vallée de mai

SIF seychelles islands foundation

VALLÉE DE MAI MANAGEMENT PLAN

2021-2031

www.sif.sc

vallée de mai

SIF seychelles islands foundation

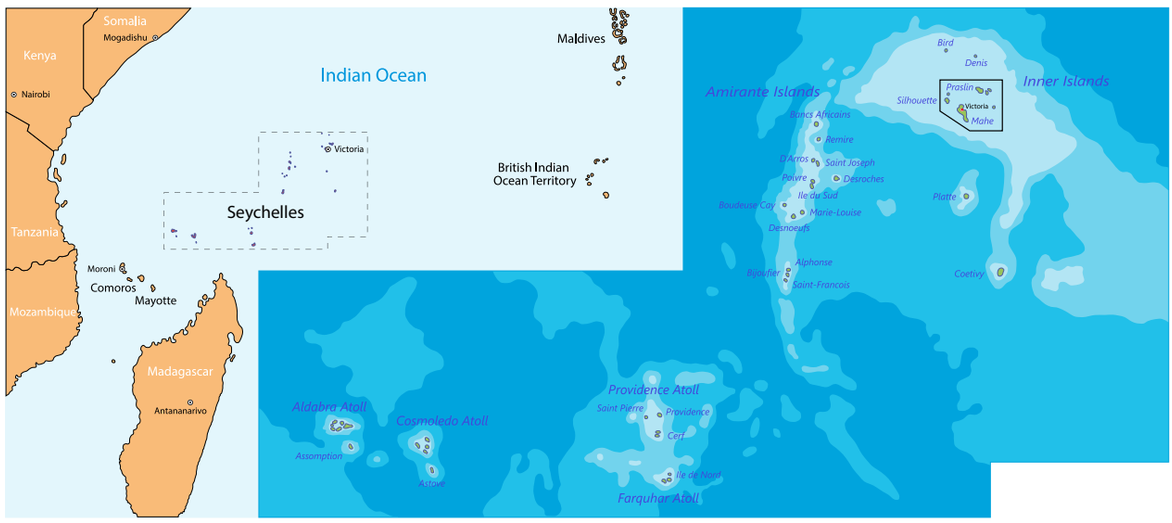
Table of Contents

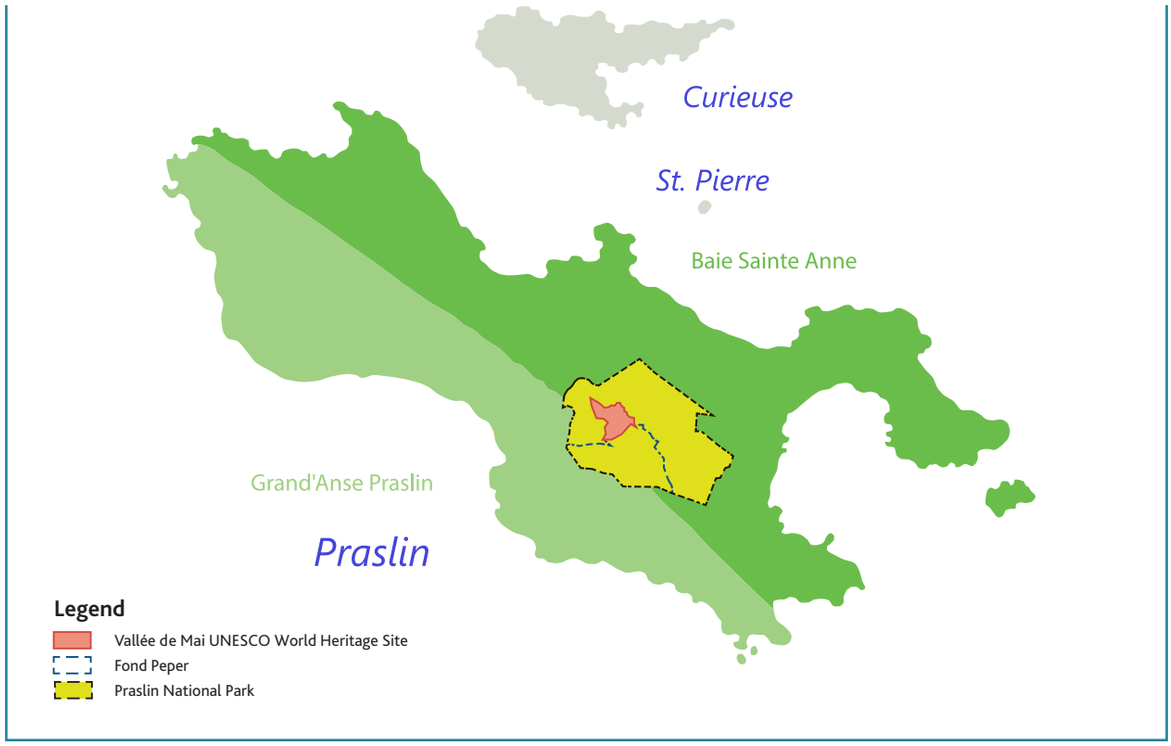
1 Vallée de Mai UNESCO World Heritage Property & Fond Peper Protected Area

The Vallée de Mai was designated a World Heritage Property by UNESCO in 1983 as a superlative example of low- and intermediate-altitude palm forest characteristic of global importance and is fulfilling all four of the World Heritage Criteria for natural properties , vii, viii, ix and x, which is exceptional.

In 1948 the Vallée de Mai was acquired by the government as a part of the water catchment area of Praslin and in 1966 declared a Nature Reserve under the Wild Animals and Birds Protection Act. In 1979 the Praslin National Park, in which the Vallée de Mai is embedded, was designated under the National Parks and Nature Conservancy Act (Cap.159).

Figure 1 - Location of Vallée de Mai UNESCO World Heritage Site





The Vallée de Mai covers an area of 19.5 ha within the Praslin National Park (342 ha), with associated protected area status. It extends from 150 m to 310 m altitude and, as is typical for Seychelles, contains slopes of ~30%. It is bounded on one side by the main road used by a great deal of associated traffic crossing Praslin.

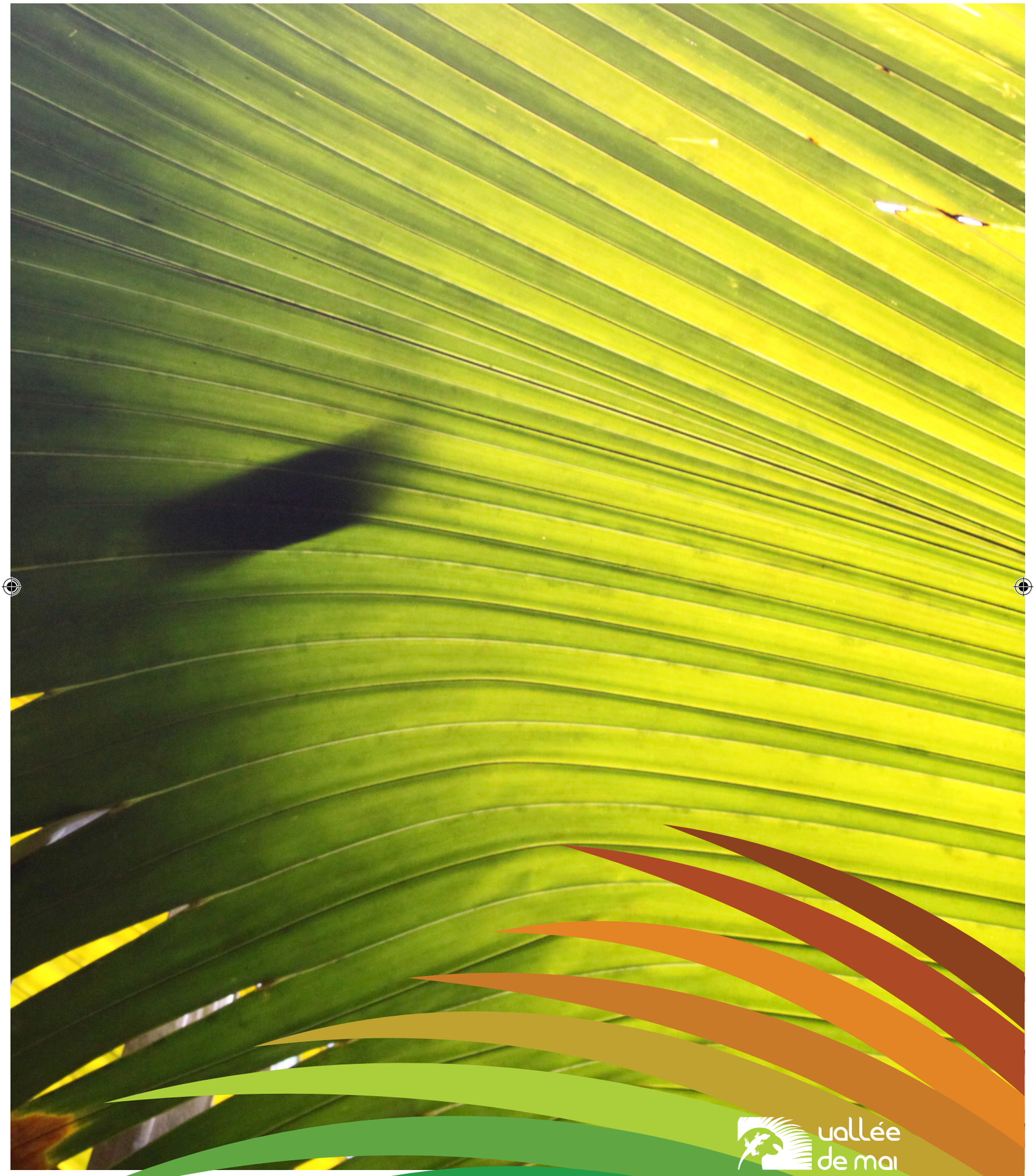
The World Heritage Property is a living 'museum' of a flora that developed before the evolution of more advanced plant families. The canopy reaches a height up to 30m in some places. The Vallée de Mai palm forest is dominated by the endemic coco de mer *(Lodoicea maldivica)* and is rich with many endemic and several threatened species. The Vallée de Mai is the only place where all six palm species endemic to the Seychelles are found together, all belonging to monospecific genera: *Lodoicea maldivica, Deckenia nobilis, Nephrosperma vanhoutteana, Phoenicophorium borsigianum, Verschaffeltia splendida,* and *Roscheria melanochaetes*. The palms grow intermixed with *Pandanus hornei, Pandanus sechellarum* and broadleaf endemics dominated by *Dillenia ferruginea* and *Northea hornei*. It is also home to *Secamone schimperiana* the only endemic climber of Seychelles listed as endangered by IUCN.

The forests of Praslin were heavily impacted by forest fires since settlement. Luckily the Vallée de Mai area escaped most of these and experienced relatively little impact from humans. In the 1930s the owner of the Vallée de Mai wanted to enrich the forest and planted some non-natives such as fruit trees to establish a botanical garden-like park on Praslin. In the 1990s an invasive creeper– Philodendron – was temporarily eradicated from the Vallée de Mai but returned and has since required regular management. The management of several other invasive alien plant species has been addressed under the EU-funded invasive alien species project from 2011 to 2015 and the subsequent Inva'Ziles project administered by the IUCN in 2017–2018. Plant species controlled include albizia *Falcataria moluccana,* kalis dipap *Tabebuia pallida*, cinnamon *Cinnamomum verum*, santol *Sandoricum koetjape*, jackfruit *Artocarpus heterophyllus,* bwa zonn *Alstonia macrophylla*, lagati *Adenanthera pavonina*, strawberry guava *Psidium cattleianum*, cocoplum *Chrysobalanus icaco*, rubber tree *Hevea brasiliensis*, vya tang *Dieffenbachia seguine* and all of the introduced palms in the site, such as Chinese fan palm *Livistona chinensis* and round-leaf fountain palm *Saribus rotundifolius*..

In late 1990s SIF was entrusted with the adjacent area to the Vallée de Mai due to the increased pressure of poaching of coco de mer nuts in this area. Historically, Fond Peper was managed by the Environment Department and specifically the Forestry Section. However, due to change of focus from traditional forestry to regulating the increasing development pressure and waste management on the island, the capacity of the Forestry Section decreased and was not in a position to address issues, such as poaching, at the required level. Consequently SIF was approached and agreed to allocate some of its resources to enhance the overall management of this area. A lease agreement between the Government of Seychelles and SIF was signed to this effect in 2018.

Fond Peper is 73 ha in area and its difficult terrain, especially next to the road, includes substantial areas of huge boulders with under- and above-ground waterways which are difficult to navigate. In addition to a high quality coco de mer forest, the area holds a broadleaf mixed forest consisting of many native species. In 2008, SIF approached the UNESCO World Heritage Centre (WHC) to explore the option of extending the World Heritage status to Fond Peper. Following the criteria of designation and extension of a World Heritage property it was clarified by the WHC that being approximately seven times the size of the original size of the property an extension would not be possible. To include Fond Peper the submission of a new designation file would be required. After much consultation Seychelles decided not to pursue the submission of a new designation file since no tangible benefits of including Fond Peper could be identified. Instead it was decided that Fond Peper should be managed in accordance with the outstanding universal values identified in the Vallée de Mai with a specific focus on advancing scientific research of the coco de mer and associated species which were completely understudied. The protection of Fond Peper has substantially increased and enhanced the ecological integrity of the Vallée de Mai which has come to the forefront with controlling the invasion of the site by the yellow crazy ant *Anoplolepis gracilipes*.

2 Management Context



2 Management Context

2.1 UNESCO Synthesis and Criteria

The Vallée de Mai was designated a World Heritage Property by UNESCO in 1983 as a superlative example of low- and intermediate-altitude palm forest characteristic of global importance and is fulfilling all four of the World Heritage Criteria for natural properties , vii, viii, ix and x, which is exceptional.

In 1948 the Vallée de Mai was acquired by the government as a part of the water catchment area of Praslin and in 1966 declared a Nature Reserve under the Wild Animals and Birds Protection Act. In 1979 the Praslin National Park, in which the Vallée de Mai is embedded, was designated under the National Parks and Nature Conservancy Act (Cap.159).

Statement of Outstanding Universal Value

Brief Synthesis

Located on the granitic islands of Praslin, the Vallée de Mai is a 19.5 ha area of palm forest which remains unchanged since prehistoric times. Dominating the landscape is the world's largest population of endemic coco de mer, a flagship species of global significance as the bearer of the largest seed in the plant kingdom. The forest is also home to five other endemic palms and many endemic fauna species. The property is a scenically attractive area with a distinctive natural beauty.

Criterion vii: Superlative natural phenomena or natural beauty

The property contains a scenic mature palm forest. The natural formations of the palm forests are of aesthetic appeal with dappled sunlight and a spectrum of green, red and brown palm fronds. The natural beauty and near-natural state of the Vallée de Mai are of great interest, even to those visitors who are not fully aware of the ecological significance of the forest.

Criterion viii: Earth's history, geological and geomorphic features and processes

Shaped by geological and biological processes that took place millions of years ago, the property is an outstanding example of an earlier and major stage in the evolutionary history of the world's flora. Its ecology is dominated by endemic palms, and especially by the coco de mer, famous for its distinctively large double nut containing the largest seed in the plant kingdom. The Vallée de Mai constitutes a living laboratory, illustrating of what other tropical areas would have been before the advent of more advanced plant families.

Criterion (ix) Ongoing biological and ecological processes

The property represents an outstanding example of a major stage in the evolutionary ecology of the Earth in that its ecology is dominated by endemic palms. The property's low- and intermediate-altitude palm forest is characteristic of the Seychelles and is preserved as something resembling its primeval state. The Vallée is dominated by the legendary coco de mer (Lodoicea maldivica) and many other endemic species are also evident. The ancient palms form a dense forest, along with Pandanus screw palms and broadleaf trees which constitute an ecosystem where unique ecological processes and interactions of nutrient cycling, seed dispersal, and pollination occur.

Criterion (x) Biological Diversity and threatened species

The Vallée de Mai is the world's stronghold for the endemic coco de mer (Lodoicea maldivica), and the endemic palm species millionaire's salad (Deckenia nobilis), thief palm (Phoenicophorium borsigianum), Seychelles stilt palm (Verschaffeltia splendida), latanier millepatte (Nephrosperma vanhoutteanum) and latanier palm (Roscheria melanochaetes), are also found within the property.

The palm forest is mature and relatively pristine and it provides a refuge or breeding area for viable populations of many endemic species, including the Seychelles black parrot (Coracopsis barklyi), restricted to Praslin, some of which are entirely dependent on the Vallée de Mai and surrounding palm forest. Other endemic species supported by the palm habitat include three species of bronze gecko, Seychelles blue pigeons, Seychelles bulbuls, Seychelles sunbirds, Seychelles swiftlets, Seychelles skinks, burrowing skinks, tiger chameleons, day geckos, caecilians, tree frogs, sooglossid frogs, freshwater fish and many invertebrates. Of these, several species are thought to be restricted to the Praslin palm forest habitat, including the giant bronze gecko (Ailuronyx trachygaster) and the Seychelles chameleon (Archaius scychellensis).

Integrity

The ecological integrity of the Vallée de Mai is high but the 19.5 ha, that constitutes the property's size is relatively small and its present status is due to some replanting of coco de mer undertaken in the past. The property is embedded within the Praslin National Park (342 ha) which provides a sufficiently large area to ensure the natural functioning of the forest ecosystem. To enhance the property's integrity, the World Heritage Committee has recommended extending the property to include the rest of the Praslin National Park, thus providing an appropriate buffer zone.

Requirements for protection and management

The property is legally protected under national legislation and is managed by a public trust, the Seychelles Islands Foundation (SIF). The management of the property has been enhanced with the adoption of a management plan in 2002. Fire is considered the most significant threat to the property, and fire response and contingency plans are essential. Tourism, as managed by SIF, makes a significant financial contribution to the protection and management of the property and its sister site, Aldabra Atoll. Overexploitation of coco de mer has potential to exhaust natural recruitment, and illegal removal of seeds is a serious problem that affects future regeneration, thus a key management priority is to maintain the palm forest by direct human manipulation with the collection and planting of the seeds before they are stolen and sold. Effective measures to mitigate threats to endemic fauna and flora from invasive species, pests and diseases are also essential as are monitoring and research programmes to understand these threats and the ecosystem in general. Climate change is likely to have serious impacts, adaptation measures and an understanding of these impacts will be essential measures.

2.2 Important Bird and Biodiversity Area (IBA)

The Vallée de Mai is part of the IBA network designated by Birdlife International as Praslin National Park and surrounding areas SC 003 qualifying under criteria A1 and A2. Criterion A1 specifically covers areas that hold significant numbers of globally threatened species. The Vallée de Mai and Fond Peper constitute the core breeding area of the Seychelles black parrot *Coracopsis barklyi*, which was declared an endemic species in 2014 and is the national bird of Seychelles. The Seychelles black parrot is categorised as vulnerable by the IUCN Red List. Criterion 2 recognises the site to be known to hold a significant component of a group of species whose breeding distributions define an Endemic Bird Area (EBA). In addition to the Seychelles black parrot, three other Seychelles endemics, the Seychelles blue pigeon *Alectroenas pulcherrima*, Seychelles bulbul *Hypsipetes crassirostris* and Seychelles sunbird *Cinnyris dussumieri* occur in the Vallée de Mai and Fond Peper but are not limited to these sites.

2.3 National context and legislative framework

The Seychelles has a strong legal and policy framework for environmental management, guided by the provisions of Article 38 of the Seychelles Constitution (1993) which declares that:

"…the State recognises the right of every person to live in and enjoy a clean, healthy and ecologically balanced environment and with a view to ensuring the effective realisation of this right the State undertakes…to ensure a sustainable socio-economic development of Seychelles by a judicious use and management of the resources of the Seychelles." (Ministry of Environment and Energy, 2013).

The Seychelles is a signatory to several international environmental conventions and has a suite of national legislation regarding establishment of protected areas and environmental management (Figure 2). These international commitments and national legislation, as well as the Seychelles Protected Area Policy (2013) inform the development of this protected area management plan. The specific policies and procedures detailed in the appendices guide how the management plan will be implemented.

Figure 2

Management context of the Vallée de Mai UNESCO World Heritage Site

International Obligations & Conventions

- World Heritage Convention - UNESCO World Heritage Site (Criteria vi, ix, x)(1972)
- CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) (1975) (Seychelles ratified in 1977)
- Convention on Biological Diversity (1992)
- United Nations Framework Convention on Climate Change (1992)
- United Nations Convention to Combat Desertification (1994)
- International Treaty on Plant Genetic Resources for Food and Agriculture (2006)
- SIDS Accelerated Modalities of Action [S.A.M.O.A.] Pathway (2014)
- Agenda 2030 for Sustainable Development and the sustainable Development Goals (2015), goal 15

Principle Legislative Framework

Nature Reserve and Conservancy (Bill, 2021)
(The bill has been approved by government, but is yet to be enacted)

Key Governance & Regulatory Instruments

- Seychelles Islands Foundation Decree, 1979
- Wild Animals and Birds Protection Act, 1966
- Wild Birds Protection Regulations, S/1 26/1966
- Wild Birds Protection (Nature Reserves) Regulations, S/1 27/1966
- Breadfruit and Other Trees (Protection) Act, 1991
- Licenses Act 2010, Licences (Tourist Guide) Regulations, 1996
- State Land and River Reserves Act, 2012
- Animal and Plant Biosecurity Act, 2014
- Coco-de-Mer (Management) (Amendment) Act, 2015
- Environmental Protection Act, 2016
- Lightening of Fires (Restriction) Act, 2019

Strategic Direction

Seychelles Protected Areas Policy 2013

Site Specific Management Plan

Vallée de Mai Management Plan 2021-2031

Operational Delivery

- Biosecurity manual and protocols
- EMS policy
- Human resource policies and procedures
- Annual workplans
- Monitoring protocols

2.4 Responsibilities of Seychelles Islands Foundation and Government agencies

The Vallée de Mai World Heritage Site and Fond Peper area are managed and protected by the Seychelles Islands Foundation (SIF). SIF, which also manages Seychelles' other UNESCO World Heritage Site, Aldabra Atoll, is a government statutory body which was established in 1979 by presidential decree and initially had the mandate to manage and conserve the natural life of Aldabra and to initiate and instigate scientific research. Management of the Vallée de Mai was mandated to SIF in 1989. SIF then became the official management authority of Fond Peper in 2018 on signing a lease with the Government of Seychelles.

SIF has an executive structure for daily management based in Victoria, Mahé, and up to 40 staff based at the Vallée de Mai responsible for operational, tourism and scientific matters. The staffing structure is shown in Appendix 1.

While SIF is responsible for day to day operation of the Vallée de Mai, the Seychelles Department of Environment is responsible for the property and the Government has an ongoing responsibility for and commitment to development of legislation and policy related to protected area management, wildlife protection and tourism promotion. In addition, the Seychelles President is also the Patron of SIF, and appoints the SIF Board of Trustees.

2.5 Outcome-based management

The conservation of biodiversity and sustainable management of human activities at Vallée de Mai and Fond Peper are achieved through a number of complementary mechanisms that include protected area designation, wildlife management regulations, pollution control regulations, tourism and environmental protection regulations. The management of the protected area employs both generic (Section 5) and specific strategies (Sections 6 and 7) to ensure sustainable management for optimum conservation outcomes.

The objectives, strategies, performance measures and management targets outlined in Sections 5, 6 and 7 reflect an outcome-based 'best practice' approach from which the effectiveness of management can be assessed. This model has been adopted following its successful application in the Aldabra Atoll Management Plan (2016–2026). It allows maximising conservation and management outcomes and enables a more objective and effective approach to assessing management performance.

The management of the Vallée de Mai and Fond Peper aims to conserve the biodiversity of the protected area, while advancing urgently needed research and maintaining opportunities for sustainable tourism at an appropriate level where these activities are compatible with maintaining the values of the protected area. While protected areas reflect a proactive and precautionary approach to conserving biodiversity, an important step in determining management priorities is to undertake a risk assessment by considering the likelihood of existing and potential pressures affecting the ecological and social values and their associated ecological and social consequences.

The relative level of risk posed by existing and/or potential pressures on values can be assessed and prioritised by considering the following factors:

- The biological intensity of the pressure - pressures that impact lower trophic levels, i.e. primary producers such as mature forest are often of greater concern than pressures on higher trophic levels;
- The temporal scale of the pressure - ongoing pressures are generally of greater management concern than pressures that are short-lived e.g. harvesting of coco de mer nuts;
- The social consequences - acknowledges that different pressures have different social and political consequences. A high socio-economic/political consequence is often of greater management concern;
- The probability of a pressure occurring within the timeframe of the management plan.

The natural attributes and the uses of Vallée de Mai and Fond Peper are well known. For the purposes of developing management priorities, pressures on the values are primarily confined to current pressures and pressures likely to occur during the life of the management plan and considered to be manageable within the protected area's context. However with the intensification of global pressures such as climate change, a different approach is required. Specifically climate change needs to be investigated as a cross-cutting issue considering its direct impact, the threats it will intensify and therefore the specific management actions which are required. Consequently this management plan requests the development of a specific climate change adaption plan. The vision and strategic objectives of the management plan (Section 4) provide the longer term (>10 years) direction for management of the Vallée de Mai and Fond Peper.

Ecological and Social Values

As a World Heritage Area, the Vallée de Mai has a statement of Outstanding Universal Value (OUV) (Section 2.1) which provides a broad description of the values of the protected area. To be able to manage and report on the OUV, the ecological and social values have been further defined to allow measurement of management effectiveness and to better report on the status of the OUV.

The conservation of ecological integrity, facilitating research, and education is the major thrust of management. Nevertheless, with the Vallée de Mai being the most visited natural site in Seychelles, tourism activities need to be carefully examined and managed not only to generate the much needed revenues to manage Seychelles' WH properties but to ensure protection of the site. In addition to nature appreciation, such activities need to safeguard our natural heritage whilst being compatible with the conservation of Vallée de Mai. These generic terms need to be defined operationally to be useful in a management context. This is achieved by identifying the key ecological and social values of Vallée de Mai and setting management objectives, strategies and targets in relation to these values.

'Ecological values' are used to describe the intrinsic biological, physical, chemical and geological characteristics of an area and the interactions and connections between these. The major ecological values are listed individually in this plan for ease of reference, but it should be noted that the environment of the Vallée de Mai is a structurally and functionally complex array of relationships between the plants and animals interacting with their physical environment.

The ecological values should (where appropriate) include:

- **Species and communities that have special conservation status**
- **Key species endemic to the protected area**
- **Key structural components of the ecosystem**
- **Exploited species and communities**
- **Key physical-chemical components of the ecosystem.**

The term 'social values' is used in this plan to define the major cultural, aesthetic, historical, recreational and economic attributes of the area.

Management Objectives

Management objectives identify the primary aims of management and reflect the statutory responsibilities detailed under relevant legislation. Objectives have been developed for all of the ecological and social values of Vallée de Mai and Fond Peper. Where a significant pressure/s on an ecological value has been identified, the management objective addresses the specific pressure/s. When there is not an obvious existing pressure or threat, the management objective provides broader direction to management in relation to protecting the value from the most likely future pressures.

Management Strategies

Management strategies provide specific direction on how the management objective/s for each value might be achieved. All strategies outlined in this plan have been defined as high (H), medium (M) or lower (L) priority to provide an indication of their relative importance. The high priority strategies considered to be critical to achieving the long-term objectives of Vallée de Mai are also designated as key management strategies (H – KMS). These strategies also form part of the performance assessment of the management of Vallée de Mai and Fond Peper, particularly during the initial years of implementing the management plan for the area (see Section 8 – Performance Assessment).

It should be noted that management priorities are likely to alter in response to changes in usage patterns, new knowledge acquired, or new threats to the site during the life of the management plan, and some flexibility in management should be allowed for in these cases.

Performance Measures

Performance measures are indicators of management effectiveness in achieving the objectives and targets of Vallée de Mai and Fond Peper. They are developed for all of the ecological values and social values, including those with intrinsic societal worth (e.g. aesthetic value).

Performance measures should be quantitative, representative and, where possible, simple and cost-effective. Performance measures for indirect (e.g. reduced pollination and seed dispersal from visitor disturbance) and direct (e.g. disturbance to native wildlife from trampling or noise by visitors) impacts should focus on surrogate (e.g. fruit and flower abundance) and direct (e.g. changes in species distribution) measures of the value respectively.

It should be noted that all performance measures are indicative only and will be reviewed and, if appropriate, revised during the development of monitoring programmes of the Vallée de Mai.

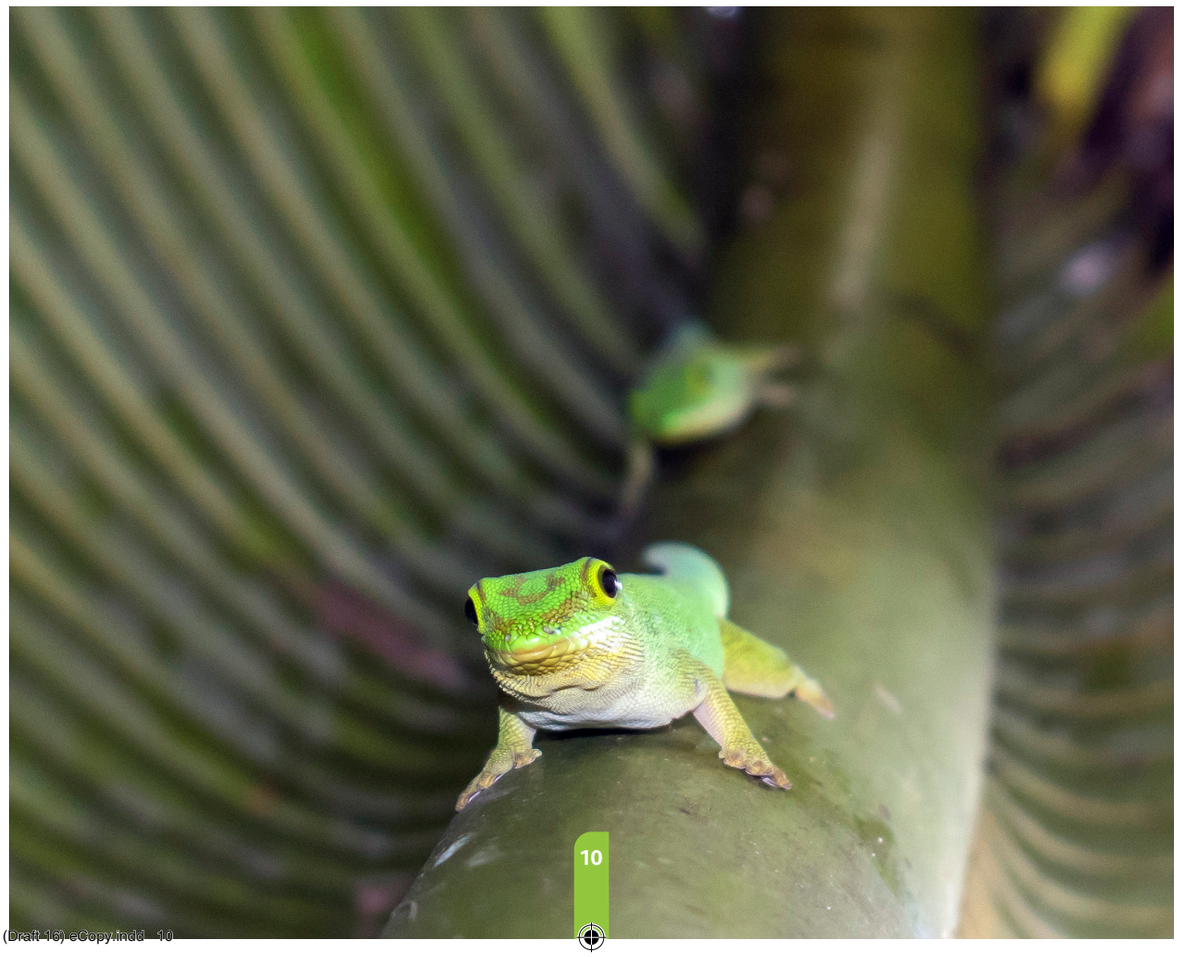
In regard to those social values that have the potential to negatively impact on the ecological values of the Vallée de Mai (e.g. via tourism), a different approach to performance assessment is required. This has been termed 'reporting', and incorporates information on the status and level of human activity. This information is important in monitoring the impacts of human activities (both visitors and staff) to assist in determining trends in use, and to assist in assessing impacts of these uses on the ecological values of the Vallée de Mai.

Management Targets

Management targets represent the desired end points of management. Targets should be measurable, time bound and expressed spatially. Ecological targets are set as either the "natural state" or some acceptable departure from the "natural state". The target provides a specific benchmark to assess the success or otherwise of management action within the life of the management plan or within a specified time period. The targets for 'active' social values are process-based and are generally stated as "Implementation of management strategies within agreed timeframes". This ensures that strategies for the social values are implemented in accordance with the management objectives.

Key Performance Indicators

Key performance indicators (KPIs) are a measure of the overall effectiveness of management in relation to the strategic objectives for the Vallée de Mai. Key performance indicators relate specifically to the management targets for key ecological and social values and reflect the highest conservation (from biodiversity and ecosystem integrity perspectives) and management (social) priorities. KPIs are a key element of the management audit process.

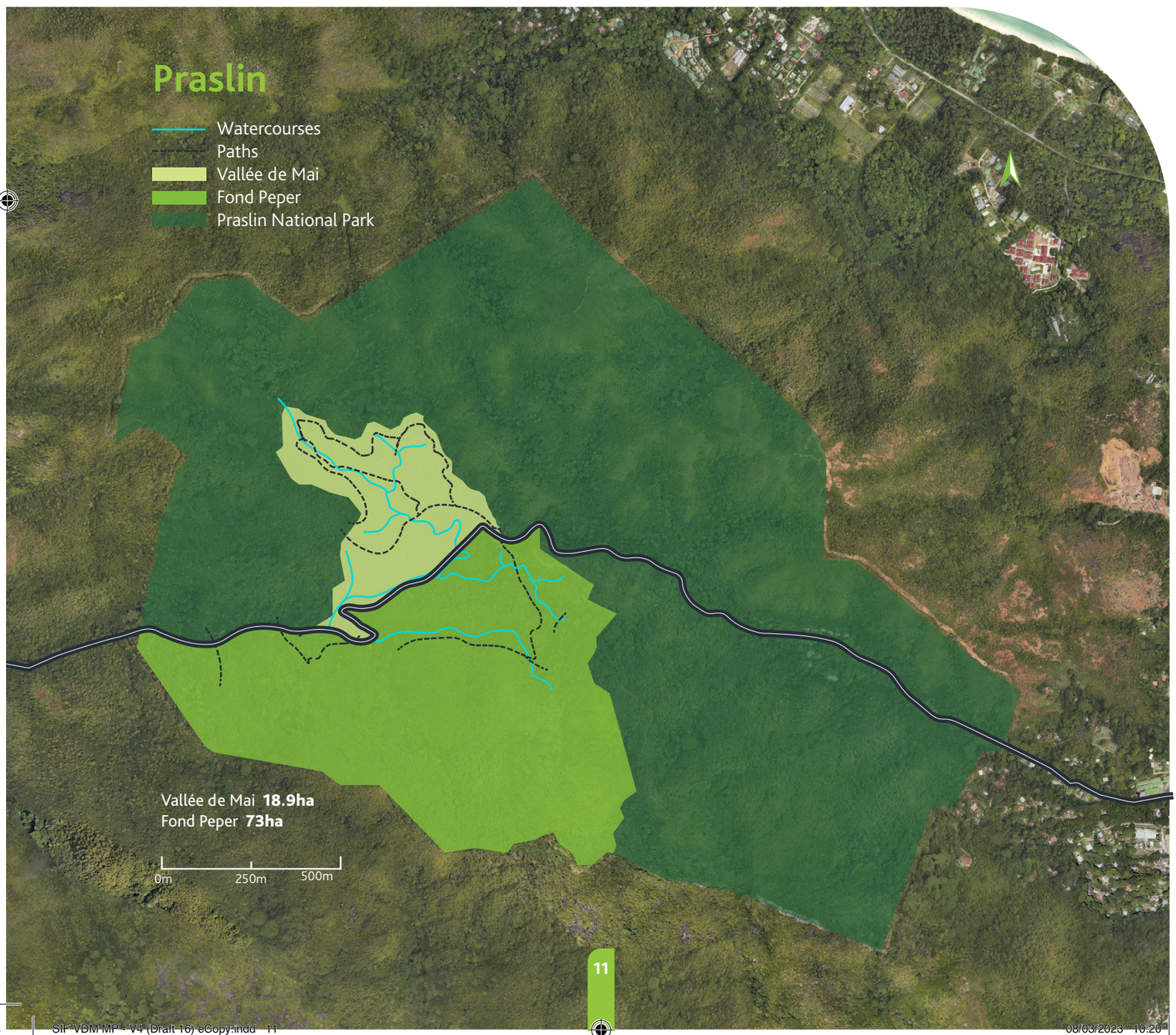


3 Values and Definition of the Vallée de Mai

3.1 *Definition of the area*

The Vallée de Mai is situated on Praslin (4°19'S, 55°44'E) and has a reserve area of 18.9 ha. Fond Peper is adjacent to the Vallée de Mai, on the other side of a major road across Praslin, and has an area of 73 ha (Fig. 3). Thus, the total area of both sites is 93.9ha. Both lie within the Praslin National Park, which is 342 ha.

Figure 3 Boundaries of the Vallée de Mai UNESCO World Heritage Site and Fond Peper Protected Area



3.2 Values of the Vallée de Mai and Fond Peper

The ecological and social values of Vallée de Mai and Fond Peper and, in the case of the Vallée de Mai, their relationship to World Heritage criteria, are shown in table 1 below.

Table 1 - Ecological and Social Values of the Vallée de Mai and Fond Peper

Ecological

Coco de mer
(KPI, WHC vii, viii, ix)

Mature palm forest habitat
(KPI, WHC vii, viii, ix)

Seychelles Black Parrot
(KPI)

Giant Bronze Gecko
(KPI, WHC x)

Seychelles Chameleon
(WHC x)

Other Reptiles
(KPI, WHC x) - bronze geckos, day geckos, skinks, tiger chameleon, snakes

Amphibians
(KPI, WHC x) - Seychelles tree frog, Praslin sooglossid, caecilians

Other Land Birds
(WHC x) – Seychelles blue pigeons, Seychelles bulbuls, Seychelles sunbirds, Seychelles swiftlets

Ecological Processes
(KPI, WHC ix)- nutrient cycling, pollination, seed dispersal

Ecosystem Services
Freshwater

Social

Historical & Cultural Values
(cultural heritage; VdM & FP)

Identity & Inspirational Values
wellbeing (Identity and inspirational values; VdM)

Research & knowledge
(WHC viii, KPI; VdM & FP)

Educational & Recreational Values
(WHC viii, KPI; VdM & FP)

Sustainable Tourism
(WHC viii, KPI; VdM)

Aesthetic Value
(WHC vii; VdM & FP)

Employment & Business Opportunity
(VdM & FP)

Importance as a water security area
(KPI; VdM & FP)

4 Vision & Strategic Objectives

The vision for the Vallée de Mai and Fond Peper is:

THE SAFEGUARDED VALLÉE DE MAI AND FOND PEPER PROVIDE OUTSTANDING OPPORTUNITIES FOR SEYCHELLES' UNIVERSALLY EXCEPTIONAL NATURAL HERITAGE, COMMUNITY, SCIENCE, EDUCATION, TOURISM AND CULTURE.

The strategic objectives for management of the Vallée de Mai and Fond Peper are to:

CONSERVE Conserve the biodiversity, ecosystem processes and other natural values of the site.

PROMOTE Promote scientific research to ensure informed decision-making and enable adaptive management and conservation.

FACILITATE Promote and facilitate regulated tourism to the Vallée de Mai excluding Fond Peper, ensuring that tourism activities do not impact on the values of the site, while generating financial support for ongoing science and conservation at Vallée de Mai and Fond Peper, and operation of both WH sites.

BENEFIT Indirectly benefit the Praslinois specifically, through water security and other ecosystem services.

FOSTER Foster a positive relationship between Seychellois and their natural World Heritage site through education and outreach, and promote cultural site values (cultural history) as a source of inspiration and local pride.

SUSTAIN Sustain and promote the unique twinning arrangement between the two Seychelles UNESCO World Heritage sites managed by SIF: the Vallée de Mai and Aldabra.

5 Management Programmes

5 Management Programmes

This chapter covers management activities that apply across the protected area or are not directly related to protecting a specific ecological or social value.

The management objectives, strategies and targets outlined in this section provide the framework for the development of specific management actions designed to conserve the ecological values and manage the social values of the protected area. These actions can be categorised into one or more of the following generic management programmes:

- *Human resources and administration*
- *Adaptive management*
- *Education and outreach*
- *Forest risk management*
- *Infrastructure management*
- *Research and monitoring, including management of invasive alien species*
- *Tourism and visitor management*
- *Sales and finance*
- *Data management*

Chapters 6 and 7 contain specific management objectives, strategies, performance measures and targets, and strategies that are identified as necessary for the specific ecological and social values.

5.1 Management framework

The development of an appropriate management framework is essential to ensure that Vallée de Mai and Fond Peper are managed effectively over the long-term. The management framework includes statutory considerations such as the development of a management plan, appropriate regulations and policies, as well as human and financial resources.

5.2 Human resources and administration

Human resources management remains a challenge in the Vallée de Mai. The limited pool of talent/viable candidates on Praslin poses difficulties in the recruitment of suitable and qualified staff for several key positions. Due to the latter, key positions in the research department are held by expatriates. The benefits of imported knowledge are certain; however localisation of posts in the research department is equally essential to obtain the right balance and to achieve continuity and progress for the organisation.

Staff turnover and the difficulty of recruiting suitable sales staff are unsettling concerns for management as this directly affects the quality of service delivery.

The aim is to elevate the standard of staff recruitment and selection process and create a platform for staff development and training to improve quality staffing. SIF has established itself as a leading environmental organisation locally; nonetheless further work is needed to improve its position as an aspiring workplace for local young talent. The implementation of a retention strategy will assist in lowering staff turnover in the tourism and services department.
The creation of the post and subsequent recruitment of an Administrative and Accounts officer has facilitated the administrative processes on site. Nonetheless to increase efficiency, there is the need to review the administrative processes and set up standardised operational protocols (SOPs).

Table 2 - Human Resources and Administration

Management Objectives	1. To increase institutional capacity 2. Elevate SIF's positioning locally as a socially responsible employer so that it becomes an inspiring work place providing a platform for career progression and personal development. 3. Improve administrative processes and establish an effective communication exchange between the site and Head Office.
Management Strategies	1. Develop and implement HR SOPs that will guide recruitment, selection and management processes. 2. Undertake a staff composition and job evaluation assessment to establish and strengthen the core team. 3. Evaluate the existing appraisal procedures and research for innovative performance review that will encourage staff development and progression. 4. Develop a training plan and policies that support academic and professional training for local staff to address skills and knowledge gaps. 5. Introduce a mentorship programme that will facilitate the localisation of key positions. 6. Create and foster a working environment that encourages staff to remain committed and dedicated to the organisation. 7. Implement a graduate development programme to attract young local professionals to join the organisation as well as to retain young local professionals within the organisation. 8. Investigate and revise the salary and benefits package to reflect competitive remuneration in comparison to other environmental organisations. 9. Promote staff rewards through staff recognition e.g. long service awards, staff retreats, staff welfare, best employee award. 10. Encourage international exchange/exposure with reputable environmental institutions and natural sites to enhance standard, staff experience, capacity building. 11. Foster an appreciation of the organisation by staff exchanges and exposure to other similar organisations. 12. Evaluate the current administrative procedure and establish SOPs and policies to improve efficiency. 13. Establish appropriate communication platforms to facilitate the sharing of information. 14. Introduce and apply the SIF employment handbook and ensure that it fully complies with the Employment Act 15. Allow the site autonomy to process a selection of human resource management procedures to improve efficiency
Target	Implementation of strategies according to the operational schedule.

5.3 Adaptive management

A review of the effectiveness of the Vallée de Mai management plan was done for the development of this management plan. In addition, a reporting mechanism has been put in place to review progress and to address emerging issues that will mitigate immediate threats to the site's ecosystem services and functioning.

However, overall reporting and an annual report for the site are still lacking and an effort should be made to address this in this management cycle.

SIF aims to implement a comprehensive adaptive management strategy to improve staffing capacity and staff expertise to better manage these emerging issues for sustainable management of the site.

Climate change remains an emerging issue, hence the need to develop a climate change adaptation plan.

Table 3 - Adaptive Management

Management Objectives	1. Enhance the ability of the VdM team to be able to address change in priorities and emerging issues. 2. Implement an adaptive management mechanism 3. Develop and implement climate change adaptation plan and embed it as a cross-cutting issue (forest risk management , tourism management, outreach and education, biodiversity)
Management Strategies	1. Review the progress of the management plan on a bi-annual basis 2. Hold a mid-term review of the management plan (after 5 years). 3. Review and upgrade the planning and reporting format of the implementation of the management plan. 4. Investigate options for improving the efficiency of producing reports and using information. 5. Improve communication of progress to encourage collective support for problem solving. 6. Publicise the implementation of the management plan for transparency and accountability 7. Develop and implement a climate change adaptation plan
Target	1. The ability of the VdM team to be able to address change in priorities and emerging issues 2. Implementation of adaptive management mechanism 3. Development and implementation of a climate change adaptation plan

5.4 Education and outreach

Education and outreach are essential to ensure that visitors, staff and local community gain a level of understanding and appreciation for the outstanding values of the Vallée de Mai. Educational and outreach activities have been greatly developed and expanded over the last 10 years to ensure that the local community develops a sense of community stewardship for the protection of the site's values. Activities are organised on a regular basis to commemorate environmental theme days both on site as well as within the community to increase the involvement and engagement of the local community, although presently school children and the elderly are the two groups primarily targeted. Activities such as night safari, Creole festival week and the school children's holiday camps have been so successful and popular that they are a must on the annual calendar list of activities for Vallée de Mai with greater demand than can be catered for.

It is worth noting that the new educational area and exhibition room that were built as part of the visitor centre to facilitate educational and outreach activities organised in the Vallée de Mai, as well improved the services and facilities for visitors.

Nevertheless with the increasing number of visitors and for further development of outreach programmes to the wider community, SIF should continue to expand the facilities, allocate more resources and develop interactive educational and interpretation content and material on the Vallée de Mai that will enhance visitor experience and broaden the community's understanding and appreciation of the site.

Table 4 - Education & Outreach

Management Objectives	1. Improve the existing facilities and services of the education centre 2. Expand outreach programmes to a wider community
Management Strategies	1. Revamp the existing exhibition and introduce interactive displays. 2. Introduce a children's corner to promote environmental education amongst younger visitors. 3. Revive the content and upgrade the information service delivery to enhance visitor's experience. 4. Make available adequate resources to enable successful implementation of environmental education activities. 5. Strengthen collaboration with various stakeholders to facilitate and support environmental outreach programmes. 6. Consolidate and improve environmental education amongst youth and senior citizen groups. 7. Introduce environmental and outreach programmes amongst other groups and individuals to involve people from all walks of life to raise awareness and interest in protecting the Vallée de Mai. 8. Get involved in national and international networks that will facilitate environmental exchange programmes. 9. Encourage more locals to visit Vallée de Mai.
Target	Implementation of strategies according to operational schedule

5.5 Forest risk management

Management of the palm forest against risks has always been a priority issue for SIF. Over the years the implementation of effective security measures has helped to reduce the level of poaching to the point that, in 2019, no poaching incident was recorded. In addition, a task force committee was set up to network with organisations to address poaching. SIF invested in staff training and a public awareness campaign to support the work in regards to poaching.

In regards to invasive alien species, over the last 10 years, SIF has been able to outsource and secure major project funding to address the issue of invasive alien species. Nonetheless, once a project is completed the challenge lies in ensuring that the monitoring and control continues, and human resources and capital are the main concerns. Biosecurity has recently been a prominent concern and therefore a protocol is being implemented to mitigate threats.

To ensure that the forest is sustainably managed, a regeneration scheme was introduced for the coco de mer recruitment seedlings in the Vallée de Mai and Fond Peper and this scheme aims to ensure that at least 20% of coco de mer nuts are left in forest for natural regeneration annually. The aim is to ensure maximum protection of the site's outstanding universal values for humanity.

Forest fire is a major threat to the forests on Praslin. Specifically the Praslin National Park, of which the Vallée de Mai is part, has a naturally high accumulation of leaf litter and therefore provides substantial potential fuel in the event of fire. Fire prevention measures are the most effective way to address the threat of fire. A first draft of the fire contingency plan was compiled that needs to be urgently completed. This is an essential document to identify clear responsibilities and procedures in the case of fire. Regular fire drills will be crucial to maintain sufficient capacity to respond in the eventuality of a fire as much as investing in the maintenance of the existing network of partners.

Table 5 - Forest Risk Management

Management Objectives	1. Ensure that the site's outstanding universal values are well managed and protected.
Management Strategies	1. Maintain and reinforce the existing security surveillance to deter poaching. 2. Develop and implement a comprehensive forest fire contingency plan. 3. Develop and implement biosecurity measures to prevent introduction and spread of invasive alien species 4. Ensure staff capacity and resources to sustain control of invasive alien species and monitoring of impacts 5. Put in place an early warning system and response mechanism to mitigate natural disasters. 6. Reinforce sustainable forest management 7. Implement law enforcement procedures to ensure an adequate level of compliance with protected area regulations. 8. Facilitate staff training and authorisation to enforce appropriate national legislation and regulations as appropriate.
Target	1. Implementation of strategies according to operational schedule

5.6 Infrastructure and facilities

The visitor centre, including the cafeteria, souvenir shop, car park and luggage area, as well as the establishment of new facilities such as the education room, have been in operation for 10 years now. A bus shelter was also constructed to better serve the local community and tourists visiting the site in 2016. With the intention of making the park accessible to all, a path for disabled visitors was set up. Given that the circular path is the most frequented path in the Vallée de Mai, maintenance work was done on this path.

All the above infrastructure and facilities are important to ensure that the increasing number of visitors to the site receive a high level of services, facilities and experiences of the site.

The setting up of a research and long-term monitoring programme called for the recruitment of staff from Mahé and expatriates, therefore the construction of two staff houses became necessary to provide accommodation.

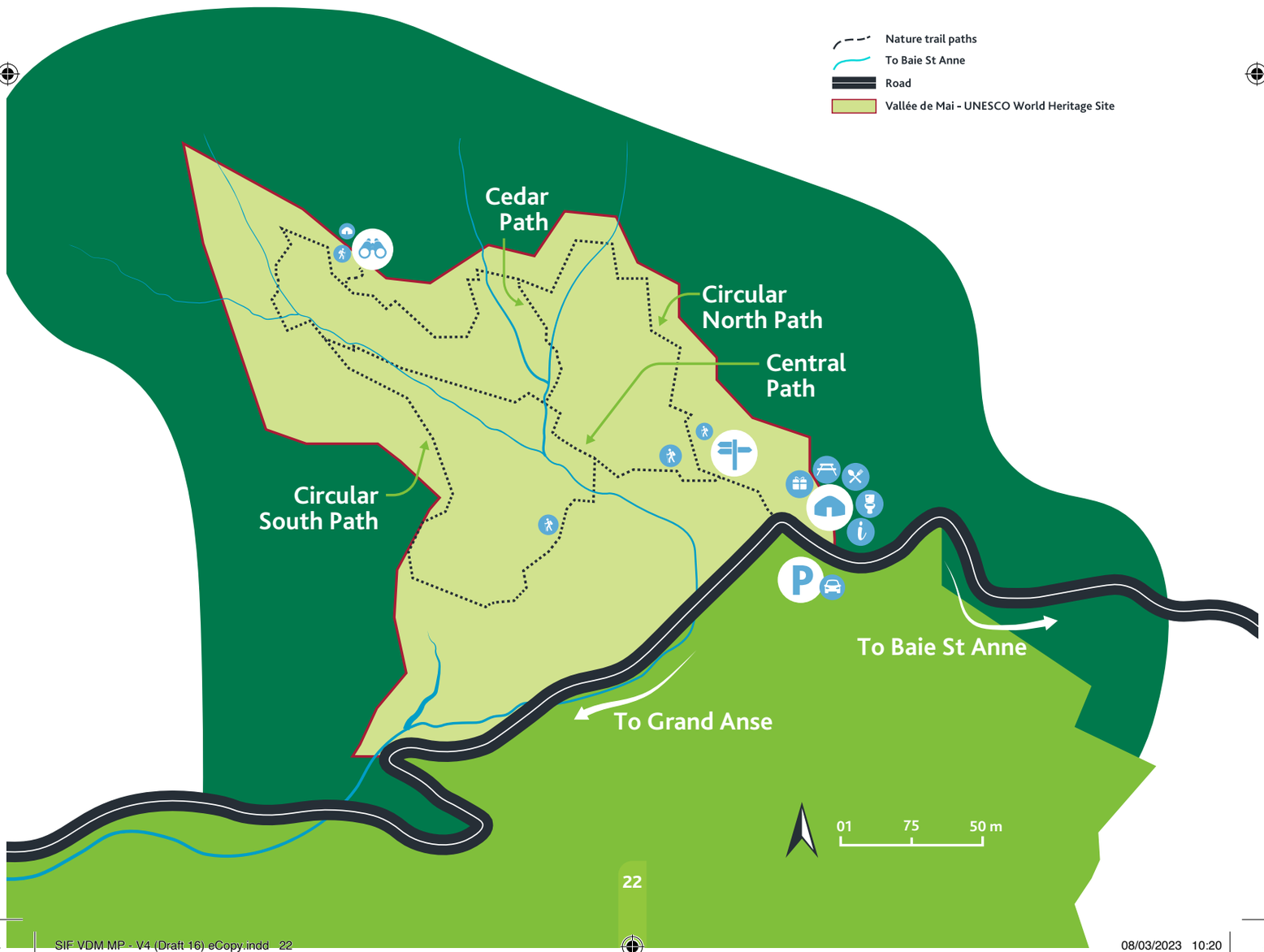
Any infrastructure developments come at a cost and increased facilities result in additional maintenance costs, notably due to a lack of staff capacity to conduct other than basic maintenance work in houses. Moreover, it is difficult to recruit reliable contractors to deliver high quality work locally and when possible, this also comes at a cost.

The humid weather and tropical climate conditions affect the state of the building; consequently more regular maintenance work is required.

Table 6 - Infrastructure and Facilities

Management Objectives	Upgrade site infrastructure to accommodate growing visitation and more inclusive of visitor needs
Management Strategies	Maintain existing facilities, develop new infrastructures, 1. Conduct renovation work to upgrade and expand the visitor centre for an improved aesthetic value and service of the site. 2. Improve the management of existing storage facility on and off site. 3. Ensure continuous maintenance and renewal of information panels and sign boards 4. Carry out regular maintenance of bridge, foot path and renovate roof of kiosks consider the use of different material to reduce maintenance pressure. 5. Extend parking facility 6. Introduce braille information board for visitors with visual impairment 7. Install railing along the main road to guide visitors from the bus stops to the visitor centre. 8. Improve staff facilities 9. Equip staff houses with the necessary facilities to improve overall comfort of staff
Target	To have fully operational infrastructure to support a high quality visitor experience and facilitate research

Figure 4 - Infrastructure facilities in the Vallée de Mai UNESCO World Heritage Site



5.7 Research and monitoring

Research and monitoring programmes at the Vallée de Mai are essential for effective and science-based management. Research provides key information on the values of the reserve. Monitoring improves understanding of the site as a 'natural' benchmark, directly increasing our knowledge-base on the short- and long-term impacts of human activities. New research should ideally be focussed on filling key gaps in scientific knowledge that will support effective management of flora and fauna. Long-term monitoring should also continue to provide information on faunal and floral trends, and insight into and predicted and actual impacts of a changing climate. A research strategy should be developed and implemented to ensure that research undertaken delivers as per the needs identified and not impacts the values of the protected area. Proactive planning to identify knowledge gaps and prioritise research programmes is essential to channel limited funds to address key information requirements.

Research focussed on the Vallée de Mai and/or Fond Peper should have an over-arching goal that strives to improve the conservation, management and understanding of the palm forest ecosystem and its biota. Research should be non-damaging, or have negligible effects on the ecology of the palm forest.

Table 7 - Research and Monitoring

Management Objectives	1. To obtain an appropriate understanding of the biodiversity and ecological processes of the Vallée de Mai and Fond Peper 2. To promote research that improves knowledge and informs management of the Vallée de Mai and Fond Peper 3. To determine the status and trends in the condition of, and the threats to the ecological values of the Vallée de Mai and Fond Peper, and the effectiveness of management responses 4. For an understanding of climate change impacts and potential resilience to be integrated into research and monitoring. 5. To provide the necessary information for the review of the management plan. 6. To promote ecological monitoring in the Vallée de Mai and Fond Peper and aid management decision making
Management Strategies	1. Develop a research strategy and permitting system for researchers in the protected area 2. Undertake a gap analysis and determine priority areas for research in the Vallée de Mai 3. Develop and progressively implement a coordinated and prioritised research and monitoring programme on key values, ecosystem processes and addressing knowledge gaps, including climate change, for effective management 4. Communicate high priority ecological research projects to appropriate research organisations 5. Develop and maintain a database of historical and ongoing research in the protected area 6. Facilitate research relevant to management and knowledge in the protected area conducted by research institutions, by providing logistical assistance and technical expertise where possible. 7. Undertake a review of the existing monitoring programme to identify gaps in and weaknesses of the monitoring programme, and ensure that the monitoring programme fulfils review requirements 8. Develop and progressively implement an integrated and prioritised ecological monitoring programme for the protected area with a particular emphasis on management review requirements. 9. Develop and implement effective database management for all monitoring and research programmes, which is stored online, provides data in real time, is updated continuously, checked regularly and accessible to relevant staff
Target	Implementation of strategies according to operational schedule

5.8 Tourism and visitor management

Since 2016, the visitor numbers to the Vallée de Mai have reached over 100,000 annually with a record of 119,121 visitors in 2018. The Vallée de Mai is the most visited natural site in Seychelles and receives over one-third of the total visitors to Seychelles. The revenue collected through visitor entrance fees supports conservation programmes of both UNESCO World Heritage properties. Although the growth in tourism is remarkable, increasing numbers of visitors are likely to have unsustainable impacts in the form of environmental damage to the site. There is also the growing concern of the site capacity and potential strain on the current services and facilities that will directly impact visitor satisfaction. The aim is to ensure that tourism is sustainably balanced to prevent or mitigate its environmental impacts so that the site maintains its value. It is equally important to ensure that the services and facilities are adequate and that visitor expectations are sufficiently met.

An electronic platform for collecting visitor data at the site has been set up; however, implementing and using the system to record quality data on visitors will improve accuracy and availability of the information. Conducting regular (at least monthly) analysis of visitor statistics is essential in strategizing for a manageable pattern in visitor distribution. Creating a platform to facilitate visitor feedback that will allow for qualitative data collection will guide management in ensuring that high service delivery is being maintained and that the necessary improvements in services and facilities are made to exceed visitor expectations.

Site information is readily available to visitors however there is potential to diversify tourism activities and provide exclusive services to enhance visitors' experience e.g. incentive groups, broadened calendar of events.

Collaborations with tourism stakeholders have been established and the aim is to broaden the collaborations and expand networking opportunities to improve the quality of service delivery, diversify tourism activities and increase knowledge-sharing on the best sustainable tourism practices.

Table 8 - Tourism and Visitor Management

Management Objectives	1. Establish a tourism management system that prioritises collecting and sharing of information and collaboration within the tourism sector to achieve higher quality visitor experience and sustainability. 2. Ensure sustainable tourism that maximises visitor experience and benefits for the sites, while limiting negative impacts
Management Strategies	1. Compile visitor statistics into daily, weekly, monthly and annual reports, including real-time analysis. 2. Analysis of visitor timing statistics and monitoring data to aim for an even distribution of visitors. 3. Implement adaptive measures and coordination with stakeholders in response to changes in visitor trends. 4. Improve visitors' experience by exploring and developing modern and interactive access to information. 5. Improve site access and delivery of services around the visitor centre for visitors with special needs. 6. Develop different networks to obtain measurable visitor feedback and use the information to increase visitor satisfaction. 7. Consolidate VdM as a pivotal player in the tourism industry for socio-economic development of Praslin and Seychelles in general. 8. Strengthen working partnerships with local stakeholders in the tourism industry. 9. Become a leader in sustainable tourism practices and share these ideals through collaboration with different partners. 10. Provide all service providers with up to date information on the site values. 11. Ensure quality of information and service provided by all service providers are in adherence to the site's OUV. 12. Develop methods to measure direct and indirect impacts of tourism on OUVs (research and monitoring) and develop strategies to prevent or mitigate these.
Target	Implementation of strategies according to the operational schedule.

5.9 Sales and Finance

Over the last 10 years the visitor centre has brought a different level of experience for visitors and has equally facilitated an increase and diversified sales activities in the Vallée de Mai. The main source of income to SIF is the entrance fees generated at the Vallée de Mai from high visitation, which makes it highly dependent on tourism numbers remaining stable. However, with the establishment of the cafeteria and souvenir shop, the Vallée de Mai is now able to raise additional funds from sales activities. The café and souvenir shop sell and promote local products from local suppliers including farmers, artists, and small businesses from Praslin and on Mahé.

SIF will continuously work with local suppliers to improve the standard and quality of their products, gearing towards a more sustainable approach. To facilitate the trade of goods SIF will develop and implement standard operating procedures. Implementing a programme of activities and events to encourage visitor spending is essential to diversify and improve revenue collection and this can also be achieved by collaborating with local partners to explore economic avenues.

Table 9 - Sales and Finance

Management Objectives	To generate benefits in the most sustainable, effective and efficient way to allow for the development of economic opportunities for the local community.
Management Strategies	1. Consolidate VdM as an economic pillar for local communities in terms of jobs and service opportunities 2. Grow the site level revenue generation to sustainably finance conservation objectives in the VdM and Aldabra. 3. Implement sales strategies that incorporate sustainability ideals of efficient use of resources and reduction of waste. 4. Continuously promote local suppliers by allowing provision of goods and services to be done primarily by local suppliers and tradesmen; priority to be given to Praslin suppliers. 5. Encourage local suppliers to increase the quality and quantity of their products at the souvenir shop and cafeteria gearing them towards a more sustainable approach. 6. Implement a programme of activities and events that will increase revenue collection from visitors. 7. Explore economic collaboration opportunities with local partners to diversify revenue collection 8. Ensure continuous and stable collection of revenues from entry ticket sales 9. Increase collection of revenue from Kokosye café and Souvenir shop through diversification of products and services. 10. Implement a monthly budget for forecasted sales and associated expenses 11. Ensure that sales performance and expenses are in line with the aforementioned budget 12. Develop and implement an standard operating procedures for trade of goods between SIF and suppliers/businesses
Target	Implementation of strategies according to operational schedule

5.10 Data Management

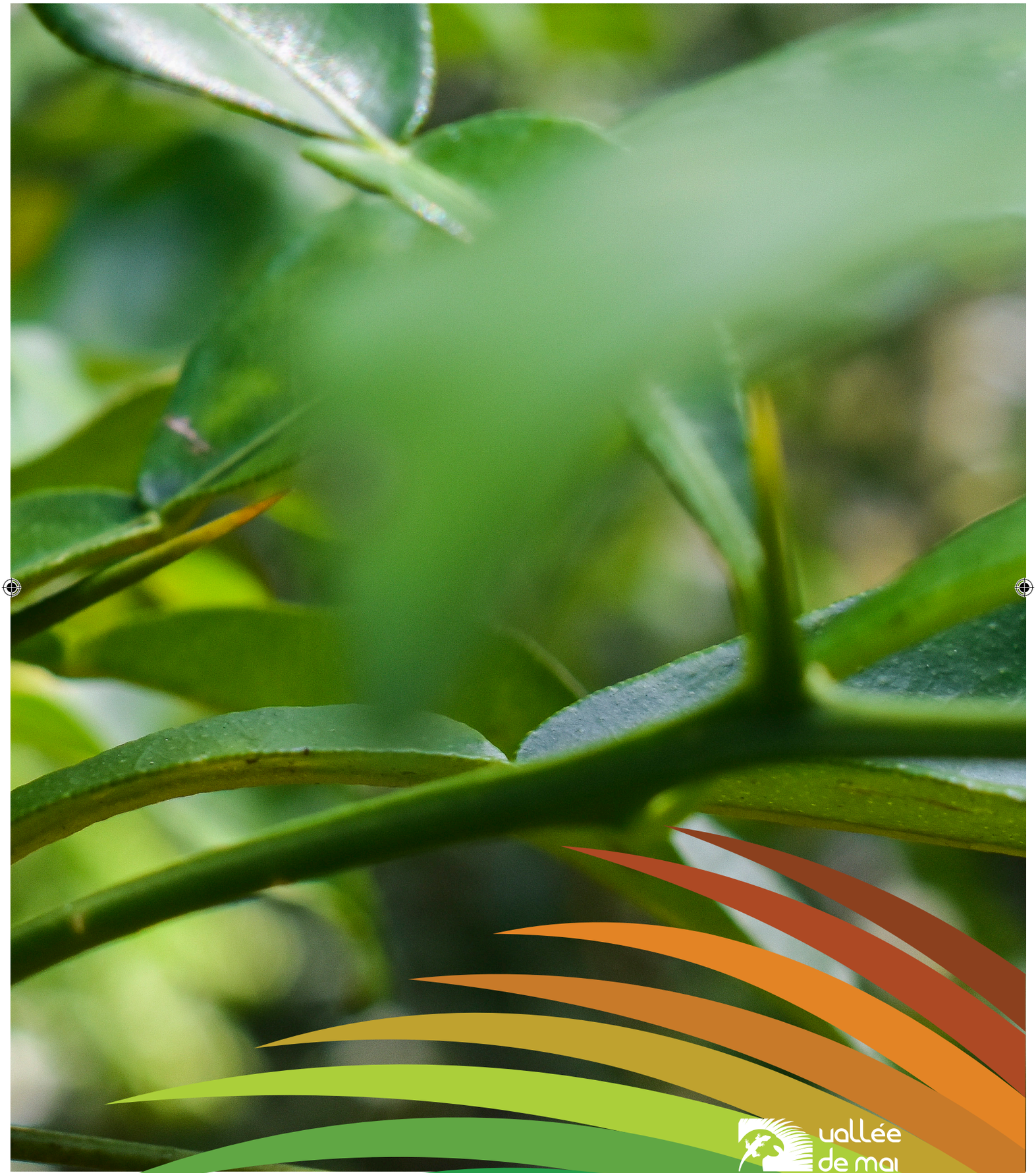
The implementation of a comprehensive and efficient data management system remains a challenge for the foundation. Nonetheless there has been some improvement and new set-ups in some departments. For the sales department the introduction of point-of-sales system has facilitated sales records and transactions that were being done manually, this also includes recording walk-in visitor statistics. In regards to the research section, there has been some development and improvement in data management where there are now operational Excel and Access databases for monitoring data and software such as quantum GIS to produce research outputs. To facilitate information sharing across the organisation, several servers have been set up to store information for Head office, Vallée de Mai and Fond B'Offay with various levels of access.

SIF needs to ensure that with the implementation of a new data management system, staff receive training to maximise the use of such a system. In addition to manuals detailing all procedures that will facilitate usage of the system and to promote easier access and understanding of the system will need to be developed and updated. As with any new technology, issues are bound to arise and therefore having an on-site support or focal person to address IT issues quickly is of paramount importance.

Table 10 - Data Management

Management Objectives	1. Ensure that all data is captured, collated and available to staff in an agreed, organised and retrievable format 2. Improve access and flow of information and sharing internally 3. Improve the efficiency of data management 4. Support the implementation of a data management system
Management Strategies	1. Synchronise all servers to increase access to information and sharing of best practices. 2. Explore the best data management system for all monitoring programmes and other scientific data being collected 3. Establish protocols detailing procedures for efficient usage of data management systems. 4. Explore possibilities of linking the sales framework and accounting system 5. Develop and implement an electronic data management system for collection of visitor statistics. 6. Streamline administrative procedures that can be accessed electronically. 7. Set up a data sharing access for the Admin & HR department to computerise calculation of overtime hours, annual and medical leave. 8. Provide staff training to ensure appropriate usage of the data management system 9. Recruit an onsite IT support to assist with the maintenance of IT, network and data management systems. 10. Implement the verification of data entry to ensure quality control of all data captured
Target	Implementation of strategies according to the operational schedule

6 Management of ecological values



6 Management of ecological values

6.1 Coco de mer (KPI, WHC vii, viii, ix)

6.1.1 Introduction

The coco de mer *(Lodoicea maldivica)* is an endemic palm on the island of Praslin and Curieuse. Until the 19th century, dense monospecific stands of coco de mer covered much of the Seychelles islands but today, relatively undisturbed coco de mer forest remains only in protected areas in the Vallée de Mai, Fond Peper and Fond Ferdinand Nature Reserve in the south of Praslin. The Vallée de Mai supports the largest and most intact stand of coco de mer in Seychelles and is one of the main reasons why the site was declared a UNESCO World Heritage Site.

The coco de mer possesses extraordinary biological features that have fascinated biologists for centuries. The coco de mer is an extreme example of island gigantism; it holds world records for the heaviest fruit of any palm (up to 45 kg), the heaviest seed in the plant kingdom (over 20 kg) and the largest female flowers of any palm (Blackmore et al. 2012). The majestic palm can grow up to 30 m in height and has fan-shaped leaves up to 10 m in length (Matatiken & Dogley 2005). The palm is dioeceous, with male and female flowers located on different plants.

The coco de mer is a keystone species and an ecosystem engineer sustaining a large variety of vertebrate and invertebrate species, which are directly dependent on palm forest habitat dominated by coco de mer (Kaiser-Bunbury et al. 2014). This includes the Seychelles black parrot *(Coracopsis barklyi)*, five endemic geckos of the genus *Phelsuma* spp. and *Ailuronyx* spp., two chameleons *(Archaius tigris, A. scychellensis)*, the Praslin snail *(Pachnodus praslinus)*, the white slug *(Vaginula seychellensis)*, several bryophyte species, lichens and ferns (Matatiken & Dogley 2005). The fact that many endemic species are restricted to forests with coco de mer highlights the conservation importance of the coco de mer forest (Fleischer-Dogley *et al.* 2011).

SIF has led and supported research which has increased knowledge on coco de mer biology and ecology. A long-term monitoring programme has been ongoing since 2009, focussing on the growth and sustainable management of the coco de mer in the Vallée de Mai and Fond Peper.

The coco de mer holds great economic and cultural importance and is a flagship species of Seychelles. The nuts have a high market value, and are sold to tourists as souvenirs. Direct and indirect revenue is also generated by the coco de mer forest of the Vallée de Mai, which is the most visited tourist attraction in the Seychelles. Historically, the coco de mer was traditionally used by the Praslinois, its leaves being made into thatch, baskets, hats and mats, trunk into furniture, crates and walking sticks, husk into rope, and nuts into utensils and vessels for water storage or liquor manufacture (Blackmore *et al.* 2012).

6.1.2 Coco de mer conservation status:

The coco de mer is categorised as Endangered on the IUCN Red List. The major existing threats to the species include long-term over-exploitation of the nuts, which has had a significant detrimental effect upon natural recruitment and regeneration (Rist *et al.* 2009). The species is protected and the nut trade legally controlled but illegal harvesting continues to represent a severe constraint upon regeneration in the wild. Fire and the spread of invasive alien species are other serious threats to the entire coco de mer forest. These threats are compounded by the highly restricted distribution of the coco de mer (Blackmore *et al.* 2012). An additional potential threat that needs to be further explored and confirmed is that of pollinator limitation, as its main pollinator, now thought to be the giant bronze gecko (with some pollination from other geckos, insects, and wind) occurs in a tiny population only in coco de mer forest and is threatened by illegal harvesting.

6.1.3 Coco der mer protection:

The coco de mer in the Vallée de Mai and Fond Peper is legally protected under the "Breadfruit and Other Trees (protection) Act" of 1991, the "Coco de Mer Management Decree" 1978 and is listed under Appendix III on CITES. Its management is regulated by the Coco de Mer (Management) (Amendment) Act 2015 and export of the kernel is restricted under the Coco de Mer (Restriction on the Processing, Trade and Export of unprocessed kernel of mature nut) Regulations 2019 and Regulations 2020.

Table 11 - Management of the Coco de Mer

Current condition	The coco de mer population is stable		
Existing and potential threats	• Illegal harvesting of coco de mer nuts • Unsustainable coco de mer nut harvesting • Spread of invasive alien species (yellow crazy ants, creepers) • Threats to pollinators (e.g. to giant bronze gecko) • Forest fires • Limited coco de mer habitat • Climate change • Limited dispersal ability and poor recruitment • Slow growth and maturation • Introduced pathogens and parasites		
Management objective	To ensure that the coco de mer population across the protected area is either stable or increasing, and that the species is playing its crucial role in forest ecology.		
	1. Develop methods and conduct a full coco de mer survey every 10 years 2. Improve current monitoring of coco de mer harvesting and regeneration to assess sustainability and ensure a minimum of 20% of nuts remains in the forest in both VdM and FP 3. Implement targets from the 'Coco de mer population regeneration and sustainable harvesting: 2020 assessment' (Collins 2020). 4. Continue IAS monitoring, research and control in VdM and FP. 5. Conduct a coco de mer vulnerability assessment to climate change. 6. Develop and implement monitoring of reproduction. 7. Continue and increase security to stop illegal harvesting of nuts. 8. Develop fire prevention and contingency plan to mitigate fire risk. 9. Continue to support research on coco de mer biology, ecology, genetics, ecosystem functions and linkages with endemic fauna across the palm forest (including in Fond Peper and Fond Ferdinand). 10. Continue to support research and conservation measures of giant bronze geckos and necessary research and support to confirm the main pollinator of CdM (see also section 6.4). 11. Instigate and support research into impacts of tourism and leaf litter disturbance on the palm forest ecosystem. 12. Support programmes to increase planting of coco de mer locally. 13. Practice adaptive management to be in a position to respond to emerging threats, e.g. new IAS. 14. Promote and drive a coco de mer species action plan. 15. Advocate for and support processes of national and international protective legislation of coco de mer.		
Performance measures	1. Number of coco de mer trees	**Desired trend**	1. Stable or increasing

Targets	
	1. Reduced abundance and distribution of IAS, specifically yellow crazy ants to consistently <5% coverage of the control area and low numbers. 2. Harvesting sustainability target of at least 20% of nuts remaining in the forest across all sites reached and documented. 3. Greater proportion of coco de mer juveniles and seedlings in forest (using 2009 survey as a baseline) 4. Increase in coco de mer population. 5. Finalised climate change vulnerability assessment for the VdM covering the coco de mer. 6. Established monitoring programmes for population estimate and reproduction. 7. Zero illegal harvesting of coco de mer nuts in the long-term across all three sites. 8. Fire prevention and contingency plan in place. 9. Finalised and implemented Coco de Mer Species Action Plan. 10. At least 2 more research papers detailing the role of coco de mer in the ecosystem. 11. Improved knowledge of pollinator population size, distribution, connectivity between sites and threats. 12. Successful planting programme in place, with at least 500 coco de mer trees planted in Seychelles. 13. Appropriate protective legislation in place and advised by SIF.

6.2 *Mature palm forest habitat (KPI, WHC vii, viii, ix)*

6.2.1 *Introduction*

The Vallée de Mai and Fond Peper palm forest ecosystem is a living remnant of the ancient palm forest on Praslin. The property comprises the densest and largest intact mature palm forest in Seychelles. It hosts six monospecific genera of palms, dominated by the coco de mer. Other endemic palms include palmiste *(Deckenia nobilis)* latannier milpattes *(Nephrosperma vanhoutteanum)*, latannier feuille *(Phoenicophorium borsigianum),* latannier latte *(Verschaffeltia splendida)* and latannier hauban *(Roscheria melanochaetes)*. The palms grow intermixed with screw palms *(Pandanus hornei)* and broadleaf endemics dominated by *Northea hornei* and *Dillenia ferruginea*.

6.2.2 *Mature palm forest conservation status:*

Deckenia nobilis - Vulnerable on the IUCN Red List
Nephrosperma vanhoutteanum - Least Concern
Phoenicophorium borsigianum - Least Concern
Verschaffeltia splendida - Near Threatened
Roscheria melanochaetes - Near Threatened and present in low numbers at the sites (none in the Vallée de Mai).

The flowering and fruiting patterns of most of the endemic palms have been monitored under SIF's long-term plant phenology monitoring programme since 2009. Although habitat degradation and fragmentation have played a major role in decreasing this palm forest habitat, the area is now protected. Relative abundance of tree species composing the palm forest has been monitored since 1988 via the 'Oxford Plots' (permanently marked quadrats) study, last conducted in 2009, which ideally needs to be repeated during the early and late phase of this management plan. Current threats to palms in the protected area are introduced plants such as invasive creepers, and invertebrates such as yellow crazy ants. Forest fires have destroyed large areas of mature palm forest in the historic and recent past. Climate change and other climatic events (e.g. storms, extended drought periods) also threaten the habitat.

6.2.3 *Mature palm forest protection*

The endemic palms in Vallée de Mai and Fond Peper are legally protected under the 'Breadfruit and Other Trees (protection) Act' 1991 and the National Parks and Nature Conservancy Act 1969 and the National Parks (Praslin) (Designation) Order 1979. Management and conservation of the mature palm forest will focus on controlling invasive alien species in the protected area and ensuring intact areas of palm forest with its associated fauna and ecosystem

functions by limiting disturbance and implementing a fire prevention plan. Phenology monitoring research will continue and expand investigation into ongoing ecosystem processes in this unique palm forest habitat, as well as the impacts of climate change.

6.2.4 Palm forest invertebrate community

The palm forest hosts many invertebrates, and an understanding of this biodiversity is currently poor, but essential to understand the ecological functioning of this habitat. Monitoring needs to be developed with specialist entomologists to ensure the management and protection of native and endemic species.

Palms and pandanus support micro-habitats that are occupied by a variety of invertebrates. Microhabitats can consist of, for example, concave overlapping leaf bases, where moisture is trapped, forming a phytotelmata. These micro-habitats encompass specific ecological conditions and microclimate that can contain specific fauna, including:

- Alluaud's stick insect *(Carausius allaudi)*
- Winged stick insect (*Graeffea seychellensis*)
- Gardiner's grasshopper (*Enoplotettix gardineri*) – Endangered
- Six-spotted bush cricket (*Odontolakis sexpunctatus*)
- > 75 species of insect on 'Vakwa parasol' (*Pandanus hornei*) and 'Vakwa maron' (*Pandanus sechellarum*), most endemic to Seychelles
- Endemic water-beetle (*Copelatus pandanorum*)
- Endemic hoverfly (*Eristalodes sechellarum*)
- Cockroaches: *Desmosia alluaudi* associated with dead coco de mer leaf bases, *Distichopis stylopygae*, *Hololeptoblatta pandanicola* and *H. minor* with *Pandanus*
- Groundhopper (*Ocytettix pupulus*)
- Planthopper (*Privesana infusca*)

Table 12 - Management of Mature Palm Forest

Current condition	The mature palm forest of Vallée de Mai and Fond Peper is in a stable condition.		
Existing and potential threats	1. Spread of invasive alien species (e.g. invasive plants, YCA) 2. Forest fires 3. Climate change and extreme climatic events 4. Limited habitat 5. Introduced pathogens and parasites		
Management objective	To ensure that the mature palm forest in the protected area is healthy and not impacted by human activities.		
Management strategies	1. Continue control, monitoring and research of IAS in VdM and FP. 2. Develop fire prevention and contingency plan to mitigate fire risk. 3. Assess vulnerability of palm forest to climate change impacts 4. Continue long-term phenology monitoring of endemic palms and endemic broadleaf species in the palm forest and extend to FP and FF as per recommendations (Collins 2020) 5. Increase understanding of vegetation dynamics and relative abundance by re-surveying permanent vegetation plots (every 5-7 years). 6. Develop and share high quality standardised protocols. 7. Support and initiate research into palm forest and community ecosystem functions, processes and connectivity. 8. Support and initiate research into invertebrate ecology, taxonomy and genetics.		
Performance measures	1. Area of endemic palm trees 2. Density of endemic palm trees	**Desired trend**	1. Stable or increasing 2. Stable or increasing

Targets	
	1. Reduced abundance and distribution of IAS. 2. No establishment of new IAS 3. Greater proportion of palm juveniles and seedlings in forest (using permanent vegetation sample plots). 4. Increased density of endemic palm trees within area and no reduction in area. 5. Fire prevention and contingency plan in place. 6. Understanding of climate change impacts to the species from finalised climate change vulnerability assessment. 7. Established monitoring programmes (surveys and dynamics). 8. Improved understanding of palm forest ecology via at least two more published research papers. 9. Key knowledge gaps on invertebrates filled (including species identification and status, and for endemic species, information on distribution, abundance and threats).

6.3 Seychelles black parrot (KPI, WHC x)

6.3.1 Introduction

The Seychelles black parrot *(Coracopsis barklyi)* is endemic to the Seychelles and is resident (breeding) only on Praslin. It is the only extant, endemic parrot in the Seychelles. The black parrots are numerous within the boundaries of Vallée de Mai and Fond Peper - the palm forest provides essential habitat for nesting during their breeding season as it is home to the highest density of mature coco de mer palms, which is the parrot's preferred nesting species.

There has been substantial research and a number of conservation achievements on the Seychelles black parrot led by SIF. Two population surveys conducted by SIF including the most recent census estimates the population of the black parrot at 1096-1742 individuals (Dueker 2018). Furthermore, until 2014, *C. barklyi* was thought to be a sub-species of the Coracopsis nigra parrots in Madagascar (including *C. n. nigra* and *C. n. libs*) and Comoros *(C. n. sibilans)* but following extensive genetic analysis driven and supported by SIF, *C. barklyi* was confirmed to be following its own, unique evolutionary path and sufficiently distinct genetically to then be declared a distinct species from the other three sub-species by BirdLife International and the IUCN (Martin *et al.* 2014, Jackson *et al.* 2016).

Regular monitoring of the black parrot by SIF started in 2009 and since then valuable data on breeding and behavioural ecology has been collected. The parrots feed on predominantly endemic and native plant species, a total of 53 recorded species (Reuleaux *et al.* 2014). Black parrot adults and chicks are fitted with coloured and numbered leg rings which enable staff to identify individual birds in the field, and more than 300 birds have been ringed by SIF staff since 2009. Blood samples and morphological characteristics are also taken for sex determination, future genetic studies, growth monitoring and disease screening. The data collected by re-sighting ringed birds is extremely valuable as it provides information on survival, distribution, movement ecology, population dynamics and behavioural ecology as well as contributing to better conservation planning for the species.

Initially conducted only in the Vallée de Mai, the breeding monitoring has extended into other areas including Fond Peper and Fond Ferdinand.

6.3.2 Seychelles black parrot conservation status:

The Seychelles black parrot is currently classified as Vulnerable to extinction on the IUCN Red List.

6.3.3 Seychelles black parrot protection

The Seychelles black parrot in the Vallée de Mai and Fond Peper is protected by the Wild Animals and Birds Protection Act 1961. The revision and update of the Seychelles Black Parrot *Coracopsis (nigra) barklyi* Conservation Assessment & Action Plan. 2009–2013 (Rocamora, G. & Laboudallon, V. 2009) is needed to further guide the management and conservation of the Seychelles black parrot. Such management will include continued long-term monitoring on the breeding, ecology and biology of the species, a Praslin-wide population survey every 5 years, protection of the palm forest, control of invasive alien species such as YCA and emerging IAS threats (e.g. Indian mynas), research to understand the fluctuating breeding activity and unique reproductive dynamics of the species, support of a proposed translocation of the species to other Seychelles islands, and continued research into causes of nest failures.

Table 13 - Management of the Seychelles Black Parrot

Current condition	The Seychelles black parrot population is in a stable condition		
Existing and potential threats	1. Limited coco de mer habitat and breeding range 2. Small population size and limited range, making stochastic impacts (e.g. fire, storms, disease) more likely to devastate population 3. Egg and chick predation by IAS 4. Fluctuating breeding activity 5. Threat to palm forest habitat; e.g. fire, illegal harvesting 6. Climate change - potential impacts on food, nest density and breeding 7. Persecution by people 8. Competition for food and nesting sites from IAS		
Management objective	Ensure that the black parrot population is either stable or increasing. To improve understanding of the population through continued monitoring to make effective and informed management decisions.		
Management strategies	1. Revise and update the Seychelles Black Parrot Conservation Assessment and Action Plan 2. Continue control and monitoring of target IAS such as yellow crazy ants in VdM and FP. 3. Continue monitoring of black parrot breeding, population (ringing of adults and chicks, re-sightings, morphometrics and blood samples). 4. Conduct a population census of the black parrots every 5 years. 5. Develop a consolidated web-based database for all parrot data, incorporating all data, with automated graphing capabilities. 6. Develop research into reproductive dynamics, including fluctuating seasonal breeding activity. 7. Support research on parrot breeding, genomics, ecology, population dynamics, movement ecology and threats. 8. Support and advise national initiatives to translocate black parrots to other islands. 9. Apply adaptive management to respond to emerging threats. 10. Use research to inform local and international protective measures.		
Performance measures	1. Number of black parrots 2. Reports & publications	**Desired trend**	1. Stable or increasing 2. Increasing
Targets	1. Stable or increasing Seychelles black parrot population(s). 2. Increased number of nests found and monitored. 3. Increased number of ringed birds. 4. Online database in daily use and used to derive report figures 5. Increased understanding of ecology, threats and breeding activity		

6.4 Giant bronze gecko (KPI, WHC x)

6.4.1 Introduction

The giant bronze gecko *(Ailuronyx trachygaster)* is one of the largest geckos in the world and is thought to be the most endangered reptile in Seychelles. The population is small and highly restricted, as the giant bronze gecko is thought to occur only in mature coco de mer forest with an intact canopy. This habitat type exists only on the island of Praslin and its total area of extent is ca. 4 km2 (Bunbury 2018). The giant bronze gecko is therefore thought to be endemic to Praslin (until recently it was also thought to occur on Silhouette but this is no longer the case). The distribution is centred in the Vallée de Mai, (where density appears to be highest), the adjacent site of Fond Peper (together ca. 0.8 km2), parts of the Praslin National Park and in the Fond Ferdinand Nature reserve, although the density is much lower than in the Vallée de Mai and Fond Peper (Mogensen 2014).

SIF has led and supported research which has substantially increased knowledge on the species biology. SIF implements ongoing herpetofauna monitoring, which aims to estimate the population sizefor the species, however this has not been possible so far due to the very low encounter rate of the species in the survey. The most recent population estimate puts the population at 1848 individuals in the UNESCO World Heritage Site of the Vallée de Mai (Tagg 2016) and the total population was estimated at 3389 ± 205 animals in 2005 (Gerlach & Ineich 2006). It is therefore crucial to establish a reliable monitoring method for the species. More than 200 individual geckos were pit-tagged in 2016 (Tagg 2016) and can be identified but no further research has yet been possible to maximise the information gain from these marked animals and important dataset.

The giant bronze gecko is thought to play an essential role in the palm forest ecosystem and is a keystone species. It has a very strong association with the coco de mer, as it is likely to be the main pollinator of this endemic palm (Mogensen 2014). It is also thought to play a role in endemic palm seed dispersal because intact endemic palm seeds have been found in giant bronze gecko scats (Mogensen 2014). The species may also be one of the top predators in the palm forest canopy, probably preying on invertebrates and possibly smaller lizards, although this has not yet been recorded. It has been found to niche segregate by tree height with the other two *Ailuronyx* gecko species with where they co-occur, with the smaller two species generally occupying lower parts of the canopy (Roberts 2009).

6.4.2 Giant bronze gecko conservation status:

The giant bronze gecko is listed as Vulnerable to extinction on the IUCN Red List due to its limited home range and small population size but has been proposed to be uplisted to Critically Endangered. The species is highly vulnerable to threats such as the recent emergence of illegal capture for the international pet/hobbyist trade, invasive alien species, and other stochastic threats that could devastate a small population (e.g. climate change impacts, disease, genetic drift or inbreeding).

6.4.3 Giant bronze gecko protection

The giant bronze gecko is in the process of being legally protected by special regulations under the Wild Animals and Birds Protection Act. Its management and conservation will focus on supporting legal instruments to increase protection of the species, reducing illegal capture, controlling IAS and protecting the palm forest, developing long-term monitoring to identify population trends and changes, and supporting research focusing on increasing knowledge on its ecology and biology.

Table 14 - Management of the Giant Bronze Gecko

Current condition	Population status uncertain due to difficulties in researching this species.		
Existing and potential threats	1. Illegal capture of live individuals for the pet trade 2. Invasive alien species (e.g. yellow crazy ants) 3. Small total population size 4. Highly restricted range (ca. 4 km²) and total dependence on coco de mer forest, making stochastic impacts (e.g. fire, disease) more likely 5. Lack of knowledge on species' ecology and biology 6. Threats to palm forest, e.g. fire, harvesting, IAS, climate change 7. Lack of connectivity between palm forest areas 8. Climate change (potential)		
Management objective	1. Improve knowledge on *A. trachygaster* population and ensure that it is either stable or increasing. 2. Improve understanding of the population through continued monitoring and research to make informed management decisions.		
Management strategies	1. Lead the development and implementation of an *A. trachygaster* Species Action plan 2. Continue control and monitoring of target IAS in VdM and FP. 3. Standardize population monitoring by developing a protocol for long-term data collection, including individual-based monitoring. 4. Population survey and mapping to determine connectivity. 5. Tighten security to reduce illegal capture. 6. Support and drive research on species biology, ecology and genetics. 7. Use research to inform international conventions and policies, e.g. IUCN, CITES, as well as to ensure national legal protection and management. 8. Investigate options, provide advice and support initiatives for establishing an *ex situ* captive population.		
Performance measures	1. Number of *A. trachygaster* 2. Distribution of *A. trachygaster* 3. Legal national protection of *A. trachygaster* 4. International recognition of species status 5. Research papers	**Desired trend**	1. Stable or increasing 2. Stable 3. Species legally protected 4. Uplisting on Red List and inclusion on CITES 5. At least 1 publication on the species
Targets	1. Species Action Plan in place 2. Stable or increasing population size and stable distribution of *A. trachygaster.* 3. Reduction in reports of *A. trachygaster* capture for pet trade. 4. Improved knowledge base of *A. trachygaster* via reports and papers. *5. A. trachygaster* listed as Critically Endangered on Red List and included on CITES appendices.		

6.5 Seychelles chameleon (WHC x)

6.5.1 Introduction

The Seychelles chameleon *(Archaius scychellensis)* is one of the two chameleon species found in Seychelles, the other being the tiger chameleon *(Archaius tigris)*. The Seychelles chameleon was recently re-discovered in 2009 in the Vallée de Mai after being 'lost' to science for nearly 200 years. The species had been overlooked due to the reorganisation of records at the National Museum of Natural History in Paris where the specimens were stored. A study in 2009 in the Vallée de Mai reported individuals that differed in appearance to the tiger chameleon and it was ascertained that these 'different' specimens were in fact the long lost Seychelles chameleon (SIF 2013, *unpublished*).

The Seychelles chameleon is a small chameleon lacking black spots/stripes, the main distinguishing feature of the tiger chameleon. It is arboreal and has only been found in mature palm habitat on Praslin and therefore appears to be a Praslin endemic (SIF 2013, *unpublished*). The Seychelles chameleon is most abundant in the palm forest of the Vallée de Mai.

Information on the Seychelles chameleon is limited. There is currently no published information on the life-history and ecology of the species despite fieldwork being conducted in 2009 and 2013. A survey of the Seychelles chameleon is incorporated in SIF's herpetofauna monitoring programme but encounter rates have not yet been high enough to estimate population size.

6.5.2 Seychelles chameleon conservation status:

As it not yet recognised as a distinct species, the Seychelles chameleon has not been assessed on the IUCN Red List but recognition, assessment and legal protection is a priority for the species. It is believed to be threatened due to limited mature palm habitat and threats linked to habitat degradation, invasive alien species, diseases and illegal harvesting for the pet trade. Legal protection under the Wild Animals and Birds Protection Act is under way.

6.5.3 Seychelles chameleon protection

The Seychelles chameleon in the Vallée de Mai and Fond Peper is in the process of being legally protected. Management and conservation of the Seychelles chameleon will focus on supporting species description and assessment, further research and monitoring, improving the conservation status of the species, mitigating potential threats and supporting legal instruments to increase its protection. The control of invasive alien species such as yellow crazy ants will be undertaken, the impacts of other IAS such as mynas needs to be better understood, and long-term monitoring of the Seychelles chameleon population will be instigated in the protected area. Research will increase knowledge on the ecology of the species.

Table 15 - Management of the Seychelles Chameleon

Current condition	Status unknown
Existing and potential threats	1. Limited palm forest habitat 2. Stochastic impacts resulting from small population size 3. Spread of IAS (e.g. yellow crazy ants, Indian mynas) 4. Lack of knowledge on the species' ecology and biology 5. Illegal capture of live individuals for the pet trade (potential) 6. Climate change (potential)
Management objectives	• Ensure chameleon population is stable or increasing. • Establish scientific research to understand its conservation status • Support and contribute to legal protection processes.

Management strategies	1. Develop and implement a Species Action Plan 2. Continue control and monitoring of target IAS in VdM and FP. 3. Develop standardized monitoring protocols. 4. Support and drive process of species recognition and conservation assessment. 5. Tighten security to deter illegal capture. 6. Support research to increase knowledge. 7. Support processes of national protective legislation for chameleons.		
Performance measures	1. Seychelles chameleon recognised as a species 2. Number/density of Seychelles chameleon 3. Legal protection of the Seychelles chameleon 4. Conservation status assessed	**Desired trend**	1. Species recognised 2. Stable or increasing 3. Species legally protected 4. Species included on the IUCN Red List
Targets	1. Conservation status of the Seychelles chameleon established. 2. Determine a population estimate, conduct population survey/census to understand population trends over time.		

6.6 Other reptiles (WHC x)

6.6.1 Introduction

The palm forest of the Vallée de Mai and Fond Peper contains 13 of the 15 endemic Seychelles reptile species, making this area of palm forest a national herpetofauna hotspot. While the giant bronze gecko and the Seychelles chameleon are key reptile species of the palm forest, the number of other geckos, skinks, chameleons and snakes make this protected area a remarkable habitat for reptiles. This includes the bronze-eyed gecko *Ailuronyx seychellensis*, dwarf bronze gecko *Ailuronyx tachyscopaeus*, Seychelles day gecko *Phelsuma astriata*, Sundbergi's day gecko *Phelsuma sundbergi*, Seychelles sucker-tailed gecko *Urocotyledon inexpectata*, tiger chameleon *Archaius tigris*, Seychelles skink *Trachylepis seychellensis*, Gardiner's burrowing skink *Pamelaescincus gardineri*, Vesey-Fitzgerald's burrowing skink *Janetaescincus veseyfitzgeraldi*, Seychelles house snake *Lamprophis geometricus* and Seychelles wolf snake *Lycognathophis seychellensis*.

Population monitoring of some of the reptiles is incorporated in SIF's herpetofauna survey but most of these lack sufficient encounters to derive reliable population estimates. The cryptic nature of many of these species has made it difficult to develop appropriate methods for sufficient detections.

6.6.2 Conservation status of other reptiles

The Seychelles house snake, Seychelles wolf snake, Vesey-Fitzgerald's burrowing skink and the Seychelles tiger chameleon are classified as Endangered on the IUCN Red List. The dwarf bronze gecko is listed as Near Threatened. The bronze-eyed gecko, Seychelles day gecko, Sundbergi's day gecko, Gardiner's burrowing skink, Seychelles skink and Seychelles sucker-tailed gecko are listed as Least Concern on the IUCN Red List. In the protected area, all reptile species are threatened by invasive alien species such as yellow crazy ants, rats and tenrecs, plus potentially Indian mynas. Several of these reptile species are also threatened by habitat degradation, illegal harvesting for the pet trade and forest fires.

6.6.3 Protection of other reptiles

Reptiles species found in the Vallée de Mai and Fond Peper are yet to be legally protected under the Wild Animals and Bird Protection Act. Only the two Phelsuma geckos are listed on Appendix II on CITES. Management and conservation of the reptiles will focus on improving the conservation status of some of the species and supporting legal instruments to increase their overall protection. The control of invasive alien species will be undertaken in the protected area and research will increase knowledge on the ecology of the species.

Table 16 - Management of Other Reptiles

Current condition	Status variable (population surveys only started in 2019 and only produced enough sightings for *A. tachyscopaeus* population estimate)		
Existing and potential threats	1. Spread of invasive alien species (e.g. yellow crazy ants, mynas) 2. Palm forest habitat degradation by invasive plants 3. Illegal harvesting of live individuals 4. Forest fires 5. Climate change (potential)		
Management objective	1. Ensure that reptile populations are stable or increasing. 2. Increase knowledge on reptile populations.		
Management strategies	1. Continue control and monitoring target IAS (yellow crazy ants, mynas) in VdM and FP 2. Establish monitoring protocols for key reptile species. 3. Support research to improve conservation status of the reptiles. 4. Support research to increase ecological and genetic knowledge on the reptiles. 5. Support processes of national protective legislation for reptiles.		
Performance measures	1. Density of reptiles in palm forest 2. Legal protection of the endemic reptiles	**Desired trend**	1. Stable or Increasing 2. Species legally protected
Targets	1. Establish population estimates of each reptile species. 2. No reduction in the reptile populations.		

6.7 Amphibians (WHC x)

6.7.1 Introduction

Seychelles is home to 14 endemic amphibian species: eight caecilians and six frogs. Amphibians in the Seychelles have been isolated for more than 65 million years since Seychelles split from Madagascar and the Indian subcontinent, making them some of the oldest animal species in Seychelles. The Vallée de Mai and Fond Peper contain several endemic amphibians including the Praslin population of the sooglossid frog *(Sooglossus seychellensis*; which may be an endemic species), the Seychelles tree frog *(Tachycnemis seychellensis)*, and at least four caecilians *(Hypogeophis pti, Hypogeophis rostratus, Grandisonia lavarta, Grandisonia sechellensis*; (Maddock 2016).

The Praslin sooglossid frog is one of the smallest frogs in the world (snout-vent length 16 mm). It is the only sooglossid frog on Praslin and was only discovered in the Vallée de Mai and Fond Peper in 2009 (Taylor et al. 2012). Following genetic research, the species was confirmed part of a separate lineage from the population on Mahé and Silhouette (Taylor et al. 2012; Labisko et al. 2019), hence termed locally 'Praslin sooglossid frog'. Work is underway to declare it a distinct species.

The Seychelles tree frog is the only tree frog in Seychelles occurring on four granitic islands (Mahé, Praslin, Silhouette and La Digue). The species has high levels of morphological variation between populations within and between islands (Maddock *et al.* 2014) but little is known about genetic differentiation of these populations.

Many aspects of Seychelles caecilian ecology are poorly known but they can be found in moist soils. All Seychelles caecilians are carnivores and relatively similar in size (Maddock 2016). Four of the seven Seychelles caecilians occur in the Vallée de Mai and Fond Peper, with *H. pti* known to occur only in Fond Peper (Maddock *et al.* 2017).

SIF has trialled amphibian monitoring in the Vallée de Mai and Fond Peper; however, the cryptic nature of caecilians has made it difficult to develop appropriate methods for sufficient detections. The monitoring of amphibian populations therefore currently remains limited.

6.7.2 Conservation status of amphibians

The Praslin sooglossid frog is listed as Endangered on the IUCN Red List (under *Sooglossus seychellensis*) and all other amphibian species are listed as Least Concern, although several Seychelles amphibians appear on the EDGE (Evolutionary Distinct and Globally Endangered) amphibian top 100 list. With isolated ranges, the amphibian populations are threatened by habitat loss, disease (especially lethal amphibian chytrid fungus and Ranavirus), invasive alien species such as yellow crazy ants and tenrecs, and climate change.

6.7.3 Protection of amphibians

Amphibians found in the Vallée de Mai and Fond Peper are yet to be legally protected under the Wild Animal and Bird Protection Act. Management and conservation of the amphibians will focus on establishing methods to determine population abundances/densities and distribution of the species, controlling invasive alien species, supporting legal instruments to strengthen their protection, and supporting further research to increase knowledge on the ecology, genetics and taxonomy of the amphibians to improve their conservation status.

Table 17 - Management of Amphibians

Current condition	Status unknown (no population surveys)		
Existing and potential threats	1. Limited palm forest habitat 2. Habitat loss -palm forest habitat degradation by invasive plants 3. Presence and spread of invasive alien species (tenrecs, yellow crazy ants) 4. Diseases 5. Forest fires (human induced and wildfires, large areas of mature palm forest destroyed in the historic and recent past) 6. Climate change		
Management objective	To ensure that the amphibian populations in the protected area are not substantially impacted by human activities.		
Management strategies	1. Develop and implement monitoring programmes and protocols. 2. Continue control and monitoring of target IAS in VdM and FP and monitor and potentially control any emerging IAS. 3. Support research to improve ecological/genetic knowledge and conservation status of amphibians. 4. Support processes of national protective legislation for amphibians.		
Performance measures	1. Conservation status of amphibians 2. Number of amphibians	**Desired trend**	1. Improved 2. Stable or increasing
Targets	1. No reduction in amphibian populations.		

6.8 Other landbirds (WHC x)

6.8.1 Introduction

Aside from the Seychelles black parrot, the mature palm forest of the Vallée de Mai and Fond Peper is home to several other endemic bird species, including the Seychelles blue pigeon (*Alectroenas pulcherrima*), Seychelles bulbul *(Hypsipetes crassirostris)*, Seychelles sunbird (*Cinnyris dussumieri*) and Seychelles swiftlet *(Aerodramus elaphrus)*. SIF black parrot surveys on Praslin (in 2011 and 2018) have also included Seychelles blue pigeons and Seychelles bulbuls in counts.

6.8.2 Conservation status of other landbirds

- The Seychelles blue pigeon is classed as Least Concern on the IUCN Red List although the population is considered to be in decline. It is fairly common throughout the inner islands.
- The Seychelles bulbul, classed as Least Concern, is widespread in the inner islands.
- The Seychelles sunbird is thought to have a stable population and is classed as Least Concern. It is widespread and common across the inner islands.
- The Seychelles swiftlet, although found on many of the granitic islands, is classed as Vulnerable on the IUCN Red List due to the impact of pesticides, disturbance to breeding sites and introduced predators such as cats and barn owls.

Overall, the endemic landbirds face threats from invasive alien species such rats, cats, mynas and yellow crazy ants. Forest fires and climate change could have also impacts on the bird populations.

6.8.3 Protection of other landbirds

The endemic landbirds in the Vallée de Mai and Fond Peper are protected by the Wild Animals and Birds Protection Act 1961. Management and conservation of the landbirds will focus on measures to control invasive alien species.

Table 18 - Management of Landbirds

Current condition	Landbird populations are currently stable, although the Seychelles blue pigeon appears to be in decline and the Seychelles swiftlet is Vulnerable		
Existing and potential threats	1. Invasive alien species 2. Forest fires 3. Climate change 4. Stochastic effects in small island populations 5. Disease		
Management objective	To ensure that the landbird populations in the protected area are stable or increasing and to help mitigate potential threats and pressures on the populations		
Management strategies	1. Continue control and monitoring of target IAS in VdM and FP. 2. Research myna population, and control options.		
Performance measures	1. Number/density of landbirds	**Desired trend**	1. Increasing
Targets	1. No reduction in landbird population sizes.		

6.9 Ecological processes (KPI, WHC ix)

6.9.1 Introduction

The Vallée de Mai and Fond Peper are dense mature endemic palm forests of ecological significance. Largely untouched, the low- and intermediate-altitude palm forest is characteristic of the Seychelles. The sites contain all six endemic palms of the Seychelles which grow intermixed with *Pandanus hornei* and broadleaf endemics dominated by *Northea seychellana* and *Dillenia ferruginea*. Together these species constitute an ecosystem in which unique ecological processes and interactions of nutrient cycling, seed dispersal, and pollination occur.

Dominating nutrient cycling processes is the coco de mer. Research has revealed that the coco de mer exhibits a remarkable mechanism to improve its nutrient supply by using its large fan-shaped leaves to funnel any nutrient-rich material, especially pollen, falling on its leaves to the base of the trunk (Edwards *et al.* 2015). This in turn supports a community of animals unique to the coco de mer forest habitat that depend directly or indirectly on the nutrients funnelled to the roots.

Frugivorous birds play an important role in seed dispersal. The Seychelles black parrot has potential to disperse seeds of the endemic *Verschaffeltia splendida, D. ferruginea* and *Ficus lutea* (Reuleaux *et al.* 2014). Other seed dispersers include the Seychelles blue pigeon and Seychelles bulbul. The latter is known to feed on a wide variety of native and introduced fruits (Kueffer 2006). Geckos of the genus *Phelsuma* spp. and *Ailuronyx* spp. are also believed to contribute to seed dispersal (Oleson & Valido 2003); intact endemic palm seeds occur in giant bronze gecko scats (Mogensen 2014).

Phelsuma spp. and *Ailuronyx* spp. geckos are key pollinators of the coco de mer forest, with the giant bronze gecko probably being the key pollinator (Roberts, 2009; Mogensen, 2014). Other species recorded as possible pollinators of the coco de mer include a cricket endemic to the coco de mer leaf litter (C. Kaiser-Bunbury, pers. comm.) and *Phelsuma sundbergi*, and the wind is also thought to play a role in longer distance pollination. Other palm species are pollinated primarily by insects (bees, beetles) and geckos. Broadleaf species, such as *Northea*, are mainly pollinated by insects, sunbirds and geckos.

6.9.2 Conservation status of ecological processes

Threats to palm forest ecological processes are primarily from invasive alien species, especially yellow crazy ants, and forest degradation and fragmentation. By impacting the populations of endemic fauna, and potentially dominating nectar supplies of receptive plants (including coco de mer), yellow crazy ants can disrupt essential ecosystem functions and therefore cause 'invasional meltdown' of the palm forest ecosystem (Abbott 2005, Kaiser-Bunbury *et al.* 2014). Illegal harvesting of live animals and forest fires also threaten the integrity of ecological processes.

6.9.3 Protection of ecological processes

Management and conservation of ecological processes will focus on controlling invasive alien species and reducing illegal harvesting in the protected area. Research into these processes is needed, and will be supported and established to advance knowledge of ecological processes wherever possible.

Table 19 - Management of Ecological Processes

Current condition	Ecological processes in the palm forest are little known and in unknown condition and likely threatened by the yellow crazy ant invasion.		
Existing and potential threats	1. Spread of invasive alien species and lack of biosecurity 2. Illegal harvesting of live animals 3. Forest fires 4. Climate change		
Management objective	1. Mitigate threats hindering ecological processes 2. Ensure ecological processes are not impacted by human activities.		
Management strategies	1. Continue control and monitoring of target IAS, especially yellow crazy ants. 2. Tighten security against illegal harvesting. 3. Support and initiate research into ecosystem functions and biodiversity relationships, connectivity and networks. 4. Initiate processes to restore, rehabilitate and increase connectivity of palm forest fragments to restore ecological processes. 5. Increase and improve public outreach and education on the importance and value of entire, intact ecosystems and connectivity.		
Performance measures	1. IAS abundance and distribution. 2. Abundance of endemic fauna 3. Research reports & publications	**Desired trend**	1. Decreasing 2. Stable or Increasing 3. Increasing
Targets	1. Ecological processes unhindered by IAS and other threats 2. Better understanding of ecological processes.		

6.10 Ecosystem services: Freshwater

Introduction

On Praslin there are two freshwater wetlands and a number of freshwater sources. The northern and western systems rely mainly on the water supplied by the Fond B'Offay water catchment, one of the three main water sources on Praslin. It supplies the whole of Baie Ste Anne and Consolation areas, while the Salazie River supplies the communities extending from Baie Ste Anne through Cote d'Or all the way to Anse Boudin. The Nouvelle Decourverte and the Mt Plasir Rivers serve the communities of Grand Anse, Amitie, Anse Kerlan and Mt Plasir. The Vallée de Mai is in the central hills in the northeast of Praslin National Park. It is in the lower part of a valley toward the head of a stream, from which two streams flow, the Nouvelle Decourverte and Fond B'Offay rivers, flowing west and east respectively, though it does not include the whole water catchment (this lies within the Praslin National Park).

Consequently, understanding freshwater species that inhabit the site is very important. A 2003 study of the lower reaches of selected permanent water sources (five on Praslin) identified 12 native species of crustacea, including the endemic crab, *Seychellum alluaudi* and 17 native species of fish including the endemic *Panchypanchax playfairil* and the discovery of a new endemic species *Parioglossus multiradiatus* (Philippe *et al.* 2004). Additional work is required on more widespread waterways and in their higher reaches to gain a better overview.

6.10.1 Conservation and protection of the freshwater ecosystem

Rivers and streams are listed for protection under the State Lands and River Reserves Act (1976) in recognition of their importance for socioeconomic development. The Protected Area does not cover the entire water catchment area, and is vulnerable to a number of threats.

Table 20 - Management of Freshwater Ecosystem Services

Current condition	Status unknown (no research)		
Existing and potential threats	1. Increase in population will increase demand for water extraction with ramifications for downstream biodiversity. 2. Human activities upstream of any type within the National Park could adversely affect lower reaches of watercourses. 3. Pollution of water catchment (natural and unnatural). 4. Land erosion, e.g. landslides, run-off. 5. Plastic pollution and use of river as a dumping ground for waste. 6. Canalisation and reclamation of flood plains etc. 7. Climate change		
Current major pressures	1. Human activities upstream on river banks		
Management objective	1. Manage Fond B'Offay (main water collection and treatment station, providing freshwater to the population). 2. Ensure that freshwater ecosystem services are not impacted by humans.		
Management strategies	1. Routine monitoring of water quality. 2. Routine monitoring of aquatic biodiversity 3. Develop and implement freshwater monitoring protocols. 4. Educate local population in vicinity of water catchment and river banks, on water as an ecosystem service, and its protection.		
Performance measures	1. Drinking water quality 2. No disturbance to freshwater ecosystem	**Desired trend**	1. Tested and monitored 2. Protected
Targets	1. Safe drinking water 2. Extended protection 3. No loss of ecological processes.		

7 Management of the Social Values

7 Management of the Social Values

Social values are heavily linked to the historical, cultural, aesthetic, recreational and economic attributes of the protected area. Striking the right balance between protecting the environment for future generations and allowing ongoing sustainable use is a key future challenge for management of Vallée de Mai and Fond Peper

7.1 Historical and cultural values

There are many stories surrounding the origin of the Vallée de Mai. In the 16th century, coco de mer nuts were only known from Maldives, Sumatra and Java where they were found washed up onshore. However, an expedition led by Marion Dufresne in 1768, concluded that the origin of the coco de mer was on Praslin Island in the Seychelles.
Upon trekking the trail from Baie St Anne to Grand Anse through the palm forests on Praslin in 1881, the British Major General C. G. Gordon discovered that the coco de mer trees possessed a striking resemblance to female and male sexual body parts. After his encounter with this 'tree of knowledge' bearing the 'mysterious, forbidden fruit', in this primeval palm forest he 'declared' that he had found the "Garden of Eden".

During the early 1900s, the primeval palm forest was acquired by numerous owners until 1928 when part of it was purchased by Mr France Jumeau. As the purchase occurred in the month of May and the area purchased was in a valley, this part of the palm forest was called the 'Vallée de Mai'.

In 1948, the government acquired Praslin's upland water catchment including the Vallée de Mai. The Vallée de Mai was declared a nature reserve in 1966 under the Wild Birds Protection (Nature Reserve) Regulation and embedded in the Praslin National Park when it was declared in 1979. In 1983 the reserve was inscribed as a UNESCO World Heritage Site due to its uniqueness and endemism. The Seychelles Islands Foundation took charge of the management and conservation of Vallée de Mai in 1989.

Table 21 - Management of Historical and Cultural Uses

Requirements	NA
Management objective	Encourage visitors' appreciation of the historical and cultural properties of the site.
Management strategies	1. Develop educational materials and displays showcasing the historical myths and stories in the museum. 2. Encourage local community and visitors to engage in cultural events organised at the site. 3. Maintain and protect the cultural aspects of the site and its natural resources. 4. Disseminate/educate stakeholders on the cultural and historical assets of the site.
Reporting	Reports on activities focusing on the history and culture featuring in SIF annual reports
Targets	1. Organise one major activity annually to celebrate Seychellois heritage and culture (Festival Creole) 2. Involve min 1000 visitors and stakeholders actively in Festival Creole activities annually. 3. Collaborate with Department of Culture, Seychelles Heritage Foundation, National Museum in any activities to raise awareness on the historical and cultural values of the reserve.

7.2 Identity and Inspirational Value

The Vallée de Mai has always been considered as a place of tranquillity and serenity, where visitors come to connect with nature. A place that is valorised by artists as it brings inspiration in various forms such as music, poetry, photography and paintings. The sound of the wind gently rattling through the palm leaves with the whistle of the endemic black parrot has given rise to numerous patriotic songs by famous Seychellois artists.

Apart from maintaining a healthy and undisturbed ecosystem, in the future, the appreciation of nature by providing space for mental wellbeing to the visitors should be enhanced. This will help to identify and promote the Vallée de Mai as a haven to embrace peace and nature, and as an ideal location to host special events.

Table 22 - Management of the Identity and inspirational Value

Requirements	1. Healthy and functional ecosystem services 2. Undisturbed and peaceful environment
Management objective	Promote the area as a unique and pristine site that inspires visitors to connect with nature.
Management strategies	1. Encourage local artists and other individual/groups to develop their talents and creativity from the ecosystem services of the site. 2. Market the site as a sanctuary to connect with nature, promotes wellbeing and an ideal place to host special events. 3. Develop and implement visitor management strategy and system that will allow visitors to enjoy the beauty and tranquillity of the forest.
Reporting	1. Regular assessment on the activities/events 2. Annual reporting
Targets	1. Implement the visitor management strategy 2. Survey visitor satisfaction three times during the duration of this management plan

7.3 Research and knowledge

The Vallée de Mai is a protected area that provides a unique opportunity for scientific research. This site, along with adjacent Fond Peper, contains the largest intact palm forest in Seychelles, and is home to the iconic species such as the coco de mer, bronze-eyed geckos, black parrot and other endemic species. The reserve is therefore of tremendous scientific importance because it provides opportunities to build knowledge, facilitate learning and understand local ecological processes and the effect of climate change on endemic species in this ecosystem.

Effective management of the Vallée de Mai requires a thorough understanding of the ecological functioning of the reserve. Additionally, an understanding of current ecological patterns at the Vallée de Mai will provide insight to future ecological changes as a response to climate change. Research programmes should, ideally, be designed to fill key gaps in existing knowledge and generate knowledge that directly contributes to management.

Table 23 - Management of Scientific Research

Requirements	1. Provision of access to representative palm forest sites with minimal human influence as 'control sites'. 2. Access to representative sites covering the range of major human activities in the protected area as 'impact' sites. 3. Research facilities and support
Management objective	1. To promote the use of the site for ecological research 2. To ensure ecological research is ethical and ecologically sustainable. 3. To maintain ecological values of the nature reserve that are important for scientific research.
Management strategies	1. Develop a research strategy to determine priority areas for future research 2. Provide onsite facilities and support for researchers to undertake priority research projects contributing towards sustainable management of the site. 3. Identify and formalise partnerships and collaborations for research projects to improve management decisions. 4. Ensure ecological research is ethical and ecologically sustainable 5. Maintain the ecological values of the protected area and its importance for scientific research
Reporting	VdM Science Coordinator to ensure completion of annual reports and, research and monitoring projects.
Targets	1. To increase understanding and knowledge of Vallée de Mai's ecological role and function on a local and global context 2. Establish at least 3 new scientific collaborations/projects on aspects of palm forest research (research agreements, MoUs) 3. Secure research funding for at least three projects on aspects of palm forest research 4. To increase number of scientific papers to on average at least one per year.

7.4 Education and recreation

Education and outreach has always remained a top priority of SIF. It is firmly believed that one must gain knowledge and understand the importance of our flora and fauna at this site before effectively contributing to the sustainable management of the reserve. Therefore, effort and resources have been invested to engage the community and visitors to learn and valorise the sites. With the opening of the new visitor centre, education and outreach were incorporated into the plans, where a room was allocated for educational and recreational activities. Activities are done on environmental theme days during the year to teach and engage with the visitors on the different environmental aspects of the Vallée de Mai.

One of the most renowned annual events of the Vallée de Mai is the holiday camp. Launched in 2012, this activity aims to inspire the younger generation to learn and develop a strong interest in conserving the environment. Over the years, the participation of the Vallée de Mai education section has been noticeably in most of the activities organised on Praslin, which has helped to promote and raise awareness of environmental issues of the Vallée de Mai.

Management of education and recreational activities will involve increasing visitor involvement and also developing more educational materials to effectively share information about the palm forest's biodiversity.

Table 24 - Management of Education and Recreation

Requirements	1. Access to educational tools 2. Access to infrastructure and facilities
Management objective	Expand the outreach programmes to the wider community and promote recreational activities
Management strategies	1. Develop in-house educational materials 2. Establish MOU with community groups (senior citizens and working class) to strengthen collaboration and encourage involvement of local communities. 3. Increase and diversify recreational activities for all age groups.
Reporting	EOPO monthly report, Annual report
Targets	1. Production of educational materials that are appropriate for different age groups 2. Signed MOUs with identified partners 3. Maintain two holiday camps annually, organise the celebration of the UNESCO World Heritage Day and commemorate 10 other UN days by organising or participating in activities to raise awareness on related issues to these.

7.5 Sustainable Tourism

Ecotourism activities are essential for contributing to the protection of the ecosystem of the Vallée de Mai by fostering a greater appreciation and understanding of the environment. The acknowledgement of the natural values and the designation of the World Heritage status have further enhanced the nature reserves marketability as a tourism destination. Ecotourism in the Vallée de Mai is essential for financially supporting the conservation work, research, management and protection of both World Heritage sites. From the revenue collected at the entrance of Vallée de Mai, 50% is used for the management/operation of Aldabra Atoll.

The COVID-19 pandemic has directly hit the Seychelles' tourism industry, inevitably having a ripple effect on a multitude of tourism sectors. The Vallée de Mai was no exception to the negative effects of the pandemic, with a drastically reduced revenue. Despite the steady increase in the number of visitors since, it has not been possible to resume the level of revenue in 2020. Repetitive and continued assessments and statistics of tourist inflow and revenue are required to understand the performance of this activity. It is expected that tourism resumes its normal activities in 2021–2022, a revenue recovery to pre-COVID levels is anticipated.

However, although an increase in tourists signifies more revenue, visitor management strategies should be firmly implemented and enforced as a high number of unmanaged visitors may cause irreversible environmental damage. Therefore, to maintain a balance between tourism activity and biodiversity conservation, there is a need to review and reinforce SIF policies, rules & regulations for all visitors and service operators and develop new sustainable tourism activities that are consistent with maintaining the nature reserve's values.

Table 25 - Management of Sustainable Tourism

Requirements	1. Well-maintained trail/path system. 2. High aesthetic quality of the environment. 3. Healthy ecosystem. 4. Abundance of flora and fauna 5. Guided tour facilities 6. High quality signage and information 7. Sustainable support facilities
Management objective	1. To maintain a viable source of revenue from tourism activities that support conservation 2. To ensure that ecotourism activities are managed in a manner that is consistent with maintaining the ecological and social values of the site 3. To maintain a healthy balance between tourism activities and biodiversity conservation
Management strategies	1. Ensure that all tourism activities are in compliance with the reserve policies 2. Assess the nature, level and potential environmental impacts of tourism activities at the site, and develop a variety of sustainable activities that will promote visitation and support biodiversity conservation 3. Review and enforce SIF policies, rules and regulations that all visitors and service operators must adhere to. 4. Create a platform to make the various conservation work and projects visible to encourage potential donors to fund and contribute towards these.
Reporting	Annual report that includes number of visitors, activities completed and revenue generated
Targets	1. Implementation of strategies within agreed timeframes

7.6 Aesthetic value

The Vallée de Mai has significant natural beauty, recognised in its World Heritage listing. The aesthetic value of the nature reserve is captured in the statement of Outstanding Universal Value which states: *"The property contains a scenic mature palm forest. The natural formations of the palm forests are of aesthetic appeal with dappled sunlight and a spectrum of green, red and brown palm fronds. The natural beauty and near-natural state of the Vallée de Mai are of great interest, even to those visitors who are not fully aware of the ecological significance of the forest."* (UNESCO).

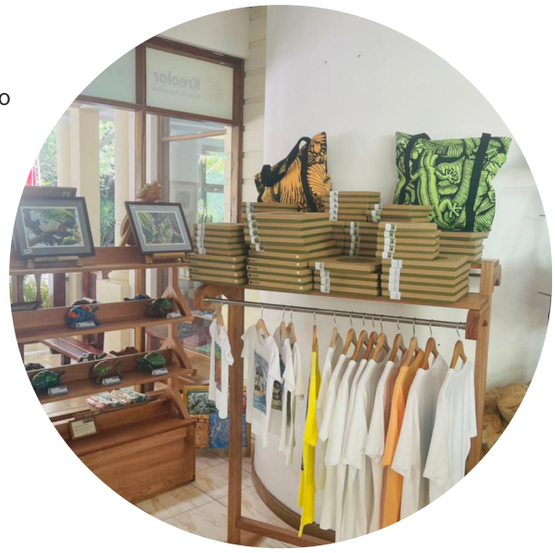
The aesthetic value of the Vallée de Mai can be appreciated when walking through the entrance of the reserve and observing the lush green endemic palm forest. Whilst there are a few manmade structures in the reserve, it is anticipated that new infrastructure will be minimised and designed to protect the aesthetic values. In designing new or replacement infrastructure, management should consider the siting, design, height, materials, and colours to minimise visual impacts to the natural environment. Any infrastructure projects must therefore be planned with careful consideration of this issue.

Table 26 - Management of Aesthetic Value

Requirements	1. Minimal visual impact & intact palm forest 2. Maintained integrity of the site
Management objective	To ensure that the aesthetic values of the nature reserve are maintained
Management strategies	1. All infrastructure should be designed to blend in with the environment for minimum visual impact. 2. Ensure regular maintenance on the site infrastructures 3. Conduct maintenance of the site in a manner that does not compromise the aesthetic value of the forest. 4. Raise awareness and put in place facilities to prevent visitors from causing damage to the site.
Reporting	Annual reporting of any new infrastructure developed at the reserve.
Targets	1. Maintain and enhance the outstanding aesthetic values of the forest

7.7 Employment and Business Opportunities

With the establishment of the Vallée de Mai visitor centre in 2009, SIF was able to provide more facilities and services hence offering more employment and business opportunities for the local community. The visitor centre also brought forth new positions in education and outreach and visitor centre operation. As the number of visitors grew over the years, the capacity to accommodate the rising numbers also increased in terms of acquiring more staff in the sales section to provide an adequate service. The Vallée de Mai has also helped create job opportunities for local business operators such private licensed guides, Destination Management Companies, taxi drivers, wedding coordinators and local suppliers for the cafe and souvenir shop.



The future objective is to enhance and expand Vallée de Mai's services and activities. By developing new activities, more employment opportunities will be created to boost Vallée de Mai's capacity.

Table 27 - Management of Employment and Business Opportunities

Requirements	The Vallée de Mai remains the most visited natural attraction in Seychelles for tourists and locals alike
Management objective	1. Create a favourable business environment and opportunities for the local community.
Management strategies	1. Develop and implement a scheme of service that encourages the local community to take up employment in the Vallée de Mai. 2. Continue to expand services/activities that will benefit local service providers, suppliers and artisans, with priority given to the local community 3. Provide opportunities for local artists to showcase and sell their work through organised events.
Reporting	Annual reporting
Targets	1. Maintain a workforce that is 80% Seychellois 2. Increased and more diverse representation of local businesses providing services and showcasing their talents in the Vallée de Mai.

7.8 Importance as a Water Security Area

The freshwater sources provide habitat to various aquatic species found in the Vallée de Mai and Fond Peper palm forest. They play a crucial role in the biodiversity and the forest ecosystem. They also supply the local community with freshwater for domestic consumption via the Public Utility Corporation (PUC) network. PUC has a water catchment and treatment plant bordering the Vallée de Mai and is responsible for managing the water source for distribution to the households on Praslin. These freshwater sources have for many years benefited the farming community to guarantee food security for the Grand Anse community despite seasonal droughts. The freshwater supply from the Vallée de Mai also supports a Praslin-owned water bottling company.

Through its conservation programme protecting the water catchment, SIF ensures that the watershed is protected and maintained for the continued survival of the forest biodiversity and ecosystem. SIF aims to continuously engage with the local community and stakeholders through its outreach and education programmes to raise awareness of the importance of the Vallée de Mai as a water security area as well as to encourage the sustainable use of water and the importance of protecting water sources more generally.

Table 28 - Management of Water Security

Requirements	Maintain the Vallée de Mai and Fond Peper as a water catchment and watershed at the highest standard.
Management objective	1. To protect the watershed area to sustain the biodiversity and ensure its sustainable use by the local community. 2. Ensure sustainable management of water resources to guarantee and facilitate socio economic activities by the local community (e.g. agricultural, water bottling)
Management strategies	1. Develop and implement a monitoring system to guarantee high water quality and best watershed management at all times. 2. Liaise closely with PUC to ensure the sustainable distribution of water resources to the local community, specifically Grand Anse. 3. Engage the community through education and outreach programmes to understand and value the importance of the watershed and how it supports socio-economic activities.
Reporting	Annual reporting on the water quality of water sources
Targets	1. Regular basic monitoring of water quality implemented 2. Maintain records of regular water testing by PUC 3. Celebrating World Water Day annually and participating in outreach and educational activities organised by PUC and government departments

8 Performance Assessment

8 Performance assessment

Various levels of performance assessment are required to be undertaken by SIF to meet agency and World Heritage reporting requirements.

8.1 Assessment of Management Effectiveness

The effectiveness of the management plan will be reviewed every five years through a formal auditing and review process. The audits will include reports on the status of the key ecological values of the protected area and an assessment of the effectiveness of management strategies.

Overall management performance will be audited via a status report assessing compliance against the stated key ecological and social management targets (i.e. outcome-based approach) and against progress towards implementation of the key management strategies (i.e. activity-based approach).

The bi-annual review will include the identification of issues affecting implementation, resource allocation, progress in implementing the management plan strategies, and the condition of ecological and social values against performance measures and targets. Preparation of annual work plans and monitoring programs for the protected area's values will inform the audit process.

8.2 Assessment of the World Heritage Outstanding Universal Value

As the protected area is a World Heritage site, SIF has obligations to report on the maintenance of the Outstanding Universal Value (OUV) of the site (see statement of OUV Section 2.1.1). This reporting comprises UNESCO World Heritage Convention monitoring through periodic reporting every six years; and a three-yearly IUCN World Heritage Conservation Outlook Assessment prepared by an IUCN expert panel in consultation with SIF. This management plan has been structured to reflect the OUV and therefore the values align with the IUCN reporting requirements. The intention, therefore, is that the annual management reviews and audit by SIF will streamline and provide the information to support IUCN reporting requirements.

8.3 Summary of Management Effectiveness for the Vallée de Mai

The Vallée de Mai has undergone management effectiveness assessments developed by UNDP and IUCN. The UNDP management effectiveness assessment framework evaluates the legal structures, boundaries, planning, management, monitoring and enforcement of the World Heritage Site. The Vallée de Mai increased from 81 (of 102) in 2014 to 86 in 2017, providing the site with the second highest score of all protected areas in Seychelles.

IUCN Conservation Outlook assessments were conducted in 2014, 2017 and 2020. Below is a summary of the overall results and changes during the assessment periods.

Category	2014 Score	2017 Score	2020 Score
Overall Assessment	**Good with some concerns**	**Good with some concerns**	**Good with some concerns**
The protection and management of Vallée de Mai Nature Reserve is generally effective and is supported by a national legal framework, although there is a lack of a national protected area system. The management authority is very competent and is effectively implementing science-based programmes, outreach and education schemes. However, the future of the site's key value, the coco de mer palm, is currently under threat from illegal collection and over-exploitation for its nuts and kernel. The site's management has recently reduced both commercial harvesting and illegal collection of nuts, although the conservation impacts of these requires assessment.			
Current state of trend and values	**Low Concern Trend: Data Deficient**	**Low Concern Trend: Stable**	**Low Concern Trend: Stable**
The overall values of Vallée de Mai are currently stable. Scientific understanding of its values has improved considerably over the last five years. However, the key iconic species of the site, the coco de mer, is under threat due to illegal collection of nuts reducing its ability to regenerate naturally. The site remains a stable haven for many endemic and native species of fauna and flora.			
Overall Threats	**High threat**	**High threat**	**High threat**
The illegal collection, plus the unsustainable harvesting of coco de mer nuts are the major pressures on the Vallée de Mai. Although the site's management SIF has implemented a coco de mer regeneration scheme, the scheme cannot be promoted openly to better engage staff due to the risk of poaching. Invasive alien species are a threat to the site's endemic fauna such as the Seychelles black parrot. Forest fire is a high threat which can lead to loss of habitats and potential loss of the largest coco de mer population.			
Overall protection and management	**Effective**	**Effective**	**Effective**
Vallée de Mai's protection and management to preserve the site's key values is sufficient to maintain a stable conservation trend. There have been significant improvements in scientific research and site management capacity over the last five years. The management authority has made important changes to their strategies and use of science-based decision-making as a principle. There is a positive level of outreach to local communities, tourists and local tourism enterprises. A series of research studies conducted over the last five years form a strong base for the site's managers to make informed, adaptive decisions. The levels of coco de mer commercial harvesting have been reduced, but the conservation impacts need to be assessed. Management's responses to address illegal collection of nuts appear to have had a positive effect, but a thorough assessment is required.			

9 References

Abbott K. (2005) Supercolonies of the invasive yellow crazy ant, *Anoplolepis gracilipes,* on an oceanic island: Forager activity patterns, density and biomass. *Insectes Sociaux* 52: 266-273

Blackmore S, Chin S-C, Chong Seng L, Christie F, Inches F et al. (2012) Observations on the Morphology, Pollination and Cultivation of Coco de Mer (*Lodoicea maldivica* (J F Gmel.) Pers., Palmae). *Journal of Botany* 2012: 1-13 (doi:10.1155/2012/687832)

Bunbury, N. 2018. Non-detriment findings report on *Ailuronyx trachygaster* for submission by the Seychelles government to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Cuthbert, H. (2010) The distribution and impacts of the introduced yellow crazy ant *Anoplolepis gracilipes* within the Vallée de Mai UNESCO World Heritage Site, Seychelles. MSc Dissertation, University of East Anglia, UK.

Dueker S. (2018) Black Parrot Distance Sampling Report 2018. Unpublished Report for SIF.

Edwards PJ, Fleischer-Dogley F & Kaiser-Bunbury CN. (2015). The nutrient economy of *Lodoicea maldivica*, a monodominant palm producing the world's largest seed. *New Phytologist* 206: 990-999

Fleischer-Dogley F, Kettle CJ, Edwards PJ, Ghazoul J, Maattanen K & Kaiser-Bunbury CN. (2011). Morphological and genetic differentiation in populations of the dispersal-limited coco de mer (*Lodoicea maldivica*): implications for management and conservation. *Diversity & Distributions* 17: 235-243

Gerlach J & Ineich I. (2006) *Ailuronyx trachygaster.* The IUCN Rd List of Threatened Species. Available from: **https://www.iucnredlist.org/**

Jackson H, Bunbury N, Przelomska N, Groombridge JJ. (2016). Evolutionary distinctiveness and historical decline in genetic diversity in the Seychelles Black Parrot *Coracopsis nigra barklyi.* Ibis 158: 380–394

Kaiser-Bunbury C, Cuthbert H, Fox R, Birch D, Bunbury N. (2014) Invasion of yellow crazy ant *Anoplolepis gracilipes* in a Seychelles UNESCO palm forest. *NeoBiota* 22: 43–57

Kaiser-Bunbury C, Fleischer-Dogley F, Dogley D, Bunbury N. (2015) Scientists' responsibilities towards evidence-based conservation in Small Island Developing States. *Journal of Applied Ecology* 52: 7–11

Ketterer, L. (2010). Management Effectiveness Assessment UNESCO Natural World Heritage Site Vallée de Mai.

Küffer C. (2006) Impacts of woody invasive species on tropical forests of the Seychelles. PhD Dissertation. ETH, Zurich, Switzerland.

Labisko J, Griffiths RA, Chong-Seng L, Bunbury N, Maddock ST, Bradfield KS, Taylor ML & Groombridge JJ. (2019) Endemic, endangered, and evolutionarily significant: Cryptic lineages in Seychelles' frogs. *Biological Journal of the Linnean Society* 126 (3), 417-435 (doi: 10.1093/biolinnean/bly183/5288504)

Maddock ST, Day J, Nussbaum RA, Wilkinson M & Gower DJ. (2014). Evolutionary origins and genetic variation of the Seychelles treefrog, *Tachycnemis seychellensis* (Duméril and Bibron, 1841)(Amphibia: Anura: Hyperoliidae). *Molecular Phylogenetics and Evolution* 75, 194-201

Maddock S. 2016. Systematics and Phylogeography of Seychelles Amphibians. PhD Dissertation, University College London, UK.

Maddock ST, Wilkinson M, Nussbaum RA & Gower DJ. (2017) A new species of small and highly abbreviated caecilian (Gymnophiona: Indotyphlidae) from the Seychelles island of Praslin, and a recharacterization of *Hypogeophis brevis* Boulenger, 1911. *Zootaxa* 4329: 301-326

Martin RO, Perrin MR, Boyes RS, Abebe YD, Annorbah ND, Asamoah A, Bizimana D, Bobo K, Bunbury N *et al.* (2014) Research and conservation of the larger parrots of Africa and Madagascar: a review of knowledge gaps and opportunities. *Ostrich* 85: 205–233

Matatiken D & Dogley D. (2005) Guide to Endemic Palms and Screw Pines of the Seychelles Granitic Islands. Plant Conservation Action Group, Seychelles.

Ministry of Environment and Energy (2013). Seychelles Protected Area Policy. Mahé, Seychelles.

Mogensen T. (2014) The Ecology of The Giant Bronze Gecko *(Ailuronyx trachygaster)*. MSc Dissertation, Aarhus University, Denmark.

Noble T, Bunbury N, Kaiser-Bunbury C, Bell DJ. (2011) Ecology and co-existence of endemic gecko species in a native palm forest. *Journal of Zoology* 283: 73–80

Oleson JM & Valido A. (2003). Lizards as pollinators and seed dispersers: an island phenomenon. *Trends in Ecology & Evolution* 18: 177-181.

Reuleaux A, Bunbury N, Villard P, Waltert M. (2013) Status, distribution and recommendations for monitoring of the Seychelles black parrot *Coracopsis (nigra) barklyi*. *Oryx* 47: 561–568

Reuleaux A, Richards H, Payet T, Villard P, Waltert M, Bunbury N. (2014) Breeding ecology of the Seychelles black parrot *Coracopsis barklyi*. *Ostrich* 85: 255–265

Reuleaux A, Richards H, Payet T, Villard P, Waltert M, Bunbury N. (2014) Insights into the feeding ecology of the Seychelles black parrot *Coracopsis barklyi* using two monitoring approaches. *Ostrich* 85: 245–253

Rist L, Kaiser-Bunbury C, Fleischer-Dogley F, Edwards P, Bunbury N, Ghazoul J. (2010) Sustainable harvesting of coco de mer in the Vallée de Mai, Seychelles. *Forest Ecology & Management* 260: 2224–2231

Roberts V. (2009) Habitat preferences and niche partitioning among endemic geckos (Genus: *Ailuronux*), Seychelles. MSc Dissertation, University of East Anglia, UK.

Rocha S, Perera A, Bunbury N, Kaiser-Bunbury CN, Harris J. (2017). Speciation history and species-delimitation within the Seychelles bronze geckos, *Ailuronyx* spp.: molecular and morphological evidence. *Biological Journal of the Linnean Society* 120: 518-538. doi: 10.1111/bij.12895

Tagg C. (2016). Population status and movement ecology of the Giant Bronze Gecko *Ailuronyx trachygaster* on Praslin, Seychelles. MSc Dissertation, Bournemouth University, UK.

Taylor ML, Bunbury N, ChongSeng L, Doak N, Kundu S, Griffiths R, Groombridge JG. (2012) Evidence for evolutionary distinctiveness of a newly discovered population of sooglossid frogs on Praslin Island, Seychelles. *Conservation Genetics* 13: 557–566

Seychelles Islands Foundation 2016: Aldabra Management Plan: A Management Plan for Aldabra Atoll Natural World Heritage Site.

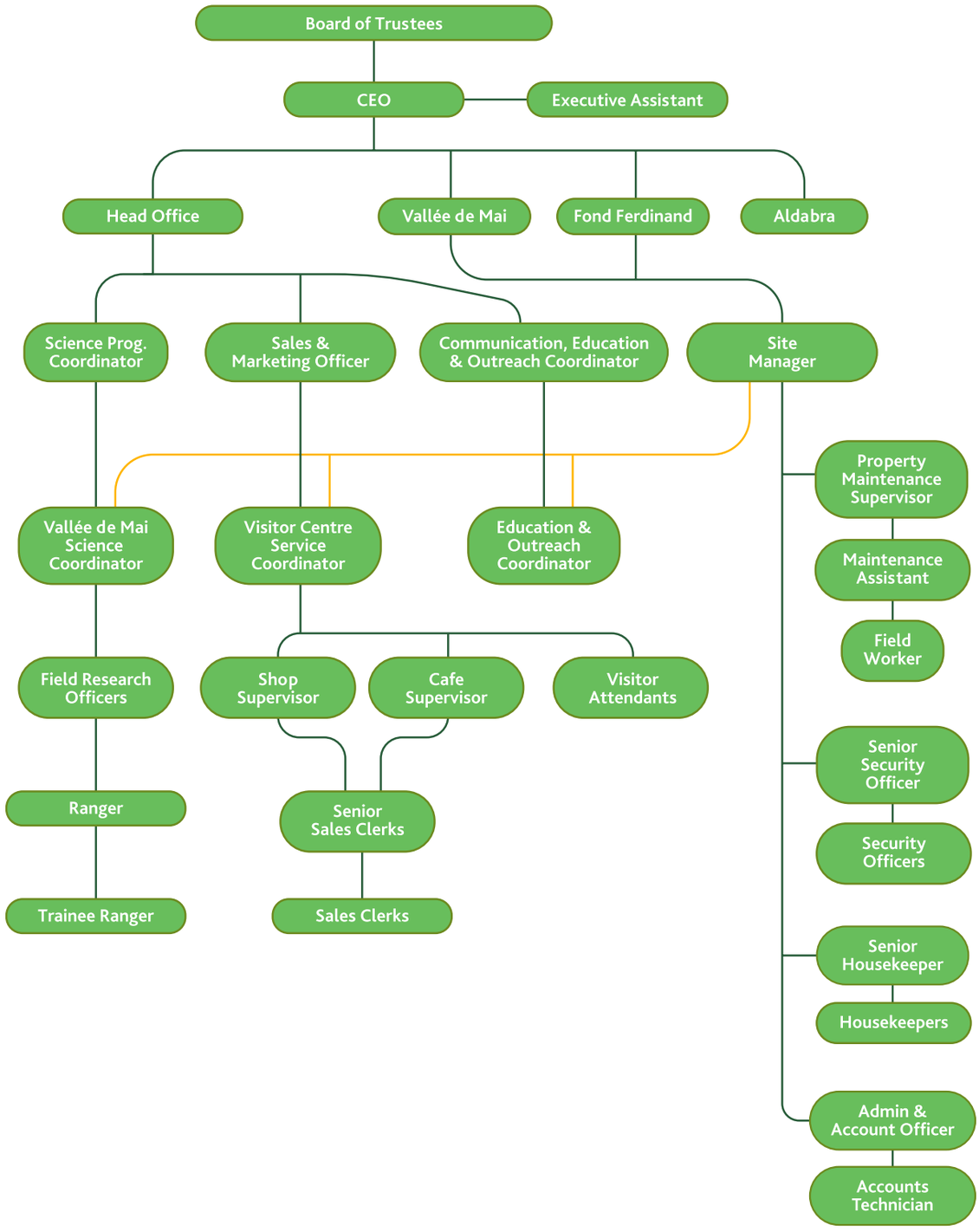
Seychelles Islands Foundation (Ed.) (2001): Vallée de Mai Management Plan: A Management Plan for Vallée de Mai Natural World Heritage Site. 2002–2008.

Seychelles Islands Foundation's website www.sif.sc

10 Appendices*

APPENDIX 1

Seychelles Islands Foundation staffing structure for Vallée de Mai.



APPENDIX 2
Biosecurity Manual & Protocols

APPENDIX 3
EMS Policy

APPENDIX 4
Human Resource Policies & Procedures

APPENDIX 5
Monitoring Protocols

APPENDIX 6
Implementation Schedule

The implementation of the 2021 Vallée de Mai Management Plan will be ensured through the monitoring of values throughout the implementation period, periodic effectiveness assessments of the management plan with all relevant stakeholders, the development of Annual Workplans throughout departments that align with management strategies across all Ecological and Social Values, and lastly abide to research strategies that enable informed management and conservation of the of Vallée de Mai UNESCO World Heritage Site.

*Appendices shall be made available to external parties upon request via email to **info@sif.sc**