

# 2014 ANNUAL REPORT







Fotonatura



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# Message from SIF's CEO



The work of the Seychelles Islands Foundation (SIF) has greatly diversified over the last few years. The days when we simply provided access to visitors so they could experience one of the best natural 'Jurassic Parks' in the world, are behind us. In 2014, alongside the increase of international arrivals to Seychelles, the visitor number record has been broken once again. The Vallée de Mai team welcomed just below 87,000 visitors, who were greeted and provided with up-to-date information via an innovative electronic application even before visiting the site. Today the visitor centre not only serves our visitors but provides the local community with a platform to generate their own revenue by offering direct services and supplying our café, souvenir shop and operations.

What has not changed is that the protection, conservation and research of Seychelles' UNESCO World Heritage sites remains at the core of all of SIF's work. In 2014 this work and the results of our efforts were recognized by the International Union for the Conservation of Nature (IUCN), with both sites being rated as 'highly effectively managed' with a 'positive conservation outlook'. The concerns raised by IUCN are linked to the intensified threats that both sites are exposed to.

It is only with your support, funding, collaboration and the hard work of a team prepared for hours of walking in harsh terrain, and camping in the midst of mosquitos, that re-discoveries can be made, and

that one small bird, the Red-whiskered Bulbul, which poses a threat to Aldabra's birds, can be located and shot. It required several years of sampling, substantial funding, and research collaborators to be secured, for SIF to finally be able to declare the Seychelles Black Parrot an endemic species, the 13<sup>th</sup> official endemic bird species of Seychelles. Endless hours of planning were needed to organise a team to dive and discover an extension of Aldabra's reef which is the same size as 42 football pitches! It is a great deal of work to repeatedly inject 1782 introduced trees with herbicide in the forest, especially when one has to climb over big boulders sometimes to reach a single tree. There are many hours spent behind desks or in meetings, driving, fixing broken engines and boats, resolving equipment problems, cleaning, cooking and serving, and doing many other tasks that are not mentioned in our annual reports, but they form the backbone of all of SIF's work so that the results you will read about in the next pages could be achieved.

Finally it must be recognised that the unwavering support of the government, strategic guidance of the board and efforts of our collaborators and the high interest of civil society has much contributed to our success in 2014.

Dr Frauke Fleischer-Dogley, CEO

# 2014 highlights

A brief summary of SIF's milestones and achievements in the past year. More details can be found in the report.



- The unexpected rediscovery of the Aldabra Banded Snail (*Rachistia aldabrae*) on Malabar Island at Aldabra, after being declared extinct in 2007, was a highlight of the year.
- After five years of intensive research by SIF and collaborators, taxonomic experts at Birdlife International finally recognised the Seychelles Black Parrot as a distinct endemic species, *Coracopsis barklyi*, bringing the number of endemic birds in Seychelles to 13.
- Following an intensive 3-year eradication project, the last introduced Red-whiskered Bulbul was culled on Assumption Island, removing this threat to Aldabra's native avifauna, and eradicating this invasive species from Seychelles as a whole.
- The Vallée de Mai continued its record-breaking trend with a new annual record of 86,985 visitors in 2014. This increasing number is a credit to the hard work and determination of the Vallée de Mai and SIF team.
- Aldabra secured its fourth international conservation designation and has become a recognised site in the Indian Ocean South East Asia (IOSEA) Marine Turtle Site Network.
- Aldabra and the Vallée de Mai were both listed with a positive conservation outlook, 'Good with some concerns', and as highly effectively managed in a new IUCN World Heritage Outlook report released this year.
- Under a GEF-funded project an outer reef map for Aldabra was completed, which will assist in the proposal to expand the Aldabra Marine Protected Area.
- A stewardship scheme was established with the community of Praslin to maintain an area of land near the Vallée de Mai free from invasive plant species.
- The eradication of the Ring-necked Parakeet from Mahé made impressive progress with at least 80% of the birds removed by the end of the year.
- A total of 1782 introduced trees were controlled in the Vallée de Mai in a major step towards creating an introduced plant free palm forest.
- The realisation of the Aldabra House project made significant progress with world renowned Marks Barfield Architects fighting off stiff competition to win the opportunity to lead and design this world class project.
- The visitor experience at the Vallée de Mai was improved with the installation of new information panels at the visitor centre and in the forest, and a new free visitor guide.
- SIF furthered its digital presence by launching a Twitter and Youtube page.
- The first study to exclusively focus on the movement of the endemic Giant Bronze Gecko was started in the Vallée de Mai.
- At the seminal IUCN World Parks Congress in Sydney, Aldabra Atoll featured prominently in a new film on Marine World Heritage that premiered at the Congress. Narrated by UN Goodwill Ambassador Gisele Bündchen, the film tells the story of some of the major conservation achievements at three of the 47 Marine World Heritage sites.
- Five scientific peer-reviewed papers were published on the Vallée de Mai and Aldabra with two others in press.

Aldabra Banded Snail





# Staff changes and new positions

## Administration and Human Resources Officer

**Bernadette Julie** joined the Head Office administration team this year and brought with her a wealth of experience in human resource management and administration. Bernadette is well versed with the issues that staff and management face working in the environment sector, after starting her career in the Department of Environment more than two decades ago. In particular, her recent experience at the Seychelles Fishing Authority should be beneficial to the staff on Aldabra where the remoteness of the atoll and its logistical challenges, complicates the planning of recruitment and staff movements.



Bernadette Julie

## Aldabra House Project Coordinator



Christina Quanz

**Christina Quanz** has been working for SIF for several years now, most recently as Project Officer for the Environmental Management System project on Aldabra where she coordinated the set-up of the renewable energy system. After leading this highly successful project, that has revolutionised the operations of Aldabra, Christina was ready for a new challenge. With her extensive knowledge of Aldabra, excellent project management skills, and experience of renewable energies, Christina was the perfect candidate to undertake the role of Project Coordinator in the development of Aldabra House.

## Visitor Services & Sales Officer



Dorothy Victor

**Dorothy Victor** re-joined SIF this year after an extended break. Dorothy previously worked in the accounts department at SIF, where she was responsible for setting up the souvenir shop in the Vallée de Mai. Dorothy has returned but is now working on site to ensure that an excellent service is delivered to all visitors at the Vallée de Mai. She is also researching ways to increase revenue collection at the Vallée de Mai, which should help us to implement more of our research projects and ensure continued protection of Seychelles' two World Heritage Sites.



Laurent Leite

## Ring-necked Parakeet eradication Team Leader

The Ring-necked Parakeet eradication team welcomed a new Team Leader in 2014. **Laurent Leite** originally joined SIF in 2013 when he was employed as an Invasive Species Technical Officer (ISTO) on the invasive bird eradication project on Aldabra. After several months on this project and on the Assumption introduced bird eradication project Laurent returned to Mahé and joined the Ring-necked Parakeet team initially as an ISTO. Working on these different projects, Laurent has gained a wealth of experience in invasive bird eradication and was well suited to take on the role of Team Leader to see this project through to its final stages.

# Positive result in first IUCN World Heritage Outlook report

Both Aldabra Atoll and the Vallée de Mai received a positive conservation outlook in the first ever analysis of all 228 natural UNESCO World Heritage Sites by the International Union for the Conservation of Nature (IUCN).

The report is the result of detailed assessments of all 228 natural World Heritage Sites by hundreds of independent experts, and rates the conservation outlook of all of the sites. Sites are divided into four categories: 'Good', 'Good with some concerns', 'Significant concern' and 'Critical'. The Vallée de Mai and Aldabra were both rated as 'Good with some concerns'. These concerns are based on the threats to the sites, and include invasive species (both sites), poaching (Vallée de Mai), fire (Vallée de Mai) and climate change (both sites).

The protection and management of both sites by SIF was assessed as 'Effective' (Vallée de Mai) and 'Highly Effective' (Aldabra Atoll). It was noted that management actions had already been taken to mitigate or remove some of the threats to the sites. Further details on the work undertaken by SIF to remove



and control invasive species, one of the key threats, at the two sites can be found on pages 33 - 45 in this annual report. The IUCN report also found that the Outstanding Universal Values of the two sites, which form the basis for their inscription as World Heritage Sites, were 'stable' and of 'low concern'. SIF's key management objectives include conserving and enhancing these values and it is gratifying to see this reflected in an independent assessment.

Of the 228 sites assessed, 21% have a good conservation outlook, 42% were deemed to be 'good with some concerns', 29% have 'significant concerns' and a further 8% are listed as 'critical', which means they are deemed to be 'severely threatened' and require urgent attention to avoid the loss of their natural value. The report found that invasive species, tourism, poaching, dams and logging are the most pressing threats to World Heritage Sites worldwide, but climate change may soon be the most significant threat. The full report can be accessed at: <http://worldheritageoutlook.iucn.org/>





# The Aldabra Champion

## Professor David Stoddart 1937 – 2014

2014 sadly saw the passing of the eminent scholar Professor David Stoddart. A life-long champion of Aldabra, David was one of the founding fathers of the research station on Picard Island. SIF owes a great deal to his commitment, passion and tireless determination for the protection of Aldabra in the face of adversity.

His legacy will live on, not only through the Professor David Stoddart Scholarship for Seychellois university students, which was established by SIF three years ago, and his many published works that continue to be key references for Aldabra and the Seychelles, but also through the continued protection and conservation success of Aldabra. David was deeply interested not only in Aldabra but Seychelles as a whole, and his book 'Biogeography and Ecology of the Seychelles Islands' remains the definitive publication on the ecology of the country and a highly treasured reference book.



SIF Chairman (centre) Ambassador Maurice Loustau-Lalanne, with David (left) and his wife June (right) in California in 2012

David was a world authority on coral atolls, and a leading figure in coral reef science and conservation. He undertook extensive field work in major reef systems throughout the Caribbean Sea, Pacific and Indian Oceans. Primarily a geographer, David received his PhD in 1964 from the University of Cambridge where he stayed on as lecturer in Geography until 1988. He then moved to the University of California at Berkeley where he was professor of Geography and head of department, positions that he held for the rest of his career until he retired in 2000.

There were numerous achievements in his life but some notable scientific accolades include being the first co-ordinating editor of the international journal Coral Reefs, the driving force behind the establishment of the four-yearly International Coral Reef Symposium, and the first president of the International Society for Reef Studies. These achievements were recognised through several awards, including gold medals from three leading geographical societies, the Darwin medal of the International Society for Reef Studies and the Gregory medal of the Pacific Science Association. He was also appointed an OBE by the Queen of England in 1979.

An indomitable character, David was a passionate man and a force to be reckoned with. Some of those that worked closely with him on Aldabra share some of their memories:

*"A giant for environmental protection and a close friend has sadly left us and I am deeply saddened by this news. His legacy for Seychelles and SIF has been immortalized as we continue to fund one student under the Professor David Stoddart Scholarship at the University of Seychelles."*  
Ambassador Maurice Loustau-Lalanne

*"David Stoddart's epitaph is Aldabra. The Seychelles Islands Foundation continues the legacy."*



*Without him scientific discovery would not have happened and I for one will remember him always as an inspiration that has led me in my career."*

*Professor Ian R. Swingland OBE PhD DSc*

*"It would take a whole volume to tell the tales of David's largely, plant collecting expeditions around the Indian Ocean, some of which I was delighted to share, often with trepidation. We shall not see his like again."*

*Dr Malcolm Coe*

*"His dedication and enthusiasm will be sorely missed, but his contributions to reef and atoll conservation, especially Aldabra, will be an enduring legacy."*

*Dr David Bourn*

*"Fortunately for the good of science and for all the friends and colleagues who had the honour to know him, David.....dedicated himself to science and in particular to a small corner of the Indian Ocean which he knew and loved better than anyone. For that we all owe him an enormous debt of gratitude."*

*Adrian Skerrett*

*"I remember David's dedication to the Aldabra 'cause' – which possibly almost bordered on the fanatical!"*

*Lindsay Chong-Seng*



Above: Professor David Stoddart (front row, third from left) on Aldabra in 2001

Below: David (centre) on his last visit to Aldabra.



# Vallée de Mai Management

The visitor experience at the Vallée de Mai was enhanced this year with a series of new communication and interpretation materials, including a leaflet, maps and information panels. Visitor numbers continued to increase with a new record of 86,985 visitors in 2014. The Coco de Mer regeneration scheme continued with only 358 nuts collected, ensuring

that the harvest of these nuts is sustainable for the regeneration of the palm forest. Sadly the number of Coco de Mer nuts poached increased in 2014 after the decreasing trend of the past few years. Work will continue by SIF and its partners to tackle this issue and reduce this threat to the Coco de Mer.



## Vallée de Mai statistics

2014 was another record-breaking year for the Vallée de Mai with a new high of 86,985 visitors welcomed to this World Heritage Site. This is an increase of 4% from 2013 and is testament to the dedication and hard work of the Vallée de Mai team.

Our visitor attendants took a total of 3,262 people on free guided tours in 2014, a rise of 38% from 2013 when the tours were first introduced. These twice daily tours are growing more popular with our visitors and allow them to gain a much deeper insight and understanding of the forest during their visit. Despite this increase in those taking guided tours (by SIF, local tour operators and private tourist guides based at the Vallée de Mai), half of the tourists that visit are exploring the forest on their own. Therefore the quality and amount of information available to the visitors in the forest needed to be reviewed.



Total number of visitors to the Vallée de Mai from 2001 - 2014





## New interpretation materials

As a result of the need to review the information available to visitors in the forest, a series of new communication and interpretation materials was installed at the Vallée de Mai early in 2014. These materials included a new visitor guide in four languages, and a free electronic brochure that includes information on visitor facilities, how to get there, SIF and an interactive forest guide with details on some of the wildlife that can be encountered during a visit to the forest. This e-brochure is free to download for any smartphone through iTunes or Google Play.

In addition, 15 panels were placed throughout the forest with information on various aspects of the forest ecosystem, such as Coco de Mer, Seychelles Black Parrot, invasive species, and endemic birds of Seychelles. These brightly coloured and easy-to-read panels are in four languages and will enable every visitor to gain a more thorough understanding of the forest and a more fulfilling experience at the Vallée de Mai. There are also two new maps of the visitor centre and forest paths, enabling easier navigation around this World Heritage Site.



Above: The home page of the new Vallée de Mai app.

Below: SIF Visitor Attendant Medina Laboudallon using one of the new information boards.



## Coco de Mer statistics

The number of Coco de Mer nuts harvested for sale as souvenirs from the Vallée de Mai and Fond Peper continued to decrease in 2014 with only 348 nuts collected, 19% less than 2013. In fact no nuts were collected from Fond Peper this year. This decrease is again attributable to the regeneration scheme that was started by SIF in 2012, whereby at least 20% of the nuts are left in the forest to

germinate, so that harvesting is carried out sustainably to ensure the future of the Coco de Mer.

Unfortunately the number of nuts poached from the Vallée de Mai and Fond Peper rose by 71% from 2013, with a total of 228 nuts poached in 2014. The previous few years had seen a decreasing trend in the number of nuts poached. The rise could be attributed to an increased pressure from the illegal trade of the kernel. This is however a worrying trend and SIF will continue to work with the Ministry of Environment, Energy and Climate Change, the Seychelles Police Department and other local partners on Praslin to tackle this important issue. A Coco de Mer task force is planned to be established in 2015 on Praslin, which will unify all of these stakeholders to try and reduce this severe threat to the Coco de Mer.



Total number of Coco de Mer nuts collected for sale in the Vallée de Mai and Fond Peper from 2001 - 2014

# Aldabra Management

Several substantial steps were taken to improve the management of Aldabra in 2014. The progression of the Aldabra House project brings the atoll closer to a long-term sustainable financing mechanism which will facilitate the management of Aldabra. The protection of the ecological integrity of the atoll was strengthened with the development of a biosecurity plan. With parts of this plan already being implemented, it will ultimately safeguard the atoll from the threat of invasive species. The renewable energy system also continued to perform consistently well with 98% of the research station's energy needs supplied by solar power in 2014, which resulted in a reduction in operation costs.



## Aldabra House

Following the announcement of the Aldabra House project at the 30<sup>th</sup> anniversary of Aldabra as a UNESCO World Heritage site in 2012, the project has made great progress in 2014 and a leading UK architecture firm has been commissioned to develop the project concept.

Based on Mahé, Aldabra House will be a visitor centre providing an experience for the many people who cannot visit Aldabra, due to the atoll's remoteness and logistical difficulties to access.



Aldabra House will bring the experience of the atoll to visitors on Mahé

Making Aldabra accessible through this centre will raise awareness and visibility of the outstanding universal values that define this natural World Heritage Site, and diversify and increase sustainable financing mechanisms for Aldabra by becoming a visitor destination in itself. To ensure that Aldabra House will be a centre of excellence with the highest international standards in sustainable architecture and an appealing design, SIF launched an international competition in 2014. Five architectural firms were invited to share their conceptual design proposals for Aldabra House in order to find the most suitable partner for this exciting project.

All five submitted concepts were of an extremely high standard, making the final decision exceptionally difficult for the Aldabra House committee. Following careful and detailed consideration of the conceptual design proposals, the committee selected Marks Barfield Architects. Founded in 1989 by Julia Barfield and David Marks, Marks Barfield Architects conceived and designed the famous London Eye. They have a diverse portfolio of projects that includes the Royal Botanic Gardens of Kew Treetop Walkway as well as education, cultural, commercial, leisure, and transport build-



ings. The company has won more than 60 awards for design, innovation and sustainability.

To gain a better understanding of Aldabra, its beauty and its challenges, Julia Barfield, and an exhibition designer from Real Studios, Mike Hawkes, visited Aldabra at the end of 2014. This trip was important for Julia and Mike to familiarise themselves with this extraordinary place and also to work closely with the island staff to incorporate their ideas and visions into the Aldabra House project. The visit allowed a greater understanding by Marks Barfield and Real Studios of SIF's aims for Aldabra House and how to effectively communicate this vision to visitors. Countless ideas were discussed during their excursions around the atoll and many of these will be developed and realised when the exciting new Aldabra House opens its doors on Mahé, inviting everybody to have their own Aldabra experience. Over the next year SIF plans to finalize the detailed concept for Aldabra House and submit this to the local authorities for approval.



Julia and Mike from Marks Barfield Architects and Real Studios during their visit to Aldabra

## Biosecurity plan for Aldabra

Under the EU-funded invasive species project, a biosecurity plan for Aldabra was finalized in 2014. This plan aims to prevent further introduction of invasive species into Aldabra's ecosystem and was developed by biosecurity consultant Dr Grant Harper in close consultation with SIF. Grant has also worked previously with SIF leading the rat and cat eradication feasibility research on Aldabra.

There are already a number of invasive alien species on Aldabra, some of which are being tackled by SIF (see invasive species section p. 33-45). To ensure the future ecological integrity of Aldabra, however, it is important not only to remove invasive species but also to limit the chances of any other introduced species from reaching the atoll, which could have disastrous effects on native wildlife.

Under this new biosecurity plan, SIF has started putting in place a number of procedures to prevent such introductions. These procedures involve thorough screening of all supplies destined for Aldabra, both on Mahé and Assumption and when they arrive on the atoll. The plan also makes

provisions for ensuring that staff and visitors do not accidentally introduce any species. Biosecurity officers on Mahé and Aldabra will be responsible for implementing the plan, and ensuring that biosecurity measures are in place at all levels. Later on, when funding can be secured, biosecurity rooms will be constructed on both Mahé and Aldabra where rigorous checks and containment will be carried out. The biosecurity plan marks a new era in the management of Aldabra as SIF takes an essential step forward in securing greater protection for the atoll.



A biosecurity plan for Aldabra will help prevent invasions from invasive species such as Yellow Crazy Ants

## Aldabra's PV system continues to excel

In 2014, Aldabra's photovoltaic system produced 35,886 kWh of electricity, which covered 98% of the station's electricity demand. The backup diesel generator was only required to run for 84 hours, providing 839 kWh of electricity. Aldabra now consumes less than three drums of diesel per year compared to the 190 drums per year in 2008, which is an incredible achievement for the environment and the financial operation of the atoll. In addition, since the completion of the project in 2012, the system alone has avoided over 100,000 kg of CO<sub>2</sub>.

Investments into energy efficiency were furthered in 2014 with the completion of the installation of inverter-type air conditioning units by the island mechanic, Alain Banane. Comparative measurements between previous air conditioning models to the latest inverter type models, highlighted an impressive electricity saving of 65%, compared to models operated in 2008, and 52% compared to models used in 2012. The relatively high investment costs for these units have proved themselves worthwhile with the significant reductions in electricity consumption. Further reductions should be possible with intelligent timer settings and automatic sensors. By phasing out old air conditioning units SIF is able to avoid the ozone depleting effects of their refrigerants reducing their contribution to global warming. During a recent energy

audit it was confirmed that the introduction of the energy efficient fridges in 2012 had resulted in average electricity savings of 70%. As a further energy efficiency measure, Aldabra's washing machines were connected to a solar heater which has allowed for electricity savings of between 26–52%, depending on the programme used.

Another remarkable achievement was the renovation of a huge water storage tank at the research station, which was a team effort by the whole island community. An additional 100,000 litres of rainwater storage capacity has now been added to the overall water storage system. This will reduce the dependency on the desalination plant and supply enough water throughout the dry season.

The island's biological waste management was improved by installing a compost tumbler unit that produces excellent soil in just six weeks. This unit allows for more sustainable use of large amounts of biological waste. Prior to having the compost tumbler, the disposal of bio-waste was problematic on the island. Besides cooked food waste, the new unit can be used for fish bones, soft plant waste, fruits, vegetables, coffee grounds, teabags, paper, eggshells and egg cartons, bread and biscuits, and much more. The nutrient rich soil that is produced benefits the research station's garden and avoids the need for any chemical fertilizer in the otherwise nutrient poor soil.

Efforts continue to ensure the successful operation of the renewable energy system and improve the overall sustainability of operations on Aldabra.



Mechanic Alain Banane and Logistics Assistant Marvin Roseline install the new air-conditioning units



Renovating the water tank on Aldabra



# SIF research in the Vallée de Mai

The importance of the research programme in the Vallée de Mai was emphasised this year with the publication of several scientific papers in peer-reviewed journals on Coco de Mer and Seychelles Black Parrot. Research highlights of the year included; the designation of the Seychelles Black Parrot as a distinct species, new research on the Giant Bronze Gecko and the most successful Black Parrot breeding season since the research programme started.



Chong-Seng

## Coco de Mer

### Genetic research

PhD student Emma Morgan, from the Swiss Federal Institute of Technology - Zürich (ETHZ), continued her research this year on arguably the Seychelles' most enigmatic species, the Coco de Mer. In collaboration with SIF, Emma is working to unravel some of the mysteries surrounding the demographic and genetic patterns of natural Coco de Mer populations. Using genetic analysis on leaf and flower samples Emma has created a genetic profile of individual trees in selected sites within the species' natural range across Praslin and Curieuse.

Now these genetic profiles have been created, it has been possible to identify the parent trees of Coco de Mer juveniles and seedlings. By identifying an offspring's maternal tree, we can gather information on the distance the seed travelled before germinating. When both the maternal and paternal trees are matched to their offspring, the distance between the female and male provides us with data on the tree's pollen dispersal distance. This complements other research being undertaken by SIF to identify the pollinator(s) of the Coco de Mer.

Preliminary results from Emma's first field season in 2013 indicated relatively high levels of inbreeding in Coco de Mer on both islands, and that gene flow appeared to be limited to fairly short distances.



SIF

Emma collecting samples from a Coco de Mer

In 2014 additional leaf samples of primarily adult trees were collected from the same sites but in a wider area, and lab work was conducted to identify a larger proportion of parent trees of the offspring in the 'natural' remnant patches of Coco de Mer. Analyses of the data continue but so far more parental assignments have been made using the 2014 samples, increasing the strength of the data set, and indicating that pollen has dispersed further than appeared from the original 2013 trees sampled. The last phase of fieldwork is planned in 2015, when more DNA samples will be collected and the genetics research finalised.

Another intriguing question Emma is trying to shed light on is the varying nut production of female trees. In Emma's 2014 field season she collected soil samples from the area around a number of female palms. Resin bags were used to measure the nutrient content of the soil, and whether these growing conditions bore any relation to the number of nuts produced by the tree. The lab work was completed in late 2014 and analysis of the data will continue in 2015.



Extracting samples from the resin bags in the lab

## Linking research and conservation policy

Two SIF authored peer-reviewed scientific publications were published this year on the Coco de Mer. The first was published in the *Journal of Applied Ecology*, titled 'Scientists' responsibilities towards evidence-based conservation in a Small Island Developing State'. The paper uses the example of Coco de Mer management to demonstrate the successful linking of scientific research and conservation management in a small island context.

There is a recognised gap between scientific research and conservation policy and action, with the recommendations of published conservation research papers often not being implemented or known about by practitioners. There are many reasons for this gap; practitioners may not be aware of the relevant scientific publications in their field, publications are often inaccessible to non-academics, they may be written in technical jargon, or simply make impractical recommendations that have not taken into account conservation needs on the ground.

The paper describes how scientific research on the Coco de Mer was established according to the needs of management authorities and was subsequently used to improve conservation management and policy. It also asks researchers to consider their responsibilities after publishing papers and shows how follow-up after publication can make a genuine difference to conservation management if the appropriate steps are taken.





## Parental care in the Coco de Mer

A second research paper was accepted in December for publication in the journal *New Phytologist*. The paper was based on long-term research on the Coco de Mer and remarkably, showed that the Coco de Mer actually improves soil conditions for itself and its offspring by funnelling organic debris, including pollen, from the leaf surfaces to the base of the trunk.

The authors investigated the apparent paradox of how the Coco de Mer, which only grows naturally in extremely poor soils on Praslin and Curieuse, is able to bear the largest seeds in the plant kingdom (female palms) and produce vast amounts of pollen (males). How do the trees obtain the nutrients they need to support such a large investment in reproduction? To answer this question, they measured the amounts of nitrogen and phosphorus used for leaf growth and reproduction (in fruits and male flowers) by Coco de Mer trees in the Vallée de Mai. They also measured the amounts of these nutrients in the soil, and the quantities of water flowing down the trunk during rain.

The results show, as suspected, that the nutrient costs of reproduction are very high in both male and female plants. Indeed, the amounts of phosphorus used each year to make fruits and male flowers are six to seven times greater than those used to make new leaves and trunk. So where do these nutrients come from? Rainfall measurements show that the leaves of a Coco de Mer form a gigantic and highly efficient funnel, channelling almost all of the water that falls on them to the base of the trunk. Any organic debris on the leaf surface, for example, pollen or the faeces of lizards, birds or invertebrates, gets flushed to the bottom of the tree in this rapid movement of water. In this way, a male Coco de Mer can improve its own nutrient and water supply, while a female tree also improves the supply for its seedlings, which usually grow very close to the mother tree because the large seed size limits dispersal.



This process means that soil conditions in a Coco de Mer forest are highly variable, and are more nutrient-rich close to Coco de Mer trunks than further away. These soil conditions have affected not only the ecology and life history of the Coco de Mer, but the remarkable community of animals that only occur in this forest.

# Giant Bronze Gecko

## Research on Giant Bronze Gecko movements in the Vallée de Mai

The Giant Bronze Gecko (*Ailuronyx trachygaster*) is one of the largest gecko species in the world and is endemic to the native palm forest of Praslin. It is almost exclusively a canopy dweller and is most often seen feeding determinedly on male Coco de Mer flowers. Indeed, the species only occurs in mature Coco de Mer forest where male Coco de Mer pollen appears to be its main food source.

The giant geckos appear to have a strong dependence on Coco de Mer flowers and are thought to play a role in Coco de Mer pollination, another area currently being researched by SIF. There has been limited research on these geckos; there is no information, for example, on their territory size or movements and it is unknown whether individual geckos move frequently between Coco de Mer adult trees, which is essential for effective pollination. The size and status of the gecko population is also unknown.

To start exploring the giant geckos' territory size and movement patterns, an intensive two week project was undertaken in the Vallée de Mai at the end of May. Reptile experts Dr Nik Cole (Durrell Wildlife Conservation Trust), Rouben Mootoocurpen (Mauritian Wildlife Foundation), associated SIF researcher Dr Chris Kaiser-Bunbury, Vallée de Mai and SIF Head Office research staff formed the 'Gecko team'.



One of the geckos with a radio transmitter 'backpack'



The Giant Bronze Gecko are often seen feeding on the flowers of the male Coco de Mer catkin

An incredible total of 51 giant geckos were caught in the two weeks. All geckos were measured and implanted with a small PIT tag that can be read by an electronic device when the animal is re-caught and identifies it for life (like a barcode). The geckos were also marked with a temporary but highly visible UV-fluorescent number, which lasts only until the animal next sloughs its skin. Six animals were also fitted with a tiny 1.5g radio-transmitter in a custom-designed 'backpack'. The transmitters allow the animal to be tracked directly and not depend on opportunistic re-sightings or re-captures in order to obtain information on their movements.

Once the geckos were released Vallée de Mai staff searched for them over the next few weeks. The fluorescent numbers were slowly sloughed off and the batteries in the radio-transmitters were very small and short-lived. Re-sightings of the marked geckos were less frequent than expected, and many non-marked geckos were also spotted, making the detection rate very low and suggesting that the density of these geckos in the forest is higher than expected, a positive sign for this endemic threatened species.

We are incredibly grateful to have had Nik and Rouben for a full two weeks to guide the project and train the staff in the necessary techniques, and we would like to thank them, the Durrell Wildlife Conservation Trust and the Mauritian Wildlife Foundation for their efforts and support in the completion of this short term project.





Reinhard Mischke

The newly classified Seychelles Black Parrot (*Coracopsis barklyi*)

## Seychelles Black Parrot

### Distinct species status confirmed

In April 2014 following five years of intensive research by SIF, including molecular genetic analyses in collaboration with the Durrell Institute of Conservation and Ecology (DICE), the Seychelles Black Parrot was officially recognised as a distinct species, *Coracopsis barklyi*, by taxonomic experts at Birdlife International.

The Seychelles Black Parrot is part of a small group of parrots (*Coracopsis* sp.) found only in the Western Indian Ocean. It was previously considered a sub-species of the Lesser Vasa Parrot, along with three other sub-species occurring in Madagascar and the Comores. The Seychelles *Coracopsis* was long suspected to be a distinct species due to differences in ecology, size and vocalisations. Until recently, however, genetic evidence to confirm species distinction was lacking.

In 2013 SIF partnered with researchers Dr Hazel Jackson and Dr Jim Groombridge from DICE, who conducted a combination of morphology analyses along with genetic analysis on blood samples from parrots from all four sub-species. The research provided the necessary evidence that the Seychelles Black Parrot is evolutionary distinct from other black parrots in the *Coracopsis nigra* group. Taxonomic experts at BirdLife International reviewed this evidence and decided to officially recognise the Seychelles Black Parrot as a distinct species, *Coracopsis barklyi*.

The threat status of the Seychelles Black Parrot was subsequently reviewed by the IUCN Red List, which is used as a global benchmark for conservation recognition of species. Its small population size and range (it is resident only on Praslin) meant that the Seychelles Black Parrot was listed as 'Vulnerable to extinction'. As the national bird of the Seychelles and the thirteenth official endemic bird of the country, this recognition of species status will help to ensure that the Seychelles Black Parrot receives stronger conservation protection and attention.

## Two papers published on the feeding and breeding ecology of Seychelles Black Parrot

What is the favourite food of Seychelles Black Parrots? Many have thought that it is introduced fruits such as mangos or papaya. But an SIF authored paper published this year in a special issue of *Ostrich: Journal of African Ornithology*, which focused on African parrots, debunks this myth by examining the feeding ecology of these endemic parrots.

The paper summarises the findings of four years of feeding observations of black parrots by SIF staff on Praslin. The authors compared two alternative methods of recording feeding data; incidental observations and feeding transects, to assess methods as well as the parrots' feeding preferences.

The parrots were found to feed on 46 different plant species within this study, bringing the total number of known Seychelles Black Parrot food plants to 53 species. The parrots actually favoured endemic and native species, particularly endemic palms, rather than introduced fruit trees. They mainly ate fruit pulp, buds and seeds, but leaves, bark and scale insects were also occasionally consumed. In a comparison of transects versus incidental observations, the latter method resulted in many more recorded feeding encounters than transects, but the transect results are more objective and therefore more reflective of actual feeding patterns.



A young black parrot chick

The authors conclude that the methods are complementary and each can be useful depending on the information needed and the questions asked.

Following this research, we now know that, although the black parrots are regularly seen eating introduced fruit, such as papaya and starfruit, these sightings are simply more visible to most people since they occur in gardens and farmland. This leads to the mistaken impression that these fruit trees are preferred, whereas in fact, the parrots favour the fruit, flowers and seeds of endemic trees, with endemic palm trees being the most commonly consumed. This study confirms that the black parrot is heavily dependent on native palm forest, not only by nesting in Coco de Mer trunks but by feeding on the other palm species.

An understanding of feeding requirements is vital for species conservation, particularly for rare endemics like these parrots which are restricted to very small areas, and will help to guide and prioritise habitat management strategies to ensure the survival of this unique species.

A paper on the breeding activity of the Seychelles Black Parrot was also published this year. Results from the first four years of SIF research on black parrot breeding were published in the same issue of *Ostrich*. The paper presents data from the first four monitored breeding seasons (2009–2013) and is the most comprehensive study of Seychelles Black Parrot breeding ecology published to date.

A total of 36 nests were monitored over the 4-year period and overall nest success (nests with at least one fledged chick) was 53%. In the core breeding area of the Vallée de Mai 96% of the nests were in dead Coco de Mer trunks, and deep cavities with good canopy cover were preferred by the parrots. Nest site turnover was found to be relatively high due to dead palm trunks falling or deteriorating. Breeding activity, not only success, varied substantially between the four seasons for unknown reasons. In very active seasons it is possible that a shortage of high quality nesting cavities limits breeding success. A positive finding was that at least 57% of fledglings survived their first year, which is a relatively high survival rate for birds.





A ringed black parrot fledgling

The paper also documents some other key findings, especially with regards to invasive alien species. Black Rats were found to be important nest predators, causing the failure of up to 33% of nests, and mynah birds were also implicated in nest failures. Another interesting observation was the fascinating breeding behaviour of the Black Parrots, for example they practice very unusual side-by-side copulation, and it was confirmed that the species breeds cooperatively (i.e. with male parrots bringing food for the female to the nest).

## 2013/2014 breeding season

In the 2013/14 Black Parrot breeding season, a total of 17 nests were found by the research team with 21 chicks hatched and 12 chicks fledged, resulting

in a nest success rate of 58.8%. Eight new nest sites were located by the team and an interesting discovery was finding active nests in the cavities of trees other than the Coco de Mer (e.g. Palmiste and Albizia). Also for the first time in the five years of SIF's black parrot breeding programme, a nest with four eggs was recorded, although only two of the eggs hatched. The usual clutch size is 2 or 3 eggs and this large clutch size could be as a result of improved female condition due to food availability, which is certainly an encouraging sign. The black parrot team also continued ringing adults and chicks this season with the total number of ringed parrots now 166, 20 of which were ringed this season. Alongside their research, the team also assisted in SIF's education and outreach programme and gave three presentations on the black parrot in schools on Praslin.

# SIF research at Aldabra Atoll



2014 was a year of discoveries on Aldabra, proving that the atoll still has many secrets to be uncovered. The rediscovery of the presumed extinct Aldabra Banded Snail was a highlight, as well as the mapping of the outer reef habitats, which showed that the reefs extended much further than was previously realised. The Green Turtle satellite tagging project that started in 2011 came to a close with mixed results and Aldabra was declared a site of importance for marine turtles under the IOSEA network. Research into landbird genetics progressed, with results expected in 2015, and surveys of nesting landbirds and frigatebirds were repeated. Research under the SIF/ University of Zurich collaboration continued with one MSc thesis completed and further progress on the seed dispersal network of Aldabra.





C Onezia

Thought to be a victim of climate change, the Aldabra Banded Snail was re-discovered in 2014

## Extinct Aldabra Banded Snail rediscovered

Incredibly the Aldabra Banded Snail (*Rhachistia aldabrae*), declared extinct in a paper published in 2007, was re-discovered alive and well on Aldabra in August 2014. Before the discovery, the last living individual of this endemic species was recorded in 1997. Subsequent searches yielded only shell remains and no living specimen was recorded until 2014. The snail's apparent demise was linked to declining rainfall on Aldabra (Gerlach, 2007) and was widely publicised internationally as one of the first casualties of climate change impacts.

The team of Aldabra staff were exploring infrequently visited parts of Malabar Island, when the snails were found. The beautiful deep purple and bright pink snails were spotted by Shane Brice in dense mixed scrub on Malabar. Senior Ranger Catherine Onezia's suspicions were raised as the snails were found on one of Aldabra's endemic trees Bwa Mamzel (*Allophylus aldabricus*). On searching the area further, the team located several individuals, including juvenile snails. The discovery of the young snails is very encouraging as the last juveniles were recorded in 1976 and were considered to be particularly vulnerable to desiccation as a result of reduced rainfall. Identification of the snails was confirmed by mollusc experts Dr Vincent Florens (University of Mauritius) and Pat Matyot.

The Aldabra team returned to the site of discovery on Malabar Island in October, before the onset of the wet season, to gain a better understanding of the snail's abundance, distribution and density. Intensively searching an area of approximately 1600 m<sup>2</sup>, the team recorded 21 Bwa Mamzel trees with Aldabra Banded Snails and a total of 31 snails were recorded. Three of the snails were at a neo-natal stage (less than a single whorl in addition to the larval shell), 14 were juveniles (2–7 mm) and 14 were sub-adults or adults (7–14 mm). Although the majority of snails were found on Bwa Mamzel, two observations were made of snails on native *Tarennia supra-axillaris* and Bwa Faune (*Terminalia boivinii*) trees. All snails observed on this trip were inactive; however, most of the individuals recorded previously had moved to new locations suggesting that the snails were in estivation – an inactive state resembling deep sleep, in which some animals living in hot climates, such as snails, spend much time and which protects these animals against heat and dryness.

There is still very little known about the ecology of this rare snail but the rediscovery provides an incredible second chance to protect and study this historical species in the wild and ensure that it is not lost. Climate change may not have caused the demise of this snail so far, but its impacts remain a likely threat to this species and many others globally. Surveys will be conducted in 2015 to continue to monitor this known population of Aldabra Banded Snails and search for other locations where they might occur.

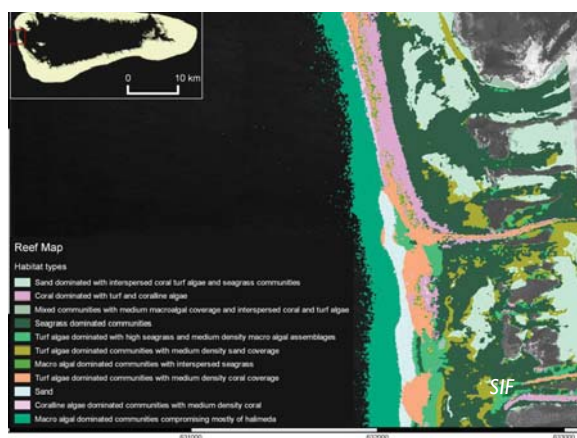
# Marine monitoring

2014 was the fourth year of the National GEF Protected Areas project, under which SIF's key objectives were to identify and nominate an area for the expansion of Aldabra's Marine Protected Area, map the outer reef habitats, continue the marine monitoring programme, and develop a new management plan for the atoll.

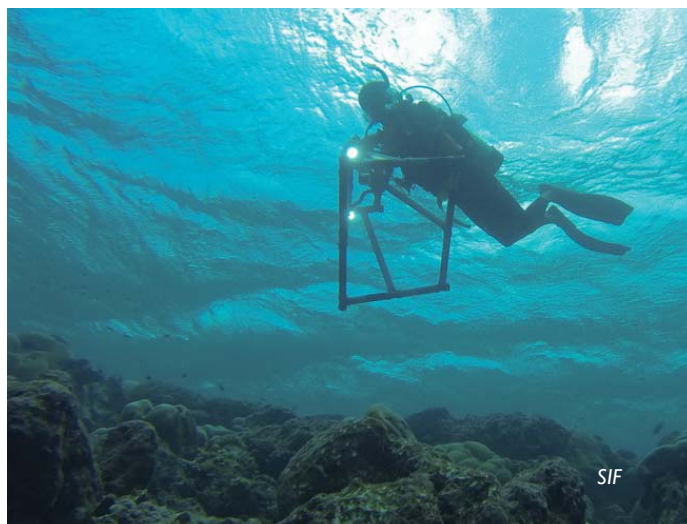
## Reef mapping and MPA expansion

It is important to have a habitat map of Aldabra's outer reefs as it shows the extent and spatial distribution of the different habitats present in the area, and can allow for monitoring of habitat changes over time. The map produced showed that an area of 3.35 km<sup>2</sup> of Aldabra's coral reef is currently unprotected, supporting the proposed expansion of the marine protected area around Aldabra. With this map, a new wider area has been nominated for protection and will be submitted to the Government of Seychelles for review in 2015.

The habitat map shows that Aldabra is surrounded by an area of reef of ca. 56 km<sup>2</sup>, which extends up to 2 km wide in some areas, and only 300 m in other steeper parts of the atoll. Eleven distinct habitat types were discerned from the field data collected in 2013. The distribution of habitat types



Snapshot of the new outer reef habitat map for Aldabra (showing part of the west coast of the atoll).



A diver preparing to conduct a photo-quadrat benthic survey at Aldabra.

showed that Aldabra is rich in seagrass beds in the outer lagoon reef, and surrounded by coral and reef-rock habitats on the steeper slopes. The west coast is marked by well-developed spur-and-groove coral formations, with large sandy spits in between. The north coast is characterised by steep forereef slopes, and high concentrations of rare and endangered coral species, such as the Pearl Bubble Coral (*Physogyra lichtensteini*). High concentrations of macro-algae were common along the eastern side of the atoll, and the reefs on the south coast of Aldabra were surprisingly rich and diverse in coral, but also highly variable from one reef spur to the next.

## Marine monitoring

SIF started a marine monitoring programme in October 2013 and surveys continued in 2014. The Aldabra Marine Monitoring Programme consists of two components; coral reef monitoring via transects and Baited or Unbaited Remote Underwater Video systems (B/RUVs) to establish the abundance and diversity of fish communities. All surveys were undertaken alongside extensive staff training to ensure the long-term continuation of the programme.

The reef monitoring will track changes in the cover of the seabed and the associated fish community over time. This will allow SIF to monitor the health state of Aldabra's reefs, and record changes in rela-





Imran Ahmad

The marine monitoring programme aims to gather valuable data on the fish communities of Aldabra.

tion to water temperature and sea level. Aldabra is one of few sites where the coral recovery process since the 1998 bleaching event can be monitored in the absence of human interference, and is therefore a regionally important marine monitoring site.

Twelve permanent sites were monitored for benthic cover and fish communities at two depths, 15 and 5 m. Temperature and water level dataloggers were deployed at selected sites around the atoll at different depths to allow for investigations into correlations between environmental variables and reef health. Benthic cover surveys measure the percentage of live hard and soft coral, dead coral, and algal covered reef structures, while fish counts and size estimation indicate how well the system is balanced. For example, if algal growth increases then we may expect to see an increase in fish that feed on algae. The results of the initial surveys compared to previous data collected suggest a slow and steady increase in both hard and soft coral cover, while fish communities appear to be stable. The continued

recovery of the reefs after the mass coral mortality in 1998 is a sign of hope for marine ecosystems worldwide if they are given the protection needed to recover.

In 2014 unbaited Remote Underwater Video systems (RUVs) and Baited Remote Underwater Video systems (BRUVs) were deployed again. These systems were deployed during spring tides to study the effect of this high tide on the density and abundance of fish. Four sites along the Aldabra west coast were selected, and five baited and five unbaited samples were collected from each site. The footage captured some interesting data, and a few rare sightings were made, including a dugong.

A review of the BRUV data, showed an abundance of large, long-lived, predatory fish species, such as potato groupers and silver tip reef sharks, which is reflective of a healthy marine ecosystem. The results of these studies will be published over the next few years and are expected to have important implications for the management of Aldabra.



R Baxter

Two Green Turtles race back to sea after nesting on the beaches of Aldabra

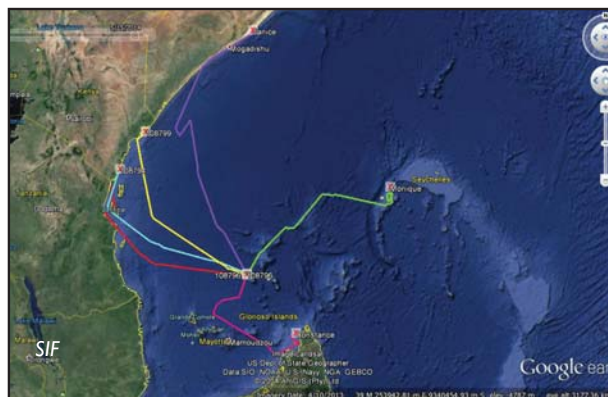
## Turtles

### Satellite tagging project

In the 2012 SIF annual report we described a satellite tagging project on six female Green Turtles from Aldabra. These tags all stopped transmitting data earlier than expected but after seeking advice from experts in the field and researching the protocol further, another two satellite tags were attached to new turtles in May 2014.



Attaching the satellite transmitter to 'Alda'



The movements of the six tagged turtles.

To identify suitable candidates for the tags, intensive monitoring using the atoll-wide flipper tagging programme was conducted to find turtles that were towards the end of their breeding season. This reduces the chance of the tag being knocked off during mating and increases the likelihood of the female leaving Aldabra waters imminently. After several months of this monitoring 'Alda' was tagged on 14<sup>th</sup> May and a second female '108799' a week later. Alda had been observed nesting on at least three occasions prior to the tag being fitted and encouragingly both of the turtles were seasoned nesters on Aldabra; Alda nested on Picard in 2007 and 108799 in 2005.

Alda departed Aldabra immediately after the tag was attached, travelling rapidly west, then north-west to the Tanzanian coastline, where she then moved



further north. Following this substantial journey she stopped in the shallow waters west of the Pemba Channel around Fungu Nyama. Alda remained in this area for over two months until we stopped receiving location data from her tag in August 2014. These shallow East African waters are known for their numerous and extensive seagrass beds which provides ideal foraging habitat for Green Turtles.

The second tagged turtle 108799, remained in Aldabra's waters for almost a further two weeks after her satellite tag was attached, nesting one more time. After this nesting attempt she travelled rapidly towards Africa, reaching the Kenyan coastline east of Kipini, then moving north before reaching the shallow waters south of Pate Island. Similarly to Alda she also seemed to find a good foraging area as she remained here for almost two months, until we stopped receiving location data from her tag, also in August.

In total eight satellite transmitters have been deployed on Green Turtles at Aldabra since 2011,

none of which transmitted data for more than three months. It was expected that the tags would transmit data for a much longer period. The problem is thought to lie with the tags and it is hoped that all of the turtles are alive and well, which we will be able to confirm when they return to Aldabra to nest in 2–6 years time. The Aldabra staff are keeping a watchful eye for the return of the female turtles that were tagged in 2011 and 2012 as they could be returning to nest any time now.

Despite having only a short period of transmission, the tags still have provided a valuable insight into the migratory routes and foraging areas of Aldabra's nesting Green Turtles, showing that Aldabra's turtles use the waters of at least six different countries. To effectively conserve Green Turtles our work confirms the importance of adopting a holistic trans-boundary approach, ensuring that both turtle feeding grounds and nesting sites are protected. This information will certainly be incorporated into collaborative regional efforts to protect the Western Indian Ocean Green Turtle population.

## Long-term monitoring

The staff on Aldabra continued the long-term turtle flipper tagging programme with 160 Green Turtles tagged in 2014. Turtles were tagged either while nesting or in the water. Tags are used to identify individual turtles and can help to provide information on their nesting patterns and periods through re-sightings.

A total of 4398 emergences by nesting Green Turtles were documented on Settlement Beach in 2014 which was lower than the highest record in 2013, but consistent with the annual rate of total emergences seen since 2010. Recording the number of emergences, by counting the tracks of the female turtles, is a useful way to gauge nesting density of turtles, from which population estimates can be made. This is done by counting the number of fresh tracks along a beach. Further to this, each emergence can be investigated to discover exactly what the turtle did; whether or not an egg clutch was laid, for example. These data indicate how many turtles emerge each night and, over a long period of time, can show population trends.



Staff on Aldabra attaching a metal flipper tag to a turtle

## IOSEA turtle site network designation

Aldabra Atoll received its 4<sup>th</sup> international designation in 2014 with the announcement that the site was included in the newly launched IOSEA Network of Sites of Importance for Marine Turtles. The Indian Ocean – South-East Asian (IOSEA) Marine Turtle Site Network is expected to enhance both the local and global recognition of the importance of these selected sites, while also offering long-term conservation benefits that are more easily achieved through such a coordinated network. This IOSEA network will optimise the use of limited resources and will help to diffuse adverse socio-economic impacts over a wider geographic scale, while promoting ecological connectivity as well as resistance and resilience to environmental stress.

Aldabra met the stringent Evaluation Criteria, as assessed by the IOSEA Advisory Committee and endorsed by the collective IOSEA membership, to be

admitted into the network as a critical site needed to secure the future of marine turtle species. The IOSEA Memorandum of Understanding is an agreement concluded under the Convention on Migratory Species (CMS) Secretariat and is administered by the United Nations Environment Programme (UNEP).

Green Turtles are listed by IUCN as globally endangered due to severe declines in their numbers as a result of hunting, fishing by-catch and coastal habitat modification. Prior to 1968, when Aldabra was established as a nature reserve, Green Turtles suffered intense exploitation for their meat. Following several decades of protection under SIF however, and the implementation of the Turtle Protection Act in 1994, this turtle population has recovered. Between 1968 and 2008 there was a 500–800% increase in the number of nesting Green Turtles on Aldabra (Mortimer, 2011), and it now has the second largest population of nesting Green Turtles in the Western Indian Ocean.



Green Turtle





Aldabra Rail, the only surviving flightless bird in the Indian Ocean

## Birds

### Landbirds

#### Genetic research

SIF researcher Dr Janske van de Crommenacker returned to the Durrell Institute of Conservation and Ecology (DICE) at the University of Kent this year to continue the genetic analyses of Madagascar and Aldabra Fodies. The first aim of her research was to confirm and further resolve the hybridization dynamics between Aldabra and Madagascar Fodies. This research follows the discovery of a small Madagascar Fody population in the Takamaka region of Aldabra (see 2012 and 2013 SIF Annual Reports), which is the subject of a continuing intensive eradication programme. The Madagascar Fodies are thought to have arrived from Assumption Island where they were introduced in the 1970s, and where they are also being eradicated (see p. 33). Using phylogenetic analyses Janske will be able to confirm whether the invasive Madagascar Fodies did originate from Assumption as is currently assumed. Janske will also try to estimate when the invasion occurred, hopefully confirming whether it is a very recent event, or if the population has been present and undetected on Aldabra for much longer.

Janske was also working on the genetic analysis of the Aldabra Rail (*Dryolimnas cuvieri aldabranus*)

to help clarify its species status. The Aldabra Rail's appearance and behaviour seem to be sufficiently different to its ancestral population on Madagascar to justify its re-classification from sub-species to species; the Aldabra Rail, unlike its remaining living rail relatives in the Western Indian Ocean, has lost the ability to fly. Confirming the Aldabra Rail as a separate species would greatly help its conservation and protection.

Janske successfully extracted DNA from museum specimens of the three *Dryolimnas* rail sub-species; Aldabra Rails, Assumption Rails (now extinct) and Madagascar Rails, kindly supplied by the Natural History Museum of London in Tring. These museum



Aldabra Fody

samples are usually a tiny piece of tissue cut from the toe-pad of the birds. Some of the samples are over 100 years old and the quality of the specimen is affected not only by its age but also by the preservatives used. These factors can make the process of DNA analysis more difficult but the first results are promising.

The next goal is to amplify a selection of DNA regions from these extractions to construct phylogenetic trees and assess genetic differences between the three sub-species. Using the public digital GenBank database it is possible to compare the DNA sequences of these rail samples with those of close and further relatives elsewhere in the world, to get a better picture of the relationship of *Dryolimnas* rails with other rails. Through the American Museum of Natural History in New York, Janske also obtained specimens of Aldabra Rails that lived on Picard before their extinction on this island. It is possible that even fine-scale genetic differences may be detectable, such as between Aldabra Rails living on Aldabra's different islands (Picard, Polymnie, Malabar and Ile aux Cedres) or between the current reintroduced population on Picard and its pre-extinction population. Understanding more about the genetics of these unique rails will also help SIF make decisions on the conservation management of the population. We hope to have the final results of all of these analyses in 2015.



Janske examining the rail specimens at the Natural History Museum.



An Aldabra Drongo feeding its chicks

## Nest monitoring

To shed light on the factors affecting populations of Aldabra's landbirds, nesting success of these species is monitored. This is important as baseline data can assist in the decision making process if conservation intervention is required; for example, if changes in the abundance of landbirds or environmental disturbances occur. Baseline data can also be used to predict the likely recruitment and population growth of these species. Under the GEF project launched in 2010 (see SIF annual report 2010/2011), a baseline landbird nesting survey was undertaken on Picard Island in 2014.

Following earlier studies of landbird nesting success in the 2000/2001 and 2011/2012 breeding seasons it was concluded that further study was needed to draw meaningful conclusions. Therefore landbird nests continued to be monitored in the 2013/2014 breeding season, with the overall aim of determining the reproductive success of nesting landbird species on Picard and assessing the importance of various causes of nest failure.

On Aldabra, the most frequent cause of nest failure



appears to be predation, and potential nest predators include rats, coconut crabs, cats, herons, geckos, drongos, pied crows, coucals, rails, and kestrels. The introduced Black Rat (*Rattus rattus*) is thought to be one of the main nest predators on Aldabra. Its impact on the nesting success, and therefore, the abundance of Aldabra's birds is likely to be severe but there is still insufficient data to confirm this or the impact of other predators.

In the 2013/2014 season, a total of 167 nests belonging to 12 different landbird species were monitored, with the Souimanga Sunbird (50%) and Aldabra Fody (26%) accounting for the majority of nests studied. Generally, overall nesting success was

poor with only 25% of nests, for which the breeding outcome was known, fledgling young. This is comparable with the 2000/2001 study but lower than the nesting success recorded from 2011/2012. This monitoring programme has been incorporated into the long-term SIF research programme.

Since 2011, SIF has conducted an annual survey of breeding pairs of Greater and Lesser Frigatebirds at Aldabra. From these surveys it has been identified that there are large annual fluctuations in the numbers of breeding frigatebirds. This is a possible result of the long breeding cycle of these birds, as it takes more than a year for a chick to fledge, or other factors such as food availability.

## Frigatebird survey

In February 2014 the fourth annual frigatebird survey was undertaken at the four frigatebird colonies of Aldabra (Grande Poche, Passe Gionnet, Camp Frigate and Middle Camp), to provide further information on the fluctuations in breeding activity and breeding colony size. This survey estimated the total number of breeding pairs of Lesser Frigatebirds to be 5,480 and Greater Frigatebirds to be 2,360. This is a decrease in the numbers recorded in 2013, however, it is consistent with the annual fluctuating patterns previously mentioned. The colonies at Grande Poche and Middle Camp were noticeably smaller in comparison to the previous year. This decrease was more pronounced in the Greater Frigatebirds with a 46% reduction in breeding pairs from 2013, compared to only 17% in the Lesser Frigatebirds.

The most welcome discovery of the 2014 survey was finding frigatebirds nesting again at a former colony to the south of the Passe Gionnet colony. Aldabra's frigatebirds are known to be sensitive to human disturbance and a link has been suggested between tourist visits and the abandonment of a colony.

Following recent research (Sur et al., 2013), new regulations were implemented in 2011 to limit

disturbance to the birds, and visits are now only made to the colony at Grande Poche where a greater distance can be enforced between the visitors and the colony. Although only a small number of nests were counted at the former colony at Passe Gionnet large numbers of frigatebirds were seen wheeling in the sky, which was not seen in 2013. This is fantastic news as it suggests that the change in regulations has facilitated the return of the birds to their former areas.



Staff undertaking the frigatebird survey



Aldabra Giant Tortoise, a potential seed disperser

## Aldabra Giant Tortoise

### Research into the seed dispersal network of Aldabra

While animals, such as tortoises, can roam free throughout their lives, plants have had to develop different 'tricks' to be able to move around the landscape. For example, most flowering plants attract pollinators, which move their genes across the landscape, and frugivores (fruit-eating animals) that move their seeds. By using the assistance of animals to move their seeds, plants can escape predators and diseases and colonise new habitats, which ensures their survival. Understanding how fruiting plants and frugivores interact may provide clues about how the community in a given ecosystem works, and thus help in taking effective management and conservation actions when needed.

With this in mind, and to aid with SIF's goals of managing and protecting Aldabra Atoll, PhD student Wilfredo Falcón started research under a collaboration between SIF and the Zurich Aldabra Research Platform (ZARP) in 2013. His aim was to not only understand the underlying processes that affect seed dispersal on the atoll, but to go one step further and

predict where the animals will disperse these seeds.

The first step in the project is to confirm the identity of the seed dispersers on Aldabra. To study this, Wilfredo is acquiring detailed information about all the plant/animal interactions in the community. This year more video-camera traps were deployed in different parts of the atoll to specifically capture interactions between plants and frugivores. In addition, field observations were conducted and faecal analysis was used to determine which species of plants different animals were eating.

Through a literature review and the data from the first field season of this project (2013–2014), a preliminary seed dispersal network for Aldabra was drawn. Visualising plant/animal interactions in a network allows us to understand the structure of these connections to find out if there are certain plants that depend on specific animals for seed dispersal, if certain species of plants act as a hub by attracting many animals, and if there are generalist frugivores that disperse the seeds of many different plants.

The preliminary network shows that Comoros Blue Pigeons and Aldabra Giant Tortoises seem to interact with a larger number of plants in comparison to other animals. Also, plants such as the Aldabra



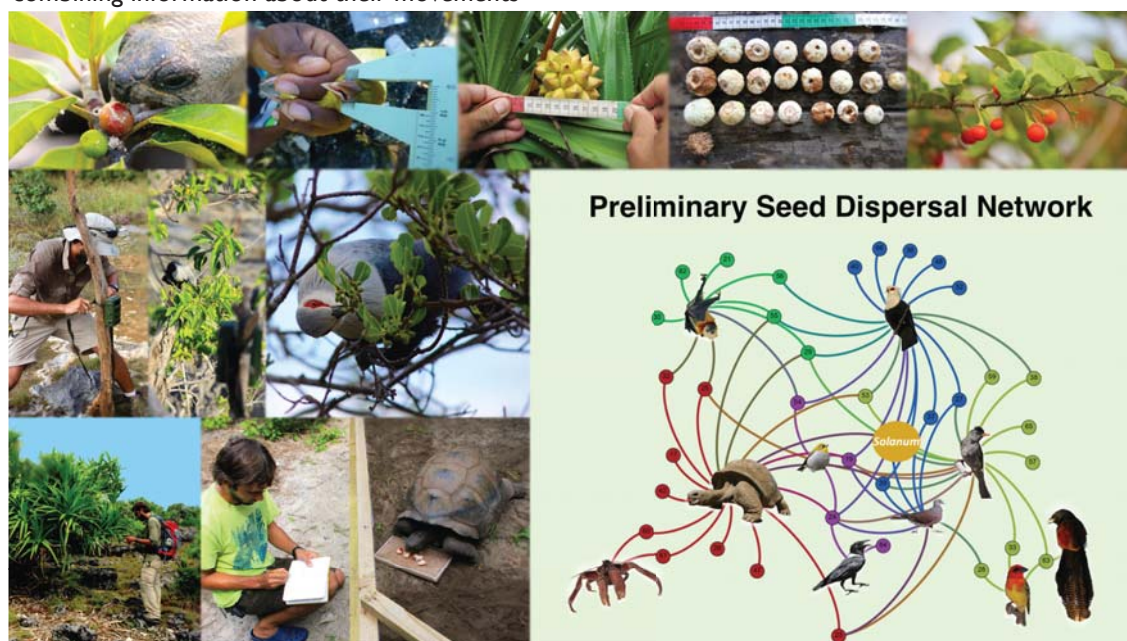
Tomato (*Solanum aldabrense*) are linked to a larger number of animals in comparison to other plants. Wilfredo will continue to collect data to confirm the different interactions reported in the literature (as some animals may eat the fruits without dispersing their seeds), and to develop a more detailed seed dispersal network for the atoll. This will allow him to answer more specific questions such as; What happens if tortoises or blue pigeons disappear from the system? What would happen to a plant that relies on a single animal to disperse its seed if that animal disappears? What if a hub plant species disappeared? Using network and modelling approaches to explore these questions Wilfredo can assess the impact of species extinctions or introductions to the community.

It is very difficult to directly determine where animals disperse the seeds of plants. Fortunately, spatially-explicit genetic tools can be used to explore this. The Aldabra Tomato is one of the plants in the network with the most connections. Using genetic markers and analyses to identify parentage relationships between individual plants will help to determine how far from the mother plant seeds are dispersed within islands, and also between islands.

Giant Tortoises are thought to be one of the key drivers of the seed dispersal network on the atoll. By combining information about their movements

(31 tortoises have external GPS tags attached) and their gut retention time from research last year, a predictive seed dispersal model can be developed. To test this model, tortoises were fed ingestible VHF tracking devices that resemble artificial seeds. GPS points are then recorded on where they were fed, and where the devices were deposited. By understanding and predicting how the animal's behaviour, movement and physiology determine the outcome of seed dispersal, impacts of this species' potential extinction on the ecosystem can be assessed, and we can use this information to predict how tortoises and other animals alter the way plants 'move' across the landscape.

Wilfredo has had the invaluable help of the Aldabra research team to collect all these data and the results of this project will help SIF three-fold. First, we will gain a better understanding of how animal-mediated seed dispersal affects the plant community structure. Second, using Aldabra as a study site ensures that the project will contribute to our understanding of dispersal processes in a young tropical island ecosystem with a virtually untouched plant and frugivore community. Finally, these results will help inform management strategies specific to Aldabra Atoll, as well as in a broader context, informing conservation strategies aimed at restoring plant and animal communities on islands.



A preliminary seed dispersal network for Aldabra and a snapshot of Wilfredo's field work

# Primary productivity and rainfall on Aldabra Atoll

University of Zurich MSc student John Shekeine, collaborated with SIF under the ZARP group for his thesis. This investigated the implications of local rainfall trends on the atoll's Aldabra in order to evaluate potential threats to the food resources of the giant tortoises.

John analysed a newly compiled historical rainfall record of Aldabra together with two potential measures of plant primary productivity: a) tree ring measurements of the deciduous tree species *Ochna ciliata* and, b) satellite derived NDVI (Normalized Difference Vegetation Index) data for the period 2001–2012. In line with general regional declines, John found that rainfall on Aldabra had declined by about 6 mm/yr in the last four decades, and this decline could mostly be attributed to changes in rainfall during the wet season. John was unable to deduce long-term patterns of vegetation

productivity through the *O. ciliata* samples. However, satellite data was used to derive the productivity of the vegetation for the period 2001–2012, which was then compared to rainfall seasonality. The strongest relationship between rainfall and vegetation productivity was seen in the eastern parts of the atoll, which is an area dominated by deciduous grasses that support high densities of tortoises. While the seasonality in productivity was found to be correlated with rainfall, there were no changes found in mean rainfall or productivity for the period 2001–2012.

This study has highlighted the sensitivity of Aldabra's vegetation to rainfall and the potential impact that increasing water stress could have on the atoll's terrestrial ecosystem. A research paper based on these results is planned to be published in 2015.



Vegetation of Aldabra



# Invasive Alien Species activities



SIF's EU-funded invasive species project was in full swing this year, the last full year of the project, with significant progress and achievements made on eradicating a range of species. The highlight of the year, however, was without a doubt the eradication of the Red-whiskered Bulbul from Seychelles, which marks the largest successful introduced avian eradication in the world to date. This successful eradication was the product of several years of hard work, determination and collaboration with many local and international partners.

## Assumption invasive bird eradication and Red-whiskered Bulbul eradicated from Seychelles

The invasive bird eradication programme on Assumption reached an exciting climax at the end of 2014 when the last Red-whiskered Bulbul was culled, and the species was eradicated from the island and consequently from Seychelles. This marks the largest successful introduced bird eradication in the world so far and the first large-scale eradication of this species.

Using a combination of mist-netting and shooting, 5279 bulbuls were removed from Assumption over a 3-year period with a local and international team of

up to ten staff. After intensive efforts at the beginning of the year, only two bulbuls remained on the island after mid-May. The penultimate bulbul was shot on 3<sup>rd</sup> November and the last bird targeted on 18<sup>th</sup> December. The team spent several weeks after the last bird was shot, repeatedly combing the 11 km<sup>2</sup> island for signs of any remaining birds. The team of four, headed by Seychellois Team Leader Jessica Moumou, with hunters from New Zealand, the UK and Canada, were unanimous in declaring success. They covered the island extensively, had a great knowledge of the area and the bird which all assisted them in declaring this island free of this invasive species.

Within Seychelles, the Red-whiskered Bulbul occurred only on Assumption and briefly on Aldabra so its removal from both islands also marks its eradication from the entire country. As the first large-scale avian eradication in the world, the success is a milestone in international conservation and invasive species management and should open the way for other introduced bird eradications on islands worldwide.

Efforts to remove all of the Madagascar Fodies also made great progress, with numbers down from over 3000 birds at the beginning of the project to fewer than 20 birds remaining by the end of the year. This was a tough achievement to reach as the fodies continued breeding in this time, making it more challenging for the small team to ensure the con-



Red-whiskered Bulbul

stant decline in numbers that is necessary to eradicate the species. A permanent team will remain on Assumption until the end of the breeding season in April 2015 in the hope that they can further reduce the population.

SIF remain confident of success in removing the fodies from Assumption but the lack of experience and lessons from other bird eradications has made this both a testing but exciting time, with every step marking new and untested ground for the team. It has taken longer than expected to get to this stage, making it very difficult to predict an end point for the eradication of the fodies. We are very close but, as with mammal eradications, targeting every last bird is essential for success.

## Aldabra invasive bird eradication

2014 saw the end of one season and the beginning of another on the introduced Madagascar Fody eradication programme in the Takamaka region of Aldabra. The Takamaka team's focus for both seasons was on culling the few remaining Madagascar Fodies in the area plus any potential hybrid birds (the offspring of Madagascar and native Aldabra Fodies), which may distort and dilute the genetic composition of the Aldabra Fody.

Terence Mahoune led the team again this year, following last year's successful eradication of the Red-



Several members of the 2014 Takamaka team including team leader Terence Mahoune (centre)



Aerial view of the Takamaka hut on Grande Terre Island

whiskered Bulbul from the atoll, and has a wealth of experience on Aldabra. Terence was assisted by a team from Seychelles, New Zealand and the UK, all of whom brought valuable invasive species eradication experience and included a professional avian hunter. The team prioritised the completion of a thorough survey and extensive observations in the Takamaka area, in addition to targeting the introduced birds, to update the distribution map of Madagascar Fodies after the progress made in the previous season. The team prioritized specific areas that were known to be hotspots in the two previous seasons.

Once the mapping had been completed, the team used decoy birds and pre-recorded fody calls to lure and capture the birds in mist-nets. Flight patterns, favourite perches or nesting spots of the fodies were identified and mist-nets set up on flight paths. Some birds proved more challenging than others to target and the assistance of the professional hunter was invaluable in removing these birds.

By the end of 2014 the only male Madagascar Fody known to be still at large on Aldabra is the legendary 'Rasputin', the most flighty bird encountered by the team, that has now survived two eradication seasons. There are likely to be a few other Madagascar Fodies in the area but all of these will be targeted once the next breeding season starts early in 2015. After several successful seasons great progress has been made at removing the majority of the Madagascar Fody population from Aldabra. However, several more seasons of monitoring and observation will be needed to be confident that this threat has been removed from Aldabra completely.



## Ring-necked Parakeet eradication on Mahé

The eradication of the introduced Ring-necked Parakeet from Mahé made excellent progress in 2014 following the recruitment of professional hunters and a new partnership with the Seychelles Peoples Defence Force (SPDF). SIF is leading this eradication under the EU invasive species project because the introduced parakeets pose a significant threat to the endemic Seychelles Black Parrots of Praslin, the national bird of Seychelles and a flagship species of the Vallée de Mai.

The eradication started in June 2013 and the team spent six months trialling capture methods, following and observing the birds to determine movement patterns and feeding preferences, and publicising the project to establish a network of contacts. During

this initial phase, mist-netting, trapping and shooting were all intensively trialled, and shooting was determined to be the most effective and efficient method. Following this, a professional hunter was recruited to work on the project, which partners SIF with the Environment Department, the Seychelles Police force, and the SPDF. This partnership has proved to be a successful combination, with good results so far.

By April 2014, following the recruitment of a hunter, a total of 100 birds had been successfully targeted, confirming that professional shooting was the most efficient method for targeting this species. Unfortunately, the regular roost counts conducted by the team indicated that the population, initially thought to be c.300 birds, was at least 30% larger than first estimated. This observed population increase is not unusual and is in keeping with predictions for annual increases due to prolific breeding by this species.



Ring-necked Parakeet

J Grammer



One of the professional hunters and a member of SPDF working together to target the parakeets

The removal of a large number of birds has changed the behaviour and movements of the remaining population. Compounding these behavioural effects of a declining population, the parakeets are also highly sensitive to disturbance of any sort. The team have learned that the parakeets' movements between feeding and roosting areas can change instantly and unexpectedly in response to both urban and natural disturbances; for example, construction work, falling or removal of trees/branches or changes in landscaping or lighting conditions. Thus, to keep 'on top' of the ever-changing situation and ensure success with the shooting, the team members put considerable effort into observing the birds' movement patterns around Mahé on a daily basis. The observations take up the majority of the non-hunting team members' time and are equally if not more important than the hunting efforts themselves since they are key to the success of any targeting. To remain effective, the team have had to constantly adapt their

strategy and approach to adjust to these changes in the bird's behaviour.

In July 2014 another professional hunter was recruited, which doubled the efforts of the team, and by December over 80% of the population had been eliminated. This was an impressive achievement for the project but the most difficult part of the eradication - targeting the final, educated and elusive birds - is still ahead and could take many more months. The eradication project has recently received substantial financial support from the Department of Environment, the Environment Trust Fund Seychelles and the Global Environment Facility, which should enable the completion of this eradication.

There were some reports by members of the public of parakeets seen on Silhouette and Praslin. A resident of Silhouette Island successfully targeted the known lone parakeet on Silhouette. On Praslin, the team spent a week talking to all staff and guides at the Vallée de Mai, everyone who had reported hearing or seeing a parakeet on the island, and members of the public, including several fruit farmers. They also conducted observations at key viewpoints in areas where the bird had been reported but found no sign of any parakeets on Praslin. This does not rule out the presence of a parakeet on Praslin and further observations are required to be able to confirm its occurrence or absence. The team will return to Praslin in 2015 to continue their investigations.

The progress to date on this project is testament to the dedication of the team and the importance of the partnership with the Environment Department, the Police Special Services Wing and the SPDF. It is also dependent on the continuing support of the public so we would like to express our sincere gratitude to our fantastic supporters and network of local residents who provide essential help to the project with daily observations, reports, counts, access permission, and refreshments! Your support will be increasingly important to reach the goal of eradicating this major invasive species from Seychelles.





Several ring-barked invasive trees in the Vallée de Mai

## Introduced tree removal from the Vallée de Mai

Great strides were made in 2014 with the start of a comprehensive plan to control the introduced plants and trees in the Vallée de Mai. This ambitious plan was based on information gathered during a detailed plant survey in 2013, which provided information on the abundance and distribution of introduced plant species in the Vallée de Mai as well as the surrounding Praslin National Park.

Using this data, along with a literature research and consultation with local experts and members of partner organisations, such as the Seychelles National Parks Authority (SNPA), a management strategy was developed for these invasive plants. Several criteria were used to assess which species should be addressed first, which life stage should be targeted and what control methods to use. It was decided to focus on adult reproductive trees of six species to start with: kalis dipap (*Tabebuia pallida*), santol (*Sandoricum koetjape*), lagati (*Adenanthera pavonina*),

albizia (*Falcataria moluccana*), jackfruit (*Artocarpus herterophyllus*) and bwa zonn (*Alstonia macrophylla*). A combination of ringbarking and herbicide would be used for each tree. The use of herbicide was only decided upon following trials that ensured there would be no impacts on either the surrounding vegetation or water quality. Before starting with the control programme a distribution map was completed and the team walked the entire Vallée de Mai locating and marking all adult trees of these target species. The team then began the control treatment, with the invaluable assistance of fieldworkers and staff from SNPA, and it was completed in around six months with a total of 1422 trees controlled (18 albizia, 59 santol, 65 jackfruit, 44 bwa zonn, 666 lagati and 570 kalis dipap).

To test the effectiveness of the control methods, the team regularly checked a number of the treated trees. The trees health state and any defense methods that developed (e.g. aerial roots, regrowth of bark, explosive flowering/fruitletting, etc.) were recorded. At this point no extreme responses were

observed and further action was not deemed necessary. Nevertheless, the resilience of these species is well known, and the trees will continue to be monitored and the control methods repeated if necessary.

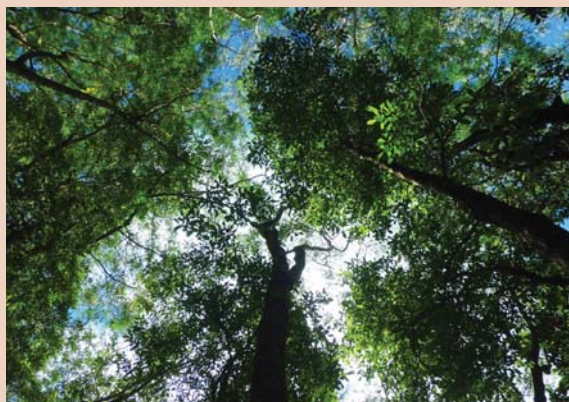
The team then faced their next challenge, the treatment of the most widespread invasive plant in Seychelles, Cinnamon (*Cinnamomum verum*). Control for this species was conducted alongside the mapping of the strawberry guava (*Psidium cattleianum*). At the end of December, 321 cinnamon trees had been treated and 89 guavas recorded. Whilst controlling the cinnamon, any saplings encountered of any of the previous six target species were also controlled or removed. There are only a few cinnamon trees

remaining that will be addressed early in 2015. This will be done alongside the control of guava, and other invasive species such as Chinese palm (*Livistona chinensis*), the prolific vya tang (*Dieffenbachia seguine*), rubber tree (*Hevea brasiliensis*) and bwa ber (*Pentadesma butyracea*).

By the end of 2014, the 19.5 ha of the Vallée de Mai had been covered twice by the team treating a total of 1,782 trees. This is the first time in the history of the Vallée de Mai that such a large scale plan for invasive plant control has been implemented. However, there is still much more work to do and the area will need to be regularly monitored over the next few years.

## Leaf litter experiment

Changes in light, temperature, humidity or other physical parameters due to the removal of large trees can cause potentially harmful effects on the forest biota. With this in mind, the invasive species team conducted several experiments, which concluded in 2014. One of the experiments has shown how the creation of gaps in the forest canopy (e.g. by the removal of invasive trees) benefits the regeneration of introduced plants over native plants. A second experiment provided evidence that covering the ground with palm leaves encourages the growth of native seedlings rather than introduced plants. As a result of this experiment, endemic latannien fey (*Phoenicophorium borsigianum*) leaves will be placed on the ground under the introduced trees that are being controlled.



Above: gaps in the forest canopy can benefit the regeneration of introduced plants. Below: The leaf litter experiment in the Vallée de Mai where some areas were covered with endemic palm leaves







The first eight introduced species that were targeted (clockwise from top left): Lagati, bwa zonn, jackfruit, santol, albizia, kalis dipap, cinnamon, strawberry guava.



## Yellow Crazy Ant survey

Since 2009 the abundance and distribution of Yellow Crazy Ants (YCA) in the Vallée de Mai has been assessed through an annual survey. Surveys between 2010 and 2013 have shown that the species range and population size has not changed markedly and that the population remains confined to the north-eastern part of the Vallée.

In December 2014 the fifth YCA survey was completed. The main objective of this survey was to determine the factors that were limiting the population's distribution as they could potentially be used to control the species. To do this additional data was collected in the survey regarding the ant's ecological relationship with other species. Through the use of pitfall traps, the presence of other ant species could be detected. At each trap, several variables were also recorded - temperature, humidity, canopy cover, ground cover type and habitat type. In addition, an increased number of sampling points were surveyed resulting in a finer-scale assessment of the ant distribution.

YCA were present at 24 of the 50 survey points. This is a significant increase compared with the previous survey in November 2013 and the historically occupied areas. There was a slight change in distribution with six newly occupied points, all of them towards the north of the reserve. Nevertheless, ants were absent from four points that were previously occupied. These results should be con-

sidered carefully as the increase could be attributed to higher detection rate by the newly used pit-fall traps, and an underestimation in previous surveys. It does not necessarily mean that the range of the YCA is widening.

Previously the YCA was suspected to have a competitive relationship with the White-footed Ant (*Technomyrmex albipes*). This would limit the distribution of the YCA as the two ant species would occupy different areas. But the survey results showed that it was with the big-jawed Matektek (*Odonotomachus simillimus*) that the YCA had an exclusive relationship, as their distributions were in distinctly different areas. In addition, three new species of ant that had not been previously recorded in the Vallée de Mai were noted in the surveys. The suspected mutualistic relationship between the YCA and scale insects was also investigated during the survey, as the scale insects are a source of sugary honeydew for the ants, and are known to define the spread of YCA in other areas. This relationship was only found in a small area in the north eastern area of the Vallée. However, a new mutualistic relationship was observed between the YCA and another kind of cicada, the endemic Buffalo Tree Hopper (*Leptocentrus madly*), which also produces honeydew.

Further research is needed to fully understand these new findings and to assess the efficacy of potential methods that could be used to control YCA in the Vallée de Mai.



Yellow Crazy Ants have been observed tending scale insects



Volunteer Pedro Martinez sets the pitfall traps for the Yellow Crazy Ant survey





Indian Mynah Bird

## Indian Mynah Bird survey

The Indian Mynah Bird (*Acridotheres tristis*) is included in the top 100 list of the world's worst invasive alien species by the IUCN's Global Invasive Species Database. An aggressive bird, it is known that mynahs compete for nesting hollows with other birds and, on some occasions have been known to prey on other birds' eggs and chicks. This makes them particularly threatening to endemic bird species such as the Seychelles Black Parrot, as well as the many endemic species of reptiles and invertebrates of the Vallée de Mai that they also feed on.

Mynahs are extremely common and well established on many of the Seychelles granitic islands. SIF has been monitoring their numbers on Praslin, in particular their proximity to the Vallée de Mai and the surrounding Praslin National Park. In 2010/2011 a survey of the presence of mynah birds in these areas was undertaken and was repeated again in 2014 at the same locations to establish if the distribution of mynahs was widening. The surveys showed that their presence at the chosen points had substantially increased, from a total absence in the area in 2010/2011 to a presence rate of 31% in 2014. Fortunately no mynahs were detected within the boundaries of the Vallée de Mai, although they occurred in close proximity. In some locations birds were present only 170 m from the reserve boundary

which is a significant increase from the approximate minimum distance of 1.2 km in 2011. At the moment there is no quantifiable impact of mynahs on other endemic bird species, which are still more abundant and widespread in the surveyed area than mynahs.

Four years ago, mynahs were common around the coastal, cultivated and urban areas of the island and were rarely encountered in the native forest or upland areas. Now they are frequently seen in other habitats and appear to be encroaching on the Praslin National Park from the north and east; the same directions that the nearest urban areas are located - Baie Ste Anne and Cote d'Or. This serves to underline the close relationship between the abundance of this invasive bird species and human presence.

Although mynahs have been successfully controlled, and even eradicated, from other smaller islands in Seychelles, Praslin's size and the high number of mynah birds on the island make control of this species extremely difficult. As yet no control measures will be taken for mynah birds in the Vallée de Mai but regular surveys will continue to be carried out to monitor the distribution of this species. If and when control methods are deemed necessary they will be carefully considered and reviewed before any action is taken.



The sisal stand at Ile Michel in February 2014 before treatment (left) and in October 2014, six months after the first treatment (right).

## Sisal eradication progress on Aldabra

Control of invasive sisal (*Agave sisalana*) on Aldabra has been ongoing since the 1970s. In 2013/2014 research into other possible eradication and control techniques for this plant was undertaken. After reviewing both mechanical and chemical control methods, a chemical approach was chosen as it had been shown to be successful in other invasive plant eradications worldwide. A trial was conducted to understand which combination of herbicide concentration and application method would be most effective for large-scale management with limited environmental side effects. The trial found that the plants only died after the central growing leaf was cut and herbicide applied directly to the growing tip. Since the herbicide is applied directly to a very small area of the plant and not sprayed, there are no non-target effects with surrounding vegetation, even when very close to the treated plants, remaining healthy.

From a survey in 2013, sisal was known to occur at three locations at Aldabra; Picard, Ile Michel and Anse Polymnie. In March 2014 the first patch of sisal on Polymnie was treated using the methods from the previous trial. This patch consisted of a small

number of large plants that were rooted deeply in the limestone rock, plus two dozen small plants that had re-sprouted after being manually cleared in 2012. At the end of 2014, Polymnie was confirmed to be sisal free with no re-growth of plants. The patch of sisal on Picard was also treated in March but repeated treatments were necessary at this patch as regular monitoring by staff showed that there was still some re-growth of small plants. This will continue to be monitored and we hope Picard will be sisal free early in 2015.

The biggest challenge for the eradication of sisal from Aldabra was the large, dense patch on Ile Michel in the eastern side of the atoll's lagoon. Ile Michel is one of the largest lagoon islands and can only be reached during a limited number of high tides each month. This sisal patch consisted of several thousand large plants (>2 m high) and a similar number of smaller plants growing underneath.

In March 2014, a team of six intrepid staff visited Ile Michel to start the eradication of this patch. The team suited up in coveralls and other protective clothing, wearing safety goggles to protect their





The sisal team in March 2014 ready to treat the plants at Ile Michel

eyes. Protective gear is essential for this work as sisal leaves are serrated, with needle sharp spikes on the tips of the leaves, and a sap that can cause skin irritation. Around 70% of the sisal plants in the patch were treated with herbicide. A return visit was made in May to check the outcome of the treatment and assess plant mortality. The team found that about 60-70% of the treated plants were dead or showing clear signs of dying, with no effects of the herbicide seen on non-target species. In October another visit was made to try to eliminate the last of the surviving sisal plants. At this point most of the large plants had died, making it possible for the team to remove the dead material and reach the much smaller plants still growing underneath. Over two days the team worked through the patch inch by inch, removing dead plant material and cutting and treating all remaining small sisal plants, some of which some were smaller than an inch high.

The Aldabra team will regularly monitor the three controlled sisal patches in 2015 and remove any new plants that might re-sprout from remaining roots. We are confident that Aldabra should be declared sisal free very soon, which will be the first sisal eradication on a large island.

## Rat and cat eradication feasibility study on Aldabra

### Rat trapping

Invasive mammal work on Aldabra has continued in 2014 with the fifth rat trapping season undertaken to assess the density of the rat population in different habitats on Picard. This data will assist in the drafting of a rat eradication plan for the atoll. To estimate population density, a mark-recapture study is being used in three trapping grids on Picard. The captured rats are marked with a small metal tag in their ear to allow them to be recognized on recapture. Their weight, size and sex are also recorded. Several rats captured and marked in the mangroves in February 2013 were recaptured in late 2014, showing that these rats can probably reach over two years in age. The team also conducted two mark-recapture rat trapping grids at Cinq Cases on Grande Terre. They trapped every night for 10 nights in a grid area of 100 x 100m, with 25 cage traps in each grid.

Initial analyses of the data show that the density of rats on east Grande Terre seems to be considerably less than the densities on Picard. Furthermore, adults of both sexes are much smaller than rats caught on Picard. This information will be invaluable when it comes to planning a rat eradication on Aldabra.



## Bait trials in mangroves

On Aldabra, rats occur in all available vegetation types, including mangrove forest, at high densities. Mangrove forest appears to be a particularly good habitat for the rats with larger recorded body sizes, larger juveniles and better body condition than rats trapped in 'terrestrial' forest.

The most common and successful technique in eradicating rats from islands is to distribute poisonous rat bait. The periodic cycle of tidal inundation in the mangroves however, poses a problem for this technique as bait may get washed away, making it inaccessible to rats only hours after distribution. On smaller scales, poisonous bait blocks have been nailed to trees in mangrove areas to counter this problem but for the vast area of mangroves on Aldabra this is not a viable method. Another technique involves creating poisonous bait bolas (two bait blocks connected by a string) that are thrown or propelled in the canopy and caught by twisting around branches. Although this method of bait distribution has not yet been technically proven possible on a large scale, it was still trialled on Aldabra to investigate if there would be uptake of the bait by rats.

In the trial a small-scale (60 m x 60 m) grid was created with regular spacing of bait distribution points. Pellets of non-poisonous bait with marker dye were drilled and connected to strings. These bait bolas were manually thrown into the canopy at each distribution point and traps were set inside the grid a few days later for three nights. During this period there was a spring tide that allowed for complete inundation of up to 1 m depth in the grid.

Only four rats were captured in the first three nights of trapping, but three of these had eaten the bait. Three additional nights of trapping 10 days later, as part of the regular research programme, captured a total of 13 rats that had eaten the bait, five of which had eaten the bait very recently as it was still present in the stomach. The low number of rats caught during the first three nights trapping was disappointingly low, but the fact that 75% had eaten the bait and, more than a week later, rats that had eaten bait were still being caught, is very promising.



Above: A poisonous bait bola ready to be distributed in the mangroves.

Below: Staff members threw the bait bolas by hand to distribute them in the mangroves



Although this method demonstrated some potential success in eradicating rats from the mangroves, its application to the large mangrove area of over 1600 ha at Aldabra would need further consideration. It has been a useful trial however and will help to inform any future eradication plan.



## Cat population density on Grande Terre

Grande Terre is the only island on Aldabra where feral cats are still present and research into the density of the cat population is required before an eradication programme can be planned. Work towards this was conducted in 2014 with the use of wildlife camera traps to assess feral cat population density on Grande Terre. Sixteen trail cameras were placed in a four-by-four grid formation, 700 m apart. The cameras have a motion sensor and are triggered by cats when they enter the viewfinder of the camera. The cameras were set to only take pictures from dusk to dawn, when cats are generally more active, to maximise the battery life.

The cameras were retrieved after being active for approximately six weeks and an initial review of the results has revealed that 13 cameras took pictures of a cat on one or more occasions. The other three cameras experienced technical problems and did not record any cat presence. The next step is to carefully go through all pictures and try to identify individual cats by their size and markings. Once identified, re-sightings of individuals can be used to estimate cat density in this area, in a process similar to that of the rat trapping. This will not be an easy task however, as the pictures are black and white and many are blurred making individual identification difficult, which is vital for a meaningful density calculation. Further in-depth analysis of these pictures is planned for 2015.



Above: Cat tracks on West Grande Terre. Below: A feral cat captured on a camera trap on Grande Terre



# Education and Outreach

Highlights for the SIF Education and Outreach Programme in 2014 included the launch of a community stewardship scheme for invasive plant species on Praslin, a fun run to raise awareness of the threat of Coco de Mer poaching, and a visit to the Vallée de Mai by all first year secondary students in the country.



## Education

### Friends of Vallée de Mai club

In 2014 there were 96 children enrolled in the Friends of Vallée de Mai club from all four schools on Praslin. The members participated in many of the outreach activities organised by SIF throughout the year as well as having regular club sessions at school. Over the past few years the club continues to go from strength to strength with each school club full every term, and many repeat members



Some of the SIF students that visited the Vallée de Mai in 2014

who often stay in the club for several years. These long-term members are an asset to the club in their commitment, knowledge and experience and they have truly become youth ambassadors for the Vallée de Mai.

### School presentations and visits

There were 18 school groups that visited the Vallée de Mai this year from seven different schools across Mahé, Praslin and La Digue, which was an impressive total of 440 students. In addition to these independent visits, SIF collaborated with the Seychelles National Youth Council (SNYC) on a new nationwide initiative where SNYC tried to reconnect students with nature. As part of this initiative all students in the first year of secondary school visited the Vallée de Mai, a total of 745 students from all 11 state secondary schools.

SIF's Education and Outreach Programme Officer also gives presentations in schools on a variety of topics. This year, 27 presentations were given in 10 different schools on Mahé and Praslin. The presentations were on a variety of subjects including birds of Seychelles, sustainable living, Ring-necked Parakeets, and the Vallée de Mai.





Part of the holiday camp's objectives are to get students to discover for themselves the natural world of the Vallée de Mai

## SIF Holiday Camp

The SIF Holiday Camp programme continued with two holiday camps held at the Vallée de Mai in 2014, during the August and December school holidays. The camps were held over five days and a total of 40 children attended, with children aged from 8-11 years old attending the camp in August and those aged from 4-7 years old attending the camp in December.

The camps were an opportunity for the children to learn about the Vallée de Mai forest ecosystem and Aldabra, as well as other aspects of the natural environment. The camp aims to further the children's understanding of the natural world and give them a chance to experience nature up close. The children were taught a variety of subjects through a mixture of theoretical classroom activities, such as presentations and worksheets, but also through practical field sessions, and arts and crafts. While learning about invasive species for example, the children took a guided tour in the Vallée de Mai to learn about the invasive plants and animals first-hand, and also helped clear more invasive plants from the community stewardship plot launched by SIF earlier this year (see p. 49). This enabled the children to be directly involved in the management of these invasive species and learn how they can help to protect the native biodiversity of Seychelles.

## Outreach

SIF's profile was raised at a national level by a number of outreach events in 2014. These events have provided an excellent opportunity for SIF to communicate with a local audience on specific projects and to share knowledge on Aldabra and the Vallée de Mai. From a total of 16 events it is estimated that around 2,800 people were engaged in the activities. A synopsis of a selection of these events is provided below.

### World Wetlands day

To commemorate World Wetlands Day, the Wetlands Unit at the Department of Environment on Praslin collaborated with SIF to organise activities for 15 schoolchildren from Praslin. The children visited the Pasquere wetland on Praslin to learn more about wetlands, their function and the species that live in this type of habitat. The children spent several hours in the wetland discovering different animals plants including how they have adapted to this unique environment. They also conducted a small 'mangrove survey', identifying the different mangrove species and recording any animals that they saw.



## World Wildlife Day

This new global event was celebrated for the first time in 2014 on 3<sup>rd</sup> March and was facilitated by the Convention on International Trade in Endangered Species (CITES). It seemed appropriate to focus on one of Seychelles CITES listed species, the Coco de Mer, and children from Praslin voiced their concerns on the issue of Coco de Mer poaching at a ceremony at the Vallée de Mai. Each school had asked their students to write a group letter on the issue that was read out and presented to the two Members of the National Assembly of each respective district at the ceremony. The children called for 'tougher punishments for poachers' and declared that they would like 'us all to make our contribution to help the Coco de Mer'. The Members of the National Assembly accepted these letters and proposed to take them to the National Assembly for further discussion.

## Earth Day

To learn more about sustainable practices in action 20 children from the Friends of Vallée de Mai club on Praslin visited the GVI Seychelles research base



Students and staff at GVI Seychelles create an Earth Day banner

on Curieuse Island in celebration of Earth Day. GVI staff and volunteers gave the children a guided tour of the different sustainable measures they had taken at the base to mitigate effects of climate change. The first part of the tour introduced the photovoltaic system that is installed at the research base, and explained how light energy from the sun generates electricity for the GVI base through this system. The second part of the tour looked at how rainwater is harvested on site and stored for use on the base. The final part of the tour visited the small kitchen garden that was planted with a variety of herbs and vegetables that are harvested by the team, and reduced their external food consumption. This enriching experience was an excellent way to learn more about ways that we can all live more sustainably and have a smaller impact on the environment.

## World Environment Day

For the first time on the 5<sup>th</sup> June, the Vallée de Mai organised a relay Fun Run on Praslin to raise awareness of the issue of Coco de Mer poaching for World Environment Day. Over 150 people from twenty different local organizations participated in the race. The relay run started at Baie Ste Anne primary school with the last leg racing through the Vallée de Mai on the North Circular path, then finishing at the Vallée de Mai visitor centre. After the run, each team read out a pledge on how they would help to fight Coco de Mer poaching and raise awareness of this issue in the community. It was a very successful event and all of the organisations were keen to participate in similar activities in the future.



Participants in the fun run race to the Vallée de Mai to highlight the threat of poaching to the Coco de Mer.



# Invasive species activities

## Invasive species community stewardship scheme on Praslin

A new community stewardship scheme was launched by SIF at the Vallée de Mai to promote the protection of native palm forest. The launch of the scheme coincided with celebrations for the International Day of Biodiversity on 22<sup>nd</sup> May.

As part of SIF's four-year EU-funded project to tackle invasive alien species there was a need to raise awareness of the threat of invasive plant species to the endemic plants of Seychelles and to engage the local community in their control. This stewardship scheme aims to encourage the local community to become 'stewards' for a plot of land opposite the Vallée de Mai in Praslin National Park. With SIF's assistance and guidance it is hoped that community members will maintain and protect this area from invasive plant species into the future.

At the launch event in May, around 100 participants from local community groups and schools worked alongside Vallée de Mai staff to clear invasive plant species such as Vya Tang (*Dieffenbachia seguine*) and Philodendron creepers (*Philodendron* sp.) from the plot, as well as planting over 170 native and endemic plant seedlings. The species planted included Bwadanat (*Heritiera littoralis*), Lattanyen Lat (*Versaffeltia splendida*), Lattanyen Fey (*Phoenicophorium borsigianum*), Lattanyen Milpat (*Nephrosperma vanhoutteanum*), Lattanyen Oban (*Roscheria melanochaetes*), Palmis (*Deckenia nobilis*), and Vakwa parasol (*Pandanus hornei*).

Members of the local community returned throughout the rest of the year to assist in the maintenance of the plot and continue planting endemic seedlings, replacing any that had not survived. It is hoped that over the years as the seedlings grow they will out-compete the invasive species thereby restoring the native forest in this area. A big thank you to all our supporters and volunteers who gave up their free time and energy to support and participate in this new scheme, and of course to the many partners who have worked with us on the project.



Above: A student plants an endemic palm seedling at the stewardship plot on the International Day of Biodiversity



Below: A pile of invasive Vya Tang roots removed from the stewardship plot.



Entries in the invasive species poster competition held in local schools by SIF

## International Day of Biodiversity

The theme for the 2014 International Day of Biodiversity was 'Island Biodiversity'. With this in mind SIF chose to focus their celebrations on the threat that invasive species pose to the unique biodiversity of the Seychelles. Several different activities were organised at the Vallée de Mai, including the launch of the community stewardship scheme (see above). Visitors to the Vallée de Mai could try their hand at the Biodiversity Day trail quiz as they explored the forest. With some assistance from fact sheets placed throughout the forest, the trail quiz tested their knowledge of the wealth of biodiversity found in the Vallée de Mai. A group of 30 children from local schools who came to the event learned more about the impacts of invasive species on the environment by participating in different games such as 'Invasive species bingo' and 'Invasive or Native?', where they had to guess if a species was invasive or native. Earlier in the year a poster and photography competition was launched in the primary and secondary schools. The theme of the competition was 'Invasive species: a threat to our island biodiversity' and the prizes were awarded at the biodiversity day event. The judges noted that they were impressed with the high standard of entries for this competition.

## Clean up the World Day

SIF held an event on 20<sup>th</sup> September to maintain and 'clean' the recently launched stewardship plot at the Vallée de Mai of invasive plant species, expanding the focus of this global environmental day to incorporate invasive species into the clean-up. The team for this event was members of the Friends of Vallée de Mai club, Praslin Scout Association and Vallée de Mai staff. The team split in two and some concentrated on the removal of invasive plants at the stewardship plot, such as Vya Tang and Lerb Lanmar, and replaced them with endemic palm seedlings and seeds such as Lattanyen Lat and Palmiste. In total around 150 endemic seedlings were planted. The rest of the team collected rubbish along the roadside from the Vallée de Mai to Grande Anse with a total of 56 kg of non-biodegradable waste gathered. In the afternoon, SIF joined several other local organisations to form a motorcade that toured the communities of Praslin highlighting the need to protect and clean up the local environment. The staff used the opportunity to raise awareness on the impact of invasive plant species to the native biodiversity of Seychelles.



Members of the local community assisting in removing invasive plants from the stewardship plot near the Vallée de Mai.



# VIP visits

## President of Cape Verde visits the Vallée de Mai



The President of Cape Verde H.E. Dr. Jorge Carlos De Almeida Fonseca at the Vallée de Mai.

We were honoured to welcome the President of Cape Verde, H.E. Doctor Jorge Carlos De Almeida Fonseca, to the Vallée de Mai on Praslin in June 2014. President Fonseca was accompanied by Ministers Mitcy Larue and Jean-Paul Adam and was welcomed by the Chairman of SIF, Ambassador Maurice Loustau-Lalanne and the Vallée de Mai staff.

Ambassador Loustau-Lalanne accompanied the President on a tour of the visitor centre after which they took a walk in the unique palm forest where the ambassador explained the importance of this forest to the biodiversity of Seychelles. President Fonseca saw both the male and female Coco de Mer trees and had the opportunity to play the infamous 'Guess the weight of the Coco de Mer' game. The President was an enthusiastic participant and gave an impressive

guess, only 2 kg more than the actual weight of 21 kg. Afterwards a Vallée de Mai staff member demonstrated the de-husking of a giant Coco de Mer nut and the President and his delegation were surprised at the strong odour of the Coco de Mer husk.

On their return to the visitor centre Ambassador Loustau-Lalanne and the President discussed the importance of the Vallée de Mai in the support of Aldabra Atoll, reinforced by the display items that showcased the unique wildlife of Aldabra. Minister Larue then presented the President with a Coco de Mer nut as a 'souvenir of Praslin'. Ambassador Loustau-Lalanne also presented him with a book, co-authored by SIF CEO Dr Frauke Fleischer-Dogley, on the history and biology of the Coco de Mer.

# Staff Training and Movements

This year SIF continued to invest in the training and development of their staff. Many staff members participated in national workshops and several also expanded their skills and qualifications in a range of areas with support from SIF and their partners.

## Staff Training

Overseas training		
<b>June</b>	Mariette Dine	Ecole Thematique sur les invasions biologique, Réunion
<b>October</b>	Marc Jean-Baptiste	Experiences of World Heritage in Africa, Morocco
Other training		
<b>February</b>	Wilna Accouche, Mariette Dine	Cybertracker course
<b>March</b>	Mariette Dine, Dylis Pouponeau, Catherina Onezia Marc Jean-Baptiste, Wilna Accouche	Marine mammal visual monitoring (MCSS) Emergency Response planning workshop
<b>April</b>	Mariette Dine	QGIS for Ecological Monitoring
	Dainise Quatre, Rebecca Filippin, Daig Romain, Philip Haupt, Christina Quanz, Heather Richards, Catherina Onezia	Tropical Coastal Ecosystems online course, University of Queensland
	Christina Quanz, Terence Mahoune, Jessica Moumou	Coral reef monitoring workshop (ARVAM)
<b>June</b>	Steve Denis	Microsoft Excel/Word Level I
<b>September</b>	Sheril de Commarmond	Coral reef monitoring and PADI Advanced Open Water course (GVI)
<b>November</b>	Shane Brice Giovanni Rose Annette Bonne	Under 60 miles coxswain licence PADI Advanced Open Water course Introductory certificate in Financial and Management Accounting
	Marille Benoit	Diploma in Human Resource Management (SIB), 2012-2014

## Staff Movements

<b>March</b>	CEO	Steering committee meeting for EU funded project on Islands and Invasive Alien Species, Mauritius
<b>June</b>	CEO, Science & Projects Programme Coordinator	Capacity building workshop for SIDS on Invasive Alien Species, Montreal
<b>July</b>	Janske van de Crommenacker	Island Biology conference, Hawaii
<b>September</b>	CEO	African Regional Preparatory Meeting for the 11 <sup>th</sup> Conference of the Parties to the Convention on Migratory Species (CMS), Zimbabwe
<b>November</b>	CEO	IUCN World Parks Congress, Sydney



# Publications

## Media (Newspaper and magazine articles)



Date of publication	Publication name	Article title
01/01/2014	Silhouette	Aldabra and its extended family
01/02/2014	FIRST Magazine	Leader in Environmental Protection
10/02/2014	Nation	Aldabra prize for eco-school competition re-launched
12/02/2014	Today	Vallée de Mai to tackle invasive plants
24/03/2014	Nation	Speaking out for World Wildlife Day
31/03/2014	Nation	New materials to boost visitors experience in the Vallée de Mai
01/04/2014	Sesel Sa	Celebrating 30 years of conservation
01/05/2014	Kreol Magazine	Vallée de Mai:Thirty years on
05/01/2014	Silhouette	Vallée de Mai: 30 years of discovery
01/05/2014	Asian Diver	Treasured territory:Aldabra's untouched paradise
02/05/2014	Nation	Outreach programme a great success
05/05/2014	Nation	Seychelles Black Parrot an endemic species
11/06/2014	Nation	SIF involves Praslin community in fight against invasive species
13/06/2014	Today	National Parks celebrates 35 years
20/06/2014	Nation	SIF welcomes the President of Cape Verde to the Vallée de Mai
01/07/2014	Sesel Sa	The Black Parrot: National Bird of Seychelles
21/07/2014	Nation	Ring-necked Parakeet numbers reduced by 50%
05/08/2014	Nation	End of season for invasive bird eradication at Takamaka
01/09/2014	Silhouette	Our National Bird:The Seychelles Black Parrot
01/09/2014	Nation	Children learn about the environment in the 5 <sup>th</sup> SIF holiday camp
01/09/2014	Nation	Extinct snail rediscovered at UNESCO site Aldabra Atoll
08/09/2014	Nation	Management plan for Aldabra
01/10/2014	Sesel Sa	The Vallée de Mai:A World Class experience
15/10/2014	Nation	RNP appeal for information
01/11/2014	Mollusc World	Rediscovery of Aldabra Banded Snail
06/11/2014	Architects Journal	Marks Barfield wins contest for Seychelles World Heritage Site
08/11/2014	Today	SIF Newsletter

## Scientific publications (peer-reviewed articles)

Bunbury, N. (2014) Distribution, seasonality and habitat preferences of the endangered Madagascar Pond-heron *Ardeola idae* on Aldabra Atoll: 2009–2012. *Ibis* 156: 233–235.

Edwards PJ, Fleischer-Dogley F, and Kaiser-Bunbury CN. (in press) The nutrient economy of *Lodoicea maldivica*, a monodominant palm producing the world's largest seed. *New Phytologist*.

Kaiser-Bunbury CN, Fleischer-Dogley F, Dogley D and Bunbury N. (in press) Scientists' responsibilities towards evidence-based conservation in a Small Island Developing State. *Journal of Applied Ecology*.

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

Martin RO, Perrin MR, Boyes RS, Abebe YD, Annorhah ND, Asamoah A, Bizimana D, Bobo KS, Bunbury N, Brouwer J, Diop MS, Ewetu M, Fotso RC, Garteh J, Hall P, Holbech LH, Madindou IR, Maisels F, Mokoko J, Mulwa R, Reuleaux A, Symes C, Tamungang S, Taylor S, Valle S, Waltert M and Wondafrash M. (2014) Research and conservation of the larger parrots of Africa and Madagascar: a review of knowledge gaps and opportunities. *Ostrich*, 85(3): 205–233.

Reuleaux A, Richards H, Payet T, Villard P, Waltert M and Bunbury N. (2014) Insights into the feeding ecology of the Seychelles Black Parrot *Coracopsis barklyi* using two monitoring approaches. *Ostrich*, 85(3): 245–253.

Reuleaux A, Richards H, Payet T, Villard P, Waltert M and Bunbury N. (2014) Breeding ecology of the Seychelles Black Parrot *Coracopsis barklyi*. *Ostrich*, 85(3): 255–265.

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OSTRICH  
ISSN 0038-082X EISSN 1727-847X  
http://dx.doi.org/10.29095/OSTRICH.2014.85.361

### Breeding ecology of the Seychelles Black Parrot *Coracopsis barklyi*

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Knowledge of breeding ecology is required for many conservation interventions. The Seychelles Black Parrot *Coracopsis barklyi*, endemic to the island of Praslin, is vulnerable to extinction. We aimed to improve understanding of *C. barklyi* breeding ecology to aid conservation planning. We present the results of four years of research, including nesting cavity characteristics and availability, reproductive success, breeding parameters, parental behaviour and reproductive strategy. Thirty-six breeding attempts were studied over the four seasons. Nests were mainly located in Coco de Mer palms *Lodoicea maldivica*. Deeper cavities with more canopy cover were preferred. There may be a shortage of high-quality nesting cavities in intensive breeding seasons. Average clutch size was 2.2 eggs, incubation period was c. 15 d and egg fertility was 71%. Rats were key nest predators, causing the failure of up to 33% of breeding attempts. The probability of nest success was 52%. At least 57% of fledglings survived their first year. This species breeds cooperatively and practices a highly unusual side-by-side copulation. We discuss the implications of the results in the context of former, ongoing and potential conservation measures for *C. barklyi* including translocation, invasive species management, nest box provisioning, habitat restoration and further research.

**Keywords:** avian breeding ecology, breeding success, chick growth, island endemic species, nesting cavity selection, palm forest

#### Introduction

Natural history research, the study of organisms in their environment, has declined in popularity in recent decades. Such research, however, still has much to offer, as a foundation for understanding ecosystem processes and functioning, and particularly in conservation (Bury 2006). 'Knowing your species' through basic natural history work has been described as the first stage in conservation management of threatened populations in one successful conservation framework (Jones 2004). In cases where very little is known about the threatened target species, group or habitat, ecological field research is a crucial prerequisite for effective conservation management (e.g. translocations, re-introductions or captive breeding).

The Seychelles Black Parrot *Coracopsis barklyi* has a small total population of only 520–600 individuals restricted to a single island (Reuleaux et al. 2013). It is one of the rarest species on the Seychelles archipelago and is considered vulnerable to extinction by the IUCN (BirdLife International 2014). Little has been documented, however, about the breeding ecology of *C. barklyi*, or its congeners, *C. sibani* (Comores) or *C. nigra* (Madagascar) in the wild (Stevens et al. 1992; Bollen and van Elsacker 2004; Ekstrom et al. 2007; Rocamora and Laboudallon 2013). The breeding strategy and reproductive dynamics of *C. barklyi* are therefore largely unknown, an information gap which hinders implementation of some aims under the Species Action Plan for the Seychelles Black Parrot (Rocamora and Laboudallon 2009) and which could be restrictive should urgent conservation interventions become necessary.

From the few *C. barklyi* nests that have been documented (Evans 1979; Merritt et al. 1986), it was known that nests are situated in tree cavities, with trunks of the endangered endemic palm Coco de Mer *Lodoicea maldivica* being favoured. This nesting preference was thought to limit the species' breeding range (Merritt et al. 1986) since the native range of *L. maldivica* is restricted to Praslin and Curieuse. The number of nests found was very small (e.g. the first two nests described in Loutiau-Lalanne 1963 [cited in Evans 1979]; three active nests in Merritt et al. 1986; a total of seven nests reviewed by Rocamora and Laboudallon 2013), and in those studies it was not possible to individually mark the parrots, so little could be concluded about breeding strategy or reproductive success. It was recently confirmed that *C. barklyi* is not resident on Curieuse and therefore only breeds on Praslin (Reuleaux et al. 2013), which increases the vulnerability of the population to potentially devastating stochastic effects such as disease, the introduction of competitors or predators, or environmental impacts such as forest fires or storms.

Given the small population and area of distribution of *C. barklyi*, as well as its status as a national bird and flagship species for the Seychelles palm forest on Praslin, the Black Parrot is already a high national priority for conservation management. It has been the subject of intensive ecological field research since 2008, and of conservation interventions, including the ongoing eradication of the introduced Ring-necked Parakeet *Psittacula krameri* from Mahé, which is being implemented as a result of the threat

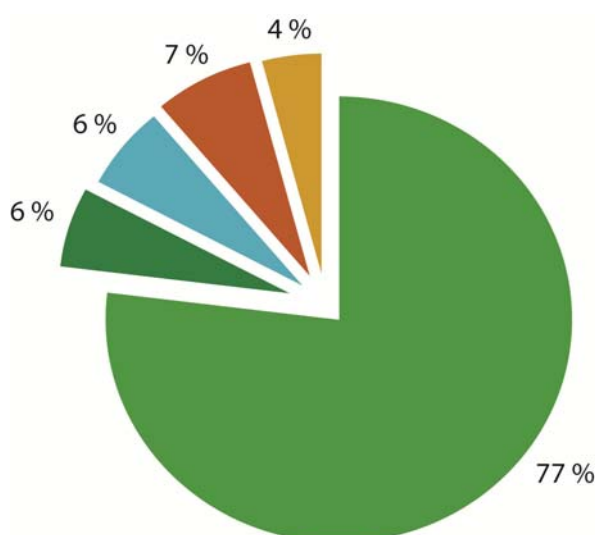




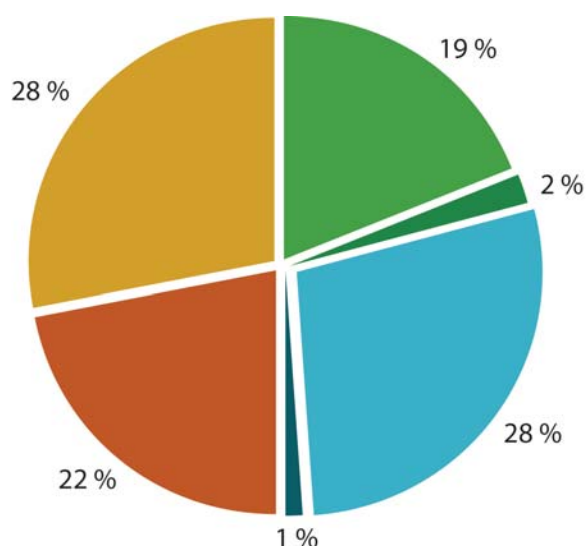
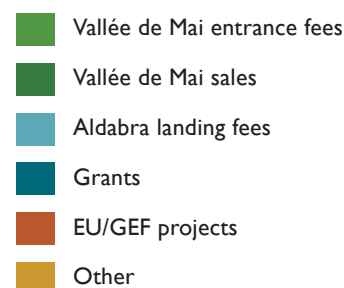
# Financial Information 2014

As in previous years, the main contribution of income was the entrance fees to the Vallée de Mai, which provided 77% of the total income in 2014. The remainder of the income was more evenly spread than previous years, with an increase of 5% in Aldabra landing fees as the threat of piracy has reduced, and a decrease of 7% in income from the EU and GEF as these large projects are in their final stages of funding.

A small increase in expenditure from 2013 in head office and Vallée de Mai operation costs, was attributable to the expansion of the staff teams at both these offices. This will ensure that the visitors to the Vallée de Mai continue to receive an excellent level of service, and that SIF as an organisation can continue to manage and protect both World Heritage Sites effectively.



## INCOME



## EXPENDITURE



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Seychelles National Meteorological Service, IBC Solar

## The following people for their help and advice on specific projects

Katy Beaver (Plant Conservation Action Group)  
Lindsay Chong-Seng (Plant Conservation Action  
Group)  
Adrian Skerrett (Seychelles Bird Records  
Committee)  
The EU Project Steering Committee (Pierre-Andre  
Adam, Ronley Fanchette, Denis Matatiken, Pat  
Matyot, James Mougall, Ronny Renaud, Adrian  
Skerrett, Sidney Suma)

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Göttingen, Germany)

# SIF in a nutshell and how to help

Seychelles Islands Foundation (SIF) is a non-profit charitable organization which was established as a Public Trust in 1979 to **manage, protect, research and promote** sustainable ecotourism in the Seychelles' two UNESCO World Heritage sites of Aldabra Atoll and the Vallée de Mai on Praslin. A major focus is on scientific research to support and improve conservation management of the unique biodiversity and ecosystems of these two very different sites.

To successfully operate and protect two World Heritage sites, which are more than 1000 km apart and each with their specific set of challenges, SIF relies primarily on income generated by entrance fees and sales from the Vallée de Mai. This is supplemented by project funding, grants and donations. Aldabra provides some direct income through visitor impact fees but piracy activities have reduced this source of revenue. SIF's management and work at these sites will continue to be dependent on visitor numbers and the generosity of our supporters for the foreseeable future.

There are a number of ways in which you can help us with this work:

- Visit the Vallée de Mai any day of the year and experience the magic of this unique site for yourself
- Purchase SIF products and souvenirs directly from the Vallée de Mai shop or the SIF Head Office in Mont Fleuri, Victoria
- Stop at the Vallée de Mai cafeteria and support local Praslinois producers and suppliers
- Spread the word - share news and information about SIF's work via social media or word of mouth
- Volunteer for SIF – depending on active projects, there may be limited volunteer opportunities for suitably qualified international volunteers to help with research, conservation work or specific projects for 4-6 month periods.
- Join in with or contribute to our public events, such as environmental theme days or the community stewardship plot on Praslin.

If you would like to contribute, receive more information or are interested in receiving further news about SIF via monthly e-newsletters please sign up on the home page of our website or contact us by email at [info@sif.sc](mailto:info@sif.sc).



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