

An aerial photograph of a tropical coastline. In the foreground, there's a lush green hillside with some buildings and a parking lot. Below that, a clear turquoise bay is filled with numerous white sailboats of various sizes. The water transitions from light blue near the shore to a deeper blue further out. In the background, there are more green hills and a small town with buildings along the coast. The sky is bright blue with scattered white clouds.

ANTIGUA AND BARBUDA BLUE RESURGENCE PROGRAM

September 2023 Proposal

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INTRODUCTION

Facing climate change:

Climate change is one of the biggest challenges faced by small island developing states (SIDS), including Antigua and Barbuda. The effects of climate change are adding to the urgency and burden faced by Caribbean countries to conserve biodiversity, water supply, forests, marine resources, and improve overall human development. The El Niño Southern Oscillation (ENSO) phenomenon frequently impacts Antigua and Barbuda. ENSO events often result in drought, which could exacerbate the scarcity of freshwater resources in Barbuda. Consequently, the country must explore inventive solutions to address this issue, including exploring opportunities in the marine sector. Additionally, Antigua and Barbuda has one of the most extensive networks of mangrove wetlands in the Eastern Caribbean, which play an important role in coastal risk management and provide habitat for marine and terrestrial species. However, these ecosystems are threatened by human activities and climate change, which could have devastating effects on industries like tourism and fisheries. Consequently, the Antiguan government has been working on the development of a framework to develop an integrated approach for coastal management.

Threats to Antigua and Barbuda's Coastal Ecosystem:

Antigua and Barbuda's coastlines are indented with numerous creeks, inlets, associated reefs and wetlands, and have extensive reef systems. Not only the climate change, but human activity is another threat to these ecosystems:

- 1) First, one of the biggest threats to Antigua and Barbuda's natural environment is the uncontrolled clearance of coastal ecosystems for residential and commercial purposes, which damages sensitive areas and harms marine ecosystems. Developers are cutting down trees, removing seagrass and mangroves, and building hotels and guest houses closer to the beach. This destroys habitats and nursing grounds for marine species, demeaning industries like fishing and tourism and speeds up coastal erosion. On the other hand, this situation is being exacerbated by ineffective management and insufficient local and regional legislation. Moreover, this growth without proper waste management infrastructure leads to improper disposal practices. The lack of proper waste management infrastructure means that solid waste, including plastics, chemicals, and other pollutants, can accumulate on land, leach into the soil, and contaminate groundwater. These pollutants can then be transported to nearby rivers, streams, or coastal areas through runoff or leaching processes, causing pollution in the surrounding marine environment. The polluted water can harm marine life, affect ecosystems, and degrade water quality, leading to negative impacts on the biodiversity and health of marine organisms.
- 2) The second risk is agricultural development: Agriculture poses significant risks to marine environments through various mechanisms. One of the main concerns is nutrient runoff, where the use of fertilizers in agricultural practices can lead to excess nutrients, such as nitrogen and phosphorus, being washed off the fields and entering water bodies. These nutrients fuel the growth of sargassum and other aquatic plants, leading to harmful algal blooms. These blooms can deplete oxygen levels in the water, causing hypoxic or dead zones where marine life

struggles to survive. Additionally, pesticides and herbicides used in agriculture can contaminate water sources, leading to toxic effects on marine organisms. Sediment erosion from agricultural lands can also degrade water quality by smothering coral reefs, seagrass beds, and other critical marine habitats. Furthermore, the conversion of land for agriculture can result in the destruction of coastal wetlands and mangrove forests, which serve as vital nurseries and habitats for marine species. The loss of these habitats disrupts the natural balance and biodiversity of marine ecosystems.

- 3) The third threat to the natural environment is tourism. Tourism in the Caribbean can have detrimental effects on marine environments. The region's exquisite coral reefs, known for their beauty and biodiversity, are at risk of degradation from activities such as diving, snorkeling, and boat anchoring, leading to physical damage and ecosystem disruption. Overfishing driven by the demand for seafood, coupled with unsustainable fishing practices, disrupts marine food chains, depletes fish populations, and threatens overall biodiversity. Improper waste management associated with the influx of tourists contributes to water pollution, harming marine life. The destruction of essential habitats like mangroves and seagrass beds to make way for tourism infrastructure disrupts coastal ecosystems, removing crucial breeding grounds and nurseries for marine species. Additionally, tourism's contribution to greenhouse gas emissions exacerbates the Caribbean's vulnerability to climate change impacts, including rising sea temperatures and coral bleaching. It is essential to prioritize responsible tourism practices and foster collaborative efforts to protect and conserve the marine environment in the Caribbean for future generations.

Impact on Industries:

In the 2021 National Budget Statement, the Prime Minister estimated that economic activity in 2020 decreased by 17%, which was a significant contrast to the 5% growth witnessed in each of the preceding five years. Nonetheless, this growth helped cushion the economy's impact during the pandemic. Antigua and Barbuda heavily rely on the ocean-linked tourism and fisheries industries, which contribute to 50% of the GDP (45% of employment) and 2% of GDP, respectively.

However, these industries face a significant threat due to uncontrolled development and pollution of the coastal ecosystem. The reduction in tourism visitors by over 60% in 2020 compared to 2019 resulted in a reduction of over 60% in the hotel and tourism sector, leading to a considerable decrease in employment. The World Health Organization estimates that inaction on climate change in Antigua and Barbuda could cost up to \$25.8 billion by 2050, with tourism, health, and fishing being the most impacted sectors.

Antigua and Barbuda's Road to sustainability:

To address these issues, the government of Antigua and Barbuda has been working on the development of a framework to advance an integrated approach for coastal management. Over the past few years, Antigua and Barbuda has successfully deployed 11 Marine Protected Areas (MPAs) covering roughly 20% of their coastal waters and covering around 30,000 hectares. However, the limited funding and inadequate legislative framework significantly diminish the potential positive impact of these areas.

To remediate this bottleneck, the government of Antigua and Barbuda has developed the Maritime Blue Economy Plan, which aims to manage the use of the country's coastal resources in a sustainable, integrated, way, providing significant economic benefits for the country. The government has taken action to develop and implement a national system of coastal and spatial planning, as well as implement Environmental Impact Assessment (EIA) into its coastal management strategy. By protecting its natural resources from potential harm caused by development or other activities, Antigua and Barbuda can ensure that these resources continue to provide ecosystem services that are critical to the livelihoods of local communities.

In addition to these efforts, Antigua and Barbuda set up their Nationally Determined Contribution (NDC) with a focus on climate change resilience and adaptation:

- 1) Reduce greenhouse gas emissions including CO₂, CH₄, N₂O and HFCs, and the estimated cost of implementation of measures is US\$ 220 million.
- 2) Reduce dependency on imported energy by developing local renewable energy. The objective is to reach 50 MW of electricity from these sources by 2030.
- 3) Develop innovative waste-to-energy solutions to reduce pollution and increase energy output.
- 4) Protect by 2030 all remaining wetlands and watershed areas with carbon sequestration potential.
- 5) Improve disaster preparedness through Disaster Risk Management (DRM).

The efforts led by the government underline the nation's willingness to take action and provide the right tools for innovative solutions to come and support their climate change policies.

How can NOAH ReGen help reach this new vision?

Noah ReGen – which stands for Network Ocean Ambassador Headquarters Regeneration – is an international group offering ocean states a comprehensive solution to:

- Fast-track their ecological transition, including tools for valuing their natural resources,
- Unlocking new sources of income by attracting private funds, and
- Tracing blended finance projects for maximum impact.

We believe that saving humanity from the worst consequences of climate change requires regenerating our oceans. And this requires reimagining how we do climate funding – focusing on blended finance, local ownership, and deep traceability. At scale.

Following the signature of an agreement during COP27 between Prime Minister Gaston Browne and NOAH ReGen, we embarked on a transformative journey to support the government of Antigua and Barbuda in realizing this new vision that will not only restore ecosystem services such as fisheries, biodiversity, tourism, shore protection, and carbon sequestration, but also generate wealth from marine resource products that will support the long-term protection of these areas.

By taking an integrated and holistic approach at national level and developing and implementing a ridge to reef strategy, the overall objective is to guarantee the durability and the sustainability of Antigua and Barbuda's ecosystem services as well as providing a roadmap to new economic development for local communities.

Following the extensive discussions with local and international stakeholders, NOAH ReGen drafted the Blue Resurgence Program to support the government of Antigua and Barbuda in the development of their new Blue Economy strategy.

In the proposed Blue Resurgence Program, Noah will:

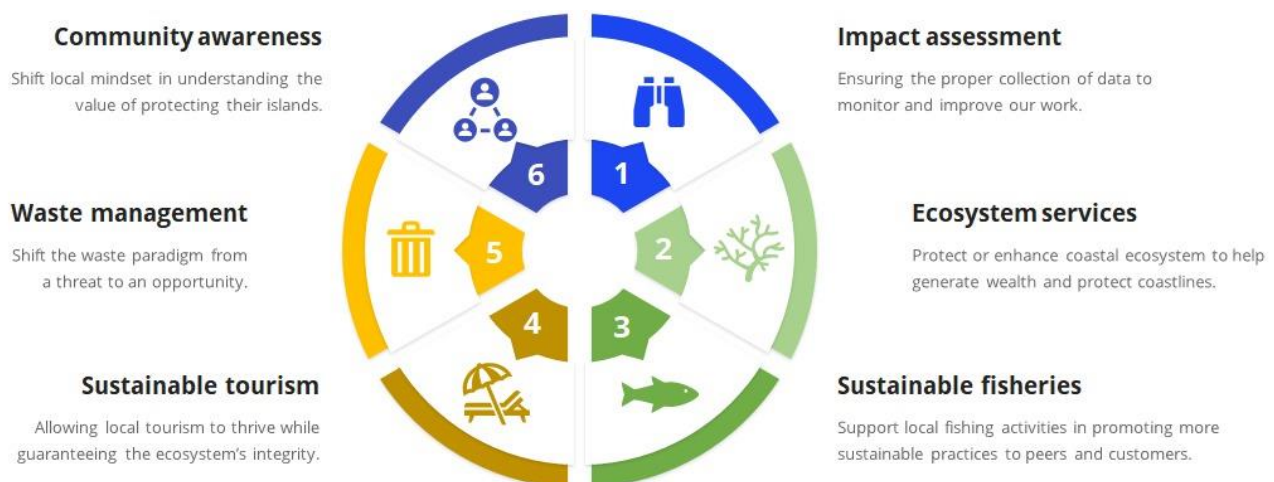
1. Coordinate the regeneration work with local actors to ensure that the work creates a net positive for the environment;
2. Serve as the focal point for conversations with the government;
3. Provide the necessary monitoring and verification technology to accurately quantify ecosystem improvements, using algorithms and machine learning based on high-resolution satellite images;
4. Prepare the necessary documentation (project design documents (PDD), monitoring reports, contact with validation and verification bodies) for the issuance of carbon credits, providing new revenue streams for the government and a source of financing for regeneration activities.
5. Help in raising funds for all the projects inside this program

VISION

Objective

The aim of this proposal is to outline a program that will support the government's Maritime Blue Economy Plan to build a comprehensive ridge-to-reef strategy that promotes coastal restoration, community well-being, and economic growth. To achieve this, we must move beyond conventional conservation approaches and embrace a holistic perspective on the nation's "blue assets," paving the way for a sustainable and resilient blue economy in Antigua and Barbuda.

The Blue Resurgence Program



The Blue Resurgence Program, or BRP, will work on 6 main axes in order to achieve AB ambitious vision:

1. Building of a strong Impact Assessment of the project

The first work plan and objective of this comprehensive project is to provide an accurate diagnosis of the geographical distribution, current status, health, and potential threats faced by each unique marine ecosystem within the target area. By meticulously mapping and identifying these ecosystems, estimating their carbon content, assessing their health, and establishing a nationally accepted standard, this initiative strives to create a solid foundation for effective conservation and regeneration actions. Continuous monitoring further ensures that the project remains adaptive and responsive, enabling timely interventions and paving the way for a sustained and impactful marine resurgence program. To achieve this ambitious goal, a series of meticulously designed steps have been devised and could be found in this Work Plan chapter below.

2. Enhancing ecosystem services provided by coastal environments

The BRP aims to enhance the extremely valuable ecosystem services provided by Antigua and Barbuda's coastal environments. It involves implementing measures to protect and restore mangroves, coral reefs, and seagrass beds, which play critical roles in coastal protection, carbon sequestration, and providing habitats for marine life. These efforts contribute to maintaining the health and resilience of pristine areas, such as the Codrington lagoon, while generating new sources of revenue through carbon and biodiversity credits.

3. Ensuring the emergence of a sustainable fisheries sector

The BRP aims to establish sustainable fisheries practices by implementing effective management strategies. It involved training local fishermen, fostering collaboration with communities and regulators, improving monitoring of wild stocks and diversifying the sector.

4. Encourage sustainable practices for tourism

The BRP focuses on identifying and promoting ecotourism opportunities that minimize negative impacts on the environment and local communities. It involves creating nature-based tourism experiences and supporting the existing ones, training existing tourism actors on sustainability issues and promoting the rich cultural heritage of Antigua and Barbuda.

5. Improving infrastructure for waste, pollution, water treatment and energy

The BRP focuses on improving infrastructure in Antigua and Barbuda to mitigate the negative impacts of waste and pollution. This includes implementing waste management systems, and promoting recycling and waste reduction practices, upgrading wastewater treatment facilities and transitioning towards cleaner energy sources. By doing so, the goal is to reduce pollution and preserve the natural beauty and ecological integrity of the islands.

6. Rally communities behind the protection of their natural and cultural heritage

The BRP seeks to engage and empower local communities to become active participants in the conservation of their natural and cultural heritage. Through educational programs, community outreach initiatives, and the promotion of environmental stewardship, the project aims to raise awareness and foster a sense of ownership and pride in preserving the unique natural resources and cultural traditions of Antigua and Barbuda.

By developing a unified strategy for coastal protection and blue carbon, The Blue Resurgence Program (BRP) will greatly enhance the social and economic well-being of the island. This shared roadmap will foster collaboration and stronger partnerships among the community, government, NGOs, and other stakeholders.

Through collective efforts, the stakeholders can leverage their respective strengths and resources to implement more effective conservation and restoration initiatives. This, in turn, will lead to improved ecosystem health and increased resilience to the impacts of climate change. Consequently, sustainable economic opportunities, such as eco-tourism and responsible fishing practices, can emerge, benefiting both the environment and the local economy. Furthermore, involving all stakeholders in the implementation of this strategy will promote social cohesion and enhance community ownership and engagement in environmental management. By working together, we can establish a solid foundation for the long-term success of the blue economy in Antigua and Barbuda, serving as a beacon of inspiration for others facing similar challenges: the BRP has the potential to serve as a model for other developing nations and island states facing similar challenges.

Scaling up

The Blue Resurgence Program will commence its operations with a pilot phase to be selected in either Antigua or Barbuda. The Area of Interest (AOI) will be selected after careful assessment and understanding of the actual degradation status of ecosystems and areas that show greater potential to work.

Recognizing the unique ecological significance of Barbuda's marine habitats, this initial phase will serve as a testing ground for implementing sustainable conservation practices and evaluating their effectiveness. Upon successful implementation and positive outcomes, the program aims to expand its operations to a national level, encompassing additional areas of interest such as the Northeast Marine Management Area (NEMMA).

This phased approach allows for focused efforts in Barbuda while ensuring the scalability and broader impact of the program throughout the entire nation, promoting the long-term preservation and sustainable use of marine resources. The success of this project will also attract new funding resources, allowing for expansion of our conservation efforts. By creating new restoration projects, we will be able to reach the Nationally Determined Contributions defined by the government.

Making Antigua and Barbuda a blueprint for marine conservation

The BRP has the potential to become a conservation blueprint for other nations grappling with similar environmental challenges. By demonstrating effective strategies, sustainable practices, and measurable outcomes, the program can serve as a model for addressing marine ecosystem conservation on a global scale.

Lessons learned from the program's implementation, including the pilot phase in Antigua or Barbuda and the subsequent expansion to a national level, can be documented and shared with other countries facing similar issues. Antigua and Barbuda can position itself as a leader in climate resilience by actively promoting the program and showcasing its achievements and best practices through international platforms, conferences, and partnerships.

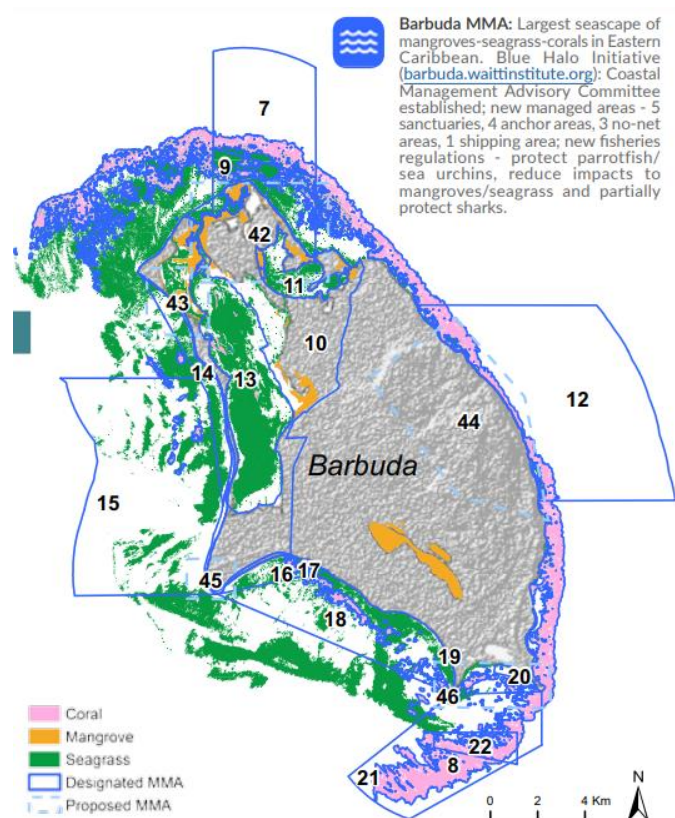
By sharing knowledge and collaborating with other nations, Antigua and Barbuda can contribute to a collective global effort in combating climate change impacts and protecting marine ecosystems. This leadership role will not only enhance the country's reputation but also inspire and guide other nations in their own climate resilience initiatives, fostering a collaborative response to shared environmental challenges.

AREAS OF INTEREST

Barbuda and Codrington lagoon

Barbuda is the top fishing island in the Eastern Caribbean due to unique environmental and social factors. Barbuda is a very low and dry limestone island, too infertile to grow food, so the population lives almost entirely from the sea. They have the richest fishing resources in the Eastern Caribbean due to Codrington Lagoon, the largest lagoon in the eastern Caribbean, which is isolated from the sea by a 10-kilometer barrier beach, and which is accessible from the sea only by a long winding channel through the mangroves.

Because of the very low freshwater input, the lagoon is essentially marine, and its shallow mangroves, seagrass, and coral reefs provide unexcelled nursery grounds for juvenile reef fish, lobster, conch, and sea cucumbers,



which migrate through the narrow channel, and then reach maturity in the seagrass beds and coral reefs that surround the island. These reefs and seagrass are the largest and least damaged in the Eastern Caribbean, and the richest in productivity due to habitat quality, the small population and lack of pollution from land-based sediment and sewage inputs. Barbudans export their catch throughout the northeast Caribbean. Codrington Lagoon is also a Ramsar site essential for migratory birds, and home to the largest Frigate Bird nesting colony in the Caribbean. This site is a unique ecotourism resource and migratory bird watching site. It is the only pristine large lagoon left in the Eastern Caribbean, since the only similar large lagoon Simpson's Bay in St. Martin, has been turned into a stinking dead zone due to sewage pollution and garbage dumping. Codrington Lagoon should be designated and managed as a UNESCO World Heritage Site to preserve its uniqueness and importance.

Barbuda mangroves grow tall and green only in Frigate bird nesting sites, fertilized by bird droppings. At their bases there are masses of algae like mangroves in other parts of the Caribbean receiving sewage. The rest of Codrington Lagoon, even the areas in front of town and where fishermen gut their catches are largely free of weedy algae because of the low water nutrient levels from land-based sources of pollution. As a result of low nutrients almost all the mangroves are dwarf mangroves, growing very slowly. Marine plant growth of mangroves, saltmarshes, and that seagrasses can be accelerated, both above ground and below, with solar panels and the Biorock process, without nutrient additions, and the increased carbon stored can be documented if a global carbon credit trading scheme is agreed to. Barbuda has the highest potential for mangrove Blue Carbon storage in the Eastern Caribbean apart from the much larger and wetter Trinidad.

Barbuda also has a unique social setting, it is the only island in the Caribbean entirely owned in common by the residents. Following emancipation from enslavement, Barbudans were granted ownership of the entire island because it had no value to anyone else since it was too dry to grow cotton or sugar cane. Barbudans are a very independent community used to surviving on their own for hundreds of years, and they value education highly.

In 2017, category 5 Hurricane Irma opened a 1.2-kilometer-wide gap in the barrier beach, which threatens the finely balanced water quality of Codrington Lagoon. Previous hurricanes had created gaps in the barrier, but they had always closed naturally. This time, the gap continues to open up. Closing it is essential to preserve the water quality of Codrington Lagoon as the critical fisheries nursery area for the future of Barbuda's fisheries economy.

Because hurricane Irma destroyed or damaged most of the houses on the island, the entire population was evacuated to Antigua for around a year and a half. During this period of forced involuntary exile, rich foreign developers occupied the land behind the pristine beaches, the largest in the eastern Caribbean, for hotels, luxury villas, golf courses, and a mega-yacht marina, which would dredge Codrington Lagoon open to the sea for luxury boats, and dump sewage and fertilizers into the pristine lagoon, destroying the fisheries (<https://www.globalcoral.org/palmetto-point-development-potential-impacts-on-barbudas-fisheries/>). The developers are continuing to clear-cut the natural vegetation, dig up the highest sand dunes essential to groundwater recharge, and destroy and fill in essential wetlands as part of their development schemes, against the will of most of the population. The same developers had previously destroyed the most important fisheries nursery grounds, mangroves, seagrass, and coral reefs at Guana Cay, Abaco, Bahamas with a similar scheme (<https://www.globalcoral.org/golf-courses-kill-coral-reefs-and-fisheries-harmful-algae-blooms-and-disease-caused-by-nutrient-runoff-from-golf-course-development-on-guana-cay-abaco-bahamas/>). Harmful algae blooms can quickly be reversed only by removing the nutrient sources that fuel them (<https://www.globalcoral.org/covid-ends-dolphin-pollution-in-discovery-bay-jamaica/>).

The Barbuda Council, the elected government of the island, has requested technical assistance to close the Hurricane Irma gap to preserve Codrington Lagoon and enhance their sustainable fisheries capabilities with mariculture.

NonSuch Bay and NEMMA

The Northeast Marine Management Area (NEMMA) encompasses about 10,475 hectares (25,884 acres) of marine and coastal area in the northeast of Antigua. It is Antigua's largest marine reserve and comprises fringing and patch reefs, seagrass meadows, rocky and sandy bottom areas, and mangrove forests, as well as 28 named offshore islands (Environmental Awareness Group n. d.; Figure 1). These rich and diverse coastal and marine ecosystems support the NEMMA's tourism and fishing industries, nourish beaches and sequester carbon as well as protect vulnerable coastlines from erosion and storm surge during hurricane season (Ecoengineering Caribbean Ltd 2007). The NEMMA is recognized as a globally significant refuge for endemic, rare and globally important wildlife including the critically endangered Antiguan racer snake (*Alsophis antiguae*), hawksbill sea turtle (*Eretmochelys imbricata*), and elkhorn, staghorn and fused staghorn corals (*Acropora palmata*, *A. cervicornis* and *A. prolifera*) and the vulnerable West Indian whistling duck (*Dendrocygna arborea*) (Jackson 2008). The health of coastal and marine habitats within the NEMMA are tightly linked and reliant on one another, as is the wellbeing of coastal communities and the productivity of these natural environments.

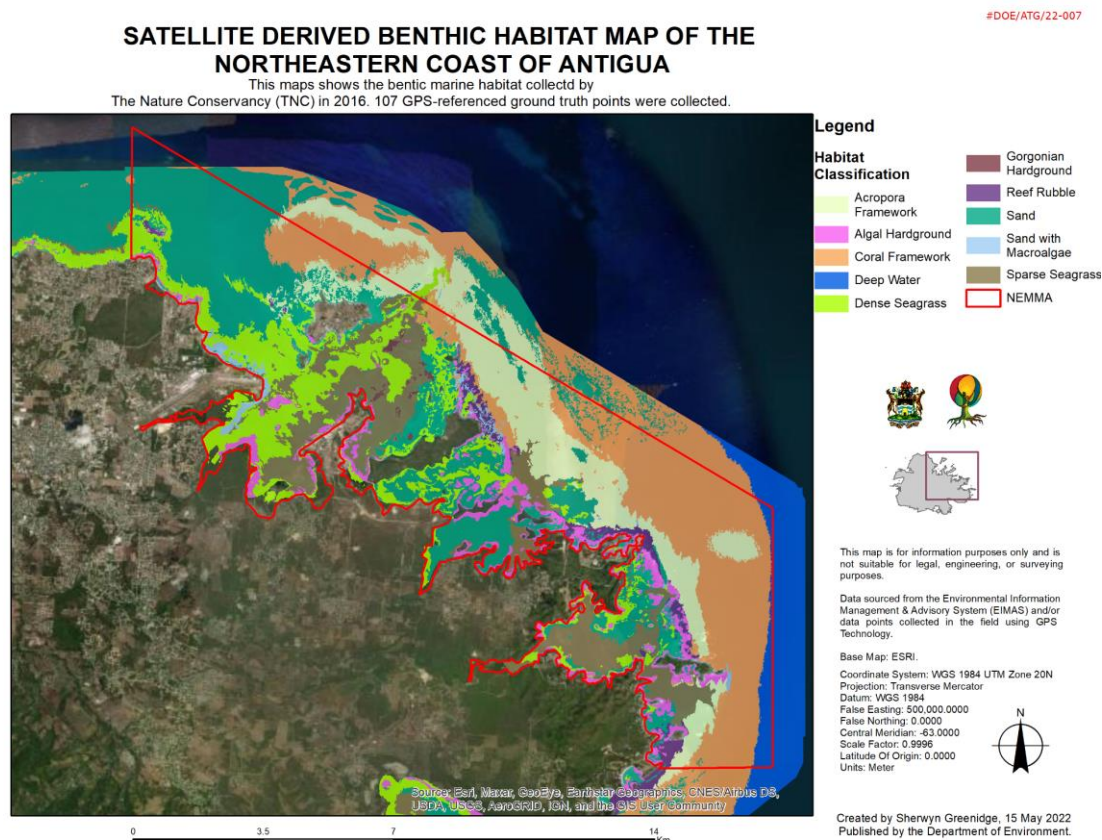


Figure 1. Map of the NEMMA with satellite derived marine benthic habitats. Credit: Antigua & Barbuda Data Management Unit, Department of Environment.

The NEMMA was designated as a marine reserve in 2005 under the Antigua and Barbuda Fisheries Act (Antigua Ministry of Agriculture Fisheries and Barbuda Affairs 2006; Cap 173, Section 22). A management plan for the reserve was created for the period of 2007-2010 (Jackson 2008), however, due to a series of financial and institutional challenges, the management plan was never implemented nor enforced by the Fisheries Division. This has left critical coral reef, seagrass and mangrove ecosystems within the NEMMA vulnerable to unsustainable coastal and marine development, illegal and unreported fishing

and garbage dumping, physical damage from ship groundings, improper anchoring and prop washing, as well as plastic and effluent pollution. This has contributed to the demise of critically important and endangered species as well as the proliferation of invasive and/or detrimental species, further degrading the health of these ecosystems and diminishing the profitability and resilience of the industries which rely upon them. The NEMMA provides a plethora of ecosystem services that are essential yet undervalued, highlighting the importance of reevaluating the area and implementing a natural resource plan that is financially and institutionally feasible. As noted in the 2007 Environmental and Socio-economic Study of NEMMA, the area supports a variety of fish species, including some that are commercially important, such as spiny lobster and conch. Additionally, the tourism sector generates an estimated \$10 million annually, and the area provides important coastal protection against storms and sea-level rise.

The area of interest: Nonsuch Bay area

The Area of Interest (AOI) for this Marine and Terrestrial Management Area is located at the south-east range of the NEMMA, and encompasses the ecosystems within the Nonsuch Bay area, specifically from the south-west border of Devil's Bridge National Park to Exchange Bay (Figure 2). The proposed AOI is bounded seaward by:

- 17.092124°, -61.681969°
- 17.095133°, -61.648370°
- 17.066630°, -61.641542°
- 17.046279°, -61.646414°
- 17.027315°, -61.658725°
- 17.040509°, -61.681839°



Figure 2. Map of the proposed Area of Interest for this Integrated Marine Management Strategy.

English Harbor and Nelson's dockyard

Nelson's Dockyard, located in Antigua, is surrounded by a coastline that's ecologically pivotal, underpinned by intricate marine systems, and concurrently holds considerable economic value. Scientifically, the adjacent marine areas have been quantified to support diverse coral ecosystems. Studies have shown that healthy coral reefs can support up to 25 tons of fish per square kilometer annually, underscoring their role as vital fish habitats. Economically, this translates into substantial support for local fisheries, a critical source of income for many coastal communities.

Furthermore, seagrass meadows along the coastline play a dual role. From an ecological perspective, they are vital for carbon sequestration. Economically, they bolster the fishery sector by providing nursery grounds for many fish species, which has a cascading benefit for the local fish market and associated industries.

Mangroves, another integral component of the coastline, not only house diverse terrestrial and aquatic species but also act as buffers against storm surges and sea-level rise. The economic implications here are considerable, with mangroves potentially averting over \$80 billion in damages to global coastal properties annually.

It's noteworthy to mention that the National Parks Authorities have been proactive in recognizing and maintaining these assets. Their initiatives and conservation efforts have been instrumental in preserving the ecological and economic integrity of the region. The introduction of the Blue Resurgence Program aims to further buttress these efforts. Collaborating closely with the National Parks Authorities, the program's vision is to enhance marine conservation, ensuring the long-term sustainability of both the ecological and economic assets of Nelson's Dockyard and its surrounding coastline.

Workplans

Our strategic approach focuses on short-term and long-term objectives. In the short term, we prioritize comprehensive assessments and meticulous mapping of the island's diverse ecosystems, enabling us to address immediate challenges and plan for the future. Transitioning to the medium term, our efforts intensify with active cleaning and enhanced protection measures in small areas, utilizing cutting-edge technologies and community involvement to preserve the delicate marine life from pollution and human disturbances. Looking ahead to the long term, our ambitious vision is to restore and regenerate between 10 to 30% of all ecosystems on the island, driven by sustainable practices.

1. Building an Impact Assessment to evaluate the current state and continuously monitor future efforts

The process of Impact Assessment is an iterative process and is the first step in order to correctly evaluate the current national situation of each pillar and create a sustainable strategy to monitor future regeneration efforts.

The Blue Resurgence Program comprehensive strategy involves a four-step process. The BRP will work on four main axes to reach this objective, each of them will be supported by local and international stakeholders: (a) Ecosystem Mapping, (b) Ecosystem Carbon Estimation, (c) Ecosystem Carbon Assessment and (d) National Blue Carbon Standard

- a. **Ecosystem Mapping:** first we will conduct meticulous mapping and identification of each unique ecosystem, using satellite images and Noah's proprietary technology, ensuring we grasp their distinct characteristics and intricacies.
- b. **Ecosystem Carbon Estimation:** through soil samplings and ground-truth data we will be able to calibrate our models of remote sensing and be able calculate the carbon stock density and fluxes of each marine ecosystem.

- c. **Ecosystem Carbon Assessment:** with the help of international partners that will provide the knowledge and experience to the local teams, we will rigorously assess and evaluate the current health and level of protection of these invaluable ecosystems, allowing us to identify areas that demand immediate attention. Based on the work done in the previous two steps and these thorough assessments, we will strategically evaluate protection and regeneration actions, ensuring a sustainable and effective impact
- d. **National Blue Carbon Standard:** the creation of a nationally accepted Blue Standard is important in order to create the “rules of the game” for any blue carbon regeneration or protection activities that could arise.
- e. **Monitoring:** we will generate and perform the necessary steps to follow in order to perform continuous monitoring once the different actions are implemented. Building a monitoring strategy to assess impact and anticipate risks is essential for the success of the Blue Resurgence Program in Antigua and Barbuda. By implementing a comprehensive monitoring system, the program can track and evaluate the outcomes and effectiveness of conservation efforts in real-time. This strategy enables the identification of potential risks and challenges, allowing for timely interventions and adaptive management. This will be of vital importance to pave the way for Work Plan 2.

a. Ecosystem Mapping

The objective of this very first study is to integrate all the State of the Art of studies done by the government and local or international parties in understanding, analyze, map or evaluate the current state of marine ecosystems. For example, for seagrass we will build on the foundation of two significant studies that mapped and characterized seagrass beds in Antigua and Barbuda. The first work (Hawes, Sperry, Benson & Mitchell, 2010), provided vital baseline data for coastal topography and nearshore bathymetry in Barbuda. Utilizing innovative techniques like drop camera systems and laser-scaled still images, they analyzed 309 transects and 1976 images, yielding valuable insights into percentage coverage and benthic communities. The second study, conducted by the National Oceanography Centre (2022), contributed essential outcomes, including marine habitat maps with seagrass deposits' depth and a deeper understanding of seagrass health and composition.

Then, once the State of the Art is evaluated, we will proceed to the mapping of the main marine ecosystems of the islands in order to create an estimation of the areas covered by the main marine ecosystems in Antigua and Barbuda (mainly seagrass, mangroves and others that could be important in the calculation of carbon sequestration potential).

This part of the study will cover the following step-by-step approach:

- I. Research and public data analysis: research on public data (research papers, reports, and datasets from government agencies, NGOs, and other relevant sources) to better understand of the current state of knowledge about marine ecosystems in Antigua and Barbuda, including their distribution, ecology, and conservation status.
- II. Determination of the areas of interest and obtaining satellite images: by review of existing literature and consultations with local stakeholders, we will delimit the area of interest we want to map. Once the areas of interest have been identified, we will obtain high-resolution satellite images from PLANET provider. The images will be used to map with high accuracy the

distribution of marine ecosystems in the study areas using Noah's proprietary technology explained in the following step.

- III. Geospatial analysis to determine the exact location of seagrass and mangroves: we will use deep machine learning geospatial analysis techniques to determine the exact location of seagrass and mangrove ecosystems within the study areas. This will involve the processing and analysis of satellite images using Geographic Information System (GIS) software. The results of this analysis will provide a detailed map of the distribution of marine ecosystems in the study areas.

b. Ecosystem Carbon Stocks and Fluxes Estimation

In parallel to the previous point, the BRP will need the support of local teams to conduct sampling missions. This on-the-ground data collection will serve as a vital input for algorithms and models, enabling them to make informed predictions and assessments. The involvement of local teams ensures that the data reflects the specific characteristics and dynamics of the ecosystem, enhancing the accuracy and relevance of the algorithms' outputs.

On top of that, a soil sampling process will be needed in order to quantify the carbon stock and fluxes of mangrove and seagrass meadows. Based on preliminary estimations, 24 samples for seagrass and about 20 for mangroves would be enough. For each island, seagrass samples will be taken in: dense healthy seagrass, sparse healthy seagrass, seagrass in sediment deposition areas, seagrass in areas with "local" sediments (scarce allochthonous sedimentation due to 'runoff'), deteriorated meadows and control areas. To the surveys it is necessary to add the sampling of the aerial and underground biomass, and to estimate the stock in living plants and the amount of litter accumulated in the meadows must also be quantified (3 squares of 20x20 in each type).

With all this, we would have covered the main factors of variation of the blue carbon stock in the seagrasses of the islands and the information that they will ask you if you want to certify carbon credits.

For mangroves, the information available seems scarce, but based on preliminary research, each mangrove should be distinguished by typology according to kind, degree of exposure, sea-land gradient and healthy vs degraded. It would be necessary to sample the underground part (probes in triplicate for each type) and the aerial part (DBHs in 3 5x5 plots). The boreholes (with 50 cm of recovered material would be sufficient, although 1m is ideal) should be divided into 3 sections: recent, intermediate and old.

Of all the samples, the organic matter would have to be determined doing laboratory analysis.

Potentially the sampling will be led by the CSIC and the team of Miguel Angel Mateo who also sampled extensive regions of mangroves and seagrass in the past, including the project of LIFE Blue Natura, initiative that this project reference to.

c. Ecosystem Carbon Assessment

This part of the study is based on integrating the result of the two previous steps and identify areas that needs protection or regeneration actions.

Rigorous assessment involves evaluating various factors that influence the health and protection level of marine ecosystems. This assessment considers biodiversity, ecosystem structure, and potential stressors or threats such as pollution, habitat destruction, and fishing pressure. Assessing these factors

provides a comprehensive picture of the ecosystem's current state and identifies areas that need immediate attention. The assessment helps prioritize protection and regeneration actions, ensuring that efforts are focused on areas with the greatest need. It also ensures that the actions taken are strategically planned to achieve sustainable and effective outcomes.

It will cover the following step-by-step approach:

- I. Estimation of historic evolution of ecosystem degradation and baseline determination: Based on results of step “a” and “b” before, we will integrate the carbon stocks with the surface of each ecosystem. We will analyze the historic images to determine the increase or decrease of surface of marine areas (seagrass, mangroves, etc.) country-wide. The main objective of this step is to identify areas with higher levels of degradation rates, potential degradation causes, carbon stock changes and generate a baseline for future monitoring and conservation efforts.
- II. Baseline definition: we will define a future probabilistic scenario of a “business as usual scenario” stating what would have happened if we do not implement any regenerative initiative.
- III. Final report including changes in existence of the last years, ecosystem degradation/regeneration rates and baseline quantification: preparation of a final report, which will summarize the findings of the study. The report will include information on the surface and carbon stock changes in the last years. On top of that, we will select POC areas where protection and regeneration activities could start.

d. Creation of a National Blue Carbon Standard

Creating a national Blue Carbon Standard involves establishing a set of guidelines, protocols, and criteria that define how carbon sequestration and ecosystem restoration efforts will be measured, validated, and reported. This standard provides a common framework for all stakeholders involved in marine ecosystem protection and regeneration. It ensures that activities are carried out consistently and transparently, and that results are credible and comparable. The standard also sets expectations for accurate carbon accounting and reporting, which is essential for tracking progress and communicating the impact of the project to stakeholders and the broader public.

e. Continuous monitoring

Monitoring will involve the systematic collection of data over time to track the progress and effectiveness of the protection and regeneration actions, with the support mainly of local partners and satellite technology.

A comprehensive monitoring strategy will be developed to collect data on various parameters such as ecosystem health, carbon storage, biodiversity, water quality, and potential threats, with the combination of local support and technology.

This data is collected at regular intervals after the implementation of actions to assess changes and trends. The monitoring strategy allows the project team to identify any deviations from expected outcomes, potential risks, or challenges that may arise. Timely interventions and adaptive management can be implemented based on the insights gained from monitoring, ensuring that the project remains

responsive and effective. This strategy also informs the development of future plans and actions, ensuring the sustained success of the marine ecosystem resurgence program.

International Partnership Participation

Each of these steps plays a vital role in achieving the overarching goal of resurging marine ecosystems at a national level by protecting and regenerating them. The combination of technology, data collection, assessment, and standards ensure a well-informed and strategic approach to ecosystem conservation and restoration.

Mapping, Sampling, Laboratory analysis, Assessment and Monitoring will be done with help of already identified international partners. Strong partners with outstanding experience in each domain will be onboarded, such as Movired, Tecnoambiente, MAP, CSIC. Please refer to Annex 3 “Stakeholder Mapping” for further information of each stakeholder.

2. Enhancing ecosystem services provided by coastal environments

This second Work Plan is the continuation and Implementation of the Work Plan 1 described above.

After the initial impact assessment and having a complete and deep understanding of the issues in the islands, the goal of this project is to restore and preserve endangered environments, coupled with the recognition and incorporation of the value of ecosystem services in coastal development, that would yield positive outcomes for both the well-established fishing and tourism industries. It is essential to have a comprehensive understanding of the marine environment's condition to ensure the sustainable growth of these sectors. Additionally, by incorporating sustainable practices and promoting carbon sequestration, the coastal development initiatives can also contribute to the generation of carbon credits, further enhancing the economic and environmental benefits of the project.

The BRP will work on four main blue assets to reach this objective: coral reefs, mangroves, seagrass and, in the future, seaweed.

To work on each ecosystem, the same strategy will be followed: first to do a deeper assessment of each ecosystem (define location, protection status, current health status, potential threats and courses of action found in the previous work plan). After that, actions will be implemented oriented in two fronts: protection and regeneration/revegetation.

In the 4 years of the project, the ambition is to protect at least 30% of the natural marine resources of the island and degenerate degraded ecosystem up to 10%.

Below there is a description of each ecosystem, the current state, threats it faces, and the potential solution proposed based on research done so far. Concrete solutions will be proposed once Work Plan 1 and Work Plan 2 are implemented.

a. Coral reefs

Coral Reefs in Antigua and Barbuda face significant challenges, with an estimated coverage of 5490 ha in the Caribbean, of which only 64% are protected within marine and coastal areas. These vital ecosystems are predominantly located on the east side of the country, benefiting from robust water circulation and high wave energy. However, they are under grave threat from more frequent and destructive hurricanes, alongside human-induced pressures such as over-fishing, boat anchoring damage, improper fish trap placement, recreational diving disturbances, and sewage release from coastal developments. Climate change impacts, including rising temperatures, ocean acidification, and extreme weather events, worsen the situation. Urgent attention and a strong regeneration focus are required to reverse the coral reefs' very poor condition, as live coral coverage is estimated at a mere 3.8% in sampled areas.

After identifying various initiatives working on coral restoration, the objective would be to test out these solutions to identify which one is the most suitable to ensure the longevity of the coral reefs. Most of these solutions have already done field tests in similar areas around the world with positive results showing growth and resilience to rising temperatures.

b. Mangroves

The mangroves in Antigua and Barbuda cover approximately 800 hectares, facing a high level of threat, with only 47.19% of their surface protected within marine and coastal areas. The main causes of degradation include economic growth in coastal development, which has been significantly reduced through awareness and legislation efforts. Hurricanes and storms also pose challenges to regeneration, despite decreased coastal development. Additionally, factors such as sea-level rise, higher temperatures (due to coral reef destruction), and increased coastal erosion contribute to the mangroves' vulnerability.

The conservation of mangroves in Barbuda is an important part of the overall strategy to protect the island's coastline and ensure its long-term sustainability. On top of that, there are areas that show clear degradation rates.

In order to tackle both elements, the procedure to follow is the one recommended by many mangrove protection and restoration initiatives found globally called CBEMR (Community Based Ecological Mangrove Rehabilitation). CBEMR-Community-Based Ecological Mangrove Restoration is a mangrove restoration methodology that is grounded in the basic principle that restoring mangroves requires that the natural ecological processes that once supported the healthy mangrove need to be restored first and foremost. CBEMR thus places a strong emphasis on correcting hydrological problems and dealing with natural or man-made stressors in order to facilitate natural mangrove regeneration. It reaches far beyond mere hand-planting of seedlings, as is typical of mangrove restoration projects, and increases the effectiveness of restoration of degraded mangrove forests by embracing and understanding the mangrove ecosystem as a whole.

CBEMR is also a participatory, community-led process that thinks long term. Community involvement occurs from the planning stage, through implementation often engaged in the required physical adjustments to the site to the monitoring and follow-up, which may involve developing a management plan. By engaging the local community from the onset of the restoration project, CBEMR does not consider community involvement as a mere mechanism to levy manpower for field work. Rather it relies on participation as an empowering process that creates a sense of ownership of the restoration project

among the community and that helps maintain the project's benefits on the long run. The CBEMR approach teaches local people how to restore the hydrology of former or degraded mangrove sites to facilitate the natural regeneration of mangroves.

For this project, we will work with recognized international partners, such as MAP (The Mangrove Action Project), The Ocean Foundation, Tecnoambiente and The Mangrove Alliance, that will not only help in the mapping, assessment and training for the implementation of the groundwork, but also will closely collaborate with the local communities, implementing these practices, bringing knowledge to the local actors and giving them the tools and confidence for mangrove restoration and protection, generating the solid ground for these type of actions to last decades.

This approach has already been implemented and proved in many use cases around the globe and it has been detailed in many studies, by different stakeholders and the partners we have been discussing.

For further information about this approach, please refer to the material prepared by The Mangrove Alliance (<https://www.mangrovealliance.org/wp-content/uploads/2021/09/Mangrove-Principles-LONG.pdf>) and MAP (<https://www.mangroveactionproject.org/cbemr/wp-content/uploads/2015/05/CBEMR-Infosheet6.pdf>) and its use case in El Salvador: <https://mangroveactionproject.org/2023/04/18/impact-assessment-of-mangrove-restoration-training-in-el-salvador/>)

c. Seagrass

Seagrass is a major carbon sink, but about half the world's seagrass has been lost to pollution, dredging, and sediment runoff from land. The seagrasses in Antigua and Barbuda covers approximately 25260 ha and face a high level of threat, with only 21.68% of their surface protected within marine and coastal areas. Unfortunately, these vital ecosystems, which serve as food sources for fish and turtles and act as nurseries for young conch, spiny lobsters, shrimp, and various fish species, are being destroyed due to several factors. Economic growth in coastal development has been significantly reduced through awareness and legislation efforts. However, climate change remains a major concern, with increasing pH levels, temperature, and sea level rise posing a significant threat to the seagrasses, ultimately leading to potential complete destruction. Moreover, the rise in hurricane and storm frequency contributes to seagrass damage, with intense storm surges often washing up these ecosystems on the seashores.

Our upcoming plan is built on the foundation of two significant studies that mapped and characterized seagrass beds in Antigua and Barbuda. The first work (Hawes, Sperry, Benson & Mitchell, 2010), provided vital baseline data for coastal topography and nearshore bathymetry in Barbuda. Utilizing innovative techniques like drop camera systems and laser-scaled still images, they analyzed 309 transects and 1976 images, yielding valuable insights into percentage coverage and benthic communities. The second study, conducted by the National Oceanography Centre (2022), contributed essential outcomes, including marine habitat maps with seagrass deposits' depth and a deeper understanding of seagrass health and composition.

There are currently several actors already working on seagrass restoration in Barbuda. The objective would be to support their work and work on capacity building with international partners to ensure the success of the conservation and restoration efforts.

These partners have significant and relevant experience in this domain, some of them have already worked in studies of carbon assessment, mainly a project in particular in the cost of Andalucía, Spain

called LIFE Blue Natura (<https://life-bluenatura.eu/>). These partners like CSIC and Tecnoambiente will help in the mapping, assessment and training for the implementation of the groundwork for seagrass protection and regeneration.

d. Seaweed

The Barbuda community has the potential to tap into the growing demand for seaweed as a sustainable and lucrative industry. Seaweed is becoming increasingly popular as an alternative to conventional crops and farming practices, as it requires no fresh water or fertilizers, and can be grown in areas that are not suitable for other crops. With the pristine tropical waters of Codrington lagoon, Barbuda has the perfect location for mariculture by cultivating red seaweed species such as *Gracilaria* and *Eucheuma*, as long as pollution can be prevented. These species are commonly used in a range of applications, including food, pharmaceuticals and cosmetics, and are rich in high-value ingredients such as agar and carrageenan.

With the help of existing models and techniques, Barbuda can effectively harness the potential of seaweed cultivation. The seaweed industry in Indonesia and Africa has been successful in promoting and processing seaweed for both local and international markets. By following similar models, Barbuda can adapt its seaweed production to cater to the needs of the local market, as well as tap into the growing international demand for seaweed-based products.

The location of Barbuda and its proximity to Antigua's port facilities can also help to facilitate the easy export of seaweed-based products. The proximity of Antigua's port facilities can enable Barbuda to easily reach international markets interested in buying high-quality seaweed products. Additionally, the utilization of seaweed products from Barbuda can provide an alternative to unsustainable fishing practices and serve as an effective solution to combat the negative effects of *Sargassum* blooms that have been affecting the island's tourism and fishing industries.

Antigua and Barbuda already have some experience in seaweed cultivation. The goal would be to connect local experts with regional and international partners to create a business model around red seaweed production and transformation.

3. Ensuring the emergence of a sustainable fisheries sector

In Barbuda, the BRP is dedicated to the establishment of a sustainable fisheries sector that harmonizes the well-being of the local communities with the health of the marine ecosystem. By implementing a comprehensive approach, encompassing biodiversity mapping, community and fisherman training, collaboration with fishing communities, and aquaculture expansion, we strive to achieve a balanced and thriving fisheries industry. Through the preservation of marine resources, promotion of responsible fishing practices, and the exploration of innovative solutions, our project sets the stage for a sustainable future, benefiting both the environment and the socio-economic fabric of Barbuda.

The BRP will work on four main axes to reach this objective: mapping of local biodiversity, training and educational programs, collaboration with the fisheries sector for increased regulation and expansion into aquaculture.

a. Mapping of local biodiversity

The mapping of biodiversity in Barbuda's marine ecosystems is a critical component of conservation project's efforts to ensure a sustainable fisheries sector. Barbuda is home to the Codrington Lagoon National Park, a bird sanctuary that serves as a critical habitat for numerous bird species, including the magnificent frigatebird, the brown pelican, and the West Indian whistling duck. The restoration of the coastal habitats and the sandbar would help to preserve and enhance these habitats, ensuring the continued survival of these bird species. In addition, Barbuda's waters are home to several commercial fish species, including snappers, groupers, and tuna. The restoration of coastal habitats could help to protect the spawning and nursery grounds of these fish, supporting sustainable fishing practices and maintaining healthy fish populations. Lobsters and conch are two of Barbuda's most valuable, and easily overharvested marine resources.

This process involves conducting comprehensive surveys, completing or updating existing ones, and an assessment to identify and understand the various habitats, species, and ecological processes within the marine environment. This can include habitat identification, species assessment, biodiversity hotspots and ecosystem interactions.

The Environmental Awareness Group (EAG) has been carrying out similar work in Antigua and their expertise could be greatly beneficial for the mapping of Barbuda marine biodiversity.

b. Training and educational programs to enhance skills in sustainable fishing

Training fishermen is a crucial aspect of your conservation project in Barbuda, as it empowers them with the knowledge and skills necessary for sustainable fishing. The training program focuses on several key components.

Firstly, fishermen are educated on responsible fishing techniques that minimize negative impacts on the marine environment. This includes promoting selective fishing methods, such as using appropriate gear and mesh sizes to avoid catching undersized or non-targeted species. Fishermen are also trained on the proper handling and release of bycatch, reducing unnecessary waste and harm to non-target species.

Sustainable fishing practices are a key focus of the training program. Fishermen receive guidance on understanding fishing seasons and limits, avoiding overfishing, and adopting responsible harvesting techniques. They learn about the importance of respecting catch quotas, size limits, and protected areas to ensure the long-term viability of fish populations and ecosystem health.

Addressing the issue of bycatch and discards is another important aspect of the training program. Fishermen are taught about using modified fishing techniques or gear to reduce accidental catch of non-target species. They are also educated on proper handling and release methods to increase survival rates of unintentionally caught species.

The training program also includes modules on environmental awareness and the relevance of marine conservation. Fishermen learn about the ecological value of the marine environment, the role of healthy ecosystems in sustaining fisheries, and the potential impacts of human activities on marine biodiversity. This helps foster a sense of stewardship among fishermen and encourages them to actively participate in conservation efforts.

Access to resources and support is provided to the fishermen through the training program. This may include information on sustainable fishing practices, updated regulations, and access to fisheries

management resources. Ongoing support and mentoring are offered to address any challenges or questions that arise in the transition towards sustainable fishing practices.

Beyond training fishermen, it's vital to involve and educate citizens about marine protection and sustainable fishing. The BRP goes beyond fishermen, aiming to enlighten everyone about the urgent need for marine conservation and the positive impact of sustainable fishing on the environment and fisheries sector.

This includes dispelling misconceptions and cultural norms around fishing. Introducing alternative culinary choices like cooking smaller lobsters and lionfish helps reduce demand for overexploited species. Workshops shift perceptions, reducing pressure on resources and promoting a balanced marine ecosystem.

c. Collaboration with fishing communities to develop and enforce regulations that support the long-term sustainability of the fisheries sector.

Collaborating with fishing communities is an essential, specifically in the context of managing Marine Protected Areas (MPAs) and tailoring regulations to support the needs of the fishermen. This collaborative approach recognizes the importance of engaging local fishermen as active stakeholders in decision-making processes, ensuring that their perspectives and expertise are incorporated into the management strategies.

The involvement of fishing communities brings valuable local knowledge and expertise to the table. These communities have a deep understanding of the marine environment, including seasonal patterns, migration routes, and spawning grounds of various fish species. By incorporating their traditional knowledge, the management of MPAs can be informed by these insights, leading to more effective conservation measures that are in harmony with the natural processes of the marine ecosystem.

Through collaborative discussions and consultations, the fishing communities can provide valuable input on the potential impacts of proposed regulations on their livelihoods. This engagement allows for a better understanding of their needs, concerns, and challenges, which can be considered when tailoring the regulations. By considering the social and economic aspects of the fishing communities, the regulations can be designed to support sustainable fishing practices while minimizing adverse impacts on their livelihoods.

These roundtables could help the Ministry of Environment and the Ministry of Agriculture to adapt their new policies to support new sustainable fishing practices that will not only protect fish stocks but also provide a framework to encourage fishermen to follow this new vision. Indeed, by involving them in the enforcement of regulations, they become partners in ensuring compliance within their own communities. This approach can lead to greater community buy-in, increased trust, and a stronger sense of collective responsibility for the conservation of marine resources.

d. Diversification of the fishing sector

Diversifying the sector with, for example, aquaculture opportunities is a key component of your conservation project in Barbuda, aiming to diversify the fisheries sector and promote sustainable practices. Aquaculture offers opportunities for economic growth while minimizing the ecological impact

on wild fish populations. Two specific areas of focus within aquaculture are seaweed cultivation and sea cucumber farming. Here's an overview of their benefits:

Seaweed Cultivation: As mentioned in the previous chapter, Barbuda is an ideal location for seaweed cultivation, notably red seaweed species. In addition to providing numerous ecosystem services, red seaweed can be used for a variety of applications ranging from food, feed, biostimulants, cosmetics and biomaterials. By establishing seaweed farms, your project can create additional income streams for fishing communities, generate employment opportunities, and contribute to a more sustainable blue economy. Foster Derrick, seaweed farmer in Antigua, could accompany local fishermen in the creation of new farms in Codrington lagoon.

Sea Cucumber Farming: Sea cucumbers are echinoderms that play a significant role in marine ecosystems. They contribute to nutrient recycling and improve water quality. Sea cucumbers also have high commercial value, particularly in Asian markets. Sustainable farming practices can reduce the pressure on wild populations, protect their natural habitats, and help restore their numbers. By focusing on sea cucumber farming, your project can support the conservation of wild populations while providing economic benefits to the local communities. Although no entity is working on sea cucumber cultivation locally, there is much expertise to draw upon in Mexico, Belize and Panama.

Careful planning, stakeholder engagement, and adherence to best practices will ensure that aquaculture operations align with conservation goals and promote a resilient blue economy in Barbuda.

4. Developing a sustainable tourism sector

The BRP aims to redefine tourism in Barbuda. The tourism industry represents roughly 50% of the nation's GDP, it is important to ensure that these activities are aligned with the regenerative vision of the government. Through the BRP, we will analyze and propose opportunities for eco-tourism experiences that offer visitors a chance to connect with nature, support local communities, and contribute to the preservation of Barbuda's unique biodiversity and cultural heritage.

The BRP will focus on three main axes to reach this objective: creation of nature-based tourism experiences, integration of cultural heritage in tourism activities, collaboration with local businesses to develop sustainable practices.

a. Support and encourage nature-based tourism experiences

Some nature-based tourism initiatives exist on the island. The BRP will aim to strengthen these activities and also create new ones that will allow visitors to engage with the island's unique ecosystems while promoting their conservation. For example, mangrove kayaking and birdwatching, where visitors can explore the intricate mangrove forests and observe a rich variety of bird species is a prime sustainable blue/green tourism activity. To minimize degradation, the establishment of canoe trails within the mangroves, ensuring that visitors can enjoy the experience while minimizing disturbance to this vital habitat.

In the bird sanctuary, the construction of an observation platform provides scientists and tourists with an opportunity to view the area with limited disturbance to wildlife. This platform allows for an

immersive experience, showcasing the diverse avian species that call Barbuda home while ensuring their protection and conservation.

Seagrass safaris offer visitors a chance to explore the vibrant seagrass beds, which serve as essential habitats for marine life. Through guided tours, visitors can learn about the ecological importance of seagrass meadows and witness the abundance of marine species that rely on them for survival.

Lastly, with the possible deployment of seaweed farms, a new form of eco-tourism can focus on providing insights into the innovative practices of seaweed farming while highlighting the economic and environmental benefits associated with this form of aquaculture.

In addition to these activities, the goal is also to support and promote existing activities that are aligned with this vision.

b. Integration of cultural heritage elements into tourism experiences, showcasing the unique traditions and history of Barbuda

The BRP recognizes the importance of integrating cultural heritage elements into tourism experiences, allowing visitors to appreciate the unique traditions and history of the island. By showcasing the rich cultural heritage of Barbuda, we aim to promote a deeper understanding and appreciation of the local community. Visitors can engage in immersive experiences that highlight traditional practices, such as basket weaving, boat building, and storytelling, providing insight into the island's craftsmanship and ancestral knowledge. Additionally, cultural tours can be organized to explore historical sites and landmarks, including ancient settlements and colonial architecture, providing a glimpse into the island's vibrant history. Through the integration of cultural heritage into tourism experiences, we can foster cultural preservation, empower local communities, and offer visitors a more authentic and enriching encounter with the vibrant traditions and history of Barbuda.

c. Collaboration with local businesses to adopt sustainable practices and support community-based tourism initiatives

The BRP places a strong emphasis on collaborating with local businesses to adopt sustainable practices and support community-based tourism initiatives. Firstly, we will work closely with diving operators to promote sustainable diving practices that minimize disturbances to marine ecosystems, such as proper buoyancy control and responsible interaction with marine life. Additionally, we engage with hotels to implement eco-friendly measures, including energy and water conservation, waste management, and the use of locally sourced and sustainable materials such as sargassum, food waste and agricultural waste. Collaboration with shipping companies will aim to reduce the environmental impact of vessels through the implementation of sustainable shipping practices and proper mooring installations to avoid any further destruction of seagrass beds and coral reefs. Furthermore, we strive to enhance the visitor experience by improving visitor amenities and upgrading facilities of national park authorities. Through these collaborative efforts, we aim to foster sustainable tourism practices, preserve the natural heritage of Barbuda, and empower local communities to benefit from tourism in a responsible and inclusive manner.

5. Improving infrastructure for waste, pollution and water treatment

Conservation efforts are futile if human activities continue to have a negative impact on coastal ecosystems. Therefore, in addition to protecting the coastline, the BRP aims to improve infrastructure that is vulnerable to extreme weather and that can be in overcapacity. By doing so, the BRP expects to reduce the environmental footprint of commercial and domestic activities on marine ecosystems.

The BRP will work on four main axes to reach this objective: Sargassum and Waste management.

a. Sargassum

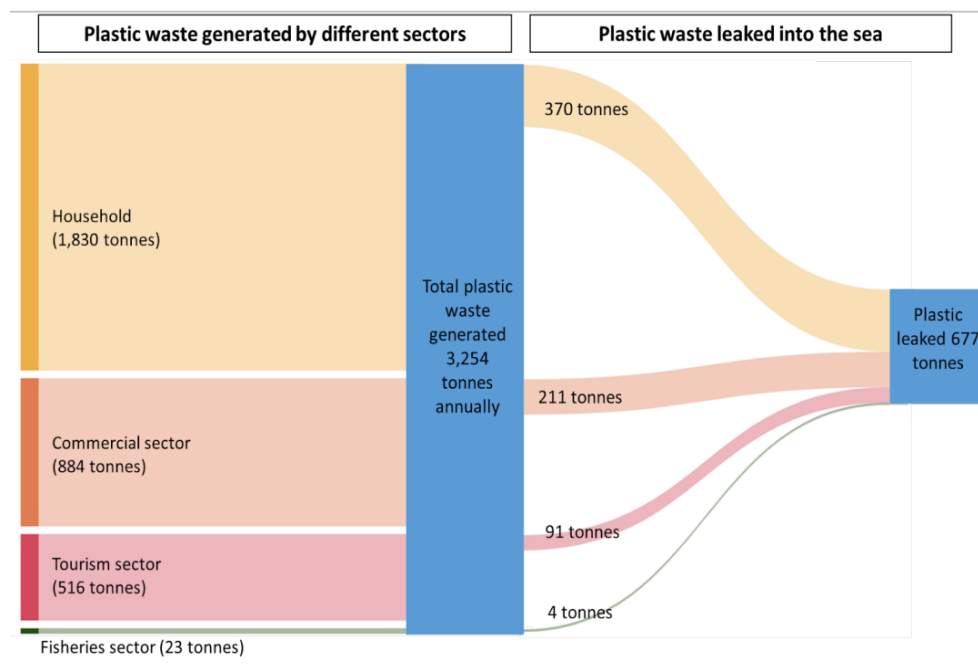
Since 2011, there have been massive sargassum blooms towards the Gulf of Mexico, Florida, and the Caribbean. Antigua and Barbuda, being in the northern part of the Caribbean islands, has been significantly affected by these incoming waves of seaweed, which originates from the Sargasso Sea, carried by four major sea currents from West African shores. In 2018, Antigua and Barbuda experienced its worst year to date, with the arrival of 20 million tons of sargassum in the Caribbean, resulting in beach closures and hotel disruptions due to piles of seaweed. Sustained research suggests that a combination of fertilizer run-off from the Amazon and nutrient-rich upwelling from the West-African coast created the ideal conditions for the blooms. The tourism industry incurred substantial costs of approximately US\$120 million in 2018 for collecting and disposing of the algae, while fisheries in the region are concerned about the impact on fish stocks, posing a significant threat to their livelihoods.

Barbuda could also leverage the potential of sargassum as a raw material to produce new products. Sargassum blooms and inundation area which has been a major liability for the fishing and tourism industries on the island but could become an opportunity to develop a new industry and diversify the economy. In the Caribbean and around the world, companies have already started to develop and launch new products using sargassum, which could increase interest in the product. With smaller processing facilities adapted to the needs of the islands, sargassum could be rapidly processed and exported for local or international use. The utilization of sargassum could also help to reduce the negative impact of beaching on tourism health and its facilitation of beach erosion humans, as well as on the growth of mangroves, coral reefs, and seagrasses, ultimately contributing to the overall health of the marine ecosystem.

b. Waste management

In the nation's NDCs, the need to improve waste to energy initiatives as well as upgrade existing infrastructure is essential in supporting the national strategy to fight against plastic and waste pollution. Antigua and Barbuda, a pioneer in the battle against marine plastic pollution, has been recognized as the nation with the lowest ocean plastic emissions according to the Environmental Performance Index (EPI), which measures the absolute quantity of plastics a country releases into the oceans. Antigua and Barbuda's impressive EPI score of 83.70 places it at the top among 180 other countries, reflecting significant efforts in reducing plastic usage. Nonetheless, in 2021, the country generated 3254 tons of plastic waste, of which 677 tons was leaked into the sea¹.

¹Mittempergher, D., Raes, L., and Jain, A., The economic impact of marine plastic pollution in Antigua and Barbuda: Impacts on the fisheries and tourism sectors, and the benefits of reducing mismanaged waste,



Plastic source and leak portion of the ocean in Antigua and Barbuda

A potential venture that could help solve waste management issues in Antigua and Barbuda would be a waste management plant that specializes in recycling and waste-to-energy conversion. The venture could provide waste collection services to households and businesses, ensuring the proper segregation of waste at the point of generation. The collected waste could then be processed using waste-to-energy technologies such as anaerobic digestion, which would convert the waste into biogas and organic fertilizers. Additionally, the company could establish a recycling facility that focuses on the recycling of plastic waste, which would significantly reduce the amount of plastic waste that ends up in the ocean. This business venture would not only contribute to environmental sustainability but would also create employment opportunities and promote economic growth in Antigua and Barbuda.

The Japanese Government built a large modern Fisheries building on Barbuda, including refrigeration and freezing facilities. These do not currently work, so the fishermen cannot use them. We will repair them and install a solar powered desalinization facility, ice plant, and freezing facilities in the building, so that fishermen can export their catch to a much broader market without worrying about getting them to market immediately before they rot. In addition, we will install a fish waste collection and processing plant to turn them into a fertilizer resource to improve soil fertility, vegetable production, and soil water holding capacity using volcanic ash imported from the nearby volcanic island of Montserrat, following previous successful projects on Barbuda.

Water pollution coming from human activities can have some negative impacts on coastal environments. In addition to possibly contaminating water and impact in local fauna, excess nutrients from agriculture and households can increase eutrophication, notably expanding the risk of sargassum

blooms. Understanding and mapping the potential areas at risk will enable to develop a strategy to mitigate those effects and treat the water before arriving near the shore.

6. Rally communities behind the protection of their natural and cultural heritage

The involvement and ownership of local communities in conservation projects are crucial. Their knowledge, stewardship, and empowerment ensure sustainable outcomes. Collaboration between conservation initiatives and communities leads to effective and meaningful efforts benefiting both nature and people. By engaging local communities as key stakeholders, the BRP can foster a sense of shared responsibility and promote social equity, creating a more inclusive and resilient approach to environmental conservation.

The BRP will work on three main axes to reach this objective: local training, rallying youth around coastal protection, and protecting cultural heritage on both islands.

a. Local training

Providing support for the local communities and giving them the right tools to participate in the conservation efforts is essential for the success of the project.

Secondly, training will be provided to fishermen to adapt to the new activities that will be provided by the conservation efforts. This can be for mangrove restoration, eco-tourism in the bird sanctuary or even seaweed cultivation and processing. These efforts can be carried out by the Barbuda Fishermen Association who have already been working on these activities. Regarding seaweed, several partners including Foster Derrick could provide the necessary training.

b. Rallying youth around coastal protection

The younger generations play a critical role in ensuring the survival of Barbuda's coastline, as they will be the stewards of the island's natural resources in the years to come. Educating them on the importance of protecting the coastline is essential in preserving the island's natural beauty and safeguarding its unique ecosystems. This can involve teaching them about the impact of human activity on the environment, such as the effects of pollution and overfishing, and providing them with the knowledge and tools they need to take action to protect the coastline. By instilling a sense of environmental stewardship in the younger generations, we can ensure that they will be equipped to take on the challenges of the future and work towards a sustainable future for Barbuda. Ultimately, this education can serve as a crucial step towards preserving the island's natural resources for future generations to enjoy. Creation of good jobs in climate adaptation, conservation, sciences and the maritime industries can also help economic development as well as gender mainstreaming. Gender mainstreaming in industry may also create investments.

c. Protecting the cultural heritage of the island

The cultural sites of the country are considered as high valued non-renewable resources. Archaeological sites are the most impacted sector of cultural heritage, and a primary objective of this project was to carry out surveys and reviews of archaeological and coastal heritage sites to gain insights into the threats and impacts on these sites, notably those that are the most impacted by rising sea levels, such as the

Antigua Naval Dockyard -inscribed on the UNESCO World Heritage List in 2016 and the Arawak's Pearn's Point

With the support of Dr. Reg Murphy, we would like to develop a protection plan that will survey and monitor and protect the indigenous cultural landmarks on the island and include this in the valuation of the area and incorporate this into the marine special planning and integrated coastal planning. To increase our capacity, we can ask for assistance from international institutions such as UNESCO and OAS. This can also enhance eco-tourism interest and revenue.

Project governance:



The project governance structure is designed to create a national consortium of stakeholders who will work together towards a common vision. The main goal of this structure is to ensure that all stakeholders have a voice and can contribute their expertise towards the success of the project.

The **steering committee** (SC), composed of seventeen members, will focus on carrying out the vision of the BRP and define the action plan and validate the budget.

The SC will be comprised of:

- 3 members of the management team
- 8 members of government institutions
- 6 representatives of each working group

Each group has one vote, totaling three votes. Each decision will require a simple majority to pass.

The **project management team**'s role is to implement the vision of the SC through the following tasks:

- Liaising with the SC
- Administrative management
- Funding management
- Liaising with working groups
- Monitoring and evaluating the progress of each project

The **working plan groups** focus on the field implementation of the BRP. They will be divided into the six pillars of the BRP. Each working group will have a project leader who will lead and be the voice of the project. This will ensure that there is clear leadership and direction for each aspect of the project, and that each division is able to work effectively towards its specific goals.

Supporting partners will have no control on the project but can provide support or expertise as needed. These partners may include NGOs, investors, international institutions, industry partners, and other businesses willing to support the project. Their involvement will be critical to the success of the project, and their expertise and resources will be greatly appreciated.

This system is designed to allow people on the ground to have a voice and use their expertise to drive the project in the right direction. This will help to ensure that the project is relevant to the needs of those it is intended to serve, and that it meets the requirements of all stakeholders involved.

Having a consortium of stakeholders is essential for the success of a restoration project in Antigua and Barbuda. The restoration of natural habitats and ecosystems requires a multi-faceted approach, involving a range of different expertise, resources, and perspectives. A consortium of stakeholders, including government institutions, NGOs, investors, international institutions, industry partners, and other businesses willing to support the project, will ensure that all necessary resources and expertise are brought to the table. This will increase the chances of success, as everyone involved will be invested in the project and working towards its goals. Additionally, the involvement of government institutions will lend credibility and support to the project, which will be critical for its success. By working together towards a common vision, the consortium of stakeholders will help to ensure that the restoration project is relevant to the needs of those it is intended to serve, and that it meets the requirements of all stakeholders involved.

System of checks and balances:

To build a system of checks and balances in the BRP consortium, it is crucial to establish clear guidelines, ethics codes, and Key Performance Indicators (KPIs) that all participating stakeholders must adhere to.

The first step is to develop a robust selection process for consortium members, ensuring they share the vision and values of the project. Regular monitoring and evaluation of performances against the established KPIs are essential. In cases where companies fail to meet the ethical standards or fulfill their KPIs, a transparent process should be in place to address and rectify the issues. This may involve warnings, corrective actions, or, if necessary, the replacement of non-compliant companies with more suitable partners who are committed to upholding the ethics code and meeting the project's objectives.

Project funding:

The finance structuring of the project revolves around a collaborative and transparent approach to secure funding for the proposed initiatives. Under this framework, the project is divided into six pillars, each comprising multiple work groups responsible for specific tasks.

To secure financial approval, each local working group, alongside international partners, must present a comprehensive budget encompassing (1) planned regenerative or sustainable activities and actions, (2) associated costs for each action. This budget should be submitted to the local fund manager, MEPA, centralizing budget requests. MEPA plays a crucial role in consolidating the information received from the work groups and submitting funding proposals to the RePlanet Fund, which will be established through a combination of public funding, private funding and philanthropic contributions. Once funding is approved, the Blue Planet Impact Fund disburses the allocated funds to MEPA, who then distributes the budgets to the respective work groups.

Additionally, as the management team, NOAH ReGen will oversee the issuance of ecosystem credits and facilitate the linkage between project working groups and credit buyers.

To maintain transparency and accountability, the work plan groups are required to provide regular updates on budget allocations and any variances between projected and actual expenditures. This finance structuring ensures a coordinated and responsible approach to resource allocation, enabling the realization of a sustainable and resilient blue economy in Antigua and Barbuda.

ONBOARDING PROCESS

The onboarding process for **new partners** entails signing an NDA and MoU to establish a solid foundation.

Once these agreements are in place, we will share detailed information about the project and provide the AB_Blue Resurgence Program – SD – Partnership Onboarding_V3 template for each partner to complete, along with their tentative budget for proposed actions.

Subsequently, the steering committee will carefully evaluate and vote on each new member. This streamlined approach ensures transparency, accountability, and seamless integration of potential partners.

ANNEX

Annex 1: Sampling methodology

As part of this Blue Resurgence Program, a big objective is to estimate the carbon stock of seagrass meadows and to calculate with the best possible detail, the abundance, distribution, and dynamics of the carbon stocks and fluxes associated to these ecosystems. Therefore, the sampling has the main objective to response to the question of how much organic and inorganic carbon (or CO₂ equivalents for other GHG) is stored/stocked in the biomass and sediments of the different Antigua and Barbuda seagrass species.

The methodology for quantifying the carbon stock of seagrass involves the following steps:

1. Definition of project boundaries: Firstly, one must define the spatial boundaries within which the project is to be carried out in seagrass meadow, taking into account the typology of the project that is to be carried out, and therefore whether its objective will be the recovery, restoration, conservation, or creation of new communities, etc. Similarly, it is important to consider in which homogeneous environmental units carbon sinks are to be estimated.
2. Sampling Design and Strategy: The sampling design should be carefully planned to ensure that the sampling effort is representative of the seagrass meadows' variability. Typically, this involves selecting a series of sampling plots within the seagrass meadow.
3. On site Sampling: Within each plot, the above-ground and below-ground biomass of the seagrass should be measured. Above-ground biomass can be harvested using scissors or a rake. Below-ground biomass can be sampled by taking sediment cores.
4. Laboratory Analysis: The samples are shipped to a laboratory for its analysis. Then they should be dried and weighed in the laboratory to determine their dry weight and then different procedures will be carried out to determine the total carbon content and carbon stock
5. Upscaling: The use of GIS data will enable to extrapolate random seagrass soil sampling into a country-wide mapping of carbons stock.
6. Regeneration activities: Even though this step is not necessarily involved in the sampling methodology, the result of the steps mentioned before will help to shape this critical step.

For further detail on the project boundaries, amount of samples to be taken, sampling procedure and laboratory analysis, please refer to the document ***“Noah Regen - Seagrass Sampling Methodology (Antigua and Barbuda Project)”***.

Annex 2: Project budget and carbon potential

Project budget is estimated for all the 6 project pillars, plus eventual administrative costs.

Costs were estimated based on on-site partners who have long experience in ecosystem regeneration and Noah's estimations based on previous project experiences.

Project incomes are estimated based on average carbon credit generation based on regenerative activities, average carbon stock for the region, average carbon credit prices and known degradation rates.

Overall A&B Regeneration Budget						
PROJECT TOTAL			\$ 766.106	\$ 1.983.620	\$ 2.804.376	
Activity	Description	Concerned partners	Year 1	Year 2	Year 3	Comments
Cost	1. Ecosystem Services	Mangrove Alliance (Leroy) & Tom Gores	\$ 104.500	\$ 453.500	\$ 2.003.000	
Cost	2. Sustainable Fisheries		\$ 112.500	\$ 265.000	\$ 265.000	
Cost	3. EcoTourism		\$ 10.400	\$ 107.000	\$ 17.000	
Cost	4. Infrastructure		\$ 83.000	\$ 740.000	\$ -	
Cost	5. Natural & Cultural heritage		\$ -	\$ 20.000	\$ 20.000	
Cost	6. Monitoring		\$ 349.006	\$ 234.550	\$ 349.006	
Cost	7. Administrative	All partners	\$ 106.700	\$ 163.570	\$ 150.370	
Income	Carbon credit Potential		\$ 1.851.461	\$ 2.100.368	\$ 3.184.005	Constant carbon credit flow from Year 3 onwards

For further detail on the project budget, hypothesis, data sources, please refer to the document ***"A&B proposal_budget"***

Annex 3: International Stakeholder Mapping

• Tecnoambiente

- Andres Prieto
- <https://www.tecnoambiente.com/es>
- andres.prieto@tecnoambiente.com
- Tecnoambiente is an Environmental Consultancy with its own accredited Laboratory. In addition to onshore environmental advisory services, Tecnoambiente is specialized in the marine environment and offshore projects. Tecnoambiente brings extensive experience in delivering geophysical, hydrographic and baseline surveys, and environmental services to industries including Oil & Gas, Renewables, Submarine Cables and Ports. Based out of Spain, with offices in Barcelona (HQ), Zaragoza, Jerez and A Coruña, they are also present in Perú and Colombia, and are able to deliver projects around the world.
- Responsible for mapping, assessment and implementation. Tecnoambiente have worked with seagrass mapping with sonar technology for the BLUE Natura project.

• VERICO

- Miguel Angel Mateo
- <https://verico.eu>
- Verico SCE, a European cooperative in Bavaria, offers a unique structure among accredited verification bodies. Verico's members, small enterprises, and freelancers from various EU countries, use the cooperative model to deliver accredited and multi-sectoral services. As cooperative owners, we're driven to exceed client expectations with high-quality services. Verico's members' diverse expertise across industries, as

assessors, and expert witnesses, enables a customized, efficient approach to projects like certifications for energy management systems, emissions report verification, and greenhouse gas inventory MRV capacity-building. With extensive experience, Verico excel in areas such as greenhouse gas emissions, energy efficiency, and verification/accreditation procedures.

- [Actions to be carried out]

- **CEAB CSIC**

- Miguel Angel Mateo
- <https://www.csic.es/es>
- The Spanish National Research Council (CSIC) is Spain's largest public research institution and a prominent player in the European Research Area. It operates under the Ministry of Science and Innovation and is vital for implementing Spain's Science, Technology, and Innovation System. CSIC is engaged in various activities including generating knowledge through research, transferring research outcomes to foster tech-based enterprises, providing expertise to both public and private sectors, offering high-level training, promoting scientific awareness, managing advanced facilities, and representing Spain in international arenas. CSIC's comprehensive role contributes significantly to advancing scientific and technological progress within Spain and beyond.
- Main responsible for seagrass mapping in LIFE Blue Natura project: principal investigator of the LIFE Blue Natura project and is the main responsible for any question related to the quantification of the sinks that they carry out in the project

- **Mangrove Ocean Project (MAP)**

- Laura Mitchie
- <https://mangroveactionproject.org>
- Mangrove Action Project (MAP) is a US-registered 501 c (3), which has advocated for the conservation and restoration of global mangrove forests since 1992. MAP personnel, now based on several continents, have conducted mangrove workshops in more than 20 countries, teaching best practices for mangrove conservation, restoration, and education. MAP works with a variety of mangrove stakeholders, including coastal communities, NGOs, scientists, and governments to improve mangrove practices globally.
- Responsible for mangrove restoration implementation.

- **Coastruction**

- Nadi Fani
- <https://www.coastruction.com>
- Coastruction's primary role involves designing, producing, and installing naturally shaped artificial reefs to restore damaged reef systems and safeguard vulnerable coastlines. Their approach emphasizes the integration of key species into these artificial habitats, increasing the likelihood of success. Using solely natural materials, Coastruction strives to mimic the balance of a healthy ecosystem, where organisms collectively endure external pressures and maintain equilibrium. Coastruction's commitment extends to 3D printing reefs tailored to local species and site-specific conditions, fostering optimal ecosystem integration. Collaboration with local experts enhances their ecological understanding. The company prioritizes environmental

sustainability by minimizing CO2 emissions, utilizing natural materials like beach sand or recycled concrete, and curbing transport emissions through on-site printer deployment.

- [Actions to be carried out]

- **The MEPA Trust**

- Ruth Spencer
- <https://mepatrstantiguabarbuda.org/>
- The MEPA Trust is committed to establishing a reliable source of funding to sustainably manage and enhance the land and sea areas of Antigua and Barbuda. This financial support is dedicated to safeguarding biodiversity, natural resources, and other endeavors that align with the organization's conservation goals. These priorities were determined through consultations with stakeholders in alignment with the Trust's objectives. Notably, MEPA Trust emphasizes stakeholder engagement, including fishers, farmers, sea users, and local communities, in all projects funded by the Trust, ensuring a collaborative approach to conservation and sustainable development.
- [Actions to be carried out]

- **Rrreefs**

- Ulrike Pfeundrt
- <https://www.rrreefs.com>
- Rrreefs is a Zurich-based organization merging science, engineering, art, and education. Leveraging 3D printing, Rrreefs craft bricks that accommodate the complex needs of coral reef ecosystems. These bricks feature micro-level intricacies and roughness, fostering coral larvae settlement, and diverse marine communities. Varying-scale voids provide habitats for other species. Burnt clay's porous texture and alkalinity make it an ideal substrate for coral growth. By using 3D printing and local materials, Rrreefs produce eco-friendly, reducing CO2 emissions, and creating local jobs. Rrreefs seamlessly integrate the latest scientific insights by updating our open-source code, exemplifying the versatility of digital manufacturing.
- [Actions to be carried out]

- **Reefy**

- Jaime Asencio
- <https://reefy.nl>
- Reefy introduces the revolutionary REB (Reef Enhancing Breakwater), an ingenious modular artificial reef. This innovation uniquely combines wave energy dissipation for coastal protection with the provision of essential substrate and habitat complexity to enhance marine biodiversity. Reefy's mission is to shift the paradigm of marine infrastructure's environmental impact from negative to positive. Drawing inspiration from nature, we strive to rewild the ocean on a grand scale, offering crucial protection against climate change impacts while benefiting both marine ecosystems and coastal communities.
- [Actions to be carried out]

- **Sea Cleaners**

- Elise D'epenoux
- <https://www.theseacleaners.org>
- Sea Cleaners operates with the belief that addressing global plastic pollution demands a comprehensive strategy encompassing correction, prevention, and cure. Sea Cleaners pioneering approach integrates advanced technologies and successful depollution solutions to prompt consciousness and transformative shifts in behavior. Rejecting passive stances, Sea Cleaners proactive and holistic strategy aims to imprint the concept of "demonstrate to convince and multiply actions on a large scale" into public consciousness. Sea Cleaners objectives include cleaning oceans, recycling plastic waste, advancing scientific understanding of plastic pollution, raising awareness, and promoting circular economy principles. Sea Cleaners is the embodiment of individuals who've witnessed the alarming degradation of the ocean ecosystem due to plastic firsthand, motivating us to drive change through action and awareness.
- [Actions to be carried out]

- **Thalasso Ocean**

- Paulina Zanela
- <https://www.thalassoocean.com>
- With a skilled global team boasting 100+ years of expertise in blue economy, business development, biochemistry, and ocean sciences, Thalasso provides inventive solutions for societal and environmental benefit. Their process involves close collaboration with coastal communities. Thalasso monitors sargassum blooms, collecting the seaweed proactively to prevent shoreline hazards. Their approach includes comprehensive impact assessments, evaluating both negative and potential positive effects of the blooms. Furthermore, they capitalize on this resource by converting seaweed into valuable bi-products, primed for commercialization. paulinazanela@gmail.com
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- [Actions to be carried out]

- **Seatrients**

- Amankwa Baptiste
- <https://www.seatrients.com>
- Seatrients is dedicated to unveiling the sea's health treasures, beginning with Caribbean algae farming traditions. Sea moss algae, a key element, has been celebrated across islands for its immunity, fertility, and wellness benefits, backed by ancestral wisdom. Recent research has amplified its advantages, including iron, zinc, omega-fatty acids, and B vitamins; vital for nourishing underprivileged populations globally. Seatrients' mission is to uncover marine biosystem potential worldwide, advocating for responsible algae farming to enhance oceanic biodiversity.
- [Actions to be carried out]