



# **Kapisen**

Plant Conservation Action group **Newsletter**

September 2011

Issue 12

*Our Precious Forests*

## Precious forests

Dear readers,

The year 2011 has been declared by the United Nations (UN) as the International Year of Forests. According to the UN, about one third of the planet is covered in forest and about one third of this forest is still in a relatively undisturbed and pristine state. Worldwide 1.6 billion people depend on forests and 300 millions live in forests. 80% of terrestrial biodiversity is found in forest!

An estimated 90% of Seychelles' total land area is covered by some sort of forest, which makes it one of the most forested countries in the world. The Seychelles islands are a forest in a sea of water! Seychellois mostly live in a narrow band of land along the coast, between the forest and the sea, and that is where we spend our days and where our buildings and infrastructures are placed. But our life on this strip of land of just a few square kilometres is only possible thanks to all the services and products that the forest and the sea provide us with.

Most of the forests of Seychelles are secondary; with the major area of primary forest remaining in Seychelles being the low tree and scrub forest of Aldabra Atoll. Nevertheless, forests are home to almost all terrestrial biodiversity, and they serve us in many ways, e.g. as water catchments, climate regulators and by protecting our slopes from erosion. They also create the landscape beauty of the Seychelles that attracts so many tourists every year. Given the importance of forests for our country, it is surprising how little time we spend in them and how little practical effort we as individuals, invest in maintaining their values. When have you last spent time in one of our beautiful forests for an extensive hike? How many Seychellois are paid in one way or another to take care of our forests?

In this issue of Kapisen devoted to the importance and beauty of the forests of Seychelles, we include articles describing the personal experiences and impressions of both Seychellois and visitors in our forests (p. 13-21), and an article on the different kinds of forest helps you to appreciate the diversity of types (p. 5-7). But we also highlight the threats to our forests such as climate change (p. 3-4, p. 8-9), and the need to protect them (p. 16), care for them and restore them (p. 11-12). These emerging restoration success stories show that we can indeed make a difference. The UN Year of Forests should

remind us of taking time to enjoy our forests and feeling responsible to care for them.

We hope you enjoy reading this 12<sup>th</sup> issue of Kapisen!

Katy Beaver, Eva Schumacher, & Christoph Kueffer,  
Editors of Kapisen

The electronic pdf version of Kapisen can be downloaded:  
<http://seychelles-conservation.org/kapisen.aspx> or  
[www.plantecology.ethz.ch/publications/books/kapisen](http://www.plantecology.ethz.ch/publications/books/kapisen)



The native palm forest at La Réserve, Mahé (E Schumacher).

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## Why are our forests so important to us?

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Did you know that 90% of our lovely country is officially covered with some kind of forest? For Seychellois, it may not seem like it because there are so many buildings and other infrastructure developments, there is still a lot of eroded land and large areas of rock and boulders, and the outer islands are mostly covered with only scrub vegetation. The reason this figure may seem surprisingly high is that land use planners consider shrubby vegetation (such as on Praslin or Aldabra) and artificial plantings (e.g. former coconut plantations) as forested land. But it also shows that the land area where we spend most of our time - urban areas, tourism developments commercial / industrial areas and agricultural land - make up only a very small proportion of our country. Most of our islands are indeed forests! And if you think about it, the fact that 90% of our land is covered with some kind of tall greenery is very significant. Living plants provide us with oxygen; they also act as a 'sink' for the carbon-dioxide (CO<sub>2</sub>) which our human activities are busily pumping out into the atmosphere. Let us consider some of the other important ways in which our forest-covered land contributes to our wellbeing.

One of the main functions of forest-covered mountains has been powerfully brought home to us this year, as a long drought struck during the drier



Mountains covered with forest - so important for our water supply (K Beaver).

cooler season of the South East wind: water supply! The forest acts as a 'sponge', allowing soil to absorb rainfall and release it into the rivers which supply us with most of our water. Without forest cover, the soil is unable to absorb much water in the rainy season. Without forest, our rivers would dry even more quickly than some of them did this year. The cloud forests (see p. 8-9) of the higher mountains have a particularly important function in this process: the tiny leaves of mosses and the leaves of ferns, herbs and shrubs 'catch' the water held in the clouds and allow it to drip to the ground, where it is absorbed and released little by little into the mountain streams. The forests on either side of river banks are also vital in protecting the river banks from erosion, hence the need to prevent tree felling by law within 10 metres of all major river banks.

But coastal forests are important too, in protecting our coastlines. Beach dune vegetation prevents the erosion of beach sand, and mangrove roots are wonderful at trapping mud and debris brought down in the rivers or washed up with the tide. Unfortunately much coastal vegetation has been lost, for example almost all of the mangrove forests that existed along the Eastern side of Mahé when humans first settled in Seychelles. These were gradually cleared to allow easier access to the land and to remove crocodile habitat, but mangroves provided timber, charcoal and dyes, as well as crabs, fish and other foods. Mangrove forests also provide shelter and food for migrating birds, and for many young fish and prawns, and they allow a slow seepage of nutrients beneficial to the surrounding coral reefs. Hence the reefs on which we depend so much for fish have lost this beneficial input.

When the first settlers arrived in Seychelles, the mountain forests also provided them with many useful materials, not just timber for building ships and houses but also materials for thatching, making rope, tools and domestic implements, and also provided a certain amount of food. However, the forest clearance for both timber and agriculture went too far and the fertile soil was quickly depleted or lost through erosion, leaving the mountains denuded. By the end of the 19<sup>th</sup> century the lower mountains had been planted with coconut palms but the upper mountains were covered mainly by cinnamon trees that had been introduced earlier and spread by forest birds.

A second major deforestation took place in the early part of the 20<sup>th</sup> century as cinnamon was exploited for its oil, requiring an enormous amount of firewood to supply the distilleries that processed the cinnamon



Mangrove roots are wonderful for trapping mud! (K Beaver).

leaves. The slopes became bare once more but fortunately were gradually reforested from the 1950s onwards, often with planted timber trees such as mahogany and 'santol'. Fast-growing species, such as albizia, were also planted as they helped to prevent further soil erosion. Who was to know at the time that some of these introduced species would later become invasive?

Lessons were learned from the previous destruction of forests and in the 1970s a nature protection system was set up, starting with the establishment of the first National Parks. This system has gradually been extended until Seychelles now holds the world record for the country with the highest percentage of land under protection, almost 50%. This is a great achievement.

However, because of previous forest destruction, almost all of the original forest is gone, at least in the granitic islands (see p. 16), and what little remains is significantly impacted by humans. Most forest is now secondary forest and consists mainly of introduced species. Does that mean secondary forest is "bad" forest? Not at all! Forests are important to us for many reasons, as we have seen above. Although some of the native biodiversity has been lost (we do not know exactly how much), relatively few species have actually become extinct in Seychelles so far. Most species survive somewhere on the islands, even if they are much reduced in size and distribution. And the majority of these species depend on the remaining forests for their survival, so the secondary forests are an absolutely essential part of our environment. However, the richer the biodiversity, the better is a forest able to provide the many ecosystem services

that are so valuable to us humans. This is why protection and even rehabilitation of certain forests is important.

Our forests are precious, not just for their direct services to humans as described above, and for their unique and essential biodiversity, but also for rather unscientific, indefinable qualities such as beauty, calm, tranquillity and special aura, qualities which also seem to attract the tourists that are an essential part of our island economy. We can all benefit from such valuable forest qualities. And remember that mountain forests also provide us with a good way of keeping fit, as well as a place to explore and increase our understanding of our environment.

There are many threats to our forests (see Kapisen 11, p. 3-5) - fire, storms, continued land clearance, habitat fragmentation, being overrun by invasive alien species, pests and diseases, non-sustainable harvesting of certain species, loss of biodiversity, climate change - so we all need to love and care for our forests and their biodiversity! If we can do so, then we and our children and even our great grandchildren can continue to enjoy their many benefits.



Coastal vegetation protects the beach from sand erosion (K Beaver).

## On the forest types of the Seychelles

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### 1. Introduction

The main historical contributions on the study of vegetation types are from Vesey-Fitzgerald (1940) and Procter (1984). More recently, we have been reviewing in more detail the changes of vegetation with elevation (Elzein 2011, Senterre et al. 2009). The aim of this article is to present an updated classification of forest types in the Seychelles. Our contribution is based on extensive field observations for more than 3 years, on several islands, combined with quantitative analyses of the forest types from sea level to the highest summit, and integrating international nomenclatural standards (Grossman et al. 1998). The use of standardized nomenclature aims at emphasizing the correspondence of similar vegetation types from one region to another, i.e. homologies and analogies, which is a very important aspect for the study of ecosystem functioning and for analyzing conservation priorities in a wider context.

Due to its hot and wet climate, without prolonged dry season, the Seychelles “zonal” vegetation type is only made of “rain forests”. Nevertheless, when some factors are not optimal, e.g. in excess, the forest may differ floristically and physiognomically from what corresponds to the macroclimate and then forms what is called “azonal” forest types. These azonal factors are responsible for the differentiation of the main forest types in the Seychelles, and some factors are more important than others.

As for most rain forests in the tropics, the main forest types in Seychelles are distinguished first based on altitude. The other two main factors are related to drier vs. wetter soils (i.e. saxicolous vs. swamp forest) and to humidity (linked to the concavity vs. convexity of land forms). The fourth determinant factor corresponds to the influence of the sea, e.g. mangroves and coastal forests. Finally, the last determinant factor corresponds to the dynamics of the forest, i.e. the stage of regeneration after disturbance, whether it is due to natural reasons or to human influence (see Kapisen 11, p. 6-8). For each of these 5 most important environmental factors, nature changes gradually

and we sometimes call these distinct dimensions of changes “gradients”. The definition of a given forest type can be simplified first to the combination of these 5 most important environmental gradients, and the gradient itself can be simplified into categories. It is useful to remind here that such descriptive studies on plant communities are nothing more than a way of conceptualizing stand ecosystems, exactly as taxonomy (description of species) is a way of conceptualizing groups of similar individuals.

### 2. The main forest types of Seychelles

**Lowland rain forest:** This is the only “zonal” forest type, i.e. the only one not influenced by any limiting factor. It occurs mostly at 0-300(-350) m a.s.l. and has been mostly converted into secondary forests. Lowland rain forests may be extinct or are at least the rarest and most threatened habitat.

**Submontane rain forest:** This forest type occurs just below the cloud belt or at its lower limit, at (300-)350-500(-550) m a.s.l. It contains several rare species, some of them extinct or not seen for a very long time. Mosses are not yet abundant, and Kapisen is becoming co-dominant in the trees. These forests have also been heavily affected by humans and only few remnants remain on Silhouette. One big stand of a drier variant has recently been discovered on Mahé where more exploration is needed, especially on the southern slopes of Mont Jasmin to Port Launay.

**Lower montane rain forest:** This forest is by far the most popular, the most visited and the most studied in the Seychelles. Most of what remains in terms of pristine forest is of this type. It occurs at (500-)550-780 m a.s.l. Its popularity comes from the abundance of the endemics and the beauty of its moss cover, and also from its accessibility. Nevertheless, truly “pristine” stands are rather small and remain in only few areas like Congo Rouge, Montagne Planneau, lower slopes of Morne Seychellois and Pérard, Mont Pot à Eau and Mont Dauban.

**Tree fern montane rain forest:** It was recently demonstrated in a scientific study that moss forests above 780 m are of a different type. The most visible characteristic is the abundance of the tree ferns in the understorey, but a significant number of other species indicates this transition to a wetter and colder forest type. The moss flora in particular changes. In contrast to “lower montane forests”, this tree fern-dominated variant has been mostly neglected by visiting scientists. The reason is that only 3 stands exist, all still pristine and relatively far

# Forest Types



**Photo 1** A pristine stand of tree fern montane rain forest photographed on the western slopes of Morne Seychellois, i.e. one of the rarest and most pristine forests in Seychelles. (B Senterre)

from any trail, towards the main summit of Congo Rouge, on the western slopes of Morne Seychellois and Pérard. This habitat, endemic to Mahé, should remain strictly reserved for scientific studies, i.e. no trail should be open and visits should always be associated with a specific scientific purpose or with general exploration.

**Dry saxicolous rain forest:** These forests occur at all elevations and are closely associated with glacis areas (or “inselbergs”, “saxicolous” means growing on the rocks). They have been very poorly studied due to difficulty of access (in granite boulders). Nice stands can be seen at Montagne Brûlée, Bernica, Mont Sébert, Glacis Sarcelle, etc. These forests occur in fringes close to steep rock outcrops. They are characterized by very special microhabitats in their understorey due to the combination of water catchment from the rocky outcrop, the increased air humidity due to the steep slopes and cliffs, and due to the shady wet environment between the big granite boulders. For these reasons, this habitat seems to play a role of refuge for species from

wetter habitat-types, as revealed by the presence of isolated individuals of rare species, e.g. see the presence of Bwa banann on Curieuse. It includes also some endemic species strictly restricted to this habitat, like the Bwa mediz.

**Dry hill slopes / ridges rain forest:** This forest type is floristically and physiognomically similar to the previous one, except for the rare wet-habitat species and for not being associated with glacis or big granite boulders. In the old days, it was probably the most dominant forest type on Praslin, where it can still be observed in large stands. It is still found in a few places on Mahé, where it is clearly threatened, and more abundantly on Silhouette, in unexplored areas like Pointe Civine and North of Casse Tonnère.

**Swamp rain forest:** These occur mostly in coastal forest areas but also in few other places like Mare aux Cochons or towards Casse Dent-Forêt Noire. All known stands of this very rare forest type have been strongly degraded by humans, even at the recently made Ramsar site of Mare aux Cochons.

**Ravine / valley rain forest:** This is probably one of the most interesting forest types nowadays, where several species have been discovered recently like Mapou-d-gran-bwa and also many fern species and other small plants. Such habitat may be playing an important role of refuge for forest species and includes its own “ravine-endemics”, species only associated with ravines. Many ravines of Silhouette, Mahé, Praslin, and Félicité are still unexplored or very poorly explored.

**Coastal rain forest:** Several species named “-bord-mer” in Creole indicate this forest type, which is affected by the influence of sea spray. Such coastal forests are less interesting in terms of biodiversity but play an important role for the protection of the beach front against storm surges and tsunami. They occur in most of the “plateau” areas or in a narrow fringe along the coast.



**Photo 2** A complex mosaic of forest types in the tree fern montane rain forest belt, from ravine to ridge, mixed with secondary patches. (I Fabre)

**Mangrove rain forest:** This forest is like a swamp forest but where the water is brackish. It occurs just behind the coastal fringe, at river mouths or even develops out into the sea. As for coastal forest, the plant diversity is less interesting, but these forests play a very important role of protection against the sea and are a key habitat for the life cycle of many marine species. Good mangrove forests remain in a few places on Mahé, like Port Launay, also on Curieuse, and some very nice stands exist on Silhouette, and of course also on some outer islands like Aldabra.

**Early secondary rain forest:** In contrast to all the “pristine” or “old growth” forest types presented above, this one has been disturbed and is struggling to come back to equilibrium. When a disturbance affects the canopy cover, like tree fall, hurricane or clearing, the environmental conditions change drastically from shade to light. This new environment allows opportunist species to “invade” the newly opened space, many of them being exotics. After a few years (in good conditions) the “pioneer” bushy vegetation will become a low forest with irregular canopy cover, dominated by short-lived trees, and this is what we call an early secondary forest.

**Late secondary rain forest:** This forest type follows the previous one in time. After a few decades (again in good conditions), most often ca. 30 years after a disturbance, the early secondary forest will have become slightly higher and especially denser in terms of forest strata. The trees that dominated the canopy of the early secondary forest will be gradually dying and replaced by other species which germinated in the slightly shady understory of the early secondary forest. The life span of these late secondary species is much longer. The forest will need more than half a century or up to a century to progressively change the floristic composition back to a “primary forest” form. These late secondary forests occur in extensive areas on Mahé and Silhouette. They include “Albizia” forests for example and most of the abandoned plantation forests.

### 3. More reflection and more research needed ...

The forest types as presented above are much simplified and in reality most stands combine more than one limiting factor, i.e. more than one gradient. Submontane ravine forests are quite different from lower montane ravine forests, and the same is true for saxicolous forests. The strange vakwa-dominated forest at the very top of Morne Seychellois and Pérard probably corresponds to the



**Photo 3** One of the few areas on Mahé for well conserved dry saxicolous rain forest, here in the submontane belt towards Montagne Brûlée (B Senterre).

combination of tree fern lower montane belt with a slightly hydromorphous soil.

Therefore, the diversity of forest types, defined as all the possible combinations of the main gradients described above, is huge. The complexity of vegetation types and their classification are major challenges and we need more descriptive studies of these ecosystem entities in order to improve our management of biodiversity by combining species-level and ecosystem-level criteria. We urgently need conservation-oriented vegetation maps, but these can develop only when description of vegetation units becomes more advanced.

### 4. To know more about forest types and their classification

- Elzein, H. (2011): Caractérisation des types de forêts montagnardes sur l’île de Mahé (Seychelles). - Master Thesis, Université Libre de Bruxelles, Service Eco-Ethologie Evolutive, Bruxelles, 84 pp.
- Grossman, D.H., et al. (1998): International classification of ecological communities: terrestrial vegetation of the United States. Volume I. The National Vegetation Classification System: development, status, and applications. - The Nature Conservancy, Arlington, Virginia, USA, 127 pp.
- Procter, J. (1984): Vegetation of the granitic islands of the Seychelles. - In: D.R. Stoddart (ed.) Biogeography and ecology of the Seychelles islands. Pp. 193-208. - Junk Publishers, The Hague.
- Senterre, B., Gerlach, J., Mougat, J. & Matatiken, D.E. (2009): Old growth mature forest types and their floristic composition along the altitudinal gradient on Silhouette Island (Seychelles) - the telescoping effect on a continental mid-oceanic island. - *Phytocoenologia* 39 (2): 157-174.
- Vesey-Fitzgerald, D. (1940): On the vegetation of the Seychelles. - *J. Ecol.* 28: 465-484.

## How will climate change affect the montane cloud forests of the Seychelles?

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and Justin PROSPER, Environment Department,  
Government of Seychelles

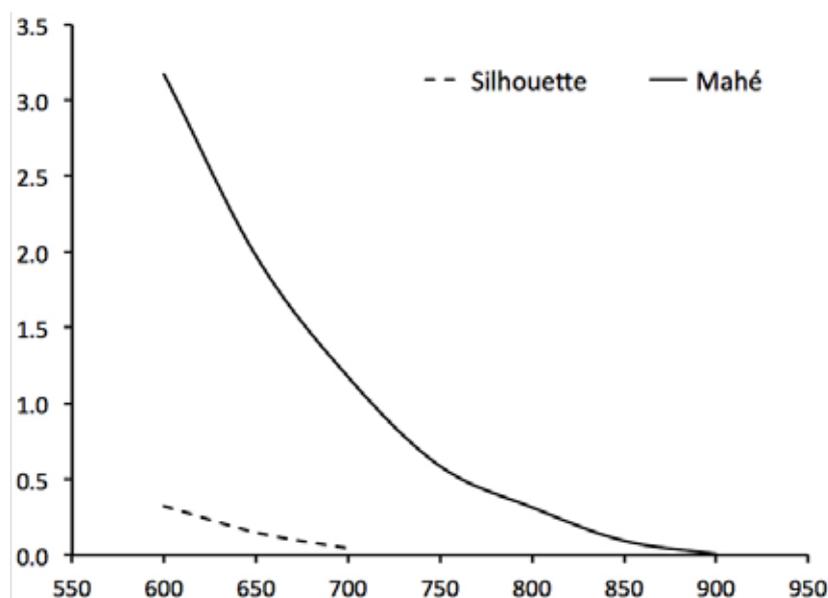
[j.prosper@env.gov.sc](mailto:j.prosper@env.gov.sc)

The forests found only on the highest peaks of Mahé and Silhouette are among the most unique habitats of Seychelles (compare p. 5-7). These forests are sometimes called montane cloud forests or montane mist forests because it is clouds and mist that make them special. They are often immersed in cloud, which makes them very moist and dark. They look very different from other forests in Seychelles and an abrupt change in the vegetation can be experienced when walking uphill to a place such as Congo Rouge. At some point along the walk there are suddenly more old Kapisen trees, more mosses and ferns, and the forest floor is covered in a thick moist litter layer. This abrupt change happens at the elevation where the lower border of the cloud layer rests.

Montane cloud forests are very important habitat for the biodiversity of Seychelles. For instance many species of amphibians (caecilians, tiny Sooglossid frogs), ferns, mosses and flowering plants are almost

exclusively found in this forest type. Among the endemic trees and shrubs of the Seychelles about 50% are found in the montane cloud forest habitat, and a few of these are almost exclusively present in this habitat.

Because montane cloud forests are so dependent on the presence of a cloud layer, climate change might have a profound effect on this habitat in Seychelles. Clouds in Seychelles are formed through local effects of the mountain topography that interact with regional and global climate systems, so it is very difficult to predict how cloud formation will change in the future with climate change. However, we did a simple calculation using Geographical Information Systems (GIS) to indicate the sensitivity of this habitat type to only minor changes in the average elevation of the cloud layer (Fig. 1). Figure 1 shows how much area in square kilometres (on the y-axis) is available for the formation of montane cloud forest given a certain average elevation of the lower end of the cloud layer (on the x-axis). Currently the montane cloud forest begins at an elevation of c. 600 m asl, which means that potentially about 0.3 square kilometres on Silhouette and another c. 3.2 square kilometres on Mahé are currently available for montane cloud forest (although some of it is glaciais vegetation or already heavily disturbed and invaded by alien plants). If the cloud layer would on average rise by just 100 m, to 700 m asl, then the climate conditions for cloud forests would disappear from Silhouette as well as from all areas on Mahé except for c. 1 square kilometre around Morne Seychellois. Indeed, Seychelles has recently experienced prolonged dry



**Figure 1:** The maximal potential area of montane cloud forest in square kilometres on Mahé and Silhouette (dashed line) as a function of the elevation of the lower end of the cloud layer (meters above sea level).



**Figure 2:** Silhouette in early December 2010 with the clouds well above the highest peaks (C Kueffer).



**Figure 3:** Mahé in early December 2010 with the clouds slightly above the highest peak Morne Seychellois (C Kueffer).

periods during which the clouds were mostly situated above the highest peaks of Mahé and Silhouette. Figure 2 and 3 shows Mahé and Silhouette in early December 2010 when this situation persisted for weeks and cloud forests in Seychelles became much drier than normal. The same has been true during at least part of prolonged drought of 2011.

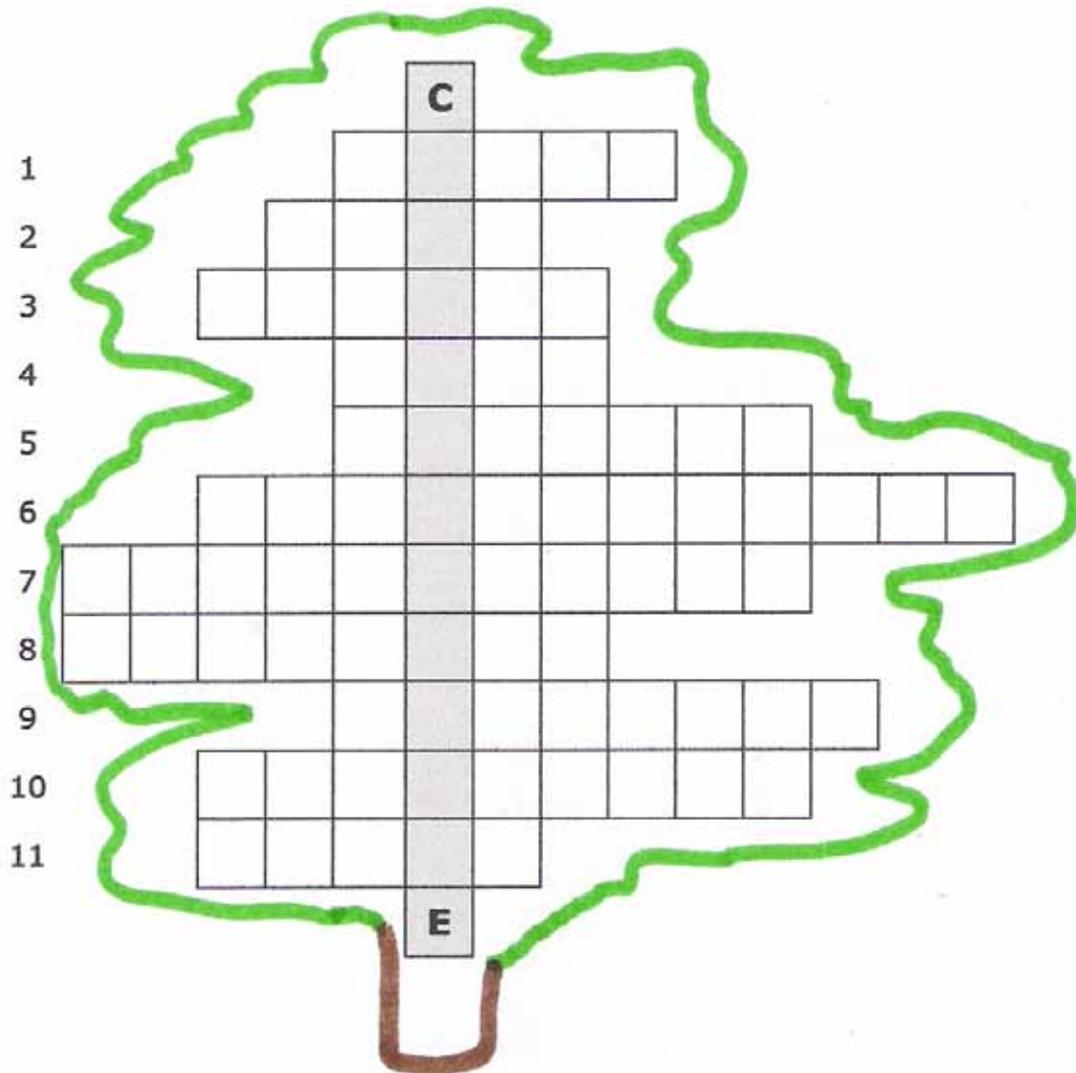
We don't know what will happen to the flora and fauna of Seychelles' cloud forests if such a rise of the cloud layer should occur. It is fair to assume that most of Seychelles' plants and animals can probably survive outside of a cloud forest climate. The area of cloud forests in Seychelles has probably also been small over extended periods in the past, and Seychelles has probably in the past regularly experienced periods of drier climate. For instance, the whole Western Indian Ocean region experienced drought periods in the mid-Holocene some 4000 to 5000 years ago (Rijsdijk et al. 2011). So, it is unlikely that many species that are fully dependent on cloud forests could have evolved and persisted in the Seychelles. However, we must also keep in mind that a microclimate and vegetation structure similar to that characteristic of cloud forests with deep and moist litter layers, old and slowly decaying trees, and a rather dark understorey may have extended below the cloud layer in natural forests

before deforestation and subsequent invasion by alien species transformed this habitat; as indicated by remnant mid-elevation stands of Kapisen trees. Thus, habitat transformation, alien invasions and climate change will probably exert threats to cloud forest species in synergy. For sure, cloud forest species are particularly vulnerable to climate change and should be a priority for species conservation in Seychelles. Among others, all plant and animal species from the cloud forest habitat for which this is possible should be propagated and conserved in *ex situ* collections. And special care should be taken that cloud forests remain among the least disturbed habitats in Seychelles.

## Literature

Rijsdijk et al. 2011. Mid-Holocene (4200 kyr BP) mass mortalities in Mauritius (Mascarenes): Insular vertebrates resilient to climatic extremes but vulnerable to human impact. The Holocene, in press. DOI: 10.1177/0959683611405236

## Forest word puzzle



Fill in the words of each clue and write the letters in the squares in the tree above.

1. Forests catch and store \_\_\_\_\_ which we use for drinking and washing.
2. Unfortunately \_\_\_\_\_ can easily burn down our forests.
3. Forests are a source of \_\_\_\_\_ to use for making furniture and houses.
4. Trees help to prevent the erosion of \_\_\_\_\_.
5. Our forests contain many \_\_\_\_\_ plants which are found nowhere else in the world.
6. Many different species of plants and animals live in our forests. We call this wonderful variety of species \_\_\_\_\_.
7. We must use forests in a \_\_\_\_\_ way, so that there will always be forests in Seychelles.
8. In many countries, people collect \_\_\_\_\_ from the forest to cook their food.
9. Walking in Seychelles forests is good physical \_\_\_\_\_ for our bodies.
10. Many Seychellois use \_\_\_\_\_ plants to heal themselves when they are sick.
11. Tree provide us with \_\_\_\_\_ from the hot sun.

When you have completed the puzzle, the **letters in the central grey column** will give you the name of an important environmental factor in the lives of forest trees, in our own lives and in the future of our Earth.

C \_\_\_\_\_ E

You will find the answers on page 19.

# Restoring Forests

## Restoring forests - two encouraging examples in Seychelles (photo stories)

### Example 1: Praslin forest

contributed by TRASS (photos by TRASS)  
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TRASS (Terrestrial Restoration Action Society of Seychelles, an NGO based on Praslin) is undertaking a post fire rehabilitation trial in two areas (Point Chevalier and Newcome) where fires and subsequent soil erosion have had a devastating impact on what was once native palm forest (see Kapisen 11, p. 6-8). The project is a scientific trial using different treatments and species and funding is through the GoS-GEF-UNDP Sustainable Land Management programme.



A. November 2010: prior to the trial.



B. Loosening the soil by tilling in one of the 40 x 40 metre plots.



C. Mixing carbon and organic matter with the soil when planting the young trees.

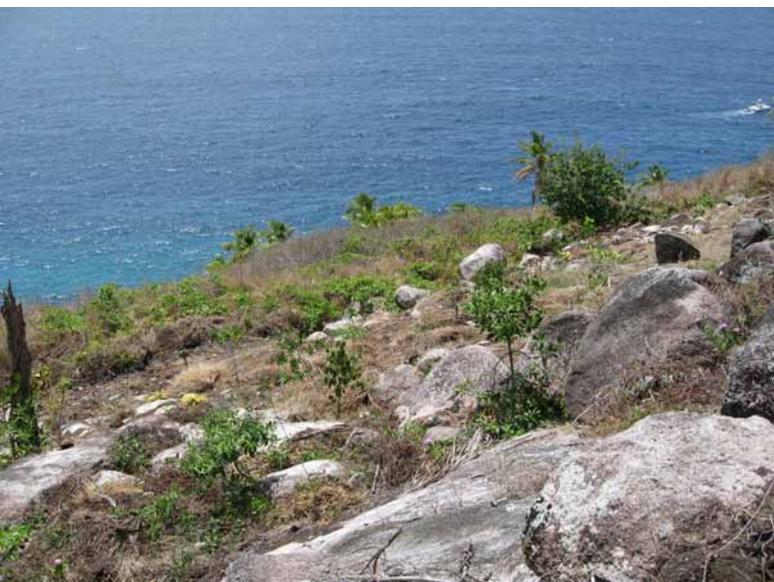


D. February 2011: One of the plots planted with young trees and mulched with dead palm leaves.

## Example 2: North Island forests

contributed by PCA & North Island (photos by PCA)  
[www.north-island.com](http://www.north-island.com)

North Island was once covered with native vegetation, then converted into a huge coconut plantation, later abandoned except for minor agricultural production, and is now an island with a five star resort, committed to restoring the majority of its 201 ha to fully functioning native habitats. Vegetation rehabilitation has been ongoing since 2002, financed by the resort. From 2005 to 2009, they were partners in an FFEM-funded project, during which a solid work relationship with PCA was established, which was subsequently maintained until today. PCA's role continues and includes providing advice regarding the vegetation restoration, monitoring of progress and ensuring feedback of findings into the Vegetation Management Plan updates.



**1 A.** A glacial area cleared of alien vegetation and planted with native species (September 2008).



**1 B.** The same view in February 2011, with good growth of the native trees.



**2 A.** Planted endemic palms in a shaded location; the ferns remain as a native 'weed' of coconut plantations.



**2 B.** The same palms photographed from the same position four and a half years later.



**3 A.** Plateau coconut plantation with most alien species removed and planted with native species.



**3 B.** The same plateau area from the same position 5 years later - coastal trees grow faster than endemic palms!

## A historical plant exploration (PCA's April field trip)

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Compared to the 'normal' types of PCA field trips this one was rather sedate and easy. We didn't even get our clothes grubby. The idea was to rediscover the Anse Royale –Anse a la Mouche nature trail as described in the 'Nature Trails and Walks in Seychelles' series of 1992 (No. 9). We wanted to see how much had changed in 19 years, using this booklet as our baseline, and six keen walkers turned up on this cloudy Saturday morning.

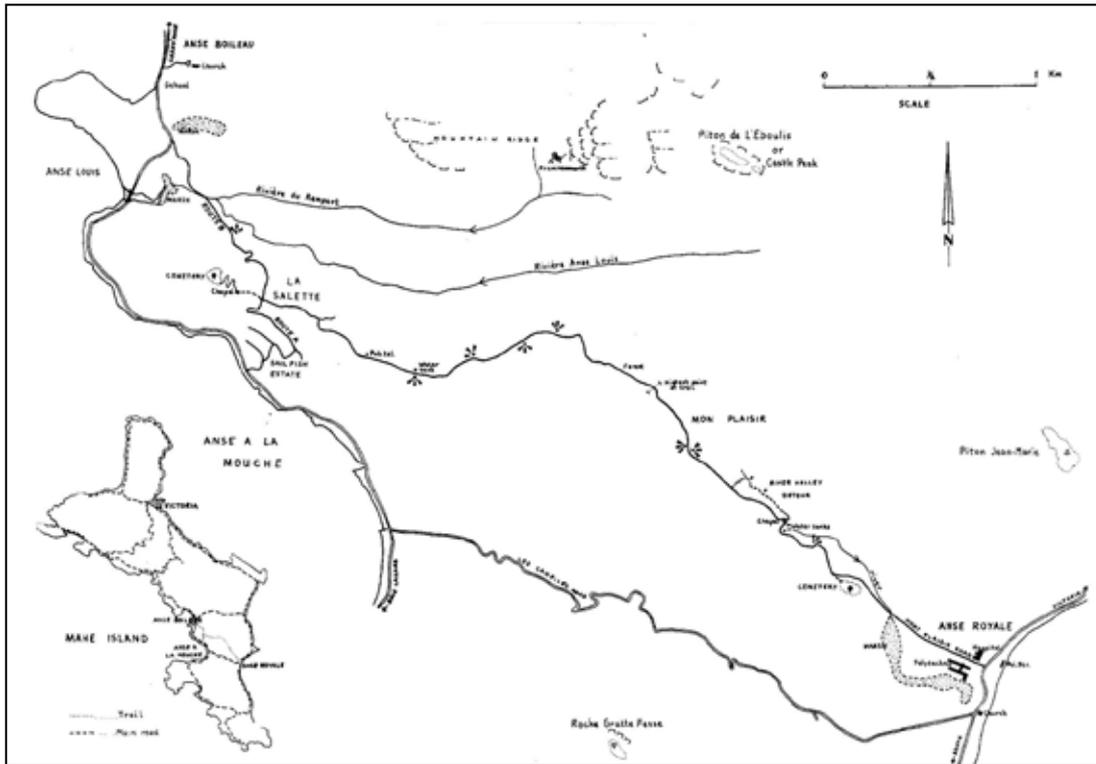
In 1992 the trail followed a partly motorable road that crosses Mahe from Anse Royale to Anse a la Mouche. It left the main coast road at Anse Royale hospital, passing the Polytechnic across coastal lowland and continuing up the hill to an area called Mont Plaisir at the crest. From there it widened into a tarred road that forked opposite the La Salette chapel, one way going to Anse a la Mouche through Sailfish Estate and the other to Anse Louis and Anse Boileau. Now these roads are hard-surfaced and fully motorable, and there is a regular bus service!

The leaflet identified many plant species along the way and we were particularly keen to see what was still there. From the start it was clear that much had changed in the landscape on the coastal plateau. Many more residential blocks have sprung up on the right side of the road which is now tarred all through with a two-lane section leading into the old polytechnic compound, now the University of Seychelles. Anse Royale hospital has tripled in size as well. Happily these constructions do not seem to have encroached further on the marshland at the foot of the hill. The river from the valley of Dan Kre still flows around the back of the university playing fields where a sizeable patch of marshland remains. Trees such as bodanmyen, bonnenkare-d-rivyer, kaoutsou and palms such as lantannyen fey noted in 1992 are still there, although the bamboo and rafia had disappeared. Small clusters of lapsouli and sonz could also be seen, although much reduced.

Up the hill we went, looking for the big cashew tree near the steps to the old cemetery. It was no more but the cemetery on the hill-slope had clearly received some new inmates over the past 19 years, with new graves sprouting bunches of brightly coloured artificial blooms here and there. We had no difficulty identifying the graves of the notorious persons mentioned in the leaflet, along with several others identifiable by their shiny granite gravestones.

Back on the road we found some of the hedge vegetation missing or changed and the water

# Field Trip



The trail map from the 1992 booklet.

treatment plant was no longer in use, although the large tanks remained. Further up the road we found the little corrugated iron chapel and opposite it the path to Dan Kre.

This was a most interesting diversion, through a forest of santol interspersed with palms (lantannien fey, milpat and palmis). Many smaller plants grew under this canopy, including zannannan maron, vya and ilangilang saplings. We were looking out for the black pepper creepers but hadn't expected a proper concrete road now running through what had been a patch of forest. The pepper was still there but so were several houses with lush gardens of flowering exotics. We tried another path that led us to yet another house and so we headed back to the main road.

The top of Mont Plaisir was now more densely populated, but down the hill heading towards Anse a la Mouche there seemed to be less change. A forest of kalisdipap, bwa zonn, kazou and lagati covered part of the hillside until we reached the second crest where a full view of Anse a la Mouche bay could take the breath away. A second detour through Dan Banbou to the upper Anse Louis area provided a bit of a shortcut to La Salette. There is now a new and larger chapel but the two stained glass windows (one dated 1877) have been incorporated into the new building. By then we were becoming more interested in reaching my house where a barbecue was being

prepared for us – in celebration of my birthday as it happened! It gave a fine relaxing ending to an interesting historical plant exploration.



Five of the historical plant explorers, the sixth being the photographer, Hicham, who appears in the photo/article on page 15 (H Elzein).

## The joys and trials of working in a Seychelles mountain forest (a personal view)

By Hicham ELZEIN

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When I was given the opportunity to study the mountain forest of Mahé for my master thesis, I got so excited that I could not think about anything else for months. As a student in agronomy from the Free University of Brussels (ULB), I was trying to picture how work in the field could be in a tropical mountain forest of an idyllic island in the middle of the Indian Ocean. I was also interested to meet the local people and to share field experience with them. At last, I could satisfy my addiction to botany with this study.

The main objective of the study is to describe the different plant communities that occupy the mountain forests and to assess the biodiversity of these habitats. The choice of taking a census of the plant species that live in the primary forest involves long and rough walking through the forest away from the trails. Indeed the less disturbed areas of the mountain forest only remain on the summits and in the less accessible parts of the National Park. Therefore, it took our small team about 2 to 4 hours to reach each of the 12 plots we had to do. The most exhausting trips we did were those to the summits of Morne Seychellois and Mont Pérard since they are the highest mountains of Seychelles.

Of course making a plot study in the forest is far from going for a peaceful walk. The main goal is to reach the place of study as quickly as possible in order to



The mist forest wonderland (H Elzein).

achieve the census of the species. So we need to get up early and spend the whole day in the forest until sunset in order to optimize our time. The fact that we walk at a quick pace and thereby get from 100 to 900 meters of altitude within a few hours allows us to consider this study as a kind of sport!

Besides the exhausting climb and pace of work, the high forest is difficult terrain in which to carry out research. Someone who has not experienced such working conditions before could easily underestimate the difficulty before going on a trip. Getting to high altitudes away from the trails means climbing steep and very slippery slopes, and we have to bear in mind that walking at a quick pace does not mean walking carelessly. Along the way, it is essential to watch carefully what we stand on because there are plenty of holes hidden below fallen trunks or leaves and many roots running over the ground. Trying to



Some of the forest exploration team (Hicham and Laurie are on the right) (H Elzein).



A brief view before the cloud cover descends once more (H Elzein).

grab trees or branches to help one climb is risky as many of the trees are palms that have sharp spines!

Yet it is worth sweating that much to get the inestimable opportunity to observe a primary mountain forest as it was supposed to be before the arrival of man on Mahé, with relatively few exotic species. Another wonderful reward is to reach viewpoints located on most of the summits and to look upon the incredible landscapes of the island.

## Plant diversity and protected areas within Mahé

By Laurie RENGUET

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Seychelles's biodiversity is unique; its flowering plant and fern flora has more than 84 endemic species, meaning species that we find only here in Seychelles. However, studies estimate that more than 90% of Seychelles' primary vegetation has been destroyed as a result of human disturbance, which presents a real threat to the survival of these plants. Fortunately there still exist some well conserved places with a beautiful biodiversity, such as Morne Seychellois National Park. But is it enough? Today, the conservation of biodiversity and the protection of natural spaces become urgent to save threatened ecosystems or critically endangered species.

For my Master degree at the University of Brussels (ULB), my thesis is focused on the identification of key biodiversity areas in Mahé. In this work, the conservation value of an area is revealed by measuring the biodiversity of native species (endemic + indigenous plant species), and giving a more important weight to rare endemic species.

An important part of my work was to study the distribution of the species, collecting data in the Seychelles National Herbarium on Mahé and in the literature. Once we collected this data, we noticed that the different areas of Seychelles, and even Mahé where unequally explored by different botanists in the past. The most probable explanation was the difficulty to access some of the remoter areas. And to have a global view of the pattern of plant biodiversity on Mahé, it is important to take into account those exploration gaps. But it was also interesting to note that La Digue, for example, was shown to be weakly

Finally, I can look back and say that it was one of the best experiences I have ever had. Even though I hope I contributed a little to improve knowledge on local flora, I surely know that this experience and all the people I met during my time in Seychelles did contribute hugely to improving my personal knowledge. I wish to thank to everyone who allowed me to make this possible and who helped me out.



Which areas need better protection for endemic plant biodiversity? (L Renguet)

explored, with only 12 specimens collected. Also, ferns have been much less collected than flowering plants (angiosperms).

On Mahé, a lot of areas still needed to be explored to know better the distribution of endemic species. So an important second part of my work on Mahé was to contribute to the survey of the less explored areas that seem to be interesting for the conservation of their plant biodiversity.

Unfortunately I didn't have much time to carry out a lot of exploration, so I had to choose only eleven places to survey, making for each of them as complete a list as possible of the vascular plants (flowering plants and ferns).

One of the places of greatest interest amongst the eleven areas explored proved to be Montagne Planneau, which contains the most important species richness compared with the others areas. However this zone is outside of National Park delimitation and has no protected status. Without any status, this area may have to respond to many more anthropogenic pressures, which could be fateful for its biodiversity. So Montagne Planneau is for sure a priority area for floral biodiversity conservation.

# Peter's Plant

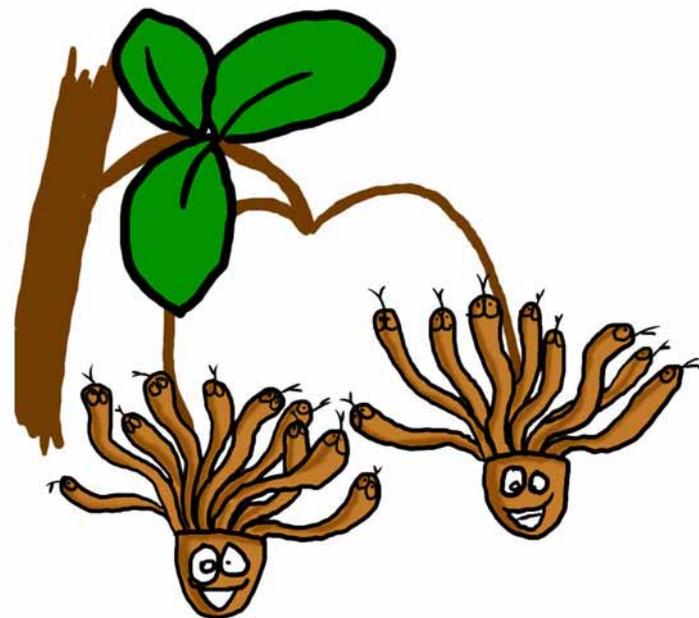
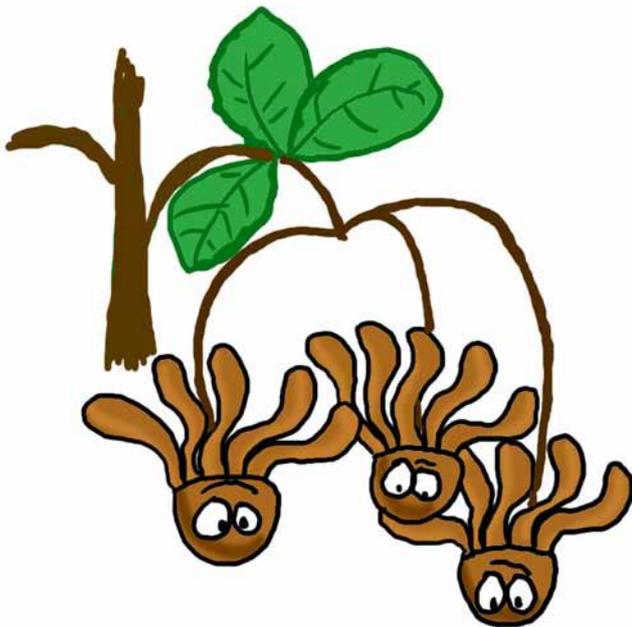
## Peter's cartoons

We really like Peter Lalande's cartoons of Bwa Mediz, which reveal two versions of how this plant got its common names Bois Meduse and Jellyfish Tree. It also raises some interesting points about how plants get their names!

Medusa is the biological name given to the type of free-swimming marine animal that we call a jellyfish ('Lagratel'), and the fruits of Bwa Mediz do look a little like **upside down jellyfish** as they hang on the tree.

But the scientist who originally gave Bwa Mediz its scientific name (*Medusagyne*) never saw ripe fruits! Apparently he only saw immature fruits, which consist of an ovary with many protruding styles (see photo), and it reminded him of the Greek mythical woman Medusa, whose hair was made up of writhing snakes! So he linked the name **Medusa** (the woman with snake-hair) and **gyne** (from **gynaecium** - the female parts of the flower).

(Personally I think the ripe fruits look like upside-down umbrellas - Ed.)



Bwa Mediz



Immature fruit (C Kaiser-Bunbury).



Ripe fruits (A Finger).

## PCA news

The Year of Forests has been reflected in our choice of subjects for a **series of weekly plant articles** written and illustrated by various PCA members for a new daily local newspaper that first appeared in February of 2011. Each article is about one, or sometimes two, forest plants of Seychelles. A mixture of native and introduced species is covered, including planted forest trees, native forest shrubs, trees and herbs, including those found in glacia habitats and in palm, mangrove and coastal woodlands. After all, much of our land in Seychelles is characterised as 'forested' in one form or another, so there are plenty of species to choose from!



**Successful field trips:** This year we have again been able to keep to our bimonthly schedule of field trips for members, sometimes joined by friends or other interested people. Notes from two of these trips are included on page 13 and 21. We have tried to choose a mixture of easier and more challenging routes, different types of habitats and also provide the possibility of exploring new areas and/or locating plants of interest. In this way we cater for different interests and abilities and have fun as well. Sometimes we have enlisted the help of a knowledgeable person, such as Guy Esparon in the Takamaka district, to help us explore less familiar terrain. This has proven a great asset when the person has a good knowledge of local plants.

Our work with **North Island** continues (see photo article on page 12) and becomes more rewarding as the vegetation rehabilitation progresses and we see our monitoring clearly showing the successes but also revealing problems that need to be solved.



**Awareness and outreach:** As well as the series of articles on forest plants (see above) which has required quite some coordination between members, we also took part in the "Family Fun Day" held in June to commemorate Environment Day. Families of all sizes were encouraged to participate in fun activities relating to the environment, conservation and sustainability. At the PCA stall we had various displays and activities, including making toys out of coconut leaves and writing an environmental pledge on a painted paper 'leaf' to hang on a tree.



**An exciting new project** has been started by PCA this year, funded mainly by the Small Grants Programme (SGP) of the Global Environment Facility (GEF) and assisted by several government and NGO partners. The project focuses on the National Herbarium, which is housed in the Natural History Museum in Victoria. It has often been seen as a collection of old dried plants instead of the important research and educational resource that it should be. So our project is trying to change that by firstly training young local scientists in botanical methodologies (including forest monitoring - see pages 15 and 16) and upgrading the herbarium and ensuring it is properly maintained. The next stage is to get the local community involved in providing photos and information about some of the plants that are not yet well recorded in the herbarium collections. A digital herbarium will also be developed using some of this material, which will make it easier for non-specialists to identify plants and find out more about them. Also included will be the development of displays and other outreach materials for the community, to increase awareness about plants, their importance in our lives and about the newly vibrant herbarium.



Seychelles Museum and Herbarium staff with PCA-SGP project workers and one of the two Belgian student researchers (H Elzein).

**Increased membership:** As the year has progressed we have welcomed six new members and not lost any of our current members, which is very encouraging for a voluntary organisation. New members are both local and from overseas (mostly people who have worked with PCA as Master Students). This gives us a firmer base and a larger pool of interested people who wish to expand their knowledge on plants and plant conservation but are also willing to participate in and contribute to our activities.

This year we decided to become a **member of Seychelles' umbrella organisation for NGOs**, known as LUNGOS, and now hold our regular monthly meetings in their small meeting room. LUNGOS provides a number of facilities, free courses and so on, that we can make use of and we have become an active member.

PCA has been represented at numerous **stakeholder workshops** (there seem to have been many of them this year!) by various people in their capacity as PCA members or as staff of other organisations, thereby contributing to plant conservation and giving NGO views on topics such as sustainable land management, biodiversity conservation, biosecurity, tourism and the environment.

Answers of the puzzle of page 10:

1. Water	7. Sustainable
2. Fire	8. Firewood
3. Timber	9. Exercise
4. Soil	10. Medicinal
5. Endemic	11. Shade
6. Biodiversity	

## Ste Anne 1

In May 2011, Randolph Hermitte and I, **Andre Dufrenne**, climbed up the mountain on Ste Anne Island to carry out a trail cleaning from the bottom to the top. It took us about one and a half hours to reach to the top. Along the way we observed many different plant species, both invasive and native, often growing together. Examples of endemic species were Kafemaron Gran Fey (*Paragenipa wrightii*), Kafemaron Pti Fey (*Erythroxylum sechellarum*) and Bwa Kalou (*Memecylon eleagni*). Other plant species that we observed were the alien Bwa Zonn (*Alstonia macrophylla*), and the indigenous Bwa dir (*Canthium bibracteatum*) but many more species are present on the island.

The most exciting discovery was the big Bwa Gayak (*Intsia bijuga*) trees. Three of them were found near the rocky hills, which was a new discovery for us on the island. And next to the indigenous Bwa Gayak trees was a big endemic Bwa Sagay tree (*Diospyros sechellarum*). This is the biggest Bwa Sagay tree I have seen on Ste Anne Island and another four of them were seen on the other side of the mountain where there was a bush fire four years ago, with smaller seedlings near the trees. The mountain on Ste Anne Island is very impressive, with a good bird's eye view of the Marine National Park that includes the islands of Moyenne, Cerf, Long and Round, as well as Ste Anne itself.

It is nice to be able to report this news in 'Kapisen', so in the future we hope that readers get a chance to visit the mountain on Ste Anne Island with its rich native plant biodiversity, either as PCA members or perhaps as guests on the island. We plan to encourage our guests to discover the rocky hill top with its native plants.



Trunk of Bwa Gayak  
(A Dufrenne).



Bwa Sagay Tree  
(A Dufrenne).



The magnificent view of the Marine National Park from the summit of Ste Anne (A Dufrenne).

## Ste Anne 2



A 'magic' fern acting like a ship-in-a-bottle! (K Beaver)

A rather curious find was also made by Andre Dufrenne on Ste Anne. He found a discarded empty soy sauce bottle amongst leaf litter near one of the abandoned youth villages and noticed a small plant growing inside. The opening of a soy sauce bottle is only a couple of millimetres in size so that you can control the flow of the sauce when pouring. So how did the fern get inside the bottle? You have to remember that ferns reproduce by means of spores rather than seeds. The microscopic spores can easily float in air or water, so a spore must have passed into the bottle and found a suitable place to grow in the decaying remains of soy sauce - the effect is quite magical, don't you think?

## Learning by doing and exploring

A number of PCA members visited a research experiment site in June, one of several glacis sites where Christopher Kaiser-Bunbury (from Aarhus University in Denmark and also a PCA member) and his local team from the National Parks Authority (including James Mougall, another PCA member) are carrying out interesting research into ecological interactions following removal of alien flowering plant species. Our PCA members were interested to learn more about the research and to help with data collection in the field, as this is a way of educating ourselves in a hands-on way.

After a hot morning on the exposed glacis we then descended into some forest where we were thrilled to see about 12 adult *Vateriopsis* trees (Bwadfer) in a place where they seemed to be growing naturally rather than having been planted. In addition, and more importantly, there were healthy seedlings and a few saplings growing beneath some of the trees, so this little group of one of our rare endemic species is regenerating. It had only been discovered in the past few years.

As we descended further down the mountain we followed a river bed that had more or less dried out in places, due to the long drought we have had this year. Indeed the drought has affected quite a lot of species, leading to considerable leaf fall, and it will be important to observe whether certain glacis and forest plants recover or not. Fortunately the drought broke towards the end of August and rains have been fairly good for the past month. It may be a test for things to come, as weather experts have predicted an increase in extreme weather events for Seychelles.

A dried up river bed after the long drought (K Beaver).



PCA members getting practical experience on the glacis (K Beaver).



Healthy *Vateriopsis* seedlings, outcompeting cinnamon seedlings on the forest floor (K Beaver).



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## What people said about Kapisen Issue 11

*"Always very impressive!! Both in terms of quality of newsletter and the fact to keep it ongoing over the years!!"*

Local PCA supporter

*"Another great newsletter! Well done. You make it look easy....."*

PCA Honorary overseas member

*"It once again is a great edition."*

Local hotel environment coordinator

*"Thanks for this – it is a welcome distraction perfectly timed for the added enjoyment of my lunch break."*

Overseas researcher

*"Thanks. Very interesting issue indeed."*

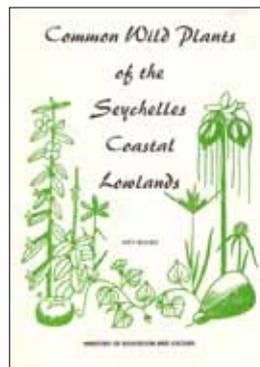
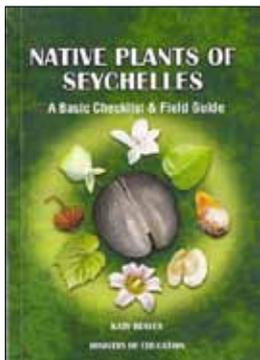
Local educator

*"Just a quick word of appreciation for the excellent and informative issue of Kapisen. I was delighted to read the articles by the members of PCA whom I know, and particularly pleased to read of your successes."*

*"I believe that I'm hugely privileged to have had the opportunity to share time with you all on Seychelles. Keep up the good work!"*

PCA member now living overseas

## Reprints of plant identification guides



Reprints of two plant identification guides are available. Originally published by the Ministry of Education, their distribution has until now been very limited. The reprinted books are available from local book sellers and other outlets at a reasonable price. Profits from sales will go to PCA, so by buying copies of these books you will be supporting plant conservation! The books are also available from the website of the Natural History Book Service <http://www.nhbs.com>

## PCA field trips



*Weekend of 15/16 or 22/23 October (final date to be decided early October)*

*Weekend of 17/18 December (final date to be decided early in December)*

A new schedule of field trips will be developed for 2012. The first trip will probably be at a weekend in the middle of February and subsequently at two-month intervals.

Before the date, please contact Katy Beaver to find out details and arrangements (see below).

## 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 Katy Beaver (Secretary) at

E-Mail: [kbeaver@seychelles.net](mailto:kbeaver@seychelles.net)

Phone: (+248) 424 1104 or (+248) 257 4619

