Darwin Plus:
Overseas Territories Environment and Climate Fund

Final Report

To be completed with reference to the "Project Reporting Information Note":
(https://dplus.darwininitiative.org.uk/resources/information-notes/ /).

It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes.

Darwin Plus Project Information

Project reference	DPLUS085
Project title	Post-disaster Restoration of Mangroves (PROM)
Territory(ies)	The British Virgin Islands (BVI)
Lead organisation	International Union for Conservation of Nature (IUCN)
Partner institution (s)	Ministry of Natural Resources, Labour and Immigration, BVI
Darwin Plus Grant value	£322,076
Start/end date of project	1st April 2019 – 31st March 2022
Project leader name	Ali Raza Rizvi
Project website/Twitter/blog etc.	https://www.iucn.org/theme/ecosystem-management/our-work/ecosystem-based-approaches-climate-change-adaptation/post-disaster-restoration-mangroves-british-virgin-islands-prom
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1 Project Summary

In 2017, the British Virgin Islands were hit by Hurricanes Irma and Maria (both Category 5) within weeks of each other. Outside the initial impacts of the disaster and damage to human well-being and infrastructure, the ensuing ecosystem degradation continues to impact the islands. With substantial impacts on ecosystem services including damages to key coastal ecosystems (i.e. corals, mangroves, beaches and seagrass beds) and other environmental infrastructure assets, losses were estimated at GBP 3.1 million. Preliminary estimates indicated that over 90% of red mangroves were lost. The sheer amount of degradation created a compounding problem for natural regeneration, as the mangroves' seed banks were largely wiped out.

Mangrove ecosystems play a vital role in the Caribbean by providing ecosystem services such as prevention of coastal erosion, coastal protection from wave energy and storm surges, carbon storage, water filtration, and key nursery habitats for many local and commercial fisheries. The decimation of mangrove ecosystems in the British Virgin Islands also significantly impacted tourism, affecting the natural beauty of coastal ecosystems and beaches, leading to decreased water quality, and impacting fisheries. Mangroves not only directly benefit the communities who live near them, but also local and national economies. They are invaluable for resilience to natural disasters and adaptation to climate change, providing a coastal buffer to rising sea levels. Recognising the critical role of mangrove ecosystems in BVI, the Ministry of Natural Resources and Labour requested assistance with the recovery and restoration of mangrove ecosystems.

The project worked to synthesize disconnected studies and information into a territory-wide mangrove risk assessment using the IUCN Red List of Ecosystems (RLE) methodology. Simultaneously, the project conducted on-ground mangrove capacity building and restoration activities in collaboration with local stakeholders, led by project partner the Jost Van Dyke Preservation Society. Caribbean mangrove restoration expert Dr. Gregg Moore from the University of New Hampshire consulted throughout the project as a scientific advisor, providing technical support during capacity building activities as well as working to build local leadership in mangrove restoration through the advanced scientific training of local students via an exchange between the University of New Hampshire and the local H. Lavity Stoutt Community College.

Two critical components of the success of the PROM project were in (1) building coherency across multiple mangrove projects, nurseries, investments and engagements in the BVI and (2) building up public knowledge and perception of the critical role of mangroves for climate adaptation, disaster risk reduction, and ecosystem health. For both of these components, the project team worked closely together with the BVI government to facilitate collaboration and build a territory-wide mangrove restoration, monitoring & evaluation, and management plan. The emphasis on building coherency, capacity and collaboration in mangrove restoration and management will help guide priority management actions in the BVI beyond the project duration to ensure long-term sustainability or project activities.

Finally, the PROM project worked to ensure the model, scientific restoration developments, and lessons learned are not limited to the BVI, but spread across the Caribbean, mainstreaming mangrove restoration and management as an ecosystem-based approach to both disaster risk reduction and climate adaptation.

2 Project Stakeholders/Partners

Since the inception of the project, the BVI Ministry of Natural Resources and Labour (MNRL) has been a critical project partner, with Joseph Smith-Abbott, Permanent Secretary, Mervin Hastings, Deputy Director of Conservation & Fisheries, and the Honourable Minister Vincent O. Wheatley all strongly engaged in the project together with the spread of other mangrove activities in the BVI.

The Jost Van Dyke Preservation Society (JVDPS) led on-ground mangrove restoration activities, including field logistics, coordination with local stakeholders and the Government of BVI, and facilitating community engagement. Ms. Susan Zaluski, Director of JVDPS served as the project's on-ground coordinator. Susan also facilitated critical linkages with local partners including the H. Lavity Stoutt Community College in her role as Head of Marine and Maritime Studies, and the National Parks Trust of the Virgin Islands and brought linkages between this project and other Darwin-funded projects including DPLUS081 and DPLUS073.

Dr. Gregg Moore (University of New Hampshire) was engaged throughout project implementation as a scientific advisor and mangrove restoration expert, working closely with the JVDPS on the identification of key restoration site, effective mangrove restoration techniques, as well as monitoring & evaluation of project activities, and providing scientific recommendations to the government. Dr. Moore also supported the training and higher education of local students, which helped to build local capacity and increase engagement.

Project partner the H. Lavity Stoutt Community College (HLSCC), established a mangrove nursery in 2020 with technical assistance from the JVDPS, funded by BVI Unite, and worked with the PROM project to supply seedlings, as well as supporting graduate students to support restoration activities and produce student research projects. Student interns and recent graduates from HLSCC serving as nursery staff also helped serve as facilitators at local plantings. Ms. Nia Jeffers, local manager of the HLSCC mangrove nursery, joined the University of New Hampshire as a graduate student under the supervision of Dr. Gregg Moore, through financial support from the PROM project and a teaching and research partnership with the HLSCC's Centre for Applied Marine Studies. Nia's research focused on improving mangrove nursery and planting success.

The National Parks Trust of the Virgin Islands (NPTVI) served as a project partner, especially for sites on Anegada, where NPTVI has an established on-island presence and for Prickly Pear Island, which falls under the management authority of the NPTVI.

One of the first tasks of the PROM project in building mangrove project coherency across the BVI was working to link between the many mangrove projects and investments across numerous institutions and stakeholders. An overview of relevant projects and how they were engaged with the PROM project is available in Table 1 below.

Table 1. Evolution of Post-Hurricane Mangrove Restoration in the BVI.

Organisation/Project	Project Details or Outputs
Jost Van Dykes Preservation Society (JVDPS)	• Developed pilot mangrove nursery • Developed system of monitoring • Outright purchase of land to serve as protected private land reserve (2.4 acres) • Education and outreach (youth involvement) • Plans to be a continuous steward of the restoration landscape

Department of Disaster Management (DDM) Establishing Flood-Resilient SMART Communities project
 	
Funded by the Caribbean Development Bank via the Community Disaster Risk Reduction Fund
	• Began as a National Initiative to identify flood vulnerable communities.
	• 3 target communities (Jost Van Dykes, Sea Cow's Bay, East End/Long Look) were identified as targets for developing site management plans for mangroves, developing nursery reared techniques, and developed opportunity maps for where planting and restoring red mangroves should be focused
	• Results were published in Ocean and Coastal Management in 2021 as *Reducing the vulnerability of coastal communities in the Caribbean through sustainable mangrove management*, main findings included:
	  ○ NDVI analysis revealed that up to 94% of mangroves were impacted by Hurricane Irma
	  ○ Flood risk vulnerability maps identified coastline most vulnerable to storm surges
	  ○ Small-scale mangrove restoration can provide flood protection up to 475m inland
	  ○ Mangrove restoration can reduce flood risk to at least 700 buildings

Post-Hurricanes Irma and Maria, 2017	
Mapping for evidence-based policy, recovery and environmental resilience project (DPLUS081) *Funded by UK DEFRA's Darwin Initiative*	Training outcomes included the ability to use current GIS data and Remote Sensing techniques to map and model the following environmental issues: • Damage and natural recovery following Hurricanes Irma and Maria • Monitoring vegetation health for BVI Dry Forests • Identify invasive vegetation of pine species - Casuarina
Improving small island resilience and self-sufficiency in habitat monitoring and management project (DPLUS073) Funded by UK DEFRA's Darwin Initiative in partnership with the University of Roehampton and the Royal Society for the Protection of Birds	• Mangrove Rapid Assessments of Post-Hurricane Imra (JVDPS/UNH) • Detecting Change via Remote Sensing: Satellite Imagery (JVDPS/UNH) • Ground truthing at degraded mangrove sites (JVD) using a monitoring protocol based on IUCN's "Managing Mangroves for Resilience to Climate Change." manual. • Promote the value of natural coastal and marine habitats in providing protection against future extreme weather • Assess the resilience of key terrestrial and marine habitats • Establish environmental baselines • Produce long-term management plans • Increase awareness of the value of key habitats and implement resilience recovery measures • Perform restoration activities, including the design and launch of the JVD Pilot Mangrove Nursery and the trial of alternative mangrove method restoration techniques with the added support of the UK's Foreign and Commonwealth Development Office (FCDO)

Post-disaster Restoration of Mangroves (PROM) (DPLUS085)
 	
Funded by UK DEFRA's Darwin Initiative
	• Develop a territory-wide plan for sustainable mangrove management and restoration based on a Red List of Ecosystems ecosystem risk assessment and community-based methods
	  ○ Mangrove Restoration Feasibility Report
	  ○ Regional Restoration and Monitoring Framework
	• Supported and upscaled mangrove nurseries in the Territory, including physical nursery construction and restoration at identified sites
	• Invested in site-level mangrove restoration to address the degradation following hurricanes Irma and Maria

3 Project Achievements

3.1 Outputs

Output 1: RLE experts training workshop and capacity building provided for national government, local and regional stakeholders and relevant assessors

1.1 Online briefing on RLE to enable pre-workshop data gathering.
Complete. The online briefing for the RLE workshop session occurred first during the IUCN scoping mission in early 2020. In July 2020, IUCN in collaboration with the MNRL hosted a virtual a two-hours session to connect past and present initiatives and jointly discuss how to establish a common vision for the future of mangrove restoration and management in the British Virgin Islands (see Annex 6 for further information).

1.2 Data gathering for preliminary RLE assessment.
Complete. Data gathering with local partners was finalized in February 2021 with the completion of the online repository with all the available information – BVI Mangroves repository – that can be used in further analysis.

1.3 Expert Training workshop held on executing RLE assessments for local government, and relevant assessors.
Complete. The RLE workshop was conducted from October 20 to November 17 2020 as a four-week asynchronous online training, due to COVID-19 travel restrictions. All the workshop materials were made available to all participants through Google Classroom including video presentations and supplementary readings. A discussion forum was available throughout the four-week period for students to post their questions, which were answered timely by the trainers.

1.4 Analysis and validation of data generated in activities 2.2 and 2.3.
Complete. Data analysis by RLE experts and data validation by the Ministry and project team has been completed. The estimation of mangrove extent was completed for each of the available spatial data files (shapefiles) or extracted from available tabular data. A description of the available data as well as the area estimates derived from each one is available on the BVI Mangroves repository. ***The results of the assessment indicated that the status of the mangroves of BVI is Endangered (EN-CR).***

1.5 RLE Validation workshop to validate and finalise mangrove ecosystem assessment.
Complete. The RLE results were shared and approved by national and governmental assessors to the project. The data and Conceptual Model used to carry out the assessment is consolidated in a folder available to national stakeholders and government.

1.6 Webinar on the Red List of Ecosystems – case studies & applications.
Complete. The RLE tool and its applications was presented at a workshop in July 2020 together with the past projects and other activities within the framework of this project. The rationale behind was to showcase the linkages between BVI work so far and how it could be integrated in the analysis of mangrove ecosystems. Additionally, by doing so and showing examples from other countries it was possible to emphasize the added value of conducting baseline ecosystem risk assessments as a first step for decision making processes. The BVI RLE results, together with other Caribbean island RLE case studies and applications, were furthermore highlighted in the closing virtual workshop held 1-3 March 2022, further described in Activity 4.2.

Output 2: Territory-wide Red List of Ecosystems assessment for BVI mangroves

2.1 Relevant data gathered.
Complete. GIS experts, together with local experts, and relevant scientists and stakeholders, compiled the necessary data for completion of the mapping assessment of the mangrove ecosystems, the analysis of RLE criteria A and B and the development of the conceptual model and ecosystem description.

2.2 Criteria A and B assessed, according to data availability and quality.

Complete. The assessment of RLE criteria A and B has been finalized after consultation with the Ministry and project team.

2.3 Criteria C, D and E assessed, according to data availability and quality.
Complete. Due to limitations to access abiotic and biotic time series data, the assessment of criterion C, D and E were not able to be carried out. These criteria are more data intensive than the spatial criteria (A and B), and such data deficiencies are in line with RLE assessments in other Caribbean mangrove systems. However, per the other criteria assessed, ***the results of the assessment indicated that the status of the mangroves of BVI is Endangered (EN-CR).***

2.4 Conceptual diagram for mangrove ecosystems developed.
Complete. In consultation with local experts and relevant scientists and stakeholders a conceptual model diagram for BVI mangrove ecosystems was developed and integrated in to the RLE assessment (Annex 4). This conceptual model was designed and validated in consultation with the local team, government, and stakeholders.

2.5 National RLE assessment for mangrove ecosystems.
Complete. The national RLE assessment for mangrove ecosystems was completed in March 2021 based on criteria A and B. ***The results of the assessment indicated that the status of the mangroves of BVI is Endangered (EN-CR)*** *(Annex 5).*

Output 3: Prioritisation of degraded mangrove areas for restoration and other ecosystem-based approaches to benefit livelihoods and climate resilience

3.1 Detailed and robust map of mangrove cover and restoration opportunities in BVI is produced, including pre-and post- Irma imagery.
Complete. A remote sensing approach was employed to assess mangrove recovery, health, and opportunities for restoration. SENTINEL 2 satellite images were analysed for 1) preparing pre and post hurricane Irma and Maria maps, 2) identifying mangrove patches through supervised classifications and subsequent infrared composition analysis and 3) Using Normalized Difference Vegetation Index (NDVI) image analysis as a proxy for mangrove health and recovery. The maps produced depict the mangrove recovered and damaged areas and were used as part of the RLE process. Process details were highlighted in the closing virtual workshop held 1-3 March 2022, further described in Activity 4.2.

3.2 Capacity building in mangrove restoration methodologies for local stakeholders is conducted.
Complete. Susan Zaluski of the Jost Van Dyke Preservation Society coordinated capacity building in mangrove restoration through training and engagement of community volunteers, students, and youth. Dr. Gregg Moore provided ongoing technical support and has developed training materials for restoration monitoring, plant nursery techniques, and mangrove restoration practices (see Moore's Regional Restoration and Monitoring Framework, Annex II). At project end, 167 community members (95 female) participated in trainings and restoration activities. Further records and details on capacity building activities and trainings are available in the final restoration report A review of on-the-ground work carried out, Annex 9.

3.3 Restoration is executed with local organisations and communities at a number of priority mangrove sites based on the opportunity map as well as field data & local knowledge.

Complete, with some restoration activities ongoing based on project sustainability plan. Restoration activities, led by the Jost Van Dyke Preservation Society, H. Lavity Stoutt Community College, and the National Parks Trust of the Virgin Islands were carried out from 2021-2022, and will continue following project closure.

The Mangrove Restoration Feasibility Report, produced by the JVDPS, informed project activities by setting the project restoration sites, number of hectares to be restored, methodologies for restoration (including required debris removal), estimated costs, and due diligence process for potential restoration sites (Annex 1).

At project end, 5.5 hectares have been restored across 13 sites, representing 2,067 propagules, and engaging 167 community members. Further records and documentation of restoration activities are available in Annex 9. Another 2000+ propagules are expected to be planted during summer 2022 (see Section 6 "Sustainability and Legacy" for more information).

3.4 Monitoring & evaluation of success conducted throughout for adaptive management and to produce scientifically robust results.

M&E plan development and operationalization complete, with M&E activities ongoing beyond project end.

The ground-truthing documented in the Post Hurricane Recovery of Mangroves in the BVI: Mangrove Restoration Feasibility Report (Annex I), as well as the Regional Restoration and Monitoring Framework (Annex II), established the framework for monitoring and evaluation of results from pilot activities on restoration. This framework includes monitoring that will capture both structural and functional parameters indicative of ecosystem health as well as restoration planting success. Permanent (i.e., geo-referenced) transects with fixed plots spanning gradients of salinity, elevation and/or tidal regime will be sampled biannually or at least once a year. The basic ecological monitoring protocol that could be realistically applied within this context includes the collection of data on stand characteristics, pore water chemistry, water quality metrics and from a pair of water level recorders that should be established at each restoration site and each reference site.

Success will be measured with both ecological and social metrics. Among the ecological metrics include planting success that will focus on survivorship and plant growth measures (canopy height, percent cover, etc.). Additional ecological metrics will include the aforementioned contributing factors of soil conditions (pore water salinity, redox potential, pH) and hydrology (water level recorders). Finally, wildlife utilization will be measured using avian survey and point counts based on Caribbean Waterbird Census as well as nekton survey (for sites with appropriate hydrology and water depth). For measuring success in social metrics, public engagement, community involvement, and participation in outreach, training, and restoration actions will be monitored and volunteer participation documented with gender disaggregated data. ***On-ground project partners JVDPS and HLSCC will continue to implement this framework at all current and future mangrove restoration sites in the Territory beyond project end, to capture long-term ecological impact of collective mangrove restoration work.***

3.5 Webinar on Nature-based Solutions for disaster risk reduction and climate adaptation – mainstreaming and implementation.

Complete. The two-hour webinar "*Post-Disaster Mangrove Restoration of the British Virgin Islands: Accelerating the implementation of ecosystem-based approaches for disaster risk reduction and climate adaptation*" was hosted by IUCN in collaboration with the Ministry of Natural Resources, Labour and Immigration in July 2020 (*Annex 6*).

In addition, the project's closing workshop and scientific symposium "*Mangrove Restoration as a Nature-based Solution for Climate Resilience in the Caribbean*" took place in March 2022 shared new science, examples, and lessons learned from the implementation of mangrove restoration as a nature-based solution in the Caribbean, with a view to highlighting PROM project results and lessons learned (see final report under *Annex 11*, and more information under see Activity 4.2).

Output 4: Cross sectoral policy mainstreaming and capacity building

4.1 Drafting of a territory-wide mangrove management plan in consultation with BVI government.

Complete. In 2021, the report **"Situational and Policy Analysis of Mangroves in the British Virgin Islands: Legislative and Management Parameters for Mangrove Restoration in the British Virgin Islands"** (see Annex III) was finalised in a consultative process with the BVI government and local stakeholders. This report provided policy and

management recommendations that served as the cornerstone of the political engagement of the project to promote the sustainable management of mangrove ecosystems in the BVI.

Throughout the project duration, close engagement with the MNRL continued to build momentum for recognition of mangroves in national policy and adoption of key mangrove-relevant legislation that had been sitting in limbo, such as the Environment Bill and Wetlands Management Plan. For example, in April 2021, the Minister of Natural Resources the Hon. Vincent Wheatley delivered a statement on collective mangrove restoration efforts at the House of Assembly of the Virgin Islands (see Annex 7). In this statement he reiterated that the replanting of mangroves cannot replace the loss of healthy mangrove communities which can be destroyed with unauthorized reclamation projects and other activities, emphasising that it is a legislative priority to introduce environmental legislation this year to afford mangroves a higher degree of protection in the BVI. This message of political commitment to adopting mangrove legislation was again shared by the Hon. Vincent Wheatley at the UNFCCC COP26 in Glasgow in November 2021, as well as in the closing workshop where he shared "*It rests on the shoulders of my government and governments across the region to lead in efforts to recover and protect our mangrove systems. We must take strong, decisive, and urgent action, including enhancing our legislative policy and management frameworks in the Virgin Islands. I will welcome my technical team to ensure that the draft Environmental and Coastal Zone Management Act 2021, which includes strong measures to protect mangroves, is brought to the House of Assembly this year. I also will work to put in place supporting policies such as the Marine Estate Administration Policy 2021 to increase the stock of mangroves within the boundaries of protected areas. I encourage other countries in the region to take similar, concrete, necessary steps to protect mangroves in the Caribbean." (*see Day 1 of the symposium here, starting at 09:21 for the Hon. Wheatley's remarks).

However, the overall political climate in BVI prevented the said legislation from being passed during the project duration. Throughout 2021, a Commission of Inquiry by the Foreign, Commonwealth and Development Office led to a judicial review of almost every major decision taken by the BVI cabinet in the last decade. In early 2022, BVI Premier Andrew Fahie was furthermore arrested in Miami for alleged drug smuggling and money laundering, with the result of the UK debating applying direct rule in the BVI. Due to the overhaul of many politicians and broader political issues taking the spotlight, the momentum behind the introduction of environmental legislation stalled.

However, we close the PROM project recognizing that we have built mangrove engagement as well as high-level political acknowledgement, while simultaneously developing a framework supported by both political and public enthusiasm for improving protection of mangroves in legislation (see *BVI Beacon article, Mangrove planting is great, but new laws needed too*). When the political situation permits, we encourage our partners in the BVI to move forward with passing the Environment Bill or similar legislation to improve protection and management of mangrove ecosystems.

4.2 Closing workshop building capacity on integrating and mainstreaming project outputs.

Complete. From 1-3 March 2022, a virtual regional workshop and scientific symposium entitled "*Mangrove Restoration as a Nature-based Solution for Climate Resilience in the Caribbean*" was organized from the IUCN, the the British Virgin Island's Ministry of Natural Resources and Labour, Jost Van Dyke Preservation Society, University of New Hampshire, Caribbean Biodiversity Fund, Global Island Partnership and Global Mangrove Alliance. This regional workshop shared new science, examples, and lessons learned from the implementation of mangrove restoration in the Caribbean, with a view to highlighting PROM project results.

The workshop had three main objectives: (1) sharing new scientific developments, in both ecosystem assessment and in mangrove management and restoration practices, including nursery and planting techniques specific to Caribbean island contexts; (2) highlighting lessons learned and results of the collaborative restoration work in the British Virgin Islands; and (3) accelerating the uptake, resourcing and implementation of Caribbean mangrove restoration, harnessing the best of science and nature.

Outcomes of this event included:

- sharing scientific best practices and techniques for mangrove restoration in Caribbean Island contexts;
- promoting new long-term resourcing and financing mechanisms for the protection and restoration of mangrove ecosystems in the Caribbean;
- building new partnerships among national, regional, and global actors.

The event drew attendance from **420 participants across 61 countries** and presentations from 29 representatives from **20 organisations**, including (in alphabetical order) the Belize Forest Department, Caribbean Biodiversity Fund, Darwin Initiative, French Committee of IUCN, Global Island Partnership, Global Mangrove Alliance, Institute of Marine Affairs, Trinidad and Tobago, IUCN Jost Van Dyke Preservation Society, Ministry for Natural Resources, Labour and Immigration of the British Virgin Islands, National Parks Trust of the Virgin Islands, The Nature Conservancy, Organisation of Eastern Caribbean States, Provita, Royal Society for the Protection of Birds, St Lucia, SwissRe, University of Manitoba, University of New Hampshire and the Vieques Conservation and Historical Trust, Puerto Rico.

Webinar recordings are available for all three days of the symposium at the following links: Day 1 - Nature-based solutions through mangrove restoration, Day 2 - Best practices and scientific developments on mangrove restoration and rehabilitation and Day 3 - Accelerating mangrove management and restoration in the Caribbean. The final workshop report is available here as Annex 11.

4.3 Report on outcomes of project.

Complete. The final report, entitled *"Mangrove Restoration for Climate Resilience in the Caribbean: Lessons from the British Virgin Islands"* (*available here as Annex 11*) captures the main outcomes of the regional workshop and scientific symposium (Activity 4.2), as well as project outcomes from Outputs 1, 2 and 3. Outcomes from on-ground restoration activities are further elaborated on *in Annex 9.*

4.4 PROM results are shared/communicated in international platforms including the UN Community of Ocean Action for Mangroves, the Global Mangrove Alliance (GMA), the Partnership for Ecosystem-based Disaster Risk Reduction (PEDRR), and Friends of Ecosystem-based Adaptation (FEBA).

Complete. PROM results have been communicated widely including:

- Joseph Smith-Abbot, Deputy Secretary the BVI Ministry of Natural Resources, Labour, and Immigration presented on mangrove restoration in the BVI at the Caribbean Challenge Initiative and Caribbean Biodiversity Fund event "Scaling up Ecosystem-based Adaptation in the Caribbean" in July 2020.
- In November 2021, the Honourable Minister Vincent Wheatley, Minister of Natural Resources, Labour and Immigration joined the UNFCCC COP26 high-level reception "Celebrating Successes of Nature-based Solutions for Adaptation" to provide remarks on BVI mangrove restoration work and the role of mangroves for climate resilience in the Caribbean (see social media posts here and here).
- Ms. Nia Jeffers presented on BVI mangrove restoration at 5 international professional conference/webinars over the past year (see Annex 8). Ms. Jeffers highlighted her work managing the mangrove nursery, innovating better approaches to cultivate high quality mangrove propagules, and planting initiatives with HLSCC and JVDPS under this project, focused on developing best practices to improve mangrove planting success in the BVI and the wider Caribbean region. In additional, Ms. Jeffers developed a webpage/blog to inform others of the importance of mangroves with links to her ongoing master thesis research (https://vimangroves.com)
- Through the Global Mangrove Alliance (GMA), the project was profiled as a case study in the GMA's State of the World's Mangroves Report released on World Mangrove Day 2021.
- The final project report "*Mangrove Restoration for Climate Resilience in the Caribbean: Lessons from the British Virgin Islands*" was promoted widely through both IUCN and Global

Mangrove Alliance platforms, together with partners and networks of the Global Island Partnership and Caribbean Biodiversity Fund.

4.5 Promotion of results and report via IUCN network.

Complete. The final project report "*Mangrove Restoration for Climate Resilience in the Caribbean: Lessons from the British Virgin Islands*" was promoted widely through IUCN platforms. *See 4.4 for additional PROM promotion activities utilizing the IUCN network.*

3.2 Outcome

The project's Outcome is "***Community-based mangrove restoration, sustainable protection, and management for enhancing climate and disaster resilience of communities exposed to the effects of climate change***".

In the aftermath of hurricanes Irma and Maria, many standalone projects and initiatives were launched in the BVI on mangrove restoration. The PROM project was designed to capitalize on IUCN's convening power to bring local stakeholders together to synergize between projects and synthesize these multiple efforts into a Territory-wide approach to mangrove restoration and enhancing climate resilience of the BVI.

With the engagement of diverse stakeholders throughout the project, and the on-ground and scientific leadership of project partners JVDPS and UNH, the project outcome is accomplished, and a sustainability plan in place to continue mangrove restoration activities even after formal project closure.

Capacity building and mangrove restoration activities on the ground led to over 330 trained people and at least 260 persons, (140 women/girls and 120 men/boys) have participated in mangrove outplanting activities. - more information is available in *Annex 9.*. Strong connections were facilitated on the ground between stakeholders. Susan brought a cohesive plan together across multiple projects and funding sources. Public opinion on the critical role of mangroves for climate resilience was enhanced (*see Annex 10*). Through engagement with HLSCC, NPTVI, and JVDPS, restoration activities will continue in the BVI, and the M&E Plan will continue to be used.

Through working with both the University of New Hampshire and the HLSCC, the project worked to support building local capacity and scientific leadership, particularly in supporting Ms. Nia Jeffers in her graduate research with Dr. Gregg Moore. As part of this work, Ms. Jeffers worked as the manager the mangrove nursery, innovating better approaches to cultivate high quality mangrove propagules, and planting initiatives with HLSCC and JVDPS under this project, focused on developing best practices to improve mangrove planting success in the BVI and the wider Caribbean region. In additional, Ms. Jeffers developed a webpage/blog to inform others of the importance of mangroves with links to her ongoing master thesis research (https://vimangroves.com). Building local leadership in mangrove restoration efforts contributes to the long-term sustainability of the project.

Finally, the project worked with the BVI government to build political engagement and high-level recognition of mangroves, with the goal to adopt legislation to further protect mangroves in the BVI. The Minister of Natural Resources the Hon. Vincent Wheatley has on multiple occasions emphasized that it is a legislative priority to introduce environmental legislation to afford mangroves a higher degree of protection in the BVI.

The final outcome report shared lessons learned across the Caribbean, encouraging further UKOT and regional coordination and partnerships on mangrove protection and management, in the face of Caribbean island vulnerability to climate change hazards.

We close the PROM project with recognition that Darwin's funding has been catalytic in altering the status quo of mangrove engagement on-the ground, building local leadership in mangrove management and restoration, fostering enthusiasm and cross-project coherency in restoration

activities, as well as supporting the high-level political recognition of the role of mangrove management and protection for enhancing climate and disaster resilience.

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3.3 Monitoring of assumptions

Key risks and assumptions identified in the logical framework, as well as how they were managed, are as follows:

Assumption 1: Local and national stakeholders are interested and willing to share data and incorporate recommendations for coastal planning and management.

Throughout the project, government representatives were willing to share data and information with the project team to conduct both the vulnerability mapping and ecosystem risk assessment. National stakeholders were also very interested to incorporate recommendations for coastal planning and management, with the MNRL signalling on multiple occasions that protecting mangroves is a legislative priority. However, the broader political climate in the BVI in 2021-2022 prevented legislation from being passed during the project term.

Assumption 2: Stakeholders are interested in and supportive of initiatives.

Local stakeholders and government representatives supported this project and collaboratively worked with the project team to implement planned activities. It is worth highlighting that the approach proposed – transition from theory (synthesizing the post hurricane assessments ongoing on the island) to practice (on-ground mangrove restoration through the PROM project) – was very well received, with strong encouragement for the project to help local stakeholders begin restoration activities.

Led by the JVDPS in partnership with NPTVI, HLSCC and other local agencies, restoration activities have received significant attention, evidenced by increase demand by corporations, schools, property owners and community groups, and documented across local media. Project leaders do not need to solicit the public's interest at this stage, they merely need to field inquiries for participation. The anchors of the JVDPS and the H Lavity Stoutt Community College nursery played a pivotal role in community accessibility.

Assumption 3: Continuous support and cooperation with government agencies, community leaders and IUCN.

Despite challenges due to the COVID-19 pandemic, cooperation with the MNRL remained strong throughout the project. In 2021, bringing on the Jost Van Dyke Preservation Society as an on-ground project partner made significant and measurable contributions by direct engagement of the community and a diversity of stakeholders in the BVI.

Assumption 4: Sufficient funding is ensured to implement the full scope of intended activities.

Responding to the demand as described in Section 3.2, the on-ground implementation of mangrove restoration activities was supported with additional funds as a result of budget reallocation as a result of COVID-19 pandemic impacts (e.g. to travel). By doing so, the project team responded to the BVI government and local stakeholder demand to place more emphasis on on-ground efforts. Sufficient funding was in place to implement the full scope of activities.

Assumption 5: Fieldwork is not adversely affected by weather (i.e. cyclones) or political conditions.

While the project team identified weather and political conditions as major risks that could have interfered with the field operations, we could not have anticipated the real culprit: the outbreak of the COVID-19 global pandemic. The project team worked to reduce the impacts to the project, by implementing virtual options for workshops, and limiting size of on-ground groups for capacity building and restoration activities.

In July 2021, the British Virgin Islands experienced its first major COVID-19 outbreak via local transmission. A curfew and heightened social distancing measures limited the JVDPS's ability to host group events. However, because this time frame also coincided with the ripening of seeds, time was spent mainly doing activities that only required a few persons. As the situation with COVID-19 improved, restoration activities have proceeded on all four major islands starting from

October 2021 and project delivery of activity 3.3 Restoration is executed with local organisations and communities at a number of priority mangrove sites based on the opportunity map as well as field data & local knowledge will not be too badly impacted.

4 Project support to environmental and/or climate outcomes in the UKOTs

The PROM project contributed towards the following main UKOT environmental and climate outcomes:

- Addressing the awareness gaps between biodiversity, economic and human wellbeing for integration of environmental considerations into decision making, policy frameworks and regulation[1]
- Reducing the risks of harm from environmental hazards by 1) identifying major threats, 2) assessing the risk of collapse of mangrove ecosystems and 3) enhancing long-term resilience and adaptive capacity through a tailored mangrove management plan;
- Using resources from nature more sustainably and efficiently by providing a roadmap towards sustainable management of the BVI mangrove ecosystem and enhanced livelihoods of local communities;
- Enhancing beauty, heritage and engagement with the natural environment by deploying ecosystem-based approaches to climate adaptation and disaster risk reduction thus benefiting nature and human wellbeing;
- Mitigating and adapting to climate change by strengthening the capacity of stakeholder and institutions to mainstream ecosystem-based approaches into their plans (i.e. NAPs) and strategies (i.e. NBSAPs).

5 OPTIONAL: Gender equality

Equal representation of stakeholders at different levels as well as gender balance were important criteria when carrying out capacity building / training sessions and restoration interventions. For gender related aspects, the project uses as reference the BVI National Gender Policy to support and promote the rights and equality of all its citizens regardless of gender.

Our gender indicators included:

- Number of participants (50% women) trained to assess ecosystem risk using the IUCN RLE protocols to execute community-based mangrove restoration (At completion: 20 participants and 80% women.)
- Number of participants (50% women) trained in locally appropriate mangrove restoration methodologies. (At completion: 167 participants, including 95 women/girls, see more information in *Annex 9.*

6 Sustainability and Legacy

Throughout project implementation, sustainability and legacy was a critical goal, as we worked to shift the BVI mangrove restoration from a project-to-project approach to a long-term restoration framework that maximizes on local synergies. Outcomes of the PROM project are integrated across multiple mangrove and coastal management stakeholders, projects and agencies on the ground, and the work to build coherency and a universal plan for restoration monitoring across the BVI. Key aspects of the long-term sustainability of the PROM project include:

- ***Short-term plans for further mangrove plantings using 2021 propagules ready to harvest:*** In July and August 2022, seedlings from the 2021 propagule harvest will be ready to go in the ground. 3 more major plantings include:
    - Anegada's South Coast led by JVDPS and the National Parks Trust of the Virgin Islands with Anegada Lands Advisory Committee invited to help provide guidance and enhancement of local participation. A targeted 1,000 propagules/seedlings from Anegada's nursery will be planted.
    - Prickly Pear Island led by JVDPS, the National Parks Trust of the Virgin Islands and the HLSCC Mangrove Nursery Team using a targeted 500 seedlings from the HLSCC Nursery. Further, NPTVI has sought funding from UniteBVI to continue long-term monitoring and replanting at Prickly Pear.

- Jost Van Dyke's Cape Wright/Diamond Cay area with JVDPS and the HLSCC Mangrove Nursery using a targeted 1,000 seedlings and propagules from HLSCC and JVD Nurseries combined.

- ***Building long-term monitoring and management capacity for mangrove ecosystems in the BVI:*** On-ground project partners JVDPS and HLSCC will continue to implement the Territory-wide monitoring framework developed under the PROM project at all current and future mangrove restoration sites in the Territory beyond project end, to capture long-term ecological impact of collective mangrove restoration work. To this end, project funds were used to purchase drone equipment for Tortola/Jost Van Dyke (owned by the National Parks Trust of the Virgin Islands NPTVI) and Anegada (managed by Rondel H. Smith, a local resident of Anegada who served as a PROM project assistant on behalf of JVDPS in exchange for drone imagery). Additional funding from UniteBVI/WellBeings also secured a drone for the HLSCC Mangrove Nursery Team.

- ***Supporting training of local BVI graduate and undergraduate students to engage in mangrove restoration and building local expertise and leadership.*** The project worked to facilitate links with an exchange program between University of New Hampshire and the H. Lavity Stoutt Community College, and also directly supported Nia Jeffers, local student, to pursue her Masters' degree on mangrove restoration in the BVI. As part of this work, Ms. Jeffers worked as the manager the mangrove nursery, innovating better approaches to cultivate high quality mangrove propagules, and planting initiatives with HLSCC and JVDPS under this project, focused on developing best practices to improve mangrove planting success in the BVI and the wider Caribbean region. As a local ambassador of mangrove restoration and conservation, Ms. Jeffers' training and mentoring of local undergraduate students will ensure development of an engaged local workforce and preservation of local expertise. It is our goal that Ms. Jeffers becomes the local mangrove expert.

- ***Building public perception of mangroves in the BVI***: Throughout project implementation, the project team has been active in writing and/or contribution to popular articles about BVI's mangroves, and their expertise has been tapped by local and regional journalists for insights, opinions, and quotes regarding the status of mangroves in the BVI. See Annex 10 for a list of articles published on mangrove ecosystems during project duration, demonstrating the growth in public perception of the value of mangrove ecosystems. In addition, the project team worked closely with the MNRL on pushing for greater legislative protections for mangrove ecosystems (see Section 4.1 for details). Despite current political uncertainties, mangroves are now well recognised in the BVI, and this momentum will continue past project duration.

- ***Politically positioning the BVI as a champion of mangrove restoration in a post-disaster context, including through advocacy for upscaling the approach to build climate resilience in the Caribbean.*** Project sustainability focused on building the regional and global recognition of the BVI as a champion of mangrove restoration. The closing workshop focused on presenting lessons learned from the BVI for wider regional uptake drew attendance from 420 participants across 61 countries (see Section 4.2 for more info). MNRL partners Joseph Smith-Abbot, Deputy Secretary the BVI Ministry of Natural Resources, Labour, and Immigration and the Honourable Minister Vincent Wheatley, Minister of Natural Resources, Labour and Immigration presented at regional and global IUCN climate workshops and conferences throughout project, such as at the UNFCCC COP26 and the Caribbean Biodiversity Fund workshop (see section 4.4 for further details). Our goal is that the BVI is now recognized as a champion of mangrove restoration, in recognition of benefits to climate adaptation and disaster risk reduction.

7 Lessons learned

Functional linkages with key local stakeholders and organisations were critical to ensure long-term project sustainability. *Initial project engagement with local stakeholders helped shift the project focus from a project-based approach to a Territory-wide approach to mangrove restoration linking across different projects and leveraging the expertise of a wide stakeholder*

group. Building these functional linkages and long-term partnerships across local stakeholders is critical for long term sustainability of project outcomes and objectives, even in a time of political uncertainty in the BVI.

The realities of working in a post-disaster context meant that some mangrove restoration sites required a large amount of debris removal and preparation before any active restoration work could commence. *In addition, some sites were determined to be impossible to restore within the project budget because of the costs associated with the required derelict vessel removal. Preliminary estimates of number of hectares to be restored were based on remote-sensing or GIS data alone, while final numbers and costs reflect the required hurricane debris removal (e.g. derelict vessels) and fence installation (which is required as over-grazing of feral ungulates on new mangrove planting sites has been documented decimating trial sites under different projects) – all realities of working in a post-disaster context. The ground-truthing exercises and local expertise of the JVDPS were critical in this regard.*

It was also critical to manage public expectations on the realities of mangrove restoration – which is not just large-scale planting. The huge amount of initial excitement on restoration activities commencing, both at the community and government level, meant that expectations of participants and volunteers had to be carefully managed to avoiding taking precedence over technical staff's ability to keep up with planning and evaluation, and ensuring best practices.

Adaptability in project targets was instrumental in the continuation of the project and its success. *Throughout the lifespan of the PROM project, we have responded to the needs of the BVI government, local stakeholders, and on-ground conditions to adapt our goals accordingly. Given the complexity of mangrove ecosystems and their capacity to restore/regenerate naturally, a scientifically robust on-ground analysis was necessary to identify which areas most required "artificial" restoration as well as the type and scope of intervention needed and any associated activities. This ground-truthing of the GIS data was critical in order to make scientifically robust and realistic decisions, as well as to determine the cost effectiveness and feasibility of different restoration sites.*

Maintaining budget flexibility for adaptive project management was critical - including the ability to shift funding between budget lines due to unanticipated COVID-19 pandemic - to ensure impactful project results.
Adaptability in the face of a global pandemic, which restricted international travel for much of the project duration. With Darwin's support, we reallocated funds from unspent travel and events budgets to provide additional support to mangrove restoration activities on the ground. This flexibility was critical to project success and to responding to the evolving needs of ecological restoration and provided valuable support that allowed for additional technical training and research development opportunities (Jeffers and Moore) that helped strengthen local capacity for ecological monitoring of mangrove habitats.

[something about working with the Government, esp in a time of political unrest]

7.1 Monitoring and evaluation

This project followed the standardised guidance on monitoring and evaluation for EbA following the Friends of Ecosystem-based Adaptation G*uidebook for Monitoring and Evaluating Ecosystem-based Adaptation Interventions*, available here. The Guidebook is a practical guide for planners and practitioners for monitoring the outcomes and impacts of EbA, and to better understand the outcomes and impacts of on-the-ground projects working with and enhancing nature to reduce the negative impacts of climate change on people.

The Regional Restoration and Monitoring Framework (Annex II) provided a scientifically robust framework for monitoring and evaluation of restoration activities both for the Darwin project as well as for other complementary mangrove interventions in the Territory. This framework includes monitoring to capture both structural and functional parameters indicative of ecosystem health as well as restoration planting success. The approaches developed are modular and scalable, allowing for engagement of both (locally trained) volunteers, as well as technical staff from university and government agencies (i.e. DDM, National Parks, etc.). The trainings and

monitoring equipment provided for the project will insure local ability to maintain and grow ecological monitoring initiatives to suit current and future restoration planning and goals.

7.2 Actions taken in response to Annual Report reviews

All feedback has been responded to throughout this report.

8 Darwin Identity

Darwin recognition and identity was built throughout project, including by utilizing Darwin logo on all project documents and presentations (see project archive here). Local and global technical partners are familiar with Darwin's identity and work to build coherence between multiple mangrove projects at the Territory level. The final project workshop and report brought wider regional recognition to Darwin, with 420 participants across 61 countries joining the three-day virtual regional workshop (see Section 4.2 for more info). Project outcomes were also widely promoted via the Global Mangrove Alliance and recognized in the 2021 State of the World's Mangrove Report (see Section 4.4 for more info).

Local BVI news articles published within the scope of the PROM project

Public perception of mangroves has been positively impacted by the many collaborative efforts that have taken place in the BVI to conserve, protect or restore mangroves. Since hurricanes Irma and Maria, many local news articles have highlighted the importance of mangroves, covered the success of these projects and have pushed for greater protections. See Annex 10 for a full list.

- *3 March 2022, Virgin Islands natural assets valued at $93 million in 2020, BVI Beacon*
- *1 March 2022, Best Practices In Focus For Mangrove Symposium, Government of the Virgin Islands*
- *9 February 2022, EDITORIAL: The Virgin Islands must save the mangroves, BVI Beacon*
- *28 January 2022, Mangrove destruction leaves VI ever more vulnerable to climate change, BVI Beacon*
- *3 November 2021, Mangrove efforts expand to Prickly Pear, BVI Beacon*
- *18 May 2021, Mangrove replanting passes 1,000 goal, BVI Beacon*
- *3 May 2021, Statement By The Honourable Vincent O. Wheatley Minister For Natural Resources, Labour & Immigration - Mangroves Replanting Efforts Throughout the Territory, Government of the Virgin Islands*

9 Impact of COVID-19 on project delivery

Actions taken to mitigate project impacts due to the COVID-19 pandemic included:

- Hiring the local JVDPS to facilitate the on-ground mangrove conservation and restoration actions, including associated field logistics, coordination with the Government of BVI and local stakeholders, and facilitating community engagement. Susan Zaluski, of the JVDPS, joined the PROM project team in this key role as our on-ground coordinator in charge of ground implementation. With Susan's coordination and leadership with the established H. Lavity Stoutt Community College's Mangrove nursery, restoration efforts and trainings were able to begin at the end of 2020.
- Planned in-person workshops were shifted to virtual engagements throughout the project duration, including for the RLE workshop and closing workshop in 2022. Given the shift to virtual workshop engagements, the unspent portions of the travel and event budgets due to the pandemic were reallocated, with Darwin's support, to support the on-ground restoration work led by the JVDPS.

10 Finance and administration

10.1 Project expenditure

Project spend (indicative since last Annual Report	2021/22 Grant (£)	2021/22 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	[redacted]	[redacted]	[redacted]	
Consultancy costs	[redacted]	[redacted]	[redacted]	Some of the costs associated with the consultancies are under line “operating costs” as pe approved by DARWIN.
Overhead Costs	[redacted]	[redacted]	[redacted]	
Travel and subsistence	[redacted]	[redacted]	[redacted]	
Operating Costs	[redacted]	[redacted]	[redacted]	
Capital items				
Others - Audit	[redacted]	[redacted]	[redacted]	Please note that the total actual audit cost amounts to [redacted] but IUCN has only claimed a total of [redacted]
TOTAL	[redacted]	[redacted]		

Staff employed (Name and position)	Cost (£)
Ali Raza, Climate Change Head Manager	[redacted]
Emily Goodwin, Climate Change Programme Officer	[redacted]
Gabi Allen, Admin Assistant	[redacted]
Kate Brown, GLISPA Coordinator	[redacted]
Maria Hasler, Programme Finance Manager	[redacted]
Milena Berrocal Vargas, Technical Officer	[redacted]
Nick Abery, Red List of Ecosystems Junior Professional	[redacted]
Olivia Massot, Admin Assistant	[redacted]
Radhika Murti, Director Centre for Society & Governance	[redacted]
Tatiana Chudina, Admin Assistant	[redacted]
Verónica Ruiz, Programme Manager Resilience	[redacted]
TOTAL	[redacted]

Consultancy – description and breakdown of costs	Other items – cost (£)
Provita – Conduct the British Virgin Islands Red List of Mangrove Ecosystems	[redacted]
Gregg Moore – Develop mangrove restoration-based knowledge products and support local partners	[redacted]

Nia Jeffers - Support the professional growth and involvement in applied research of Ms. Nia Jeffers via her master thesis	[redacted]
TOTAL	[redacted]

Capital items – description	Capital items – cost (£)
TOTAL	

Other items – description	Other items – cost (£)
Audit	[redacted]
TOTAL	[redacted]

10.2 Additional funds or in-kind contributions secured

N/A

10.3 Value for Money

This project provided excellent value for money. By building close collaboration with other Darwin projects, as well as other local stakeholders and partners on the ground, this project maximized on synergies.

The shift from in-person workshops to primarily virtual engagements (RLE workshop, closing workshop) saved planned budget on international travel and meetings and was reallocated (with Darwin's support) to support on-ground restoration work led by local partner JVDPS.

Investment in developing local scientific capacity and leadership: Ms. Nia Jeffers, local manager of the HLSCC mangrove nursery, joined the University of New Hampshire as a graduate student under the supervision of Dr. Gregg Moore, through financial support from the PROM project and a teaching and research partnership with the HLSCC's Centre for Applied Marine Studies. Nia's research focused on improving mangrove nursery and planting success. As part of this work, Ms. Jeffers worked as the manager the mangrove nursery, innovating better approaches to cultivate high quality mangrove propagules, and planting initiatives with HLSCC and JVDPS under this project, focused on developing best practices to improve mangrove planting success in the BVI and the wider Caribbean region.

Collectively, these strategic budgeting decisions have led to long-term sustainability of project interventions. After project close, a further 2000+ propagules are ready to be planted by a network of local stakeholders under JVDPS' continued leadership in the BVI.

11 OPTIONAL: Outstanding achievements of your project during the (300-400 words maximum). This section may be used for publicity purposes

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to BCF-reports@niras.com putting the project number in the Subject line.	Yes
Is your report more than 10MB? If so, please discuss with BCF-reports@niras.com about the best way to deliver the report, putting the project number in the Subject line.	No
If you are submitting photos for publicity purposes, **do these meet the outlined requirements (see section 11)?**	Yes
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	