IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 05 November 2017

Please note: this is an archived Conservation Outlook Assessment for Vallée de Mai Nature Reserve. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Vallée de Mai Nature Reserve

SITE INFORMATION

Country:
Seychelles
Inscribed in: 1983
Criteria:
(vii) (viii) (ix) (x)

Site description:
In the heart of the small island of Praslin, the reserve has the vestiges of a natural palm forest preserved in almost its original state. The famouscoco de mer, from a palm-tree once believed to grow in the depths of the sea, is the largest seed in the plant kingdom. © UNESCO

SUMMARY

2017 Conservation Outlook

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 and 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. The National Government and the managing agency are implementing targeted conservation measures and aim to tighten law and legislation to protect the species, which include an increase in penalty for poaching of coco de mer nuts.
Current priorities for the Nature Reserve include continuation and expansion of the outreach and education programme; finalizing a fire contingency plan; promoting an increase in the size and connectivity of Vallée de Mai within the Praslin Island landscape, with a legally designated buffer zone; increasing anti-poaching; and continuing to control the harvesting of coco de mer seeds while expanding a programme of replanting seedlings.
The site's monitoring programme requires urgent improvement to ensure (a) effective monitoring of key values before, during and after Invasive Alien Species control; (b) fully functioning databases and developed protocols. Invasive Alien Species management has been mainstreamed in the site management, and an emergency action plan has been put in place to control and manage the invasion by yellow crazy ants.

Current state and trend of VALUES

Low Concern
Trend: Stable

The overall values of Vallee 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 (Lodoicea maldivica), 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

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

Mostly 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 appears to have had a positive effect, but a thorough

assessment is required.

FULL ASSESSMENT

Description of values

Values

World Heritage values

► **Scenic palm forest**
Criterion:(vii)

The site 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 (World Heritage Committee, 2010).

► **An oustanding example of an ancient monodominant ecosystem**
Criterion:(viii)

The site is an oustanding example of a very old, monodominant ecosystem (Edwards et al., 2015), and supports several species that have adapted to the unusual environment provided by the dominant tree, the coco de mer, which produces the largest seed in the plant kingdom. It is probable that this is the oldest monodominant forest in the world, and shows the greatest range of adapted species. Such monodominance is usually interpreted as the end-point of a successional process (Hart et al., 1989). The survival of this ecosystem is probably due to it being on an island, since it would almost certainly have been replaced by faster growing species on the continental mainland.

►

An outstanding example of biological evolution dominated by endemic palms

Criterion:(ix)

The site represents an outstanding example of biological evolution dominated by endemic palms. The site's low and intermediate-altitude palm forest is characteristic of the Seychelles and is preserved as something resembling its primeval state. The forest is dominated by the coco de mer Lodoicea maldivica but there are also five other endemic species of palms. Located on the granitic island of Praslin, the Vallée de Mai is the only area in the Seychelles where all six species occur together and no other island in the Indian Ocean possesses the combination of features displayed at the site. The ancient palms form a dense forest, along with Pandanus screw palms and broadleaf trees, which together constitute an ecosystem where unique ecological processes and interactions of nutrient cycling, seed dispersal and pollination occur (World Heritage Committee, 2010).

► Endemic palm species

Criterion:(x)

The Vallée de Mai is the world’s stronghold for the endemic coco de mer (Lodoicea maldivica, EN). In addition, the endemic palm species millionaire’s salad (Deckenia nobilis, VU), thief palm (Phoenicophorium borsigianum, LC), Seychelles stilt palm (Verschaffeltia splendida, NT), latanier millepattes palm (Nephrosperma vanhoutteanum, LC) and latanier palm (Roscheria melanochaetes, NT), are also found at the site (World Heritage Committee, 2010).

► Endemic animal species supported by the palm habitat

Criterion:(x)

The palm forest has been highly altered by past use (Vesey-Fitzgerald, 1940), but still provides a refuge for viable populations of many endemic species, some of them only to be found in the palm habitat. These include three endemic species of bronze gecko, endemic blue pigeons, bulbuls, sunbirds, swiftlets, Seychelles skinks, burrowing skinks, tiger chameleons, day geckos, caecilians, tree frogs, freshwater fish and many invertebrates (World Heritage Committee, 2010). The Seychelles black parrot (Coracopsis barklyi, VU), recently identified as a distinct species, is restricted to Praslin Island and

totally dependent on the Vallée de Mai and surrounding palm forest (BirdLife International, 2016).

Other important biodiversity values

► Other important biodiversity values

Vallee de Mai lies within a Conservation International-designated Conservation Hotspot, a WWF Global 200 Eco-region, a WWF/IUCN Centre of Plant Diversity and is one of the world's Important Bird Areas (UNEP-WCMC, 2011).

Assessment information

Threats

Current Threats

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 programme, it cannot be promoted openly to better engage staff due to the risk of poaching. The illegal collection of coco de mer nuts substantially reduces natural regeneration. The invasive yellow crazy ant (Anoplolepis gracilipes) is a serious threat to the site's endemic fauna such as the Seychelles black parrot (Coracopsis barklyi).

► Logging/ Wood Harvesting

High Threat
Inside site, throughout(>50%)
Outside site

Coco der mer nuts were previously heavily exploited in Vallée de Mai, and it was clear that harvesting at those levels could not be maintained indefinitely.

It was recommended that a set of sustainable harvesting and replanting strategies should be implemented to increase the regeneration rate and long-term sustainability of the site (Rist et al., 2010; Fleischer-Dogley et al., 2011). Based on these recommendations, SIF has initiated an incentive-driven stewardship scheme to ensure that a minimum number of nuts remain in the forest. Poaching of coco de mer nuts has now substantially decreased due to increased surveillance but it remains a long-term threat to the integrity of the property (Confidential consultation, 2017).

► Roads/ Railroads

Data Deficient
Outside site

The main Praslin road passes through the Praslin National Park, adjacent to the Vallée de Mai. The effects of disturbance and noise on the site's fauna are unknown.

► Invasive Non-Native/ Alien Species

High Threat
Inside site, throughout(>50%)
Outside site

The threat of invasive alien species is high in the site since they can lead to changes in species composition and habitats (Ketterer, 2010). Although this threat has decreased in terms of invasive plant species (which have been controlled for the last three years with excellent progress made in removing several invasive plant species entirely from the site and a biosecurity plan developed), the threat from invasive animals has substantially increased, with the expansion of the highly invasive yellow crazy ant Anoplolepis gracilipes, which now covers more than 70% of the site (IUCN World Heritage Consultation). The number and abundance of several endemic arboreal species was lower in invaded areas (Kaiser-Bunbury et al., 2014b), and there are also indications that yellow crazy ants have started to impact upon black parrot nests for the first time this breeding season, and threaten much of the native biodiversity of the site. Rats remain a problem and tenrecs pose a threat to the ground fauna (Management Authority consultation).

► Tourism/ visitors/ recreation

Data Deficient

Inside site, localised(<5%)

Tourism numbers are increasing annually at this small site (SIF 2009, unpubl. report), and although tourism management is conducted (via paths and guided tours and off-peak activities), the impacts of 100,000 tourists a year in a 19.5-ha site need effective management. So far the trail infrastructure has been improved substantially to limit erosion of trails. It is also important to monitor noise levels, and disturbance to black parrot nests to better understand possible impacts (Management Authority consultation).

► Poaching

High Threat
Inside site, extent of threat not known
Outside site

Illegal collection of coco de mer nuts in Vallée de Mai has begun in recent years due to the high value of its nuts and kernels. Poachers often climb the palms and cut off all infructescences with mature and immature nuts, an impact which appears to negatively affect reproduction in female trees for up to 3–5 years (Rist et al., 2010). Poaching primarily targets the kernel of both mature nuts, sold as an aphrodisiac in the Chinese medicine market, and of immature nuts, as a delicacy for local consumption (Kaiser-Bunbury et al., 2014a). The illegal collection of coco de mer nuts has substantially decreased due to increased surveillance by the management authority (Seychelles Islands Foundation), but remains a long-term threat to the integrity of the site (Confidential consultation, 2017).

► Other Activities

Data Deficient
Inside site, extent of threat not known

The thick palm leaf litter of the Vallée de Mai is a hugely important part of the ecosystem and trampling/disturbance of this substrate is likely to have unpredictable effects on leaf litter fauna and possibly also nutrient recycling. Walking off-path through the Vallée de Mai by staff is controlled. More work needs to be done to raise awareness of and limit these impacts (Confidential consultation, 2017).

Potential Threats

High Threat

Forest fire is a high threat which can lead to loss of habitats and potential loss of the largest coco de mer population. The new and improved fire prevention and response plan needs to be implemented urgently, for the site to be able to respond to any break-out of fire.

► Fire/ Fire Suppression

High Threat
Inside site, throughout(>50%)

There is a high volume of fallen dry leaves from the palms in the site (a natural part of the ecosystem), thus the fire hazard is high. The risk is exacerbated by the public road crossing through the middle of the Praslin National Park which is adjacent to the site. Forest fire is a high threat which can lead to loss of habitats and potential loss of the largest coco de mer population. A firebreak around the perimeter of the site is maintained. An improved fire prevention and response plan has been developed in collaboration with the local fire brigade and is in internal review, and several fire drills have been organised. However, the final fire contingency plan needs to be implemented urgently, for the site to be able to respond to any break-out of fire.

Protection and management

Assessing Protection and Management

► Relationships with local people

Highly Effective

There are no residents inside or adjacent to the site due to the fact that the site is within the bigger 300 ha Praslin National Park (Seychelles, 2001). The site has good relationships with local people living on Praslin Island, and admission is free for local residents. Excellent education, communication and outreach programmes are implemented included annual holiday camps,

information days and competitions for local school children, guided tours, and open days to raise awareness of coco de mer poaching, as well as using the visitor centre as an educational interaction with local people. However, cooperation with the private sector, especially tour guides based at the site, is not satisfactory and their potential to assist with policing of the site and visitors is untapped despite the increasing numbers of tourists.

► Legal framework

Highly Effective

The property is embedded within the Praslin National Park (300 ha). The property is legally protected under national legislation and is managed by a public trust, the Seychelles Islands Foundation (World Heritage Committee, 2010). An adequate legal framework for the maintenance of the Outstanding Universal Value including conditions of Integrity of the World Heritage property exists.

► Enforcement

Data Deficient

Poaching of coco de mer nuts is still a big problem, and increased patrolling to deter poachers would be beneficial if more resources were available.

► Integration into regional and national planning systems

Highly Effective

The site is fully integrated and the whole of the reserve is mapped as a sensitive zone, which is legalised int the Environment Protection Act 1994. The site is additionally fully recognised and protected as a water catchment area.

► Management system

Some Concern

The Vallée de Mai (19.5 ha) was declared a nature reserve in 1966 to protect the coco de mer. It was declared a World Heritage site in 1983 and the Seychelles Island Foundation has been responsible for its management since 1989 (Birdlife, 2013). The last management plan, adopted in 2002, was based on a management effectiveness assessment, with the time-frame until

2008 (SIF, 2008), but is now outdated. There is coordination between a range of administrative bodies/levels involved in the management of the property, which has seen an improvement. The CEO of the Sychelles National Parks Authority is a trustee of the board of the Seychelles Islands Foundation. Local communities have some input into discussions relating to management but no direct role in management.

► Management effectiveness

Mostly Effective

Although the management plan has expired, it was identified that management decisions are successfully going towards preserving and improving upon the site values. However, several gaps were identified which need to be addressed, including improved visitor management (particularly during peak times), and the data management system. Most important is, however, the compilation of a new Management Plan to steer management, measure progress and to build the basic structure of the follow-up actions identified (Ketterer, 2010). SIF now runs extensive education and outreach campaigns (Kaiser-Bunbury et al., 2014a), and a large number of scientific research programs have recently been carried out/are currently being carried out at the site. Invasive Alien Species management has been mainstreamed in the site management.

► Implementation of Committee decisions and recommendations

Mostly Effective

Capacity-building has substantially increased – a research team has been established and is led by a local graduate. Scientific research has greatly improved at the site - SIF carries out long-term research programs on-site, as well as collaborating with other universities and research bodies. Computer facilities are now available on-site. Educational programs and public participation have further improved. The extension to the property (Fond Peper area) has now been implemented. However, at the time of inscription, the Committee requested the State Party to extend the boundary of the property to include the whole of Praslin National Park (300 ha) and this has not yet been met.

► Boundaries

Mostly Effective

The current delimitation of the property is thought to be adequate. Nevertheless, an extension of the reserve area to help curb coco de mer poaching in the immediate vicinity of the Reserve was recommended (Periodic Reporting, 2001). The extension to the property (Fond Peper area) has now been implemented, and boundary clarification adopted by the Committee in 2017. However, the boundary has been requested by the Committee to be extended to include the whole of Praslin National Park in order to ensure the natural functioning of the forest ecosystem and its integrity, and this has not been implemented.

► Sustainable finance

Mostly Effective

The available budget is sufficient but further funding would enable more effective management to international best practice standard. The existing sources of funding are secure in the medium-term and planning is underway to secure funding in the long-term. Tourism provides the major sources of revenue, and the site is self-sustaining (Periodic Reporting, 2001).

► Staff training and development

Mostly Effective

A range of human resources exist, but these are below optimum to manage the World Heritage Property. Training has greatly improved at the site. A capacity development plan is in place and partially implemented; technical skills are being transferred from external staff to those managing the property locally. Responsibilities have been transferred to local rangers, university graduates involved in scientific monitoring, management and human resources. Support is given to local staff to complete training and education abroad, temporarily, as well as ecological, natural history and statistical training on-site. However, the site is somewhat in competition with the tourism industry for skilled staff, and tourism generally provides better employment conditions.

► Sustainable use

Data Deficient

Coco de mer nuts are harvested on-site for sale due to their high value. It was previously overharvested, with 99% of nuts taken out of the site, with only a handful left to germinate. Rist et al. (2010) suggested that 20% of nuts should be left in the forest to regenerate, to move towards sustainable management of the most iconic and flagship species, the national symbol of Seychelles. In response, a stewardship scheme commenced in 2012, whereby a greater proportion of nuts are left to regenerate in the forest (Kaiser-Bunbury et al., 2014a). The effectiveness of the scheme has been reviewed and the recommendations are being considered. Other pressures such as from illegal harvesting to fill demand for coco de mer kernel represent significant additional threats (Rist et al., 2010). The extent of poaching across the Vallée de Mai and adjacent palm forest area needs to be assessed.

► Education and interpretation programs

Highly Effective

An outreach programme was initiated in 2009 (Friends of Vallée de Mai) which aims to bring all local schoolchildren to the Vallée de Mai to experience the site and learn about its values. SIF holds regular education and outreach events including annual camps, information days and competitions for local school children, guided tours, and open days to raise awareness of coco de mer poaching. A community stewardship scheme was launched in 2014 to promote the protection of palm forest, and the importance of tackling invasive alien species. The visitor centre ensures that education and awareness is a substantial part of the activities there.

► Tourism and visitation management

Mostly Effective

There is an average understanding and promotion of the site values in local and national tourism policies. There is limited co-operation between those responsible for the World Heritage property and the tourism industry to present the Outstanding Universal Value and increase appreciation. A visitor fee is collected and makes a substantial contribution to the management of

the World Heritage property. Visitor services and facilities meet standards of design and safety, and are appropriate for the character and values of the protected area. However, the increasing numbers of visitors at the site will require management of visitor flow to reduce number of visitors during peak hours, which is mainly linked to transport availability. Regular patrolling is carried out to monitor and minimise impact of visitors, but there is potential for cooperation with private tour guides based at the site to assist with policing. A visitor management strategy should be developed, especially since the site is highly dependent on the fees collected.

► Monitoring

Mostly Effective

A management effectiveness assessment has been conducted, but staffing was not sufficient to ensure that all baseline information for key indicators is available. A phenology programme was started in 2008 to collect long-term data on plant species at the Vallée de Mai. In 2009 SIF launched a long-term monitoring and research programme. This has focused on the Seychelles black parrot, sooglossid frogs, giant bronze gecko and Seychelles chameleon. The coco de mer long-term monitoring programme focuses on growth and reproductive patterns. However, improvements need to be made to the Vallée de Mai's monitoring programme to ensure (a) effective monitoring of key values before, during and after Invasive Alien Species control; (b) fully functioning databases and developed protocols. Analysis of existing data is required, e.g. on phenology, and possible links to fluctuating breeding activity of black parrots.

► Research

Mostly Effective

Knowledge about the values of the World Heritage property is good for most key areas but there are gaps. Research into and control of yellow crazy ants is urgent, and an emergency situation has been declared by the board and external funding has been secured to control and manage the invasion. Also required are: a re-survey of the permanent plots at the Vallée de Mai to examine long-term vegetation trends, and re-surveys of black parrot and mynah bird populations (2017/2018). There are several research programmes related to the site (SIF, 2013), and research results are widely

shared locally, nationally and internationally.

Overall assessment of protection and management

Mostly 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 appears to have had a positive effect, but a thorough assessment is required.

▶ Assessment of the effectiveness of protection and management in addressing threats outside the site

Mostly Effective

SIF, as well as being responsible for the Vallée de Mai, is responsible for the adjacent area of the Praslin National Park, Fond Peper. Coco de mer nuts are also commercially harvested from this area so a regeneration scheme in Fond Peper is being implemented though there is a greater difficulty in patrolling this larger area of forest.

▶ Best practice examples

The site offers one excellent example of best practice in conservation financing. The revenues from tourism fully fund the core management and protection of both UNESCO World Heritage Sites managed by SIF (Vallée de Mai and Aldabra Atoll), as well as benefiting local business and the community. The site also has a very effective education and outreach programme that involves and benefits the local community.

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ **Scenic palm forest**

Good
Trend:Stable

The site remains a stable haven for many endemic and native species of fauna and flora. It has maintained its aesthetic, beautiful character as a remarkable and accessible example of a palm forest ecosystem (Ketterer, 2010).

▶ **An oustanding example of an ancient monodominant ecosystem**

Good
Trend:Stable

The site continues to support several unique species that have adapted to the unusual monodominant environment provided by the coco de mer forest (Edwards et al., 2015).

▶ **An outstanding example of biological evolution dominated by endemic palms**

High Concern
Trend:Stable

The palm species found in the area together constitute an ecosystem where unique ecological processes and interations continue to occur. However, the key iconic species of the site, the coco de mer, is under threat due to, illegal collection of nuts and its inability to regenerate naturally (Rist et al., 2010). With the implementation of the regeneration scheme 50% of the nuts are left in the forest.

▶ **Endemic palm species**

Good
Trend:Improving

The endemic coco de mer Lodoicea maldivica, and other rare palms, including five other endemic species, continue to be preserved as an outstanding example of ancient palm forest (Ketterer, 2010). This is the only site where these species co-exist and is one of the best preserved examples of palm forest globally (Rist et al., 2010). A recent re-survey of the permanent sample plots have indicated an increase in palm density.

► **Endemic animal species supported by the palm habitat**

Good

Trend:Stable

The small site remains a stable haven for many endemic and native species of fauna. Black parrots (Coracopsis barklyi) are probably the most important avian flagship species of the Vallée de Mai and the Vallée is thought to form the population's stronghold. The parrot population in 2013 was estimated to be around 520-900 individuals (Reuleux et al., 2013).

Summary of the Values

► **Assessment of the current state and trend of World Heritage values**

Low Concern

Trend: Stable

The overall values of Vallee 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 (Lodoicea maldivica), 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.

Additional information

Benefits

Understanding Benefits

► Outdoor recreation and tourism

Vallée de Mai is visited by the majority of tourists that come to Seychelles and is a major tourist attraction for the country as a whole (SIF, 2009).

► Importance for research

The scientific value of the Vallée de Mai ’s ancient palm forest ecosystem is substantial – it is an important area for scientific research into palm forest ecology, ecosystem functioning, evolutionary processes and new species discovery. Vallée de Mai serves as a training platform for young Seychellois scientists and environmentalists as they can be involved in international research and receive strong training in scientific methods, ecological monitoring, and natural history. They have opportunities to get involved in many types of monitoring and research and in all aspects from designing studies, collecting data in the field, to entering data. Many local and international university students carry out their research at Vallée de Mai annually.

► Contribution to education

The Vallée de Mai is now a major platform for education and outreach on Praslin and in Seychelles, with a continuous intensive programme for schoolchildren and other groups to learn about the natural environment, sustainability and the importance of Vallée de Mai in conservation of those endemic species, especially the unique coco de mer.

► Soil stabilisation

Vallée de Mai’s forest provides the stability for the soil on Praslin Island as it is situated on the hillside of the island.

► Water provision (importance for water quantity and quality)

Vallée de Mai provides important watershed protection services for water retention and holding capacity which bring benefits directly to the local

population. The stream ecosystem within the site is also an important habitat for endemic freshwater species such as the Seychelles crayfish.

► Provision of jobs

The site provides jobs and important sources of direct income (via selling of merchandise, cafeteria products, guided tours) to the Praslinois population.

► Tourism-related income

The site is an essential source of indirect income from tourism on Praslin, in terms of attracting tourists (many of whom would otherwise not visit the island or spend less time there; SIF, 2009) who then require accommodation, food & provisions, transport and other services.

► Sacred or symbolic plants or animals

The biodiversity of the site serves as a symbol and icon for the country and the tourism industry (coco de mer, ancient, monodominant palm forest). The site is also the stronghold site for the national bird, the black parrot and several other endemic species.

► Natural beauty and scenery

The property is a scenically attractive area with a distinctive natural beauty (SoOUV, 2010).

Summary of benefits

Vallée de Mai is the most visited natural attraction in the Seychelles. The revenue from tourism has brought direct financial benefits for the conservation and management of the area. Income from entrance fees and sale of coco de mer nuts has enabled Seychelles Island Foundation, the management authority of Vallée de Mai, to carry out conservation and protection work on the site (SIF Annual Report, 2008). The site delivers direct key benefits associated with higher tourist numbers to the Praslinois (the local population on Praslin). A recent internal report by SIF identified large economic benefits to the Praslinois population as a direct result of the presence of the site on Praslin (SIF, 2009). The site directly provides jobs and sources of income to the Praslinois

population, as well as indirectly supplying income from tourism.
The Vallée de Mai is the finest remaining representation of a once dominating habitat on Praslin (coco de mer also grows more sparsely on Curieuse Island), providing a cultural and scientific base-line for a close-to-natural state of a once dominating habitat type and its associated fauna. One important benefit of the Vallée de Mai ecosystem is the delivery of ecosystem services (e.g. little soil erosion within the site, intact watershed dynamics of water retention and holding capacity) which directly benefits the Praslinois people.
From a more regional and global perspective, the protection and preservation of the Vallée de Mai is of scientific and cultural importance. Much scientific insight has been generated by understanding ecological and evolutionary processes of this ancient palm forest. From a cultural point of view, the Vallée de Mai forest has been depicted on thousands of paintings and provided inspiration of much craftwork, for both of which exists a high demand globally.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	Seychelles Island Foundation (SIF)		Ecology, genetics and conservation of the Seychelles black parrot: long-term research programme into the endemic Seychelles black parrot including population monitoring, breeding monitoring, blood sample collection for genetics, disease research and sexing, feeding ecology, and habitat suitablility surveys on other islands. Project has included four MSc theses to date. Results published internationally (Reuleaux et al., 2013; Reuleaux et al., 2014a; Reuleaux et al., 2014b). Recently elevated to full species status (Jackson et al., 2016).
2	SIF		Life history and reproductive ecology of coco de mer: project aims to unravel the elusive reproductive system and life history of the coco de mer including identification of the main pollinator, determining growth rates, reproductive success and variation, and investigating age and longevity. The nutrient economy of the coco de mer was also studied (Edwards et al., 2015).

№	Organization/ individuals	Project duration	Brief description of Active Projects
3	SIF/ETH Zurich		Demographic and genetic processes underlying reproduction in Lodoicea maldivica, the largest-seeded plant in the world: PhD research carried out by student Emma Morgan, based at ETH Zurich, investigating genetic processes, genetic variation, seed and pollen dispersal, reproduction and genetic sex determination of coco de mer palms. Results published internationally (Morgan et al., 2016; Morgan et al., 2017).
4	DICE/ NHM/ local partners		A cutting-EDGE approach to saving Seychelles' globally unique biodiversity: a multi-partner project focusing on research and conservation of the Seychelles EDGE species (Sooglossid frogs, caecilians, sheath-tailed bats, black parrots, corals).
5	SIF/Durrell Institute of Conservation and Ecology (DICE)		Amphibians on the EDGE: evolutionary relationships and conservation ecology of sooglossid frogs (Sooglossus sp): PhD research carried out by student Jim Labisko based at DICE, University of Kent, UK, looking at ecology, genetics, vocalisations, pathogens and IAS impacts on this endemic frog family (continuation of Mres research).
6	SIF/Natural History Museum, UK		Phylogeographic patterns and systematics of Seychelles caecilians: PhD research carried out by student Simon Maddock. Results published internationally (Maddock et al., 2016).
7	SIF		Monitoring and control of yellow crazy ant distribution patterns across the site. Project aims to understand and control the threat by the recent invasion of this species, which now covers 70% of the site. Results published internationally (Kaiser-Bunbury et al., 2014b).
8	SIF/Durrell Wildlife Conservation Trust		Giant bronze gecko (Ailuronyx trachygaster) movement patterns at the Vallée de Mai. The gecko species is one of the largest in the world, and is endemic to the native palm forest of Praslin. Research is ongoing, looking into territory size and movements, and whether individual geckos move frequently between coco de mer adult trees. Project has included two MSc theses to date.
9	University of Vigo		The evolutionary history and geographic structure of the endemic Seychelles and Wright’s skinks (Trachylepis sechellensis and T. wrightii respectively) across the Seychelles inner islands: research carried out by Dr Sara Rocha. Results published internationally (Rocha et al., 2016).
10	SIF		Coco de mer regeneration scheme. Incentive-driven stewardship scheme to reduce commercial harvesting via increased seed planting and monitoring.

№	Organization/ individuals	Project duration	Brief description of Active Projects
11	SIF		Pioneering a holistic approach in managing invasive species in protected areas and testing it in the Vallée de Mai UNESCO World Heritage site, funded by IUCN

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	SIF and university partner	Strengthening community and site custodian capacity for disaster preparedness and response including forest fires, to enhance the protection of the Vallée de Mai. Project aims to build a public sense of responsibility for the VdM via community-led emergency response and fire management training and capacity building.	
2	Assessment of poaching	The effects of poaching across the Vallée de Mai and adjacent palm forest area (including Fond Peper) are not fully known.	
3	Research on endemic reptiles	Endemic reptiles - no baseline data on abundance or density exists for the reptiles, which include 15 endemic species, three of which are endemic to palm forest. SIF will be developing and implementing a reptile monitoring programme in 2017 to collect data on these species. Several reptile species are likely to be threatened by the increasing yellow crazy ant and rat populations.	
4	Research on endemic amphibians	Endemic amphibians – unknown status (as above) – this group includes two endemic frog species (one of which is endemic to Praslin) and several caecilian species.	
5	Research on endemic invertebrates	Endemic invertebrates – unknown status – the invertebrates of the site have not been well studied and monitoring needs to be put in place to assess the effects of invasive species. It has been shown that endemic arboreal snails and slugs are largely absent from areas that are infested with yellow crazy ants so the spread of these ants is of major concern to these species and their ecosystem functions.	

№	Site need title	Brief description of potential site needs	Support needed for following years
6	Research on freshwater streams	Freshwater streams and biodiversity - unknown status.	
7	Research on leaf litter	Leaf litter – unknown status - the thick palm leaf litter of the site is a hugely important part of the ecosystem and trampling/disturbance of this substrate is likely to have unpredictable effects on leaf litter fauna and possibly also nutrient recycling.	

REFERENCES

№	References
1	BirdLife International. (2013). Important Bird Areas factsheet: Praslin National Park and surrounding areas.
2	Edwards, P.J., Fleischer-Dogley, F. and Kaiser-Bunbury, C.N. (2015). 'The nutrient economy of Lodoicea maldivica, a monodominant palm producing the world’s largest seed'. New Phytologist 206:990–999.
3	Fleischer-Dogley, F., Kettle, C.J., Edwards, P.J., Ghazoul, J., Määttänen, K. and Kaiser-Bunbury, C.N. (2011). 'Morphological and genetic differentiation in populations of the dispersal-limited coco de mer (Lodoicea maldivica): implications for management and conservation'. Diversity and Distributions 17:235–243.
4	Hart, T.B., Hart, J.A. and Murphy, P.G. (1989). 'Monodominant and species-rich forests of the humid tropics: causes for their co-occurrence'. The American Naturalist 133:613–633.
5	Jackson, H. A., Bunbury, N., Przelomska, N. and Groombridge, J.J. (2016). 'Evolutionary distinctiveness and historical decline in genetic diversity in the Seychelles Black Parrot Coracopsis nigra barklyi'. Ibis 158:380–394.
6	Kaiser-Bunbury C.N., Fleischer-Dogley F., Dogley D., and Bunbury N. (2014a). 'Scientists’ responsibilities towards evidence-based conservation in a Small Island Developing State'. Journal of Applied Ecology 52:7–11.
7	Kaiser-Bunbury, C.N., Cuthbert, H., Fox, R., Birch, D. and Bunbury, N. (2014b). 'Invasion of yellow crazy ant Anoplolepis gracilipes in a Seychelles UNESCO palm forest'. Neobiota 22:43–57.
8	Ketterer, L. (2010). Management Effectiveness Assessment UNESCO Natural World Heritage Site Vallée de Mai.
9	Maddock, S.T., Briscoe, A.G., Wilkinson, M., Waeschenbach, A., San Mauro, D., Day, J.J., Littlewood, D.T.J., Foster, P.G., Nussbaum, R.A. and Gower, D.J. (2016). 'Next-generation mitogenomics: a comparison of approaches applied to caecilian amphibian phylogeny'. PLOSone 11:e0156757.
10	Morgan, E.J., Kaiser-Bunbury, C.N., Edwards, P. J., Fleischer-Dogley, F. and Kettle, C.J. (2017). 'Keeping it in the family: genetic implications of limited seed dispersal for the dioecious palm Lodoicea maldivica, the largest-seeded plant in the world'. Conservation Genetics doi:10.1007/s10592-017-0982-2.

№	References
11	Morgan, E.J., Määttänen, K., Kaiser-Bunbury, C.N., Buser, A., Fleischer-Dogley, F. and Kettle, C.J. (2016). 'Development of 12 polymorphic microsatellite loci for the endangered Seychelles palm Lodoicea maldivica (Arecaceae)'. Applications in Plant Sciences 4:1500119.
12	Reuleaux, A., Bunbury, N., Villard, P. and Waltert, M. (2013). 'Status, distribution and recommendations for monitoring of the Seychelles black parrot Coracopsis (nigra) barklyi'. Oryx 47:561–568.
13	Reuleaux, A., Richards, H., Payet, T., Villard, P., Waltert, M. and Bunbury, N. (2014a). 'Breeding ecology of the Seychelles Black Parrot Coracopsis barklyi'. Ostrich 85:255–265.
14	Reuleaux, A., Richards, H., Payet, T., Villard, P., Waltert, M. and Bunbury, N. (2014b). 'Insights into the feeding ecology of the Seychelles Black Parrot Coracopsis barklyi using two monitoring approaches'. Ostrich 85:245–253.
15	Rist, L., Kaiser-Bunbury C.N., Fleischer-Dogley, F., Edwards, P., Bunbury, N. and Ghazoul, J. (2010). 'Sustainable harvesting of coco de mer, Lodoicea maldivica, in the Vallée de Mai, Seychelles'. Forest Ecology and Management 260:2224–2231.
16	Rocha, S., Perera, A., Silva, A. and Posada, D. (2016). 'Evolutionary history of Trachylepis skinks in the Seychelles islands: introgressive hybridization, morphological evolution and geographic structure'. Biological Journal of the Linnean Society 119:15–36.
17	SIF. (2009). Unpublished report: tourism survey report.
18	Seychelles Island Foundation Annual Report 2008.
19	Seychelles Island Foundation Annual Report 2013
20	Seychelles Island Foundation’s website www.sif.sc.
21	Seychelles Islands Foundation (Ed.) (2001): Vallée de Mai Management Plan: A Management Plan for Vallée de Mai Natural World Heritage Site. 2002-2008.
22	State Party of the Seychelles (2010) Periodic Report Second Cycle Section II: Vallée de Mai Nature Reserve. Paris, France: UNESCO World Heritage Centre.
23	Taylor, M., Bunbury N., Chong-Seng, L., Doak, N., Kundu, S., Griffiths, R. and Groombridge, J. (2012). 'Evidence for evolutionary distinctiveness of a newly discovered population of sooglossid frogs on Praslin Island, Seychelles'. Conservation Genetics 13:557–566.
24	Vesey-Fitzgerald, D. (1940). 'On the vegetation of Seychelles'. Journal of Ecology 28:465–483.

№	References
25	World Heritage Committee (2010) Decision 34 COM 8E. Vallée de Mai Nature Reserve (Seychelles) Statement of Outstanding Universal Value. .