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Revitalizing Landscapes Transforming a Sand Quarry into a Thriving Nature Reserve & Bioregional Hub

Inter-American Development Bank
Walkers Institute for Regenerative
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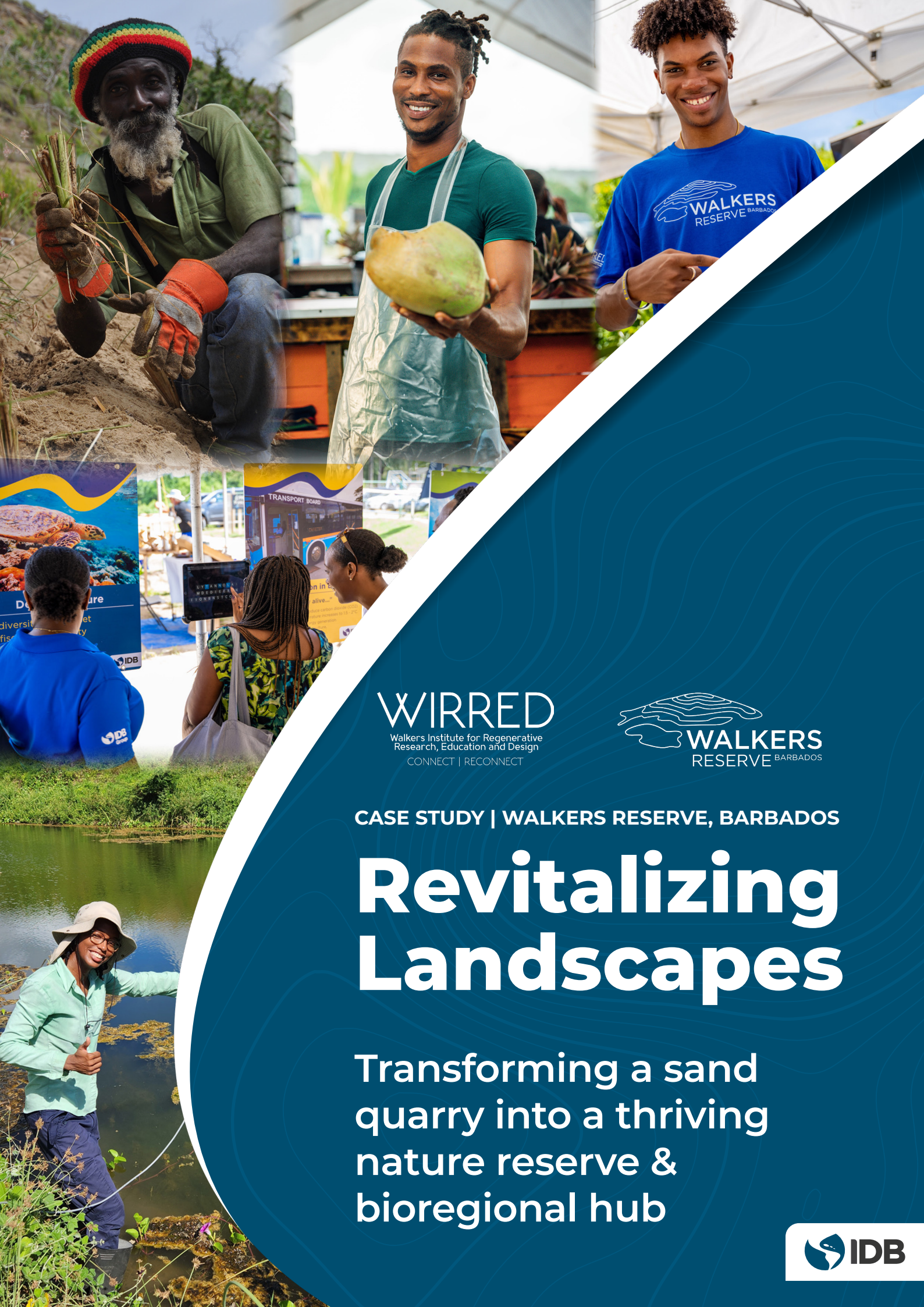
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CASE STUDY | WALKERS RESERVE, BARBADOS

Revitalizing Landscapes

Transforming a sand
quarry into a thriving
nature reserve &
bioregional hub



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1 Partners in Innovation: IDB and WIRRED

Since the 1960s, the Walkers Sand Quarry has been an active mine supplying silica sand to the construction industry of Barbados. With the exhaustion of sand supply, the focus has shifted to land restoration and from this, the Walkers Institute for Regenerative Research and Design (WIRRED) was born to transition Walkers Quarry to Walkers Reserve.

The Reserve aims to be a biodiverse landscape utilizing regenerative agroforestry to guide the transformation of the quarry into a thriving nature reserve and eco agro-tourism destination.

The Inter-American Development Bank (IDB)

The IDB is committed to fostering projects such as Walkers Reserve which exemplify the feasibility of attaining climate and biodiversity targets through initiatives that also produce strong with economic and social outcomes. Such transformational projects are the key drivers of sustainable and inclusive development for all.



Figure 1: Walkers Sand Quarry in operation, 2013. *Photo: Richard Gill Associates, 2013*



Figure 2: IDB | WIRRED Knowledge Fair, 2022

The IDB is an international entity with several decades of experience in promoting poverty reduction, economic growth, private sector development and fostering regional integration and trade in developing countries in the Latin American and Caribbean (LAC) region.

The IDB and IDB Invest jointly approved more than \$2 billion in nature finance in 2023. Nearly 13% of total approvals, this funding met the higher standard of nature-positive financing. The amount:

- Includes \$1.33 billion for the public sector and \$765 million for the private sector;
- Reflects a series of reforms and innovative approaches towards mainstreaming biodiversity into IDB's and IDB Invest's structure, operational work, knowledge, and policies;
- Aims to support countries in LAC to conserve and restore biodiversity and meet biodiversity targets, including tracking and reporting nature finance.

The Partnership

The IDB began its technical cooperation with WIRRED in 2019, through supporting the mainstreaming of developing solutions to the impacts of climate change, while building natural capital and increasing biodiversity within Barbados. The overarching objectives of this cooperation was:

- 1. To make the economic case for ecosystem service benefits through quarry restoration;**
- 2. To provide an example of successful quarry restoration practices that can be replicated in the Latin America and Caribbean (LAC) region.**

The Project that emanated from this overall objective set out to develop an Integrated Master Plan (IMP) for the future use of Walkers Quarry while piloting sustainable interventions to promote environmental regeneration and long-term ecological enhancement. Additionally, the Project also involved the development and implementation of a global communications strategy with a focus on promoting Walkers Reserve as a regional hub for landscape restoration.

Subsequent sections of this report will provide an overview of the results generated from this partnership and highlight the key outcomes. This includes:

- 1. Strategic Plan and Master Plan; Including a Spatial Plan & Development Phasing Plan**
- 2. Agribusiness and Eco-tourism Assessments**
- 3. Water Resources Study; including a Water Monitoring, Modelling & Management Programme**
- 4. Awareness campaigns and,**
- 5. A Communications Strategy for regional showcase of the project's impact.**

The current publication seeks to compile the main results to serve as a valuable resource for policymakers, practitioners, and researchers interested in advancing natural capital initiatives in the Caribbean and similar contexts.



Figure 3: The transformation of Walkers Reserve over a decade.

2

Setting the stage: Walkers and its environs

Walkers Reserve is a 277-acre coastal site located in St. Andrew within the Scotland District on the Northeast of Barbados.

The community of Belleplaine is an immediate neighbor of Walkers Reserve to the south and west and is a quiet rural settlement. Belleplaine is designated in the draft Physical Development Plan (PDP) for Barbados as a Regional Centre.

There has been limited economic activity in Belleplaine and as a result, the area has relied upon Walkers Sand Quarry as a primary source of employment (directly and indirectly) for the past 50 years.

The regeneration of Walkers and its development as a sustainable business is therefore considered mutually beneficial to the Belleplaine community and an important economic driver.



Walkers Reserve is located within the Barbados National Park boundary and the Integrated Coastal Zone Management District 3. Walkers Reserve is situated north of the village of Belleplaine and accessed along the western boundary of the Ermy Bourne Highway, the National Scenic Highway corridor and “main street” through this village. Belleplaine and Walkers Reserve are located at the heart of the System of National Parks and Open Spaces. The national vision is for this parks system to be protected, improvements be made to address the impacts of climate change and resiliency increased, while meeting the recreational needs of residents of Barbados and tourists alike.

WIRRED is dedicated to studying, developing, and implementing regenerative strategies that increase biodiversity, enhance ecosystem services and improve the well-being of individuals and communities. Leading the way in climate resilience, this serves as a positive impact model for Barbados and other Small Island Developing States (SIDS).

Barbados is a place of rich potential because it is an intersection of complex layers and forces. These layers include the geological, ecological, cultural, and economic intersections.

Being the easternmost Caribbean island, Barbados is a geological wonder. It is a layered formation of coral reefs, uplifted by the continuous collision of the westward-moving Atlantic Plate and the eastward-moving Caribbean Plate. The island's structure is influenced by three key forces: the uplifting of these geological plates, soil deposits from South America, and the growing coral reefs.

Where these plates converge, South American material is pushed up from the ocean floor, resembling wrinkles in a rug. Coral reefs develop on this Barbados ridge as it ascends towards the sea's surface. Eventually, the reef rises above the sea, forming new layers that encircle the island. Like an escalating coral staircase, new layers emerge above the water, creating new terraces, thus expanding and elevating the island. Unlike the steep volcanic islands to the west, which are formed from molten rock due to plate subduction, Barbados has a unique origin story that makes it multi-layered and stable.

Barbados, where the Westerly Trade Winds converge with the outflows of South American rivers, has long been an ideal environment for fostering biological diversity. Such diversity encompasses plant and animal ecosystems as well as varied human cultures and activities. The island has historically hosted fluctuating populations of various indigenous groups from South America and the Caribbean, making it a hub for cultural exchange and expansion. Situated at the tropical crossroads of European settlement, the African Slave Trade, and between North and South America, Barbados has been a pivotal point for international travel, trade, and banking.

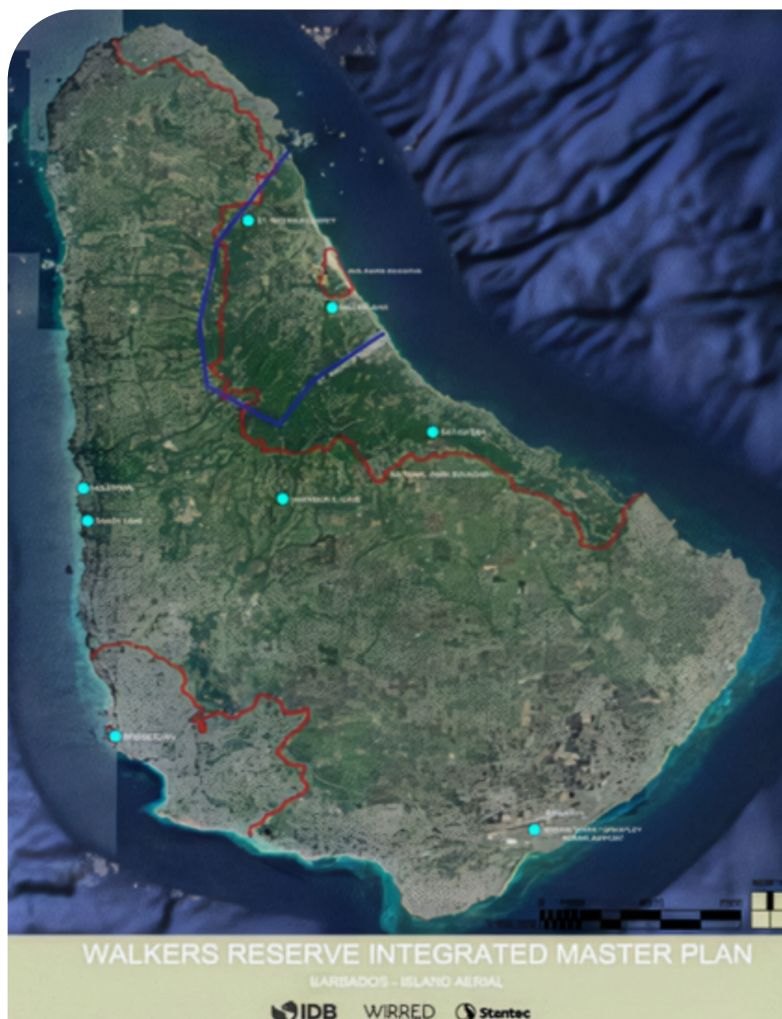


Figure 5: An aerial view of Barbados.

Once dubbed “Little England,” this small island was significant enough to warrant an invading army during the English Civil War and was one of the few international airports accommodating Super Sonic Transport flights. These layers and their interactions contribute to Barbados being an unusually fertile, stable, and strategic land.

The island’s layered nature creates stability unique among the steeper volcanic islands typical of the Caribbean. Being flatter and not prone to volcanic activity, Barbados’s coral layer-cake structure provides flat, pH-balanced fields and roads, facilitating plantation agriculture and transportation. Its location also places it east of most hurricanes, making Barbados a long-standing safe port in storms. Such stability provided England with a reliable outpost in the New World, where they could land and trade goods, as well as launch political, military, and economic ventures.

The stability is reflected in the political systems throughout history, making Barbados an investment haven from the 1600s to the present day. Ironically, the unusually steep, eroded, and unstable landscape of the Scotland District has served as a refuge for people, animals, and plants for ages and is still a getaway for Bajans. As the saying goes, the exception proves the rule.

Riding the leading edge of the converging Caribbean and Atlantic Plates, at the focal point of the Trade Winds, and at the Intersection of the Americas, this has positioned Barbados as a leader in many ways: Geologically, Ecologically, Geopolitically, and particularly in International Trade and other global issues like Climate Change. It stands as a stable point at the intersection of significant global forces.

3

Regenerative Agriculture:

A holistic approach to sustainable farming

Regenerative agriculture describes farming practices rooted in ecological principles and focused on restoring soil health, increasing biodiversity and promoting sustainable land use practices. Unlike conventional agricultural methods which often deplete soil nutrients, degrade quality, contribute to deforestation, and increase greenhouse gas emissions, regenerative practices seek to restore and harmonize the relationship between agriculture and the environment.

There are various approaches to regenerative agriculture, including:

- **Cover cropping** – Cover crops are planted to cover soil that would otherwise be bare, for example - between growing seasons, to prevent soil erosion and prevent nutrient loss.
- **Crop rotation** – Planting of different types of crops in the same area each growing season. Since different plant species use and release different nutrients in varying quantities, alternating crops can prevent soil nutrient depletion and enhance soil structure and water retention. This diversity also helps manage weeds and pests naturally, as rotating crops disrupts their life cycles.
- **Reduced pesticides** – By fostering a rich soil biodiversity through the methods described above, the need for chemical pesticides is minimized leading to healthier soils and crops, improved water quality, and a reduction in harmful environmental impacts. When chemical pesticides are used extensively, they can leach into waterways, contaminating aquifers and the marine environment. The reliance on pesticides can also disrupt beneficial insects and pollinators, disrupting ecosystems.
- **Reduced or no-till farming** – Planting of crops without plowing or disturbing the soil. By minimizing soil disturbance, microorganisms grow and thrive, helping to build a healthy topsoil while also improving water retention and preventing erosion.
- **Agroforestry** – Agricultural and forestry practices are combined to create diverse and resilient agricultural systems. Compared to monoculture, agroforestry is more similar to natural ecosystems where different biological systems work together and flourish. As plants and trees support each other symbiotically, productivity increases.

1. Improve Soil Health

At the core of regenerative agriculture is the commitment to restoring soil health. Healthy soils are rich in life, including microorganisms, fungi, and earthworms, all of which are essential for nutrient cycling and soil structure. Regenerative agriculture promotes practices that prioritize soil quality through enhanced organic matter, biodiversity, and microbial activity. These practices include cover cropping, crop rotation, agroforestry, reduced tillage, and the use of organic amendments which create a vibrant soil ecosystem that supports healthy plant growth and enhances resilience to climate change.

2. Greenhouse Gas Reduction

Regenerative agriculture has the potential to lower greenhouse gas emissions by not only curbing emissions but also actively sequestering carbon, reversing the effects of prior emissions. Techniques such as cover cropping, no-till farming, and the application of organic amendments enhance soil structure and increase its capacity to store carbon dioxide from the atmosphere.

Additionally, regenerative practices often minimize reliance on synthetic fertilizers, which can emit nitrous oxide, and encourage biodiversity, reducing the necessity for chemical inputs. By integrating trees and perennial crops and adopting managed grazing practices, regenerative agriculture promotes healthier ecosystems that enhance carbon capture and diminish overall emissions.

3. Water Conservation

Regenerative methods focus on improving soil health and structure which in turn increases the ability of the soil to absorb and retain water. This reduces the need for irrigation, conserving freshwater resources. This is especially important in the context of Barbados, which ranks as one of the most water scarce countries in the world, and since there are competing uses for freshwater resources, water availability is often a limiting factor for agriculture.

4. Enhance Biodiversity

Regenerative systems include a variety of plant species and reduced pesticide use which promotes habitats for beneficial insects, birds, and other wildlife. This biodiversity helps establish natural pest control mechanisms, creating healthier crops and reducing downstream environmental impacts of pesticides. Diverse plant root systems also improve soil health and stability, allowing for a richer community of microorganisms that contribute to nutrient cycling and soil fertility.



Regenerative Agriculture at Walkers Reserve

The project started in 2011, and since then, hundreds of thousands of trees have been planted of 134 different plant species, including a variety of fruit trees planted in the orchard and being propagated at the nursery. These trees include Bajan cherry, soursop, tamarind, pineapple, seagrape, cashew, almond, avocado, Jamaican ackee, Bajan ackee and pomegranate, just to name a few.

Furthermore, the trees have been planted in a way to reduce the site's vulnerability to erosion and severe storms. The roots bind the soil together and have proven to be highly effective. The Reserve is also home to a wide range of animals, including Moore hens, lizards, butterflies, frogs, bees, and monkeys.



Figure 6: Planting Vetiver 'Khus Khus' grass to stabilise slopes, retain water and increase biomass at Walkers Reserve.

Regenerative Agriculture at Walkers Reserve

The regenerative approach to landscape rehabilitation and food production at Walkers Reserve has demonstrated measurable improvements in soil structure and biodiversity. Through successive planting and soil amendment cycles (chop and drop), soil organic matter has increased, leading to enhanced slope stability, water retention and plant resilience. Through the efforts at Walkers Reserve, experience-based workshops, internship programmes and volunteer engagements have helped disseminate these regenerative techniques.

Regenerative agriculture at Walkers Reserve has been both a transformative journey and a continuous learning experience which is marked by numerous successes and an equally important collection of hard-won lessons. Unlike conventional farming that leans on monoculture for uniform yields, the Reserve has embraced polyculture systems grounded in permaculture principles. These systems are designed not just for productivity but for resilience which incorporates companion planting, seasonal variation and ecological support systems such as pollinators, windbreaks and rainwater harvesting. Instead of investing in chemical fertilizers, Walkers invests in building ecosystem services into the landscape, enhancing soil health and increasing biological productivity in ways that endure over time.

Various planting patterns have been used across the site to reflect these varied conditions. For example, multi-use trees such as jamun are strategically planted as windbreaks along ridge lines to shield more vulnerable plants from wind shear. These trees serve both ecological and productive roles, offering shade and wind protection while yielding a fruit that is popular for juices and jams. In the permaculture orchard, one finds a mix of fruit trees like soursop, guava, pomegranate, and Bajan cherry; root crops like dasheen and cassava; and herbs and vegetables that are both climate-resilient and nutrient-dense. This polyculture approach not only diversifies output but also enriches the soil and strengthens plant health through natural interactions.

More than 100 bee boxes are maintained at Walkers to support a healthy bee population. This bee population plays a critical role in plant pollination and ecosystem functioning. The bees not only support the fruiting of plants but also form the foundation of a regenerative micro-enterprise which focuses on honey production. This enterprise adds economic value to ecological restoration, with raw honey emerging as a high-value product that complements the range of fruits and vegetables grown on site.

Importantly, food produced on site at Walkers Reserve supplies a local restaurant, demonstrating a practical farm-to-table model with seasonal harvests that are used by both residents and tourists. The integration of agriculture, ecological design and enterprise illustrates how regenerative farming can create layered value.

Regenerative Agriculture at Walkers Reserve

However, regenerative agriculture is not without its constraints. Unlike monocultures that generate large quantities of a single crop, polyculture systems, especially when run by a single producer, are limited in volume and seasonality. While this is limited by economies of scale, it opens the door to new models. The methods used at Walkers Reserve can guide and inspire the formation of regenerative cooperatives, food networks and knowledge exchanges that scale impact while staying true to ecological integrity.

Furthermore, the trees have been planted in a way to reduce the site's vulnerability to erosion and severe storms. The roots bind the soil together and have proven to be highly effective in protecting steep slopes from slippage during heavy rainfall events. The regenerated spaces at Walkers Reserve are now home to a wide range of animals, including Moore hens, lizards, butterflies, frogs, english hares, monkeys and a wide range of insects.

These signs of life are a direct outcome of the broader landscape regeneration strategy undertaken at Walkers Reserve. What was once a barren, wind-swept quarry is now being transformed into a dynamic mosaic of woodlands, wetlands, orchards and grasslands. The reintroduction of native vegetation, stabilisation of slopes and design of habitat corridors have played a central role in reversing land degradation and encouraging the return of wildlife. Restoration efforts are guided not only by ecological goals but also by the site's hydrology, topography, and microclimates to ensure that each intervention enhances biodiversity, supports ecosystem services, and builds climate resilience across the landscape.



Figures 7 and 8: Increase in canopy cover resulting from regenerative farming techniques employed at Walkers Reserve.

4

Strategic and Master Plan for Walkers Reserve

The Master Plan outlines a transformative approach for Walkers Reserve, shifting from extractive industrial practices to a regenerative model that integrates climate resilience and renewable energy. The Master Plan establishes key facilities like an upgraded entrance, educational centers, and a visitor hub, all within a carefully designed framework that prioritizes environmental conservation.

It emphasizes the need to enhance capacity for strategic decision-making through the understanding of people, land, and culture through a study of local, social and ecological patterns.

The Plan highlighted the rich potential of Barbados given its intersection of complex layers and forces, including the geological, ecological, cultural, and economic intersections. Geologically, the island is composed of layers of coral reefs uplifted out of the ocean by the on-going collision of the westward-moving Atlantic Plate meeting the eastward-headed Caribbean Plate. Its land is built from three forces: the up-welling of these geologic plates; as a lens of soils eroded from South America; and the reefs that grow atop them.

The layered nature of the island created a stability unique amongst the steeper volcanic Islands characteristic of the Caribbean. It is both flatter and is not prone to volcanic activity. This coral layer-cake structure made for flat pH-balanced fields and roads facilitating both plantation agriculture and transportation. Its location puts it to the East of most hurricanes. Barbados has long been a safe port in the storm. It gave England a stable outpost in the center of the New World where they could land and trade goods as well as to launch other political, military, and economic forays.

This stability has been reflected in the political systems throughout history and led to it being an investment haven from the 1600's until the present day. Ironically, the uncharacteristically steep, eroded, and unstable landscape of the Scotland District has made it a refuge for people, animals, and plants for ages. It is still where Bajan's go to get away. As they say, the exception proves the rule.

Today, Barbados continues to leverage its advantageous position at the crossroads of the Caribbean and Atlantic, leading in areas such as tourism, banking, and ecological initiatives. Its role as a microcosm for global change allows it to address pressing issues like climate change while maintaining its rich cultural heritage. Overall, the interplay of geological, ecological, and cultural layers makes Barbados a vibrant and stable foundation for growth and transformation in the region.

The Master Plan helps to define the steps to be taken in shifting from an extractive to a regenerative prototype that is resilient to the effects of climate change, applies climate change mitigation and adaptation approaches, and contributes to the goals of the nation's sustainable agenda.

The Plan considers overlapping needs and requirements of intended activities within a cultural heritage landscape, and all of its components developed and implemented through the lens of environmental conservation and an ecosystem-based approach to climate change adaptation and mitigation driven by renewable energy technologies.

Current activities at the Reserve are described and a phased plan is provided (over a 7-year period starting with the cessation of mining) for the implementation of outputs aligned with the objectives of the Reserve. This includes:

- **The Gateway - An upgraded entrance to the Reserve where commercial operations and administrative functions will be centered. The area will feature a new Welcome Centre that will be the control point for visitor reception and the dissemination of information on the Reserve's product offerings and prescribed tours.**
- **Educational Facilities - Including the existing Walkers Reserve Education Centre (WREC) which will be built out to include a campus with dormitories and study spaces. The area also contains the Garden of Hope featuring native medicinal plants and facilitates workshops hosted by the Caribbean Permaculture Research Institute (CPRI).**
- **Visitors Hub - The Visitor's Hub will be a primary area for hospitality and recreation, offering both land and water based leisure activities and being an events hosting space.**

All components were carefully sited, taking sensitive ecological areas into consideration. Additionally, the eastern, southern, and southwestern sections of the site are designated in the Master Plan as a Limited Development Area, which contain the most sensitive natural areas of the Reserve.

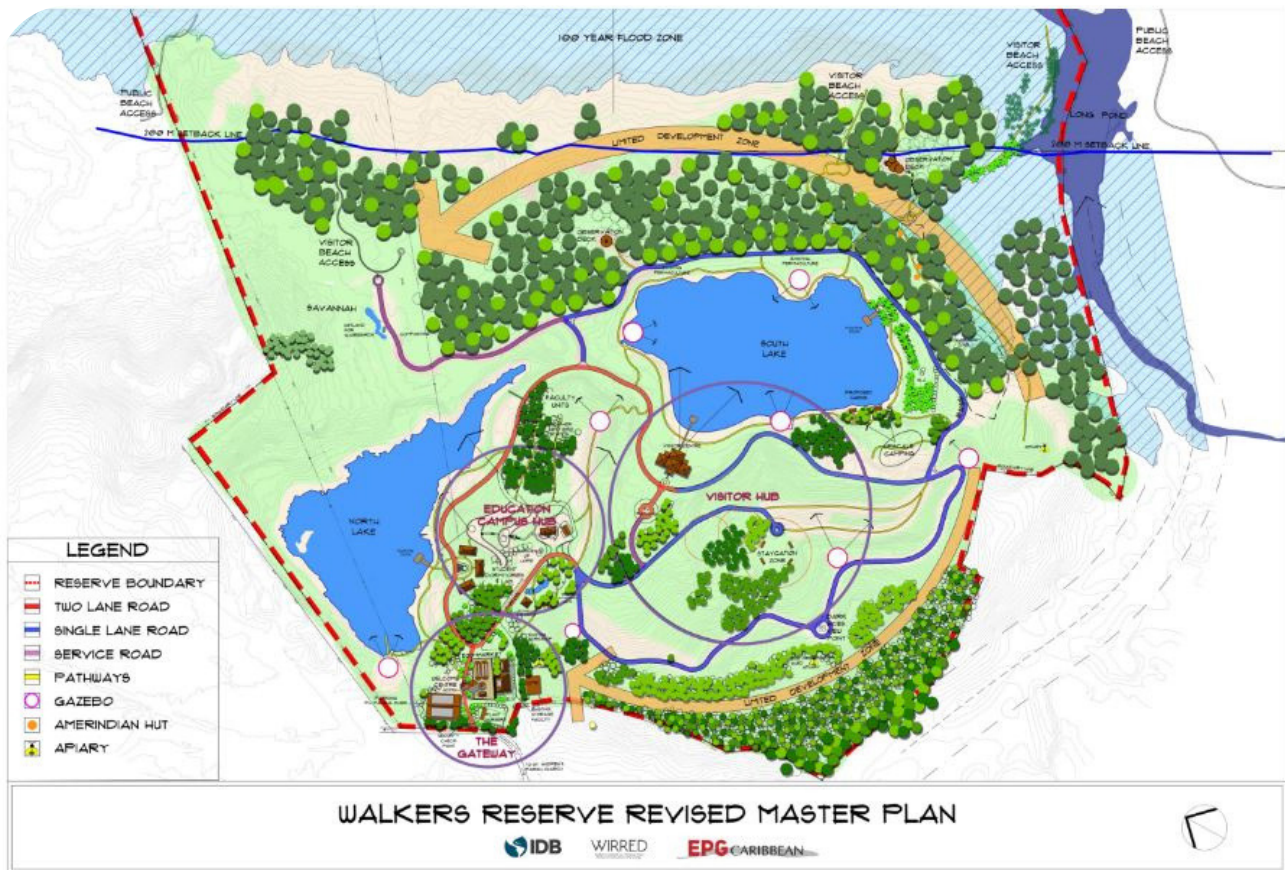


Figure 7: Master Plan for Walkers Reserve.

In support of these key development nodes, there will be an array of amenities and services supported by green infrastructure and powered by renewable energy sources.

These services, some of which have already been initiated, will include low impact accommodation for overnight stays, support of environmental education and research programs, development of trail networks for eco-tours, and inclusion of interpretive displays.

Agribusiness at Walkers Reserve

The feasibility assessment of agribusiness at Walkers Reserve focused on three key areas - Honey, Coconut and Aloe commercialization.

Honey - While there is significant local demand for honey, hive productivity is threatened by changing environmental conditions, namely extreme heat and drought.

Coconut - Local and global demand exceeds supply for coconut products, presenting opportunities for local production. Coconut trees, with their long lifespans, help to retain soil carbon while sustainable local production could reduce imports and CO emissions.

Aloe - Despite rising global demand for aloe vera, local cultivation is minimal. The absence of market channels and the need for large-scale operations limit commercialization potential.

Honey

The honey market in Barbados has been roughly estimated at \$6 million USD. Local apiaries produce only 3% of market demand, indicating that there is a ready market for local raw honey in Barbados.

Recognizing this gap, the Government of Barbados (GoB) identified beekeeping as a sector of focus in 2019.



Figure 8: Jars of raw honey from the Walkers Reserve apiary programme (wrap).

Agribusiness at Walkers Reserve

The pollination services provided by bees directly impacts the functioning of ecosystems and ultimately local and regional economies. Walkers Reserve has the largest apiary on island with 76 hives and has the potential to expand up to 250 hives. However, its capacity to produce endless honey is limited by the small size of Barbados, limited foraging areas for the bees, habitat destruction, pests and parasites, use of pesticides and climate change induced challenges from extreme weather events.

While hive productivity has been impacted by multiple factors, changing environmental conditions is a significant one. Bees have been unable to adapt quickly to fast-paced changes, with some having become endangered. Apiarists in Barbados have found that severe heat and drought have significantly impacted honey yields. For example, 2023 was an extremely unproductive year due to the extended heat (an 18- year high of 34.2 C was recorded at the end of September 2023) and drought experienced.

The industry may therefore need to explore intervention if it is to survive the future impacts of climate change. While Barbados currently does not allow the importation of bees into the country as a matter of policy, declines in hive productivity could drive discussions around required actions to help the industry thrive.

Coconuts

The global and regional demand for coconut and coconut based products is expected to outstrip supply for some time to come given the declining plantations that currently exist, and the time required to rejuvenate them, to meet current demand.



Figure 9: Thriving coconut tree at Walkers Reserve

Agribusiness at Walkers Reserve

The renewable nature of coconuts makes it an environmentally friendly, sustainable resource that can be responsibly harvested without depleting natural ecosystems. With a lifespan of 60+ years, coconut trees can protect soil carbon long term, aiding in climate change mitigation. Barbados has a clear market for coconut water which is sold in large quantities daily by roadside vendors. When exploring higher value coconut-based products, coconut oil stands out as a strong option.

Barbados' food import bill indicates that 81kg of coconut oil was imported into Barbados at a cost of \$637,000 in 2022, suggesting market demand exists for this product. Producing coconut oil for the local market promotes sustainable development as imports of coconut products and the associated CO emissions from the transportation of these imports into Barbados would be diminished. Decreasing imports would greatly benefit the economy of Barbados as foreign exchange outflow is reduced. Further, this sustainable organic product sold using eco-friendly packaging materials, will reduce the environmental impact of packaging waste, aiding Barbados' goal of reducing its carbon footprint and transitioning to a green economy.

Aloe

The global demand for aloe vera is on the rise. Aloe has many benefits and has become more widely known by health and environmentally conscious consumers seeking products that are safe, effective, natural, and eco-friendly. However, it is not a widely farmed product in Barbados or the wider Caribbean region.

Less than \$1,000 worth of aloe extract was imported into Barbados in 2022 indicating minimal consumption. Rather, readily available imported finished aloe-based products such as aloe creams, shampoos, sunscreens etc., dominate the market.

The Dutch Caribbean islands have achieved a level of success commercializing aloe far ahead of the rest of the region, producing an assortment of high value products on a global scale. One of the identified Dutch Caribbean aloe operations were quite large, at 150 acres. Any effort to farm this product viably in Barbados would require economies of scale to export the raw or finished goods in sufficient quantities to cover costs.

No viable local or regional opportunities were identified for commercialization of an aloe product. While the development of aloe vera for a global market arguably could have significant potential, no existing market channels for sale of the aloe vera were found locally for global buyers. This coupled with the acreage needed for cultivation limits its potential for the Reserve.



Figure 10: A flowering aloe plant.

Agribusiness Plan Conclusions

Coconut-based products were identified as the best option for commercial development, leading to the creation of a detailed business plan, focused on coconut water & virgin coconut oil. The commercial development of coconut-based products aligns well with Walkers' sustainability goals, as the renewable nature of coconuts means they can be harvested responsibly without depleting the ecosystem.

The findings from the Financial Analysis for Agribusiness at Walkers Reserve report were used to inform an agri-business plan for Walkers Reserve. Since the report found the production of coconut-based products to be the best agribusiness option, a business plan for the expansion into commercially producing coconut-based products, in particular coconut water and virgin coconut oil, was developed.

The Plan therefore provides greater detail on the execution of coconut agribusiness at Walkers; including market analysis, a financial plan and an implementation strategy. The demand for coconut-based products globally and locally is at an all-time high and is expected to continue growing. While there is insufficient local supply to meet the demand for fresh coconut water, with increased coconut oil imports in 2022, the demand for coconut oil is also high.

Caribbean governments have been seeking to capitalize on this global demand. They have funded and encouraging the development of the industry for the Caribbean through projects including the Alliances Coconut Industry Development, Expansion and Enhanced Support, which provides technical assistance to coconut farmers. In 2021, Barbados was ranked 77th in production of coconuts in the Food and Agriculture Organization Corporate Statistical Database. Well behind a number of its regional counterparts, this indicates it still has a way to go to develop the industry to its full potential.

The commercial development of coconut-based products aligns well with Walkers' sustainability goals. The renewable nature of coconuts means they can be harvested responsibly without depleting the ecosystem. Coconut trees are well-suited and fit seamlessly into the Walkers landscape. With a lifespan of 60+ years, they play a critical role in soil protection and sequestering carbon long term.

Financially, this option yields a higher investment return compared to aloe and honey production.



Figure 11: Fresh coconuts being served at Walkers Reserve Eco Market.

Eco-tourism at Walkers Reserve



Figure 12: Guests hiking on one of the nature trails at Walkers Reserve.

Key challenges in expanding ecotourism at the Reserve are its location and transportation costs to the area. Therefore, it was recommended to promote closer hotels, organize transportation from the South and West Coasts, and develop on property accommodation options for overnight stays.

Additional proposals include creating an environmental education facility & diverse accommodation options like cabins, cabanas and glamping sites to attract tourists and researchers.

Walkers Reserve is currently in the early stages of development as an ecotourism attraction, and there is potential for greater expansion. The Ecotourism Business Plan assesses current ecotourism activities at the Reserve and makes recommendations to facilitate the expansion of eco- and edu-tourism.

Eco-tourism at Walkers Reserve

The Plan noted that one of the greatest challenges of the Reserve in attracting tourists was its location. The location and the lack of transportation to the area makes it expensive and challenging to justify, especially for couples or single travelers. As a result, it was recommended that the focus should be on promoting the hotels on the West Coast that are in closer proximity and corporate groups for retreats etc.

Additionally, it was proposed that vehicles should be purchased that could facilitate transportation to the South Coast and West Coast hotels on alternate days or to organize “an island tour” which would culminate in a lunch, or sunset at Walkers or even a full day out.

Further recommendations from this report include the establishment of a larger environmental education facility on the property to attract international researchers and students as well as a staycation area, with tourism accommodation (for both visitors and locals) featuring a variety of styles, such as cabins, cabanas, yurts, and glamping etc.; and student accommodation, which could double as Airbnb-type accommodation out-of-term.



Figure 13: A guest at one of the look-out points at Walkers Reserve.

Water Resources Assessment

A comprehensive water resources assessment was conducted at Walkers Reserve to ensure the sustainable use of water for current and future activities. This assessment considered the impact of both future developments and environmental changes like climate change, projecting a nearly 20% increase in irrigation needs by 2050 due to climate change.

The overarching goal is to sustainably manage water resources in terms of both volume and quality. The assessment estimated current water consumption for irrigation, landscaping, composting, and offices, excluding sand quarry operations. Water is sourced from the Lakes, rainwater, or the Barbados Water Authority (BWA) potable water supply.

To effectively manage resources, the assessment identified knowledge gaps and recommended implementing a monitoring program, improving water modeling, enhancing collaboration, and developing a Water Management Plan.

The impact of climate change on water consumption at the Reserve was also calculated using historic climate data with projections for the periods 2020-2039 and 2040-2059 from the World Bank Climate Change Knowledge Portal.

These were assessed under the Coupled Model Intercomparison Project Phase 6 RCP6- SSP2 climate scenario and the calculations suggest that by 2050, climate change could increase the volume of water required for irrigation by nearly 20%.

The calculations make a number of simplifying assumptions and therefore the figures should be considered as indicative of the magnitude of the expected increase in



Figure 14: Water monitoring probe being deployed at Walkers Reserve.

A number of areas where there are gaps in knowledge were identified. If addressed, these would improve the ability of Walkers Reserve to manage their water resources more effectively and provide a sound basis for considering how the area could be sustainably developed.

Recommendations stemming from these were:

- **Implementation of a monitoring program** - The report provided an outline of a monitoring program that encompassed both groundwater and surface water quality and quantity. It was recommended that the monitoring program become part of the regular management activities of Walkers Reserve and further that following the initial period of monitoring the program its performance and results be assessed and adjustments made.
- **Water modeling** - Improving existing water modeling by monitoring groundwater level responses as well as the water level responses in the Lakes and using this information to refine the model calibration. The most important insight that the hydrogeological model has to provide is how much water can be sustainably abstracted from the two Lakes.
- **Increased stakeholder engagement** - To facilitate further engagement with recommended collaborators to enhance water management at the Reserve.
- **Water management plan** - After filling some of the data gaps, the water management plan, referred to as the Walkers Water Safety Plan, can be developed. This Plan will set out what ongoing monitoring is required and, based on modeling outputs, how the water resources should be managed, the potential hazards, and how those might be managed.

Walkers Monitoring Programme



Climate change can have far reaching negative impacts on the natural functions of water bodies as well as their other potential uses. However, apart from a few sporadic studies, little has been done regarding water quality in the Scotland District of Barbados (which comprises 14% of land area) and where Walkers Reserve is located.

Coming out of the recommendations above, a Pilot Monitoring programme was designed and implemented. The Pilot Monitoring programme established a sufficient baseline data set on water quantity and quality of the surface waters and groundwaters located at the Reserve.

The monitoring program has collected data on changes in the surface water levels, along with several water quality parameters (pH, temperature, conductivity, nitrates, dissolved oxygen and salinity) for the two lakes on site and groundwater levels via a borehole for the period January-August 2023.

By increasing the capacity to monitor trends over time, this will enable a better understanding of the potential impact of climate change on the long-term viability of activities that rely on water at Walkers Reserve. Results from monitoring will be inputted into a Water Resource Management Strategy for the Reserve and allow water resources to be sustainably used and managed on the Reserve. In turn, this will have a wider benefit as the lands around Walkers Reserve have been identified as being suitable for agricultural production purposes. Any additional climate information specific to the area will be beneficial in informing development decisions in the communities surrounding Walkers Reserve.

While the data has provided a strong start to establishing baseline data, as the dataset is young, it is recommended that consistent monitoring be conducted for a minimum of one year to best find patterns and trends.

Groundwater Modelling

A groundwater model that simulates the climate-hydrological processes on Walkers Reserve was developed. The work shows that the model is capable of representing the site's hydrogeology, capturing the dynamics of water level fluctuations in response to changing rainfall patterns, and projecting the available water from the perched aquifers at the site. Results found a 35% (SSP245) and 59% (SSP585) decline in water volume by 2028.

A dynamic computer simulation, the groundwater model predicts the fluctuations in groundwater levels of perched aquifers at the site, characterizes the flow regime and forms a scientifically sound basis for decision-making.

The Special Report on Emissions Scenario Representative Concentration (SRES) and Representative Concentration Pathways (RCP), used as climate scenarios, have now been supplemented by Shared Socioeconomic Pathways (SSPs).

SSP2-4.5 and SSP5-8.5 were considered since they represent medium challenges to mitigation and adaptation and a more extreme or worst-case scenario. The scenarios were imposed and compared to a baseline groundwater model to project changes in water availability over time. The baseline volume in North and South Lake used was 202,000 m³. Under the SSP245 scenario, the projection is that in five years (2028) the total water volume will approximately be 147,900 m³, which represents 54,000 m³ less water or a decline of 35%. The ensemble climate model projections using the SSP585 scenario, showed a more significant decline in five years (2028) with the total water volume predicted to be 82,120 m³, which represents approximately a decline of 59% by 2028.

The potential impact of model uncertainties, data gaps, and assumptions when analyzing forecasts for water availability in the perched aquifers at Walkers Reserve should be carefully considered when interpreting the significance of the predictions. Ongoing efforts to monitor various environmental parameters (water levels, rainfall, water quality) should produce data that can be incorporated into the model for improved validation. Additionally, downscaled SSP projections for several climate variables may become available and the model should be updated to incorporate these. Nevertheless, the report concluded that it is crucial to incorporate the anticipated effects of climate change into water resource planning and implement appropriate adaptation strategies.

SSPs: SSPs are socio-economic-based climate change scenarios that are used to derive greenhouse gas emissions scenarios with different climate policies).

5

Awareness Campaigns and Community Driven Activities

As part of the collaboration and the need to showcase to a broader community the different activities being developed and their link to the international climate change negotiations, we developed “Degrees of Change”. This Knowledge fair was a community-driven event where various stakeholders were brought together to visualize the future they imagine together and to anchor expectations on the solutions WIRRED is concretely developing as it addresses food sovereignty, conservation of local flora and fauna and builds a shared vision of the future.

At the knowledge fair, multiple stakeholders focused on NGOs in Barbados' environmental sector were brought together to exhibit their work. The aim was to encourage notable public figures and members of the public to visit Walkers Reserve and engage with NGO representatives while learning about developmental projects taking place on the island. Particular attention was placed on the role of youth engagement as a fundamental driver of change.

Exhibitors at the fair included:

- The Ashley Lashley Foundation
- The Barbados Youth Action Programme
- Caribbean Protected Areas Gateway
- Biocultural Education and Research Programme
- Save Soil Movement
- The St. Andrew Parish Independence Committee (PIC)

The Knowledge Fair was attended by just over 300 persons. Events included tree planting, a stakeholder panel discussion on generating solutions for the climate crisis, live music concert as well as a plethora of local vendors with local foods and products.



Figures 15 and 16: Exhibitors and guests at the knowledge fair.

Live Living Room Sessions

As part of our outreach, between April and July 2020, WIRRED in collaboration with the Caribbean Permaculture Research Institute (CPRI) hosted “LIVE Living Room Sessions” on StreamYard.

These 1-hour interactive sessions were a platform for local and international thought leaders to introduce regenerative concepts.

The regenerative concepts are versatile as they apply to a variety of stakeholders, facilitate dialogue and increase awareness towards Regenerative Agriculture, Climate Change, Mitigation and Resilience, Building Biodiversity and Renewable Energy.

These sessions created a more relaxed space for disruptive and innovative conversations on building climate resilience.



Figure 17: Online discussions presented by WIRRED and the Caribbean Permaculture Institute (CPRI), Powered by the IDB.

6

How do we foresee the future at Walkers Reserve?

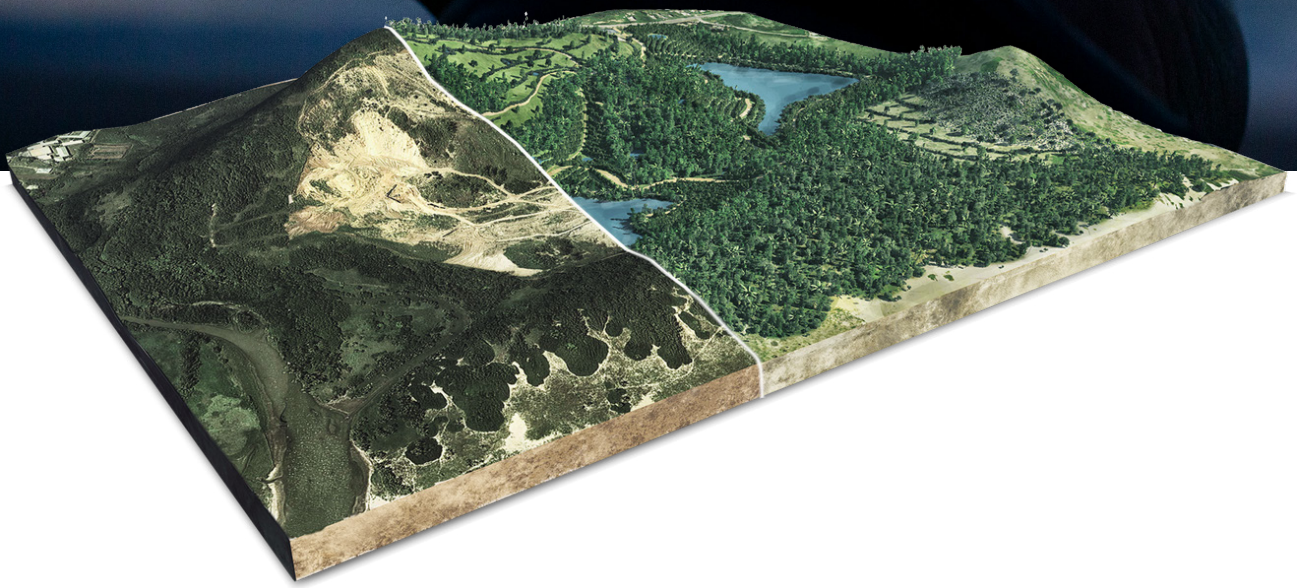


Figure 18: Walkers Reserve, a bioregional hub and model for climate resilience.

As we look to the future, Walkers Reserve is being positioned as a beacon of hope and an example of regenerative land stewardship. By integrating climate resilience, ecotourism and biodiversity conservation, the Reserve exemplifies the multimodal benefits that can be achieved through conscious human activity focused on maximising the 8 forms of capital.

The 8 Forms of Capital framework offers a holistic lens to evaluate and design regenerative systems. At Walkers Reserve, this framework guides decision-making and underscores the integrated nature of the project. These are:

- 1. Social Capital** - strengthened through partnerships with community groups, NGOs, and regional stakeholders.
- 2. Cultural Capital** - reflected in the preservation of local traditions and integration of indigenous knowledge into restoration efforts.
- 3. Spiritual Capital** - nurtured by the creation of a space where people can connect to nature and find meaning in stewardship.
- 4. Intellectual Capital** - developed through research, monitoring, and educational programs that share regenerative practices.
- 5. Experiential Capital** - gained through hands-on training, community events, and citizen science opportunities.
- 6. Natural Capital** - restored through ecosystem rehabilitation, biodiversity protection, and improved water and soil health.
- 7. Material Capital** - invested in infrastructure such as the visitor hub, education facilities, and green technology installations.
- 8. Financial Capital** - generated through sustainable agribusiness, ecotourism, and partnerships that support the long-term viability of the Reserve.

By intentionally balancing these eight forms of capital, Walkers Reserve operates as a model for integrated development, where ecological restoration, economic opportunity, and social resilience are achieved in harmony. The regenerative model created through this project is more than a local success story; it is a blueprint for transformative change that can be used by international producers, government authorities and development agencies to transform the future of extractive industries.

By demonstrating how economic viability and environmental integrity can coexist, the Reserve will inspire industries to adopt practices that regenerate rather than degrade natural assets around the world.

