

# Kapisen

Plant Conservation Action group Newsletter

April 2008

Issue 8

PCA celebrates 5 years of action in plant conservation

## PCA's 5<sup>th</sup> Anniversary!

Dear readers,

The Plant Conservation Action group (PCA) has been celebrating its 5<sup>th</sup> anniversary (p. 3). We had planned to invite contributions for a special issue that looks back on the history of PCA on this occasion, but there are so many new activities to report that we decided it is much more important to show you just how alive and active plant conservation has become in Seychelles!

The articles in this issue demonstrate one particular achievement of plant conservation in Seychelles over the past few years: That the activities undertaken cover a comprehensive range from education (p. 7), field excursions (p. 13 & 15), conservation planning (p. 10), conservation action (p. 12), and a concerted strategy for plant conservation-related research (p. 4). These activities are undertaken by a wide variety of people and agencies, from the government (Ministry of Environment, Natural Resources and Transport) to NGOs (e.g. ICS, PCA), to the private sector (e.g. North Island Resorts) and amateur botanists from all walks of life.

We think that a particular strength and contribution of PCA in this broadly based endeavor for the conservation of Seychelles plants is that it has enabled the interlinking and interweaving of activities from different agencies and different realms, from education to research. Thanks to PCA a National Strategy for Plant Conservation (Kapisen No. 2, 2004) and a National Plant Conservation Research Agenda (p. 4) now help to plan and coordinate actions. And PCA functions also as a main connection in the plant conservation web in very tangible ways. For instance, about a year ago Christopher Kaiser, a Postdoc from ETH Zurich (Kapisen No. 6, p. 6, 2006), started research on the interaction of plants and pollinators in Seychelles. In earlier days new research might have taken place in Seychelles unnoticed except for a few people, until eventually someone located an article in the National Archives, or more recently on the Internet. In the case of Chris, he could engage from the very beginning in education (p. 7), field excursions (p. 13), and research planning (p. 4); and the issue of pollination as an important part of plant conservation has already been taken up in concrete conservation work such as the habitat restoration project on North Island. Presentations have been given by visiting experts since the colonial times, and reports were filed in the National Archives. However, the experience of PCA shows that such interactions

work better if they are long term and involve not only the head of an agency, but also other dedicated people, who may include practitioners doing actual conservation work in the field, amateur botanists, educators and the plant conservationists of the future – the children. And for kids (and grown-up kids!) we include in this issue more of Peter's cartoons (p. 5 & 14) and Katy's puzzles (this time a Sudoku, p. 6).

A strong indication that collaborations work in a productive way in plant conservation in Seychelles is the fact that all articles in this issue are coauthored by members of different agencies – for example two National Park rangers, two master students and a senior scientist from ETH Zurich have co-authored the article about La Reserve palm forest (p. 10).

We are looking forward to another five successful years of PCA, and we hope that the success stories then will tell about plant species that could be removed from the red data list thanks to conservation measures!

Katy Beaver, Christoph Kueffer & Eva Schumacher  
Editors

The electronic pdf version of Kapisen can be ordered from [boga@seychelles.net](mailto:boga@seychelles.net) or downloaded from [www.plantecology.ethz.ch/publications/books/kapisen](http://www.plantecology.ethz.ch/publications/books/kapisen)



**Photo front cover**

Plant training course on Aride island (E. Schumacher).

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## PCA - Five Years of Action

By Katy BEAVER and Frauke FLEISCHER-DOGLEY

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The Plant Conservation Action group (PCA) reached its fifth anniversary in November 2007 and has plenty of achievements to celebrate. For example, PCA initiated and has been instrumental in the production of the Seychelles National Strategy for Plant Conservation (2005-2010), the new Plant Conservation Research Agenda (2008-2015), a detailed Red Data List for woody endemic species and the first of a series of booklets on the endemic flowering plants of Seychelles. PCA has worked with a number of partners as well as with the Department of Environment (Seychelles Ministry of Environment, Natural Resources and Transport) over the past few years, including the Institute of Integrative Biology at ETH Zurich and local partners Island Conservation Society (ICS, an NGO) and North Island (a tourist development). A five-year Vegetation Management Plan for North Island (2007-2011) has been produced as a result of this non-government collaboration.

Members of PCA have advised and contributed to the work of a considerable number of master, doctoral and post-doctoral students and other researchers who have taken up plant research projects in Seychelles or who have carried out monitoring work on the islands. All of this work has resulted in reports, theses and scientific papers which further our knowledge of plants and plant conservation in the country. In addition, four of our members have qualified for their own Doctorate degrees and one member for a Masters degree in the last two years alone. But our work has not been only about research - PCA recently facilitated a plant training course organised by ICS for people already working in the field as rangers, for example. We have also had very interesting explorations of various lesser-known areas of the islands, often finding new sites for rare or endangered plants.

Finally plant conservation has been placed conspicuously on the national agenda of nature conservation and environment protection and is no longer simply a marginal item. For the first time a newsletter, KAPISEN, is illustrating the importance of Seychelles plants as the basis for all life in our islands. A platform has been created, focussing on our plants

and the increase in knowledge. The development of a comprehensive toolkit, which includes Seychelles National Strategy for Plant Conservation, the Plant Conservation Research Agenda, the woody species Red Data List and the North Island Vegetation Management Plan, ensures that existing knowledge is documented and shared to facilitate and ensure the future protection and conservation of Seychelles plants.

We are proud to have played our part in bringing this about and are grateful to our partners for their contributions, without which we could not have achieved as much. We realise, however, that there is still much to do, so we hope that other organisations will join us in this work. Even more, we hope that more people will join PCA and help us in our "Promotion of Plants". Current membership includes people from all walks of life, from professional conservationists and educators to people who consider plants as their hobby, from retired forestry officers to people early in their careers, and includes both locals and expatriates. So if you have an interest in plants and plant conservation you are welcome to join PCA and make a contribution towards their promotion.



Some products of PCA: the National Strategy for Plant Conservation, the Plant Conservation Research Agenda, the first booklet of a series on the native plants of Seychelles, the North Island Vegetation Management Plan, and several issues of KAPISEN - the biannual plant conservation newsletter.

## Seychelles Plant Conservation Research Workshop 2007

By Christoph KUEFFER<sup>1</sup>, Denis MATATIKEN<sup>2</sup>, Katy BEAVER<sup>3</sup>, Frauke FLEISCHER-DOGLEY<sup>3</sup>, and Christopher KAISER<sup>4</sup>

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From June 26 to June 29 2007, a plant conservation research workshop was held in Victoria entitled "Synergies between Plant Conservation and Ecological Research". The organisers were PCA, the Terrestrial and Ecological Research Centre of the Seychelles Ministry of Environment, Natural Resources and Transport (TERC, ex Botanic Garden Section) and several institutes from the Federal Institute of Technology (ETH) Zurich, Switzerland.

The workshop's aims were to review past and present plant conservation and research activities and to identify future priorities and synergies between conservation and research. Ultimately, the objective was to develop a research agenda for plant research in Seychelles, which is listed as Subtarget 3a in the Seychelles National Strategy for Plant Conservation for 2005–2010 (NSPC, see Kapisen No. 2).

The c. 40 workshop participants provided a broad range of expertise to plant conservation in the Seychelles. Representatives from several ministries of the Seychelles government, different NGOs



Plenary session during the conference (E. Schumacher).

and the private sector, mainly the tourism industry, represented the local plant conservation community. International scientists with research experiences from other oceanic islands, such as Mauritius, La Réunion, Rodrigues, Azores, Pacific islands, Hawaii, New Caledonia, were also present. Presentations from seven local and eleven international experts were scheduled, along with group discussions on the following topics: taxonomy; *ex-situ* plant propagation; education, awareness, and capacity building; *in-situ* conservation of rare species; plant-environment interactions (particularly soils); and biotic interactions (particularly plant-animal interactions).

### Significant points arising from workshop discussions

The basis for rational conservation actions is a good knowledge of the current situation and its dynamics. It was therefore concluded that the compilation, documentation and interpretation of data on the current status of the endemic flora and its habitats is a foremost priority. Existing data has to be made more easily accessible to researchers and gaps in the knowledge of the flora need to be filled. Changes in population sizes and habitat characteristics need monitoring. Clearly, an understanding of plant reproductive processes, such as pollination and seed dispersal, are very important in determining the health of populations and habitats, yet only limited knowledge on this exists. Furthermore it was highlighted that the impact of climate change, mainly expressed in more frequent and extreme weather events, needs to be monitored, especially in mountain mist forests and inselbergs – two habitats that are of paramount importance for Seychelles' plant biodiversity.

*Ex-situ* conservation, the conservation of threatened species outside their habitats, has progressed in Seychelles, especially through the work of the Biodiversity Centre in Barbarons with the support of Eden Project in Cornwall (UK). However, besides the Biodiversity Centre, many others in Seychelles and in the Western Indian Ocean region have gained relevant experiences in *ex-situ* plant propagation, and this expertise needs to be linked. *Ex-situ* conservation should be more focused on complementing *in-situ* conservation, and questions such as where self-sustaining populations can be re-established in the field, have to be answered. For this, the genetic diversity of very rare species has to be better understood to ensure that *ex-situ* populations conserve genetic variability. Such



Intensive discussions in one of the small groups (E. Schumacher).

research is expensive, so it was proposed that a protocol is established to map out the level of genetic research required for every critically endangered species separately, based mainly on the significant threat factors of a species.

Finally it was emphasised that a thorough understanding of the uniqueness of the Seychelles flora is missing, which would greatly strengthen the cause of plant conservation in Seychelles. The age, isolation and granitic nature of Seychelles must have shaped the endemic flora in many ways. Prof Peter Edwards (ETH Zurich), for instance, illustrated in his presentation the many ways in which the Seychelles flora is adapted to regeneration in a granite-dominated environment - from boulders to inselbergs - with shallow and nutrient-deficient soils.

The workshop participants discussed how to fill knowledge gaps, and how to disseminate research results to the relevant actors. To enhance the research and management capacity in Seychelles, visiting scientists need to be in communication with local researchers from the inception phase of research projects. It was suggested that it should become compulsory for every visiting scientist to contribute to training courses or long-term research and monitoring programmes.

The general conclusion at the workshop was that Seychelles has achieved much in plant conservation. It is reassuring that, after many years of very successful conservation of the Seychelles avian fauna, the country is strengthening its capacity to also conserve the native flora. To further implement this agenda however, it will be necessary to strengthen and widen the network with universities and research institutions. Priority will be given to research projects which are financially self-supporting and fully collaborative with Seychelles. The Seychelles will also

strive to access and engage finance internationally, regionally and locally, for example available through the UNDP-GEF Mainstreaming Biodiversity Project and the Sustainable Land Management Project.

## The Seychelles Plant Conservation Research Agenda

A direct outcome of the Workshop was a Plant Conservation Research Agenda for the years 2008 to 2015. The Agenda was prepared at the workshop, and after a lot of editing and further feedback, a final version was reviewed by the members of the PCA and the workshop participants. The Seychelles Ministry of Environment, Natural Resources and Transport (MENRT) has accepted it as the national research agenda for plant conservation. The strategy is divided into ten objectives - Documenting plant diversity; *Ex-situ* conservation; Prioritisation of species and habitats for conservation action; Understanding plant-environment relations; Invasive species; Climate change; *In-situ* conservation of threatened plant species; Understanding biotic interactions on a community level; Capacity building; and Education and awareness building. Each objective includes background information, a number of actions relating to the objective, together with a rationale and recommendations on how to proceed with each of the actions. An electronic version of the Seychelles Plant Conservation Research Agenda can be downloaded from the Kapisen webpage ([www.plantecology.ethz.ch/publications/books/kapisen](http://www.plantecology.ethz.ch/publications/books/kapisen)). Local and international experts are most welcome to consider how they can contribute to the achievement of the targets!

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### Peter's Plants



Bwa Zoliker

# Plant Sudoku

## Plant Sudoku

By Katy BEAVER

Even if you are familiar with Sudoku puzzles, you may find this an interesting challenge because of the use of picture symbols instead of numbers. And you don't have to be an artist to copy the simple symbols into the grid!

Fill in the grid so that every row, every column and every 3 x 3 box contains each of the nine plant structures shown below:




## Experiences from an Interactive Plant Conservation Training Programme

By Marie-France BOUZIN (Biodiversity Centre), Andre DUFRENNE (ICS), Randolph BIJOUX (ICS) and Katy BEAVER (PCA)

From Monday 22<sup>nd</sup> October to Saturday 27<sup>th</sup> October, 2007, the Island Conservation Society (ICS) with the help of the Plant Conservation Action group (PCA), organised a plant training programme. This course was officially opened by Rolph Payet (Special Advisor in the President's Office) and Gerard Rocamora (ICS Scientific Director). The workshop facilitators were Christoph Kueffer (ETH Zurich/ University of Hawaii/ PCA), Katy Beaver (PCA) and Eva Schumacher (ETH Zurich/PCA). Eleven participants from different environmental NGOs, the private sector and the Division of Environment completed the course.

The objectives of the training course were to introduce us to Seychelles plant diversity and habitat associations; to develop or improve our plant identification skills; to learn about and practise easy and effective vegetation monitoring techniques; to understand the importance of vegetation management for rehabilitation of island ecosystems; and to give us a feeling for the relevance of plants for ecosystems and human wellbeing in Seychelles.

On the first day we got an introduction to Seychelles' plant biodiversity by Lindsay ChongSeng who has worked for the Seychelles Islands Foundation (SIF) for many years. Christoph gave us information on

### Good cooperation results in a successful course

The Island Conservation Society (ICS) was keen to run a practical training course on plants for local conservation workers through the French funded FFEM project "Rehabilitation of Island Ecosystems". This four-year project was initiated by Gerard Rocamora of ICS and involves rehabilitation on several Seychelles islands, including North Island, Aride and Conception. Incorporated are the eradication of alien predators such as rats, rehabilitation of vegetation through removal of invasive plants and propagation of native species, reintroduction of threatened animal species such as the Seychelles White-Eye and relevant training for local people. PCA is involved in the FFEM project mainly in an advisory capacity, particularly for the vegetation rehabilitation on North Island, where PCA members have played an important role in producing a five-year Vegetation Management Plan for the island. ETH (a Swiss university) has regularly contributed masters students for plant research projects in Seychelles, including monitoring of the vegetation rehabilitation on North Island.

the basics of conservation and in the afternoon we proceeded to the Botanical Garden at Mont Fleuri where James Mougall introduced us to some of the common native and introduced plant families and species present in Seychelles.

However, in the six days of training we had only two days indoors - that is because the training was more practical, with field visits to several areas for us to better understand plants in their natural environment.



What are the essential parts of a plant? Artistic drawings of plants helped to see things from a plant's viewpoint (E. Schumacher & A. Dufrenne).



# Training Course

Firstly a trip to Aride Island was included for us to get a good knowledge of the conservation and vegetation monitoring method on the island (see cover photo). Already we were sharing our experiences. We also visited Mare aux Cochons pilot rehabilitation site in the Morne Seychellois National Park and La Reserve palm forest, where we practised the trail transect method - a fast way to characterise habitat quality. Our trip to Barbarons Biodiversity Centre enabled us to see some of the rarer endemic plant species of Seychelles and learn about horticultural techniques for ex-situ conservation. By contrast, our visit to MENR Plant Genetic Resources Unit at Grand Anse gave us information on the agricultural plant biodiversity of Seychelles and the conservation of traditional well-adapted local varieties.

The toughest day for us was the last field day. We climbed up to Copolia, where we had an introduction by Christopher Kaiser (ETH/PCA) to glacies vegetation and to different forms of flowers and their pollinators. This was followed by a visit to Port Glaud mangrove trail and then we went back up into the mountains again along the Morne Blanc nature trail, where we saw mosses, ferns, epiphytes and the mountain mist

forest. It was a challenging experience because we covered three trails in the same day. Most of the participants were saying that “it is too hard and we will not make it”, but when we climbed Morne Blanc forest in the afternoon, we forgot about the hot sun and we all put our fatigue aside. Really for me it was “A day that I will never forget”!

We received special handouts prepared for the course by Christoph, Eva and Katy, and also a copy of PCA's book on palms and screwpines (vakwa). And during the course a photo-herbarium of plant leaves was created, which will help us to further improve our plant identification skills. The interaction between the instructors and the participants was very good, as knowledge was being shared by both sides. We must also mention the fantastic organizational skills of Andrew Jean-Louis, the ICS Project Coordinator for the FFEM project, and are grateful to Gerard Rocamora and ICS for giving us this opportunity to meet with colleagues and plant experts to share experience, knowledge and increase our capacity in native plant identification and monitoring.

## Some of the comments from participants at the end of the course

“I have come to realise just how important plants are to us.”

“Thank you for this course which was hugely useful and very pleasant.”

“My awareness of the importance of plant pollinators has increased.”

“Despite the overloaded programme, we did have enough opportunity to make comments and ask questions, and the course facilitators even encouraged us to do so and took our contributions as part of the learning process of all.”

“In the beginning of the course I didn't realised why monitoring was important but by the end it started making a lot of sense.”



Trail transect monitoring on Aride (E. Schumacher).



Identification of mosses and lichens on Morne Blanc (E. Schumacher).



## Four months later.....

PCA followed up with participants four months after the course to see how they were using the information and experience they had gained. Here is what some of them said:

“I was able to help my colleagues to better identify our mangrove species and also to identify the famous Bwa Bannann that we have on Curieuse Island.”

“Here on Aride we’ve set up a small nursery where we are growing Bwa siro from cuttings. This is a tree that land birds feed on their seeds but on Aride it is in low density. The cuttings are already developing well.....and will soon be transferred to the forest.”

“...on Alphonse, (vegetation) rehabilitation will require intense involvement of trained staff and plant experts. I anticipate that with the skills gained during the workshop I will be able to make a significant contribution...”

“I have already tried to encourage public awareness of how plants are very important in our world. I now have some photographs that we can use for an exhibition in the future.”

“As for the monitoring methods and the vegetation survey method, as a ranger these two activities can be used and help us in most of our every day work in the Vallée de Mai.”

“I realized far better the necessity to see the role of insects as potential endemic plant pollinators and have actively worked towards getting this ecosystem angle better into our preparatory work for upcoming invertebrate introductions”

(See also “Notes from the Field”)



Group picture on the Copolia inselberg (E. Schumacher).

## The Conservation Value of the Palm Forest La Reserve on Mahé

By Bettina BAADER, Bettina HENDRY, Hansel SIMARA, Steven AZEMIA & Karl FLEISCHMANN

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### Introduction

Approximately 45% of the land area of the Seychelles is currently under some form of legal protection. Nevertheless, certain areas of rich plant diversity remain outside this protection. One of them is the La Reserve forest, a mature and almost undisturbed mid-altitude forest (200-500 m a.s.l.) located in the southern part of Mahé. La Reserve is one of the last remaining representatives of a native palm forest on Mahé and was proposed as an area of special conservation value by Carlstroem (1996) and in Objective 2, Target 6 of the National Strategy for Plant Conservation (NSPC). However, to date there are no management or conservation efforts in that area and no formal protection exists.

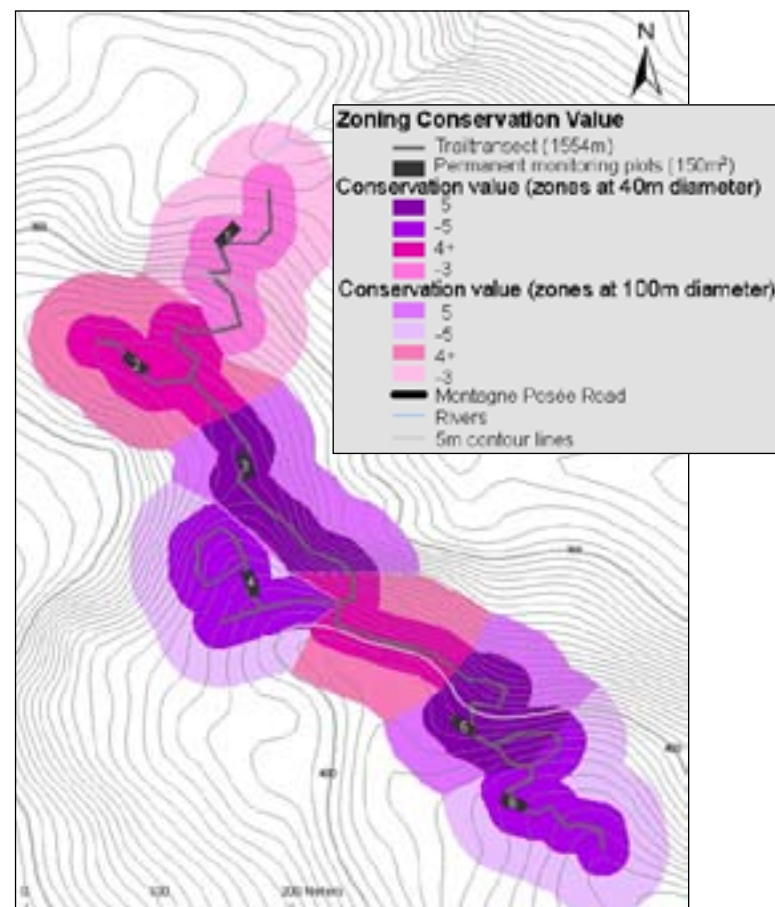
Between 1991 and 1996 Fleischmann (1997) investigated the species composition and the conservation value of the La Reserve forest. The aim of this study, performed between April and June 2007, was to evaluate and interpret changes in terms of vegetation patterns, species regeneration and plant invasions between 1991 and 2007 by resurveying the area with the same transect and plot methods. In particular we were interested in monitoring changes in the presence of invasive species and the conservation value of the area (regeneration and abundance of native tree species, degree of invasion of alien plants and occurrence of red listed plants) (see Baader & Hendry 2007 for detailed methodology).

### Results

The La Reserve forest is dominated by endemic palms. With the exception of *Lodoicea maldivica*, all five endemic palm species of the Seychelles, *Deckenia nobilis*, *Nephrosperma vanhoutteana*, *Phoenicophorium borsigianum*, *Roscheria*

*melanochaetes* and *Verschaaffeltia splendida*, are present. Our findings indicate that nearly 75% of all species recorded in La Reserve are native and almost 60% are red listed species according to the proposed 2007 IUCN Red List (Huber & Ismail 2007) - including *Camposperma seychellarum*, *Canthium carinatum*, *Colea seychellarum*, *Craterispermum microdon*, *Diospyros seychellarum*, and *Vateriopsis seychellarum*. In total, 31 native woody plant species were recorded within the study site. *Cinnamomum verum* is still the most prominent alien species in the forest. Additionally, the creeper *Merremia peltata* has started to invade the area and is of great concern. The number of native and rare species increases and the number of alien species decreases by over 50% from the edge to the centre of the palm forest.

Our results reveal a number of changes in species composition over the past 16 years (details can be found in Baader & Hendry 2007). Palms have in general become more dominant at the expense of dicotyledonous tree species, notably *Diospyros*



**Fig. 1.** Forest zonation according to conservation values (1, lowest; 5 highest) with respect to rejuvenation of native tree species, abundance of natives, degree of invasion of alien plants, and occurrence of red listed plants (see Baader & Hendry 2007 for more information).

and *Psychotria pervillei*, which are not recorded along the trail anymore, followed by *Northea hornei*, *Colea* and *Canthium bibracteatum* which still show some regeneration in the study area. However, alien species, particularly *Adenanthera pavonina*, *Chrysobalanus icaco*, *Cinnamomum*, and *Syzygium jambos*, have also increased in prominence. Since most of the alien species in La Reserve show a successful regeneration, it is assumed that they will maintain (*Cinnamomum*) or even increase (*Alstonia macrophylla*, *Chrysobalanus*, *Merremia*, *Ochna ciliata*, and *Psidium cattleianum*) their prominence in the future. In contrast, without an appropriate management of this forest, many of the dicotyledonous red listed species (e.g. *Camptosperma*, *Craterispermum*, and *Diospyros*) will decline or disappear in the future, since they hardly rejuvenate.

The monitoring of the conservation value supported the fact that a significant part of La Reserve forest is of outstanding ecological value (Fig. 1). Six of seven sub-transects showed a high or very high conservation value (between 4 and 5) attributable mainly to a high species diversity and abundance of natives.

Apart from the vegetation monitoring a new survey of boulder fields was designed. This investigation provides an overview of geomorphologic features in



The magnificent La Reserve palm forest (K. Fleischmann).

La Reserve based on five boulder size classes. A first statistical analysis shows a significant correlation between big boulders and palms, and between small or no boulders and dicotyledonous tree species. These findings strongly indicate that the endemic palms preferably grow in boulder fields, whereas dicotyledonous trees rather occur between small boulders or in areas without any rocks.

## Conclusions

The La Reserve palm forest has an outstanding floristic and ecological value. It is one of the best-preserved relicts of an almost undisturbed palm forest on Mahé with a high percentage of red listed species and a high ecological value (Fig. 1). Endemic palms and some other woody endemic species show a successful regeneration. The species diversity in the La Reserve forest is comparable to Silhouette Island and the upper parts of Congo Rouge (Fleischmann, 1997). However, alien species have increased their abundance over the past 16 years, and some of the red-listed species are declining. The area therefore unquestionably deserves formal protection status and active conservation management. The zonation of the La Reserve palm forest presented in this study (see Baader & Hendry 2007 for more information and detailed maps) can serve as a basis to define boundaries of a formally protected area and specify different management zones (e.g. buffer, ecotourism and strictly protected core zones) within such a protected area. Active management should include regular monitoring, weeding of invasive species (especially *Merremia* and in the vicinity of red listed plants), and minimizing disturbance (e.g. by visitors).

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## Habitat Restoration in Mare aux Cochons (Morne Seychellois National Park) – Part One

By Terence VALENTIN<sup>1</sup>, Hansel SIMARA<sup>1</sup>, Frauke FLEISCHER-DOGLEY<sup>2</sup>, Eva SCHUMACHER<sup>3</sup>, Christoph KUEFFER<sup>3</sup>

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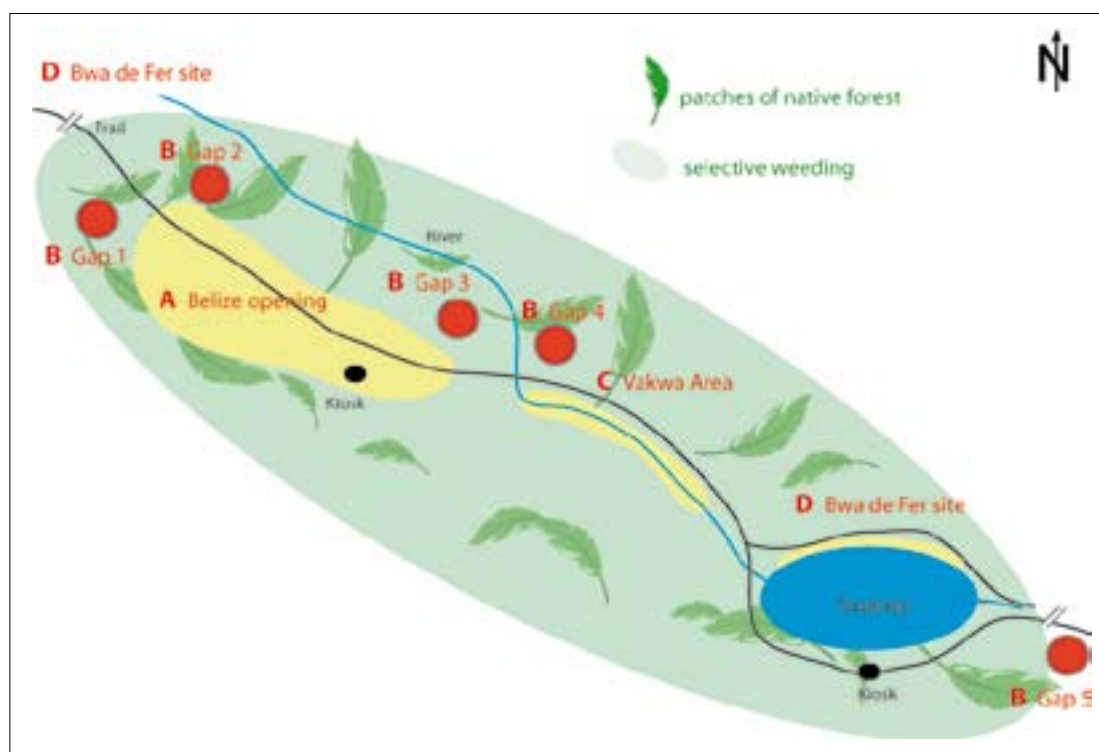
### Introduction

Many natural areas in Seychelles are heavily invaded by alien plants. It is therefore important that we learn how to reduce the abundance of invasive plants and support the growth and reintroduction of native species. Such measures to restore habitats may increase the habitat quality for native plants and animals in the wild, and prepare suitable sites for the reintroduction of very rare species propagated *ex situ* in Botanic Gardens (see article on Research Agenda Workshop, pp. 4). In Seychelles several habitat

restoration projects have been very successful in the lowland (e.g. Kapisen No. 4, p. 6-7; No. 6, p. 16-17, No. 7, p. 6-7). But in upland forests habitat restoration is often far more difficult, especially due to the remoteness of the sites, difficult topography, slow growth of most of the endemic and some of the native species, or the limited knowledge about the ecology of the species and habitats. However, it is not impossible! The National Park Unit of the Seychelles Ministry of Environment, Natural Resources and Transport (MENRT) has been doing habitat restoration work for over 10 years in the Morne Seychellois National Park. We report in this issue on the general background and history of habitat restoration in the National Park. In the next issue of Kapisen we will discuss some of the more recent and practical experiences.

### The history of the habitat restoration site at Mare aux Cochons

In 1996 the National Park Unit initiated a habitat restoration project at Mare aux Cochons in the center of the Morne Seychellois National Park (Fleischer-Dogley 2004). Mare aux Cochons is situated in a valley approximately 450 m above sea level. The habitat restoration site is about 1 kilometre long with a width of about 50 m; from North-West to South-East (see Map). The area is situated along one of the most prominent eco-tourism trails that starts at Le Niol or Danzil, explores the Mare aux Cochons



Map of the Mare aux Cochons restoration area.

# Mare aux Cochons

swamp (Kapisen, No. 7, p. 20-21) and finishes at Port Glaud.

At the start, invasive woody plants such as Kannel (*Cinnamomum verum*), Prindefrans (*Chrysobalanus icaco*) and Zambroza (*Syzygium jambos*) were removed, and the cleared areas were replanted with both common and rare native species. For instance, the central Belize plateau, a grassland of 25-50 m by 200 m, was mainly replanted with different species of endemic palms (A on Map). Among the rare species were some critically endangered ones such as Bwabannann (*Gastonia lionnetii*) and Bwadfer (*Vateriopsis seychellarum*, D on map). Some of the saplings for replanting were grown in an *in situ* nursery near the site. In a first phase a total of about 1,500 endemic plants was planted. Different management strategies were tested. One involved the total removal of the alien canopy while in a second trial the canopy was only thinned. In the completely cleared areas debris was arranged along the contourline at a height of one meter to protect the seedlings and to assist in the creation of an appropriate microclimate. It proved that growth of the native species was better under a thinned canopy of alien species such as Kannel. In the case of Bwadfer, for instance, the growth rate of the plants under the alien canopy was 2.5 times higher than the growth rate of those in a completely cleared site. Planting and maintenance of the plantation was labor-intensive due to the remoteness of the site. The maintenance also involved weeding twice a year, and watering during the first two months after planting.

Between 2002 and 2005 ETH Zurich did field research on invasive woody plants in the Mare aux Cochons area in collaboration with the National Park Unit (Kueffer and Schumacher 2005). This collaborative project allowed for further development of the restoration activities. Among others, five experimental plots of a diameter of c. 15 meters were set up (Schumacher 2007), to test replanting techniques for native species in forest gaps (B on Map). Secondly, weeding around pockets of vegetation with a high proportion of native species was started (selective weeding, Kueffer 2003; Kueffer and Schumacher 2005). Such selective weeding involved clearing around single large trees, or around small groups of a few individuals. In other cases areas as big as a ridge mainly composed of native species were managed. The hope is that such selective weeding will enhance fruit production of adult native trees and survival of native seedlings in the cleared plots.

For areas with particular abiotic conditions specific replanting strategies had to be devised. For instance, along a river in the vicinity of the swamp area there



is a grassland that is regularly flooded (C on map). This area was successfully replanted with Vakwa parasol.

## The long-term perspective

The long-term goal is to restore an area of several hectares of native species dominated forests in the centre of Mare aux Cochons. It is obvious that total clearance of the alien canopy and replanting with native species is not effective, and also far too costly. But natural processes may assist in speeding up the transformation from alien to native vegetation on a larger scale than the current patches. Inselbergs, that are scattered in the Mare aux Cochons area and mainly covered with native vegetation, together with weeded and restored patches of native vegetation, may serve as native seed sources for the surrounding forest (Kueffer 2003). Native birds such as the Seychelles Bulbul (Merl, *Hypsipetes crassirostris*) feed on the fruits produced in these pockets and disperse the seeds to the Kannel understory. An advantage is that native species seem to regenerate better under a Kannel canopy than Kannel seedlings (Kueffer, Schumacher et al. 2007). Kannel may not be particularly successful in maintaining regeneration under a closed canopy. The species may simply have profited from massive deforestation in the past that allowed it to rapidly spread on highly disturbed land and it now benefits from its overwhelming abundance and seed production across the main granitic Seychelles islands. It may well be that a foremost obstacle for native plants to compete with Kannel is their current low abundance, which leads to a low input of native seeds and consequently juvenile regeneration. Consequently, if there are plenty of native seeds produced and dispersed in the forest, the Kannel forests could slowly transform into a mixed forest with native plant species once again more common.

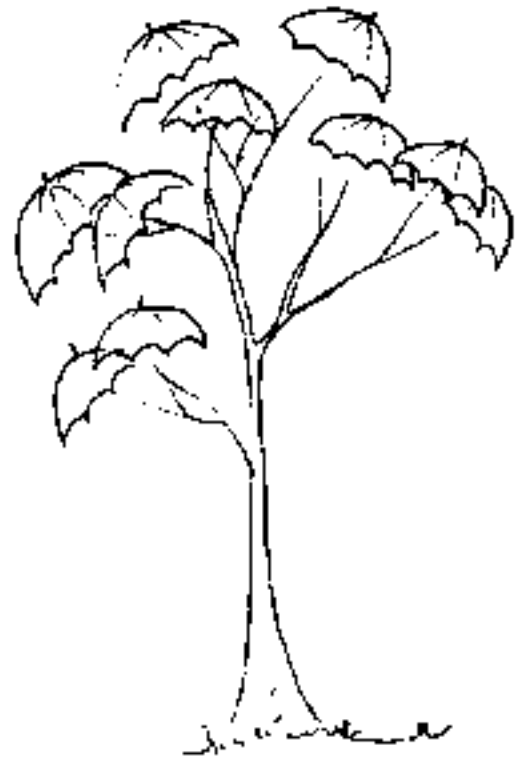
Hopefully in a few years the Mare aux Cochons area will once again be mainly composed of native species, including some very rare ones. The area is well situated. Many local people and visitors use the trail and can therefore enjoy the results of habitat restoration. For instance, the area was visited as part of a recent plant conservation course (see article p. 7). Native vegetation in the National Park is not only restored to save unique plants and animals of the Seychelles, but also for people to enjoy!

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## Peter's Plants



Vakwa parasol

## PCA NEWS

At the **PCA Annual General Meeting (AGM)** held in January 2008, a new four-member committee was elected, with Lindsay Chong-Seng as Chairperson, Denis Matatiken as Secretary (to be assisted by Katy Beaver and Marie-Thérèse Purvis), Andy Roucou as Treasurer, and Katy Beaver as the fourth member. Meanwhile, another PCA member, Marie-Thérèse Purvis is to be congratulated on achieving a Doctorate in Education at Warwick University, UK, on “school improvement in a small island state”; and Christoph Kueffer and Eva Schumacher have moved to Hawaii, where they are again working on invasive plant species.

### PCA scheduled field trips

At the AGM it was decided to schedule more **regular field trips** (see below) to enable us to go out as a group and explore in an informal and enjoyable way. Each will be led by one of our experienced members. Anyone with an interest in plants is welcome to join.

<i>Sunday 1 June,</i>	Grand Bois (Anse Boileau).
<i>Sunday 3 August,</i>	Anse Cache (new search for the lost pitcher plants).
<i>Sunday 28 September,</i>	La Reserve (to the top - <i>Vateriopsis</i> etc.).
<i>Sunday 30 November,</i>	private glacis restoration project.
<i>Sunday 28 December or 4 January 2009,</i>	Mount Harrison (from Barbarons).

Before the date, please contact Katy Beaver to find out details and arrangements (email [kbeaver@seychelles.net](mailto:kbeaver@seychelles.net) or telephone 241 104)

The **North Island Vegetation Management Plan 2007-2011** was printed and circulated to stakeholders and is due for its first review around April this year. This reflects the Plan's policy of adaptive management, in which progress is assessed and the effectiveness of the rehabilitation evaluated so that adjustments and monitoring can be made if necessary. Although the ultimate aim is to have a self-sustaining environmental system on the island, to a lesser or greater degree vegetation rehabilitation is bound to be experimental and flexibility is therefore required (see also the Mare aux Cochons rehabilitation project, p. 12)



Another document is now complete and ready for distribution - the **Seychelles Plant Conservation Research Agenda** (see last page). Edited by PCA members, it is the outcome of an international workshop held in Victoria in 2007 (see p. 4).

Two new plant research projects have been started. Christopher Kaiser, a PCA member, is looking at **plant pollinator relationships** amongst plants living on mid-altitude inselbergs (glacis). The research will help us to know which animals (both native and non-native) are pollinating flowers, which in turn will help in prioritizing native plant species for conservation efforts. This work will be complemented by that of Aline Finger, who is looking at the **genetics of three rare endemic plant species** (two critically endangered and one endangered), which will again assist in designing conservation measures for these species. Both these researchers are from ETH, the university in Zurich with which PCA has a partnership.

Michael Huber and Sascha Ismail have won a coveted **prize for their Master thesis**, conducted together with PCA in 2006: “Suggested IUCN red list status of the endemic woody plants of the Inner Seychelles”. The Walter-Schneider prize of the Department of Environmental Sciences (ETH Zurich) is awarded annually to a master thesis that “addresses environmental problems in their complexity in an innovative way”. Congratulations Michael and Sascha!

## Notes from the Field

On PCA's field trip to the Copolia area on Mahé, a few individuals of *Seychellaria* were spotted by Lindsay Chong-Seng. This tiny plant is the only endemic saprophytic species in Seychelles. It is either purple or whitish in colour and is difficult to see on the forest floor, which may be one reason why it was at one time thought to be extremely rare. However, it has now been found at several sites on Mahé and Silhouette. Another site for a rare indigenous plant, *Viscum triflorum*, was also located by PCA members a short time ago. This indigenous parasitic plant has been heavily exploited for medicinal purposes and become very rare as a result.



Much to see and discuss in the forest as Chris Kaiser leads PCA members and ETH students on our first expedition of the year (K. Beaver).



The Plant Training Course (p. 7) certainly got participants more aware of the importance of insect-plant relationships in nature. Here is what one of them, Andre Dufrenne observed recently: I made my study in my garden at home, where I planted eggplants (Brenzel) and noticed that there were no insects on the newly opened flowers. Then I thought about the Carpenter bee, *Xylocopa caffra*, that we call Mous Brenzel in Kreol. So I took a small walk in the forest and found one digging a hole in a dead piece of wood. I brought the wood back to my garden and the next day I observed two Carpenter bees flying around the eggplant. I learned that if there are no Carpenter bees then you are less likely to get any eggplants to make a salad or chutney. I want to pass on this information to other people so that they do not kill the Carpenter bee when these insects dig holes in wood, and so that they become more aware of the importance of the wildlife of Seychelles.



In December 2007, a team of researchers (the “Pollination Team” - Christopher Kaiser, Terence Valentin, James Mougale and David Bourke) mainly from the Department of Environment and ETH Zurich, conducted pollinator observations on Kafe maron gran fey, *Paragenipa wrightii*, at Bernica on Mahé. During this time, most of the mature individuals produced flowers, and flower visitors were abundant and most diverse. To assess fruit set (an approximate measure of pollination success), they tagged several of the trees with flower buds and returned to those trees at weekly intervals. While initial fruit set (the number of developing fruits divided by the number of flower buds) appeared to be high, suggesting a relatively high pollination success, they recorded a surprisingly high level of fruit predation. Most fruits of Kafe maron gran fey at Bernica turned red within a couple of weeks after flowering, started to wilt on the plant and fell to the ground. All of those fruits showed a clear hatching hole of a pest and usually half of the developing seeds inside the fruit were eaten. At Bernica, the rate of fruit predation appeared considerably higher compared to other glacis sites where they conducted similar work. They say “We have no explanation as to why the Kafe maron gran fey population on Bernica was so severely affected by the pest species. We can only speculate about the long-term consequences of this attack on recruitment of *Paragenipa* on Bernica. Further studies are needed to quantify the attack rate on Bernica and other sites and most importantly to identify the pest. More urgent questions will arise if the pest is identified as introduced to Seychelles”.



When Eva Schumacher and Christoph Kueffer visited Curieuse Island in early November 2007, they were particularly interested in the effects of prolonged drought on this very dry island. All plants showed clear signs of drought damage, which confirms that lack of rain matters on dry Seychelles islands such as Curieuse or Praslin. However, there were clear differences between species. Many native species seemed to deal relatively well with the drought (e.g. *Dillenia*, *Erythroxylum*, *Euphorbia*, *Nephrosperma*, *Paragenipa*), while other native species such as *Canthium bibracteatum* suffered heavily. In particular, some of the invasive trees such as *Anacardium* and *Tabebuia* were apparently also rather well adapted to dry conditions, and the species that showed least drought damage was the invasive *Chrysobalanus icaco* – a coastal species in its native range. Recent experiments in Seychelles have shown too that some invasive species (another example is *Psidium cattleianum*) seem to be well adapted to drought (see Schumacher et al, Biotropica, in press). Such observations may be important when considering future climate change or improving habitat restoration techniques (Photos: E. Schumacher).

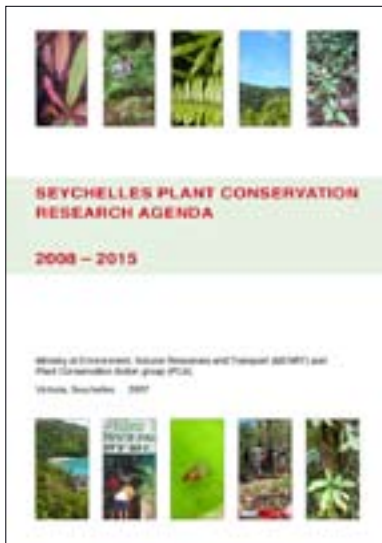


Close to the Mare aux Cochons marsh, hikers on the ecotourism trail used to pass below the canopy of a well developed Bwa gro lapo (*Grisollea thomassetii*) tree, and in the vicinity of the tree usually some seedlings of the same species could be found. However, several PCA members noticed that this tree is now dead, and the reason is not known. This observation showed once again the fact that every remaining individual of a critically endangered species of Seychelles, such as *Grisollea*, could die any day. Time is pressing to assure that their population sizes increase!

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## Seychelles Plant Conservation Research Agenda

The Seychelles Plant Conservation Research Agenda, a response to the National Strategy for Plant Conservation, is now complete and ready for distribution.

Edited by PCA members, it is the outcome of an international workshop held in Victoria in 2007 (see p. 4)

An electronic version of the Seychelles Plant Conservation Research Agenda can be downloaded here:

[www.plantecology.ethz.ch/publications/books/kapisen](http://www.plantecology.ethz.ch/publications/books/kapisen)

Local and international experts are most welcome to consider how they can contribute to the achievement of the targets!



## PCA field trips

La Reserve

<i>Sunday 1 June,</i>	Grand Bois (Anse Boileau).
<i>Sunday 3 August,</i>	Anse Cache (new search for the lost pitcher plants).
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Before the date, please contact Katy Beaver to find out details and arrangements (email [kbeaver@seychelles.net](mailto:kbeaver@seychelles.net) or telephone 241 104)

## Join PCA!

Any person interested in plant conservation in the Seychelles, either from the Seychelles or somewhere else in the world, is invited to join the Plant Conservation Action group (PCA). As a member you support plant conservation in the Seychelles, get Kapisen - the PCA newsletter - twice a year sent to you by e-Mail, and get regular invitations to events and field excursions.

For joining PCA, contact Lindsay Chong-Seng (Chairperson) or Denis Matatiken (Secretary) at

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