalization of designs and project development

Obtaining material for the execution of the project has the potential to have adverse environmental and social impact on the areas where they are obtained. For instance, material for land reclamation and boulders for protective works can be obtained from the rivers in close proximity to the area. To ensure that the possibility of adverse impacts are reduced, materials will be extracted only from licensed/permitted sites and quarries and the Design Engineer for final design and the NWA team will, with due diligence, investigate the earmarked rivers and identify areas that are in need of de-silting to trigger use of the material from these areas. Likewise, boulders will be identified from areas which will not significantly alter the river regime at the peril of communities and livelihood in the areas of removal.

All community members are expected to have equal access to all the outputs of the Component which will be implemented taking due cognisance of the requirements of the National Policy on Gender Equity, 2011. While every effort will be made to achieve gender balance in the use of project resources, the nature of the construction industry in which most of the resource will be expended, is such that it is dominated by males. This means that more males than females are likely to be directly involved as labourers on the shoreline protection elements and in the reforestation activities. Accordingly, the project will stipulate that where possible, special considerations should be made for females providing related services and for female providers of goods and services, subject to the national procurement guidelines. Also, during the procurement process, gender equity within employment strategies of the contractors will be weighted in analysis of bids.

During the movement and transportation of heavy material and equipment, there are likely to be some disruption to normal activities due to traffic snarls and diversion, noise and dust nuisance. These matters will be addressed under the EIA and the appropriate plan designed to lessen them. At the same time, the ABCDEA and other community groups will be engaged on an ongoing basis and updates provided through frequent interactions with the PMU/NIE.



PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation

The general organizational structure for the programme is outlined ~~below (Figure P).~~ in Figure W. The PIOJ falls under the Ministry of ~~Finance~~ Economic Growth and Planning ~~to which it~~ Job Creation and reports- directly to the Prime Minister. The Ministry of Finance and the Public Service maintains responsibility for budgets and will allocate the fiscal space and provide budgetary support, particularly for counterpart funding, where needed.

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

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

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

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

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

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

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

For Component 1, a committee of local stakeholders based in ~~Negril~~ the areas receiving support will provide additional input and oversight. The active local environmental group, ABCDEA, will be invited to assume this role and to represent the community on the Programme Steering Committee.

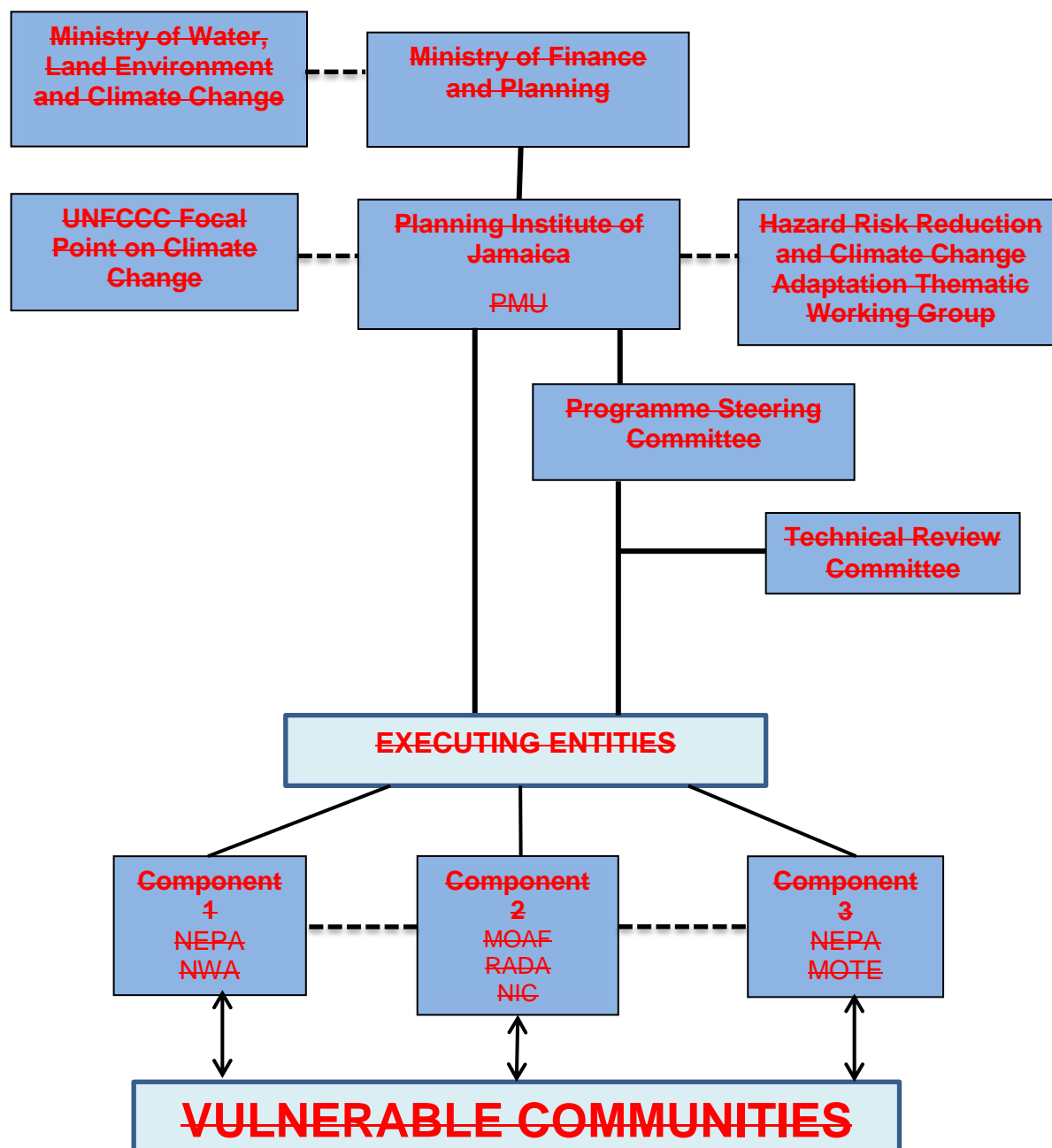
Each executing agency ~~will have~~ has a management system including a point person/ manager who will have the responsibility of communicating directly with the PMU. Additionally, this system will facilitate on-going internal monitoring within each agency. Agency Responsibilities are summarised in Table 14:

Agency Responsibilities are summarised in Table 13 below:

Table 1413: Stakeholder Responsibility Matrix (Selected Activities)

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

		<u>NIE and partners: contractors</u>
3	Development of guidelines and standards for beach restoration	NEPA



The indicative organisational structure is outlined below (Figure W).

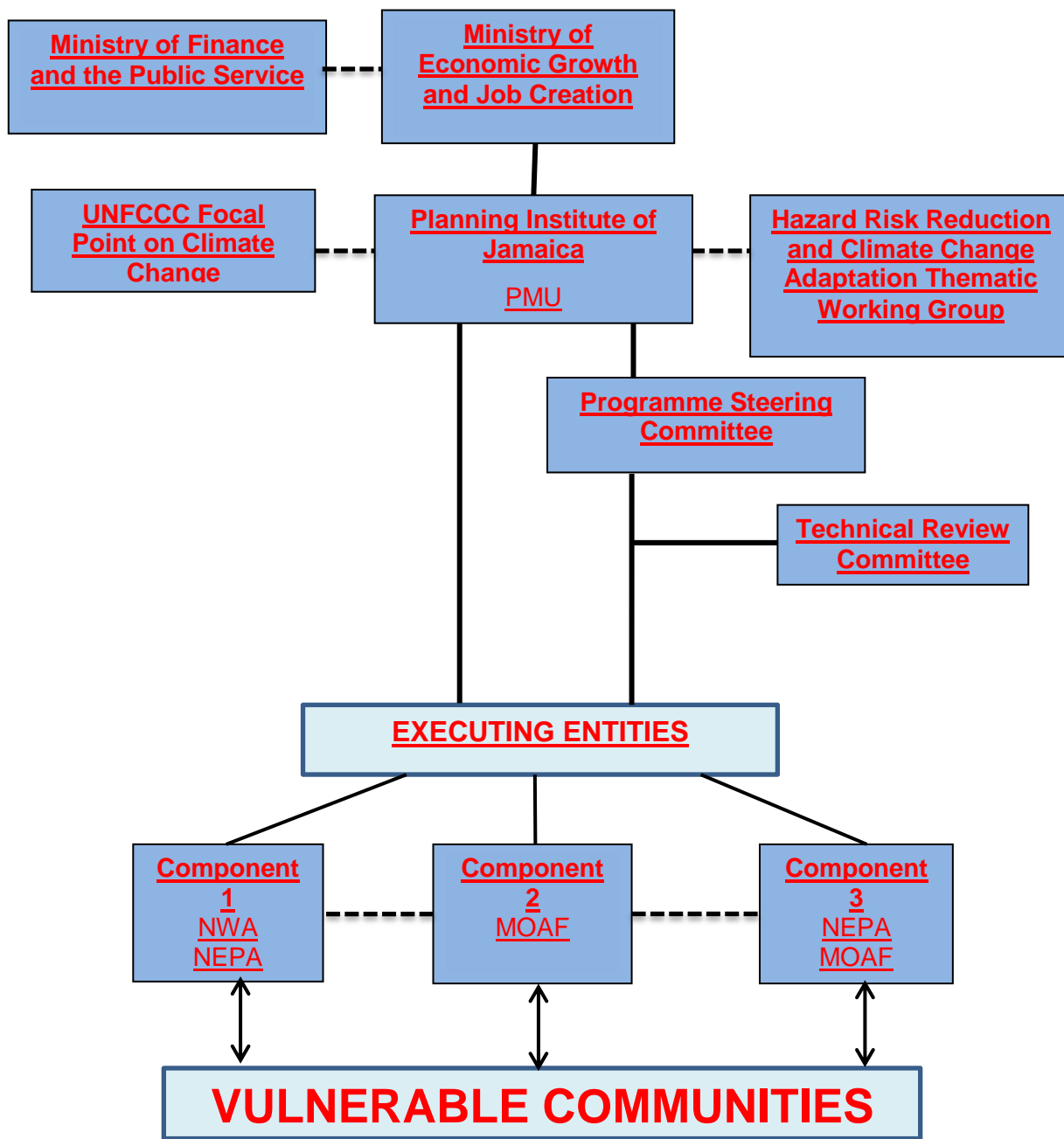


Figure **WP**: Indicative Organizational Outline (Source: PIOJ, **20112017**)

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

For financial risk management the framework is expected to draw heavily on the budgetary and fiduciary management arrangements which govern the operations of the Planning Institute of Jamaica and all public sector agencies, the **GovernmentGOJ** procurement policy, and the Adaptation Fund Board financial management requirements. Specific instruments to be observed will include: GOJ Financial Administration and Audit Act, PIOJ Accounting Systems and Procedures Manual: International Financial Reporting Standard (IFRS), Generally Accepted Accounting Principles (GAAP) and the GOJ Public Sector Procurement Procedures (October **20102014**). All procurement of works and services under the project will be guided by the GOJ Procurement Guidelines, Policies and Procedures.

More specific risks associated with the programme are largely as follows: [\(Table 15\)](#):

Table 1544: Major Risks of the Programme

Risk Class/Category	Level	Mitigation Strategies and Notes
Financial: (i) inflation leading to increased costs for goods and services.	Moderate Low	The government has recognized the project as important to national development. As such, it will be included in the public sector budget in the 2013/142018/2019 to 2014/152019/2020 Financial Years for additional resources to be made available, if necessary
Financial: (ii) Possibility of higher costs for works in Component 1	Low to moderate	There is a contingency provision built into the project budget and tendering will be on a fixed cost basis. Also, the fact that the project has gone through the PSIP is a positive in the event that additional resources are needed by the GOJ.
Environmental: natural hazards (flood events, drought, storm surges, storms) hamper some efforts	Moderate to High	The programme is seeking to reduce the effect effects of natural hazards. However, the expected outcomes such as behavioural changes and the construction of infrastructure are at risk in the early phases of the programme. To reduce the risks associated with hazard events, the project will try to schedule critical activities outside of the peak Hurricane Season. It will also front-load capacity building activities (including disaster risk/natural resources management training).
Operational/Administrative: loss of technical staff; coordination of activities with other agencies; large number of on-going projects/programme	Low/ to moderate	Existing inter- and intra-agency frameworks will be incorporated in the programme to reduce competition and avoid segmentation. For example, the Vision 2030 thematic working groups (TWGs) increase collaboration. Furthermore, each executing agency has and is incorporating the activities within their respective workplans. This will ensure that staff is assigned accordingly. The various training activities will reduce the likelihood of loss of technical capacities.
Stakeholder Buy-in: willingness of persons to understand, accept and implement the programme	Low	<p>The development of the concept and the full programme proposal involved consensus from stakeholders at all levels – public and private sector agencies, vulnerable groups, NGOs, academia. In moving forward:</p> <ul style="list-style-type: none"> • The consultation process will be on-going during the life of the programme and beyond. • Knowledge transfer and awareness building are key within this programme and also in other complementary ones. • Lessons learnt from other initiatives will be incorporated to maximize impact. • An in-depth understanding of cultural behaviours will form the basis on which consultations are conducted. <p>Regarding political buy-in, the government is committed to climate change adaptation and mitigation and has endorsed this programme.</p>

Ranks: Low, Moderate, High

The Government of Jamaica has signalled its commitment to adapting to climate change; ~~with the inclusion of climate change in the country's Vision 2030 Jamaica and the establishment of a Ministry of Water, Land, Environment and Climate Change (MoWLECC). Division are examples of this. Given this level of commitment, it is therefore expected that the project will be a priority initiative of the Government.~~ The highest risks in the programme are related to natural hazards, and every effort will be made to reduce potential damage during the early stages of the programme (as this is the period within which the risk is greatest). As such, the schedule of activities will be cognisant of this.

C.- Describe the monitoring measures for environmental and evaluation arrangements social risk management, in line with the Environmental and provide a budgeted M&E plan Social Policy and Gender Policy of the Adaptation Fund.

Initial screening and analysis of proposed project activities has identified a number of potential environmental and social impacts and risks using the AFP's requirements (see Section II: K) as well as the NIE's Environment and Social Safeguards Framework (ESF). The risks were identified from a combination of approaches including using feedback from residents and other stakeholders consulted as well as technical review by the programme development staff which also identified risks inherent to the proposed work. The resulting Environmental and Social Management Plan (ESMP) reflects recommendations made by these groups to address concerns which they perceived could emanate from implementation of the project. These recommendations have been adjusted against the AFP's requirements, the NIE's ESF, as well as national requirements and incorporated as mitigating measures in the ESMP. Recognising that unknown/unplanned risks may arise, provisions have been made for on-going screening and the development of additional or revised mitigating measures, during project implementation, as the need arises. Specifically, the ESMP:

- a) Identifies and summarizes potential adverse environmental and social impacts in line with the AF's ESP
- b) Describes mitigating measures and actions designed to reduce the potentially adverse environmental and social impacts to acceptable levels in order to uphold the AF ESP principles, the NIE's ESF as well as national laws and standards
- c) Assigns roles and responsibilities for the management of mitigation measures and monitoring actions to be undertaken under the programme

Thus the management of the ESMP will be guided by the following:

- 1. The relevant stakeholders, including the agency and organizations with responsibility for gender affairs, have been and will continue to be consulted during implementation
- 2. The needs and challenges of vulnerable population/ groups (women, youth, and other marginalized) in the communities are considered, as far as possible in the final designs and implementation.
- 3. All environmental permits and licenses required for the successful implementation of the project are obtained and the relevant and associated plans and procedures adhered to.
- 4. The contractors engaged are required to comply with the ESP requirements and develop and implement management and monitoring plans
- 5. The project has been designed with a sum set aside for environmental monitoring and management.
- 6. The project facilitates on-going and open dialogue with beneficiaries and provides a mechanism for feedback and airing grievances.

The ESMP uses an approach to risk management that facilitates rigorous assessments and management measures being applied as activities are defined, approved and implemented. It (Table 16) forms the basic foundation for the implementation of the safeguards and the PMU/NIE will be responsible for its monitoring.

Table 16: Measures for Environmental and Social Risk Management

<u>PROJECT ACTIVITIES</u>	<u>AF PRINCIPLES TRIGGERED FOR COMPLIANCE/ MANAGEMENT</u>	<u>POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS</u>	<u>MITIGATION MEASURES</u>	<u>MONITORING INDICATORS</u>	<u>RESPONSIBLE PARTIES</u>	<u>COST (USD)</u>
<u>1. Watershed Rehabilitation Through Reforestation</u>						
	<u>Access and Equity</u>	<u>Disagreements related to selection of beneficiaries</u> <u>Disagreements related to distribution of benefits/selection of geographical area</u>	<u>Transparent and objective criteria for selection of workers and beneficiaries developed and applied.</u> <u>Activities carried out in accordance with Forestry Management Plan and involving Local Forest Management Committee</u> <u>Use participatory approach, including awareness building, involving community groups and local authorities.</u> <u>Forest Wardens and extension officers used to identify planters and members of local forest management organisation</u>	<u>Selection Criteria developed</u> <u>Level of integration of forestry management practices/protocols</u> <u>Degree of involvement of local community groups</u> <u>Evidence of inclusive stakeholder engagement process</u>	<u>NIE and Executing Entities</u> <u>Forestry Department/RADA PMU</u>	
	<u>Gender Equality and Women's Empowerment</u>	<u>Possibility of low access/ participation by women compared to men in labour activities.</u>	<u>Implementation of activities in accordance with the National Gender Policy, 2011 and Gender Mainstreaming Manual, 2016 and with the aid of the NIE Gender Specialist.</u>	<u>Gender assessment</u> <u>Project monitoring reports including sex disaggregated data</u>	<u>NIE and Executing Entities</u>	<u>Included in activity's budget</u>

<u>PROJECT ACTIVITIES</u>	<u>AF PRINCIPLES TRIGGERED FOR COMPLIANCE/MANAGEMENT</u>	<u>POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS</u>	<u>MITIGATION MEASURES</u>	<u>MONITORING INDICATORS</u>	<u>RESPONSIBLE PARTIES</u>	<u>COST (USD)</u>
			<u>Gender training organized by the NIE.</u> <u>Partner with local women's organization and service providers where possible</u> <u>Adopt and build on methodologies used by rural sociologist previously contracted under the GOJ/AFP (Component 2)</u>	<u># of Gender training sessions conducted</u> <u>Evidence of approach used</u>		
<u>2. Coastal Protection (General)</u>						
	<u>Gender Equality and Women's Empowerment</u>	<u>More men than women will benefit directly from the low representation of women in male-dominated construction industry</u>	<u>Contractors advised that where possible, special considerations should be given to females providing construction or related services and to female providers of goods and services</u> <u>Analysis of bids from contractors assesses gender equity requirements within employment strategies</u>	<u>Evidence of requirement in procurement guidance notes</u> <u>Evaluation instrument has gender weighting</u>	<u>PMU and National Works Agency</u>	<u>Included in Component 3 budget</u>
	<u>Core Labour Laws</u>	<u>Unsuitable/unsafe working conditions</u>	<u>Relevant labour laws cited in contracts.</u> <u>Monitor complaints using grievance mechanism</u>	<u>Contracts citing laws</u> <u># of complaints received</u>	<u>PMU /NWA</u> <u>PMU</u>	<u>No additional cost</u>

<u>PROJECT ACTIVITIES</u>	<u>AF PRINCIPLES TRIGGERED FOR COMPLIANCE/ MANAGEMENT</u>	<u>POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS</u>	<u>MITIGATION MEASURES</u>	<u>MONITORING INDICATORS</u>	<u>RESPONSIBLE PARTIES</u>	<u>COST (USD)</u>
			<p><u>Designate specific areas for storage of fuel, chemicals or other hazardous material.</u></p> <p><u>Conduct safety training for workers before project activities begin to raise awareness of work place hazards and how to minimize unsafe practices.</u></p> <p><u>Contractor will be required to provide protective gear relative to workers' duties and erect appropriate signage</u></p>	<p><u># of work-related accidents reported due to non-compliance with relevant provisions</u></p> <p><u>Specific areas designated for hazardous materials</u></p> <p><u># of safety training sessions conducted</u></p> <p><u>Protective gears provided and warning signs posted at work sites.</u></p>	<u>Contractors</u>	
	<u>Public Health</u>	<p><u>Increased respiratory and or ocular irritation /health issues</u></p> <p><u>Traffic congestion during construction due to movement of materials</u></p>	<p><u>Preparation of appropriate plans including, traffic management and occupational health and safety</u></p> <p><u>Provision of protective gear (eg. dust masks, goggles, helmets etc.) to workers. The EIA will also define standards to be met.</u></p>	<p><u># of plans</u></p> <p><u>Occupational health and safety reports</u></p> <p><u>Evidence of gear distributed and used</u></p> <p><u>Dust suppression measures in place</u></p>	<u>PMU; Executing Entities; Contractors</u>	<u>Included in Component budget</u>

<u>PROJECT ACTIVITIES</u>	<u>AF PRINCIPLES TRIGGERED FOR COMPLIANCE/MANAGEMENT</u>	<u>POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS</u>	<u>MITIGATION MEASURES</u>	<u>MONITORING INDICATORS</u>	<u>RESPONSIBLE PARTIES</u>	<u>COST (USD)</u>
Coastal Protection: Installation of Revetment and Sea Wall						
	<u>Compliance with Law</u>	<u>Navigation charts may change based on shoreline changes.</u>	<u>Obtain approval of Harbour Master for changes in navigation chart.</u>	<u>Request to Harbour Master/ Approval obtained</u>	<u>PMU</u> <u>NEPA</u> <u>NWA</u>	<u>Budgeted as part of environmental monitoring under Component 1</u>
	<u>Protection of Natural Habits/Conservation of Biological Diversity</u>	<u>Sea grass beds may be disturbed if they exist in the work area</u>	<u>Conduct EIA Environmental Impact Assessment if required by permitting process</u>	<u>EIA conducted</u> <u>Compliance with conditions of permits and licenses</u>	<u>Contractor</u> <u>NEPA</u> <u>NWA</u> <u>NIE/PMU</u>	
		<u>River regime altered by removal of materials for construction and livelihoods impacted</u>	<u>Boulders identified from earmarked rivers which need desilting/with excess boulders</u>	<u># of site visit reports</u>		
			<u>Fabricate concrete structures that are designed to meet the criteria for use as armour structures, as necessary.</u>	<u>Design Consultant report/NWA</u>		
		<u>Encroachment on coral colony</u>	<u>Presence of corals determined during EIA; appropriate corrective measures identified based on findings</u>	<u>Reports of Assessment of coral</u>	<u>NEPA</u>	
	<u>Pollution Prevention & Resource Efficiency</u>	<u>Generation of various waste materials; scrap materials on site</u>	<u>Implement Waste Management plan</u>	<u># of Site visits for compliance</u>	<u>MLSS</u> <u>NWA</u> <u>PMU</u>	

<u>PROJECT ACTIVITIES</u>	<u>AF PRINCIPLES TRIGGERED FOR COMPLIANCE/MANAGEMENT</u>	<u>POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS</u>	<u>MITIGATION MEASURES</u>	<u>MONITORING INDICATORS</u>	<u>RESPONSIBLE PARTIES</u>	<u>COST (USD)</u>
		<u>Noise and vibration from construction equipment</u> <u>Increase in respiratory tract infections due to inhalation of dust and toxic fumes during construction activities</u>	<u>Conduct health and safety awareness for staff and target communities</u> <u>Establish and publicize a Stakeholder Engagement Plan that includes a grievance redress mechanism for addressing community concerns and complaints</u> <u>Contractor required to: design and implement workplace safety procedures at sites in line with standard industrial practice;</u> <u>Manage waste from site clearing in accordance with the approved Waste Management Plan.</u>	<u># of sensitisation sessions held</u> <u>#Stakeholder Engagement sessions</u> <u># of complaints received and addressed</u> <u>Safety standards displayed at work site</u> <u>Waste management plan</u>		
<u>Coastal Protection: Land Reclamation</u>						
	<u>Protection of Natural Habits/Conservation of Biological Diversity</u>	<u>Source site for materials negatively impacted by removal</u>	<u>Materials extracted only from licensed sites and quarries</u> <u>Due diligence carried out on earmarked rivers to identify areas in need of de-silting to trigger use of the material from these areas</u>	<u>Level of conformance with approved contract requirements</u> <u>Extent of compliance with EIA conditions</u>	<u>Design Engineer for final design and the NWA team</u> <u>NWA PMU</u>	<u>Budgeted</u>

<u>PROJECT ACTIVITIES</u>	<u>AF PRINCIPLES TRIGGERED FOR COMPLIANCE/MANAGEMENT</u>	<u>POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS</u>	<u>MITIGATION MEASURES</u>	<u>MONITORING INDICATORS</u>	<u>RESPONSIBLE PARTIES</u>	<u>COST (USD)</u>
	<u>Pollution Prevention</u>	<u>Accidental spills when transporting material</u>	<u>Materials obtained from the rivers in close proximity to the area and transported in accordance to the specifications outlined in the EIA</u>	<u>Traffic Management Plan</u> <u>Environmental Permit</u>	<u>NWA/ Contractor</u> <u>NRCA/NEPA</u>	
<u>Coastal Protection: Installation of WADS</u>						
	<u>Protection of Natural Habits/Conservation of Biological Diversity</u>	<u>Movement of WADS after the project ends may result in some damage to coastal eco-systems</u>	<u>Prior to movement of WADS a bathymetric study would be done and appropriate protocols developed for relocation.</u>	<u>Protocols developed for relocation of WADS.</u> <u>Relevant permits obtained</u>	<u>NEPA and NWA as part of their institutional remit</u>	
<u>3. Capacity Building</u>						
	<u>Access and Equity</u>	<u>Conflict in choice of beneficiaries for training</u> <u>Non-inclusion of persons with disabilities</u> <u>Low take up of training</u>	<u>Social Development Commission, ABCDEA and other community groups solicited to help identify individuals using a participatory approach</u> <u>Established training institutions (HEART Trust) and the Fisheries Division to present training</u> <u>Certificates provided</u>	<u>Transparent selection criteria implemented</u> <u># of complaints received and evidence of remedial action taken</u> <u># of PWDs involved</u> <u>Level of participation of cross-section of beneficiaries</u> <u># of sensitization sessions in the project area</u>	<u>PMU/NIE</u> <u>SDC ABCDEA PMU</u>	<u>Budgeted under Component 3</u>

<u>PROJECT ACTIVITIES</u>	<u>AF PRINCIPLES TRIGGERED FOR COMPLIANCE/ MANAGEMENT</u>	<u>POTENTIAL ENVIRONMENTAL & SOCIAL IMPACTS</u>	<u>MITIGATION MEASURES</u>	<u>MONITORING INDICATORS</u>	<u>RESPONSIBLE PARTIES</u>	<u>COST (USD)</u>
			<u>Members of the Fishermen's Cooperative and other registered fishers and related persons targeted for fisheries related training</u>	<u># of fishers trained</u> <u># of fishers' groups strengthened</u>		
	<u>Gender Equality and Women's Empowerment</u>	<u>Low female participation</u>	<u>Special mobilisation of women, especially fish vendors</u>	<u># of mobilisation sessions conducted</u> <u># female participants in sensitization activities</u>	<u>SDC</u> <u>PMU</u>	

Risk Identification and Screening for Environmental and Social Management

Table 16 reflects the risks and related mitigating measures identified at the (Component 1) design stage based on technical and local community knowledge and information; however, it is likely that other risks may emerge once final designs and permitting requirements are finalised and implementation commences. [LR2]Provisions are therefore made to carry out further risk assessments according to the screening and assessment procedure contained in the AF ESP Guidance Document. The PMU will activate this process and will, in consultation with the EEs and with the input of residents/beneficiaries, determine actions to mitigate such risks and update the ESMP.

The process below identifies steps/procedures for updating the ESMP as and when the environmental and social assessments have been carried out. This process is designed to ensure that there is:

- screening of particular sub-project activities as their design elements and specific locations are further defined;
- appropriate assessment of possible impacts and the formulation of suitable action plans for mitigating and managing potentially adverse environmental and social impacts;
- integration of these measures into the overall project implementation arrangements; and
- a mechanism for receiving and responding to stakeholder concerns regarding the project's social and environmental performance.

Procedure for Risk Identification and Screening for Environmental and Social Management

1. A template/checklist for categorizing risks and identifying their potential impact as well as weighting the likelihood of occurrence has been outlined and will be shared to EE and contractors to be followed in the risk screening and assessment process
2. All project activities which are sufficiently developed (engineering designs, detailed drawings, etc.), will be screened and assessed according to relevant national environmental laws/guidelines, the 15 AF ESP.
3. Activity screening will be done by the respective activity/sub-component leader (for example, NEPA or NWA) and must consider not only the details of the activities but also the details of the specific environmental and social setting within which each activity will take place to determine where there are risks. Risk findings must be substantiated and documented[CB3][CB4].
4. Once risks are identified, assessment of possible impacts will be undertaken by sub-component/activity leads to gauge the intensity and significance of potential impacts. The PMU/NIE will ensure that independent technical panels are used, where appropriate, for sub-projects/activities that involve serious and multi-dimensional social and/or environmental concerns.
5. For activities assessed as having 'low' to 'moderate' risk ranking, activity/component lead in consultation with the environmental authorities, NIE, and/or affected communities [LR5]will identify and plan risk mitigation measures.

The results from the Environmental Impact Assessment and any conditions of licences or permits imposed by regulators shall trigger an automatic update of the ESMP

6. Project activities that are assessed to pose 'high' environmental and/or social risks will not be approved unless a comprehensive risk management plan has been developed and approved. (No such activity is expected to be a part of this programme).

7. The PMU is responsible for clearing the risk screening/assessment reports[LR6] and submitting same to the NIE/PSC for approval[LR7]. Only **approved** activities can proceed to the implementation phase.[CB8]
8. There will be quarterly reviews of the ESMP by the Programme Steering Committee. The objective of these quarterly reviews is to ensure that the necessary updates have been applied and amendments made, reflecting any changes to environmental conditions or legislation that are relevant to the programme, or new social or environmental risks that have been identified
9. The PMU will update the ESMP and overall monitoring plan to include any newly identified elements[CB9].

Further to the above:

- All environmental permits and licences required (eg. EIA, beach license) will be obtained prior to the implementation of activities[CB10]
- Conditions stipulated by regulators (such as maintenance plans, traffic management plans, etc.) will be strictly adhered to by the programme
- All MOUs with Executing Entities will include detailed references to the ESMP and the 15 ESP Principles as well as requirements for risk review sessions and reporting on such sessions
- The TORs of Committees and technical review panels [LR11] and Contractors will also include the ESP references.
- The NIE will conduct training and sensitisation workshops for Executing Entities, partner agencies and other key stakeholders to facilitate understanding of the national social and environmental safeguards and ESP requirements, their obligations and their respective roles/responsibilities in relation to the ESMP.
- Ongoing monitoring exercises will be carried out, including by the beneficiary communities acting as front-line monitoring agents.
- PMU/NIE and partners will ensure timely and adequate information dissemination including continuous consultation and coordination with affected stakeholders

Monitoring, Reviewing and Updating[CB12] the ESMP

Oversight for all programme activities will be the responsibility of the NIE with support from the Programme Steering Committee, as appropriate. The PMU will monitor programme implementation and achievement of outcomes/outputs by the Executing Entities/Contractors. The PMU will be responsible for updating the ESMP and will liaise with the executing partners and contractors in this regard. These updates will be done periodically as particular activities are designed in further detail, new risks are identified and any required assessments are undertaken. ESMP activities are also aligned with the M & E framework, particularly those related to site visits, mid-term/end of year reviews and stakeholder consultations.

Categorizing Risks and Identifying their Potential Impact

The risk categorization approach outlined in the NIE's ESF will be used to guide the process. It uses four levels of risk as defined below (

Table 17). In addition, a risk assessment template will be shared with partners to guide assessment of the likelihood, impact and management measure associated with each risk as they apply to the AF's ESP (Table 18).

Table 17: Categorisation of Risks

<u>Category Assigned</u>	<u>Specific Requirements</u>
<u>High</u>	<u>Significant adverse risks and impacts on human populations and environment, requiring avoidance or mitigation, including those risks which are any of the following: irreversible, high in magnitude or extent, complex, or located in an insecure project area or context.</u>
<u>Substantial</u>	<u>Less than high, for example where risks and impacts on a smaller scale, reversible, or in a safer project context, but still requiring mitigation or management</u>
<u>Moderate</u>	<u>Less significant risks with low probability of adverse effects where risks can be easily mitigated in a predictable manner</u>
<u>Low</u>	<u>Risks and impacts minimal or negligible.</u>

Source: Environmental and Social Framework, PIOJ, 2017

Table 18: Risk Identification and Assessment Template

<p align="center">GOJ/Adaptation Fund Programme Enhancing Resilience, Protecting Livelihoods and Improving Food Security Risk Identification and Assessment Template</p>								
<u>Component/ Activity</u>	<u>AF ESP</u>	<u>Risk Name</u>	<u>Likelihood (1-4)</u>	<u>Impact (1-4)</u>	<u>Risk Score (P x A)</u>	<u>Mitigation Measures</u>	<u>Responsible</u>	<u>Frequency/ Timeline</u>
-	<u>Access & Equity</u>	<u>Disagreements related to selection of beneficiaries</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>Transparent and objective criteria for selection of workers and beneficiaries developed and applied.</u>	<u>PMU</u>	<u>Quarterly</u>
	<u>Protection of Natural Habitats/Conservation of Biological Diversity</u>	<u>River regime altered by removal of materials for construction and livelihoods impacted</u>	<u>2</u>	<u>3</u>	<u>6</u>	<u>Fabricate concrete structures that are designed to meet the criteria for use as armour structures, as necessary.</u>	<u>NWA NEPA PMU</u>	<u>Monthly</u>

Impact	<u>4</u>	-	-	-	-
	<u>3</u>	-	-	-	-
	<u>2</u>	-	-	-	-
	<u>1</u>	-	-	-	-
	-	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
-	-	Likelihood			

Risk Score/Category

Score 1-4 (Green) = Low

Score 5-8 (Yellow) = Moderate

Score 9-12 (Amber) = Substantial

Score 13-16 (Red) = High

Grievance Mechanism:

The Environment and Social Framework of the NIE articulates its commitment to having open and continuing engagement with stakeholders under the Environment and Social Safeguard 2 (ESS 2) – Consultation and Grievance Mechanism. This includes a grievance mechanism to respond to the concerns and grievances of affected populations in a timely, prompt, appropriate and effective manner. It also commits to dealing with concerns in an open manner at no cost to the complainant and without retribution. The project will be guided by the ESF and will utilise the existing grievance mechanism of the NIE. The NIE's Citizen's Charter provides information regarding the channels through which complaints can be lodged and also how to request information (see <http://www.pioj.gov.jm/CitizenCharter/tabid/58/Default.aspx>). All complaints which are received via the email address (info@pioj.gov.jm) are received by Wesley Hughes Documentation Centre. A response acknowledging receipt will be provided within 5 working days. Each complaint will be elevated to the responsible parties (including the PMU) to action. Formal responses will be provided within 10 working days with any deviations communicated clearly to the complainant. In addition to contact by email, complaints can also be lodged in writing to the Director General, and via telephone.

Additionally, the project website (<http://dev.adaptja.pioj.gov.jm/>) provides contact information (telephone, email and address) on the project and is used to screen for complaints as well as requests for information. The performance standards for the NIE (outlined above) apply. The project will also use opportunities during consultations to make stakeholders aware of these procedures and also to field concerns they may have.

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan in compliance with the ESP and the Gender Policy of the Adaptation Fund

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

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

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

Monitoring mechanisms:

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

- Establishing relevant baseline in each community (Component 1) will be required to effectively monitor the relevance, performance and success of the interventions. These will include level of erosion, level of deforestation, level of vulnerability in the communities.
- Programme Inception Workshop and Report – This workshop will be conducted in October 2012 to mark the start of the programme. This will be followed up with a report which will be submitted to the AF Secretariat one month following the workshop.
- Monitoring Plan – The Programme Management Unit will prepare a monitoring plan in the start-up phase of the programme using the indicators, outputs and targets identified in the programme's logical framework. The plan will detail all arrangements for monitoring of the subprojects and will also establish a methodology for tracking progress against the indicators, outputs and targets identified for the Programme. The Programme Manager will be expected to report regularly to the PSC on progress towards meeting these targets and achieving expected results as outlined in the logframe, in addition to broad reporting on progress in implementation.
- Work Plans – Annual work plans will be prepared by the project managers in order to translate the project document into operational terms. The work plans will describe in detail the intended delivery of outputs, the activities to be conducted and the results expected. In addition, they will indicate schedules and the persons/institutions assigned the responsibility for delivery results. The work plans will also be the basis for monitoring progress of project implementation.
 - In a deliberate attempt to keep GOJ, the AF Board and other development partners informed of the progress of programme implementation, project managers will be required to provide an abbreviated version of their work plan. These work plans will indicate critical milestones in implementation with the related time table and responsible personnel
- Field Visits – The project managers will be required to make field visits at regular intervals to the project sites. The purpose of the field visits will be inspection of the sites; physical outputs; and the services being provided by the project. In addition, field visits will assist in facilitating the participatory process by providing opportunities for interaction with target beneficiaries, so as to get their views on how they are being affected by the project and their proposed solutions to problems that may arise. Reports emanating from the field visits will focus on relevance and performance while seeking to unearth early signs of potential problems or success areas. The reports will be enhanced where appropriate with photographs.
- Stakeholder Meeting - Stakeholders meetings will be held with the expressed purpose of involving the major stakeholders in addressing issues relating to the programme/projects. -This will help to create a sense of ownership among stakeholders. Meetings with stakeholders will be conducted at different levels and with varying frequencies. For example, technical and operational issues will be handled at the programme/project level while policy issues will be discussed at a higher level e.g. Steering Committee.

- Reporting – The programmes/projects will be characterised by systematic reporting throughout the entire duration of the programme. In addition to annual reports, internal monitoring reports will be prepared on a more frequent basis – monthly, quarterly, etc.
- Periodic audits will be carried out and in accordance with GOJ requirements will address both fiduciary and value for money considerations.
- Questionnaire Survey – This option will be explored as the need arises during the implementation process. It may be used to get feedback from stakeholders.
- Interviews – Structured and unstructured interviews will be used as a means of gathering information for progress reports or for verification purposes.
- Focus Groups – This method may be used to continue the dialogue with stakeholders. Not only will they inform decisions made during the programme implementation, but will also be a means through which information is communicated.
- Project progress meetings in which contractors provide progress to stakeholders monthly will keep all parties informed and aware of issues arising on the project. These meetings will be organized by the Project manager in the executing entities and should include NIE/ PMU, MOF, Community Stakeholders, etc.
- The formation of the Climate Change Division in the Ministry of Economic Growth and Job Creation has provided an opportunity for an additional level of monitoring with respect to National Climate Change Policy Framework. The Climate Change Division will add this project to its database.

Table 1945: Monitoring and Evaluation Activities

Activities	Timelines/Duration	Cost (USD)	Responsible Parties
Programme Inception Workshop	October 2012	5,000	PIOJ
<u>Component 1 Inception Workshop</u>	<u>2nd Quarter 2018</u>		
Establish Programme Steering Committee (PSC)	First quarter	0	PIOJ/ PMU
Finalize Operating Modalities	First quarter	0	PIOJ/PMU, Executing Agencies
Progress Reports	Monthly, Bi-annual	0	Executing Agencies
Financial Reports	Monthly, Bi-annual	0	Executing Agencies
Site Visits	Periodic	5,000	PMU, Executing Agencies, PSC
Programme Performance Reports	Yearly	0	PIOJ/PMU
Workshops/Consultations/Meetings on Programme Status (for wider audiences)	Yearly	8,000	PMU
Mid-term Review/Evaluation	March 2014	8,000	PIOJ/PMU, External Consultants
<u>Special Evaluation</u>	<u>March 2018</u>	<u>12,000</u>	<u>PIOJ/PMU, External Consultants</u>
Terminal Evaluation	February/March 2016 <u>2019/2020</u>	8,000	PIOJ/PMU, External Consultants
Financial Audits	Annually <u>Mid term and Final year</u>	14,000	PIOJ, External Consultants

Project Evaluation:

Evaluation: An evaluation will be conducted ~~twice~~three times during the programme – a mid-term, special (because of extensions and so as to capture important lessons learned) and final evaluation (see

~~Table 19~~~~Table 15~~ above). The process will be led by an independent evaluator with the following general criteria: Relevance, Performance and Success (~~Table 20~~~~Table 16~~).

Table ~~20~~16: Evaluation Criteria

Focus of Monitoring and Evaluation	Criteria
Relevance: Degree to which the objectives of the programme	<ul style="list-style-type: none"> Was the programme planning process logical and complete? Is there adequacy in programme design?
Performance: the progress that is being made by the programme/project relative to its objectives	<ul style="list-style-type: none"> Efficiency – Have the results been achieved at reasonable cost? Was the most appropriate activities employed for the respective outputs? Effectiveness – How has the assumptions and risks affected implementation? Has/Will the stated outputs/activities produce the results expected? Timeliness of inputs
Success: The extent to which the programme/project has brought about change	<ul style="list-style-type: none"> Impact – What is the extent to which the programme is addressing the expressed objectives? Sustainability – Is the programme on-track to be sustained (mid and post programme)?

~~D: provide~~**E: Include a results framework for the programme proposal, including milestones, targets and indicators.**

The results framework is outlined in ~~Table 17~~~~Table 21~~ below. The alignment of the outcome and output indicators with the Adaptation Fund Results Framework is outlined in ~~Table 22~~~~Table 18~~.

Table **2147**: Results Framework of the Adaptation Fund

OUTCOME	Outcome Indicators	Baseline	Target (2014 2018)	Target (2016 2019)	Assumptions/Risks
Enhanced capacity to protect livelihoods and food security in vulnerable communities by: improving land and water management for the agricultural agriculture sector, strengthening coastal protection and building institutional and local capacity for climate change adaptation	i) change in beach width	Annual average -rate of beach erosion app 0.5-1.0m <u>2m</u>	Reduction in the rate of coastal erosion	-At least 20% increased accretion <u>30m reclaimed land</u>	No major natural disasters impeding progress of project and damaging infrastructure
	<u>ii) Change of land cover</u>	<u>Badly denuded slopes</u>	<u>~ 20% of trees planted</u>	<u>30,000 trees planted</u>	<u>Availability and adequacy of planting material</u>
	<u>iii) enhanced resilience to coastal erosion</u>	<u>~750km of badly eroded shorelines in 3 towns</u>	<u>- Preliminary designs completed and tendering process underway</u> <u>5% of works completed</u>	<u>600m coastline rehabilitated</u>	<u>No hazard event; response tender process</u>
	<u>Outcome Indicators</u>	<u>Baseline</u>	<u>Target (2014)</u>	<u>Target (2016)/(2018-9)</u>	<u>Assumptions/Risks</u>

	<p>iii) change in percentage of communities with improved land and water management practices in the agriculture sector in the project area</p> <p>ii) change in agricultural output of project communities</p> <p>iii) change in the incidence of down-stream flooding and soil erosion</p>	<p>Physical evidence of land degradation, soil erosion due to removal of trees</p> <p>Reported incidence of downstream flooding and soil erosion (To Be Determined (TBD))</p>	<p>Sustainable land and water management techniques introduced in 40% of targeted communities</p> <p>At least 20% of targeted farmers (male/female) employing good practices</p> <p>10%increase in crop yield</p> <p>5% decrease in pest infestation</p> <p>15%Reduction in reported incidence of downstream flooding and reduced turbidity of the rivers</p> <p>15% Reduction in level of soil erosion</p>	<p>Sustainable land and water management practices introduced in 100% of targeted communities</p> <p>At least 50% of farmers (male/female) employing good practices</p> <p>30%increase in crop yield</p> <p>10% reduction in pest infestation</p> <p>40% Reduction in reported incidence of downstream flooding and reduced turbidity of the rivers</p> <p>40% Reduction in level of soil erosion</p>	<p>No major natural disasters</p> <p>Agriculture output not adversely affected by praedial larceny</p> <p>Soil conservation coupled with increased water access successful</p>
	<p>iv) number of farmers (male/female) with increased access to irrigation water and production schemes</p>	<p>Small %age of residents (male/female) with water storage or distribution facilities</p>	<p>450 farmers (male/female) in 9 communities have access to irrigation water and .production schemes</p>	<p>1000+ farmers (male/female) in 21communities have access to irrigation water and production schemes</p>	<p>Good Community management of WUGs</p> <p>Male : female (2:1) farming ratios of the Agriculture Census maintained</p>
	<p>v) number of farmers (male/female) having access to rainwater harvesting and drip irrigation systems</p>		<p>23 farmers (15male/8female) in 6 parishes have access to water through rainwater harvesting</p>	<p>60 farmers (40male/20 female) in 6 parishes have access irrigation water and production schemes</p>	
	<p>vi) number of farmers (male/female) benefiting from soil conservation and land husbandry infrastructure (in Upper Rio Minho Watershed)</p>	<p>TBD</p>	<p>20 000 residents in 10 communities experience improved environmental conditions due to the establishment of land husbandry infrastructure</p>	<p>App. 70 000 male and female residents in 31 communities experience improved environmental conditions due to the establishment of economic live barriers,</p>	<p>Impact extends beyond the farmers</p>

				fruit trees,	
	i) change in availability (number) and quality of local planning tools for Negrii , e.g., climate risk atlas, adaptation plans and the extent to which climate resilient planning development is adopted	Development planning tools not climate smart nor standardized 0 community adaptation plans available for project communities	Climate smart guidelines developed and being used in development planning 1 st Draft of Risk atlas being tested and validated Community approval of draft adaptation plan	Climate smart guidelines for assessing development applications institutionalized and in use in at least 50% of development applications Beach restoration activities guided by standardized approach Climate risk information integrated into development planning CCA and DRR integrated into community plans and activities	
	ii) % of farmers reporting reduced losses of income and increase of supplemental income	23.% of farm household in Northern Manchester below the poverty line	30% farm households have alternative sources of income	75% farm household have alternative sources of income	Increased access to water and better husbandry contributes to security of livelihood e.g. crops plus livestock
	iii) % residents (male/female) in project communities more aware and knowledgeable of CCA and DRR issues for their community	(~90%) Majority of residents (male/female) believe CC risks more relevant to the country than to their community	At least 50% of residents in project communities believe that climate risks are relevant to their community and are willing to accept primary responsibility for adaptation	At least 75% of residents in project communities believe that climate risks are relevant to their community and are willing to accept primary responsibility for adaptation	

Verification/Source:

Engineers reports; Environmental monitoring reports, progress reports from executing agencies; site visits reports; annual reports

OUTPUTS	Output Indicators	Baseline	Target (2014 2018)	Target (2016 2019)	Assumptions/Risks
Component 1: Negrii Breakwaters Revetments and Artificial reef	Length (m) of breakwater hard structures installed	No breakwater revetment No artificial reef	590m of breakwater installed Contractors mobilised; permits and licenses obtained; 5% works completed;	990m 600 m of breakwaters revetment installed 300 meter of artificial reef installed 18,000 m ² of reclaimed	Raw materials for breakwater revetment and reclamation available within close proximity (as indicated during consultationsin public consultation with local stakeholders)

		<u>High Level of deforestation</u>	<u>20% trees planted</u>	<u>shoreline (new land)</u> <u>30,000 trees planted</u>	<u>Landowners are willing to participate in agroforestry programmes</u>
Verification/Source: Engineers reports; Environmental monitoring reports, progress reports from executing agencies; site visits reports; annual reports					
OUTPUTS	Output Indicators	Baseline	Target (2014)	Target (2016)/2018-19	Assumptions/Risks
Component 2: Land and Water Management Systems	i) number of micro dams constructed in North Manchester	0 water catchment facility in North Manchester	One micro dam partially installed	One micro dam fully installed and operational	Potential technical difficulties will be identified during the design phase and adequately addressed during implementation
	ii) number of irrigation and production schemes established in: St Thomas, St Ann, Trelawny, St Catherine, Clarendon, Manchester, St Mary	0 irrigation and production schemes in the 21 targeted communities in 6 project parishes	25 irrigation and production and productivity schemes established and operational in 9 communities serving app 450 farmers	63 schemes installed and operational in 21 communities serving over 1000 male and female farmers	A minimum of 330 female farmers expected to benefit assuming the ratio of 1female to 2 males recorded in the Agriculture Census holds
	iii) number of rainwater harvesting and gravity drip irrigation systems installed in: St Thomas, St Ann, Trelawny, St Catherine, St Mary, Clarendon	Inadequate access to irrigation facilities in selected communities in 6 project parishes	15 rainwater harvesting 8 ponds and springs 23 gravity drip irrigation systems installed and operational	30 rainwater harvesting 20 ponds and springs 60 gravity drip irrigation systems installed and operational and serving 40 male and 20 female farmers directly	Storage capacity installed will be adequate to cover periods of drought <i>NB: 10 systems to be attached to existing sources</i>
	iv) soil conservation and land husbandry infrastructure in Upper Rio Minho Watershed	Extensive soil erosion due to hillside farming, removal of forest cover and poor farming practices	App 8000m diversion /hillside ditches, 10500 individual basins, 1200m of waterway, 500m continuous mound , 250 check dam/drop structures installed, 8000 m pineapple (vegetable barrier) and 5ha fruit forest and 6 ha timber planted impacting 2	App 18000m diversion /hillside ditches, 24600 individual basins, 3000m of waterway, 1200m continuous mound , 705 check dam/drop structures installed, 18000 m pineapple (vegetable barrier) and 13ha fruit forest and 15ha timber planted impacting 5	Benefit to app 70 000 residents in the Upper Rio Minho Watershed as well as those in communities downstream through reduced flooding and siltation Soil losses reduced almost immediately after installation of

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

	ii) Evidence of documentation and dissemination of best practices	No evidence of documented best practices in project areas	Documentation of best practices for water and land management, innovations by farmers	Information made available through virtual networks, RADA, parish libraries, College of Agriculture Science and Education, Jamaica Agriculture Society, Fishermen's Cooperative, 4H Clubs and schools	
	iii) Number of (targeted) training programmes for local entities in DRR, natural resource management	Limited training in DRR for local entities in DRR and natural resource management, except the few hotels that have green certifications. Limited exposure to training with specific focus on climate change	Training programme designed in collaboration with ODPEM; materials developed; and training of fishers (mostly male), male and female youth, micro and small business owners and other groups commenced	Training programmes targeted at fishers (mostly male), male and female youth, micro and small business owners and other groups completed	The number of training workshops/events will be determined once the project commences
Coastal Adaptation Training, Tools	i) Guidelines and standards for beach restoration, shoreline protection for Negril	No specific technical guidelines for Negril	Draft set of guidelines and standards developed	One set of guidelines and standards finalized	Planning authorities receptive
<u>Coastal Adaptation Training, Tools</u>	iii) Number of climate risk atlas ² for storm surge, sea level rise (specific for Negril)	0 risk atlas information for storm surge and sea-level rise for Negril	One draft of risk atlas prepared containing information on storm surge and sea-level rise	Risk Atlas completed	Data and Information not available/inadequate
	iii) Number of adaptation plans for vulnerable sections of Negril <u>north-eastern coast</u>	0 Plan	Draft adaptation plan prepared with input from stakeholder groups representing farmers, fishers, tourism and commercial interests	One adaptation plan completed and in use	Community continues <u>Communities continue</u> to be engaged
Verification/Source: Field (assessment) reports; progress reports; environmental monitoring reports, annual reports; consultation/training reports, surveys, site visits					

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

F: Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Table 2248: Alignment of Programme with AF Objectives

Project Objective(s) ⁴⁰	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount
To protect livelihoods and food security in vulnerable communities by: improving land and water management for the agricultural sector, strengthening coastal protection and building institutional and local capacity for climate change adaptation	i) change in coastal protection infrastructure in <u>Negril-north eastern coastline (Annotto, Buff and Orange Bays)</u>	Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	4.1. Development sectors' services responsive to evolving needs from changing and variable climate 4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	
		<u>Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress</u>	<u>5. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress</u>	
	ii) <u>change in vegetative cover in selected communities in the Pencar/Buff Bay watershed</u>	Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	5. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress	
	iii) change in land and water management practices in the agriculture sector (in select communities)	Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors	4.1. Development sectors' services responsive to evolving needs from changing and variable climate 4.2. Physical infrastructure improved to withstand climate change and	

⁴⁰ The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

			variability-induced stress	
		Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	5. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress	
		Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure (increased) access to livelihood assets 6.2. Percentage of targeted population with sustained climate-resilient livelihoods	
	iiiiv) number of capacity building initiatives integrated in national and/or local decision-making within the agriculture sector and for coastal resources	Outcome 1: Reduced exposure at national level to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	
		Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks 2.2. Number of people with reduced risk to extreme weather events	
		Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses 3.2. Modification in behavior of targeted	

			population	
		Outcome 7: Improved policies and regulations that promote and enforce resilience measures	7. Climate change priorities are integrated into national development strategy	
Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator	
Increased climate resilience of the Negril coastline	Change in width of beach (m)	Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability Output 5: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types) 5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets)	
Enhanced climate resilience of the agricultural sector through improved water and land management in select communities	i) number of farmers (by gender) with increased access to irrigation water and production schemes ii) number of farmers (by gender) having access to rainwater harvesting and drip irrigation systems iii) number of farmers benefiting from soil conservation and land husband infrastructure (in Upper Rio Minho Watershed)	Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability Output 5: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types) 5.1. No. and type of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type of assets) 6.1.1.No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or	

			community-livelihood strategies	
Improved institutional and local level capacity for sustainable management of natural resources and in disaster risk reduction in the targeted vulnerable areas; and raising awareness for behaviour modification	i) change in number of local planning tools for Negril , eg, climate risk atlas, adaptation plans ii) number of entities adopting DRR/natural resources management in operations iii) number of farmers adopting sustainable practices (through farmer field schools, demonstrations plots, etc)	Output 1: Risk and vulnerability assessments conducted and updated at a national level Output 2.2: Targeted population groups covered by adequate risk reduction systems Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities Output 7: Improved integration of climate-resilience strategies into country development plans	1.1. No. and type of projects that conduct and update risk and vulnerability assessments 2.1.2. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased 2.2.2. No. of people affected by climate variability 3.1.1 No. and type of risk reduction actions or strategies introduced at local level 7.1. No., type, and sector of policies introduced or adjusted to address climate change risks 7.2. No. or targeted development strategies with incorporated climate change priorities enforced	

~~Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability~~

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Table 23: Alignment Table with Core Indicator of AF

<u>AF Core Indicator</u>		<u>Target</u>	<u>Comments</u>
<u>1</u>	<u>Number of Beneficiaries</u>	<u>12000</u>	<u>Approximately 12,000 residents (50.8 per cent female) in the 3 north eastern towns are exposed to storm surge, coastal erosion and riverine flooding.</u>
<u>3</u>	<u>Assets Produced, Developed, Improved, or Strengthened</u>	<u>450 residential structures; 1 health centre; 1 church; Metcalf Market</u>	<u>The assets will benefit from the shoreline protection measures, including the land reclamation.</u>
<u>4</u>	<u>Increased income, or avoided decrease in income</u>	<u>300 persons</u>	<u>250 fishers' livelihood negatively impacted if there is no intervention; Employment generated by construction activities.</u>
<u>5</u>	<u>Natural Assets Protected or Rehabilitated</u>	<u>30,000 trees planted</u>	<u>Reforestation will enhance the bio-diversity of the watershed while artificial reefs will improve habitat for fishes and other species in the marine environment.</u>

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

A detailed budget is outlined below in Table 24~~Table 19~~.

Table 2419: Detailed Programme Budget

Investment category	Activities	Total (US\$)
Component 1: Increasing the climate resilience of the Negril coastline (Negril Beach Restoration project) <u>Towns along the North Eastern Coast of Jamaica</u>	4. <u>1. Preliminaries</u>	400 <u>150,000.00</u>
	2. <u>2-Coastal Works-Hard Solutions</u> <u>a. Land reclamation</u> <u>b. Revetment in 3 locations</u> <u>c. Parapet walls</u> <u>d. Geotextile</u>	4,085,060 <u>3,970,000.00</u>
	<u>3. Installation of Wave Attenuation Devices</u>	<u>240,000.00</u>
	<u>4. Non – structural (reforestation)</u> <u>a. Fruit trees</u> <u>b. Timber trees</u> <u>c. Non fruit and timber</u>	<u>220,000.00</u>
	5. <u>3-Provisional Sum -and Dayworks</u>	242,500 <u>90,000.00</u>
	6. <u>4-Environmental Monitoring and Management</u>	236,378 <u>190,000.00</u>
	7. <u>5-Engineering Services</u>	280,459 <u>180,000.00</u>
	Contingencies	<u>236,378</u>310,000.00
Total: Component 1-	-	<u>5,480,775</u>.00⁴¹
Component 2: Enhancing the climate resilience of the agriculture sector by improving water and land management in selected communities.	1.Design and construction of microdam	590,000.00
	2.Implementation of rainwater harvesting and small scale gravity irrigation programme: <input type="checkbox"/> 30 rainwater harvesting system using roof catchment and tank	35,000.00
	<input type="checkbox"/> (20) Rainwater harvesting system using ponds/tanks	162,000.00
	2.1 Implementation of Sixty (60) Gravity Drip Irrigation Systems	70,725.00
	3.Establishment of small scale irrigation systems and production and productivity programmes using climate-smart	1,080,000.00

⁴¹ Based on amounts previously expended for activities under the original Component 1, there is approximately \$5.35m remaining from the original allocation of \$5.48m

Investment category	Activities	Total (US\$)
	4. Establishment and rehabilitation of soil conservation and land husbandry infrastructure	450,000.00
	5. Establishing demonstration plots applying effective land husbandry and soil conservation techniques	116,000.00
Total: Component 2		2,503,725.00
Investment Category	Activities	Total (US\$)
Component 3	1. Training of local communities and entities in disaster risk reduction (DRR) and natural resources management	117,000.00
	2. Development of guidelines/technical standards <u>adaptation plans</u> for beach restoration and shoreline protection <u>the targeted areas (north-eastern coastline)</u>	7074 <u>7074</u> ,000.00
	3. Development of adaptation plans for the most vulnerable areas along the Negri coastline <u>3. Capacity Building and Training in deep sea fishing, business development, natural resources management, etc.</u>	7470 <u>7470</u> ,000.00
	4 Documenting lessons learnt from public awareness programme	3,500.00
	5 Development of a climate risk atlas – storm surge, sea level rise, etc. – to be used in the development planning process	150,000.00
	6 Conducting workshops and field days for farmer training in water and land management and climate smart agriculture	190,000.00
	7 Farmer field schools to develop solutions and demonstrate good practices led by farmers	81,000.00
	Sub total	685,500.00
	1B. Climate change awareness and education programmes developed and implemented in project communities	100,000.00
Total: Component 3		785,500.00
Total: Components 1, 2, 3		8,770,000.00
PFG		30,000.00
Programme Execution Cost (see Table 22 <u>Table 27</u>)		415,000.00
NIE Management Fee (see Table 24 <u>Table 26</u> below)		780,000.00
Total budget		9,995,000.00

Budget Notes:

- 1) ~~4)~~ The budget for Component 1 reflects the low estimate costing by the ~~engineer~~ Executing Entity's Engineering and Quantity Surveying Team. The tendering process will be on a fixed cost basis.
- 2) ~~2)~~ Preliminaries include setting up of site office, maintenance, safety, health, welfare, supervision of works, bonds and insurance, quality control, environment and safety plans, progress reports, surveying (initial, setting out, elevations as built), testing (armour stone and fill)
- ~~3)~~ Coastal Works-Hard Solutions – material and labour costs inclusive of
Material: ~~Breakwaters: Boulders~~ C-1-BW1 (24,500m³), C-1-BW2 (23,200m³)
- 3) ~~1)~~ Geotextile ~~to footprint C-1-BW1(11,600m²), C-1-BW2 (8,970m²), fill material etc~~
- 4) ~~4)~~ Provisional Sum and Dayworks: -Land site preparation, lease and demobilization; Day Works, -Prime cost of labour, material and plant
- 5) ~~5)~~ The execution Fees for the NWA will cover the cost for site supervision and quality control, hire experts and professionals for quality assurance and to cover administration and project overheads. Typically, approximately 45% is expended on site supervision, 33 % on professional services and approximately 20 % on administration and overheads.
- 6) Environmental Monitoring and Management – includes permit monitoring, analytical and related equipment for civil works (Components 1 and 2)
- 7) ~~F~~Contingency of 5% is included in the budget. A fixed-cost budget will be used to minimise cost overruns.

H: Include a disbursement schedule with time-bound milestones

The disbursement schedule is outlined in the table below.

Table 25: Disbursement Schedule

~~The disbursement schedule is outlined in the table below.~~

Table 20: Disbursement Schedule

	Upon Agreement signature	One Year after Project Start ^a Start/	Year 2b/	Year 3*	Total
Scheduled Date	August/September 2012	October 2013 <u>April 2014</u>	October 2014 <u>2018</u>	October 2015 <u>June 2019</u>	
Project Funds	3,069,500.00	2,192,500.00	2,492,500 <u>455,600.00</u>	1,315,500 <u>52,400.00</u>	8,770,000.00
Execution Costs	137,300.00	121,450.00	95,850 <u>109,375.00</u>	60,400 <u>46,875.00</u>	415,000.00
Implementing Entity Fee	245,097.00	214,513.00	203,400.00	116,990.00	780,000.00
	<u>Actual disbursements made by AF</u>		<u>Expected Disbursements</u>		

^{a/} Use projected start date to approximate first year disbursement

^{b/} Subsequent dates will follow the year anniversary of project start

^{c/} Add columns for years as needed

* Year ends March ~~2016~~2019

The budget for the NIE is indicated below.

Table 2621: Indicative Budget for the NIE

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

* - Project Management Unit – staff related costs

** - Monitoring and evaluation, governance, risk management

*** - Promotion and Visibility

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

Table 2722: Breakdown of Execution Costs

Agency	Activities	Upon Agreement signature	One Year after Project Start	Year 2	Year 3	Total
MOAF	Project Management (including staff)	45300	45300	45300	20900	156800
	Administrative support (including materials and services)	2400	1700	1700	1060	6860
	Sub-Total	47700	47000	47000	21960	163660
NWA	Supervision of project site work	50000	40000	15000	8100	113100
	Professional fees (surveyors, divers, etc)	20000	20000	20000	20000	80000
	Overheads and Administration	15000	10600	10000	8000	43278
	Sub-Total	85000	70600	45000	36100	236378
MOTE	Support services	4600	3850	3850	2662	14962
	Sub-Total	4600	3850	3850	2662	14962

Total (US\$)		137300	121450	95850	60400	415000
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Note: Errors due to rounding

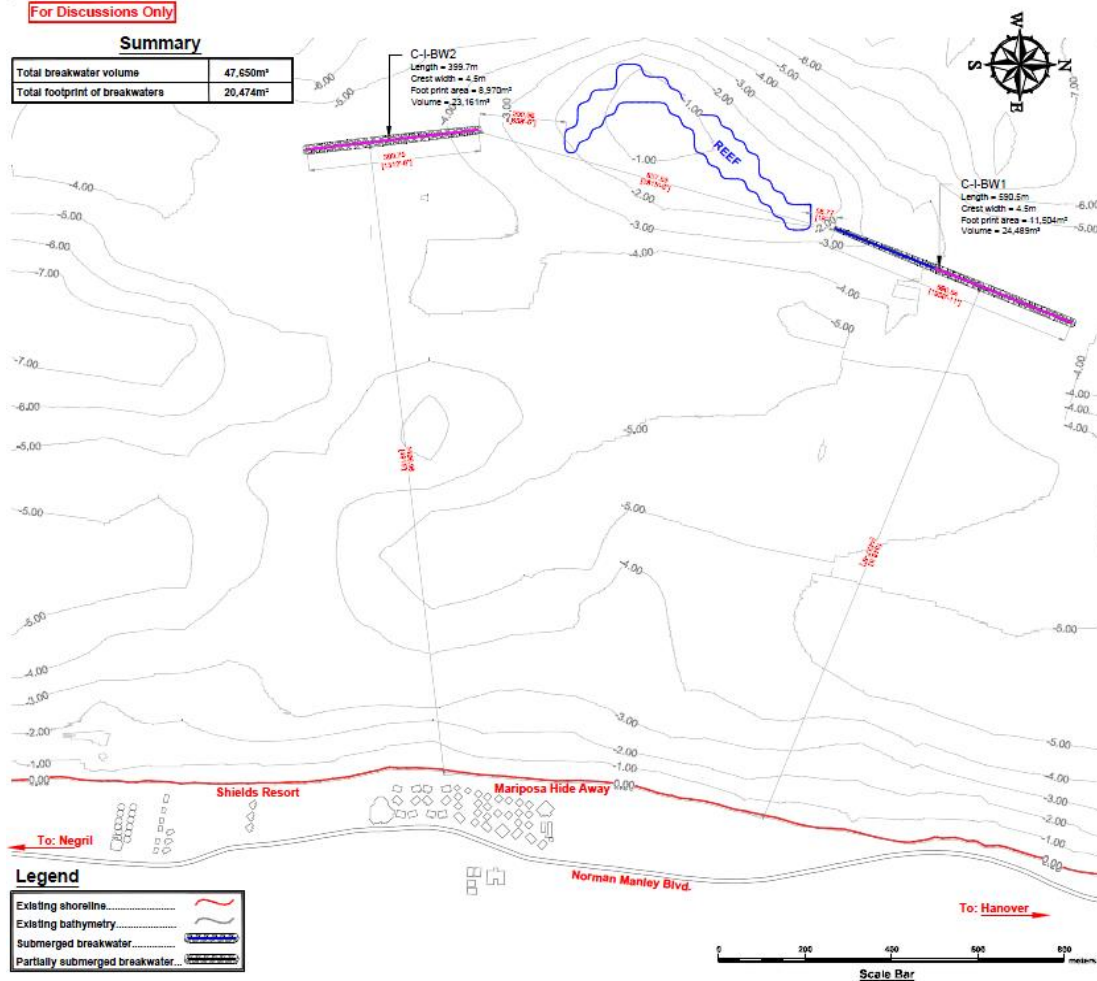
|

ANNEX 1

For Discussions Only

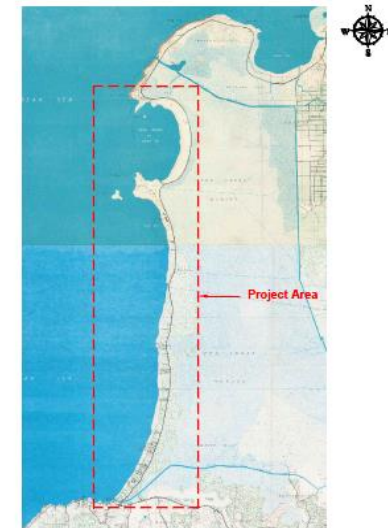
Summary

Total breakwater volume	47,650m ³
Total footprint of breakwaters	20,474m ²



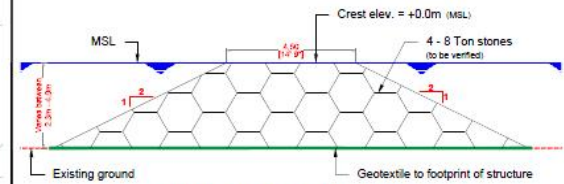
Overview of Proposed CEAC Integrated Solution # 4 Modified - Phase 1

Scale = 1:10,000



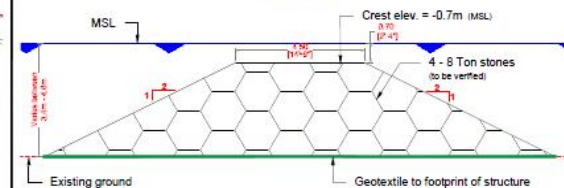
Location Map

Scale = 1:90,000



Typical Breakwater C-X
(Partially Submerged)

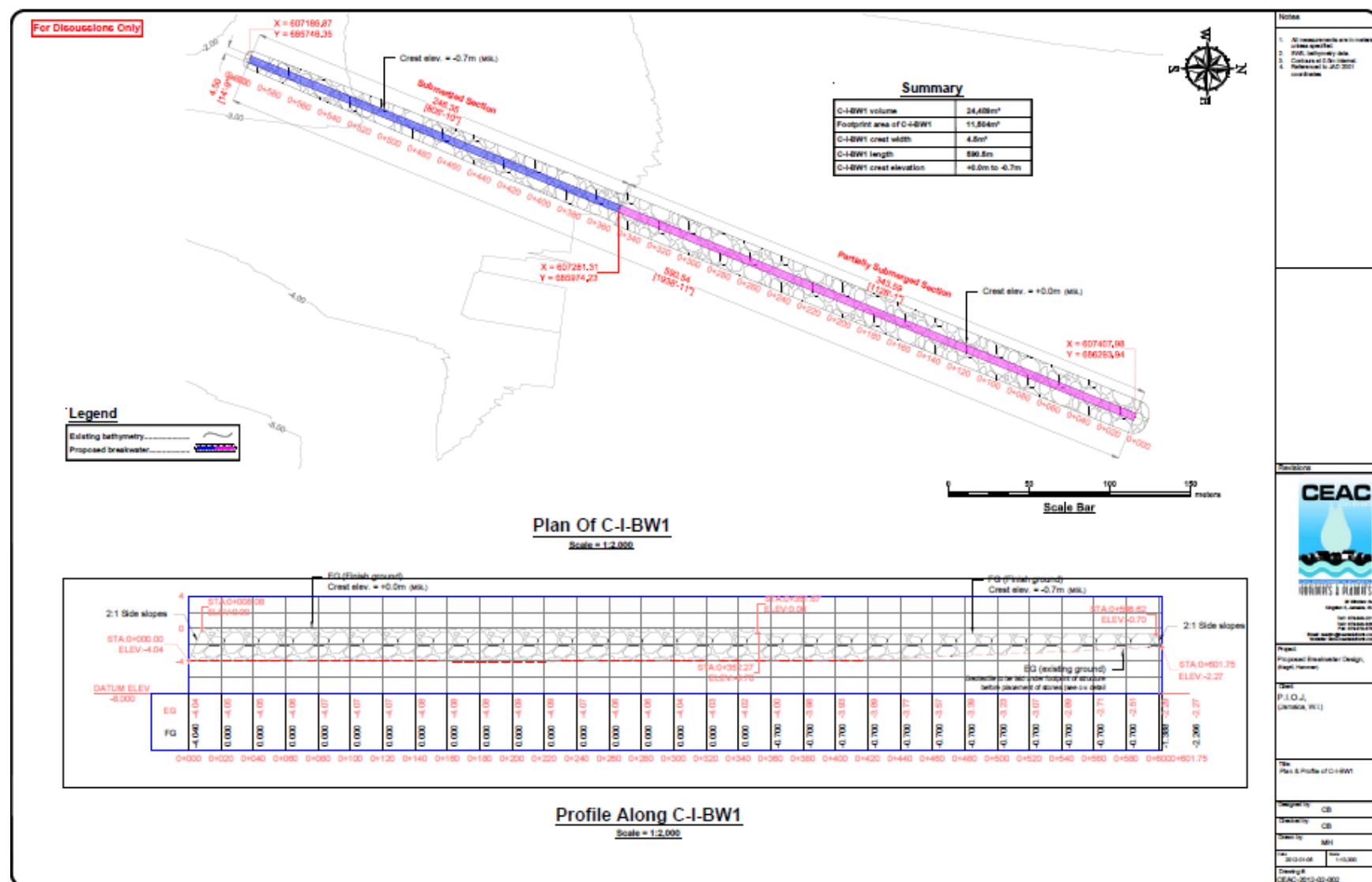
Scale = 1:150



Typical Breakwater C-X
(Submerged)

Scale = 1:150

Figure Q: (i) Proposed Breakwater Structure



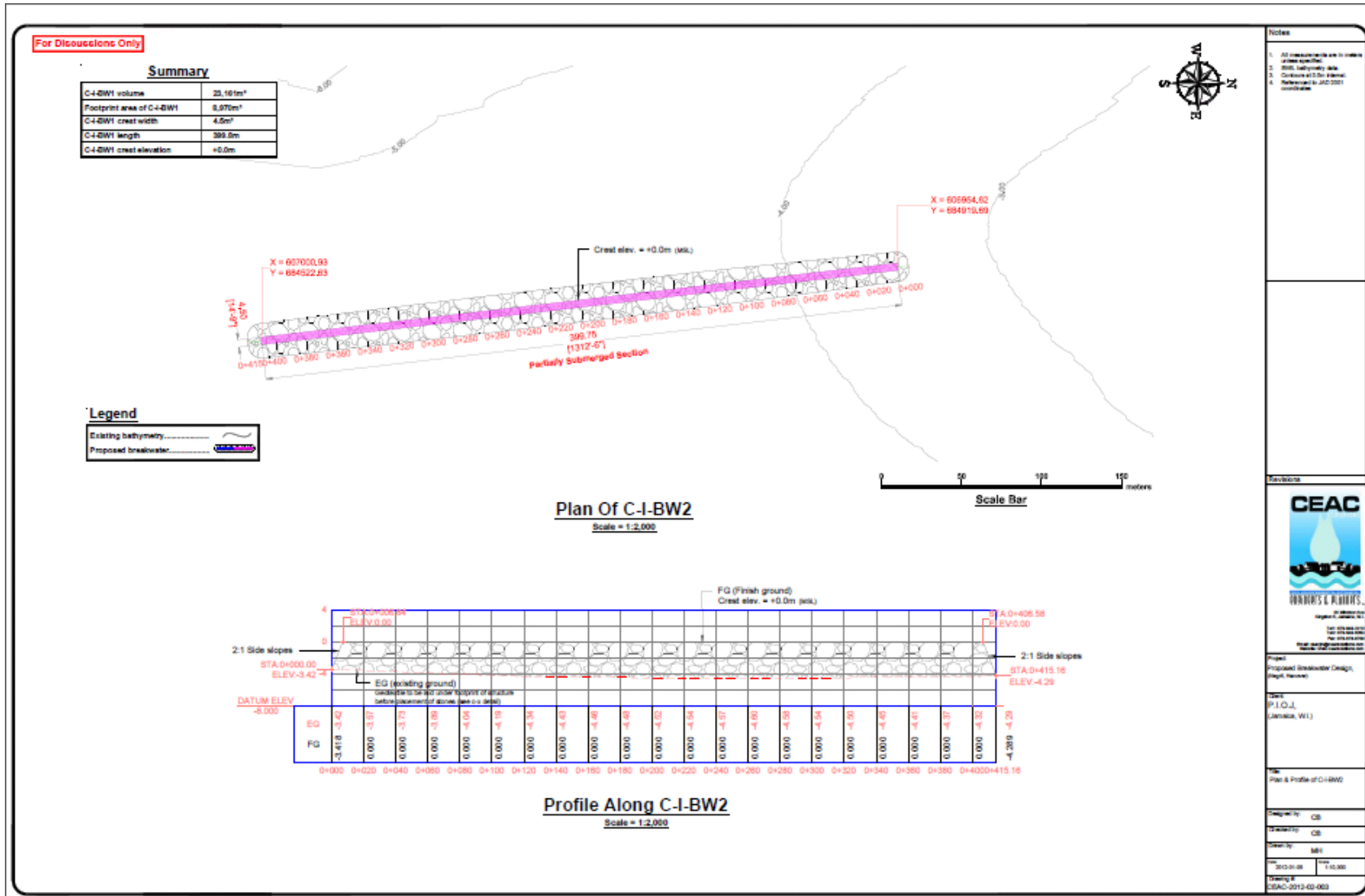


Figure M:- (iii) 400m Breakwater Structure

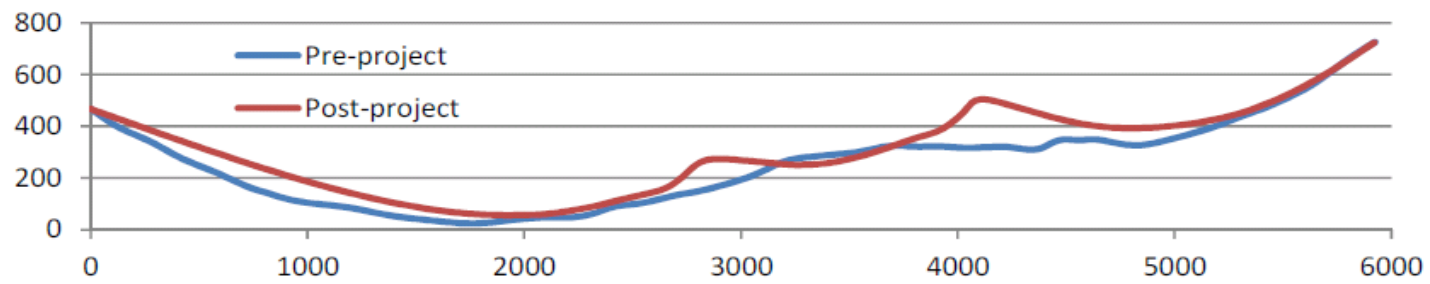


Figure M:- (iv) Comparative analysis of pre- and post-project shoreline for Negril

ANNEX-2**Consultations Meetings for the Adaptation Fund Programme Proposal****ST. THOMAS, RADA OFFICE****JANUARY 18, 2012**

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

**CHRISTIANA
JANUARY 25, 2012**

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

**FRANKFIELD- GRANTHAM
JANUARY 30, 2012**

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

9. Hubert Knight	Loggie Green
10. Shirlene Evans	Loggie Green
11. Duncan Gayle	Morant
12. Eulen Stephenson	Grantham
13. Denzil Williams	Grantham
14. Calvert Page	Grantham
15. Eric Rochester	Grantham
16. Isreal Anderson	Kilsyth
17. Vassel Jackson	Morant

18. Lincoln Weise	Morant
19. Vernal Christie	Hill Top
20. Tass Anderson	Grantham
21. Roy Myers	Morant
22. Byron Johnson	Hill Top
23. Duran McLeod	Grantham
24. Gosset Whittick	Grantham
25. Samuel Foster	Grantham
26. Pearline Thompson	Grantham
27. Wilburn Shaw	Union
28. Lorenzo Arscott	Grantham
29. Jerimiah Mckenzie	Grantham
30. Kent Briscoe	Grantham
31. Daniel Morgan	Morant
32. Scott Smikle	Hill Top

PIOJ ADAPTATION FUND PROJECT CONSULTATION MEETING- JANUARY 30, 2012

CLARENDON- BRAE HEAD

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

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

**CARRON HALL
JANUARY 31, 2012**

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

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

GUYS HILL- DECOY

JANUARY 31, 2012

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

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

VICTORIA
FEBRAUARY 6, 2012

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

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

CAVE VALLEY
FEBRAUARY 7, 2012

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

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

**PIOJ ADAPTATION FUND PROJECT CONSULTATION MEETING
EWARTON**

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

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

Negril Consultation- Breezes Grand Resort, Norman Manley Boulevard

FEBRAUARY 28, 2012

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

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

PIOJ Adaptation Project Proposal

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

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

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

<u>Public Consultation - Annotto Bay, St Mary</u>		
<u>held on September 20,2017</u>		
<u>-</u>	<u>Name</u>	<u>Organization/Community</u>
<u>1</u>	<u>Edwards Gibson</u>	<u>Gibraltar Heights, Annotto Bay</u>
<u>2</u>	<u>Warwick Daley</u>	<u>Annotto Bay, St Mary</u>
<u>3</u>	<u>Eleanor Jones</u>	<u>Facilitator,GOJ/AFP-Programme Steering Committee , Member, representative of Private Sector Organization of Jamaica</u>
<u>4</u>	<u>Arisa Murai</u>	<u>Japan International Cooperation Agency (JICA), St Mary Parish Disaster Coordinator</u>
<u>5</u>	<u>Andrea Donaldson</u>	<u>National Environment & Planning Agency</u>
<u>6</u>	<u>Maxine Robinson</u>	<u>Gibraltar Heights, Annotto Bay</u>
<u>7</u>	<u>Shane Alexis</u>	<u>People's National Party (PNP) Caretaker</u>
<u>8</u>	<u>Daniel Powell</u>	<u>Annotto Bay, St Mary</u>
<u>9</u>	<u>Gerdeen Sutherland</u>	<u>Social Development Commission</u>
<u>10</u>	<u>Nadine Brown</u>	<u>Planning Institute Of Jamaica (PIOJ)</u>
<u>11</u>	<u>Vincent Samuda</u>	<u>Gibraltar Heights, Annotto Bay</u>
<u>12</u>	<u>Semar Morris</u>	<u>Annotto Bay, St Mary</u>
<u>13</u>	<u>Jodi-Ann Mclean</u>	<u>Devon Pen, St. Mary</u>

<u>14</u>	<u>Narval Deans</u>	<u>Annotto Bay, St Mary</u>
<u>15</u>	<u>Sylvia Bundah</u>	<u>Ite Boreal,Annotto Bay</u>
<u>16</u>	<u>Ruel Francis</u>	<u>Annotto Bay Community Development and Environment Benevolent Society (ABCDE)</u>
<u>17</u>	<u>Losetta Williams</u>	<u>ABCDE</u>
<u>18</u>	<u>Donovan Davis</u>	<u>Ite Boreal, St Mary</u>
<u>19</u>	<u>xx Hunter</u>	<u>Annotto Bay, St Mary</u>
<u>20</u>	<u>Wayne Tailor</u>	<u>Annotto Bay, St Mary</u>
<u>21</u>	<u>Javanie Hall</u>	<u>Annotto Bay, St Mary</u>
<u>22</u>	<u>Lemar Richards</u>	<u>Annotto Bay, St Mary</u>
<u>23</u>	<u>Ann Marie Treasure</u>	<u>Annotto Bay, St Mary</u>
<u>24</u>	<u>Cynthia Robinson</u>	<u>Annotto Bay, St Mary</u>
<u>25</u>	<u>Audry Morrison</u>	<u>Annotto Bay, St Mary</u>
<u>26</u>	<u>Marcia Clarke</u>	<u>Annotto Bay, St Mary</u>
<u>27</u>	<u>Annetto Martin</u>	<u>Annotto Bay, St Mary</u>
<u>28</u>	<u>Dr Raphael Thomas</u>	<u>Annotto Bay Gospel Chapel</u>
<u>29</u>	<u>Marsha Johnson</u>	<u>Gibraltar Heights, Annotto Bay</u>
<u>30</u>	<u>Junior Bailey</u>	<u>Annotto Bay, St Mary</u>
<u>31</u>	<u>Sylvia Brown</u>	<u>Enfield, St. Mary</u>
<u>32</u>	<u>Desbboyh Slowey</u>	<u>Gibraltar Heights, Annotto Bay</u>
<u>33</u>	<u>Nadene McDonald</u>	<u>Annotto Bay , St Mary</u>
<u>34</u>	<u>Royan Nobel</u>	<u>Ite Boreale, St. Mary</u>
<u>35</u>	<u>Geroqe Leith</u>	<u>Devon Pen, St Mary</u>
<u>36</u>	<u>Raquel Barclay</u>	<u>Gibraltar Heights, Annotto Bay</u>
<u>37</u>	<u>Jumpei Yamahama</u>	<u>SMMC</u>
<u>38</u>	<u>Rowena Flynnch</u>	<u>ABCDE</u>
<u>39</u>	<u>Phebe-Ann Henry</u>	<u>Office of the Services Commission</u>
<u>40</u>	<u>Winnifred Vidal-Mahala</u>	<u>Stenographer, Office of the Services Commission</u>
<u>41</u>	<u>C Claire</u>	<u>Annotto Bay, Police Youth Club</u>
<u>42</u>	<u>Leiska Powell</u>	<u>Disaster Preparedness and Emergency Management (ODPEM)</u>
<u>43</u>	<u>Yvonne Dower</u>	<u>Annotto Bay, St Mary</u>

<u>44</u>	<u>Gilbert Boyd</u>	<u>Annotto Bay, St Mary</u>
<u>45</u>	<u>Krystal Lyn</u>	<u>National Works Agency</u>
<u>46</u>	<u>Roger Smith</u>	<u>National Works Agency</u>
<u>47</u>	<u>Dennis Williams</u>	<u>Annotto Bay, St Mary</u>
<u>48</u>	<u>Alicia Moore-Reid</u>	<u>Annotto Bay Community Development and Environment Benevolent Society</u>
<u>49</u>	<u>Ricardo Megle</u>	<u>Annotto Bay Fire Brigade</u>
<u>50</u>	<u>Kamora Bennett</u>	<u>Enfield, St Mary</u>
<u>51</u>	<u>Hugh Bryan</u>	<u>St. Mary Parish Council</u>
<u>52</u>	<u>Violet Mcleggan</u>	<u>Annotto Bay, St Mary</u>
<u>53</u>	<u>Walley McCarthy</u>	<u>Annotto Bay, St Mary</u>
<u>54</u>	<u>Sharon Bennett</u>	<u>Annotto Bay, St Mary</u>
<u>55</u>	<u>Lydia Oconor</u>	<u>Annotto Bay, St Mary</u>
<u>56</u>	<u>Gophila McGregor</u>	<u>Annotto Bay, St Mary</u>
<u>57</u>	<u>Fay Jackson</u>	<u>Annotto Bay, St Mary</u>
<u>58</u>	<u>Dean Jones</u>	<u>Councillor</u>
<u>59</u>	<u>Lenworth Rawle</u>	<u>Councillor</u>
<u>60</u>	<u>Ian Davis</u>	<u>Annotto Bay, St Mary</u>
<u>61</u>	<u>Omar Love</u>	<u>Annotto Bay, St Mary</u>
<u>62</u>	<u>Javaughn Taylor</u>	<u>Annotto Bay, St Mary</u>
<u>63</u>	<u>Norman Dunn</u>	<u>Annotto Bay, St Mary</u>
<u>64</u>	<u>Yolande Jankie</u>	<u>St. Mary Municipal Corporation</u>
<u>65</u>	<u>Valentine Moore</u>	<u>Annotto Bay, St Mary</u>
<u>66</u>	<u>Handel Watson</u>	<u>St. Mary Municipal Corporation</u>
<u>67</u>	<u>Keron Miller</u>	<u>Jamaica Constabulary Force</u>
<u>68</u>	<u>Tevin Grey</u>	<u>Annotto Bay, Jamaica Constabulary Force</u>
<u>69</u>	<u>Joycelyn Bagnal</u>	<u>Annotto Bay, St Mary</u>
<u>70</u>	<u>Florence Scott</u>	<u>Gibraltar Heights</u>
<u>71</u>	<u>Collin Ffrench</u>	<u>Ocho Rios</u>
<u>72</u>	<u>Velda Thomas</u>	<u>Gospel Chapel PRGP.</u>
<u>73</u>	<u>Simone Whyte</u>	<u>Annotto Bay, St Mary</u>

<u>74</u>	<u>Sheron Taylor</u>	<u>Rosemount, St Mary</u>
<u>75</u>	<u>Teisha Robotham</u>	<u>Planning Institute of Jamaica (PIOJ)</u>
<u>76</u>	<u>Kelly- Ann whervin Blackwood</u>	<u>PIOJ</u>
<u>77</u>	<u>Teisha Robotham</u>	<u>PIOJ</u>
<u>78</u>	<u>Michael Walker</u>	<u>Annotto Bay Community Development and Environment Benevolent Society</u>
<u>79</u>	<u>Valerie Walters</u>	<u>Baxter's Mountain Primary School</u>
<u>80</u>	<u>Georgia Brown</u>	<u>Annotto Bay, St Mary</u>
<u>81</u>	<u>Yamakawa Jumpei</u>	<u>Japan International Cooperation Agency (JICA)</u>
<u>82</u>	<u>Oswald Mattis</u>	<u>Rosemount, St Mary</u>
<u>83</u>	<u>Dr Mark Richards</u>	<u>Consultant, PIOJ</u>

<u>DATE</u>	<u>LOCATION</u>	<u>PARTICIPANTS</u>	<u>MEETING OBJECTIVES</u>	<u>MAIN RESULTS</u>
<u>July 3, 2017</u>	<u>National Works Agency (NWA)</u>	<u>NWA Technical Services Team; Consultant</u>	<u>Identify potential projects focussing on coastal resilience building</u>	<u>NWA provided list of projects for consideration</u>
<u>July 10, 2017</u>	<u>National Environment and Planning Agency (NEPA)</u>	<u>NEPA Senior Management and Technical Teams; Consultant, NIE Programme Manager</u>	<u>To identify areas in need of coastal strengthening as possible projects for replacing the original component 1</u>	<u>NEPA provided list of projects for consideration</u>
<u>July 27, 2017</u>	<u>National Works Agency (NWA)</u>	<u>NWA Technical Services Team; Consultant</u>	<u>Discuss steps in project development</u>	<u>NWA agreed to provide technical input in the development of the project</u>
<u>July 25, 2017</u>	<u>NEPA</u>	<u>NEPA Technical team</u>	<u>To provide technical inputs for proposed project</u>	
<u>September 13, 2017</u>	<u>Annotto Bay Health Centre</u>	<u>Annotto Bay Community Development & Environmental Association (ABCDEA) 32 persons in attendance (16</u>	<u>Solicit views on proposed solutions to climate change issues affecting community. Sensitize about upcoming public consultation</u>	<u>Environmental group confirmation of climate change impacts and agreement with proposed solutions</u>

<u>DATE</u>	<u>LOCATION</u>	<u>PARTICIPANTS</u>	<u>MEETING OBJECTIVES</u>	<u>MAIN RESULTS</u>
		males, 16 females)		
<u>September 20, 2017</u>	<u>St. Theresa's Catholic Church, St. Mary</u>	<u>Members of the general public (84 persons signed the register: 37 males, 47 females)</u>	<u>Public consultation to share proposed project</u>	<u>Community confirmation of proposed adaptation measures; several requests for urgent action be taken</u>
<u>November 14, 2017</u>	<u>PIOJ</u>	<u>Canada Caribbean Disaster Risk Management Fund (CCDRFM) team; ABCDEA representative (5 persons, 2 males, 3 females)</u>	<u>To discuss potential complementarity between community-based project to be funded by CCDRFM</u>	<u>CCDRFM would focus on the drain rehabilitation while the GOJ/AFP would focus on coastal works, capacity building and other non-structural elements</u>
<u>November 24, 2017</u>	<u>PIOJ</u>	<u>Jamaica Environment Trust (JET), Environmental Solutions Ltd UWI (Department of Geography and Geology); NIE 11 persons (2 males, 9 females)</u>	<u>To apprise non-state actors of the proposed initiative and provide the opportunity to share any concerns, especially from an environmental viewpoint</u>	<u>Core concept shared and stakeholders agreed to provide feedback. One stakeholder recommended a managed retreat; another stakeholder emphasized the need to use permeable structures</u>
<u>January 8, 2018</u>	<u>NWA</u>	<u>NWA technical team, NIE</u>	<u>To seek clarification on elements of the technical and environmental requirements; to verify that there was no duplication with any other proposed initiative; to consider whether the proposed implementation schedule was realistic.</u>	<u>Coordination mechanism with other State agencies to be finalized</u>


<u>DATE</u>	<u>LOCATION</u>	<u>PARTICIPANTS</u>	<u>MEETING OBJECTIVES</u>	<u>MAIN RESULTS</u>
<u>February 12, 2018</u>	<u>Annotto Bay, St. Mary</u>	<u>Fishers and fish vendors</u> <u>24 persons (18 males, 5 females)</u>	<u>To ensure these stakeholders understood how the sector would be directly impacted by the project and to provide opportunity for their further input especially as regards the AF ESP</u>	<u>Stakeholders agreed that the intervention was urgently needed and agreed to support the project</u>

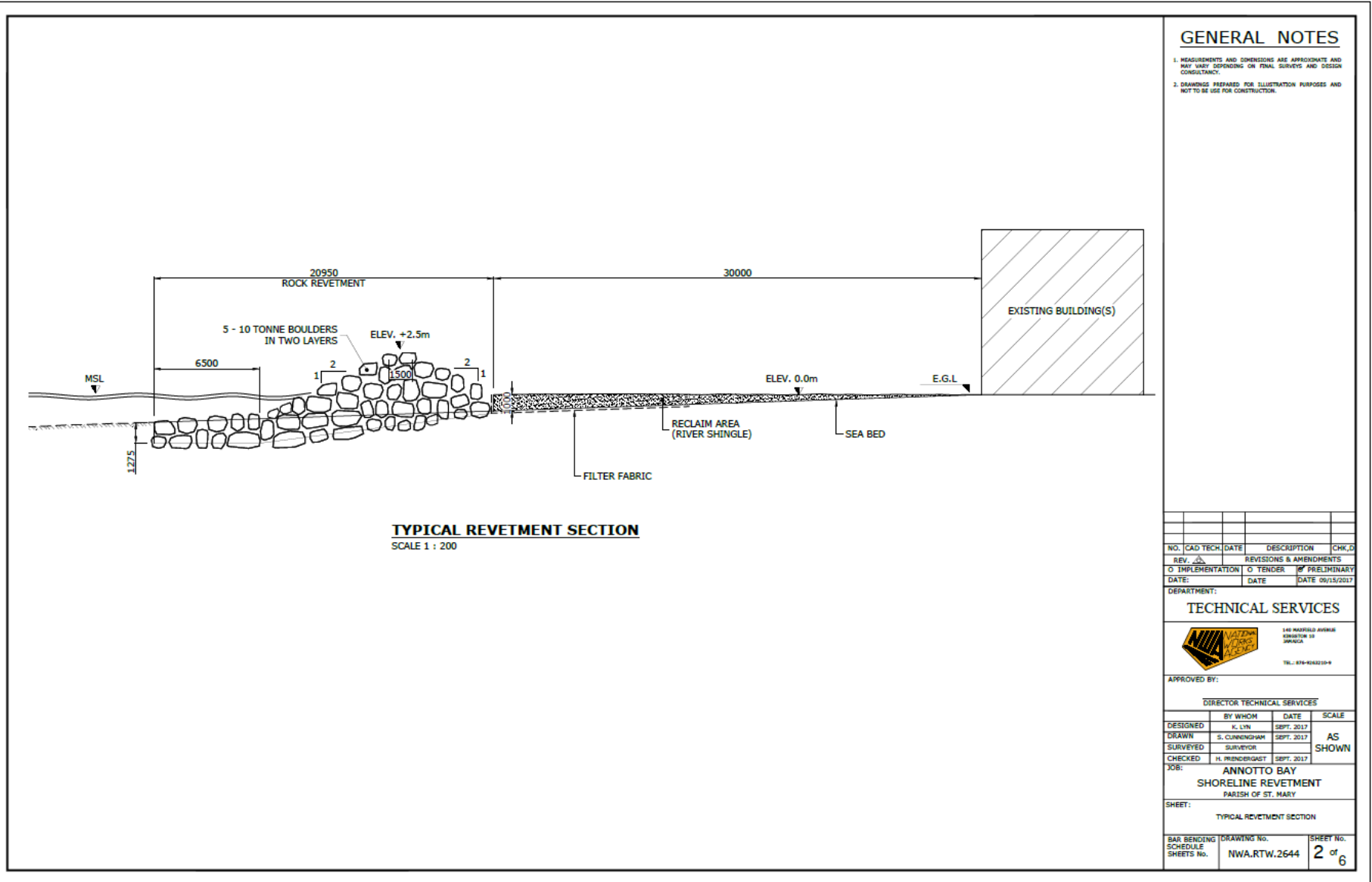
ANNEX 32. PRELIMINARY DESIGNS – COMPONENT 1





LOCATION 1 - PROPOSED SHORELINE REVETMENT

 140 MAITFIELD AVENUE KINGSTON 10 JAMAICA TEL.: 876-6263220-9	SHEET:	DESIGNED:	BY WHOM	DATE	REVISION NOTIFICATIONS				GENERAL NOTES: 1. MEASUREMENTS AND DIMENSIONS ARE APPROXIMATE AND MAY VARY DEPENDING ON FINAL SURVEYS AND DESIGN CONSULTANCY. 2. DRAWINGS PREPARED FOR ILLUSTRATION PURPOSES AND NOT TO BE USED FOR CONSTRUCTION.		SCALE:	
	PROPOSED SHORELINE REVETMENT	DRAWN:	S. CLUNINGHAM	SEPT. 2017	NO.	DATE	CAD TECH.	DESCRIPTION			CHKD	AS SHOWN
		CHECKED:	H. PRENDERGAST	SEPT. 2017								
	DEPARTMENT:	JOB:	APPROVED BY:			REV.		REVISIONS & AMENDMENTS			SHEET NO.: 1 of 6	
TECHNICAL SERVICES	ANNOTTO BAY SHORELINE REVETMENT				Q IMPLEMENTATION		Q TENDER		RELIQUARY			
	PARISH OF ST. MARY	DIRECTOR TECHNICAL SERVICES			DATE		DATE		DATE 09.15.2017			



LOCATION 2 ORANGE BAY



LOCATION 3 WHARFS LANE



LOCATION 4 BUFF BAY



GENERAL NOTES

1. MEASUREMENTS AND DIMENSIONS ARE APPROXIMATE AND MAY VARY DEPENDING ON FINAL SURVEY AND DESIGN CONSULTANT.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACCURATELY SETTING OUT THE WORKS AND MAINTAINING REQUIRED LEVELS. ANY DISCREPANCIES IN CONSTRUCTION, SETTING OUT AND OTHER DETAILS AS SPECIFIED ON THE DRAWINGS MUST BE RESOLVED WITH THE ENGINEER BEFORE PROCEEDING WITH THE CONSTRUCTION.
3. THE CONTRACTOR IS TO PROVIDE APPROPRIATE WARNING SIGNS THAT CLARIFY THE WORKS THAT WOULD BE UNDERTAKEN INCLUDING ADVISORY PRECAUTIONS TO THE MARKING OF THE ROADWAY USING APPROPRIATELY MARKED LINES (TO BE MARKED WITH IMPERMEABLE POLYURETHANE STICK, POTS, IN CONCRETE MARK AND CAUTION TAPES TO IDENTIFY EDGES OF THE SITE, PROVIDER COORDINATE TO MARKING TRAFFIC AND PLANNING AS NECESSARY).
4. **RETAINING WALL CONSTRUCTION**
5. ENSURE THAT EXCAVATIONS IN BATH ARE SAFE FOR WORKERS.
6. AT THE DEEPEST SECTION OF THE RETAINMENT THE FOUNDATION DEPTH SHALL BE AS DETAILED ON THE DRAWING AND ADJUSTED TO ALLOW THE LENGTH OF THE RETAINMENT.
7. THE RETAINMENT WALLS SHALL BE BUILT IN RANDOM RUBBLE USING C25 CONCRETE, ROUNDED STONES ARE NOT ACCEPTABLE.
8. THE STONES ARE TO BE IMMEDIATELY (PLACED) IN THE NET CONCRETE OF THE BASE AND ALL BOLTS TO A DEPTH OF BETWEEN 100-150mm.
9. ALL STONES TO BE USED FOR THE WALL CONSTRUCTION MUST BE CLEARED (WASHED) OF ALL LOOSE PARTICLES AND AGG. BEFORE PLACED IN THE WALL.
10. THE MASONRY WALL IS TO BE CONSTRUCTED USING 1:1 CEMENT & SAND MORTAR IN ALL JOINTS. BACK BACK ALL JOINTS ON THE EXPOSED FACE OF THE WALL FOR A DEPTH 100mm AND POINTED WITH CEMENT MORTAR.
11. **CONCRETE**
12. MIN COMPRESSIVE STRENGTH OF CURE SPECIMEN SHALL BE 20MPa @ 28 DAYS UNLESS NOTED OTHERWISE.
13. ALL CONCRETE TO BE MOVED WITH RUBBER (NO HARD MOUND) AND THOROUGHLY VIBRATED WITH A MECHANICAL VIBRATOR. CONCRETE CURES ARE TO BE TAKEN 1 TO BE CRACKED BY THE CONTRACTORS (TYPICAL CRACKS) AT 100mm INTERVALS TO PROVE STRENGTH OF CONCRETE.
14. **CONCRETE**
15. ALL MATERIALS USED SHALL BE CONTRACTED TO ACHIEVE NOT LESS THAN 90% REQUIRED PROPORTION DENSITY UP TO 2000kg/m³ OF CONCRETE (UNLESS OTHERWISE NOTED) AND NOT LESS THAN 90% REQUIRED PROPORTION DENSITY WITHIN THE ROAD BASE FILL.
16. ROAD MARKS SHALL BE SET OUT FROM AN APPROVED SURVEY QUANTITY AND SHALL ATTAIN A MINIMUM CRACK OF 80%.

NO.	CAD TECH	DATE	DESCRIPTION	CHK'D
REV.	JAL		REVISIONS & AMENDMENTS	
O	IMPLEMENTATION	O	TENDER	PRELIMINARY
DATE		DATE	09/13/2017	

TECHNICAL SERVICES



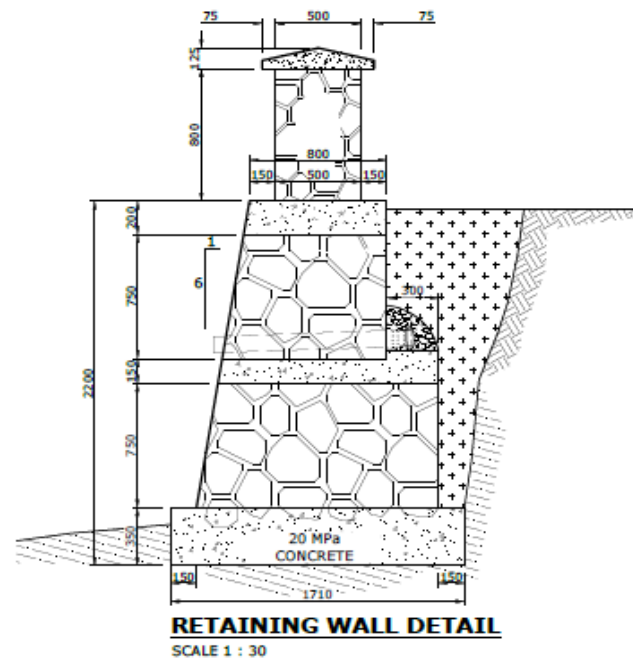
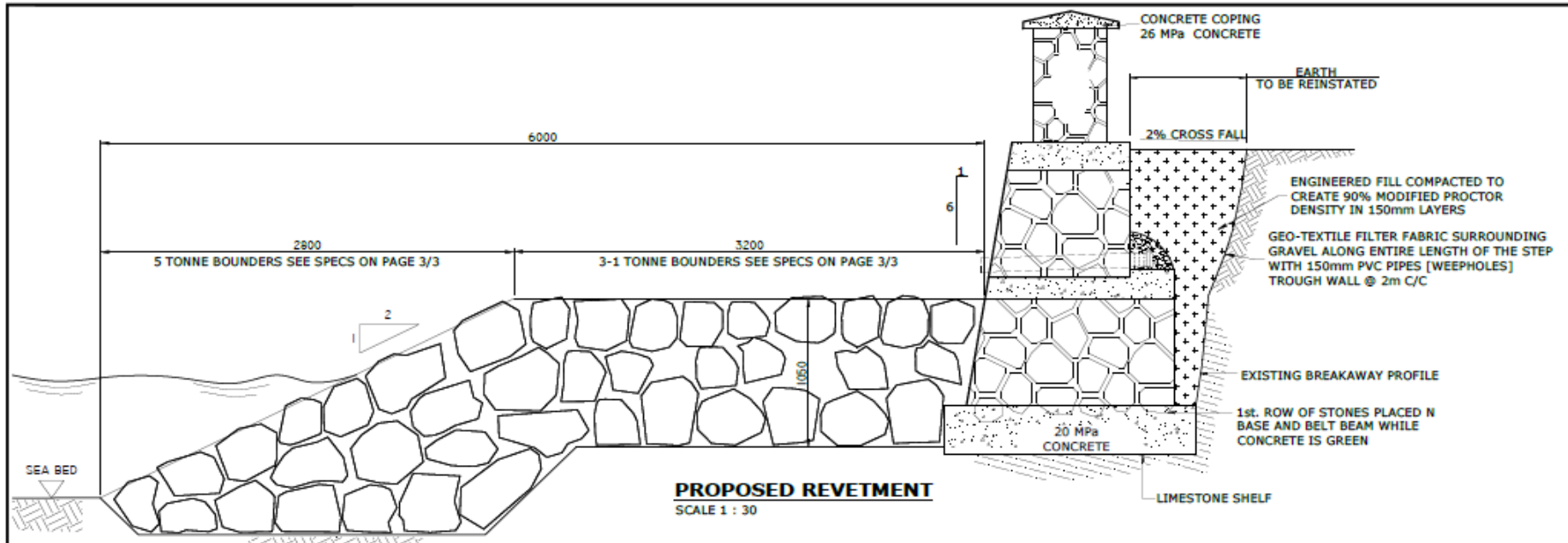
APPROVED BY: 

DIRECTOR TECHNICAL SERVICES			
DESIGNED	BY	DATE	SCALE
K. LYN	S. LYN	SEP. 2017	AS SHOWN
DRAWN	BY	DATE	SCALE
S. CUNNINGHAM	S. CUNNINGHAM	SEP. 2017	AS SHOWN
SURVEYED	BY	DATE	SCALE
S. SMITH	S. SMITH	SEP. 2017	AS SHOWN
CHECKED	BY	DATE	SCALE
S. SMITH	S. SMITH	SEP. 2017	AS SHOWN

JOB: **SEAWALL AND COASTAL PROTECTION**
MARSH OF PORTLAND

SHEET: **SITE PLAN**

SAR BENDING SCHEDULE SHEETS No.	DRAWING No.	SHEET No.
NWA.RTW.2644		4 of 6



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ARMOUR STONES

APPROVED QUARRY

A QUARRY WILL ONLY BE CONSIDERED APPROVED AFTER ALL GOVERNMENT REGULATORY AGENCY REQUIREMENTS HAVE BEEN FULFILLED AND ALL NECESSARY DOCUMENTS HAVE BEEN FORWARDED TO THE ENGINEER FOR HIS RECORDS

TESTING AND SPECIFICATIONS

ALL MATERIALS USED IN THE WORKS SHALL BE SUBJECTED TO INSPECTION AND TESTS AS PROVIDED IN THE CONDITIONS OF CONTRACT AND ELSEWHERE IN THE SPECIFICATIONS. UNLESS OTHERWISE STATED THE COST OF ALL TESTS REQUIRED BY THIS SPECIFICATION SHALL BE DEEMED TO BE INCLUDED IN THE RATES OF THE PRICED BILL OF QUANTITIES.

THE FREQUENCY OF LABORATORY TESTING ON ROCK SAMPLES SHALL BE AS DIRECTED BY THE ENGINEER TO ENSURE COMPLIANCE OF THE MATERIALS WITH THE SPECIFICATIONS. THE ACTUAL NUMBER OF TESTS WILL DEPEND ON THE UNIFORMITY OF THE ROCK STRATA.

THE ROCKS USED FOR THE CONSTRUCTION OF THE COASTAL PROTECTION WORKS SHALL BE SOUND AND DURABLE, FREE FROM FLAWS AND SOFT, WEATHERED OR DECOMPOSED PARTS. ROCKS THAT ARE CONSIDERED NOT SUITABLE SHALL INCLUDE, BUT NOT LIMITED TO: SHALE AND ROCKS CONTAINING LAYERS OF SHALE. ROCKS THAT ARE LAMINATED, FRACTURE, POROUS OR OTHERWISE PHYSICALLY WEAK WILL BE REJECTED.

ROCKS USED SHALL BE ROUGH, ANGULAR CUBICLE SUCH THAT THE RATIO OF THE LEAST DIMENSION TO THE MAXIMUM LENGTH OF THE STONE MEASURE AT RIGHT ANGLES IS NOT GREATER THAN 1:3.

ALL ARMOUR STONES SHOULD HAVE THE FOLLOWING ENGINEERING PROPERTIES:

1. A MINIMUM SPECIFIC DENSITY OF 2.50
2. ANGULAR IN SHAPE
3. ABSORPTION OF LESS THAN 1.5%
4. ABRASIONS OF LESS THAN 25% LOSSES AFTER 1,000 REVOLUTIONS.
5. M_{50} SOUNDNESS OF LESS THAN 4% LOSSES AFTER 5 CYCLES.
6. FIELD DROP TEST: NO BREAKAGE OR CRACKING (FROM 3 METERS)

ALL ARMOUR STONES SHOULD HAVE THE FOLLOWING ENGINEERING PROPERTIES:

- NO STONE FINER THAN 50% OF D50.
- NOT MORE THAN 15% FINER THAN 75% OF D50.
- NOT MORE THAN 85% FINER THAN 125% OF D50.
- NO STONE LARGER THAN 150% OF D50

A MINIMUM OF THREE SAMPLES SHOULD BE IDENTIFIED, RETRIEVED AND SENT FOR GEOTECHNICAL TESTING BY THE CONTRACTOR OR SUPPLIER TO A LABORATORY THAT HAS BEEN APPROVED BY THE ENGINEER.

THE SAMPLES SHOULD BE RETRIEVED IN THE PRESENCE OF THE ENGINEER OR AN ELECTED REPRESENTATIVE. ENGINEERING PARAMETERS ARE TO BE TESTED FOR. THE RESULTS OF THE TESTS SHOULD BE FORWARDED TO THE ENGINEER AT THE EARLIEST CONVENIENCE. THE ARMOUR STONE SHOULD BE RETESTED AT A RATE OF EVERY 5,000 TONNES OR IF THE STRATA COLORATION OR PHYSICAL CHARACTERISTICS HAVE BEEN OBSERVED TO CHANGE. THE CONTRACTOR SHOULD NOTIFY THE ENGINEER OF SUCH.

7. SORTING, INSPECTION AND GRADATION

ALL STONES USED IN THE STRUCTURE SHOULD BE SELECTED AND SORTED IN THE QUARRY BEFORE TRANSPORTATION TO SITE. THE ENGINEER OR AN ELECTED REPRESENTATIVE SHOULD APPROVE ALL STOCK PILES OF SUCH STONES BEFORE TRANSPORTATION TO THE SITE. ALL STONES ARE TO BE SORTED ON THE FLOOR OF THE QUARRY.

8. PLACEMENT AND FINISH

ONLY STONES FROM APPROVED STOCKPILES SHOULD BE UTILIZED IN THE STRUCTURES. STONES OF UNACCEPTABLE SIZE SHOULD BE REMOVED FROM THE STRUCTURE AND REPLACED WITH SUITABLE STONES AT THE ENGINEER'S REQUEST. AT THE CONTRACTOR'S EXPENSE, EQUIPMENT UTILIZED FOR THE PLACEMENT OF ARMOUR SHOULD BE APPROVED FOR ITS SUITABILITY, BEFORE THE WORKS COMMENCE. SUCH EQUIPMENT SHOULD BE CAPABLE OF PLACING OR POSITIONING THE STONES BEFORE RELEASE. IN ADDITION, SUCH EQUIPMENT SHOULD ALSO BE CAPABLE OF ROTATING AND REMOVING THE STONE AFTER PLACEMENT. ALL STONES SHOULD BE WASHED BEFORE PLACEMENT, TO THE STRUCTURE SLOPE. A SELECTIVE APPROACH TO THE USE OF CONSEQUENT ARMOUR STONES SHOULD BE EMPLOYED BY THE CONTRACTOR TO ENSURE INTERLOCKING OF THE STONE UNITS. CHECKING WITH SMALLER AND OUT OF GRADE STONES ARE NOT ALLOWED. STONES SHOULD BE PLACED IN THE SADDLE POINTS OF THE NEXT LOWER TIER. ALL FINISH SURFACE SHOULD BE WITHIN 0.30m OF THE DESIGN SURFACE. THE FINISH SURFACE SHALL BE DEFINED AS THE EXTREME EDGE OR TIP OF THE ARMOUR UNITS.

9. PAYMENT

PAYMENT FOR ARMOUR SHALL BE BY TONNES PLACED BASED UPON SITE SCALE RECORDS. DRIVING SURFACE MATERIAL SHALL BE BASED UPON LINEAR ROAD SURFACE LENGTH CREATED AND REMOVED.

GENERAL NOTES

1. MEASUREMENTS AND DIMENSIONS ARE APPROXIMATE AND MAY VARY DEPENDING ON FINAL SURVEYS AND DESIGN CONSULTANTS.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACCURATELY SETTING OUT THE WORKS AND MAINTAINING REQUIRED LEVELS. ANY DISCREPANCIES IN DIMENSIONS, SETTING OUT AND OTHER DETAILS AS APPLICABLE ON THE DRAWINGS MUST BE RESOLVED WITH THE ENGINEER BEFORE PROCEEDING WITH THE CONSTRUCTION.

3. THE CONTRACTOR IS TO PROVIDE APPROPRIATE MARKING ISSUES THAT CLEARLY DISCLOSE THAT WORKS ARE UNDERWAY INCLUDING ADVISING PERSONNEL TO THE MARKING OF THE ROADWAY LINES APPROPRIATELY WORKING SHALL TO BE ADVISED WITH EMPLOYERS PROVIDING STEEL POSTS IN CONCRETE BARS AND CAUTION TAPE TO IDENTIFY SIDES OF THE SITE. PROVIDE LINES TO MARK TRAFFIC AND PAVEMENT AS NECESSARY.

BEYOND ROAD CONSTRUCTION

4. ENSURE THAT EXCAVATIONS IN BARTH ARE SAFE FOR WORKERS.

5. AT THE DEEPEST SECTION OF THE BRAGAMAWAY THE FOUNDATION DEPTH SHALL BE AS DETAILED ON THE DRAWINGS AND ADHERED TO ALONG THE LENGTH OF THE BRAGAMAWAY.

6. REMOVE LOOSE SOIL AT THE BASE OF THE WALL AND EXCAVATE TO THE DEPTH SHOWN ON THE DRAWINGS THEN COMPACT FOUNDATION LEVEL WITH A MECHANICAL COMPACTOR.

7. THE RETAINING WALLS SHALL BE BUILT IN RANDOM RUBBLE LEAVING OUT LAMINATIONS, ROUND STONES ARE NOT ACCEPTABLE.

8. THE STONES ARE TO BE SPREADS (PLACED) IN THE MIST CONCRETE OF THE BASE AND ALL BELTS TO A DEPTH OF BETWEEN 500-750mm.

9. ALL STONES TO BE USED FOR THE WALL CONSTRUCTION MUST BE CLEANED (WASHED) OF ALL LOOSE PARTICLES AND SOIL BEFORE PLACED IN THE WALL.

10. THE BRAGAMAWAY SHALL BE TO BE CONSTRUCTED USING 1:3 CONCRETE & SAND MORTAR IN ALL JOINTS. BACK BACK ALL JOINTS ON THE EXPOSED FACE OF THE WALL FOR A DEPTH 100mm AND POINTED WITH CONCRETE MORTAR.

CONCRETE


11. MIN COMPRESSIVE STRENGTH OF CURE SPECIMEN SHALL BE 20MPa @ 28 DAYS UNLESS NOTED OTHERWISE.

12. ALL CONCRETE TO BE MIXED WITHIN 1 (NO HAND MIXING) AND THOROUGHLY VIBRATED WITH A MECHANICAL VIBRATOR. CONCRETE CURE SHALL BE TAKEN 1 TO BE CLEANED BY THE CONSTRUCTION TESTING HOUSE 1 AT 7-DAY INTERVALS TO PROVE STRENGTH OF CONCRETE.

ROADS

13. ALL MATERIALS USED SHALL BE COMPACTED TO ACHIEVE NOT LESS THAN 90% MODIFIED PROCTOR DENSITY UP TO 150mm AND 95% MODIFIED PROCTOR DENSITY WITHIN THE ROAD BASE FILL.

14. ROAD MARKS SHALL BE SET OUT FROM AN APPROVED AREA QUARRY AND SHALL ATTAIN A MINIMUM USE OF 80%.

NO.	CAD TECH.	DATE	DESCRIPTION	CHK'D
REV.			REVISIONS & AMENDMENTS	
O IMPLEMENTATION		O TENDER	P PRELIMINARY	
DATE:		DATE	DATE 09/15/2017	

DEPARTMENT:

TECHNICAL SERVICES



140 MODIFIED KUMAR
CONCRETE 15
JANUARY
TEL: 078-450010-9

APPROVED BY:

DIRECTOR TECHNICAL SERVICES

BY WHOM	DATE	SCALE
DESIGNED	K. LYN	SEP. 2017
DRAWN	S. CLUNINGHAM	SEP. 2017
CHECKED	S. SMITH	SEP. 2017

AS SHOWN

SEAWALL AND COASTAL PROTECTION

ARMOUR STONES

SHEET: 6 of 6

ANNEX 3 - SCORING MECHANISM FOR CHOOSING PROJECTS

<u>UDC</u>	<u>Adaptation</u> <u>Value</u>	<u>Available Data</u>	<u>Project</u> <u>Readiness</u>	<u>Level of</u> <u>Approval</u>	<u>Community</u> <u>Buy in</u>	<u>Experience</u>	<u>Score</u>	<u>Scoring Description</u>	
1. Dunns River Beach - Coastal Impact Assessment & Engineering Design Report - Smith Warner	high	Design report	concepts	PimpSec approval	low	medium	9	high	3
2. UDC Montego Bay Groynes Project Concept Summary	high	original designs	concepts	PimpSec approval	unaccessed	medium	8	medium	2
								low	1
<u>NWA</u>									
1. Annotto Bay To Buff Bay Shoreline Protection – St. Mary	high	hazard study, master drainage	Preliminary designs	PimpSec approval	high	high	12		
2. North Gully Improvement Works – St. James	low	Master drainage study	preliminary designs	PimpSec approval	low	high	8	Approval seen	1
3. Port Royal Street Segment 1 - Kingston	high	report	designs	approval	unaccessed	high	9	No approval seen	0
4. Falmouth Drag Line - Trelawny	low	drainage study	designs	no approval	high	low	1		
5. Manchioneal Shoreline Protection Works - Portland	high	Hazard study	no design	no approval	unaccessed	high	7		
6. Palisadoes Mangrove Replanting - Kingston	low	plan	drawings	approval	low	medium	7	Data available	1
7. Hellshire Mangrove Replanting – St. Catherine	low	Environmental Assessment	project design	no approval	unaccessed	medium	5	no data available	0
<u>NEPA</u>									
1. Coastal protection in Manchioneal, Portland	high	Hazard study	no design	no approval	unaccessed	medium	6		
2. Coastal protection along the Northern Coastal Highway									
- Annotto Bay	high	hazard study, master	Preliminary designs	PimpSec approval	high	medium	11		
- St Maragrets	unknown	none	nil	PimpSec approval	unaccessed	medium	3		
3. Coastal protection in Port Maria – St. Mary									
4. Shoreline Protection in Alligator Pond/Little Ochie in Manchester	high	no data	no information	no approval	high	medium	8		
5. Coastal Road protection in Morant Bay, St. Thomas	medium	no data	no data	no approval	unaccessed	medium	4		
6. Hellshire shoreline protection	high	no data	no data	no approval	low	low	5		

Annex 4: Agreement with Fisherfolk (Component 1)

AGREEMENT OF EASTERN ST. MARY FISHERMEN'S COOPERATIVE

RE: PROPOSED COASTAL RESILIENCE PROJECT UNDER THE GOJ/ADAPTATION FUND PROGRAMME

WE THE MEMBERS OF THE EASTERN ST. MARY FISHERMEN'S COOPERATIVE CONFIRM THAT THE PROJECT HAS BEEN DISCUSSED WITH AND EXPLAINED TO US. WE UNDERSTAND THAT IF THE PROJECT IS APPROVED THERE WILL BE TEMPORARY RELOCATION OF OUR OPERATIONS DURING THE TIME THAT THE SHORELINE PROTECTION WORKS AND RIVER TRAINING IS TAKING PLACE.

IT HAS BEEN EXPLAINED TO US THAT OUR EXISTING CONCRETE FISH HUT/ GAS HOUSE ON THE BEACH WILL NOT BE DESTROYED AND THAT A SHORT-TERM STRUCTURE WILL BE BUILT IN THE OTHER AREA FROM WHICH WE WILL OPERATE UNTIL THE WORKS ARE COMPLETED.

WE CATEGORICALLY STATE THAT WE ARE NOT BEING FORCED TO MOVE OUR OPERATIONS AGAINST OUR WILL. WE THE MEMBERS OF THE EASTERN ST. MARY FISHERMEN'S COOP WELCOME AND ENDORSE THE PROPOSED PROJECT AND WE HAVE AGREED TO THE TEMPORARY RELOCATION ARRANGEMENTS FOR THE BENEFIT OF OUR COMMUNITY AND OUR LIVELIHOODS.

SIGNED ON BEHALF OF EASTERN ST. MARY FISHERMEN'S COOPERATIVE BY:

NAME: Gilbert Boyd
President

SIGNATURE: [Signature]

NAME: T. Boyd
Vice President

SIGNATURE: T. Boyd

WITNESS: ALDON D. SMITH

WITNESS: _____

DATE: 12-02-2018

Annex 5: Environmental Permit and Licence Application Process

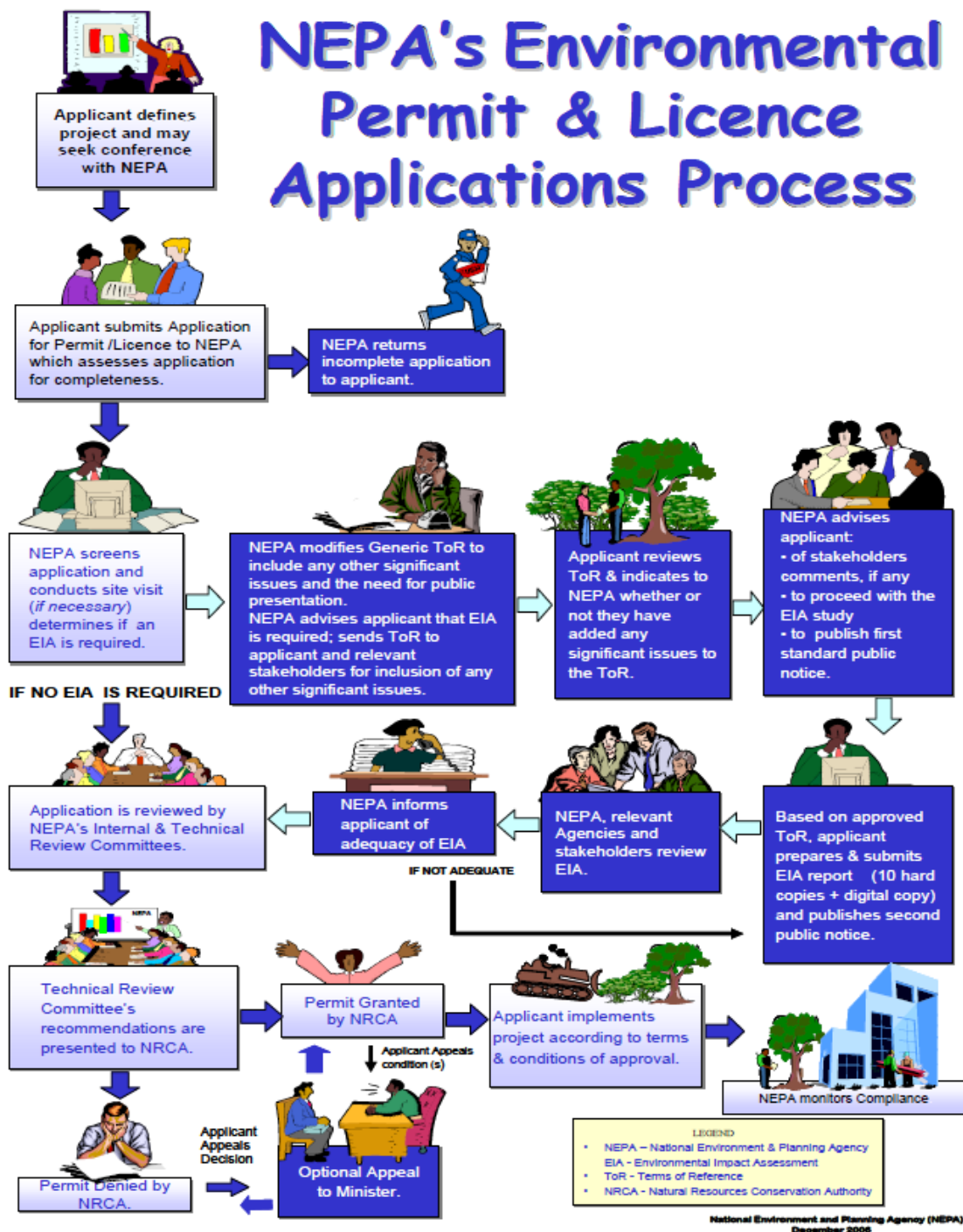


Figure X: Environmental Permit and Licence Process, Jamaica

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

A. Record of endorsement on behalf of the government² *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

<u>Una May Gordon</u> <u>Principal Director, Climate</u> <u>Change Division</u> <u>Designated Authority</u>	<u>Date: January 15, 2018</u>
--	-------------------------------

B. Implementing Entity certification *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

<u>I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (including Vision 2030 Jamaica – National Development Plan) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy and the Gender Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.</u>
<u>Implementing Entity Coordinator</u>

Kirk Philips
Director, Corporate Governance and Management

Date: *January 15, 2018*

Tel. and email: (876)935-5099
kphilips@pioj.gov.jm

Project Contact Person: Claire Bernard

Tel. And Email: (876)935-5054; cbernard@pioj.gov.jm

⁶. Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.