St Brandon (Carajos Cargados Shoals)
Final Stakeholders' Consultation Report

'St Brandon, an area that needs to be protected for <u>future generations</u> to enjoy'

An aerial view of St Brandon (Photo: J Merven).

"St Brandon, and its marine ecosystem, including the coral reefs, is a unique area that is ecologically largely intact."

Management Plan for St Brandon. 1997.

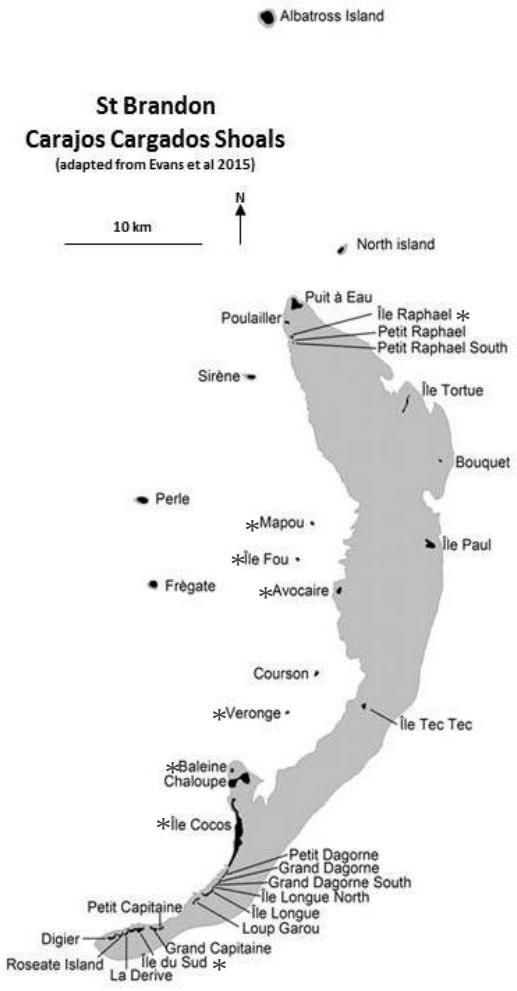
October 2019

Preamble

St Brandon (also known as St Brandon Rock, St Brandon Archipelago and Cargados Carajos Shoals) is a group of more than 30 islets in a 56 km long and 22 km wide north-south orientated lagoon system. The archipelago is situated approximately 400 km North East of Mauritius. The total area of the islets is approximately 500 hectares, which are spread over an area of 1,232 km^2. Some of these islets are mere sandy cays. The main lagoon is approximately 300 km^2 with a coral reef of 130 km in length. Albatross Island is 8 m above mean sea level and is the highest of the islands in the group, followed by Ile du Sud at 6 m above sea level (asl), and the other islands that are no more than 3 m asl. The largest island is Cocos Island (0.95 km²) followed by Albatross Island (0.67 km²), Chaloupe (0.60 km²), Puits à Eau (0.36 km²) and Ile Paul (0.26 km²), with the others being each less than 0.20 km². The islands are covered with white granular sand from eroded coral.

Of the St Brandon islets, 13 are leased to Raphael Fishing Co. Ltd.[1]; the main islands indicated (*) in the adjacent map and the rest are under the control of the Outer Island Development Corporation (OIDC). Access by boat is limited, without an effective jetty. There is no permanent human settlement on St Brandon. The population consists of mainly fishermen temporarily based on the island and staff of the National Coast Guard and the Meteorological Services. Currently, fishing for the Mauritian market is the main activity and there is no agricultural production in St Brandon.

St Brandon Archipelago has a native wildlife assemblage that is unique within the Republic of Mauritius. There are few signs of unnatural coastal erosion on any of the islets.



[1] Leased to Raphael Fishing Co. Ltd.: Ile Boisees/Ile du Sud, Petit Fous, L´Avocaire, I. aux Fous, Du Gouvernement, Petit Mapou, Grand Mapou, La Baleine, Cocos Islands, île Raphael, Ile Verronge, Ile aux Bois, Baleine Rocks.
Under the control of Outer Islands Development Corporation: Albatross Island, North Island, Siren Island, Pearl Island, Frigate Island, Sandy Cays, Eau, Tortues, Paul, Courson, Capitaine, Grand Dagorne, Petit Dagorne, Poulailler, Longue.

The marine life is relatively intact. St Brandon has been proposed for a Marine Protected Area by the World Bank, has been identified as an 'Important Bird Area' in Africa by BirdLife International, as a Marine Important Bird Area under the Nairobi Convention, and as a Key Biodiversity Area by the Critical Ecosystems Partnership Fund. However, the islands and the sea have all suffered from human-induced degrading activities e.g. over-fishing, poaching, marine debris accumulation, ships running aground on reef edges, and the invasion of plants and animals (see Appendix 1 for description).

All islands are degraded to some extent, ranging from the fairly un-accessed North Island to the highly modified Raphael Island. Even the most degraded islets still support native plants, breeding seabirds and nesting turtles. Nevertheless, there is a need for careful management, responsible use, restoration and education to ensure that adverse effects of human activities are curbed and the archipelago's resources can be increased (if not at the very least sustained) for the future generations. There are signs of decline in fishery stocks, known presence and impacts of invasive alien plants and animals, evidence for seabird and turtle poaching which can be reversed. The islands must also be helped to adapt and build resilience against external factors such as climate change and measures taken to reduce the accumulation of marine debris.

St Brandon is little known to the Mauritian public and few can afford the lengthy and expensive trip to these islets. The perception that the islands have bountiful resources has caused it to suffer from 'the tragedy of the commons'. To the extent that there is a perception that fisheries can be harvested ad-infinitum, the seabird and turtle poaching can be disregarded, and the islands are robust, which are all incorrect. The above epitomizes the need for ecosystems restoration, scientific research and monitoring and communication to stakeholders.

There is potential to develop responsible tourism on some of the islets, where visitor facilities need to be developed or improved. It is recognised that there is no scope for mass tourism and the remoteness of the islands, costs and exposure to cyclones place limits to the scale of tourism development. On the positive side, this implies that St Brandon can be developed along a genuine ecotourism model. This will allow funds to be generated to be used for marine and terrestrial biodiversity conservation, in agreement with the essence of ecotourism. The islands can be developed so that their value for tourism is improved while also enhancing the islands for their biodiversity. There are important precedents from New Zealand, other Pacific islands, the Caribbean and the Seychelles to show us how these islands could develop and be managed. The Seychelles have for many years been developing their islands (Fregate, Cousine, North and Bird Islands) for both conservation and tourism.

There have been limited conservation initiatives on St Brandon, and they need to be initiated or scaled-up. The degradation of the islands and their invasion by alien animals and weeds continues and this needs to be reversed with careful biosecurity protocols and quarantine arrangements, and active programmes for the control and eradication of invasive species. There is a need to have a conservation team living and working on site to study, manage or restore the terrestrial and marine ecosystem. This in turn will benefit the exclusive tourism experience and support the management of the archipelago sustainably.

A World Bank report on St Brandon (1996) had proposed measures that have been only partly implemented. There have been various reports and a draft management plan that address the conservation management of St Brandon, but these have not yet resulted in integrated conservation actions, although there have been a number of conservation efforts, studies, and management practices in the past.

The CEPF Project - milestones

Raphael Island, St Brandon (Photo: J Merven).

Thanks to funding obtained from the Critical Ecosystems Conservation Fund through Tany Meva Foundation between 2016 and 2019 (including a project extension), the Mauritian Wildlife Foundation proposed to foster a national dialogue between all stakeholders (see Appendix 2 for details of major stakeholders) and members of the public having an interest in St Brandon. Over 100 institutions and people were reached during the project.

From the 2nd of March to the 11th of March 2016, a 'Fact-Finding Mission' was organised to St-Brandon with a group of scientists; Dr. Nik Cole from the Mauritian Wildlife Foundation/Durrell Wildlife Conservation Trust, Prof Henk Bouwman; Ecotoxicologist and bird expert from the North West University, South Africa, Prof Tony Martin a British Conservation Biologist attached to the University of Dundee, Scotland and some members from Raphael Fishing; Mrs Nathalie Boulle, Mr Julian Merven and Mr Sybrand van der Spuy. During this short trip the aim was to obtain an overview of the current state of the atoll and the actions needed for it to be managed sustainably. A press conference was held on the return of the expedition on 11th March 2016 and reported in the press.

Photo of the press conference held on 11 March 2016 (extracted from: https://www.lemauricien.com/article/developpement-durable-raphael-fishing-investit-la-conservation-st-brandon/)

A second expedition to St Brandon materialised from 8th and 20th March 2019, with 9 full days in the archipelago. Dr Nik Cole (MWF/Durrell) led the expedition, with the participation from Mr Rouben Mootoocurpen (MWF), Dr David Derand (Durrell), and Mr Sundy Ramah (Ministry of Ocean Economy, Marine Resources Fisheries and Shipping). Data was collected from several islands on the terrestrial ecosystems, presence/absence/abundance of alien animals (rats, mice, rabbits, chicken), feasibility of eradication of alien mammals, and marine ecosystems (turtles, corals, sea cucumber, zooplankton, phytoplankton, fish diversity, salinity, light intensity, temperature etc).

A workshop on the findings of the St-Brandon Scientific expedition (8th to 20th March 2019) was held on the 23rd May 2019. (See: https://www.facebook.com/MauritianWildlife/posts/2422390081183244).

Workshop on the Findings of the St-Brandon Scientific Expedition.

Following the St-Brandon Workshop that was held on the 23rd May 2019, a follow-up meeting was organised with the stakeholders on the 30th August 2019 to identify how each institution could contribute to the future sustainable management of St-Brandon.

Meeting post the St-Brandon workshop held on the 30th August 2019.

As a result of the various consultations, including workshops and meetings, a number of collective and individual interests for actions (activities, studies and surveys) have been expressed. These are presented in Table 1 (Institutional Mapping) and Table 2 (Appendix 3, Action Plan 2020-2025 and beyond).

Table 1: Institutional Mapping - Expression of interest in actions and studies grouped per institution's participation.

No.	Institution	Action	Studies	Other
1	Association Les Amis de St-Brandon	Completing the flora survey of all islets	Climate change studies and impacts	
		Developing a management plan for St Brandon	Marine monitoring	
		Setting up a task group for St Brandon	Coral bleaching	
		Setting up a quarantine system	Algal bloom	
		Developing ecotourism on SBR	Behaviour and monitoring of sea turtles	
		Seabird monitoring		
		Start a protection programme for the sea turtle nesting beaches		
		Obtain funding and access to SBR for research students		
2	Durrell	Completing the flora survey of all islets		Survey and monitor terrestrial fauna (Reptiles/Inverts)
		Developing a management plan for St Brandon		Marine debris monitoring and Waste Management
		Setting up a task group for St Brandon		
		Eradication of invasive alien species		
		Setting up a quarantine system		
		Seabird monitoring		
		Start a protection programme for the sea turtle nesting beaches		
		Obtain funding and access to SBR for research students		

No.	Institution	Action	Studies	Other
3	Eco-sud	Developing a management plan for St Brandon	Climate change studies and impacts	Elasmobranch monitoring
		Setting up a task group for St Brandon	Marine monitoring	
		Eradication of invasive alien species	Coral bleaching	
		Setting up a quarantine system	Algal bloom	
		Start a protection programme for the sea turtle nesting beac	Behaviour and monitoring of sea turtles	
		Obtain funding and access to SBR for research students		
4	Forestry Services	Completing the flora survey of all islets		
		Developing a management plan for St Brandon		
		Setting up a task group for St Brandon		
		Eradication of invasive alien species		
5	Mauritian Wildlife Foundation	Completing the flora survey of all islets	Climate change studies and impacts	Setting up field station
		Developing a management plan for St Brandon	Long-term effects of guano mining	Fundraising
		Setting up a task group for St Brandon	Marine monitoring	
		Eradication of invasive alien species	Behaviour and monitoring of sea turtles	
		Setting up a quarantine system		
		Seabird monitoring		
		Start a protection programme for the sea turtle nesting beac		
		Obtain funding and access to SBR for research students		
6	Mauritius Meteorological Services		Climate change studies and impacts	
			Marine monitoring	
7	Mauritian Scuba Diving Association		Marine monitoring	
			Coral bleaching	
			Algal bloom	
			Behaviour and monitoring of sea turtles	
8	Ministry of Environment			Beach Profile Survey
				Beach Erosion assessment

No.	Institution	Action	Studies	Other
9	Ministry of Ocean Economy	Developing a management plan for St Brandon	Climate change studies and impacts	
		Setting up a task group for St Brandon	Coral bleaching	
		Start a protection programme for the sea turtle nesting beaches	Algal bloom	
			Behaviour and monitoring of sea turtles	
10	National Coast Guard	Setting up a task group for St Brandon	Marine monitoring	
		Setting up a quarantine system		
11	National Parks and Conservation Service	Completing the flora survey of all islets		
		Developing a management plan for St Brandon		
		Setting up a task group for St Brandon		
		Eradication of invasive alien species		
		Setting up a quarantine system		
		Seabird monitoring		
		Obtain funding and access to SBR for research students		
12	REEF Conservation	Setting up a task group for St Brandon	Marine monitoring	Awareness
		Start a protection programme for the sea turtle nesting beaches	Coral bleaching	
			Behaviour and monitoring of sea turtles	
13	RFC/ Le Frais des iles Ltee	Completing the flora survey of all islets	Marine monitoring	
		Developing a management plan for St Brandon	Behaviour and monitoring of sea turtles	
		Setting up a task group for St Brandon		
		Eradication of invasive alien species		
		Setting up a quarantine system		
		Developing ecotourism on SBR		
		Seabird monitoring		
		Start a protection programme for the sea turtle nesting beaches		
14	Valley de Ferney	Developing ecotourism on SBR		Fish Stocks and Quotas
		Seabird monitoring		Research on the shells

Table 2 (Appendix 3), the Action Plan, presents the same data above but grouped per action and identifies how institutions may wish to be more specifically involved in the actions and a time-frame for these.

Conclusion

The Institutional Mapping (Table 1) and the Action Plan 2020-2025, and beyond (Table 2) identify the main actions needed to improve the management of St Brandon and to conserve its natural resources. We have collectively set out the identified actions needed to develop and implement a long-term plan for the archipelago, working within partnerships with government ministries, specialist organisations, entrepreneurs, non-governmental organisations and the private sector to implement these plans. St Brandon can become an exceptional natural resource for the Republic of Mauritius, where conservation, scientific research, eco-tourism and fisheries can be sustainably promoted. St Brandon's regional and international significance will gain greater international importance through the identified actions. St Brandon offers wonderful opportunities for conservation of its natural resources and sustainable ecotourism and could be restored and protected so that they would be areas of outstanding natural beauty, equal if not better than the best of the remote archipelagos worldwide and of great international importance. There are examples of successful synergies between government, private sector and NGOs in the management of islands e.g. in the Seychelles (Aldabra, Cosmoledo, Assomption, North Island). A partnership of this type for St Brandon can only be beneficial for the sustainable management of the islands for future generations. This end of project synthesis document serves as a base for future positioning of St Brandon in national dialogues, policies, planning, conservation actions and fund-raising.

Appendix 1

Statement of issues

Marine Conservation:

- Protection of the lagoon and surrounding waters supporting life on St Brandon

The ~300 km^2 lagoon of St Brandon is a hotspot of marine biodiversity, feeding and supporting the whole archipelago with new life. The lagoons are abundant with life where hundreds of species, ranging from the corals and sponges, through to small crustaceans and molluscs, the millions of schooling fish, to the larger predators, such as sharks and rays and the marine turtles roam these protected waters. The area is an important spawning ground and a sheltered nursery that supports a thriving, but vulnerable ecosystem. Whether it is on the colourful reefs or on the seemingly barren sand flats, the marine components of this archipelago have their importance that requires protection.

Rays in the waters of St Brandon (Photo: J Merven).

Each element contributes to a symbiotic balance in the lagoons and also to the regional ecosystem as a whole. As an example, the schools of small fish and squid are essential food for the breeding bird colonies and the algae growing on the flats as food for the marine turtles. Protection of the lagoons are critical, but can and should not be seen in isolation of the deeper water areas around the atoll, supporting life, especially birds, turtles and larger species all living in careful balance in and around the lagoons.

This fine balance, potentially a world-class sanctuary, will easily be lost with too much human-based interference, especially by destructive fishing methods such as seine netting. This is probably the most disastrous approach of all the fishing methods as everything, including whole schools of fish and other marine creatures are indiscriminately reaped without any chance of escape.

Furthermore, the shallow lagoons offer easy access and relative operating freedom for fisherman. These same shallow waters also host juvenile fish, which are far easier to catch than mature ones. Removing immature fish prevents recruitment and reproduction rapidly driving fish stocks to a vulnerable state.

Other fishing methods, such as using fish traps can also be disastrous if not controlled properly. Lost or abandoned fish traps will kill hundreds of fish on a perpetual cycle of dying and dead fish, becoming bait, attracting other organisms into the trap, that in turn attract more for years until the trap eventually erodes.

Fishing should be very carefully monitored and managed if it is to continue sustainably for future generations. Deep water fishing is clearly the responsible and correct way forward.

Anchorage on a shallow reef inside the lagoon causes tremendous damage that takes years to recover. The monitored and controlled use of pre-defined permanent moorings, passage only through demarcated channels and deliberated zoning are practices which need to be implemented and respected throughout the lagoons in order for these to remain pristine or to allow degraded areas to recover.

It is essential that certain highly sensitive areas, or important breeding areas and nurseries are demarcated and restricted from commercial fishing in order to maintain the eco-balance that is critical to the long-term sustainability of St Brandon.

It is proposed that the National Coast Guard be better resourced and supported so that it can apply the laws of the Republic of Mauritius, in particular against illegal fishing by foreign vessels.

- Control of marine pollution

There are several pathways for marine pollution of St Brandon; transboundary (e.g. flotsam), from neighbouring countries, passing vessels, visitors, and shipwrecks. The remoteness of the islands implies that clean-ups are logistically challenging, time-consuming and expensive.

Whilst marine debris will always reach St Brandon, it is advisable to attempt to collect these debris and ship to Mauritius for safe disposal. Marine debris are a threat to the environment and to wildlife (e.g. fish, turtles and seabirds are known to ingest plastics and micro-plastics or become entangled and trapped). Furthermore, these wastes are unsightly, may take centuries to break down, and can release plasticizers, micro-plastics and other hazardous wastes, such as persistent organic pollutants that are environmental hazards.

For visiting boats, personnel and tourists, a policy of returning the waste materials back to Mauritius can be imposed. The policy of ‘reducing, re-using and recycling’ should be adopted. The use of hazardous substances should be managed with extreme caution.

The frequency of shipwrecks at St Brandon has increased significantly over the past decade, reflecting greater maritime traffic in St Brandon’s waters. For example, there have been six shipwrecks over the last decade (including two recorded within months of each other - Team Vestas Wind in December 2014 and Kha Yang in February 2015), compared to eight during the 20thC.

The risk of marine pollution and the release of invasive species from such wrecks are real and the capacity to respond to such events at present are limited. It is advised that St Brandon develops greater preparedness in the face of marine pollution that may result from shipwrecks.

- Protection and enhancement of the turtle nesting beaches

Sea turtles abound in St Brandon waters and nest in good numbers on the islands.

St Brandon is the richest site in the Republic of Mauritius for sea turtle nesting. Two species nest there, the Endangered Green Turtle (*Chelonia mydas*) and the Critically Endangered Hawksbill Turtle (*Eretmochelys imbricata*). Both species are affected by poaching, predation and disturbance. The protection of this invaluable natural resource is internationally recognised. This can be achieved through a voluntary code of conduct, patrolling and effective law enforcement.

Sea turtles use the same beaches for nesting, returning to the same spots that they hatched from. These beaches must be protected from development and over exploitation for other purposes. Introduced predators of turtle eggs and hatchlings need to be eradicated and introduced plants that negatively modify nesting beaches need to be replaced by suitable coastal native plants.

Due to the lifecycle of sea turtles involving both land and sea, these animals will require a close collaboration between terrestrial and marine conservation groups and researchers for appropriate protection and restoration activities. Careful management and protection will lead to an increase in turtle activity and numbers, and could be of great conservation significance for the region and ecotourism.

- Marine Invasive Species Management

It appears that St Brandon is currently not affected by marine invasive species, whether native or alien. However, there needs to be a marine monitoring project to identify invasive species (e.g. native crown of thorns *Acanthaster plancei* and lion fish *Pterois volans*) and attempt their control/eradication, and limit their spread.

Terrestrial Conservation:

- Determine the distribution (presence and absence) of invasive species on the islands and where feasible control or eradicate them

St Brandon islets have a range of invasive plants and animals, for example plants, such as *Achyranthes aspera*, *Millettia pinnata, Gossypium* spp*,* invertebrates, such as the big-headed ant (*Pheidole megacephala*), geckos (*Hemidactylus frenatus, Lepidodactylus lugubris*) and mammals such as mice (*Mus musculus*), ship rats (*Rattus rattus*) and rabbits (*Oryctolagus cuniculus*). These degrade the native habitat of the islands, and or reduce seabird and turtle nesting. There are significant potentials to control, if not remove most (if not all) invasive species from St Brandon due to the relatively small sizes of the islets. For example, an aerial or drone poisoning and/or hand broadcasting of rodenticides on all infested and neighbouring islets will lead to the eradication of mice, rats and probably rabbits from the archipelago. There is a wealth of national and international experience removing invasive plants and animals successfully. In parallel with a native habitat protection and restoration programme, this may make St Brandon one of the most pristine archipelagos in the Indian Ocean, if not the world. However, a strict biosecurity and quarantine system for all incoming boats for both terrestrial and marine species to St Brandon and within the archipelago must be imposed for the plan to be effective long-term. There is a need to continuously monitor against the arrival of invasive plants or animals and to have a contingency plan in place in the event of introduction.

- Restoration of the vegetation communities

St Brandon hosts an Indo-Pacific coastal vegetation, with species which are globally not endangered and widespread. These are resistant to salt sprays and strong winds. However, the introduction of invasive plants and animals, as well as habitat destruction for various reasons (infrastructure and guano mining) has caused the degradation of the native vegetation, which is marked on some islets (e.g. Raphael Island).
The ecosystem supports plants, invertebrates, turtles, and seabirds, and will need introduced species to be replaced by appropriate native coastal species.

- Restoration of the seabird communities

A combination of habitat degradation, disturbance and poaching has resulted in some seabirds being extirpated from some islands e.g. frigatebirds *Fregatta* spp. or re-breeding in very low numbers from St Brandon e.g. Red-footed Booby *Sula sula*.

The eradication of mammals and control of poaching of eggs and adult birds will favour the re-establishment of some seabirds, and increase in population of surviving species. Some of the seabirds can benefit from techniques used in Mauritius to favour re-establishment of locally extirpated species. Seabird colonies are an attraction for eco-tourism.

Albatross Island Sooty Tern Onychoprion fuscatus colony (Photo: N Cole)

Scientific Research:

- Marine biodiversity research

St Brandon offers tremendous opportunities for marine research, both pure and applied. Greater importance should be given to research that allows the marine resources of St Brandon to be better conserved. This could include an in-depth baseline study of the state of the marine ecosystem, research on coral, molluscs, crustaceans, fishes, fisheries management, marine invasive species, colonisation of wrecks by marine organisms etc. This research would guide other conservation measures.

- Terrestrial biodiversity research

Similarly, St Brandon provides great scope for terrestrial biodiversity research, but priority should be given to applied research. Some areas include terrestrial invasive species management, coastal plant dynamics, seabird and turtle ringing, tagging and monitoring.

- Marine and terrestrial biodiversity research

There is recognition that there will be areas of marine and terrestrial research that will overlap e.g. seabirds, turtles, climate change, sand erosion and dynamics. There is here the potential for the research angles to synergise rather than conflict.

- Scientific Research Programme

A research programme should be set in place that reflects the priorities for both terrestrial and marine research. To begin with, marine and terrestrial baseline studies have to be initiated. The research programme would be open to national and international universities, NGOs and research institutes and would need to be managed to provide clear guidance and to avoid conflicts and manage overlaps. The programme can remain flexible to cater for opportunities and developments. To support the research programme, Raphael Fishing has proposed to provide a functional field station to researchers on Raphael Island.

The development of the Scientific Research Programme should include a 'stock-taking' review of actions undertaken since or as a result of the World Bank report on St Brandon (1996), and those partially or not implemented.

Eco-Tourism to support Conservation:

- Zoning of the islets and sea to allow different levels of access

St Brandon needs to be zoned into terrestrial and marine areas that designate responsible open access to visitors (open zones), others that have restricted access, e.g. for islets access by paths to certain areas only (restricted islands), and others that are exclusively for scientific research or are highly sensitive to unsupervised visitation (closed zones). The designation will be dictated by security concerns and threats that regular visitorship may pose to biodiversity.

On islets, a well-marked series of paths and trails will allow easy access to places of interest, such as wildlife hot-spots, scenic views and to see some of the historic buildings (some of which will need to be restored). Routes can be made of different lengths allowing the visitor to make circuits that suit the time they have available.

In the lagoon zoning would allow the marine ecosystems to remain sustainable. Specific areas would be allocated for boating, diving, recreational fishing and water sports activities.

- Management of visitor activities

Visitor programmes must not present risks to environment and wildlife. Access to sea turtle nesting sites and rare breeding seabirds may need to be controlled so as not to disturb animals. Sea turtle nesting and hatching are very attractive to tourists, and if conducted well can generate sustainable income.

There is a global trend in ecotourism towards sustainable fishing methods. In support of this trend, the promotion of fly fishing and catch and release methods is to be encouraged.

The possibility for visitors to stay on their boats may reduce the pressure on terrestrial resources, and will need to be explored further.

- Provision of facilities for visitors

A lot can be done to improve the experience of visitors to the islands to make their visit more pleasant and memorable, without distracting from the authentic spirit of St Brandon. However, basic amenities need to be provided where visits are allowed eg mooring buoys, jetties, paths, compost toilets, recycling facilities etc.

There needs to be careful environmental, logistical and financial consideration for providing air access to St Brandon. The development of high-end exclusive tourism on St Brandon relies on air accessibility. It appears that float-planes would be the best option. This plane could also be used for emergency evacuations.

To minimise environmental impact a mix of tented camps and live-aboard on catamarans (self-accommodated, with sewerage compartment) could be an ideal formula.

Finally, with the development of ecotourism, consideration must be given to the development of scientific guides who are well-versed in both the marine and terrestrial life of St Brandon.

- Apply sustainable environmental practices

St Brandon can aspire to become one of the most sustainably managed archipelagos in the world. For example, St Brandon receives a lot of sunshine and wind annually, which could be a key factor in developing aeolian and solar energy. A policy for visiting vessels to take back to Mauritius all rubbish generated, as well as taking away from the islands some of the flotsam would be wise.

- Code of conduct

Visitors to St Brandon must adhere to a code of environmental conduct that covers quarantine, waste removal, noise control, respect for plants and animals etc. Ideally, all visitors should receive a briefing document that contains the ‘rules and regulations’, and an induction prior to conducting a trip to Saint Brandon.

Sustainable Fisheries:

- Monitor fish stocks around St Brandon

It is recognised that St Brandon is important for Mauritius for the supply of fish to the local market. Ensuring that the fisheries stock does not collapse is a priority. Experience from Mauritius and Rodrigues has demonstrated that fish, octopus and other marine food resources can be depleted. Monitoring is thus needed to be able to make informed decisions and a fishery monitoring and enforcement programme strengthened.

Fish and other products from the sea not chilled are dried and then exported for the local market in Mauritius.

- Apply sustainable fisheries practices

In order to maintain the fisheries stock certain measures will be needed. These can include zoning, rotation of zone closure, self-imposed quotas and assessment of fishing techniques (e.g. seine fishing and fish traps). The size of fish caught needs to be strictly regulated and bycatch of sea turtles, dolphins and sharks reported and measures taken to reduce this. The poaching of sea turtles and shark finning must also be strictly banned.

- Promote a common approach to fisheries

The fisheries standards must apply to all operators at St Brandon. A strict fishing code of conduct for Mauritian and foreign vessels must be adhered to. Fishing licences should be delivered to operators who are conscious of the importance and fragility of St Brandon and are willing to abide by strict environmental and fisheries standards. This will ensure that commercial fishing levels may be able to increase. Measures should apply to the lagoon and off-lagoon fisheries.

Appendix 2

Institutional Involvement

Outer Islands Development Corporation
The Government agency responsible for the management and development of the Outer Islands. "Outer Islands" is defined as all the islands comprised in the State of Mauritius other than the Islands of Mauritius and Rodrigues. The Corporation has therefore, under its jurisdiction Agalega and the Cargados Carajos group of islands (St Brandon)(http://localgovernment.govmu.org/English/Pages/outer%20Island/stbrandon.aspx). As for St Brandon the islands are being exploited in the fishing sector. The OIDC is under the aegis of the Ministry of Ocean Economy, Marine Resources, Fisheries, Shipping and Outer Islands.

Raphael Fishing Company Ltd

The Raphael Fishing Company Ltd (RFC) has been operating on St Brandon for around 100 years. The company holds a permanent lease on 13 islets in the atoll and a commercial fishing quota of 300 Tons of fish from the 600 Tons which is the total annual quota from the Ministry of Fisheries.

In the past RFC collected guano and prepared salted fish for the Mauritian market. In recent years, the company has concentrated more on fresh fish caught on bottom fishing and eco-tourism/ sports fishing. The company has three bases spread across the atoll which accommodate on average some 30 staff.

The company's main goal and interest is to make sure that St Brandon remains as pristine as possible, allowing the fragile natural resources to be protected and controlled while keeping all operations focused on medium and long term sustainability.

Mauritian Wildlife Foundation
The Mauritian Wildlife Foundation (MWF) is the only non-governmental organization (NGO) in Mauritius to be exclusively concerned with the conservation and preservation of the Nation's endangered plant and animal species in the Republic of Mauritius. The hands-on conservation projects are carried out in Mauritius including the offshore islets and Rodrigues. MWF works closely with local and international partners, with the long-term aim of recreating lost ecosystems by saving some of our rarest species from extinction and restoring the native forest. Another important part of MWF's work is to raise awareness about conservation issues through our education programme.

The Mauritian Wildlife Foundation has extensive experience in seabird studies and translocation, introduced plant and animal eradications, managing islands (e.g. Ile aux Aigrettes and Round Island), and working with multiple stakeholders (including government agencies, the private sector and local communities).

National Coast Guard
Manages a post on Raphael Island, and ensures maritime safety. Enforces the laws of the Republic of Mauritius, especially with regards to marine activities. Officers work on a rotation of around 3 months.

Albion Fisheries Research Centre
Monitors the fish stocks in and around St Brandon, and oversees marine scientific studies.

Meteorological Service.
The Meteorological Services runs a synoptic station on Raphael Island. The station was set up in the 1950s. It is manned by one Senior Meteorological Technician and one Meteorological Technician who are posted for a tour of duty of 4 to 6 months, on a rotational basis. The station forms part of the network of the Global Observation System of the World Meteorological Organization (WMO). Three hourly observations made on the island are broadcast worldwide on the Global Telecommunication System of WMO.

Given its geographical location, weather observations from St Brandon are also of paramount importance for the tracking of weather systems in particular tropical cyclones whenever these are evolving in the area.

Department of Fisheries
The department of fisheries falls under the Ministry of Ocean Economy, Marine Resources, Fisheries, Shipping and Outer Islands. This department is responsible to allocate fishing permits for St Brandon Bank to commercial fishing companies and to ensure regulations with regards to quotas, fish size and fishing methods are respected.

Department for Continental Shelf, Maritime Zones Administration & Exploration (CSMZAE)
This department operates under the aegis of Ministry of Defence and Rodrigues. Its objectives are to effectively manage and explore the maritime zones of the Republic of Mauritius in a sustainable manner and to ascertain the maritime sovereignty and territorial integrity of the Republic of Mauritius. It works on a participatory approach, an ecosystem approach based on the best available scientific information, and methods that are in line with international laws and Conventions. The CSMZAE is responsible for the formulation of policies in ocean affairs and for the establishment of legal and regulatory frameworks governing the sustainable management of the non-living resources in the maritime zones of Mauritius including hydrocarbon and mineral exploration and development.

Appendix 3

Action Plan (2020-2025, and beyond)

Table 2: Identification of actions, institutional interest and suggested time-frame for actions.

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
		Association Les Amis de St-Brandon	Logisitics support as members have boats visiting island often				
		Durrell	Can lead		x	Before and after eradication	
1	Completing the flora survey of all islets	Forestry Services	Assistance in collection of plant material and liaison with Mauritius Herbarium for identification. Designing a proper survey which subject to the approval of the Conservator of Forest.		x		
		Mauritian Wildlife Foundation	Conducting survey of all islets	x			
		National Parks and Conservation Service	Survey can be conducted by their institution		x		
		RFC/ Le Frais des iles Ltee	Helping in Logistic				

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
2	Developping a management plan for St Brandon						
		Association Les Amis de St-Brandon	Guided Laypersons observation as needed				
		Durrell	Can assist	x			
		Eco-sud	Assist	x			
		Forestry Services	Depending on the extent of vegetation on the islets, they could contribute with the development of sections on flora.	x	x		
		Mauritian Wildlife Foundation	Leading or coordinate the management plan		x		
		Ministry of Ocean Economy	Institutional Collaboration			x	
		National Parks and Conservation Service	Contribute to the development (Experience in developping)		x		
		RFC/ Le Frais des iles Ltee	Help in creating the document				

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
3	Setting up a task group for St Brandon						
		Association Les Amis de St-Brandon	Knowledgeable guides of St-Brandon (e.g. Former fisherman and administrator Who lived there)				
		Durrell	Can participate	x			
		Eco-sud	Role and time frame not specified				
		Forestry Services	Agenda depends on the extent of vegetation the islets				
		Mauritian Wildlife Foundation	Leading or coordinate the task group	x			
		Ministry of Ocean Economy	Institutional Collaboration	x			
		National Coast Guard	The NCG is already having a group of officers posted at Raphael Island				
		National Parks and Conservation Service	Be part of the task group				
		REEF Conservation	REEF Conservation can take part in different work meetings, on the implementation of project actions as well as on the monitoring of the project.	x	x	x	x
		RFC/ Le Frais des iles Ltee	Role and time frame not specified				

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
4	Eradication of invasive alien species	Durrell	David Derrand can lead and Nik Cole support		x		
		Eco-sud	Role not specified	x			
		Forestry Services	Assistance in removal of IAS				
		Mauritian Wildlife Foundation	Planning and conducting the eradication	x	x		
		National Parks and Conservation Service	Participate in the eradication of IAS Campaign		x		
		RFC/ Le Frais des iles Ltee	Helping in Logistic				

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
5	Setting up a quarantine system	Association Les Amis de St-Brandon	Coordinate advocacy need towards Authorities on illegal and abusive events				
		Durrell	Can participate and some areas lead **Note:** Requires training of stakeholders	x	ONGOING		
		Eco-sud	Role not specified	x			
		Mauritian Wildlife Foundation	URGENT! Developping a quarantine system	x			
		National Coast Guard	Can ensure that MOH(Ministry of Health?) issues a clearance certificate that the vessel has been put on quarantine				
		National Parks and Conservation Service	Role not specified			x	
		RFC/ Le Frais des iles Ltee	Helping in the control of the visitors on the Atoll				

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
6	Developing ecotourism On SBR	Association Les Amis de St-Brandon	Role and time frame not specified				
		RFC/ Le Frais des iles Ltee	Role and time frame not specified				
		Valley de Ferney	Educational tours and fishing tour		x		
7	Seabird monitoring	Association Les Amis de St-Brandon	Role and time frame not specified				
		Durrell	Can lead/participate	x	x	x	X
		Mauritian Wildlife Foundation	Conducting monitoring on all islets	x	x	x	X
		National Parks and Conservation Service	Mobilise funding for seabird monitoring/ Conservation fund for project		x		
		RFC/ Le Frais des iles Ltee	Role and time frame not specified				
		Valley de Ferney	Eradication of rats for rare birds			x	

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
6	Developing ecotourism On SBR	Durrell	Can participate , mapping and Surveying	x	x	x	X
		Eco-sud	Lead		x		
		Mauritian Wildlife Foundation	Helping to monitor sea turtle and sensitising against poaching		x		
		Ministry of Ocean Economy	Institutional Collaboration	x			
		REEF Conservation	REEF is a partner in a national project, in collaboration with other Mauritian NGOs, on turtles in Mauritius. REEF Conservation as part of an exchange of expertise participated in a training with Kelonia on identifying turtles from tracks, and tracking nests.	x	x	x	X
		RFC/ Le Frais des iles Ltee	Helping in logistic				

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
6	Developing ecotourism On SBR						
		Durrell	Can assist with research proposals		x	x	X
		Eco-sud	Assist		x		
		Mauritian Wildlife Foundation	Coordinate research, especially terresterial and seabird	x	x	x	X
		National Parks and Conservation Service	Mobilise fund through Conservation Fund		x		
STUDIES							
1	Climate change studies and impacts	Association Les Amis de St-Brandon	Role and time frame not specified				
		Eco-sud	Assist				x
		Mauritius Meteorological Services	Evolution of the climate in the region		x		
		Ministry of Ocean Economy	Institutional Collaboration				x
		Mauritian Wildlife Foundation	Coordinate or organising studies to look at climate change	x	x	x	x

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
2	Long-term effects of guano mining	Mauritian Wildlife Foundation	Assist in setting up study				x
3	Marine monitoring	Association Les Amis de St-Brandon	Role and time frame not specified				
		Eco-sud	Lead survey on seagrass coral and fish	x			
		Mauritius Meteorological Services	Monitor daily SST(Sea Surface Temperature) in the region depending on availability of intruments				x
		Mauritian Scuba Diving Association	Will supply man power for data collection				x
		Mauritian Wildlife Foundation	May help often to do marine monitoring but cannot lead	x	x	x	x
		Ministry of Ocean Economy	Institutional Collaboration				x
		National Coast Guard	The NCG being part of the Police can reinforce security of the Maritime Law	x			

		REEF Conservation	REEF Conservation is composed of marine biologist who know the different methods of monitoring, so can collaborate in this study (provide staff and some material)	x	x	x	x
		RFC/ Le Frais des iles Ltee	Assisting in logistic				
No.	**ACTION**	**INSTITUTION**	**ROLE OF THE INSTITUTION**	**TIME FRAME**			
				0-1 year	**1-3 years**	**3-5 years**	**>5 years**
4	Coral bleaching	Association Les Amis de St-Brandon	Role and time frame not specified				
		Eco-sud	Lead study and investigate diseases of coral	x			
		Mauritian Scuba Diving Association	Will supply man power for data collection				x
		Ministry of Ocean Economy	Institutional Collaboration				x
		REEF Conservation	Since REEF Conservation organises monthly follow-ups on the coral bleaching around Mauritius, we use the method implemented by the Wildlife Conservation Society Kenya with, circles by noting the number of coral colonies. Staff can be provided for the monitoring.	x	x	x	x

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
5	Algal bloom	Association Les Amis de St-Brandon	Role and time frame not specified				
		Eco-sud	Lead study and investigate of algea bloom on coral, seagrass	x			
		Mauritian Scuba Diving Association	Will supply man power for data collection				x
		Ministry of Ocean Economy	Institutional Collaboration				x
6	Behaviour and monitoring of sea turtles	Association Les Amis de St-Brandon	Role and time frame not specified				
		Eco-sud	Lead				
		Mauritian Scuba Diving Association	Will supply man power for data collection				x
		Mauritian Wildlife Foundation	May be able to assist in survey, tagging. But maybe not as lead	x	x	x	x
		Ministry of Ocean Economy	Institutional Collaboration				

		REEF Conservation	Staff and material can be provided for the monitoring of sea turtles	x	x	x	x
		RFC/ Le Frais des iles Ltee	Assisting in logistic				
No.	**ACTION**	**INSTITUTION**	**ROLE OF THE INSTITUTION**	**TIME FRAME**			
				0-1 year	**1-3 years**	**3-5 years**	**>5 years**
OTHERS							
1	Survey and monitor terresterial fauna (Reptiles/Inverts)	Durrell	Lead-No funding but staff time	x	x		
2	Marine debris monitoring and Waste Management		Assist in Establishing; No funding but staff time	x	Every 5 years		
3	Elasmobranch monitoring	Eco-sud	Lead	x			
4	Setting up field station	Mauritian Wildlife Foundation	To help in setting up a field station as a support to research		x		
5	Fundraising		Assist in raising funds to continue the work started	x	x	x	x
6	Beach Profile Survey	Ministry of Environment	Interest expressed but no time frame provided				
7	Beach Erosion assessment		Interest expressed but no time frame provided				

No.	ACTION	INSTITUTION	ROLE OF THE INSTITUTION	TIME FRAME			
				0-1 year	1-3 years	3-5 years	>5 years
8	Awareness	REEF Conservation	Staff can be provided. REEF has some slates about ecosystems that can help awareness	x	x	x	x
9	Fish Stocks and Quotas	La Valley de Ferney proposal	Role not specified	x			x
10	Research on the shells	La Valley de Ferney proposal	Role and time frame not specified				