Kapisen

Plant Conservation Action group

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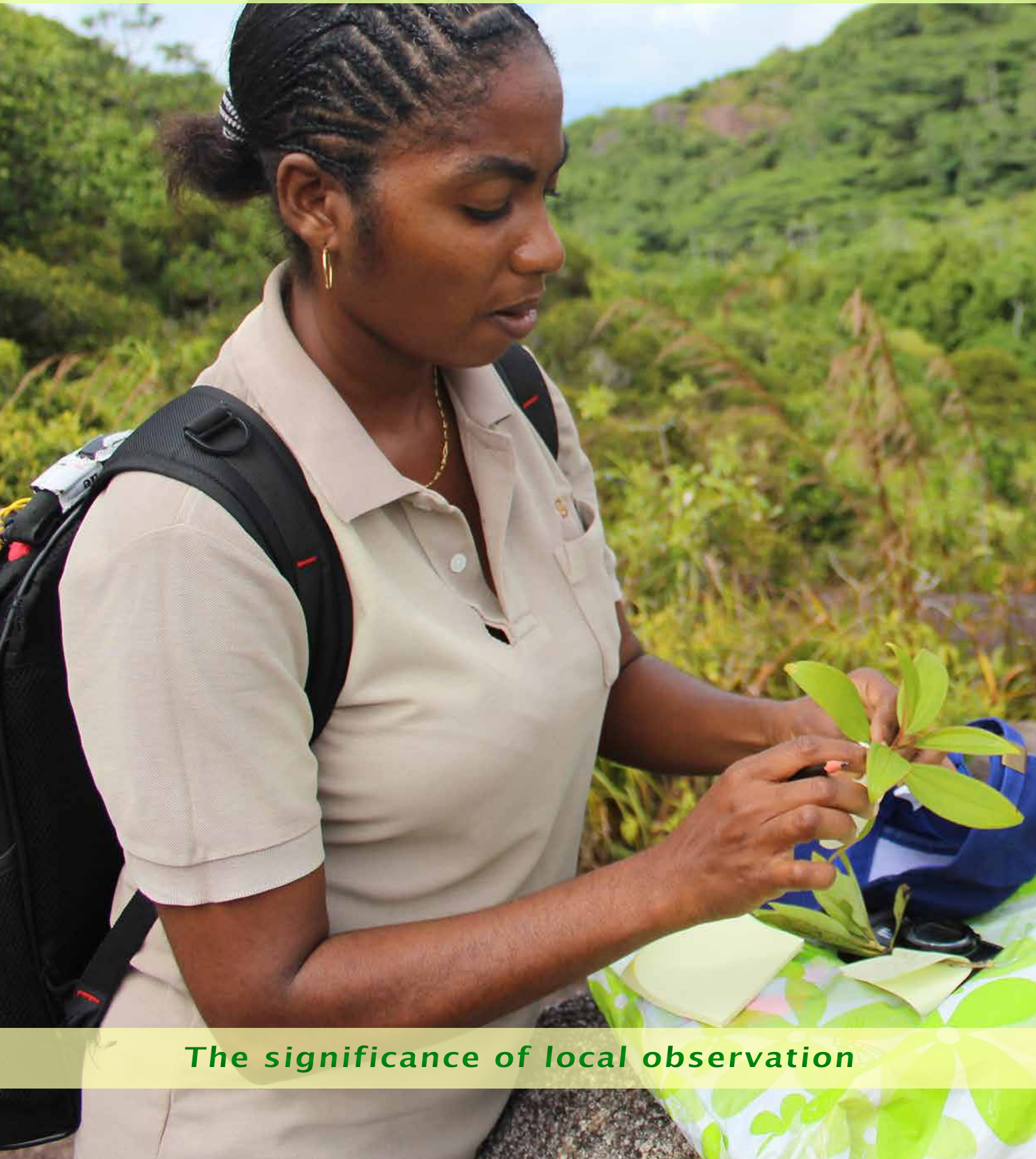
Newsletter



The significance of local observation

The significance of local observation

How are new conservation needs recognized? Often it is with observations... and those made by local naturalists are frequently essential in recognising the significance of a specific habitat or a new species. Scientific studies can then follow, for example to determine whether a newly seen organism is rare, new to science, or a recently introduced alien species (p. 22-23). A detailed study can also measure changes over time in order to answer questions such as "Is the situation becoming better for native species?" The article on page 11 gives one example of such a study in an area of native palm forest that for some years has been considered special and warrants protection. Another example forms part of a PCA joint vegetation restoration project, carried out as a result of studies which revealed that plant-animal interactions are affected by alien invasions (p. 21).

Sometimes a new perspective can trigger further reflection - for example the geological history of a location may help in understanding the origins and evolution of local species. A recent phylogenetic study of the Hypoxidiaceae family (known locally as Koko maron) is revealing endemism that may be explained by geological history (p. 17). Because the ancient history of Seychelles has huge significance for plant evolution (see Kapisen 17) it is useful to have an update by a local geologist on the origins of the archipelago's inner granitic islands (p. 7). Some plants have evolved unique forms in Seychelles, and it is local observations combined with research that is aiding a more complete understanding of the iconic Coco de Mer and its ecological interactions (p. 14).

New perspectives can also be gained by meeting scientists with different experiences, particularly those who also live and work on islands. So, attending an international conference on island biology can be a wonderful source of new ideas, based on scientists' observations of their local situation (p. 8). The recently founded international Society for Island Biology (SIB) aims to facilitate such exchange, interactions and networking among island biologists, who face similar challenges but are geographically isolated (p. 10).

Anyone who has tried to identify plant species knows that it is not necessarily easy. Yet it is essential for rangers and forest workers who are carrying out restoration work to know whether a plant is a native or alien species! A training programme in plant identification was recently devised by PCA members for just that purpose (p. 3). Observations by the Seychelles Herbarium team (p. 19) proved an essential aid for the training, as well as knowledge shared by all. Learning to identify plants requires, amongst other skills, accurate observation of specific details (p. 26). Check out the Activity page (p. 6), which gives you an opportunity to practice your observation skills! Then go and exercise these skills in a natural area such as a forest or beach fringe.

Our Field Notes (p. 22), as usual, are based on interesting observations made by PCA members while working or walking in the Seychelles environment. The Field Trip (p. 25) described by one of our new younger members is a good example of individual observations inspiring new thoughts, as are the drawings by our young artist (p. 13, 26). We are encouraged by the number of PCA members undertaking scientific training (see PCA News, p. 20) - who knows what new observations they will make and how this may lead to improved understanding of the Seychelles environment. Sharing observations and discussing their significance is an important part of conservation work. May we all learn to do more of both!

Editorial Team: Katy Beaver, Eva Schumacher and Christoph Kueffer

Cover photo: Plant identification requires good observation (see page 3) (Photo: B Seraphine)

The digital pdf version of Kapisen can be downloaded:
www.pcaseychelles.org/kapisen.html
www.seychelles.ethz.ch/Partnership/Kapisen.html

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Content

Plant ID training (or how to lose a lot of weight in 2 weeks...)

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A two-week plant identification training course was run by PCA members in July 2016 as part of the Seychelles 'Ecosystem-Based Adaptation to climate change' (EBA) project, funded and implemented by the GoS-GEF-UNDP. The project seeks to undertake forest rehabilitation activities at five sites and will involve careful selective thinning of some invasive alien species, so team leaders within the agencies carrying out the rehabilitation need a reasonable level of plant identification skills. This is important because presently rehabilitation is done by workers and local communities who often cannot ascertain the identity of a plant and therefore don't know if it is an alien or a native.

The main aim of this training was to introduce plant identification tools to non-scientists and non-botanists and to familiarize them with native and alien species. Methodology was centred on producing a training guide which is simple and adaptable for plant identification tutorials during the workshop hours as well as during self-paced study time. The training concept developed was tested with a group of 20 trainees representing various organizations.

The training included sessions on the system by which plants are identified, and an introduction to the Seychelles Plant Gallery as an identification tool. Participants then practiced plant identification in the vicinity of the training base at the University of Seychelles, in preparation for fieldwork. Then followed seven days of intensive field work, where participants observed plants in their natural habitat, taking detailed descriptive notes and collecting specimens for their pocket herbarium, which formed half of their final assessment. The following photo montage gives an idea of how the training went.

Day 1 in the lab: What do you look for in a plant when trying to identify it?

Close observation of the plant is necessary

And notes must be taken for the small field herbarium

Thank goodness for smart phones to take plant photos!

In Seychelles, treks mostly involve climbing steeply upward...

...And there are often obstacles to overcome...

But there was always a friendly helping hand at the ready

Different habitats revealed various vegetation types, here on boulders

...and here around an upland freshwater marsh

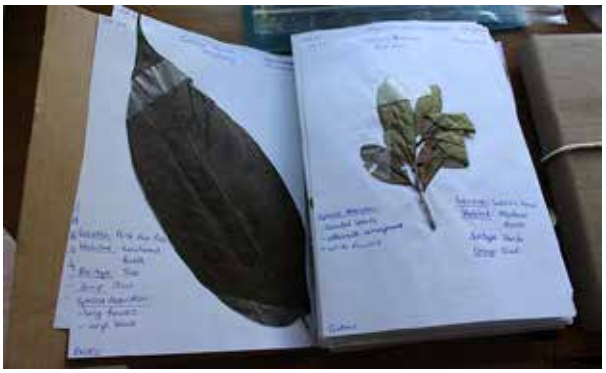
Forest was sometimes open with mainly alien tree species

But palm forests could be almost entirely native species

Lunch breaks provided time for rest and cameraderie in the shade

Views from the mountain tops made the climbs worthwhile

And then came the downhill treks - sometimes hard on the knees



No let-up! Time for homework - preparing the field notebooks

Assessment was 50% based on plant ID using the digital herbarium

The PCA Plant ID Course instructors: Lindsay, Charles, Tarah and Bruno:

(photos by Betty Seraphine, Charles Morel and Steve Agricole)

Comments from readers of Kapisen 18

"Another great issue of Kapisen! I really don't know of another plant related newsletter that can equal it – gives a real sense of everything that is going on there. When I read, for example, Plantlife's magazine in the UK – I can find out quite a bit of information about plants and a small amount about what Plantlife has been doing but I don't get the same sense of a dedicated set of people who are so actively engaged with plants! Keep it up!" (Steve Blackmore)

"Thank you so much for circulating this excellent version of Kapisen. It looks and reads very well. Interesting stories, well written and overall very informative." (Chris Kaiser-Bunbury)

Activity page

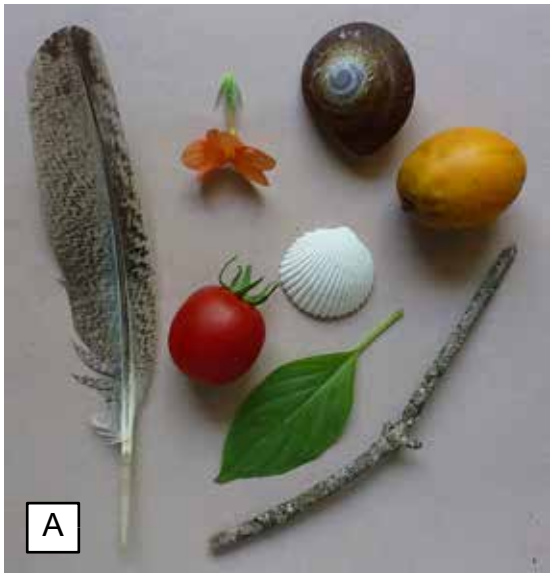
Whether you are a scientist, a teacher, a student or just someone interested in nature, the ability to notice things is really important. We all observe, but it is easy to miss details - such as a tiny mushroom on the forest floor, the number of stamens in a flower, the pattern on a small insect or the colour of a tree's bark. In nature it is also important to notice changes - a strange smell, a tree with dried leaves, the absence of spider webs - which perhaps require further investigation.

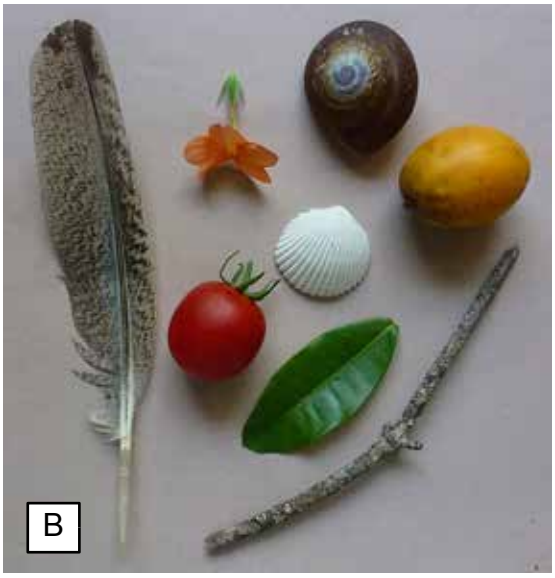
But you can always improve your observation skills. Here are some fun ways of doing so:

1. Kim's game is well known. Collect about 20 small objects (less for young children) and place them in central position so that everyone will see them but cover them with a cloth. Remove the cloth and give people 30-60 seconds to view the objects and try to remember all the items. Cover the objects again.

   EITHER: Everyone writes the names of as many objects as they can remember. Top marks for anyone who gets them all ! OR: Get everyone to turn round and/or close their eyes while you remove one item. Then remove the cloth so that people can view the objects again. Give enough time for most people to notice which item is missing, rather than letting the first person shout out. This way everyone gets a chance to improve their observation skills.

2. The following game can become quite sophisticated and requires more concentration. Arrange a few items in a central position. Cover with a cloth before allowing people to view them for 30-60 seconds. Get everyone to turn around and/or close their eyes (cheating won't improve their observations skills!) while you move one item in some way. Then give everyone a chance to notice what has changed (without one person shouting out the answer!). The example pictured below gives one change between the two Photos – A and B - can you see what it is? Of course it is easy when the change is shown next to the original arrangement! But now try remembering what Photo B looks like, then turn to page 16 and see if you can see what has changed in Photo C.





3. And don't forget when you are out on a nature trip to use your ears (calls of birds, frogs, insects, etc), your nose (good and bad smells and what produces them), and sense of touch (feel leaves, bark, rocks, mosses).

Answers on page 30.

Seychelles, the stranded microcontinent

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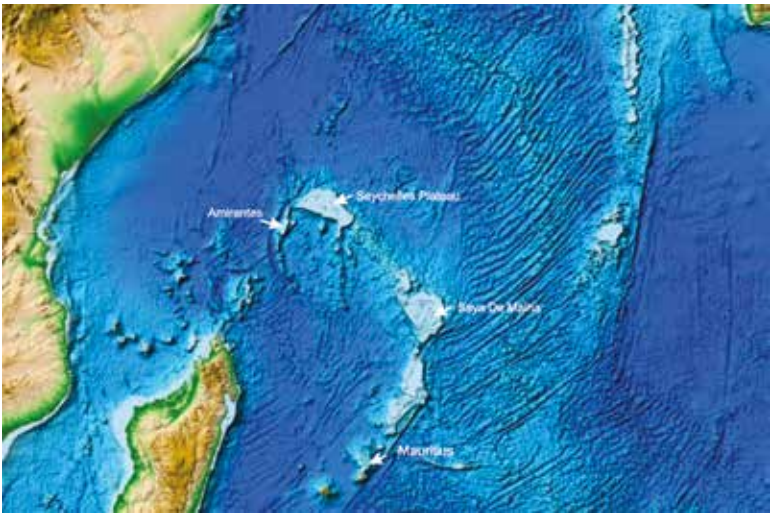


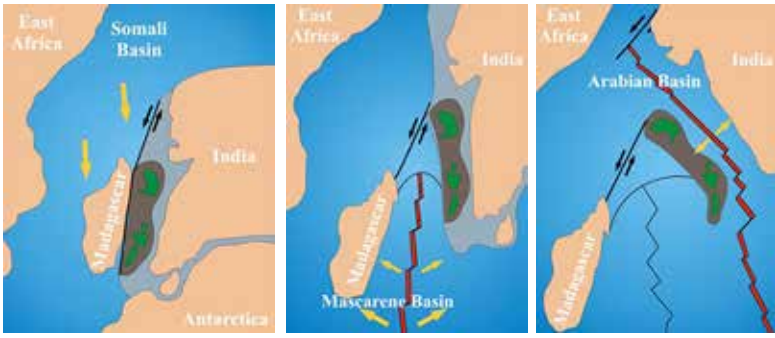
(Figure: PetroSeychelles)

The Seychelles islands are best known as a high-end tourist destination and also for their unique ecology and white sandy beaches. Some refer to Seychelles as the original 'Garden of Eden'; others call it the 'Pearls of the Indian ocean' or better still 'The Seychelles Islands, Another World'. Whatever name we choose can only provide a glimpse of the beauty and uniqueness of this small group of islands, for the granitic islands of the Seychelles are another world for one more reason: they are the only mid-oceanic granitic islands in the world. Relatively few people realise that they are such a geological wonder.

Located in the Indian Ocean, northeast of Madagascar and about 1,600 kilometres (994 miles) east of Kenya, Seychelles lies between approximately 4ºS and 10ºS, and 46ºE and 54ºE. It is an archipelago of 115 tropical islands, some granitic and some coralline. The majority of the islands are small and uninhabited. The total landmass is only 459 km^2, but the islands are spread over an Exclusive Economic Zone of 1.3 million square kilometres.

The coralline islands are a later stage of former volcanic islands that emerged from the seabed. This is how most islands of the world's oceans are formed. The granitic islands are different. Geologists will tell you that granite is probably the most common rock on continents, but it never occurs in mid-oceanic islands; so the forty-one granitic islands of the Seychelles must have a different origin. Indeed, they are the emergent peaks of a small stranded continent (more precisely a micro-continent). In fact these Seychelles Islands were amongst the earliest examples cited by Alfred Wegener as evidence for his continental drift theory.

The Seychelles islands experienced a very long and exciting history before they reached their current position isolated in the ocean. It all began 750 million years ago when the granites of the Seychelles micro-continent were formed as part of the Gondwana supercontinent. Gondwana was the great southern landmass that formed as a result of the division of a much larger supercontinent known as Pangaea about 250 million years ago. This Gondwana supercontinent consisted of present day landmasses: Africa, South America, India, Madagascar, Seychelles, Australia and New Zealand. Then, around 225 million years ago, first cracks – or rifting zones as a geologist would say – formed in the area of today's Somalia. About 50 million years later (about 167 million years ago, in the mid-Jurassic) the Gondwana supercontinent began to break up. East Gondwana, which comprised Antarctica, Madagascar, India, Seychelles and Australia, started to separate from Africa. The full separation of East Gondwana happened about 115 - 120 million years ago. One of the new continents moved northward; one of its parts, India, will eventually collide with Asia.



Left: About 150 million years ago: ongoing separation of East and West Gondwana.

Middle: About 80 Million years ago: Seychelles/India split from Madagascar.

Right: About 60 million years ago: separation of India from Mascarene Plateau. (figures: PetroSeychelles)

The Seychelles micro-continent then underwent two more stages of rifting to isolate it from Madagascar and India. Between 84 and 95 million years ago rifting separated Seychelles/India from Madagascar. An initial period of rifting (break up) moved the Seychelles/India block northwards. At around 84 million years ago oceanic crust started to form in the Mascarene basin, causing a rotation of the Seychelles/India land mass. This continued until around 66 million years ago when new rifting severed

the Seychelles from India forming the currently active Carlsberg Spreading Ridge. This last rifting episode happened at the same time as some three-quarters of plant and animal species on earth, including the dinosaurs, went extinct. It is generally thought that this mass extinction was triggered by a massive comet or asteroid impact at that time.

This catastrophic asteroid impact might also have caused the formation of Silhouette and North Island. Professor W.E Stephens, a geologist from the University of St Andrews in Scotland, undertook extensive studies of the rocks of Silhouette and North Island and concluded that these two islands formed in a manner quite similar to the famous explosive eruption of Mount St Helens in the Western USA in the 1980's. Such glowing red lava eruptions (Ignembrite eruptions) are amongst the most rapid and unpredictable, making them the most dangerous of all volcanic eruptions. 63 million years ago Silhouette was not the quiet paradise it is today! Evidence of these volcanic rocks is preserved between Pointe Ramasse Tout and Pointe Zen Zeng on Silhouette.

As mentioned earlier, the granitic islands of Seychelles are the only oceanic islands in the world formed of granite, and, if that wasn't enough to excite a geologist's interest, they are also amongst the world's oldest islands, standing proud and isolated from all other landmasses for at least 60 million years. It is indeed breath-taking to find massive granite boulders in a tropical setting. The rock occurs as high vertical cliffs, and in the form of huge boulders on the beach, and even scattered throughout the capital, Victoria. This long period of isolation (over 60 million years) has also given

Picture of corals, about ten metres above present sea level on Silhouette Island, proof that sea level was higher in the past. (P. Samson)

rise to some unique flora and fauna and several remarkable changes in sea level and climate. During the last interglacial period for example, around 125 thousand years ago, the sea level was at least several metres higher than at present. As the sea receded to the present day level, new additions to the Seychelles islands included the coastal plateaus and the coralline islands. Granitic islands such as La Digue retain remnants of fossilised reefs some 10 metres above the current sea level. (*Editor's Note: During times of lower sea level the micro-continent was more connected, with large landmasses above the sea level. This had an important impact on flora and fauna speciation.*) As there are fears that the global sea level will continue to rise due to climate change, the question is: can we really slow it down, prevent it, or should we simply learn to adapt?

Seychelles conservationists participate at international island biology conference in the Azores (Atlantic Ocean)

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Introduction

The biology and conservation of islands are themes that have attracted a lot of interest, particularly because islands provide a live laboratory and fertile environment for biological research. It is in this spirit that the 2nd International Conference on Island Evolution, Ecology, and Conservation (Island Biology 2016, http://www.islandbiology2016.uac.pt/) was organized from 18-22 July 2016 on Terceira Island of the Azorean archipelago (Portugal) in the middle of the Atlantic Ocean. The conference brought together interdisciplinary experts to share, exchange, expand knowledge and generate in-depth discussions in topical areas of island biology. Over 400 participants from 46 countries were in attendance including Gérard Rocamora and Elvina Henriette - two members of the Island Biodiversity and Conservation centre of the University of Seychelles (IBC-UniSey). Our participation was funded by the Mauritius Commercial Bank (MCB).

What did we learn for conservation in Seychelles?

Topics presented at the conference were inspiring and provided the opportunity to learn some important theories and new ideas in island biology research and conservation. The presentations included thematic areas such as biodiversity, biogeography, conservation, ecology, evolution, and global changes. One topic that was of great interest to me was the role of psychology in biodiversity conservation. Although Seychelles has been a leader in biodiversity conservation, with successful stories of species conservation, efforts to for example stop littering still remain a major battle. Hence, how can psychology and the 'theory of psychological littering' (amongst others) be used to turn the tide around? 'Environmental Identity Development' (EID) is one tool that can be implemented to encourage people to become connected with nature and learn to realize that what we do matters. EID can be further enhanced through active participation of community groups in environmental protection, an emerging area in the Seychelles which requires innovative, creative ways for its further development.

Secondly, a new perspective that I obtained from the conference was the concept of an "Island Avatar" to plan for a sustainable future in the light of global environmental changes such as climate change, land use and the impact of invasive species (see 'Moorea Island Digital Ecosystem Avatar', http://mooreaidea.org/project). The presentation brought across the point that information in itself is not sufficient to influence policy-makers. In this project the idea is to digitize an entire island ecosystem to assess how alternative policy scenarios might influence biodiversity and ecosystem services, as well as the processes that sustain them. Although, this may be an expensive venture for the Seychelles, such visualisation may be more stimulating to policy and decision makers, offering them another outlook into the future implications of today's actions and may hence generate more constructive, proactive actions and a greater response to environmental management. The idea is to '**anticipate and change our future and not only adapt'.**

Thirdly, a presentation by Celine Bellard and colleagues revealed that the Seychelles is amongst the most impacted amongst islands in terms of loss of vertebrates due to invasive alien species (IAS). This places more weight on the need to enhance efforts in bio-security, invasion biology and conservation of IAS-threatened species. Through the Key Biodiversity Areas (KBA) study (see Kapisen 16, p. 4-5) we know the distribution of rare and threatened species and areas of high conservation value, but what we lack

(Photo: E Henriette)

is an in-depth knowledge of the degree to which the species of special concern are threatened by IAS and where they are threatened. The problem of IAS in Seychelles can be studied in different ways, such as determining sites of IAS-threatened species and planning actions that efficiently target IAS, which is essential for achieving the Strategic Plan 2020 of the Convention on Biological Diversity.

Finally, new insights were gained into restoration of degraded lands. The presentation by Christopher Kaiser-Bunbury on "Incorporating evolutionary and ecological traits of the iconic coco de mer palm in forest restoration" argued in favor of using the endemic coco de mer palm (*Lodoicea maldivica)* as a keystone species for ecological restoration of degraded land on Praslin Island. His argument was based on the palm's traits (e.g. funneling mechanism provided by the large leaves which channel nutrients to the base of the tree thus permitting it to survive in otherwise poor soils, leaf litter layer of enormous shed leaves which impede establishment of invasive plants in favor of native regeneration – see also pages 14-16). From my perspective, this finding has major implications for the restoration of degraded lands on Praslin where 40% of the island is considered degraded and in need of rehabilitation.

Why was it useful? Exchanges and networking

The 2016 Island Biology conference was an opportunity for networking and exploring partnerships. For example, there was interest from the representative from Socotra Archipelago (Yemen) in the Western Indian Ocean to seek exchanges with Seychelles with respect to IAS management and island restoration. These are areas in which Seychelles is quite advanced and for which we can be a model for Socotra. Hence there is an opportunity to develop a Seychelles-Socotra partnership to share and exchange knowledge and expertise. There is already interest in an exchange visit to the Seychelles by the Socotra project team.

Conclusion

Islands present tremendous opportunities for research and conservation success stories. The Island Biology international conference brought together interdisciplinary experts working in different systems from single islands to the global scale, pursuing different research areas but all studying islands. There is, however, a need to strengthen the partnerships between different disciplines: biological-physical-social sciences, humanities, as well as bringing researchers, practitioners and policy makers together for a more unified approach to environmental management.

New Society for Island Biologists

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At the second International Conference on Island Evolution, Ecology and Conservation (Island Biology 2016, www.islandbiology2016.uac.pt/) in the Azores (Atlantic Ocean) an international society for island biologists and conservationists was formed:
the Society for Island Biology
(SIB, www.islandbiology.com).

The objective of the Society for Island Biology is to facilitate networking and knowledge sharing among experts (both academic and non-academic) on all aspects of island biology, i.e., across all plant and animal taxa and levels of biological organisation (from genes to species, to ecosystems and biogeography). In particular, SIB aims to provide a platform for both resident and visiting experts working locally on the islands of the world. Connecting and networking is a major challenge for island biologists, conservationists and others dedicated to saving natural and cultural island values, because islands are globally distributed and isolated from each other.

Participants of Island Biology 2016 (P Borges).

SIB aims to foster the following activities:

- A regular series of international island biology conferences. The first two conferences of the series were held in 2014 in Hawai'i and 2016 in the Azores. Future conferences are planned every three-to-four years; rotating among islands and geographic regions. Virtual conference formats or regional meetings might complement these conferences to enable involvement of a broader audience and reduce environmental impact.
- Enable researchers working on common themes relevant to island biology to connect and organize working groups and workshops.
- Maintain a list-server that enables continuous exchange among members. Currently such a list-server is provided at http://listserv.bgci.org/scripts/wa.exe?INDEX.
- Train the next generation of experts on topics related to island biology.
- Assist in the documentation and sharing of biological information, including new natural history knowledge, from islands around the world.

As a first step, a board with 20 members was elected. Members of the board represent both nature conservation institutions and universities, and different topics in island biology (e.g. vascular plants, mosses, vertebrates, invertebrates, evolution, invasive species, habitat restoration, threatened species conservation, paleoecology and biogeography). The members represent all major oceanic regions of the world (Arctic, Atlantic, Mediterranean Sea, Caribbean Sea, Pacific, Indian Ocean, Southeast Asia). The Western Indian Ocean is represented by two board members: Claudine Ah-Peng from La Réunion and Christoph Kueffer, one of the Kapisen editors.

La Réserve - a Seychelles endemic palm forest that deserves formal protection

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As part of my undergraduate thesis at the University of Seychelles, I performed a third re-survey of La Réserve palm forest on Mahé Island in order to continue previous assessments of its ecological significance. La Réserve is a palm forest that exhibits unique vegetation characteristics and has an outstanding protection value (see below). Situated at Montagne Posée, it was first investigated by Karl Fleischmann between 1991 and 1997, and re-visited by Bettina Baader and Bettina Hendry as part of their joint Master project in 2007 (Kapisen 8, p. 10-11). My main aim was to monitor and identify changes in vegetation composition, species rejuvenation and presence of exotic (alien) plant species in the area since 2007. I also hoped to provide suitable evidence for decision makers to declare the La Réserve forest a protected area.

The previous assessments of the ecological significance (i.e. the "Protection Value") of the La Réserve forest were based on (1) the species richness of native (i.e. endemic + indigenous) woody plant species, (2) the abundance of native and exotic tree species, (3) the degree of endemism, and (4) the rate of rejuvenation of native tree species.

To assess the vegetation changes at La Réserve forest, both quantitative and qualitative methods were used. Quantitative data collection was based on permanent plots and trail transecting (Fleischmann, 1997), and qualitative data collection involved ground-cover analysis and photo monitoring (Baader, B. & Hendry, B., 2007). The fieldwork was particularly intense, especially on the rainy days of December. Special care had to be taken on the slippery slopes while at the same time focusing on the data collection. However, the experience was incredible. In fact the fieldwork was the part that I enjoyed the most in the whole journey of my thesis.

A total of 36 woody species was recorded at the study site of the La Réserve palm forest. Native species accounted for two thirds of individuals recorded of which 58.3 % were identified as red listed species according to the proposed IUCN-Red-List 2006 (see also Kapisen 6, p. 15-16). Exotic species contributed the remaining third of the total species found within the study area. Cinnamon (*Cinnamomum verum*) was the most prominent exotic species and was recorded throughout the whole study site. The potential trend of forest succession at La Réserve was estimated by comparing the prominence values (PV) of adult trees with the corresponding prominence values for saplings. PV is the sum of the relative frequency and the relative abundance of trees in a particular transect. Species with a higher PV of saplings in comparison to the PVs of their corresponding adults are likely to experience a future increase in prominence, as illustrated in Figure 1 for endemic palm species. Alternatively, despite the common occurrences of exotic species in the area, Figure 2 shows a likely decrease for the most prominent exotic tree species at La Réserve.

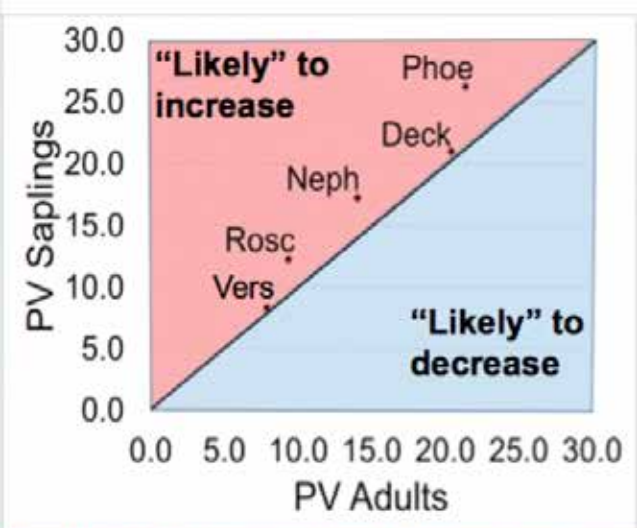

Figure 1: Rejuvenation of the endemic palms 2016 with trend of future increase or decrease

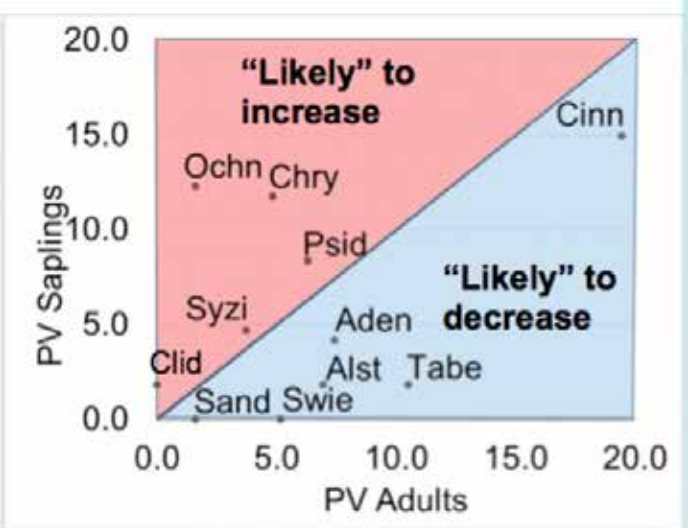

Figure 2: Rejuvenation of Exotic species with trend of future increase or decrease

Table 1 Key to abbreviations of species names in Figures 1 and 2

Abbrev.	Native palm species	Common name	Abbrev.	Exotic (alien) species	Common name
Deck	*Deckenia nobilis*	Palmis	Aden	*Adenanthera pavonina*	Lagati
Neph	*Nephrosperma vanhoutteanum*	Latannyen milpat	Alst	*Alstonia macrophylla*	Bwa zonn
Phoe	*Phoenicophorium borsigianum*	Latannyen fey	Chry	*Chrysobalanus icaco*	Prindefrans
Rosc	*Roscheria melanochaetes*	Latannyen oban	Cinn	*Cinnamomum verum*	Cinnamon / Kannel
Vers	*Verschaffeltia splendida*	Latannyen lat	Clid	*Clidemia hirta*	Fo watouk
			Ochn	*Ochna kirkii*	Bwakok
			Psid	*Psidium cattleianum*	Gouyavdesin
			Sand	*Sandoricum koetjape*	Santol
			Swie	*Swietenia macrophylla*	Mahogany
			Syzi	*Syzygium jambos*	Zanbroza

The Protection Value (PtV) is a measure to assess the quality of a patch of forest for conservation. It is calculated based on data of native rejuvenation, the abundance of native vs. exotic tree species, species richness of natives and the abundance of endemics. PtV increased significantly with altitude. PtVs were between 2 (low) at lower altitude and 5 (very high) at higher altitude (see Figure 3).

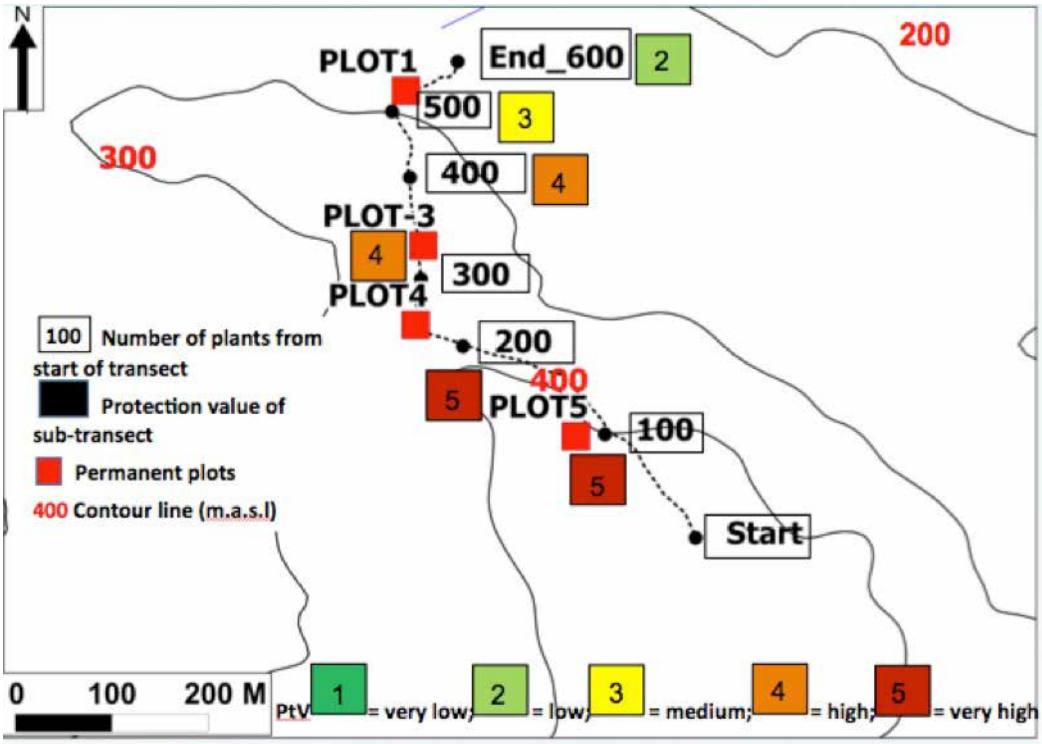

Figure 3: Map showing trail transect and permanent plots with the results of the different protection values.

Quantitative fieldwork at La Reserve (N. Pierre)

In summary, the study revealed that the endemic, palm-dominated vegetation coupled with the occurrences of red listed broadleaf tree species contribute to the high ecological significance (i.e. high Protection Values) of the forest, and that the PVs of endemic palms, notably Latannyen fey (*Pheonicophorium borsigianum*) and Palmis (*Deckenia nobilis*) have (for the second time when compared with 1997) increased over the past 9 years. Endemic palms rejuvenate significantly better than broadleaf tree species. It was seen that the study site was characterized by a high diversity and abundance of native species, especially the endemic palm species *Deckenia nobilis* and *Phoenicophorium borsigianum,* which dominate the area, thus justifying the name of "La Réserve palm forest". The high protection value of the forest, together with fact that it is one of very few remaining examples of a largely intact endemic palm forest with a very good rejuvenation, emphasize that it is highly recommended to declare La Réserve palm forest as a new protected area on Mahé.

References

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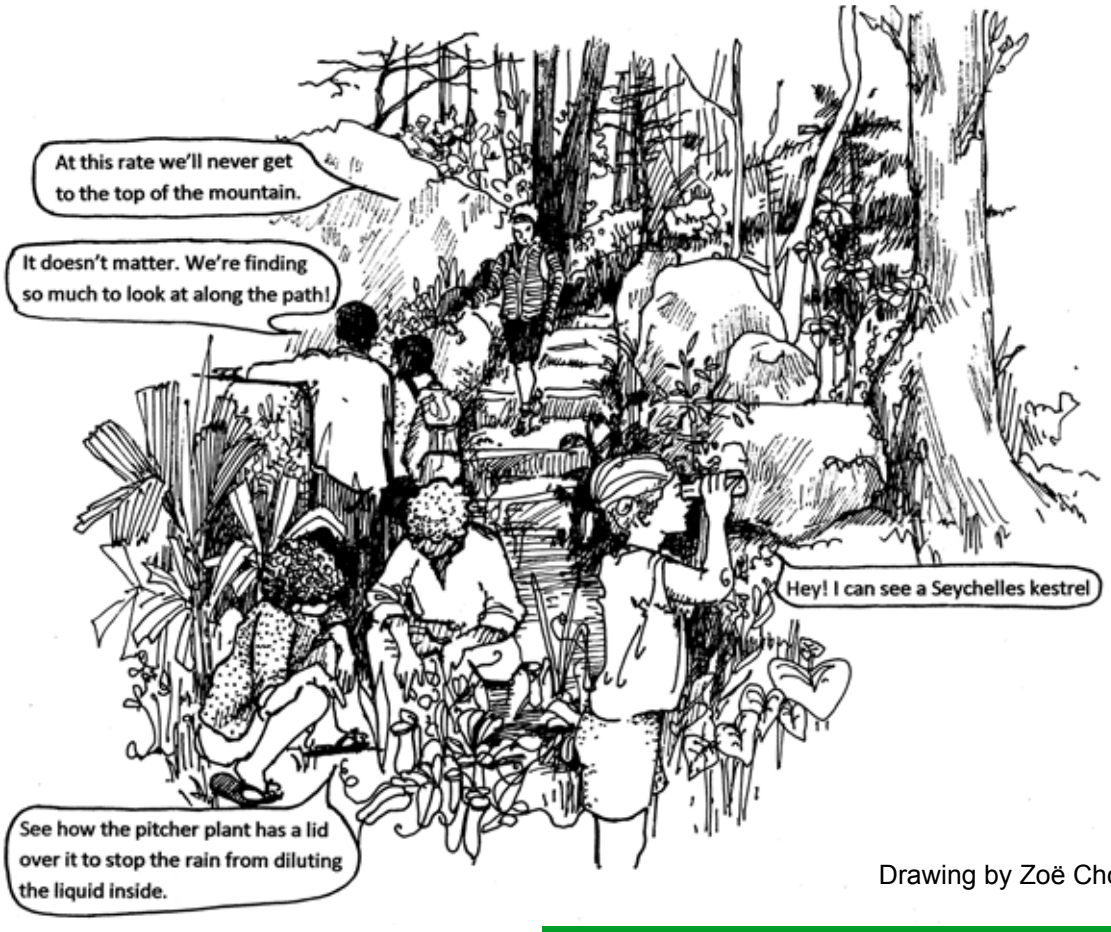

Drawing by Zoë Chong-Seng

The strange story of the coco de mer

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I well remember my first visit to the Vallée de Mai. Like so many visitors before me, I marvelled at the magnificent coco de mer palms, and especially at the gigantic juveniles with their huge leaves reaching up into the canopy. But as a plant ecologist, I was also puzzled. What unique set of conditions on these small islands had led to the evolution of a seed far larger than that of any other plant species? And why was this ecosystem so different from other rainforests in the Seychelles, not only floristically but also in its animal community? Since that first visit in 1998, I have often pondered these questions, and together with colleagues have spent much time trying to find plausible answers. In this article I describe what we have found out so far.

Why the big seed?

The coco de mer, *Lodoicea maldivica*, belongs to a group of palms called the Borasseae, with a distribution in Africa and Asia that can be linked to the breakup of Gondwanaland. Other species in this group include *Borassus aethiopum*, which is widely distributed in African savanna, and *Borassodendron machadonis,* which is found in rainforest in Thailand and the Malaysian peninsula. Both species produce relatively large seeds (though nowhere near as large as coco de mer) which are dispersed by animals.

But why are the seeds of coco de mer so much bigger? Our suggestion is that the species evolved from an ancestral palm with seeds rather like those of *Borassus* or *Borassodendron* that were also dispersed by animals. After the Seychelles broke away from the continental landmass over 100 million years ago, the island populations of this palm may have lost these agents of dispersal. With seeds simply falling to the foot of the mother tree, there would have been no advantage in a female producing many seeds, since this would lead to competition amongst her progeny, of which only one could eventually take her place in the forest. Under these circumstances, the most successful females would be those producing the largest seeds, capable of supporting the developing seedling during its early growth in the shaded forest. This suggests that the enormous seed we find today is the product of a long period of selection for plants bearing fewer but larger seeds. And the declining seed production of female trees (the average rate of seed production in the Vallée de Mai is about one seed per year) would also have had evolutionary consequences for male trees, because it reduced the chances of any particular male passing on its genes to the next generation. Increasing 'male competition' would have favoured trees that produced more pollen, which could explain why male coco de mer palms bear very large inflorescences that are densely packed with flowers containing many more stamens than related species.

Left: Female coco de mer palm (C Kaiser-Bunbury)
Right: Male catkin with many flowers (C Kaiser-Bunbury)

To make seeds and pollen, plants need nutrients such as nitrogen and phosphorus, which they take up through their roots. Given the huge seeds and vast amounts of pollen, this investment is likely to be especially high in coco de mer trees, yet the soils of Praslin are very poor in nutrients. Which raises yet another question: how do trees obtain sufficient nutrients to support such an extravagant form of reproduction? To investigate this question, Chris Kaiser-Bunbury, Frauke Fleischer-Dogley and I (Edwards et al. 2015) measured how much nitrogen and phosphorus is used for growth and reproduction by coco de mer trees in the Vallée de Mai, and the availability of these nutrients in the soil. Although we expected the nutrient costs of reproduction to be high, we were surprised to discover just how high. For example, we found that, on average, six to seven times as much phosphorus per year was used to make fruits and male flowers than was used to support vegetative growth.

But where do these nutrients come from? We noticed that the leaves of coco de mer form a

huge funnel, so that the rain falling on the forest is channelled down the trunks. At the same time, any debris such as pollen or the faeces of lizards and birds is also washed down from the leaf surfaces, which we thought might improve the nutrient supply for the tree. To investigate this idea, we measured the water reaching the ground during a shower and found, as predicted, that most of it flowed down the trunk (or down the petioles of juvenile plants). We also measured the concentrations of phosphorus and nitrogen in the soil, and found them to be much higher close to tree trunks than further away.

Left: Debris collects in the large leaves (C Kaiser-Bunbury)
Right: Juvenile palms with palm leaf litter (E Morgan)

Why is the forest so different?

From these studies we concluded the coco de mer improves its nutrient supply by funnelling nutrient-rich organic debris to the base of the trunk, allowing it to invest heavily in reproduction. However, that is not the end of the story. As Figure 1 shows, the high nutrient demand for reproduction and the funnelling mechanism to capture nutrients have many other consequences, both for coco de mer and for other organisms in the forest. I describe some of these in the following paragraphs.

1. *Low foliage nutrient concentrations*. The leaves of coco de mer have some of the lowest concentrations of nitrogen and phosphorus ever recorded in tropical rainforest. Such concentrations cannot simply be the result of poor soil, since they are much lower than in most other trees of the Seychelles. More probably, they reflect an evolved strategy of coco de mer trees allocating as much nutrient as possible to seeds and pollen, rather than to leaves and trunks.

2. *Resistance to herbivory and decomposition*. The low concentrations of nutrients make the foliage of coco de mer very unattractive to herbivores, and leaves in the Vallée de Mai show little or no grazing damage. And low nutrients also means that fallen leaves decompose very slowly, so that thick layers of litter can accumulate. This in turn increases the risk of fire in dry weather, which may explain why coco de mer trees are remarkably resistant to fire.

3. *Clustered recruitment beneath the mother plant.* Because of funnelling, the best soil conditions occur close to the trunks of coco de mer, though light levels here are low. As the young plants grow larger, they increasingly compete with the mother tree, both by taking up nutrients from the same soil pool and by overtopping the mother's foliage, and so reducing her funnelling capacity. This competition between generations could explain why female trees are apparently shorter-lived than male trees and rarely grow taller than 20 m.

4. *Monodominant forest.* Historical reports from the nineteenth century tell us that forests on Praslin were very dense and dominated by coco de mer. This is not surprising, since trees with small seeds would have little chance of establishing on a forest floor strewn with debris of coco de mer leaves, and where essential resources of light, nutrients and water were very low.

5. *The wider community*. Despite the absence of foliage feeders and the low floristic diversity, coco de mer forests support a remarkable community of animals, several of which are known primarily from this ecosystem. The fauna include five endemic species of gecko (including one found only in coco de mer forest) and a slug, all of which visit male flowers and feed on their pollen, and two species of endemic snail. And the leaf litter at the base of trees hosts a recently discovered cricket and a frog, both known only from Praslin. Little is known about these organisms, but all of them probably depend, directly or indirectly, on the stream of resources that originates as pollen in male inflorescences, is intercepted by the foliage, and is funnelled to the roots.

In conclusion, we now understand that the unique features of coco de mer – notably the huge seed and highly developed funnelling mechanism – are products of its long evolution as a monodominant species in a stable island environment. I emphasise stability because, with no means for dispersing its seeds, coco de mer would never recolonize an area if it were displaced by, say, volcanic eruption or rising sea levels. Indeed, it is interesting to note that other monodominant forests in the tropics – an example is *Gilbertiodendron dewevrei* forest in northeastern Zaire – also occur in areas where there has apparently been little disturbance over long periods. And like coco de mer, these trees also produce

The very large seed size of Coco de Mer is an adaptation to the monodominant vegetation typical of Coco de Mer forests, which in turn is maintained amongst others by poor soil and low herbivory pressure due to poor leaf quality. Coco de Mer forests are an important habitat for different specialist animals.

nutrient-poor foliage, bear large seeds (though nowhere as large as coco de mer), and give rise to shade-tolerant seedlings. However, compared to all other monodominant trees, coco de mer appears to provide the extreme case of *in situ* evolution in a stable environment. Only so, can we explain both its extraordinary adaptations, and also the several animal species that have apparently evolved for life in these remarkable forests.

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What object has changed in Photo C compared with Photo B (page 6)?

Now memorise this picture and turn to page 24 and compare it with Photo D

The enigmatic monocotyledon family of Hypoxidaceae holds a surprise: a new endemic genus for Seychelles

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The small islands of the Seychelles bear an astonishing richness of endemic plants. Three of these belong to the monocotyledon family of Hypoxidaceae ('Star Grass' family). The Hypoxidaceae is a plant family that has its centre of diversity in the Southern Hemisphere with up to 155 species and only a few species occur north of the equator. The family includes up to nine genera, all of which are herbaceous with a remarkable size variation from a few centimetres (e.g. *Pauridia longituba*) up to three metres (e.g. *Curculigo latifolia*).

There are three endemic species of the family in Seychelles. Two of the three species are of the endemic genus *Hypoxidia* (*H. rhizophylla*, *H. maheensis*). *Hypoxidia rhizophylla* has a relatively wide distribution as it occurs on Curieuse, Félicité, La Digue, Mahé, Praslin, and Silhouette in the forest understory from 100–700m, whereas its sister species is only known from the cloud forest above 600m on Mahé. The last endemic species within this plant family is *Curculigo seychellensis*; it occurs on Curieuse, Frégate, Mahé, Praslin, Silhouette, and Thérèse at medium to higher elevations in rather dry, rocky habitats. Recent taxonomic work on this species suggests that it belongs to a separate endemic genus of Seychelles, named *Friedmannia* (Kocyan and Wiland-Szymańska 2016).

Hypoxidia rhizophylla receives its species name from the fact that new roots can develop at the tips of the relatively slender leaves in order to produce offspring by vegetative reproduction. Hence, large and well-established populations can be constituted out of one or only a few clones. The three to five flowers per inflorescence of *H. rhizophylla* last usually only for a few hours. They are often reddish-brown and release an evil-smelling odour that resembles rotting flesh or dung. Such flowers attract flies as pollinators. However, the pollination biology of *H. rhizophylla* is not well investigated and regular insect visits – but not necessarily the pollination – are only reported by the endemic fly *Dichaetomyia fasciculifera* (Muscidae). In general, the fruit set is low with only 12% flowers pollinated on Mahé, and on other islands fruits seem to be even more scarce.

Flowers of *Hypoxidia rhizophylla* (L Beenken)

There is contradicting information on whether flowers of Hypoxidaceae are in general self-fertile or not.

Of the second *Hypoxidia*-species – *Hypoxidia maheensis* – even less is known. It resembles *H. rhizophylla*, but is generally larger with leaves up to 150 cm long and 20 cm across. In addition, it lacks the ability to produce vegetative propagules. It has two to four yellow-pink flowers per inflorescence, and they only partly open. The odour is similarly repellent but seems to be less intensive.

The last species is *Curculigo seychellensis*. Again it has plicate (pleated) leaves but they are much longer (up to 2.5 m) than the previously mentioned species. Unique within the whole family is that the leaves are mostly split at the apex and that the petioles and leaf margins bear distinct spines. The flowers occur on densely clustered inflorescences; they are creamish-white to yellow and last only one day. Between the ovary and the perianth there is enormous elongation, which may be 120 mm long. Its colloquial name is "coco marron", which means wild coconut because they look like young coconut palms. Indeed, without flowers the Seychelles species of Hypoxidaceae could be misinterpreted as palms. However, when flowering individuals are found, it becomes clear that this is not the case. All flowers of the Seychelles Hypoxidaceae species are relatively big (3–15 cm in diameter), are bisexual, offer no nectar as a reward and have an inferior ovary whereas palm flowers are

Flower of *Friedmannia seychellensis* (C Kaiser Bunbury)

usually smaller, unisexual, most often present nectar as a reward to pollinators, and have superior ovaries. Pollination biology of *C. seychellensis* seems to be completely unknown and reproduction seems to be at its lowest as there are no recent reports of fruits found in the field (Kapisen Vol. 10, page 19). *C. seychellensis* is the only Hypoxidaceae from the Seychelles that has some use for humans as local tobacco used to be wrapped in leaf fibres or entire leaves. The most recent phylogenetic study of Hypoxidaceae revealed that *C. seychellensis* is separate from other *Curculigo* species (a genus of circa six species) and rather goes together with *Hypoxidia*. However, the fusion of *C. seychellensis* into *Hypoxidia* seems to be a too drastic step as there are reproductive and vegetative arguments that rather propose to place it into a monotypic genus. Therefore, recent taxonomic work proposed that the species belong to a new genus, endemic to the Seychelles: *Friedmannia*. The new proposed full species name is: *Friedmannia seychellensis* (Bojer ex Baker) Kocyan & Wiland.

There are limited threats to the Hypoxidaceae species of the Seychelles. *Friedmannia seychellensis* is vulnerable to fires as it inhabits more dry areas, otherwise the populations seem to be stable and hence the IUCN lists it in the 'least concern' category. *Hypoxidia rhizophylla* is categorised as vulnerable as its habitat seems to deteriorate through the invasion of alien species. Of all the Seychelles species *Hypoxidia maheensis* is the most threatened (IUCN category 'endangered') as it is only known from Mahé and restricted to an elevation of about 700 m and similarly under pressure by alien species invasion.

Information for this article has been gathered from the following studies and books:

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PCA News

Changes within PCA

The year 2016 has brought quite a few changes for the Plant Conservation Action group (PCA) as it continues to grow. The review of our constitution and development of a strategic plan in 2014 may have helped because we now have a mission statement (see page 27), vision and attainable objectives which give us a better sense of progression and achievement. We also review our strategic plan yearly at our Annual General Meeting so as to keep members engaged, involved and focused on our main vision which works towards the sustainability of native habitats and genetic diversity, and the mainstreaming of plant conservation into all areas of Seychelles' society.

But for now, it has been one green foot in front of another towards our vision. Project work has become more prominent in the past few years, often taking the form of partnerships with other NGOs, private and government sectors, but all our activities, memorable excursions, trainings and joint ventures have helped to further empower the members and ensure continuous growth of the NGO. PCA is now looking forward to the rest of the year and to see where the winds of change will be taking it. The monthly meetings have been reduced to one every two months, which was agreed as being a more practical arrangement, while the regular field excursions and hikes are as adventurous as ever with new things being discovered every time.

Meanwhile, this year we have also had to bid goodbye to Katy Beaver as the Secretary. She had been the heart and soul of PCA but stepped down from her post in order to let PCA take up a fresh path; but she remains an ordinary member who can give support and advice. Although we feel that Katy's passion and devotion can never be replaced, the newly elected committee is trying its best to step up to the challenge of continuing the PCA legacy.

Herbarium News

There are now 3 PCA members who are staff or working with Seychelles National Herbarium. New staff member is Tarah Padayachy, a young botany graduate who joined the team at the end of February. Space is very tight, so the staff welcomed news that they would move to another more spacious location, but their hopes were dashed when the place was sold. They considered alternative options, e.g. trying to further adapt the small room they are currently in. But fortunately it now seems that an alternative option will soon be made available, and they hope to be allocated more storage and working space in a section of the old Court House which is currently undergoing renovation.

The current tiny Herbarium space (Photo: Sey Herbarium)

In the meantime, the herbarium is continuing to develop. All the newer vascular plant specimens have been properly mounted, and the majority of Dicotyledons, half the Monocots and all the ferns have been entered into the database, including those plant species for which there are no photos. The plant photograph collection is growing fast as the team go on regular field trips, focussing in particular on alien species, including ornamental and agricultural plants, many of which are lacking in the database at present.

The digital herbarium (www.seychellesplantgallery.com) has been updated with data which enables the search engine to function more completely (although there are a few issues with some of the data). Next is to find a web designer who can improve the plant gallery website design and allow it to appear correctly on Macintosh computers and smart phones. Money received by PCA from a Corporate Social Responsibility (CSR) donation will go towards this redesign. The use of the digital herbarium featured strongly in the Plant Identification Training Course which PCA and the herbarium team recently carried out (see p. 3).

PCA Members in training overseas and locally

Barry Nourice has followed up on his previous Master training course at Aberdeen University by progressing to a PhD, in which his main topic of investigation continues to be the very unusual form of soil salinity in sandy soil used by farmers at Anse Royale and on Praslin. With sea level rise due to climate change possibly becoming more severe, mitigation methods for the farmers are also an important part of his study.

Sylvanna Antha has almost completed a year at the University of Cambridge, UK, studying for a M.Phil. in Conservation Leadership. She has been based at Corpus Christi College. She is currently working on a Communication, Education and Public Awareness (CEPA) Audit, a CEPA Capacity Building Brief and a Community Based Social Marketing guide for the Zoological Society of London (ZSL) EDGE of Existence Programme.

James Mougal has recently departed for the University of Kent in UK, where he will spend a year studying for a Master degree in Conservation Ecology.

In addition, three of our young PCA members are training at BSc level in the Environmental Science course at the University of Seychelles: Nathachia Pierre (see p. 11) is about to graduate, Catherina Onezia (see page 25) is now in her 2nd year, and Mariette Dine (who wrote the 1st section of this PCA News) has just started her 1st year. All of them gained several years of experience in the field before starting at university.

We wish all six PCA members luck with their studies and we have great hopes that they will continue to be active members of PCA.

Outreach and Awareness-raising

PCA has taken part in several events during the year. In May there was a national display to commemorate Biodiversity Day, at which PCA exhibited the work being done for the glacis vegetation restoration project (see p. 21). A major event was the four-day National Expo in June at which PCA participated along with many other Environmental NGOs, again highlighting the restoration work and the negative effects of many invasive species on our native plants. Activities for both adults and children formed part of the display.

Biodiversity Day event May 2016 (A Dufrenne)

The PCA stall at June's National Expo (T Vel)

Many of PCA's previous interactive exhibits were highlighted at a workshop during a 2-day conference on Environmental Education for Sustainable Development (EESD) in August. Emphasis was placed on making learning about plants fun for all ages through interactive activities, and the importance of taking learning further by engaging people in conversations about plants and, for example, how they are used in our daily lives.

Participants enjoying the interactive activities at an EESD workshop (K Beaver)

Restoration project - progress!

The vegetation restoration site near Morne Blanc (see Kapisen 18, p 17-18) is doing well. Since mid-2015, when Seychelles National Parks Authority (SNPA) personnel had cleared 3.6 ha of alien plants, a new partnership arrangement was finalised between PCA and SNPA to allow major follow-up maintenance to be carried out in 2016 and beyond. Planting of native seedlings started in June and so far 2000 seedlings, mainly endemic palm species ready hardened to the difficult conditions in the exposed rocky area, have been planted by SNPA staff. The seedlings were raised at the SNPA nursery, where another 2000 seedlings are currently being nurtured.

Project leader Chris Kaiser-Bunbury discussing the new PCA-SNPA partnership with Jason Jacqueline, SNPA's Director of Forestry (J Mougal)

SNPA staff carrying out maintenance (J Mougal)

Meanwhile, PCA organised several nursery training sessions for the local community, guided by SNPA nurseryman, Damien Doudee, who is an expert in Seychelles native plant propagation. Participants included local Port Glaud community members, University of Seychelles students and several garden staff from Constance Ephelia Resort, where the training was held. The participants were encouraged to get further involved in the restoration project. A leaflet and special T-shirt were designed for the local community, to support their engagement in long-term restoration activities such as weeding of alien seedlings and planting of native seedlings. A special display on the project was also mounted at the PCA exhibition stall for the 4-day National Expo in June 2016.

Native plant nursery training for local community members (J Mougal)

A nature trail through the restored zone is nearing completion, making it easy for visitors to get a good idea of the natural native vegetation typical of this type of rocky habitat. Although parts of the area look a little bare at the moment, soon we hope the native vegetation will completely replace the predominantly alien vegetation that previously existed. Not only can visitors now see the endemic pitcher plants more easily, but new views of the surrounding mountains and coastal bays have been opened up. Signage and information boards will also be erected, so that people can read about this special and threatened habitat type.

Construction of the nature trail (J Mougal)

The restored site has attracted interest from the University of Seychelles (UniSey) and in July, a BSc student submitted her thesis after spending several weeks collecting field data on the succession of plant species. The primary objective of her study was to devise a monitoring strategy which can be repeated over the years. Through this we hope to develop a long-term partnership with UniSey, whereby each year the institution will provide students to conduct the monitoring programme and provide management recommendations for the restored site.

Some of the rarest plants in Seychelles

During a baseline study on the biodiversity and rehabilitation potential of the Mare aux Cochons watershed on Mahé, directed by the UNDP Seychelles Programme Coordination Unit (PCU) with funding from the Adaptation Fund, myself and my colleague Lindsay Chong-Seng have made a few remarkable discoveries.

The first one is *Asplenium petiolulatum*, a fern growing on trees or rocks previously known in Seychelles only from a single specimen collected in the area of Castor (Grand Bois, Mahé). We now discovered another 3 individuals in one small locality in the valley of Rivière Cascade. No complete specimen was collected, but rather just a few leaves and many photos. That species is also recorded from the Mascarenes and Madagascar, where it is very rare. Nevertheless, its true identity will be confirmed only when the genus *Asplenium* is reviewed in more detail.

Asplenium petiolulatum, seen for the first time in Seychelles in 2011 and now known from three individuals in the Mare aux Cochons area. (B Senterre).

Antrophyum immersum, last seen by John Horne in 1871 (B Senterre).

The second discovery is *Antrophyum immersum*, an epiphytic fern which looks very much like the Fouzer langdebef (*Asplenium nidus*) but differs by having thicker leaves, a green mid-vein, and in the position of its fructifications (spore-producing parts). This plant is very hard to spot due to its similarity with the common Fouzer langdebef, with which it can grow side by side. It was last seen on Mahé in the 1870s, and is now known from just 4 individuals in Seychelles (including the two newly discovered here).

Now that we are getting more data on the ecology of these rare species in Seychelles, it appears that the two species discussed here are submontane forest specialists, i.e. species restricted to forests at intermediate elevations. We hypothesize that these plants are so rare for two reasons. Firstly, submontane forests have almost completely been transformed by humans during the last 250 years. Secondly, most biodiversity experts always focus first on the exploration of the most pristine habitats, the most remote sites, the highest summits, and neglect the lower slopes of mountains. But although these lower slopes have been almost completely transformed and are virtually uninteresting for biodiversity, there are small refugia, mostly localized near ravines, or on steep slopes and cliffs, where the vegetation was never completely cut or burnt. Although finding such sites is like finding a needle in a haystack, once we find them we can sometimes make stunning discoveries. In conclusion, there is a need to keep exploring such habitats, although often situated in degraded or invaded landscapes. Such explorations should not only record rare discoveries but also describe the communities of invasive species (for which precise distribution data are almost nonexistent), as baseline data for the understanding of the potential redevelopment of these areas into old growth vegetation stages.

Contributed by Bruno Senterre and Lindsay Chong-Seng

Vacances et découvertes

Vacances se combinent rarement avec découvertes d'espèces rares mais, heureusement, il y a des exceptions. Alors que ma petite filleule Lola venait rendre visite à (je cite) son «parrain aventurier», une marche sérieuse en forêt s'imposait tout naturellement: le Morne Seychellois. L'équipe: moi, les Wattier (Lola, Brice et Malik) et Manu. Le matériel: ma machette et la boussole (pour entretenir ma réputation). La découverte: *Lychas braueri* (the Seychelles forest scorpion). C'est une découverte rarissime et c'est Brice, 12 ans, qui l'a faite. Quand il crie «scorpion», je pense à un article de Justin Gerlach sur une redécouverte d'un scorpion faite à Silhouette. Malheureusement, je ne connais rien aux scorpions et donc, sans connaître les caractères importants, on prend des photos de tous les coins et recoins de la bête. De retour à la maison, une petite recherche sur internet nous permet de facilement trouver tous les documents nécessaires pour préciser l'identité du scorpion (Prendini 2010).

Lychas braueri, non vu à Mahé depuis 1908 et redécouvert par Brice Wattier, 12 ans (B Senterre).

Il en existe seulement 3 espèces aux Seychelles, et d'après la clé d'identification (gros pustules sur le dos, éperons sur les tibias, etc.) la nôtre serait la plus rare des trois. Justin Gerlach (un spécialiste) nous confirmera d'ailleurs l'identité du scorpion sur base de nos photos. Bien qu'elle ait été recherchée, la bête n'avait pas été vue à Mahé depuis 1908, et n'a été revue récemment que deux fois à Silhouette. Il s'agit donc d'une découverte importante. *Lychas braueri* n'est pas éteint à Mahé. Cela pose la question de savoir si cette espèce est réellement rarissime et au bord de l'extinction depuis des décennies, ou bien si elle est en fait 'rarement observée'. On ne connait en effet pas grand chose de son écologie: quels micro-habitats l'espèce affectionne-t-elle, quand, à quel stade de développement? Par ailleurs, la taille finalement petite de cette espèce, sa couleur discrète et son immobilité en situation de stress en font une observation très difficile même quand un expert se trouverait au bon endroit et au bon moment.

En conclusion, pour mieux connaître le statut de menace de ce genre d'espèces, il est nécessaire de mettre en place des études spécialisées sur leur biologie et leur écologie. Il est aussi nécessaire d'augmenter le potentiel de découverte en développant le lien entre la communauté non-scientifique (qui fait parfois des découvertes majeures sans le savoir) et les experts (qui peuvent mettre en évidence ces découvertes). Par exemple une base de données de photos et de distribution d'espèces, et où on pourrait déposer de nouvelles photos géolocalisées adressées à l'attention de la communauté d'experts. C'est l'idée d'une base de données intégrée sur la 'biodiversité' des Seychelles que PCA et moi-même soutenons depuis plusieurs années et qui nous l'espérons recevra un jour l'attention et les moyens qu'elle mérite.

Contributed by Bruno Senterre and Brice Wattier

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Weeding activity at Jardin du Roi

As part of the herbarium team's responsibilities to continuously upgrade the Seychelles Plant Gallery, regular field trips are carried out to take pictures of the different plant species.

In June 2016, the team decided to carry out such an activity at Jardin du Roi, Anse Royale. Touring the garden, we decided to do some monitoring work in an area where some forest rehabilitation work had been carried out by members of PCA in February 2015 (see Kapisen 18, p.21). It was just amazing how in so short a time the unwanted invasive species like *Sandoricum koetjape* (Santol) and *Alstonia macrophylla* (Bwa Zonn), amongst others, had grown back up again, some as tall as three metres.

We decided there and then to uproot all the unwanted plants as they would hinder or retard the growth of the seedlings of native species that had been used for rehabilitation.

A palm seedling (bottom right) struggles with competition from invasive tree species.

Charles weeding.

Another precious native seedling is released from alien pressure!

Contributed by Charles Morel (photos: PCA)

What objects have changed in Photo D compared with Photo C (page 16)? TWO things have changed!

Now check your answers on page 30.

Field trip Bonanza

Catherina Onezia
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As a new member of PCA and a nature devotee, I couldn't resist the urge to join a long awaited exploration trip in the Morne Seychellois National Park on Mahé Island, along with 6 other participants including members and friends. The field trip objective was to commence by walking along the Casse Dent trail to Mare-aux-Cochons, then branch off via a ravine, including a swamp forest, to follow the ridge to Glacis Sarcelles, which we hoped to explore before finally following the trail back to Casse Dent and finish where we started.

Unfortunately we were not able to explore Glacis Sarcelles due to time constraints, but the field trip was nevertheless a very productive one as we made a detour and had the opportunity to explore Mont Coton. We finally terminated our trip at Le Niole, far from our starting point at Casse Dent, but we achieved some very interesting findings along the way.

With Bruno's keen eyes and experience he was able to show us one of the smallest ferns (Fig. 1) growing on rocks and it was very hard to believe that there is still a species in the Seychelles forest that is new to science.

Figure 1 Tiny fern in the palm of a hand (C Onezia).

He was also able to show us two orchids of the genus Bulbophyllum: *B. intertextum* and *B. humblotii* (Fig. 2 and 3). From Bruno I gathered that both species are not endemic to the Seychelles, but that does not mean that we should disregard them, even though *Bulbophyllum intertextum* is very common. In fact *B. humblotii* is extremely rare, and it is one of the species which has not been assessed for the IUCN red listing and thus is most often neglected in biodiversity studies. From Bruno's observations Mont Coton holds the largest population of this species, as he has only observed isolated individuals in other places.

Figure 2 *Bulbophyllum intertextum* (left, C Onezia).
Figure 3 *Bulbophyllum humblotii* (right, C Onezia).

Our well-deserved lunch break was at the breathtaking view point of Petit Congo Rouge, surrounded mostly by our native terrestrial species, as well as bird species in flight, as can be seen in the foreground of Fig.4, with Mangliyedgranbwa (*Glionnetia sericea)* and Seychelles swiftlet *(Aerodramus elaphrus)* in flight.

Figure 4 Petit Congo Rouge viewpoint (C Onezia).

The amount of endemic Bwa dou *(Craterispermum microdon)* (Fig.5) growing in one area was impressive as the regeneration was really healthy, and everyone in the group was astonished because we were told that it is not common to discover seedlings and saplings.

The population of endemic Lalyann potao *(Nepenthes pervillei)* (Fig.6) was exuberant; it was growing everywhere, so that at times we had to be extra careful as we could easily trip over the creeping stems.

For most of the last part of the walk, at lower altitude, the trail was overgrown by Prin de frans *(Chrysobalanus icaco)* and partially with Kannel

Figure 5 *Craterispermum microdon* (left, C Onezia).
Figure 6 *Nepenthes pervillei* (right, C Onezia).

(Cinnamomum verum), so that we had to forge a passage through or crawl to reach our destination. Though our bodies ached and were scratched, everybody completed the trail safely and relished this wonderful experience. The best part of the field trip was that a helping hand was always offered, camaraderie and knowledge were shared and Lindsay was astute in checking our knowledge of the surrounding flora.

Five of the participants (B Grieser-Johns)

Drawing by Zoë Chong-Seng

Plant Conservation Action group – who we are and what we do

When we started: November 2002

Who we are: We are a voluntary membership organisation (NGO), with an executive committee elected every two years. We have meetings every two months and regular field trips.

Our mission: PCA mobilises action for the scientific research and conservation of plant species, and promotes community awareness of the fundamental importance of plants in Seychelles.

What we do:

- Plant species identifications
- Advice on vegetation rehabilitation
- Vegetation surveys and management plans
- Collaborative research and monitoring
- Hands-on training in practical plant conservation
- Promote awareness about plants and conservation
- Field trips for members and plant enthusiasts
- Advocate for plant conservation

Our current project: "Restoring endangered 'glacis' vegetation with involvement of the local community"

Website: www.pcaseychelles.org **See also:** www.seychellesplantgallery.com

Contacts: pca.seychelles@gmail.com; Telephone +248 4241104 or +248 2637533

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Answers to Activity Page photo changes (see pages 6,16 and 24)

Difference between Photo A and B: The leaf is from a different plant species.

Difference between Photo B and C: The tomato has lost its stalk/sepals.

Differences between Photo C and D: The fruit has had a bite out of it; the stick has lost the top part.

Have you been an excellent observer?