



IMPACT AND SUSTAINABILITY STUDY JAMAICA

CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION
CRIS CODE: DCI-ENV/2009/021-550

MARCH 2021

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List of Acronyms

CA: Contribution Agreement
CCA: Climate Change Adaptation
CC: Climate Change
CCAP: Climate Change Adaptation Project
CBO: Community Based Organisation
CCCCC: Caribbean Community Climate Change Centre
CCD: Climate Change Division
CCFPN: Climate Change Focal Point Network
CEP: Caribbean Environment Programme
DBML: Discovery Bay Marine Lab
DRR: Disaster Risk Reduction
DRRP: Disaster Risk Reduction Project
DVRP: Disaster Vulnerability Reduction Project
EMD: Environmental Management Division
EU: European Union
EDF-11: 11th European Development Fund
FAD: Fish Aggregate Device
FD: Forest Department
FFS: Farmer Field School
GCCA+: Global Climate Change Alliance Plus
GEF: Global Environment Facility
GoJ: Government of Jamaica
KAP: Knowledge Attitude and Practices
LFMCs: Local Forest Management Committees
LUCA: Land Use Cover Change Assessment
MDA: Ministries, Departments and Agencies
MEGJC: Ministry of Economic Growth and Job Creation
MGD: Mines and Geology Division
Met: Meteorological services
MPAs: Marine Protected Areas
MTG: Modular Turbulence Generators
MWLECC: Ministry of Water, Land, Environment and Climate Change
NEMA: National Emergency Management Agency
NGOs: Non governmental organisation
NEPA: National Environment and Planning Agency
NSWMA: National Solid Waste Management Authority
NWA: National Works Agency
NWC: National Water Commission
ODPEM: Office of Disaster Preparedness & Emergency Management
OO: Overall Objective
PCJ: Petroleum Corporation of Jamaica
PSC: Project Steering Committee
PIOJ: Planning Institute of Jamaica
PMU: Project Management Unit
PPCR: Pilot Programme for Climate Resilience
PSP: Permanent Sample Plots

UNDP: United Nations Development Programme

UNEP: United Nations Environment Programme

UWI: University of the West Indies

RADA: Rural Agricultural Development Authority

RCU: Regional Coordination Unit

RiVAMP: Risk and Vulnerability Assessment Methodology Development Project

ROM: Result Oriented Monitoring

SO: Specific Objective

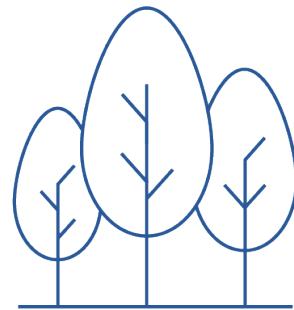
SPT: ShoreLock Proprietary Technology

SRC: Scientific Research Council

WAD: Wave Attenuation Device

WMU: Watershed Management Units

WRA: Water Resource Authority



I. Project Details and Outputs Delivered

<p>PROJECT TITLE: Climate Change Adaptation and Disaster Risk Reduction Project (CCA&DRRP) in Jamaica</p> <p>CRIS CODE: DCI-ENV/2009/021-550</p>		
AAP YEAR: 2009	DURATION: 38 months ¹ starting with the signature of the Contribution Agreement (CA) ²	DATE OF COMPLETION: 12/2013
<p>TOTAL PROJECT COST: 4,480,000 EUR (total expenditure as per final project report: 3,960,622.52 EUR)</p> <p><u>Distributed as:</u> EU: 4,130,000 EUR UNEP: 75,000 EUR Government of Jamaica: 275,000 EUR</p>		GCCA ALLOCATION: 4,130,000 EUR (with 45,000 EUR foreseen for external evaluations)
<p>AID MODALITY: Project approach</p>		<p>MANAGEMENT ARRANGEMENTS:</p> <ul style="list-style-type: none"> ▪ Joint management with UNEP, officialised through the Contribution Agreement DCI-ENV/2010/247-858/JM with UNEP (Regional Coordination Unit for the Caribbean – RCU-Car) ▪ UNEP RCU-Car and the Planning Institute of Jamaica (PIOJ) are co-managing the implementation of the project through internal agreement
<p>GEOGRAPHICAL COVERAGE:</p> <p>National coverage (14 parishes), with component 1 focusing on the Watershed Management Units (WMUs) of Hope River, Yallahs River, and Rio Bueno and component 2 on the Marine Protected Areas (MPAs), covering Negril Marine Park, Font Hill Beach, Discovery Bay Fish Sanctuary, Portland Bight Protected Area, Montego Bay Marine Park, and Palisadoes/Port Royal Protected Area.</p>		
<p>MAIN STAKEHOLDERS AND BENEFICIARIES:</p> <ul style="list-style-type: none"> ▪ The project is co-managed by the Caribbean Office of United Nations Environment Programme (UNEP) (based in Jamaica) and the Sustainable Development and Regional Planning Division of the Planning Institute of Jamaica (PIOJ). The PIOJ is hosting the Project Management Unit (PMU). ▪ Main implementing partner for the component on watershed management (Expected Result 1): the Forest Department (FD) of the Ministry of Water, Land, Environment and Climate Change (MWLECC) ▪ Main implementing partner for the component on coastal and marine ecosystems (Expected Result 2): the National Environment and Planning Agency (NEPA) of the Ministry of Water, Land, Environment and Climate Change (MWLECC) ▪ Main implementing partners for the component on institutional development, capacity building and awareness raising (Expected Result 3) are the Meteorological Services of Jamaica (Met) and the 		

¹ Initial project duration of 30 months extended to 38 months (8 months “no cost extension”)

² The Contribution Agreement (EU/UNEP) was signed in October 2010

Environmental Management Division (EMD) of the Ministry of Water, Land, Environment and Climate Change (MWLECC)

- Various NGOs and CBOs are involved in the implementation of activities, in particular for the alternative livelihood projects (component 2) and the awareness raising campaigns (component 3)
- Direct beneficiaries: public agencies receiving institutional support, vulnerable communities gaining resilience to recurrent natural and man-made hazards.
- Final beneficiaries: population of Jamaica

GCCA PRIORITY AREA(S):

Climate Change Adaptation; Disaster Risk Reduction; Mainstreaming



MAIN SECTOR(S):

Coastal zone management, Watershed management, Forestry/Agroforestry), Ecosystem-based Adaptation, Livelihoods

OVERALL OBJECTIVE³:

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.

SPECIFIC OBJECTIVES⁴ :

- SO1: To reduce downstream run-off and associated negative environmental and human impacts through rehabilitation and improved management of selected watersheds;
- SO2: To increase resilience of coastal ecosystems to climate change impacts through restoration and protection of selected ecosystems;
- SO3: To enhance institutional and local-level capacity for climate change adaptation and disaster risk reduction through increasing capacities and raising awareness.

EXPECTED RESULTS:

The Expected Results as presented in the revised logframe of the project's final report are actually activities structured according to the 3 Specific Objectives.

OUTPUTS DELIVERED:

COMPONENT 1 – WATERSHED MANAGEMENT - FOREST DEPARTMENT (FD):

- 4 Local Forest Management Committees (LFMCs) established in resp. Dallas Castle and Constitution Hill in the Watershed Management Unit (WMU) Hope River; Westphalia in WMU Yallahs River; and Sawyers in WMU Rio Bueno
- 405 ha of upper watershed areas reforested
- 436,823 seedlings produced and delivered for reforestation of watershed areas
- 4 nurseries rehabilitated or refurbished (1 master nursery at the Forest Department Head Office in St. Andrew and 3 satellites in Mount Airy – St. Andrew, Williamsfield – Manchester, Moneague – St. Ann)
- 5 agroforestry demonstration plots established (2 in Sawyers – Trelawny; 1 in Westphalia – St. Andrew; 1 in Constitution Hill – St. Andrew; 1 in Dallas Castle - St Andrew)

³ As per final revised logframe, presented in the final project report produced by UNEP. The formulation is slightly different from the overall objective appearing in the initial logframe attached to the project's Action Fiche, though the substance and scope remain unchanged.

In fact, the revised logframe merged the OO and SO of the initial logframe into one OO; further, the Expected Results of the initial logframe became the specific objectives in the revised logframe. The Expected Results level of the revised logframe actually consists of a list of activities.

⁴ As per final revised logframe, presented in the final project report produced by UNEP.

- 65,200 seedlings produced and delivered to farmers through the LFMCs for agroforestry purposes
- 402 farmers trained in agroforestry and farming on steep slopes
- Report and geodatabase on land cover in crown lands (110,011.08 ha covered)
- 3,700 ha of forest described, listed and mapped and officially submitted for declaration as Forest Reserve or Forest Management Area
- A Forest Fire Management Training Manual, including maps with the high risk areas indicated
- A retaining wall constructed (Cane River, Dallas Castle)
- 21 permanent sample and monitoring plots in the forest established and baseline data recorded (6 in Bellevue-Grand Ridge, St. Andrew; 3 in Moy Hall, St. Andrew; 3 in Blue Mountain Peak, St. Thomas; 3 in Grants Pen, St. Thomas (mangrove); 3 in Hyde Hall, Trelawny; 3 in Stephney and Johns Vale, St. Ann) (demonstration purposes)

COMPONENT 2 – COASTAL ECOSYSTEMS - NATIONAL ENVIRONMENT AND PLANNING AGENCY (NEPA):

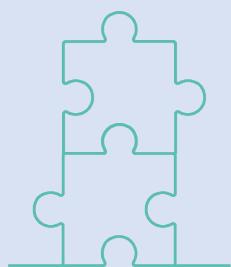
- A GIS database for coastal ecosystems developed and installed for NEPA
- 7 ha of mangrove forests restored in degraded areas within the Portland Bight Protected Area (across Portland Cottage, Clarendon and Hellshire, St. Catherine)
- 3 Marine Protected Areas (Palisadoes/Port Royal; Negril and Montego Bay) demarcated through the installation of 23 marker buoys
- 2 Fishery Conservation Areas within the Portland Bight Protected Area delineated with marker buoys, specifically the Salt Harbour Fish Sanctuary and the Galleon Harbour Fish Sanctuary.
- 2 Marine lab nurseries for coastal plants upgraded (one on the North Coast at the Discovery Bay Marine lab and the other at the Port Royal Marine lab)
- Management plans for two Marine Protected Areas (MPAs) developed (Negril Marine Park and Montego Bay Marine Park)
- 8.1 ha of seagrass beds in Negril Marine Park rehabilitated by replanting 1,500m² sea grass in prop scars and blowouts
- 19 Modular Turbulence Generators (MTG) Artificial Reef Structures fabricated and installed in a public/private partnership (GoJ with Sandal Resort International) at Bloody Bay, Negril Marine Park (= artificial reef system)
- 21 molds produced for the fabrication of Wave Attenuation Device (WAD) units.
- 150 Wave Attenuation Device (WAD) units fabricated and installed at the Old Harbour Bay
- A monitoring protocol for the Artificial Reef Structure at Old Harbour Bay established
- 60 temperature data loggers procured (used in monitoring the status of coral reefs)
- 27 temperature data loggers installed in 8 Marine Protected Areas (Negril Marine Park, Montego Bay Marine Park, Discovery Bay Fish Sanctuary, Ocho Rios Marine Park, Bluefields Bay Fish Sanctuary, Palisadoes/Port Royal Protected Area, Portland Bight Protected Area, and San San - Portland), for measuring sea surface temperatures
- 1 tidal gauge procured and installed at Barmouth Bay fishing village, Portland Cottage, to measure tidal fluctuation
- 750 m of shoreline treated in three areas (Negril Marine Park, Font Hill Beach and Discovery Bay Fish Sanctuary) with the ShoreLock Proprietary Technology (SPT) and results monitored (as pilot project)
- Alternative livelihoods promoted in coastal areas close to MPAs through the implementation of 9 livelihoods projects: 3 around Bluefields Bay Fish Sanctuary including apiary, organic farming and ecotourism; 2 around Portland Bight Protected Area including apiary and heritage/eco-tourism; 1 around Negril Marine Park with two subprojects including a palm nursery for carbon sequestration and the harvesting of Irish moss; 1 project around Montego Bay Marine Park with the Montego Bay Fishermen's Cooperative Society Ltd and the Montego Bay Marine Park Trust on ecotourism; 1 project implemented with STEPA⁵ promoting beekeeping across the parish of St. Thomas; and 1 project implemented with the Hope Foundation on agricultural disaster risk management.
- A grants management manual for NEPA developed

⁵ St Thomas Environmental Protection Association

- Beneficiaries of livelihood initiatives trained in livelihoods, CC adaptation and the importance of protecting natural resources through workshops and consultations (18) across the marine protected areas
- Baseline data established for 6 Marine Protected Areas (Montego Bay Marine Park, Negril Marine Park, Palisadoes/Port Royal Protected Area, Portland Bight Protected Area, Refuge Cay, Great Morass-St. Thomas and Ocho Rios Marine Park)

COMPONENT 3 – CAPACITY BUILDING AND AWARENESS RAISING – MET SERVICES / ENVIRONMENTAL MANAGEMENT DIVISION (EMD):

- Awareness raising campaign designed and conducted in 13 parishes (targeting Parish Councils, private sector groups, the media and schools) and in 10 vulnerable groups and communities (Old Harbour Bay- St. Catherine; Disabled Community - Portmore; Disabled Community - Kingston; Portland Cottage-Clarendon; Westphalia-St Andrew; Sawyers-Trelawny; Bluefields-Westmoreland; St. Ann's Bay-St. Ann; Buff Bay-Portland; and Port Antonio-Portland) on CC, CC adaptation and DRR
- Audio-visual kit designed and material compiled for distribution (but not distributed)⁶
- 3 case studies developed on 3 good practices in CC adaptation & DRR in farming communities (Westphalia, St. Andrew; Glengoffe, St. Catherine; Jeffery Town, St. Mary)
- A spatial database for enhanced data sharing created at the Meteorological Service
- A Climate Change Policy and Action Plan prepared (Green paper n°1/2013) and submitted to the Houses of Parliament
- A Cays Management Policy drafted
- The National Policy on Oceans and Coastal Zone Management revised
- Institutional reviews and capacity assessments conducted for 6 government agencies (EMD, NEPA, Met Services, FD, WRA⁷, ODPEM⁸)
- 1 Met Services staff trained in "Climate Change and Climate Information Services for Developing Countries" in China
- 1 Water Resource Authority staff trained in "Applied Climate Change". Professional Training Course, USA
- 1 Climate Change Division staff trained in "Applied Climate Change". Professional Training Course, USA
- A pilot public education project on CCA and DRR conducted in Manchester Parish in collaboration with the Manchester Parish Council and the Social Development Commission
- Baseline data collected and equipment procured and installed for future development of a Risk and Vulnerability Assessment
- EMD staff trained (on the job) in the Risk and Vulnerability Assessment Methodology (applied to 2 parishes)



⁶ Content of the kit: (1) Material for children (CC Comic Book, Activities for 4-5 years old, Activities for 9-11 years old); (2) 3 brochures: Let's change the way we treat our coast and beaches; Let's change the way we treat our forests and watershed areas; Project activities – Climate Change – we have to change!; (3) 8 factsheets: Climate Change & Adaptation; Climate Change & Mitigation; Climate Change & Coastal Zones and Communities; Climate Change & Agriculture; Climate Change & the Water Sector; Climate Change & Human Health; Climate Change & Rainfall and Temperatures; Climate Change and Tourism; (4) Good Practices – Disaster Risk Reduction Case Studies; (5) Manual for the Manchester Pilot Public Education Project; (6) Compact Disc

⁷ WRA: Water Resource Authority

⁸ ODPEM: Office of Disaster Preparedness & Emergency Management

II. Analysis of impact

2.1. Impact expected as per logframe objectives and their indicators⁹:

The Overall Objective has 3 indicators:

OO: 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.

- Indicator OO.1: Increased protection of selected watershed, coastal and marine ecosystems
- Indicator OO.2: Increased climate change awareness among selected publics
- Indicator OO.3: Strengthened institutional mechanisms for climate change adaptation

Specific Objective 1 has 3 indicators:

SO1: To reduce downstream run-off and associated negative environmental and human impacts through rehabilitation and improved management of selected watersheds

- Indicator SO1.1: Number of watersheds reforested
- Indicator SO1.2: Local-level management structures implemented
- Indicator SO1.3: Number of selected communities engaged in alternative livelihoods

Specific Objective 2 has 3 indicators:

SO2: To increase resilience of coastal ecosystems to climate change impacts through restoration and protection of selected ecosystems

- Indicator SO2.1: Soft engineering structures established, particularly seagrass beds and mangrove forests
- Indicator SO2.2: Alternative livelihoods promoted and adopted
- Indicator SO2.3: Mechanisms established to improve management of coastal ecosystems

Specific Objective 3 has 1 indicator:

SO3: To enhance institutional and local-level capacity for climate change adaptation and disaster risk reduction through increasing capacities and raising awareness

- Indicator SO3.1: Increased awareness of Jamaicans, particularly within the target groups of teachers, students, decision-makers, farmers, fisherfolk and community residents

Appropriateness of the logical framework to assess impact:

Both logframes, initial and revised, include indicators at the levels of the OO and SOs, though without baselines or targets. In addition, the indicators at the OO level are very general in scope and therefore difficult to be measured and to assess their achievement; the indicators at the SO level are mainly performance or output indicators.

⁹ As per final revised logframe, presented in the final project report produced by UNEP.

2.2. Direct and indirect impact as reported in the available documents (desk phase):

FROM THE GLOBAL GCCA EVALUATION REPORT (2014):

“The Project in all respects has made strides towards the overall objectives. It is a contribution that should help to inform subsequent activity that will bring Jamaica closer to practices and strategies that more comprehensively protect its coastlines, and watersheds while building better technical and institutional capacity and climate change awareness. In terms of learning, the pilot project activity is being exploited for everything possible. It will be very interesting to see what comes from these initial installations that judging from the WADS project that was visited, took a great deal of work to establish.

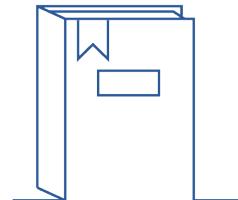
Part of the impact of the Project relates to the historic place it has in Jamaica. As pointed out by the Forest Department, departments like theirs do not have much of a chance to have projects and this one was really important in pushing the Forestry Department to be more effective in relation to climate change.

The Project has had a clear immediate impact in relation to the Climate Change Division that is currently implementing the Climate Change Policy Framework and Action Plan developed by the Project. A key element of the Framework is the creation of a Climate Change Focal Point Network (CCFPN)¹⁰ and this has happened but it is too early to speak of impact from the network, though its creation certainly is positive and brimming with potential. The network, comprising 27 representatives from Ministries, Departments and Agencies (MDAs), will collaborate with the Climate Change Division of the Ministry of Water, Land, Environment, and Climate Change, to implement the provisions of the Framework and Action Plan.”

FROM THE PROJECT'S FINAL REPORT (2014):

A post project Knowledge Attitude and Practices (KAP) study revealed that the impact of the campaign on knowledge and attitude within the targeted areas was moderate.

The experience of the Alligator Pond Public Pilot Education Project inspired the community to consider submitting a proposal to the Caribbean Development Bank's Community Disaster Risk Reduction Fund.



¹⁰ Alongside the focal points from key ministries and the Cabinet Office, representatives of the following agencies and departments will be part of this **Climate Change Focal Point Network**: Development Bank of Jamaica, Fisheries Division, Forestry Department, Jamaica Information Service, Meteorological Service of Jamaica, Mines and Geology Division (MGD), National Environment and Planning Agency (NEPA), National Irrigation Commission, National Solid Waste Management Authority (NSWMA), National Water Commission (NWC), National Works Agency (NWA), Office of Disaster Preparedness and Emergency Management (ODPEM), Petroleum Corporation of Jamaica (PCJ), Planning Institute of Jamaica (PIOJ), Rural Agricultural Development Authority (RADA), Scientific Research Council (SRC), Social Development Commission, Urban Development Corporation, and the Water Resources Authority (WRA).

2.3. Findings from the desk phase and specific issues to be further explored during the field phase:

- ◆ As the indicators at OO and SO levels have no targets, their levels of achievement cannot be measured and no unambiguous conclusions can be drawn. Yet, their levels of achievement will be estimated, based on data and information that will be collected and cross-referenced during the field phase. (box 2.4)
- ◆ To also value generated impact that is relevant to the objectives (direct impact) but falling beyond the strict scope of the indicators, an assessment and grading of the achievement of the overall and specific objectives will be carried out (box 2.5) In other words, this analysis will take into account elements and expectations reflected in the formulation of the objectives, additional to the ones already expressed by the indicators. E.g. evidence of reduced run-off in the watersheds, evidence of reduced erosion of coastal ecosystems, evidence of increased action in the fields of CCA and DRR thanks to project-induced enhanced institutional capacities, evidence and impact of increased awareness, etc.
- ◆ In terms of outputs and performance, the project did very well. The overall assessment by the global GCCA evaluation team was “very good” and the final project report¹¹ indicated an overall achievement of 94% across the set of 54 performance indicators that formed the backbone of the project’s monitoring system. For component 1 (18 indicators), 16 indicators were fully achieved but no progress was made for 2 indicators (both related to training in forest fire management). For component 2 (15 indicators): 14 indicators were fully achieved and 1 indicator was achieved for 90% (concerned the incomplete installation of data loggers). For component 3 (21 indicators), 19 indicators were fully achieved, 1 indicator was achieved at 75% (preparation of supporting materials for the Audio-Visual kits) and no progress had been made for 1 indicator (dissemination of the Audio-Visual kits). These excellent performance scores, should provide / have provided a solid basis for generating substantial impact.
- ◆ If possible, the impact of the 9 livelihood projects on the livelihoods of the beneficiaries as well as on the environment will be analysed during the field phase.
- ◆ The project contains a good number of pilot and/or research initiatives; analysis of what resulted from these initiatives will be an important task during the field visit. Analysis will include: a description of the conclusions from the pilots and research activities, on how the conclusions were capitalised and disseminated, on replication of successful outcomes and findings, on improvements of piloted/tested technologies or approaches, on continued research with different technologies or approaches in case of negative results. Examples of such pilot/research activities under the project are: agroforestry practices, forest monitoring for better forest management, techniques for rehabilitation of sea grass beds, techniques for mangrove restoration, creation of artificial reef systems through MTGs and WADs and their effect on coastal protection, ShoreLock technology.
- ◆ Another aspect that must be assessed as part of the impact analysis, is the extent to which policies, strategies and action plans that were developed with project support have been / are being implemented. In the case of the present project, it concerns the implementation of the
 - the Management Plans for the MPAs Negril and Montego Bay
 - the National Climate Change Policy and Action Plan
 - the National Policy on Oceans and Coastal Zone Management



2.4. Achievement of the logframe indicators at overall and specific objectives levels (direct impact)

INDICATOR	LEVEL OF ACHIEVEMENT	EXPLANATORY NOTES
OO.1: Increased protection of selected watershed, coastal and marine ecosystems (no baseline, no target)	58%	<p>First of all, it should be noted that in Jamaica the “ridge to reef” approach is being applied, which is based on the concept that protecting the hillsides from degradation will help in protecting the coastal and marine ecosystems, particularly coral reefs that suffer from land-based activities, in particular sedimentation. Effective protection therefore dictates the need of an integrated approach and effective cross-sectoral coordination in the planning and management of land, water and coastal uses.</p> <p>The 12 sites that have been selected by the project to improve their protection are the following:</p> <ul style="list-style-type: none"> ▪ 3 watersheds (Hope River, Yallahs River and Rio Bueno) ▪ 2 Marine Protection Areas (Negril and Montego Bay) ▪ 2 mangrove restoration sites (Portland Cottage and Hellshire) ▪ 5 beaches: <ul style="list-style-type: none"> ◆ One with the application of the Modular Turbulence Generators Artificial Reef Structure (MTG) technology (Negril) ◆ One through the collocation of Wave Attenuation Devices WADs (Old Harbour Bay); and ◆ Three beaches treated with the ShoreLock technology (Negril, Font Hill and Discovery Bay) <p>In 7 of these 12 sites (58%)¹², a long term positive impact in terms of reduced erosion and degradation of the respective watersheds, shorelines and ecosystems has been achieved.</p> <p>Impacts that have been observed by the interviewees are:</p> <p><u>With regard to watershed protection</u>¹³: Improvement of water retention (e.g. the Wagwater river maintains water all year, while before the reforestation it was drying up in the dry season), erosion control (e.g. less sediment in the Buff Bay river), and more birds are observed in the reforested area.</p> <p><u>With regard to mangrove restoration</u> in Portland Cottage¹⁴: Better protection of the village from winds, less flooding events, and presence of more fish.</p>
OO.2: Increased climate change awareness among selected publics	40%	<p>A comparison of the results of a KAP household survey¹⁶ from 2012 with the results of a “Mini KAP” survey¹⁷ conducted in 2019 shows the following figures:</p>

¹¹ Page 21 of the Final Report and Exit Strategy (October 2010 - December 2013), prepared by the PMU.

¹² The three watersheds, the two MPA, one mangrove restoration site (Portland Cottage) and the MTG technology in Negril

¹³ Glen Ivey, Regional Forest Manager N.E. Region, Forestry Department

¹⁴ Romain Hamilton, community leader and fisherman in Portland Cottage

¹⁶ Report on climate change Knowledge, Attitude and Behavioural practice survey (2012)

¹⁷ Summary of a “Mini KAP” (Marketing Strategy Limited, 2019)



		2012 (N=1484)	2019 (N=826)	DIFFERENCE
(no baseline, no target ¹⁵)		KNOWLEDGE: - Heard about CC	83%	91% +8%
		ATTITUDE: - Very concerned	50%	63% +13%
<p>The results show an increase in level of awareness about climate change compared to 7 years ago when the project initiated its education and awareness raising activities: more people have heard and are very concerned about CC due to, amongst others, massive awareness campaigns at national and local level, public education projects on CCA and DRR, production of a big variety of materials and training of government representatives in climate change related courses.</p> <p>According to the records, the level of climate change awareness has increased by 16% $(91+63) - (83+50) = 21 : (83+50) = 0.16 \times 100\% = 16\%$</p> <p>If in 2019, 100% of the households would have heard about CC and 100% would have reported to be very concerned, the increase would have been 50% (= maximum increase possible). $(100+100) - (83+50) = 67 : (83+50) = 0.50 \times 100\% = 50\%$</p> <p>Assuming that the project targeted an increase of 80% of the maximum 50% increase (i.e. an increase of 40%), the measured increase of 16% in awareness levels means an achievement of 40% of the assumed target (40% increase)</p>				
OO.3: Strengthened institutional mechanisms for climate change adaptation (no baseline, no target)	100%	<p>During the field mission a very high level of ownership of and close collaboration between all involved institutions could be noticed, under the excellent coordination of the Planning Institute of Jamaica (PIOJ) that had hosted the Project Management Unit (PMU) of the GCCA project.</p> <p><i>“Through the project we have been able catalysing on climate change adaptation and mitigation. At the time, it was one of the two major CC projects and now we have more than 40 CC and related projects. The country has learned and continues learning about addressing CCA and DDR”¹⁸. “We are realizing that this project had a lot of spin-offs”¹⁹.</i></p> <p>Further, it should be mentioned that the GCCA project has been the first project that was co-managed by the UNEP and</p>		

¹⁵ For the calculation, we adopted the assumption that the project would have targeted an increase of 80% of the maximum increase possible

¹⁸ Claire Bernard, PIOJ

¹⁹ Davia Carty, Forestry Department

		<p>PIOJ, and <i>“it has been an interesting and exciting collaboration. CC became a major concern and the project has strengthened collaborative relationships”</i>²⁰.</p> <p>The institutions that have been responsible for the implementation of the different components of the project are the following:</p> <ul style="list-style-type: none"> ▪ FD (Forestry Department): main implementation partner for watershed management (Expected Result 1) ▪ NEPA (National Environment and Planning Agency): main implementation partner for restoration and protection of coastal and marine ecosystems (Expected Result 2) ▪ EMD (Environmental Management Division) and Met Meteorological Services of Jamaica: main implementation partners for capacity building and awareness raising (Expected Result 3) <p>All these institutions are definitely strengthened through technical training, provision of equipment, improvement of infrastructure, experiencing & monitoring different coastal protection techniques, and through the development of policy papers and use of different tools (manuals and management plans) that have been produced during and after the GCCA.</p>
SO1.1: Number of watershed reforested	100%	All three targeted upper watershed areas of Hope River, Yallahs River and Rio Bueno have been reforested, with a total reforested area of 405 ha
SO1.2: Local-level management structures implemented	100%	As planned, all four Local Forest Management Committees (LFMC) have been established
SO1.3: Number of selected communities engaged in alternative livelihoods	100%	All four targeted communities (200 farmers), organized through the LFMC, have benefitted through the application of agroforestry and erosion control practices (introduction of fruit trees and contour planting of pineapple), obtaining additional income
SO2.1: Soft engineering structures established, particularly seagrass beds and mangrove forests	85%	<p>Seagrass beds (target: 1,000 m²): approximately 1,500 m² of seagrass was replanted for the rehabilitation of 8.1 ha, which has contributed to improve the marine ecosystem (achievement: 150%)</p> <p>Mangrove forests (target: 7 ha): 5 ha of mangrove restoration has been very successful in the site of Portland Cottage (contributing to better protection of the coastal community from winds and flooding), while the 2 ha of mangrove planted in Hellshire showed a mortality of 100% (achievement: 71%)</p>
SO2.2: Alternative livelihoods promoted and adopted	60%	9 of the 10 planned livelihood projects have been financed of which approx. 6 or 7 are still operational and generating an additional income to its beneficiaries
SO2.3: Mechanisms established to improve management of coastal ecosystems	50%	The Modular Turbulence Generator (MTG) Artificial Reef System in Negril acts successfully as a Fish Aggregate Device (FAD) and recruits of new corals were noted on the structure

²⁰ Chris Corbin, UNEP

		The artificial reefs in the form of Wave Attenuation Device (WAD) in Old Harbour Bay have not been successful and the level of accretion in front of the WADS is negligible.
SO3.1: Increased awareness of Jamaicans, particularly within the target groups of teachers, students, decision-makers, farmers, fisherfolk and community residents	40%	Repeats OO.2

2.5. Achievement of the overall and specific objectives (direct impact, exceeding the scope of the indicators)

OVERALL OBJECTIVE (OO): 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.

Achievement: “1” (> 75%)

EXPLANATORY NOTE:

The GCCA project has contributed to strengthening the capacity of the main national implementation partners to effectively deal with CCA and DRR, and to the development of related policy frameworks and strategies.

◆ INSTITUTIONAL STRENGTHENING (see also indicator OO.3 in box 2.4)

Forestry Department (watershed management component):

- Major seedling production of good quality due to an improved nursery at Headquarters and a centralised & standardised germination process. The overall national forest coverage is increasing (1% in 3 years) by now (2020), while before it was decreasing. On average, the Forestry Department is planting 100 ha/year with recurrent national funds, and about 150 ha/year with project funds.
- The improved master nursery produces – apart from forest trees – also fruit trees and ornamentals that are sold, through which the Forestry Department derives an additional income.
- Improved GIS capacity for land use change assessment through provision of equipment and training of the GIS-team. The GIS-team increased from 2 to 4 staff members and is technically better prepared.
- The Forest Fire Training Manual (developed with project funds) is used as an important tool and less fires are observed over the last years.
- Reforested areas are better protected through the activities of the LFMCS.

NEPA (coastal and marine ecosystems component):

- The project provided the opportunity to carry out trials that focused on improving the coastal and marine ecosystems (e.g. restoration of seagrass beds, restoration of degraded mangrove forests, application of different technologies such as MTG, WADs, ShoreLock). These trials have generated valuable information for NEPA on the effectiveness of the resp. technologies and practices in the various selected sites.
- The permanent monitoring of changes in coastal ecosystems and the establishment of an important database has given NEPA enhanced capacities in terms of tracing problems and deciding on corrective measures in a timely manner. For example, the well-elaborated and extensive document *Coastal Management and Beach Restoration Guidelines: Jamaica*²¹ includes clear guidelines – based on data, previous experiences and case studies – addressed to different stakeholders and decision-makers at

²¹https://www.nepa.gov.jm/ecentre/guidelines/coastal_management_and_beach_restoration_guidelines_jamaica_final.pdf

national as well as local level in order to better plan, design and assess the effectiveness of coastal and marine restoration interventions.

Met and EMD (capacity building and awareness raising component)

- Through the GCCA project, both agencies are now counting with a big variety of didactic materials to be used for CC awareness campaigns (including tailor-made materials for the visual and hearing impaired, and thus ensuring equity of access to information).
- In particular the audio-visual kit has been instrumental in making changes and hence in generating impact. The materials that are included²² have received high acceptance and the “Fact Sheets” have been reprinted several times after project closure. They are widely used for information / education / awareness raising of different target groups.

◆ CC POLICIES, STRATEGIES AND ACTION PLANS:

The **Climate Change Policy Framework for Jamaica**²³, being one of the main achievements of the GCCA project (in Nov 2013 at Green Paper stage)²⁴, has formally been approved and published in September 2015. The Framework outlines the strategies that the country now employs in order to effectively respond to the impacts and challenges of climate change. Given the cross-cutting nature of climate change and CC effects, the Framework emphasizes the need to develop an integrated approach so as to build resilience at all levels.

In short, the objectives of the Policy Framework are the following:

1. To mainstream climate change considerations into national policies and all types and levels of development planning;
2. To support the institutions responsible for research, data collection, analysis and projections on CC at the national level, in order to facilitate informed decision-making and strategic actions;
3. To facilitate and coordinate the national response to the impacts of climate change and promote low carbon development;
4. To improve communication at all levels on climate change impacts and also adaptation and mitigation related opportunities so that decision-makers and the general public will be better informed;
5. To mobilise climate financing for adaptation and mitigation initiatives.

The **Climate Change Division (CCD)**, established under the MWLECC in 2013, is responsible for the overall implementation of the Climate Change Policy Framework for Jamaica, including the coordination of the Ministries, Departments and Agencies in the development and execution of their respective sector action plans.

Based on the CC Policy Framework different sectors have elaborated their sector plans by now (Forestry, Energy) or are in the process of development (Tourism, Transport).

Currently, the CCD consists of 9 professional staff members (6 persons paid by the national budget and 3 paid by projects) and reports annually to the MWLECC. Part of the CCD activities are, amongst others, financed by the Green Climate Fund, the Climate Investment Fund²⁵, the Inter-American Development Bank and the Global Environment Facility (GEF). According to the Director of the CCD, as a result of an increased awareness at national level about the importance of CCA and DRR, *Jamaica is putting more*

²² (i) Material for children (CC Comic Book, Activities for 4-5 years old, Activities for 9-11 years old)

(ii) Publications:

- Brochures (Let's change the way we treat our coast and beaches; Let's change the way we treat our forests and watershed areas; Project activities – Climate Change – we have to change!)
- Fact Sheets (Climate Change & Adaptation; Climate Change & Mitigation; Climate Change & Coastal Zones and Communities; Climate Change & Agriculture; Climate Change & the Water Sector; Climate Change & Human Health; Climate Change & Rainfall and Temperatures; Climate Change and Tourism)
- Good Practices – Disaster Risk Reduction Case Studies
- Manual for the Manchester Pilot Public Education Project

(iii) A Compact Disc

(<https://www.mona.uwi.edu/physics/csgm/climate-resources>)

²³ <http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2016/05/Jamaica-Climate-Change-Policy-fwL-2015.pdf>

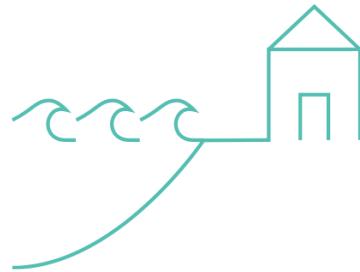
²⁴ http://www.japarliament.gov.jm/attachments/440_Climate%20Change.pdf

²⁵ Pilot Program for Climate Resilience (PPCR)

budget in CC-related issues and a discussion on the development of a CC financing strategy is now taking place at the Ministry of Finance.

In 2016, the **Climate Change Board** was established by the Prime Minister and recently the **Climate Change Focal Point Network** (participation of 27 representatives of Ministries, Departments and Agencies) was created as an instrument to mainstream CC at national level and to coordinate at an international level.

Another important policy document produced by the GCCA project is the **Integrated Coastal Resources Policy** (Sep 2013). The Ministry of Economic Growth and Job Creation (MEGJC) is in charge of the follow-up to this document and is currently in the process to merge this policy with the recently developed and comprehensive **Oceans and Coastal Zone Management Policy**, for which a consultant had been engaged. The final version is expected to be published in 2020. In a next step, a 5-year Action Plan will be developed.



Further, **Coastal Management and Beach Restoration Guidelines**²⁶

were developed under the GCCA project. They are aligned with the Climate Change Policy Framework and Action Plan (GoJ, 2015). The Guidelines focus on cost-effective and socially acceptable measures and techniques to protect against coastal flooding and erosion, to adapt to CC and to plan for appropriate land use/development. They aim to provide guidance for the development of current and future coastal management schemes that can withstand the further effects of predicted climatic change.

Related to the coastal management policies and guidelines, it is worthwhile to mention an important study on the economic valuation of coastal protection services provided by mangroves (**Forces of Nature: Assessment and Economic Valuation of Coastal Protection Services Provided by Mangroves in Jamaica, World Bank 2019**)²⁷ that has been conducted by World Bank experts, linked to the World Bank Jamaica Disaster Vulnerability Reduction Project (DVRP).

A **Communication Strategy 2013-2016** (financed by the Adaptation Fund) has been developed using the guidelines established under the GCCA project, with Negril coastal communities and farming communities as specific target audiences.

- *The Negril beach, a major tourist attraction and income earner for the country, began retreating between one and two meters annually over more than a decade. There is a need to continue the communication and awareness efforts for Negril.*
- *Agriculture experiences the greatest impact in periods of drought. There is evidence that farmers are receptive to the good practices being introduced by various groups and organizations. Demonstration plots have been found to be a useful tool as farmers are able to see the positive results of non-traditional techniques.*

Yet another strategic planning document that used the guidelines developed under the GCCA project, is the **Communication for Climate Change Resilience 2012-2017: National Strategy and Action Plan** (prepared for the Pilot Programme for Climate Resilience – PPCR)²⁸.

The draft **Montego Bay Marine Park Management Plan** (product of GCCA)²⁹ has been revised and updated by NEPA in 2017³⁰ and the **Forest Fire Management Training Manual**, produced under the GCCA, is now also used for training activities conducted by other departments and NGOs in the rest of the island.

²⁶https://www.nepa.gov.jm/ecentre/guidelines/coastal_management_and_beach_restoration_guidelines_jamaica_final.pdf

²⁷https://www.nepa.gov.jm/new/projects/docs/WorldBank2019_ForcesOfNature.pdf

²⁸ Communication for Climate Resilience 2012 to 2017: A National Strategy & Action Plan prepared for the Pilot Programme for Climate Resilience (PPCR) (Maria Protz, 2012)

(https://www.climateinvestmentfunds.org/sites/cif_enc/files/knowledgedocuments/final_communication_strategy_action_plan_0.pdf)

²⁹ The document delivered by the consultants in November 2013, was still draft text, with several gaps, and suggestions made for the finalization of the Plan

³⁰ Montego Bay Marine Park Management Plan 2017-2022 (NEPA, Feb 2017)

SPECIFIC OBJECTIVE 1 (SO1): To reduce downstream run-off and associated negative environmental and human impacts through rehabilitation and improved management of selected watersheds.

Achievement: “1” (> 75%)

EXPLANATORY NOTE:

Through the promotion of reforestation activities, sustainable agriculture practices, organisation, awareness raising and training of the local communities in forest fire management and agroforestry practices in the selected watersheds, the project has achieved to reduce downstream run-off (less sediments in the rivers as observed by interviewees) and to mitigate the negative environmental and human impacts (as has been observed by the stakeholders: there are now more birds in the forests and less incidence of forest fires).

(see also Achievements at SO3 level and OO level/indicator OO.1)

SPECIFIC OBJECTIVE 2 (SO2): To increase resilience of coastal ecosystems to climate change impacts through restoration and protection of selected ecosystems.

Achievement: “3” (between 25 and 50%)

EXPLANATORY NOTE:

The project has experimented with various coastal restoration and protection technologies. Some of these with good results and others less successful with regard to the pretended increased resilience of coastal ecosystems.

SPECIFIC OBJECTIVE 3 (SO3): To enhance institutional and local-level capacity for climate change adaptation and disaster risk reduction through increasing capacities and raising awareness.

Achievement: “1” (>75%)

EXPLANATORY NOTE:

Repeats indicators OO.3 (Strengthened institutional mechanisms for climate change adaptation) and OO.2 (Increased climate change awareness among selected publics)

(see also the observations above related to the OO level)

2.6. Signs of indirect impact

A major unintended positive impact of the GCCA project has been the establishment of the Climate Change Division (CCD)³¹ in the country. The outputs of the GCCA project have demonstrated to the Government the added value of establishing a CCD.

2.7. Conclusions on direct and indirect impact generated by the project and discussion on factors for success and failure

CONCLUSIONS ON GENERATED IMPACT:

The GCCA project has been in line with and has strongly supported the so-called “ridge-to-reef” approach being applied in Jamaica. This approach is based on the concept that protecting the hillsides from degradation contributes to protecting the coastal and marine ecosystems. In this context, effective protection dictates the

³¹ Source: GCCA Global Evaluation (April 2015)

need of an integrated approach and effective cross-sectoral coordination in the planning and management of land, water and coastal uses. In this regard, one of the main impacts of the project is that it has significantly contributed (1) to the strengthening of interinstitutional coordination and collaboration between the involved national stakeholders and (2) to the adoption of a common approach allowing to effectively build resilience at all levels.



Further, the project has served as an important catalyst and guideline for subsequent actions and interventions related to CCA and DRR. It has contributed to the strengthening of the capacity of each of the national implementing partners to effectively deal with climate change, and to the development of their related policy frameworks and strategies. Besides, the project has contributed to an increased level of CC awareness among the selected target groups, at national as well as local level, due the massive awareness campaigns, the public education projects on CCA and DRR, the production of an important variety of materials and the training of government representatives in climate change related courses.

The main implementing partners of the GCCA project have been strengthened, amongst others, in the following fields:

FORESTRY DEPARTMENT (watershed management component):

- Improved production capacity of seedlings of good quality for reforestation, higher planting efficiency in the field (introduction of trays) and generation of additional income through the production and sale of fruit trees and ornamentals.
- Improved GIS capacity for land use change assessment (equipment and training of GIS-team). GIS-team increased from 2 to 4 staff members and technically better skilled.

NEPA (coastal and marine ecosystems component)

- More experience and understanding about the underlying reasons that determine the effectiveness of different coastal and marine protection technologies (e.g. restoration sea grass beds, restoration degraded mangrove forests, application of different technologies such as MTG, WADs, ShoreLock).
- Enhanced capacity in terms of tracing problems and deciding on corrective measures in a timely manner thanks to a permanent monitoring system of changes in coastal ecosystems and the establishment of a comprehensive database.

MET AND EMD (capacity building and awareness raising component)

- Both agencies are now counting now with a big variety of didactic materials to be used for CC awareness campaigns (including tailor-made materials for the visual and hearing impaired, and thus ensuring equity of access to information).

FACTORS LEADING TO SUCCESS AND ACHIEVEMENT:

- Presence of a strong national coordinating agency (in the PIOJ)
- Promotion and adoption of an integrated approach to environmental protection (ridge to reef)
- High level of ownership, coordination and collaboration amongst the main national stakeholders
- Capacity to access international funds and technical assistance

FACTORS LEADING TO FAILURE:

- Limited financial resources of the GoJ. *"It was estimated that a 1m rise in sea level would see US\$462 million being required to protect Jamaica's coast. There is a great need for sustained sources of funding for climate change mitigation and adaptation efforts as well as for managing impacts which are beyond adaptation such as massive coral bleaching which will require significant funding for rehabilitation activities"*³².

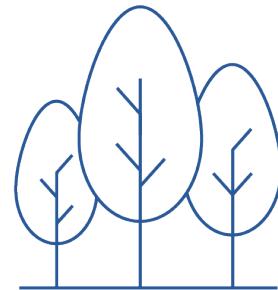
³² Green paper Climate Change Policy and Action Plan (2013)

III. Analysis of Sustainability Levels

3.1. List of services, systems and products that were established/delivered under the project and that should have been maintained (based on the outputs delivered):

COMPONENT 1 – WATERSHED MANAGEMENT - FOREST DEPARTMENT:

- Continued activity of the 4 Local Forest Management Committees (LFMCs)
- Survival of forest areas in the reforested parts of the watersheds
- Continued production of the 4 supported nurseries
- Continued monitoring of the 5 agroforestry demonstration plots; some knowledge already generated, compiled in reports and disseminated?
- Evidence of farmers in target areas practicing agroforestry and applying adequate anti-erosion farming techniques
- Continued monitoring of land cover in the crown lands / continued use of the geodatabase
- Successful declaration of Forest Reserves or Forest Management Areas based on the submissions by the project
- Continued use of the Forest Fire Management Manual
- Retaining wall on the Cane River still functional
- Continued monitoring of the 21 permanent sample plots for forest research; some knowledge already generated, compiled in reports and disseminated?



COMPONENT 2 – COASTAL ECOSYSTEMS - NATIONAL ENVIRONMENT AND PLANNING AGENCY:

- Continued monitoring of coastal ecosystems by NEPA
- Survival of planted mangrove areas in degraded coastal areas
- Continued production of the two upgraded coastal plants nurseries
- Marker buoys still used for Marine Protected Areas (MPA) management
- Sea grass beds in Negril fully grown, conserved and functional
- Continued monitoring of artificial reef structures (MTGs and WADs); any conclusions drawn, published and disseminated?
- Continued monitoring of sea surface temperatures; any conclusions drawn, published and disseminated?
- Continued monitoring of the effects of applying the ShoreLock proprietary technology to reduce coastal erosion (Negril, Font Hill and Discovery Bay); any conclusions drawn, published and disseminated?
- Continued income generation for the beneficiaries of the 9 alternative livelihoods projects

COMPONENT 3 – CAPACITY BUILDING AND AWARENESS RAISING – MET SERVICES / ENVIRONMENTAL MANAGEMENT DIVISION:

- Continued use of audio-visual kit
- Continued use of the spatial database for enhanced data sharing (Met services)
- Trained government representatives (3) using the acquired knowledge in their professional activities
- Risk and Vulnerability Assessments conducted, using baseline data, equipment and training received

3.2. Information and comments on sustainability aspects from the available reports (desk phase):

FROM THE GLOBAL GCCA EVALUATION REPORT (2014)

The global GCCA evaluation reported on the question “To what extent are the sustainability conditions met and mechanisms in place to sustain programme results and ensure a continued flow of benefits to beneficiaries?”:

“From a sustainability standpoint, the Project was never intended to result in something that would be construed as a beacon of sustainability. Not in the immediate future anyway. The Project was meant to set the course towards more comprehensive approaches and encompassing thinking on climate change. It was also meant to provide examples in areas such as physical rehabilitation of coastal areas and forests that could inspire. It contributed to policy development and the training of numerous people, setting the stage for further efforts towards sustainability. The communication team feels that a strong structure has been put in place for it to follow up with subsequent communication activities.

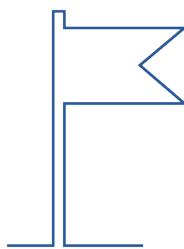
The Climate Change Division’s adoption of so many of the activities started through the Project is very encouraging. The enactment of the Climate Change Policy Framework and Action Plan and specific aspects such as the creation of the Climate Change Network are great steps towards sustainability. However, for carrying out these activities to their full completion, funding is required. The EU as well as other donors are being approached.

Government guidelines will eventually emerge from the pilot activities. The methodologies that were implemented in places such as Portland Bight and Hellshire are still being monitored by the Ecosystems Management Branch and all the best practices are being documented.

EU EDF-11 will have a focus on climate change and DRR. The EU would like to build on the experience of the Project, but with a specific focus on environmental governance and growing emphasis on coastal management and fisheries. The EU would also capitalize on institutional capacities that have been built through the project.”

FROM THE FINAL PROJECT REPORT (2014):

It appears from the final project report that detailed and realistic exit strategies were developed for each of the three components.



3.3. Summary findings from the desk phase and specific issues to be further explored during the field phase:

As can be seen from 3.1, a good number of tools and systems and services have been developed under the project. From the available reports, the quality has been generally good, the project performed well above average, sustainability considerations (exit strategies) were embedded in project planning and implementation, and the institutional beneficiaries showed a keen interest in continuing. The sustainability prospects are therefore good.

During the field phase, the general guidelines for assessing the levels of sustainability will be applied; there are no additional issues to be explored.

3.4. Results of the sustainability analysis (as per table in Annex)

24 items were checked for their sustainability. Information could be collected for 23 of these.

The scores of these 23 items are as follows:

- 6 items (26%) scored 1, meaning that they were fully sustained and expanded/improved
- 13 items (56%) scored 2, meaning that they were fully sustained in a “status quo” situation
- 2 items (9%) scored 3, meaning that they still exist but with quality and/or coverage issues
- 2 items (9%) scored 4, meaning that they disappeared or lost their functionality

Evidence was found through direct observation for 15 items (65%); through reporting by reliable sources for 5 items (22%); and through information gained from uncertain sources for 3 items (13%).

3.5. Conclusions on the sustainability aspects and discussion on factors for success and failure

CONCLUSIONS ON SUSTAINABILITY:

Sustainability is valued very high. Six years after completion of the GCCA project, almost all (95%) of the 23 systems/services about which information could be collected are still existing (only application and monitoring of ShoreLock technology discontinued). 26% of those sustained systems/services scored even “1” (expanded/improved), which are:

- Production nurseries
- Monitoring forest cover and use of geodata base
- Use of the Forest Fire Management Manual
- Sea grass beds in Negril fully grown
- Use of audio-visual kit for awareness raising

The other part (56%) of the existing systems/services maintained full coverage/level (“2”), with the exception of: the survival of planted mangrove in the degraded coastal regions with excellent results in Portland Cottage but high mortality in Hellshire, the monitoring of sea surface temperature that has been affected by malfunctioning of part of the devices, and the discontinuation of one or more of the nine supported livelihood projects.

DRIVERS FOR SUCCESS:

- High level of ownership of the involved national agencies
- Institutions strengthened and increased level of CC awareness (at national as well as local level)
- Adequate infrastructure and appropriate management of the forestry Master nursery
- Organisation and active involvement of local communities
- Professional design and lay-out of the Fact Sheets that are used for training and awareness raising, with clear and simple text and photo's included, a content that does not get outdated quickly and that can be used for a broad audience

DRIVERS FOR FAILURE:

- High costs of the ShoreLock technology, which needs at least a 6-monthly application of the powder

IV. Additional elements

4.1 M&E Practice

M&E ACTIVITIES THAT HAVE TAKEN PLACE:

▪ **Internal:**

- The Project followed UNEP's standard reporting and evaluation processes and procedures.
- A Project Management Unit (PMU), established within the Sustainable Development and Regional Planning Division of PIOJ, was in charge of the day-to-day follow-up of project activities.
- A Project Steering Committee (PSC) was set up with the aim of providing general oversight, policy guidance and monitoring of project implementation. The PSC met on a quarterly basis during the earlier stages of the Project, but this was adjusted to more frequent meetings as the project progressed. After April 2013, bi-monthly meetings were held after which it became necessary to meet monthly down to November 2013.

▪ **External:**

- ROM mission (6-17 February 2012)

% OF BUDGET ALLOCATED TO M&E THAT HAS BEEN USED:

- Budget for external evaluation: €45,000
- No information could be obtained to know whether part of the budget has been used

ADDITIONAL M&E REPORTS THAT HAVE BEEN COLLECTED:

- ROM 2012 reports (Project Synopsis/ Monitoring Report/ Monitoring Questions)

4.2. Contributions to GCCA+ knowledge management and communication

PROJECT-SUPPORTED RESEARCH AND RESEARCH FINDINGS:

Technical publications (guidelines and lessons learned)

- National Coastal Management and Beach Restoration Guidelines for Jamaica (B.Riley, 2017) (<https://www.gfdrr.org/sites/default/files/publication/Coastal%20Management%20and%20Beach%20Restoration%20Guidelines%20Jamaica%20FINAL.pdf>)
- Consolidating Change: Lessons from a Decade of Experience in Mainstreaming Local Forest Management in Jamaica, Case Study, CANARI Technical Report N° 390 (Nicole A. Brown and Noel G. Bennett, June 2010) (<https://www.canari.org/wp-content/uploads/2016/01/390-LFMC-Case-Study.pdf>)

Collaboration with scientific institutions:

- University of the West Indies (UWI)

COMMUNICATION MATERIALS

Quotes, testimonies

- *"In Jamaica we have been able catalysing on Climate Change adaptation and mitigation through the GCCA project. GCCA was one of the first two major CC projects, and now we have more than 40 Climate Change and related projects"* (Claire Bernard, Project Supervisor and Deputy Director of the General Sustainable Development and Social Planning Division, PIOJ)
- *"The Impact and Sustainability Study was overall a good experience for us as well, by looking through the eyes of an independent observer to see what has worked and what not"* (Chris Corbin, Programme Manager Pollution, UNEP)

- “Several projects have emerged out of GCCA” (UnaMay Gordon, Principal Director of the Climate Change Division)
- “We are realizing that this project had a lot of spin-offs. The I&S Study was really an eye-opener” (Davia Carty, Manager Strategic Planning, Forestry Department)
- “Mangrove needs water, but not too much...they like water but don’t love it” (Camilo Trench, Chief Science Officer of the University of the West Indies)
- About watershed protection: “We never remove trees, to plant trees” (Jerome Smith, Principal Director of Forestry Operations, Forestry Department)
- “The main reason of the Climate Change problems is the attitude of ‘dun cyah’” (meaning: don’t care in Jamaican Patois) (Lorrel Smith, Community Leader)

Videos and educational materials

- <https://www.youtube.com/watch?v=4GoCpQA0MqE>
- <https://www.youtube.com/watch?v=aew9nps8mc8>
- <https://www.youtube.com/watch?v=kRKu0Lbn5tY>
- <https://www.youtube.com/watch?v=aew9nps8mc8>
- https://www.youtube.com/watch?v=l0Qu_e-Bis8&t=318s
- <https://www.youtube.com/watch?v=e1nZOviUo-s>
- https://www.youtube.com/watch?v=nq_WVnafSWc
- Audio-visual toolkit “Climate Change, we have to change!”, GOJ/EU/UNEP Climate Change Adaptation & Disaster Risk Reduction Project (Dec 2013) (<https://www.mona.uwi.edu/physics/csgm/climate-resources>)
- Content of the kit:
 - Material for children (CC Comic Book, Activities for 4-5 years old, Activities for 9-11 years old)
 - Publications:
 - Brochures:
 - ◆ Let’s change the way we treat our coast and beaches
 - ◆ Let’s change the way we treat our forests and watershed areas
 - ◆ Project activities – Climate Change – we have to change!
 - Fact Sheets:
 - ◆ Climate Change & Adaptation
 - ◆ Climate Change & Mitigation
 - ◆ Climate Change & Coastal Zones and Communities
 - ◆ Climate Change & Agriculture
 - ◆ Climate Change & the Water Sector
 - ◆ Climate Change & Human Health
 - ◆ Climate Change & Rainfall and Temperatures
 - ◆ Climate Change and Tourism
 - Good Practices – Disaster Risk Reduction Case Studies
 - Manual for the Manchester Pilot Public Education Project
 - Compact Disc
 - A Forest Fire Management Training Manual

4.3. Opportunities for scaling up (future GCCA support activity)

- Capitalising on the established alliances with the University of the West Indies (UWI) and the Caribbean Community Climate Change Centre (CCCCC) for scaling up interventions to the Caribbean regional level
- Continue experimenting and analysing effectiveness and cost-benefit ratios of different technologies for coastal protection and beach restoration, including collocation of devices for measurement of energy &

direction of sea currents, and sedimentation; in-depth comparative analysis of effectiveness of restoration technologies applied in different sites

- Further dissemination of produced manuals and guidelines
- Facilitating exchange of knowledge / experiences, policy papers, manuals and guidelines with other Caribbean countries
- Establishing of Local Forest Management Committees (LFMCs) and applying Farmer Field School (FFS) methodology for farmer-based CC-training and demonstration purposes in other areas of Jamaica.

4.4. Climate Finance – evidence of funding mobilised from public and/or private local sources

- Currently, the GoJ is attempting to reduce the country's debt and has therefore significantly reduced public budgets of a number of sectors. However, coastal management benefits from an increasing trend of government funding³³.
- On average, the Forestry Department is planting 100 ha/year with its operational budget (public funds), and about 150 ha/year with project funds.
- Jamaica is currently exploring the feasibility of creating a sustainable funding mechanism for ocean and coastal management that would be fed by an “environment tax” to be paid by tourists. A study on the potential revenues from tourist user fees (2008)³⁴ found that an environmental surcharge of US\$2 per person could generate US\$3.4M per year, taking account of a decline in tourist visitation of 0.2% caused by such as surcharge.

³³ Source: Page 229 from “National Coastal Management and Beach Restoration Guidelines for Jamaica” (2017)

³⁴ <https://www.sciencedirect.com/science/article/pii/S0308597X08001413>

V. Sources of Information

DOCUMENTS COLLECTED AND CONSULTED FOR THE DESK PHASE ANALYSIS:

- **Programming documents**
 - ◆ Action Fiche, including an indicative logframe, 2009
- **Progress reports**
 - ◆ Final Narrative and Financial Report, with several annexes including the revised logframe. UNEP/PMU, July 2014
- **Monitoring and Evaluation reports**
 - ◆ Mission Aide Mémoire, Jamaica, GCCA Global Evaluation Report, June 2014.

ADDITIONAL DOCUMENTS COLLECTED AND CONSULTED DURING THE FIELD PHASE:

- **Progress/Evaluation/Final reports**
 - ◆ End of project report for Component 1- Forestry Department, Climate Change Adaptation & Disaster Risk Reduction (March 2014) (<http://www.forestry.gov.jm/climate-change-adaptation-disaster-risk-reduction-project-report>)
 - ◆ ROM Report, 2012
- **Policy/Strategy documents & Management plans**
 - ◆ Action Plan for Corals and Reefs in Jamaica 2018-2023 (NEPA, revised Sept 2019) (https://www.nepa.gov.jm/new/services_products/publications/docs/Action_plan_for_corals_and%20reefs_APCAR_Sept2019.pdf)
 - ◆ Coastal Management and Beach Restoration Guidelines: Jamaica (May, 2017) (https://www.nepa.gov.jm/centre/guidelines/coastal_management_and_beach_restoration_guidelines_jamaica_final.pdf)
 - ◆ Montego Bay Marine Park Management Plan 2017-2022 (NEPA, Feb 2017)
 - ◆ Climate Change Policy Framework for Jamaica (GoJ, Sept 2015) (<http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2016/05/Jamaica-Climate-Change-Policy-fwl-2015.pdf>)
 - ◆ Green Paper No.1 - Climate Change Policy Paper and Action Plan (Nov 2013) (http://www.japarliament.gov.jm/attachments/440_Climate%20Change.pdf)
 - ◆ Draft Policy on the Management of Jamaica's Cays (Sept 2013)
 - ◆ Establishment of a Climate Change Department: UNDP's Analytical Report to the Ministry of Water, Land, Environment and Climate Change, Government of Jamaica (July 2013) (<https://www.jm.undp.org/content/dam/jamaica/docs/researchpublications/crisisprevention/EstablishingAClimateChangeDeptInJamaica2012.pdf>)
 - ◆ Communication Strategy 2013-2016 (Adaptation Fund Programme, 2013)
 - ◆ Communication for Climate Resilience 2012 to 2017: A National Strategy & Action Plan prepared for the Pilot Programme for Climate Resilience (PPCR) (Maria Protz, 2012) (https://www.climateinvestmentfunds.org/sites/cif_en/files/knowledge-documents/final_communication_strategy_action_plan_0.pdf)
- **Technical documents**
 - ◆ Monitoring of restoration/climate change adaptation activities commenced under the Climate Change Adaptation and Disaster Risk Reduction (CCA-DRR) Project: Status and Trends 2013 – 2019 (NEPA, March 2019)
 - ◆ Forces of Nature: Assessment and Economic Valuation of Coastal Protection Services Provided by Mangroves in Jamaica (World Bank, 2019) (https://www.nepa.gov.jm/new/projects/docs/WorldBank2019_ForcesOfNature.pdf)
 - ◆ Summary of a "Mini KAP" (Marketing Strategy Limited, 2019)

- ◆ Monitoring of restoration/climate change adaptation activities commenced under the Climate Change Adaptation and Disaster Risk Reduction (CCA-DRR) Project: Status and Trends 2013 – 2018 (NEPA, March 2018)
- ◆ National Coastal Management and Beach Restoration Guidelines for Jamaica (B.Riley, 2017) (<https://www.gfdrr.org/sites/default/files/publication/Coastal%20Management%20and%20Beach%20Restoration%20Guidelines%20Jamaica%20FINAL.pdf>)
- ◆ KAP/B study Report – Climate Change Survey in Jamaica, Japan-Caribbean Climate Change Partnership (J-CCCP) Project Vilma Gregory, November 2016 (https://www.globalsupportprogramme.org/sites/default/files/resources/kap_climate_change_survey_report_final_with_addendum_0.pdf)
- ◆ Forest fire management training manual (June 2016)
- ◆ Good Practices: Disaster Risk Reduction Case Studies from Jamaica Climate Studies Group Mona, UWI (2013)
- ◆ Report on climate change knowledge, attitude and behavioural practice survey. Prepared by the Caribbean Institute of Media and Communication, University of the West Indies, Mona Campus. For the Planning Institute of Jamaica (2012) (https://www.climateinvestmentfunds.org/sites/cif_enc/files/knowledge-documents/cckapsurvey2012_report_0.pdf)
- ◆ Risk and Vulnerability Assessment Methodology Development Project (RiVAMP) (PIOJ, 2012) (<https://www.mona.uwi.edu/physics/sites/default/files/physics/uploads/Richard%20Kelly%20,%20Le-Anne%20Roper.pdf>)
- ◆ Consolidating Change: Lessons from a Decade of Experience in Mainstreaming Local Forest Management in Jamaica, Case Study, CANARI Technical Report № 390 (Nicole A. Brown and Noel G. Bennett, June 2010)
 - (<https://www.canari.org/wp-content/uploads/2016/01/390-LFMC-Case-Study.pdf>)
- ◆ Review of Local Watershed Management Committees and Management Committees and Governance Mechanisms (February 2003)
 - (<https://www.nepa.gov.jm/projects/R2RW/R2RW%20CD%20-%2001/024/024.pdf>)

Videos

- ◆ <https://www.youtube.com/watch?v=4GoCpQA0MqE>
- ◆ <https://www.youtube.com/watch?v=kRKu0Lbn5tY>
- ◆ <https://www.youtube.com/watch?v=aew9nps8mc8>
- ◆ https://www.youtube.com/watch?v=l0Qu_e-Bis8&t=318s
- ◆ <https://www.youtube.com/watch?v=e1nZOviUo-s>
- ◆ https://www.youtube.com/watch?v=nq_WVnafSWc

Others

- ◆ Audio-visual kit “Climate Change, we have to change!”, GOJ/EU/UNEP Climate Change Adaptation & Disaster Risk Reduction Project (Dec 2013) (<https://www.mona.uwi.edu/physics/csgm/climate-resources>)
- ◆ NEPA Projects Inventory (March 2013) (<https://www.nepa.gov.jm/new/projects/docs/project-inventory.pdf>)

RELEVANT WEBSITES:

- ◆ <https://maps.coastalresilience.org/jamaica/>
- ◆ <https://www.facebook.com/ClimateChangeJamaica/>
- ◆ <https://www.shorelock.com/negril>
- ◆ <http://www.jamaicaobserver.com/news/-Not-in-Negril- 13285839>
- ◆ <https://jis.gov.jm/stakeholders-receive-climate-change-audio-visual-tool-kits/>
- ◆ <http://www.gcca.eu/programmes/climate-change-adaptation-and-disaster-risk-reduction-jamaica>

- ◆ <http://metservice.gov.jm/category/projects/ccadrrp/>
- ◆ <https://www.sciencedirect.com/science/article/pii/S0308597X08001413>
- ◆ <https://www.adaptation-fund.org/project/enhancing-the-resilience-of-the-agricultural-sector-and-coastal-areas-to-protect-livelihoods-and-improve-food-security/>

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³⁵ More details are provided in Appendix 3 of the final project report.



Annex to the report: Sustainability Analysis

NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
COMPONENT 1. WATERSHED MANAGEMENT (FORESTRY DEPARTMENT – FD)				
1	Continued activity of the 4 Local Forest Management Committees (LFMCs)	2	R	<p>All the four LFMCs³⁶ that have been formed through the GCCA project are still active and have regular meetings, which also the Regional Forest Technicians are attending.</p> <p>It should be mentioned that before the start of the GCCA project 13 LFMCs already existed (since 2000), based on the Forest Act (1996)³⁷. The majority of them have been established through projects. To date, there are 18 LFMCs spread over the whole country (13 before the project + 4 under the GCCA + 1 additional).</p>
2	Survival of forest areas in the reforested parts of the watersheds	2	R	Survival of the 405 ha forest areas is about 80%; however, replanting has been carried out afterwards by the Forest Department using its recurrent national budget.
3	Continued production of the 4 supported nurseries	1	R	<p>All supported nurseries³⁸ are still producing.</p> <p>The infrastructure of the Master nursery at the Forestry Department has been improved under the GCCA project. Through the use of trays (instead of bags), introduced by the project, a better root</p>

³⁶ Two in the WMU Hope River (Dallas Castle and Constitution Hill); one in the WMU Yallahs River (Westphalia); and one in the WMU Rio Bueno (Sawyers)

³⁷ The mandate of the LFMCs is articulated in the Forest Act (1996), and it is to:

- Advise the Conservator on matters related to the development of Forest Management Plans and the making of regulations.
- Propose incentives for conservation practices in the area in which the relevant forest reserve, forest management area or protected area is located.
- Assist in the design and execution of conservation projects in the area.
- Monitor the condition of the natural resources in the relevant forest reserve, management area or protected area.
- Convene discussions, public meetings, and activities related to natural resources.

³⁸ Master nursery at the Forest Department Head Office in St. Andrew, and three Satellite nurseries (in Mount Airy, St. Andrew; in Williamsfield, Manchester; and in Moneague, St. Ann)



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
				<p>development of the seedlings is being obtained and has resulted in increased efficiency in planting activity in the field.</p> <p>As a result of the decision to centralise the germination process in the Master nursery (standardised process and better control) the percentage of seed losses has decreased and seedling production of the nursery increased; the seedlings raised as such in the Master nursery are to be distributed afterwards to the satellite nurseries.</p> <p><u>Reasons for success:</u></p> <ul style="list-style-type: none"> ▪ Adequate infrastructure and appropriate management of the Master nursery (centralised germination process and business approach) ▪ Introduction of trays (2 different sizes) improved production, quality and efficiency
4	Continued monitoring of the 5 agroforestry demonstration plots; some knowledge already generated, compiled in reports and disseminated	2	U	<p>The objective of the demonstration plots³⁹ was mainly for educational purpose and were linked to the LFMC. These plots are established on farmers' fields and monitored by the LFMC committee and forest technicians⁴⁰.</p> <p>Information about these plots are feeding monthly and annual reports of the Forestry Department⁴¹.</p>
5	Evidence of farmers in target areas practicing agroforestry and applying adequate anti-erosion farming techniques	2	U	<p>Apart from the confirmation of the community leader of Dallas Castle with regard to the application of agroforestry practices (introduction of fruit trees) and anti-erosion farming techniques (contour planting), it has not been possible during the field visit to confirm evidence of applying these practices by all 402 farmers.</p> <p>However, the agroforestry practices included planting of perennial fruit trees and it is very likely that these agroforestry plots are still existing. With regard to the contour-planted pineapple suckers (erosion control), existing pineapple producers continue assisting new members with the supply of suckers thus sustaining the activity.</p>

³⁹ 2 demonstration plots in Sawyers, Trelawny; 1 in Westphalia, St. Andrew; 1 in Constitution Hill, St. Andrew; and 1 in Dallas Castle, St Andrew

⁴⁰ Chapter VII of the End of project report, Component 1, Forestry Department

⁴¹ Chapter 5.1.1 of the Final Report and Exit Strategy



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
6	Continued monitoring of land cover in the crown lands / continued use of the geodatabase	1	D	The GIS Division of the Forestry Department was strengthened under the GCCA project (equipment and training) and the staff of the GIS Division has increased from 2 to 4 well-prepared experts. Its main focus is Land Use Cover Change Assessment (LUCA).
7	Continued use of the Forest Fire Management Manual	1	R	The Forest Fire Management Manual has turned to be an important tool for training and awareness raising, not only of the communities that have been involved in the GCCA project, but also of the rest of the island. Trainings are still going on and the manual is also used by other departments and NGOs.
8	Successful declaration of Forest Reserves or Forest Management Areas based on the submissions by the project	5		No information could be collected
9	Retaining wall on the Cane River still functional	2	D	The retaining wall (parapet) that has been constructed on the main roadway to the community of Dallas Castle is still functional and in good condition.
10	Continued monitoring of the 21 permanent sample plots (PSP) for forest research; some knowledge already generated, compiled in reports and disseminated?	2	R	The 21 Permanent Sample Plots (PSP) ⁴² are monitored every five years and data are collected and analysed ⁴³ . Data are available at the Forestry Department and included in its Annual Reports.

⁴² 6 plots located in Bellevue –Grand Ridge, St Andrew; 3 plots located in Moy Hall, St Andrew; 3 located at the Blue Mountain Peak, St Thomas; 3 located in Grants Pen, St Thomas (Mangrove Forest); 3 located in Hyde Hall, Trelawny; and 3 located in Stephney Johns Vale St Ann.

⁴³ Chapter VIII of the End of project report, Component 1, Forestry Department



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
COMPONENT 2. COASTAL ECOSYSTEMS (NATIONAL ENVIRONMENT AND PLANNING AGENCY – NEPA)				
11	Continued monitoring of coastal ecosystems by NEPA	2	R	<p>Staff members of NEPA visit the different coastal sites at a very regular basis and annual monitoring reports⁴⁴ are produced and disseminated by the agency.</p> <p>The “<i>National Coastal Management and Beach Restoration Guidelines for Jamaica (2017)</i>”⁴⁵ dedicates a whole chapter on monitoring and maintenance. The chapter includes recommended monitoring and inspection protocols, in addition to data collection and advice on systematic performance evaluation.</p>
12	Survival of planted mangrove areas in degraded coastal regions			<p>A total area of 7 ha was planted in two targeted sites (Portland Cottage and Hellshire) both within the Portland Bight Protected Area.</p>
12.a	Portland Cottage	1	D	<p>The restoration in the site at Portland Cottage (5 ha) focused on the hydrology of the degraded mangrove ecosystem to encourage natural regrowth of mangrove forest, assisted by nursery grown seedlings.</p> <p>The mangroves in this area have responded extremely well to the above restoration technique, showing an increase in number of individuals and in height. Monitoring conducted from 2013-2018 indicates an increase in growth of 106% from T0+48 months⁴⁶.</p> <p>Today the mangroves continue to do well with no apparent difference in restored vs naturally occurring mangrove forest.</p>

⁴⁴ Monitoring of restoration/climate change adaptation activities commenced under the Climate Change Adaptation and Disaster Risk Reduction (CCAP) Project: Status and Trends 2013 – 2018 (NEPA, March 2018)

Monitoring of restoration/climate change adaptation activities commenced under the Climate Change Adaptation and Disaster Risk Reduction (CCAP) Project: Status and Trends 2013 – 2019 (NEPA, March 2019)

⁴⁵ (<https://www.gfdrr.org/sites/default/files/publication/Coastal%20Management%20and%20Beach%20Restoration%20Guidelines%20Jamaica%20FINAL.pdf>)

⁴⁶ The site was inspected by NEPA twice a year. Given the difficult access, future monitoring will be limited to coverage measurements using drone technology. It is planned to do this on an annual basis (Source: Monitoring of restoration/climate change adaptation activities commenced under the Climate Change Adaptation and Disaster Risk Reduction (CCAP) Project: Status and Trends 2013 – 2019 (NEPA, March 2019)).



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
12.b	Hellshire	4	D	<p><u>Reasons for success:</u></p> <ul style="list-style-type: none"> The main factor is the improved influx of seawater in the restored mangrove area, due to a canal that has been dug with project support along one side of the dike. The fences that have been installed are protecting the young seedlings from being eaten by the numerous goats that are present in the region. The local community takes care of the maintenance of the canal, cleaning it from rubbish and keeping the goats out of the area. Direct sowing of mangrove seeds that were collected in the neighbourhood showed a very high percentage of survival (contrary to the nursery-grown seedlings, most of which did not survive). <p>On the other hand, the mangrove area in Hellshire (2 ha) showed two years after planting a mortality of 90%, and during the field visit of the present I&S mission it was observed that almost a 100% had died.</p> <p><u>Reasons for failure:</u></p> <ul style="list-style-type: none"> The road next to the site forms a barrier, reason why sea water cannot enter freely into the mangrove area. The mangrove plants in the site depend mainly on groundwater and rainwater; in 2014, Jamaica had suffered from one of the worst droughts recorded since the 1970s.
13	Continued production of the two upgraded coastal plants nurseries	2	D (nursery at the Discovery Bay Marine Lab) R (nursery at the Port	<p>Both upgraded coastal plants nurseries (one at the north coast at the Discovery Bay Marine Lab (DBML) and the second one at the south coast at the Port Royal Marine Lab) are still in place and producing mangrove seedling plants.</p> <p>The capacity of the DBML nursery, managed by the University of the West Indies, was considerably increased under the GCCA project: an additional production area of 200 m², housing and equipment like bags and shade cloth. The nursery focuses on the production of three mangrove species – <i>Rhizophora mangle</i> (red mangrove), <i>Avicennia germinans</i> (black mangrove) and <i>Laguncularia racemosa</i> (white mangrove). The nursery is able to deliver hardened seedlings/saplings immediately</p>



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
			Royal Marine Lab)	and at quarterly intervals thereafter. The main clients are: NEMA, NGO's and the private sector (mainly tourism-related). Currently, NEMA identified new sites to be planted with the mangrove seedlings produced by the DBML nursery.
14	The demarcation of the 3 Marine Protected Areas (MPA) and 2 Fishery Conservation Areas with the marker buoys still in place.	2	R	The marker buoys (23) that have been installed to delineate the boundaries of the Marine Protected Areas (Port Royal, Montego Bay and Negril) and the Special Fisheries Conservation Areas (Salt Harbour and Galleon Harbour) are still in place. Based on the methodology and materials employed to construct and deploy markers, maintenance cost is minimal ⁴⁷ .
15	Seagrass beds in Negril fully grown, conserved and functional	1	R	Seagrass bed restoration was carried out in the Negril Marine Park in September 2012. Shortly after planting in October 2012, the island was impacted by Hurricane Sandy which uprooted naturally occurring seagrass beds along the entire length of the Negril coastline in addition to 84% of the planted beds. Remedial planting took place in June 2013, where approximately 1,500 m ² (50% more than the logframe target) of seagrass was replanted for the rehabilitation of 8.1 ha ⁴⁸ . At the end of the GCCA project in 2013, seagrass areal coverage had increased by 125%; and in 2017 the seagrass coverage had increased with 246% relative to time zero (July, 2013). All three seagrass species were observed at the site (<i>Thalassia testudinum</i> , <i>Halodule wrightii</i> , and <i>Syringodium filiforme</i>) with <i>T. testudinum</i> being more abundant ⁴⁹ .
16	Continued monitoring of artificial reef structures (MTGs and 21 WADs); any conclusions drawn, published and disseminated?	2	R	The monitoring of the Modular Turbulence Generators Artificial Reef Structures (MTG) at Negril showed that the MTGs mainly acted as Fish Aggregative Devices (FAD) and also contributed to the retention of sand along the beach. However, several units became fouled by algae (problem of water quality due to sewage release in the sea) and thereby smothered planted corals which died off as a

⁴⁷ Chapter 5.1.2 of the Final Report and Exit Strategy

⁴⁸ Source: National Coastal Management and Beach Restoration Guidelines for Jamaica (page 176)

⁴⁹ PowerPoint presentation from NEPA during briefing meeting (27 January 2020)



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
				<p>result. Nonetheless the presence of new coral recruits was noted on the structure⁵⁰. It was concluded that the units require routine cleaning to reduce algae colonisation and enhance coral recruitment⁵¹.</p> <p>With regards to the Wave Attenuation Devices (WADs), it was observed that in Old Harbour Bay – inspite of an increase in beach width of 26% relative to the control site where no WADs were placed in the first year –the level of accretion assisted by WADs resulted to be negligible after a period of erosion. According to the NEPA experts, the devices might be more effective in maintaining beach width if they would be installed further away from the beach (seawards) or if the number of structures installed would be increased. Anyhow, more information seems to be needed about the level of wave energy and its direction, in order to allow an adequate decision regarding the most appropriate site and number of WADs to be placed.</p> <p>With regards to the effectiveness of the WADs in Negril, the results were positive. The beach areas under the influence of the WADs had accreted more intensely than the beaches at the control site where no WADs were placed.</p> <p>Data, photos and conclusions are being published in the NEPA general beach monitoring reports⁵².</p>
17	Continued monitoring of sea surface temperatures; any conclusions drawn, published and disseminated?	3	R	<p>27 temperature recording devices were installed in 8 locations⁵³ where routine coral reef monitoring is being carried out by NEPA. The main goal of the loggers is to monitor long-term temperature records at targeted reef systems, since increased sea temperature directly correlates to coral bleaching⁵⁴.</p>

⁵⁰ The organisms that were observed on the structure include sea fans, zooanthids, gorgonians, *Acropora cervicornis*, *Porites porites*, *Porites astreiodes*, *Montastraea cavernosa*, *Montastraea faveolata* and *Favia fragum*, and fifteen species of fish. *Porites porites* followed by *Acropora cervicornis* were the most abundant coral species on the structure.

⁵¹ Source: Monitoring of restoration/climate change adaptation activities commenced under the Climate Change Adaptation and Disaster Risk Reduction (CCAP) Project: Status and Trends 2013 – 2018 (NEPA, March 2018)

⁵² Source: Monitoring of restoration/climate change adaptation activities commenced under the Climate Change Adaptation and Disaster Risk Reduction (CCAP) Project: Status and Trends 2013 – 2019 (NEPA, March 2019)

⁵³ Montego Bay, Discovery Bay, Ocho Rios, Port Royal, Portland Bight, Negril, Bluefields and Portland

⁵⁴ Coral are bleached when temperatures exceed 30°C



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
				<p>Sea surface temperature records (2013-2017) show extreme temperatures above 30°C in most locations. These sites have experienced a 0.5° to 1°C increase in their highest mean monthly temperature.</p> <p>Unfortunately, NEPA faced problems with the malfunctioning of 33% of the devices due to flooding, which occurs when the loggers are left on the reef for an extended period of time. The salt water led to corrosion and once the logger seal is breached, the logger takes in sea water which corrupts and erases the data that had been captured prior to the flooding. A possible solution to this is to use silicone gel to seal the caps (o-rings) of the loggers before deployment⁵⁵ and efforts are being made to rotate the loggers more frequently (at least every 6 months).</p> <p>Another problem is theft of data loggers; therefore, community and resource user sensitisation became an important and ongoing process.</p> <p>Data and conclusions are being published in the NEPA general monitoring reports.</p> <p><u>Reasons for failure:</u></p> <ul style="list-style-type: none"> ▪ Too long rotation periods of the devices ▪ Community members not aware about the use and importance of the temperature data loggers.
18	Continued monitoring of the effects of applying the ShoreLock technology to reduce coastal erosion (Negril, Font Hill)	4	R	<p>The ShoreLock⁵⁶ technology has been applied to 750 m of shoreline⁵⁷. The technology consists in the application of a powder that is mixed with sea water and placed into existing sand on the beach at a specific concentration. Once applied, it re-establishes cohesive properties of the sand promoting accretion, which has been observed in the test sites during the monitoring period. Monitoring on water</p>

⁵⁵ Source: Page 134 of “National Coastal Management and Beach Restoration Guidelines for Jamaica”

⁵⁶ <https://www.shorelock.com/>

⁵⁷ Three test sites (Negril, Westmoreland; Font Hill, St. Elizabeth; and Discovery Bay, St. Ann)



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
	and Discovery Bay); any conclusions drawn, published and disseminated?			<p>quality and marine biodiversity proved that no negative effects of the powder (bio-degradable) could be found.</p> <p>However, the monitoring period has been too short to conclude on the long-term effectiveness of the treatment, since the success of this method requires ongoing application and maintenance. The applications did not continue after the GCCA project because of its high costs.</p> <p><u>Reason for failure:</u></p> <ul style="list-style-type: none"> High costs of the ShoreLock technology, which needs at least a 6-monthly application of the powder.
19	Continued income generation for the beneficiaries of the 9 alternative livelihoods projects	3	U	The majority of the livelihood projects ⁵⁸ , with the exception of the sea moss farm (project did not continue) and maybe some of the apiary projects (updated information was not available), are still operational and are generating income for the beneficiaries.
COMPONENT 3. CAPACITY BUILDING AND AWARENESS RAISING (MET SERVICES / ENVIRONMENTAL MANAGEMENT DIVISION – EMD)				
20	Continued use of audio-visual toolkit	1	R	In the first months of 2014, 100 copies of the toolkit were distributed at national level ⁵⁹ . The material that is included in the tool kit received high acceptance ⁶⁰ and, above all, the “Fact Sheets” have been

⁵⁸ 3 projects around Bluefields Bay (apiary, organic farming and ecotourism); 2 projects around Portland Bight Protected Area (apiary and heritage/eco-tourism); 1 around Negril (with two subprojects including a palm nursery for carbon sequestration and the harvesting of Irish moss); 1 project around Montego Bay (ecotourism); 1 project across the parish of St. Thomas (beekeeping); and 1 project implemented with the Hope Foundation (agricultural disaster risk management).

⁵⁹ Distribution to: the Jamaica Library Service, Ministry of Education (and one primary and one secondary school in each parish), Parish Councils, Combined Disabilities Association, Office of Disaster Preparedness and Emergency Management (ODPEM), European Union; the United Nations Development Programme (UNDP) and National Environment Planning Agency (NEPA) (<https://jis.gov.jm/stakeholders-receive-climate-change-audio-visual-tool-kits/>)

⁶⁰ (i) Material for children (CC Comic Book, Activities for 4-5 years old, Activities for 9-11 years old)

(ii) Publications:

- Brochures (Let's change the way we treat our coast and beaches; Let's change the way we treat our forests and watershed areas; Project activities – Climate Change – we have to change!)



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
				<p>reprinted in many occasions and used for information/education/awareness raising of different target groups. <i>“There was a lot of interest in these fact sheets and they disappeared very fast”</i>⁶¹.</p> <p><u>Reason for success:</u></p> <ul style="list-style-type: none"> ▪ Design and lay-out is professional, with clear and simple text and photo’s included. ▪ To be used for a broad audience ▪ Content does not get outdated quickly
21	Continued use of the spatial database for enhanced data sharing (Met services)	2	R	<p>The Met Service has a well-developed Website (spatial database and videos included), which is accessible for broad public (https://www.jamaicaclimate.net/)</p>
22	Trained government representatives (3) using the acquired knowledge in their professional activities	2	R	<p>At least two of the three government representatives are using the acquired knowledge in their professional activities:</p> <ul style="list-style-type: none"> ▪ A member of the Climate Change Division (CCD) that was trained in “Applied Climate Change”, a Professional Training Course in the USA; and ▪ A Met Service representative trained in “Climate Change and Climate Information Services for Developing Countries” in China, who currently is working with the Green Climate Fund. <p>Although during the field visit it was not possible to obtain information about the third person (a Water Resource Authority representative trained in “Applied Climate Change”. Professional Training Course, USA), it is very likely that also this person is applying the obtained knowledge in his/her present job.</p>

- **Fact Sheets** (Climate Change & Adaptation; Climate Change & Mitigation; Climate Change & Coastal Zones and Communities; Climate Change & Agriculture; Climate Change & the Water Sector; Climate Change & Human Health; Climate Change & Rainfall and Temperatures; Climate Change and Tourism)
- Good Practices – Disaster Risk Reduction Case Studies
- Manual for the Manchester Pilot Public Education Project
 - (iii) A Compact Disc
(<https://www.mona.uwi.edu/physics/csgm/climate-resources>)

⁶¹ Nicole O'Reggio, EMD



NR	DESCRIPTION OF SYSTEM/SERVICE/PRODUCT TO BE SUSTAINED	SCORE	EVIDENCE	EXPLANATORY NOTES
23	Risk and Vulnerability Assessments conducted, using baseline data, equipment and training received	2	R	<p>In 2010, Jamaica was selected as the first country for the RiVAMP pilot for several reasons, such as:</p> <ul style="list-style-type: none"> ▪ Its high vulnerability to tropical cyclones and sea level rise; ▪ Diverse ecosystems and rich biodiversity which are under pressure as a result of population growth, economic development and a strong international tourism industry; ▪ High-level government commitment to hazard mitigation and climate change adaptation; and ▪ Strong partners through the University of the West Indies and UNEP's Caribbean Environment Programme (CEP) based in Kingston, Jamaica⁶². <p>A second Risk and Vulnerability Assessment was conducted under the GCCA and has been an important input for the development of the Climate Risk Atlas of Coastal Hazards & Risk in Negril, Jamaica⁶³.</p>

⁶² Risk and Vulnerability Assessment Methodology Development Project (RiVAMP): Linking Ecosystems to Risk and Vulnerability Reduction - The Case of Jamaica, April 2010

⁶³ <http://www.jamentrust.org/wp-content/uploads/2016/04/JET-Review-of-the-Negril-Risk-Atlas-April-2016.pdf>



This Impact and Sustainability Assessment of the Jamaica Climate Change Adaptation and Disaster Risk Reduction Project (2009/021-550) is one of the 22 case studies that were conducted to feed into the overall **GCCA/GCCA+ Impact and Sustainability Study**.

This case study report provides a summary list of outputs delivered, a detailed analysis of ex-post impact and sustainability levels as well as additional information on the project's M&E practices, on the available knowledge and communication products, on scaling-up opportunities and on ex-post climate finance mobilised from local public and private sources.

All reports are available on www.gcca.eu/resources

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