THE STATE
OF THE WORLD's

FOREST GENETIC RESOURCES

COUNTRY REPORT

SEYCHELLES

This country report is prepared as a contribution to the FAO publication, The Report on the State of the World's Forest Genetic Resources. The content and the structure are in accordance with the recommendations and guidelines given by FAO in the document Guidelines for Preparation of Country Reports for the State of the World's Forest Genetic Resources (2010). These guidelines set out recommendations for the objective, scope and structure of the country reports. Countries were requested to consider the current state of knowledge of forest genetic diversity, including:

- Between and within species diversity
- List of priority species; their roles and values and importance
- List of threatened/endangered species
- Threats, opportunities and challenges for the conservation, use and development of forest genetic resources

These reports were submitted to FAO as official government documents. The report is presented on www. fao.org/documents as supportive and contextual information to be used in conjunction with other documentation on world forest genetic resources.

The state of Forest Genetic Resources:

Seychelles Country Report

2013

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Seychelles National Parks Authority: ASN 1O1/O3/013

Ministry Of Environment and Energy
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Acronyms and Abbreviations:

AEIN	African Environmental Information Network
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species
COMESA	Common Market for East and Southern Africa.
DOE	Department of Environment
DRDM	Department of Risk and Disaster Management.
EDF	European Development Fund
EEC	European Economic Community
EEZ	Exclusive Economic Zone
EMPS	Environment Management Plan for Seychelles
FAO	Food and Agriculture Organization of the United Nations.
FGR	Forest Genetic Resources
FOSA	Forestry Outlook Studies in Africa
FRA	Forest Resources Assessment
FS	Forestry Section
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIF	Green Island Foundation
Ha	Hectare
IDC	Islands Development Company
IOC	Indian Ocean Commission
IUCN	International Union for the Conservation of Nature.
LMOs	Living Modified Organisms
MCD	Ministry of Community Development.
MDGs	Millennium Development Goals.
MEE	Ministry of Environment and Energy.
MTA	Material Transfer Agreement
NAP	National Action Pan
NCHM	National Clearing House Mechanism
NGO	Non- Government Organization
NTFP	Non- Timber Forest Products
NPTS	Nature Protection Trust of Seychelles.
PA	Protected Area
PCA	Plant Conservation Action Group.
PDF	Praslin Development Fund.
PIC	Prior Informed Consent.
PUC	Public Utilities Corporation.
SAA	Seychelles Agricultural Agency
SCCI	Seychelles Chamber of Commerce and Industry
SCR	Seychelles Rupee
SENPA	Small Enterprise Promotion Agency.
SIF	Seychelles Island Foundation.
SLM	Sustainable Land Management
SNPA	Seychelles National Parks Authority
SIDS	Small Island Developing States.

SSDS	Seychelles Sustainable Development Strategy.
TRIPS	Trade Related Aspects of Intellectual Property Rights.
TSSD	Technical Support for Sustainable Development
UNCCD	United Nations Convention to Combat Desertification.
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program.
USD	United States Dollar.
VDM	Vallee de Mai.
WCS	Wildlife Clubs of Seychelles.

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Foreword

In response to the twelfth Regular Session of the Commission on Genetic Resources for Food and Agriculture, the Seychelles contributed to the compilation of the first State of the World's Forest Genetic Resources due to be published soon by producing this present national report. This process has enabled the country to conduct a strategic assessment of its forest genetic resources in the framework of its national forest programmes.

The preparation of the country report provides the opportunity to engage and stimulate the interests of a wide range of stakeholders to reflect on the state of forest genetic resources of the country. It was developed in line with FAO guidelines covering the current state of forest genetic resources, the importance of forest genetic resources to sustainable forest management, access to forest genetic resources and sharing of benefits arising from their use.

In the absence of recent baseline data, the report focuses on the data provided by the sector study undertaken by Indufor in 1993 and extrapolates them to give an estimation of the present state of the forest. Due consideration was also made to all the available publications made up to now. It provides a glimpse of what was accomplished, what remains to be done and what is required to achieve the conservation and sustainable use of its genetic resources.

The Seychelles is grateful to the Food and Agriculture Organisation of the United Nations for its continued support and for funding the compilation of this National Report. We are also indebted to Dr. Albert Nikiema for his guidance and for commenting on previous drafts as well as for assisting with the national workshop. I would also like to recognize the Seychelles National Parks Authority for the part they played in making the Report a reality and all who contributed to the various sections of the Report.

Mr. Wills Agricole
Principal Secretary for Environment & Energy

Executive Summary

The Seychelles archipelago consists of 115 coral and granitic islands distributed in the Western Indian Ocean. 90% of the total land surface area is covered by forests.

Forests are considered important natural resources because they provide us with timber, non timber forest resource and environmental services. They also provide habitat to the diversity of unique animals and plants found nowhere else in the world. Forests protect catchment areas and the freshwater system which the nation depends on. Government recognizes the importance of the forests and thus large forested areas are now under legal protection.

To accommodate the economic development needs, Government has put in place measures to protect its forest genetic resources. Several policies capture the essence of the key challenges but more efforts are required to provide baseline information for the implementation of effective forest management programmes. The country needs to develop and boosts its institutional capacity.

There is the increasing demand for land, timber and other non timber forest resources from forested areas located outside protected areas. Government is planning to introduce a sustainable use area under the new protected area policy to protect forest plantations. These areas will specifically be used for timber and non timber production with the application of sustainable management practices to guarantee the sustainability of forest resources. The relevant institutional and legal frameworks will have to be put in place together with appropriate funding mechanism to sustain and guarantee sustainable forest management practices in the near future.

Natural and anthropogenic factors threaten the country's forests. Natural factors such as climate change pose a threat to our forests. Extreme weather events (e.g. long persisting drought) and a significant rise in temperature may impact on the biodiversity and subsequently to the hydrological cycles. These may impact on the forest cover as well as the freshwater supply on which we greatly depend (Agricole 2010). On the other hand, anthropogenic factors are easier to control.

Funding for the implementation of forestry programmes remains a challenge. Funds are required to enhance the capacities of the relevant institution as well as for the implementation of forest programmes. Such programmes include the collection of baseline information through surveys including remote sensing techniques, establishment of nurseries, plant propagation, planting activities as well as managing the existing forest which is being threatened by invasive alien species.

The report provides an insight on the sustainable forest management in Seychelles which contributes to regional and global actions. It provides an assessment on the state of the forest genetic resources in the Seychelles, their contribution to sustainable forest development, and the importance of the forest to food production and agricultural practices. It also highlights the roles of forest in production systems, including associated biodiversity and the factors driving changes. Furthermore it

identifies opportunities and obstacles, and proposes strategies to deal with the obstacles. This includes the need to build local capacities to promote conservation, and sustainable practices and the development of forest genetic resources. The country report was prepared in consultation of a wide range of stakeholders (See **Appendix 1**) and validated by a group of targeted stakeholders (See **Appendix 2**).

The main priorities identified for the conservation of the forest genetic resources are:

- The need for a comprehensive National Forest Inventory so as to determine the real state of our forests since the last inventory was done over 20 years;
- The need for Operational Management Plans for our forests to ensure better day to day management of our forests and its resources;
- Creation of forest reserves that are protected by legislations (under the Forest Reserve Act) since none has been ever declared;
- A comprehensive review to update environmental legislations relating to the forests, its conservation and also management of the natural resources;
- Implementation of research on plant ecology and modern propagation techniques in order to boost the population of plants that are threatened;
- Control the spread of invasive alien species to reduce their forest penetration rate and find means to eradicate them;
- Strengthen networking with regional and global institutions to share experience, knowledge and resources;
- Restore degraded land;
- Boost the state of *ex situ* conservation;
- Develop local capacity to improve the knowledge of forestry staff on forestry issues, record keeping, project writing/development, forest management and improve their capacity to do research.

SECTION I: INTRODUCTION TO THE COUNTRY AND THE FOREST SECTOR

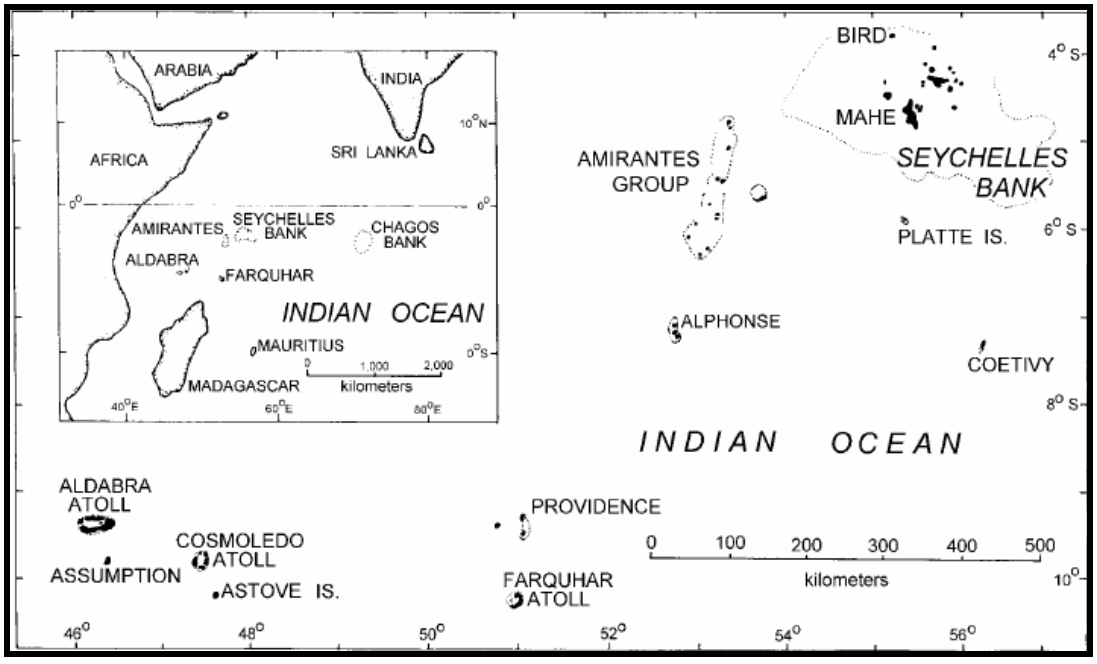
1.0 Introduction

Seychelles' forests are important for many reasons. They provide habitats to many endemic species and provide us with a range of natural products (e.g. timber and non-timber), environment benefits (e.g. clean air, and freshwater) as well as socio-economic benefits such as providing employment to a number of local people. In addition, they also play a key role in watershed management and erosion control and these are considered priorities in the country's development programmes. The protection and effective management of forests are therefore of paramount importance.

1.1 Geography

The Republic of Seychelles consists of a group of 115 granitic and coralline islands located between 4° and 11° south of the equator and between 46° and 57° East. The so-called inner granitic islands are geologically and substantially older with a higher topography in comparison to the younger, low lying coral islands which are only a few meters above sea level. Scientific evidence indicates that the granitic islands are remnants of Gondwanaland which makes Seychelles the oldest and only mid oceanic island of granitic or continental origin. The vegetation of the granitic island is different to the vegetation of the coral island.

Figure 1: Location of Seychelles



The Seychelles archipelago is made up of a total land area of 45,500 ha (455.3 km^2) distributed in an Exclusive Economic Zone of 1.3 millions square kilometers. The majority of the islands are fringed by coral reefs which are sensitive to elevated sea

surface temperatures. A mere 1 degree rise in temperature could result in the death of more than 90% of corals as was evident in 1998 and the impacts can be catastrophic (Spencer, Teleki et al. 2000).

1.2 Climate

The Seychelles has an equatorial climate with high level of precipitation. Annual rainfall may be as high as 2,200 mm annually (Walsh 1984). The level of precipitation is higher around higher grounds with rainfall level being as high as 5000 mm around the central massif. In contrast, precipitation is significantly lower at lower elevations such as the southern parts of Mahé and on the low lying coral islands.

The precipitation is influenced by the wind direction. The northwest monsoon which blows from November to March brings relatively wetter climate compared to the southeast trade wind which blows from May to October where the climate is cooler and also drier. Temperature ranges from 24 to 30°C throughout the year and relative humidity is high with average of 70-80%.

1.3 Soil

Soil formation is partly affected by the climate and the geological origin of the soil, and thus soils differ between islands. The granitic islands have poor, slightly acidic soils which are low in nutrients. The soil tends to be shallow, heavily leached and short of organic matter, with the dominance of lateritic soils throughout the granitic islands (Piggott 1968). In contrast, the soils of the coralline islands suffer high salt content and lack several nutrients and trace elements.

1.4 Rivers and streams

The Seychelles has an extensive network of small rivers and streams distributed throughout the granitic islands which partly contribute to the continuous source of freshwater to the people. The majority of the rivers and streams are located in catchments that are protected by extensive forests. There are almost 60 catchments that are presently being gauged periodically on the island of Mahé, Praslin and La Digue to provide freshwater to the people.

1.5 Population

The nation is relatively young with the Seychelles, having only been colonized during the last 250 years. Extensive population growth is more evident during the last 50 years where the population has doubled from 41,700 to 91,000 people (Nation 2012). Most of the people live on the narrow coastal plain or strip on Mahé, Praslin and La Digue where most of the economic activities are located. People move between islands in search for better economic and social welfare prospects. It is important that Government monitors population growth to foresee potential impacts on forested areas.

Table 1: Changes in population size in the last 50 years

Years	1960	1970	1980	1990	2000	2006	2008	2011	2012
Population estimate	41,700	53,600	64,400	70,000	81,131	84,600	86,956	86,000	91,000

1.6 Forest history in the Seychelles

Historically, the Seychelles were completely covered with natural forest but this changed following the arrival and settlement of man in the last c. 250 years. The Seychelles has experienced different episodes of exploitation of its natural resources. During the 19th century the first spice and other tropical products like coffee plantations were developed in the young British colony.

Up to 1905 a considerable amount of wood was harvested for construction or for export to Mauritius. The endemic as well as the indigenous species such as *Northea hornei*, *Vateriopsis sechellarum*, *Mimosups sechellarum*, *Callophylum inophylum* or *Albizia lebeck* were harvested. The most significant destruction of the country's forest however, seems to have taken place at the beginning of the last century with the appearance of the first distilleries to process cinnamon leaves.

During the first half of the 20th century the two principal industries of Seychelles were the preparation of coprah and the distillation of cinnamon leaves. Both of those industries require a large amount of combustible material (fuelwood) and this was provided by cutting down the native trees. The deforestation gave rise to severe soil erosion.

In 1938, the colonial authorities officially recognised that a large portion of the main island of Mahe had practically been deforested with the exception of a few isolated zones. In an effort to stabilize the soil the authorities promoted the planting of introduced exotic plants such as *Gleichenia linearis* or even *Chrysobalanus icaco*.
But the exploitation of cinnamon carried on all the same.

It was during the 1960's – 1970's that the local cinnamon industry was weakened due to rising competition from South-East Asia which resulted in the loss of certain key markets. The fatal blow however came with the construction of the International Airport in 1973 and the development of the tourism industry. The workforce was attracted to better pay and less labour intensive jobs that were being created in the tourism industry.

The decline of the cinnamon industry in the 1970's led to a seizure of the routine culling and harvesting of cinnamon trees and that permitted the species to grow and spread rapidly aided by birds for the dispersion of its seeds. Today *Cinnamonum verum* is widely distributed all over our forests.

Eventually most of the areas cleared have subsequently been replaced by non native and invasive alien species which threaten the country's biodiversity.

1.7 Forest Cover in the Seychelles

According to the last forest resource country assessment done, an estimated 40,600 ha are covered by forest (FAO 2010). Most of the forested area is not only used for timber production but also includes shrub land and coconut plantations established on the outer island. The forested area represents 90% of the total land area (Indufor 1993).

Given the time that such assumption was made, the accuracy of such data cannot be validated. It needs to be re-verified given the recent boom in development including changes in the land use and vegetation cover. Moreover, the data are also restricted to limited forest studies (Henry 1976) and assessment done (Indufor 1993). Hence, the existing data can be considered outdated because so much development has occurred since. The need for an inventory should therefore be considered a national priority.

1.8 Major Forest Types

Despite the word forest being associated with the vegetation cover, the definition of the word is not clear and hence very subjective. Several authors have defined forest in different ways with definition ranging from forest functions (Indufor 1993) altitudes (Carlstrom 1996) vegetation associations (Senterre, Gerlach et al. 2009) and species dominance (Wenzel and Markus 2012). The definition of Wenzel and Grulke (2012) is the most widely accepted given that it does not only relate to vegetation types but also management aspects based on the silvicultural approach. These have given rise to different forest type;

- Plantation forests
- Semi-natural albizia dominated forests
- Semi-natural high forests
- River reserve forests, montane rainforests and other natural forests
- Semi-natural low forest and bush lands
- Coco de mer dominated forests
- Degraded forest land
- Glacis vegetation and saxicolous forests

1.9 Forest ownership

According to FAO (2010) forests cover under the management of the Government bodies are 31,100 ha (77%) and private forests cover 9,500 ha (23%) (*See* Table 2). These also include protected areas in the National park which consists of 48% of the total land area. It is also important to note that app. 8,000-9,000 ha forest reserves are outside National parks on Mahé, Praslin and La Digue. Forested areas that are not legally protected, may be converted into settlements or agricultural areas

Table 2: Forest and Other wooded land

Year 1992	Private	Government	Total
Conservation areas	30	18 190	18 220
Forest (non-conservation areas)	1 640	6 400	8 040
Agriculture	9 000	1 000	10 000
Other	2 870	6 410	9 280
Total Area	13 540	32 000	45 540

Source: (FAO 2010)

Government is committed to the protection of the environment pledging to protect 50 % of its total land area, hence putting Seychelles at the forefront of environment protection. Large areas have been designated and categorized into Conservation areas (Strict Nature Reserves, Special Nature Reserves, Areas of Outstanding Natural Beauty, and National Parks) depending on the level of management intervention. These areas may include catchment and biodiversity hotspots partly managed by the Seychelles National Parks Authority (SNPA). The works of the Authority also include timber and non timber plantation establishment and harvest. The trend has now moved to forest management of conservation areas. Government is presently reviewing and updating its policy in line with IUCN criteria to fulfill our international commitment as well as land use plan to protect its biodiversity. This is important given that large forest areas are located outside protected areas.

There is an outdated forest policy document but the Seychelles Sustainable Development Strategy 2012-2020 also commonly referred to as SSDS (GoS 2012) provides the main policy framework. Several acts and ordinances regulate forestry activities. However, part of the legislation is outdated or has not been ever enforced or used fully. For example there is a forest reserve act to designate areas found outside protected areas but no timber plantation has ever been designated under this act. As a result, some of these areas face encroachment pressure, particularly for housing and related road construction. These areas will be protected under the sustainable use areas under the new protected areas policy which uses sustainable management guidelines to ensure that forestry becomes a sustainable practice for future generation. The Seychelles Government with the financial assistance of UNDP/GEF has developed new forest guidelines to ensure that such practice becomes sustainable. The guidelines not only make provision for timber but also non timber forest products that should be harvested sustainably.

1.10 Importance of the forestry sector

Forest provides us with a range of products from timber to non timber forest resources (NTFP). It also provides us with potable supply of water and also contributes efficiently to the services of the ecosystem. The sectoral GDP contribution including wood industries is estimated to be no more than 0.4% of the overall GDP but this may change significantly in the next decades (Indufor 1993). There is an increase in the demand for forest resource especially for timber and NTFP.

Timber is used mostly in the construction industry. It was previously prepared by sawmill but today most of local hardwood lumber is produced manually by timber merchants using chain saws. These are harvested on both state as well as privately owned land. Given the high cost of production, people prefer to purchase imported woods. The main import sources are the Republic of South Africa, New-Zealand and Sweden in pine sawn wood and wood-based panels. The distribution has been rather stable over the last few years, which is partly due to the fact that transportation connections are a major factor influencing the CIF price of imported products (Wenzel and Markus 2012).

Of the total supply of wood and wood products no more than a quarter is met by domestic supply while the balance is imported. The respective import bill in 1991 was SR 23.0 mill. If the imports of wooden furniture (SR 2.4 mill.) and paper and paper products (SR 20.7 mill) are considered, it appears that the sector's share of the country's total imports amounts to 5.1% (Indufor 1993). This also corresponds to the negative balance-of-payment effect, as the sector's direct contribution to exports, excluding souvenir industry, is practically zero. About three quarters (74%) of total demand of wood and wood products are absorbed by intermediate consumption, mainly in construction and furniture making, which indicates the importance of downstream effects of these products to the national economy.

The demand for fuel wood appears to be rapidly dwindling due to rural electrification and expanding use of kerosene also in the rural areas. In the 1980s, the consumption was estimated at 15,000 m^3 compared to 1992 where it was only 5,500 m^3 in wood volume equivalent (Indufor 1993). The use of firewood is now limited because of the establishment of a good local electricity network and also the promotion for the use of gas for cooking. In contrast, the use of charcoal is on the increase. It is commonly used in hotels and restaurants for barbecue. Charcoals are imported and also produced locally.

Unused timber (off cuts) and NTFP are also in great demand, especially for the craft industry which is completely dependent on tourism. SENPA is providing some training and also carries out promotional work for the artisans. The amount of raw material needed is very small, and thus can easily be met. Forest can also be used for bee keeping uses, but such practice is performed on a relatively small scale with less than 50 bee keepers on the most populated islands.

The forest is very productive and the growing stock needs to be estimated. Because of large conservation and protected areas and poor accessibility to certain sites it is estimated that only 20% is accessible on the main islands (Vielle 2001). With the increasing demand for timber and non timber resources, it is important for the forest to be managed sustainably and protected from new and emerging threats.

The importance of forest cover is now emphasized on conservation of biodiversity, ecosystems and scenic beauty, all of which are important ingredients of Seychelles as a tourist destination and as a globally significant site of unique species, i.e. biodiversity conservation. The growing population and the expanding tourism activity have increased the demand for water to levels where shortages are occurring and major infrastructure investments in dams are required to ensure adequate water supply. Forests play a key role in watershed management and erosion control and these activities now deserve a high priority in the country's development programmes.

The employment effect of forestry activities have decreased in recent years. However, the number of people relying on the timber products such as carpenters and also employed by various woodworking industries have increased. Wood is also an important raw material for handicraft industries, which should be maintained to sustain local livelihood.

1.11 Changing demands and driving forces in the Forestry Sector:

There have been significant changes in the types and diversity of products and services in the last 10 years. Demand for timber has increased primarily for the construction industry and also when the Seychelles experienced some economic downfall. Similarly, the use of bamboo for the construction of fad has also increased so as the demand for coco de mer. As a result, Government needs to put in place mechanisms to develop sustainable guidelines and a new policy to accommodate the changing demands over forest resources in the next 10 years. All those changes have been brought about as a result of changes in demands, land uses, environmental pressures and population growth. These priorities have already been incorporated into the National Policies.

Given the anthropogenic threat, Government has strengthened conservation. It has given its commitment to increase protected areas including forests to 50 % of the total land area The Cabinet of Ministers has already given their commitment and support thereby making the Seychelles the leading country with more land (in relation to its size) under protection.

1.12 Trends in forest conservation, management and production

There is an increase in the demand for forest resource especially for timber and non timber forest resources. Non timber forest resources include medicinal plants, some of which are used because of their curative properties, use of latanier leaves for thatching, use of raffia, use of *pandanus* leaves for artisanal purposes etc. A proper assessment needs to be done to determine the proportion of the local flora used in this practice.

1.13 The Current State of Forest Genetic Resources

1.14 Diversity within and between forest tree species:

There are different types of forest in the Seychelles and the classification used to describe such forest related to the type of habitats, land use and also type of species present. For example there are-

- Plantation forests
- Semi-natural albizia dominated forests
- Semi-natural high forests
- River reserve forests, montane rainforests and other natural forests
- Semi-natural low forest and bush lands
- Coco de mer dominated forests
- Degraded forest land
- Glacis vegetation and saxicolous forests

A comprehensive review is provided by Wenzel and Grulke (2012) and information is provided in Appendix 3

The distribution of the various forest types vary on the island of Mahé, Praslin and La Digue. Given the lack of scientific data, it was impossible to quantify the present areas where the different forests types are located. The only information available is that provided by FAO (2010) in **TABLE 3**. Given the unreliability of this information which dates back to the most comprehensive forest assessment done (Indufor 1993), it is important that a new comprehensive assessment be done.

Table 3: Forests on the mainland

Land use	Forest area on Mahé		Forest area on Praslin & La Digue	
	Ha	%	ha	%
Albizia forest	970	8	40	1
Mixed forest	3,606	30	1,600	43
Plantation forest	414	4	50	1
Shrub land	4,495	38	1,620	44
Coconut plantation	2,333	20	150	4
Deforested land	40	0	270	7
Total	11,858	100	3,730	100

Source: FAO (2010)(FAO 2010)

1.15 Main forest types –Ecosystem

These type of forests are located in various ecosystems. The most recent types of forests ecosystems described are those of Senterre et al (2009).

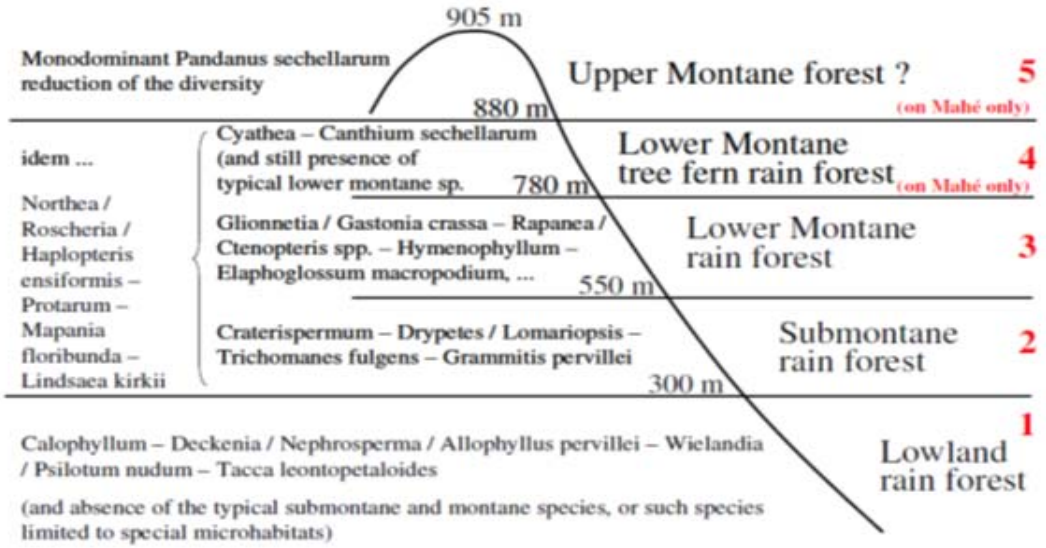


Figure 2: A schema depicting the different forest ecosystems.

The lowland rain forest (tropical ombrophilous lowland forest)
The lowland forests are characterized by a high canopy (about 25–30 m) with primarily exotic species growing from 30–50 m. It consist primarily of non-indigenous species indicator species such as *Cinnamonum verum, Calophyllum inophyllum* and *Casuarina* (in the upper tree layer), *Nephrosperma vanhoutteanum* (in the under-canopy tree layer), *Allophyllus pervillei*, (in the shrub layer) and *Hypoxidia rhizophylla* (in the herb layer).

Submontane rain forests (tropical ombrophilous submontane forest)
The identity of submontane forest is similar to that of lowland rain forest, except that emergent trees are less common. The canopy is mostly dominated by *Northea hornei* and *Dillenia ferruginea*, usually mixed with cinnamon trees. Below the canopy, the endemic palms (*Roscheria melanochaetes*, *Phoenicophorium borsigianum)* and cinnamon trees are found.

Lower montane rain forest (tropical ombrophilous lower montane forest)
The most striking difference with the lowland and submontane belts is the spectacular physiognomy of these lower montane forests (a characteristic shared worldwide). Here the canopy becomes much lower (8–16 m depending on the soil structure) and emergent trees are nearly absent giving to the canopy a very flat aspect.

Here the invasive species become clearly less dominant and the main tree is now *Northea hornei*. It is associated in the upper tree layer with *Glionnetia sericea*, *Timonius sechellensis* (a common species often abundant in such habitat). *Pandanus sechellarum* and *Roscheria melanochaetes* are sub-canopy trees. *Dillenia ferruginea*, *Cinnamomum verum* and *Psidium littorale* may replace most of the *Northea* and *Glionnetia* trees in more degraded areas.

On Mahé and Silhouette, the transition from submontane to lower montane forests can still be observed quite easily, especially if we focus on the understory indicator species. We found generally the first lower montane indicators at about 550 m, and then the typical lower montane belt becomes well developed before the 600 m. Senterre et al (2009) provides a more comprehensive account.

1.16 Forest Classification

The most accepted way of categorizing forest is by the function they provide. Such a classification for the forest in the Seychelles was introduced in 1993 by INDUFOR (Indufor 1993). The method is nationally accepted and this classification has been used to categorise the forests on Mahé, Praslin and La Digue (See Table 4). It must be noted that the area attached to these categories has moderately changed with changing expectations of forest owner and society.

Table 4: Designated function of Forest and Other wooded land (FAO 2010)

	Biodiversity	Catchment/ Biodiversity	Catchment / Production	Production	Non - Forest	Total
Mahe	860	4050	4320	520	5720	15470
Praslin	390	690	1180	0	1500	3760
Curieuse	290	0	0	0	0	290
La Digue	30	300	230	0	450	1010
Silhouette	480	1380	0	0	140	2000
Total	2050	6420	5730	520	7810	22530

It is evident from the table that more forest is left aside to the biodiversity they contain. This is important given that our knowledge on the actual distribution of species is not well known.

Table 5: Zoning of forests based on functions (Vielle 2001)

Zoning of Forest	**Purpose of zoning**
Biodiversity Zones	Conservation of biodiversity
Catchment/Biodiversity Zones	Conservation of water, soil and biodiversity
Catchment/Production Zones	Conservation of water, soil and production
Production Zones	Production of wood and non-wood forest products

Vielle (2001 has also commended that the forests of Mahé, Praslin, Curieuse, La Digue and Silhouette be classified in four zones and managed according to specific management objectives.

1.17 Use of Forest Genetic Resources

The existing plantations in the inner islands were reported to cover about 900 ha. About 25% of the plantations have been established for protection purposes leaving about 75% for production. There are no recent data to estimate the area of forest plantation presently under management. The main criterion for plantation establishment has been insufficient, or lack of, forest cover, either due to forest fire or forest exploitation. Forest exploitation is usually based on selective cutting removing only trees, which have breast height diameters above a defined minimum, which vary according to three site quality classes. Therefore, tree planting after exploitation has typically been enrichment type of plantings where valuable, relatively fast-growing species are planted in openings resulting from removing of harvested trees or forest fires. Some of the plantation areas are fairly remote or otherwise with difficult access, which is a constraint for their eventual economic utilization. Availability of marginal or abandoned land for plantation forestry could be looked into. This applies also to the abandoned coconut plantations (about 6,000 ha) both in

inner and outer islands. In the outer islands casuarina was planted to protect coconut plantations from wind. In the abandoned areas casuarina has spread to the inner parts of the islands.

In 1992, FS planted 17,477 seedlings corresponding to a net area of about 20 ha. The main species were mahogany (73%), casuarina (21%), and *Khaya nyasica* (2%). The plantation work was mainly carried out by the Sans Souci Forestry Unit. The Grand Anse Forestry Unit nursery has mainly concentrated on producing and selling of ornamental plants.

The rate of mahogany planting has been about 9 ha/year during the past ten years. It is estimated that mahogany plantations now cover an area of 270 ha. Other species, e.g. *Eucalyptus camaldulensis*, santol (*Sandoricum indicum*), sangdragon (*Pterocarpus indicus*) and calice du Pape (*Tabebuia pallida*), have had only a minor share of the planting in the past decade. In fact the majority of the sangdragon was wiped out by a wilt disease in the early 1990s'. Eucalyptuses have not been planted recently as their growth was found to be poor and mortality high due to inappropriate soil conditions. There are also three small pine (*Pinus spp.*) plantations established many years ago and the pines have grown well. It is important for a comprehensive assessment to be undertaken to establish the exact area and also the quantity of timber and non timber forest resource under production.

About 40 ha of Casuarina (*Casuarina equisetifolia*) plantations have been established on the land reclamation area in Mahé since 1986 but nowadays the plantations have been partly removed. The main purpose of these plantations has been to stabilize the reclaimed land and to use the timber for construction. Casuarinas have also been used for soil protection in Praslin.

Nevertheless, some endemic species were recognized as species with commercial value such as:

Table 6: Past use of endemic species

Species	Common Name	IUCN status	Past Uses
Mimusops sechellarum	Bwa-d-Nat.	Near Threatened	Boat building and buildings, furniture
Campnosperma seychellarum	Bwa-d-Montanny	Critically Endangered	Construction of canoes, firewood,
Vateriopsis seychellarum	Bwa-d-Fer	Critically Endangered	Furniture
Drypetes riseleyi	Bwa Mare Ti Fey	Critically Endangered	Timber,
Dillenia feruginea	Bwa Rouz	Vulnerable	Timber, construction houses
Northea hornel	Kapisen	Vulnerable	Timber
Lodoicea maldivica,	Koko-de-Mer	Vulnerable	Souvenirs

With an endemic subspecies in the Seychelles *Impatiens gordoni* has a great potential as an ornamental plant with its large showy flowers. This is also true for Vanilla (*Vanilla phalaenopsis*), a supposed endemic to the Seychelles, with apparently closely related species on the African mainland. There is currently limited work being done with the ex situ cultivation of the endangered species especially at the Biodiversity Centre. There is an urgent need for outside help to implement this programme. There are no obvious progenitors or known wild relatives in the Seychelles of any current or potentially important agricultural or pastoral plants.

1.18 Factors influencing the state of forest genetic diversity in Seychelles:

A number of natural and anthropogenic factors influence the state of the forest genetic resources. Fire, over-harvesting or over exploitation of resources, climate change and development affects the natural forests with devastating consequences on the ecosystem services such as losses of land productivity and of water quality or quantity. The impacts of forest fires could lead to siltation. Silt not only discolours beaches and swimming areas, it also kills the corals, upon which the beaches and the fish depend.

Owing to the poor soils the process of restoring badly degraded areas will inevitably be difficult, slow and expensive. The erosion can become self-perpetuating. The bare earth surface is baked hard in the sun, preventing any infiltration of water. In such cases no vegetation will grow. In some places on Curieuse, lock-and-spill drains were used. These are said to have allowed some vegetation to grow but the drains need maintenance and may be too far apart. The Forestry Section has done much tree planting on eroded areas, especially in Praslin and Curieuse. Exotics have almost exclusively been used such as casuarinas. Not surprisingly, growth has usually been poor but at least some cover is established. Water availability is a crucial issue in Seychelles where the water catchments are relatively small and thus the water retention capacity limited. A study conducted in Seychelles clearly demonstrated that water infiltration rates are fastest, and soil erosion least, under conditions of dense vegetation where the soil has a high organic content and a high capacity for soaking up moisture. Conservation of the main water catchments and rivers with water intake are of utmost importance. The State Land and River Reserves Ordinance (Cap 150) stipulates that all the riverbanks be maintained untouched under permanent tree and brush cover. The ordinance is justified in the special situation of the country. However, it has not been properly enforced.

1.19 The main environmental risks to forests in Seychelles:

Natural and anthropogenic factors are the main environment risks to forest in the Seychelles. Such factors include, forest fires, erosion, drought, invasive plants, land use change and climate change. A summary is provided below;

i) Forest Fire

Forest fires are more common during the dry season resulting from anthropogenic activities (e.g. arson & accident) and are the main cause of deforestation on Praslin

(Carolus 2009). These can result in the destruction of biodiversity, habitats and a loss in ecosystem functions. The rate of forest fires are more pronounced during the dry season. An increase in the frequency and extent of such fires are expected in view that the dry season becomes longer and more severe with climate change (Senterre 2009).

ii) Erosion

Erosion is common in areas devoid of forest vegetation cover (e.g. after a forest fire, clear cuts or infrastructure projects). With no protective cover, the top rich soils are carried away and get deposited further downstream, sometimes clogging streams. The inability of the vegetation to establish may result in some areas remaining bare, devoid of any vegetation after decades and even centuries.

iii) Drought

With the changes in weather patterns, the dry season has become more pronounced in recent years. Severe drought will have strong effects on forests and possibly on ecosystem functioning given the fact that most of Seychelles forests are adapted to a moist climate. Changes in the water cycle which may affect the occurrence of distinct tree species, but do not endanger forests as a whole may also occur.

iv) Invasive Alien plants

Island biodiversity are easily affected by alien invasive species. Not only do they endanger biodiversity but also productivity and, under certain conditions, the very existence of forests (Senterre 2009). The impacts of woody invasive species, invasive herbaceous plants and creepers have become more severe during the last decades. The most relevant invasive creepers found in Seychelles with the ones presenting the most threat to biodiversity written in bold are shown in Appendix 4.

v) Change of land use

Land use change can have a significant impact on forest. For example, forested areas may be cleared to give way to development (e.g. tourism establishment, housing etc) or agricultural activities. As a result, various functions provided by forests are lost in the process and may also contribute to the spread of alien invasive species.

vi) Climate change

Climate change is a new emerging threat that we do not yet fully understand. It is expected that certain species such as those that can easily adapt to changes in temperature will thrive. However, certain habitats may be severely impacted. The growth of unique mountain cloud forests such as at Congo Rouge and Morne Seychellois, with many rare and specialised endemic plants, could shrink in size or possibly disappear altogether.

An increase in extreme events such as storms or drought is likely to affect native plants in some habitats (coastal areas, wetlands, exposed slopes and glacis, small islands). Long droughts could also create ideal conditions for fire to spread, especially in the dry palm forests of Praslin.

Moreover the archipelago has a tropical maritime climate strongly influenced by the ocean. The effects of global warming are difficult to predict, partly because they occur on different time cycles and also because the islands of the Seychelles archipelago are small and scattered over a large area. The normal climate system is of two alternating seasons (rainfall and drier season). Analysis of temperature and rainfall data for Mahé has shown that there has been substantial climate variability over the past hundred years in the Seychelles. There have been large variations between years and decades sometimes as much as 20% difference between each period.

1.20 Future needs and priorities

The Seychelles Government acknowledges the importance of forest in habitat and species protection, protection of ecosystem services amongst other functions. The country's priorities have been incorporated in various plans and national policy document (e.g. Seychelles Sustainable Development Strategy (GoS 2012)). Activities under the strategy will ensure that forest functions (e.g. continuous supply of fresh water) and also products derived are maintained.

It is important that the habitats in which the unique species of endemic plants and animals are found are legally protected. The Seychelles has almost 50% of its land territory under legal protection. Some of the areas are highly degraded and needs to be restored given our dependence on the catchment areas. It is important that these areas are restored to increase forest cover in catchment areas to protect the potable water resources, as well as the coastal areas from erosion and siltation.

Government needs to include all stakeholders and members of the public in maintaining the forests. A clear framework to improve the planning, coordination and maintaining forests should be clearly laid out.

Given our dependence on the forests, greater emphasis should be placed on sustainable management and conservation of the various forest zones. It is also important for the Government to continue with national programmes to conserve biodiversity in hotspot areas, conservation of soil and water resources, production and sustainable management of forest products, forest protection and strengthening of the institutional framework. Local and international sources of funding are required as well as appropriate monitoring, research and planning.

Forest genetic resources will have an important role to play in meeting future demands for forest products and services in the Seychelles. Our reliance on the forest for potable water will continue to increase given the infrequency of rainfall. Furthermore the Government should implement sustainable forest guidelines. These are important to ensure that the functions of forest cover remains as well as to ensure future supply of timber and non timber product which is on the rise.

Despite of its economic and environmental importance, forest is threatened by a number of anthropogenic factors as we have seen above. These include change in land use as a result of housing and also encroachment to perform agriculture, the

spread of alien invasive plant species which competes aggressively with native species and the threat of forest fires, which can have disastrous impacts on soil and water conservation. With the increasing demand for space and the increasing demand for timber ,it is imperative that appropriate strategies be put in place to reduce the potential of such threats.

2.0 The State of in situ genetic conservation

2.1 Introduction

The state of *in situ* conservation of forest genetic resources is described, taking into consideration the various national initiatives taken place in the past ten years to conserve forest genetic resources. Actions taken as well as the limitations faced by the various organisations are also highlighted.

2.2 *In situ* conservation

The long term survival of the flora and fauna depends on the protection and maintenance of several conservation areas. These areas vary in size and depend on the management objectives. For example, an area managed for biodiversity conservation will have different management regime compared to an area managed for timber or non timber resources. These areas usually consist of population and sub population of interesting and unique species (See Table 7 for the different protected areas).

Table 7: List of protected areas

Name of protected area	Year gazetted/established.
Morne Seychellois National Park	1979
Praslin National Park	1979
Silhouette National Park	2011
Aride Special Reserve	1975
Cousin Special Reserve	1975
Aldabra Special Reserve	1981
lLa Digue (Veuve Special Reserve)	1991

There is no doubt that there may exist some genetic variation between existing sub-populations, given the fact that such species may be found on more than one island completely separated by the sea, hence with geographical limitation for exchange of genetic material such is the case for the coco de mer. Continuous research, monitoring and intervention may be required to ascertain the genetic status of such population. In order to ensure that there is no mode of genetic contamination, *insitu* conservation measures are used. I*n-situ* conservation is fundamental for the conservation of plant diversity because it may comprise of designation of protected areas. These areas are protected by law and certain management prescriptions are required for their day to day management. Approaches such as habitat rehabilitation, reintroduction of critically endangered plants to increase genetic diversity may be used to complement the long term conservation of the species.

In the Seychelles, priorities for in *situ* conservation are given to critically endangered species, flagship species and other species with a commercial value (e.g. timber species).Protection of such species usually requires the assistance of other stakeholders. Hence, Government should engage local landowners, NGOs, companies

to assist whilst retaining the monitoring and supervisory roles. By supporting and institutionalizing such arrangements, these activities can contribute to the development of the most promising mechanism for long-term forest conservation outside the main parks in Seychelles. Without the proposed action, the high biodiversity values of the areas will be depleted by encroachment of exotic species and by conversion to other land uses (see threats in previous section).

The Government has established an extensive network of protected areas. These areas provide protection to biodiversity (See Table 8), catchment areas and also ecosystem functions. Several organizations, including Authorities and Ministries are conducting studies to enhance our understanding on the value and also to make recommendations which can subsequently influence policy decisions on the management and regulation of protected areas. A list of the native plant species that are protected in such protected areas and are propagated in certain government owned or privately owned nurseries is provided in appendix 5.

2.3 The major protected areas for in situ conservation in Seychelles:

A) The Morne Seychellois National Park: is probably the most important forest in Seychelles because of its catchment and biodiversity values. It extends over a surface area of 3,000 ha from the western and north western coastline up to the highest summit in the country and culminates at the height of 905 meters. Apart from the network of trails dissecting the park, it is difficult to penetrate due to its dense vegetation and harsh topography. The park offers refuge to a unique biodiversity among which is the majority of the endemic plants of Seychelles together with a large number of endemic animal species. The high altitude forest remains relatively preserved from the spread of invasive plants.

However, even if the park was established in 1979, its management objectives were not clearly defined and no regulation was put into place with regards to its management and also in zoning the park. As a result certain zones were reforested with exotic timber species, tea plantations were established and certain residential constructions were tolerated. The existing management plan stipulates that the National park shall not be hermetic and accessible only to the management team or scientists doing research there but as the park contains a lot of renewable natural resources these can be exploited using methods and techniques that are sustainable.

This management plan dates back to 1999 and it is time that it is reviewed and regulations are elaborated for a better and more efficient management of the Morne Seychellois National Park.

B) Praslin National Park: The Praslin National Park is situated in the centre of the second largest island in the archipelago. The park was established in 1979 and covers a surface area of 337 ha. It encompasses the nature reserve of Vallee de mai (a world heritage site). The park has no physical boundary but it is delimited by fire breaks. The fire breaks are zones without vegetation, several kilometers long and a few meters wide .If well maintained those fire breaks can protect the park from fire during a fire outbreak. This is very important since Praslin is very prone to fire

especially during the dry season. The main water catchment area of the island is situated within the park and is therefore the main source of potable water to the inhabitants.

The tropical forest which constitutes the Praslin National Park is dominated by the different endemic palms of which the coco de mer is the most well known. The park is home to the six endemic species of palms found in the Seychelles.

C) Silhouette National Park: was gazetted in 2011 and is the less disturbed forest of the major granitic islands. The populations of endemic flora are of great importance for conservation of biodiversity. There is few or no exploitation of the forest but invasive species remain a serious threat. The island is managed by IDC and the agricultural activities are concentrated in the narrow coastal strip. There is no potential for a sustainable agriculture in the hills. The management of IDC has stated its commitment to conserve the forests for biological diversity as well as their catchment value. It is willing to participate in conservation but has asked for technical advice and supervision from DOE. IDC has a large labor force but without skills relating to forest conservation. The best way to conserve these important forests is therefore to develop in collaboration with IDC a management plan which IDC would implement with guidance and assistance from DOE.

Table 8: IUCN status of some of endemic species

Scientific names	Vernacular Names	IUCN status
Allophylus sechellensis	Bwa Kaful 3 Fey	Vulnerable
Aphloia theiformis var. seychellensis	Bwa Merle, Bwa Villain	Vulnerable
Brexia madagascariensis subsp microcarpa	Bwa Kato	Endangered
Campnosperma seychellarum	Bwa-d-Montanny	Critically Endangered
Canthium carinatum	Bwa Dir Blan	Vulnerable
Canthium sechellense	Bwa Dir Rouz	Endangered
Carissa edulis var sechellensis	Bwa Sandal	Critically Endangered
Colea seychellarum	Bilenbi Maron	Endangered
Craterispermum microdon	Bwa Dou	Endangered
Deckenia nobilis	Palmis	Near threatened
Dillenia ferruginea	Bwa Rouz	Vulnerable
Diospyros seychellarum	Bwa Sagay	Near threatened
Drypetes riseleyi	Bwa Mare Ti Fey	Critically Endangered
Erythroxylum sechellarum	Kafe Maron Ti Fey	Least Concern
Excoecaria benthamiana	Bwa Zasmin, Bwa Sarlot	Vulnerable
Ficus reflexa ssp seychellensis	Affouche Ti Fey	Least Concern
Gastonia crassa	Bwa Bannann	Vulnerable

Gastonia lionnetii	Bwa Bannann	Critically Endangered
Gastonia sechellarum var sechellarum	Bwa Bannann, Bwa Papay	Vulnerable
Gastonia sechellarum var curiosae	Bwa Bannann, Bwa Papay	Vulnerable
Gastonia sechellarum var contracta	Bwa Bannann, Bwa Papay	Vulnerable
Grisollea thomassetii	Bwa Mare, Bwa Gro La Po	Critically Endangered
Glionnetia sericea	Manglier-d-montanny	Endangered
Lodoicea maldivica	Koko-d-Mer	Endangered
Medusagyne oppositifolia	Bwa Mediz, Jellyfish tree	Critically Endangered
Memecyclon elaeagni	Bwa Kalou	Least Concern
Mimusops sechellarum	Bwa-d-Nat	Near Threatened
Nephrosperma vanhoutteanum	Latannyen Milpat	Vulnerable
Northea hornei	Kapisen	Vulnerable
Pandanus balfourii	Vakwa Bord-d-Mer	Vulnerable
Pandanus hornei	Vakwa Parasol	Vulnerable
Pandanus multispicatus	Vakwa Milpat	Near Threatened
Pandanus sechellarum	Vakwa Maron	Near Threatened
Paragenipa wrightii	Kafe Maron	Near Threatened
Phoenicophorium borsigianum	Latannyen Fey	Least Concern
Pisonia sechellarum	Mapou Gran Fey	Critically Endangered
Pittosporum wrightii	Bwa Zoli Ker	Vulnerable
Psathura sechellarum	Bwa Kasan Ti Fey	Critically Endangered
Psychotria pervillei	Bwa Koulev	Vulnerable
Psychotria silhouettae	Bwa Koulev	Critically Endangered
Rapanea seychellarum	Bwa Klate	Critically Endangered
Roscheria melanochaetes	Latannyen Oban	Vulnerable
Rothmannia annae	Bwa Sitron	Critically Endangered
Syzygium wrightii	Bwa-d-Pomme	Vulnerable
Tarenna sechellensis	Bwa Dur Bleu	Vulnerable
Timonius sechellensis	Bwa Kasan-d-Montanny	Vulnerable
Vateriopsis seychellarum	Bwa-d-Fer	Critically Endangered
Verschaffeltia splendida	Latannyen Lat	Vulnerable

Similar programmes are in place for some of the commercial species such as those used for timber. These are grown in nurseries and eventually used to establish sustainable plantations of both timber and non timber species.

2.4 Actions taken for sustaining *in situ* collections

The Conservation and National Parks (CNP) Section of the Division of Environment initiated a study in 1994 to establish the distribution of the endemic and threatened plant species of the granitic Seychelles. The data has been published in a national

report. However, data collected was qualitative not taking into consideration quantitative data such as population sizes, threats to species etc. The study has also lead to the establishment of other studies on the country's flagship species such as the Jelly fish plant (Matatiken 2006).

A study was done by Huber and Ismael (Huber and Ismail 2006) to establish the distribution and also IUCN status of most of the endemic species. This led to the revision of the red list of the country's endemic species. As a result, most of the information in the report has been updated using this reference, E.g. See Table 8.

There are presently local initiatives by Government and the NGO sector to restore degraded areas. Activities include the reintroduction of native, endemic and other species to restore ecosystem functions. Other works include the removal of IAS with the aim of reducing competition for nutrients. Such studies are being done on the inselbergs where competition between the IAS and the native species are high.

2.5 Constraints

Even though we have more than 48% of our total land area set aside for conservation there are still gaps in the legislations. Such gap includes sustainable level, biodiversity conservation and also management prescriptions. Moreover certain protected areas have suffered the uncontrolled pressure of development and encroachment. There is already a pronounced conflict between the demand for land for settlement and associated constructions and plant preservation and frequently only very restricted areas remain of the different habitat types. Many species with previously continuous populations have also been subdivided (fragmentation) during the last century due to the alterations in land use.

The native flora of the Seychelles has been heavily invaded by a wide range of introduced plant species including IAS. The vegetation of many pristine areas have been degraded as a result.

The lack of capacity, funding and also technical knowledge limit successful conservation programmes.

3.0 The state of ex situ Genetic Conservation

3.1 Introduction

The management of forest genetic resources in Seychelles remains primarily the responsibility of the public and parastatal sector. The main goal is to conserve the biodiversity and their ecosystem. However the rate of habitat destruction is expected to continue to increase, especially with pressure from development. Certain endemic species are under the threat of extinction due to the fact that firstly some of those trees being valuable timber trees were plundered almost to extinction by the first settlers secondly the size of their natural habitat and its fragmentation may lead to genetic erosion that may render the species less resistant to changes e.g. climate change and thirdly their habitat is being transformed by the spontaneous

propagation of alien invasive species. *Ex situ* conservation becomes therefore a necessary consequence in order to conserve those species.

3.2 Important institutions for ex situ conservation in Seychelles:

Given the fact that *ex situ* conservation activities is required to complement *in situ* conservation, various NGOs and Government institutions have programmesl in place. These programmes include the propagation of the native species, .

- Government owned nurseries.
- The Botanical Garden
- The Biodiversity Centre.
- Plant Genetic Resource Collection Station.
- Private nurseries at hotels

Also noteworthy are the privately owned nurseries for the propagation of endemics and timber species especially for restoration works or for the establishment of plantations.

a) Government owned nurseries:

Most of those nurseries are managed by the Seychelles National Park Authority and the National Botanical Garden Foundation. Native plants are propagated to fill gaps in the forest and for restoration of degraded land that has been affected by fire or other natural disasters. Also, plants are also being produced for transplantation into plantation for commercial purposes e.g. mahogany *Swietenia, Sandoricum indicum* and for establishment of timber plantations. A small amount of the saplings produced are also sold to the public.

b) The Botanical Garden.

The only botanical garden in the country was founded in 1901 is located on the main island of Mahé. It was established at a time when agriculture was the pillar of the economy. Plants were from various parts of the world were grown and analysed for their adaptability to the local climate and their suitability for future use. The garden now contains over 500 plant species both exotic and endemic, amongst the most remarkable of them is the endemic *Lodoicea maldivica* that produces the world's largest nut. The garden covers an area of 6 ha and endangered species are also propagated there.

c.) The Biodiversity Centre:

The Biodiversity Centre is situated at Barbarons on the west coast of Mahé and covers an area of 11 ha. The purpose of such project is to recreate and bring the various ecosystems closer to the people. The Centre has been instrumental in establishing methods of propagation for many endemic species (See Table 9/9). Plants with medicinal and other properties are also being propagated and sold to practitioners with the objective to prevent wild collection. The centre is expected to open in 2013..

d.) Private nurseries

There are also five star hotels/resorts with extensive native nurseries for vegetation rehabilitation. Such resorts are found in the islands of Fregate, North, Ste Anne as well as many smaller islands. The nurseries are used to propagate plants for rehabilitation works.

Table 9: Some species cultivated for Biodiversity Conservation:

SPECIES	LOCATION
Allophyllus sechellensis	Biodiversity Centre, Grand Anse unit.
Aphloia theiformis var. seychellensis	Biodiversity Centre, Sans Souci unit.
Angraecum maheense	Biodiversity centre.
Brexia microcarpa	Biodiversity Centre, Sans Souci unit.
Dillenia ferruginea	Biodiversity Centre.
Diospyros seychellarum	Biodiversity Centre, Grand Anse unit.
Drypetus riseleyi	Biodiversity centre, Grand Anse unit.
Memecylon elaeagni	Biodiversity centre, Sans Souci unit.
Ludia Mauritania?	Biodiversity Centre.
Colea seychellarum	Biodiversity Centre, Sans Souci unit.
Deckenia nobilis	Biodiversity Centre, Grand Anse unit.
Rothmania annae	Biodiversity Centre
Pittosporum scenacia subsp. wrightii	Biodiversity Centre, Sans Souci unit.
Mimusops sechellarum	Biodiversity Centre, Grand Anse unit.
Paragenipa wrightii	Biodiversity Centre.
Roscheria melanochaetes	Biodiversity Centre.
Tarenna sechellensis	Biodiversity Centre.
Verschaffettia splendida	Biodiversity Centre, Sans Souci unit.
Psychotria pervillei	Biodiversity Centre.
Phoenicophorum borsigianum	Biodiversity Centre, Sans Souci unit.
Nephrosperma vanhoutteanum	Biodiversity Centre, Sans Souci unit.
Lodoicea maldivica	Biodiversity Centre.
Canthium sechellense	Biodiversity Centre.
Carissa edulis var. sechelllensis	Biodiversity Centre
Medusagyne oppositifolia	Biodiversity Centre.

e) The Plant Genetic Resource Centre

The Ministry of Agriculture and Marine Resources owned the largest national plant genetic resources collections centre. The centre was established in 1979 and was based at Grand Anse Agricultural Research Station. The aim of the stations was to supplying material for propagation, and evaluation of varieties to farmers and the public. The national collection was composed of imported and locally selected varieties of tropical fruits and rootcrops. More than 50% of the samples were utilized each year mostly by farmers and food producers locally. The national tropical fruit collection contained over 100 varieties of mango and avocado, mostly as introduced (exotic) varieties.

Evaluations were mainly geared at assessing adaptability to soil, climate, disease resistance and yield. No breeding work was involved, the centre was simply interested in adaptive screening for quality fruit, yield etc. However much of this collection has already disappeared or is threatened by housing and tourism development. Fortunately a new initiative has been launched recently and hopefully most of it shall be recovered.

Certain amount of plantation trials with different species including *Eucalyptus* and P*inus* sp, have been established but their results have not been measured or systematically analysed. The trials however guided the selection of species for plantation establishment. The limited efforts put to research are possibly understandable due to the small size of the sector and due to the limited human resources availability especially after the reorganization in the public sector as a result of the international economic crisis this is further aggravated by the fact that very limited staff have research experience. There is an urgent need for the forestry section to build up on its research capacity if it is to improve on the present status of knowledge on our forest genetic resources.

3.2 Storage Facility

The Seychelles does not have any base collection. There is no infrastructure to preserve genetic materials in vitro material or in cryopreservation. There was an attempt made in early 2000 to establish a seed bank at the Biodiversity Centre but because of the lack of technical capacity the project was never materialized.

Instead, government opted to establish field genebanks or open field collections because they are cheaper to maintain and also they can be used as effective material source for germination and other scientific related studies.

For new acquisitions we would rely on international arrangements (institutional contacts) and we would try to maintain the acquired material in field cultivation (genebanks) as they have proved quite successful in the past.

It is important that source of genetic materials are documented to prevent any genetic contaminations. part.

3.3 Constraints:

There is considerable experience of seedling propagation but most of the information is not well documented. The knowledge for the propagation of species should be promoted to avoid people from removing plants from the forests. The energy and interest need to be redirected to help conservation. The proposed actions include compiling all the available information about indigenous species, to collect seeds from a variety of indigenous trees, to go ahead in Praslin with the intention to rehabilitate the burnt area with indigenous species, to expand and specialize nursery capacities.

Future ex situ conservation priorities are included in the Seychelles Plant Conservation Strategy (PCA 2007) and include the following:

- Aim to get 95% of the threatened flowering plants into some sort of conservation programme as 53% *of endemic flowering plant species in the granitic islands are either vulnerable, endangered or critically endangered.
- To include 30% of the critically endangered flowering plants taxa in species recovery programme;
- To improve our understanding on biological diversity and ecosystem functioning in a changing environment.
- To restore and rehabilitate areas destroyed by forest fires.
- To develop novel practical and feasible tools for ecosystem restoration.
- To develop or adopt new and efficient methods to eradicate alien invasive species.

It is important to note that the plant conservation strategy needs updating because some of the information is a bit out of date in terms of the newer Global strategy.

4.0 The State of Use and Sustainable Management of Forest Genetic Resources:

4.1 Introduction:

The Seychelles is possibly at an advantage to its distant neighbours on the continent in that it has no community living in its forests thus limiting direct human impact on the forest as few people depend directly on the forest for their livelihood. The country is in general well placed where the sustainable management of its forest genetic resources is concerned. With half of its total land area under protection, Seychelles was among the first countries in the world to adopt sustainable development as a National Policy. This was enshrined in the Environment Management Plan that was developed as a blue print for that policy. In 2000 the country developed a second generation management plan and has recently adopted a reviewed strategy towards sustainable management called the 'Seychelles Sustainable Development Strategy' (2012 – 2020) that incorporates an integrated approach towards Sustainable Management throughout the sectors of the economy. (

4.2 Legislative framework regulating the management of forest genetic resources In Seychelles

One of the key legislation assisting the Department of Environment in the sustainable management of important plant species is the Breadfruit and other trees (protection) Act. Over 30 species of plants are regulated under this law and these include both endemic and exotic species (See **Table 10/10**). Before such trees can be felled or lopped, a request has to be made to the Department of Environment. This law will be updated soon as there is a need to revise the list of plants under protection.

Table 10: Trees regulated under the Breadfruit and Other Trees Act

Scientific Name	Common name
Adenanthera pavonina	Agathie
Albizia falcataria	Albizzia
Terminatia catappa	Badamier
Hernandia sinora	Bois Blanc
Mimosups sechellarum	Bois de Natte
Heritiera littoralis	Bois de Table
Alstonia macrophylia	Bois Jaune
Siderozylon ferrugineum	Bois Mozambique
Albizia lebbeck	Bois Noir
Dillenia ferruginea	Bois Rouge
Tabebuia pallida	Calice du Pape
Casuarina equisetifolia	Cedre
Eucalyptus sp	Eucalyptus
Artocarpus altilis	Breadfruit

Intsia bijuga	Gayak
Artocarpus intergrifolia	Jackfruit
Melia dabia	Lilac
Swietenia macrophylla	Mahogany
Eugenia malaccensis	Pomme Government
Pterocarpus indica	Sandragon
Sandoricum indicum	Santol
Calophyllum inophyllum	Takamaka
Tectona grandis	Teak
Cocos nucifera	Coconut
Deckinia nobilis	Palmiste
Nephrosperma vanhoutteanum	Latanier Millipattes
Verschaffeltia splendida	Latanier Latte
Roscheria melanochaetes	Latanier Hauban
Phoenicophorium borsigianum	Latanier Feuilles
Lodoicea maldivica	Coco de Mer

Over half of the native plants of Seychelles are endemic including some very valuable timber trees. These trees were plundered almost to extinction by the first settlers. Nowadays the remnant populations are still threatened mainly by fire and invasive species. Many Seychellois are aware of their unique flora and want to help to restore it by growing trees on their land. At the same time, the FS intends to start planting indigenous species in its afforestation work. There is an urgent need to produce seedlings for use in the forestry plans. However the techniques for propagation are well known only for a few species. Also the nursery facilities are limited. It will take 3 or 5 years to build up production to the levels that can be achieved with familiar exotic species.

i) Lighting of fires act:

Fire constitute a major threat to the conservation of Forest Genetic Resource whether it be a case where the fire was set deliberately to clear for agriculture or one caused by natural causes, the disastrous effect would be the same. The Lighting of fires Act (1940) the act requires that permission be sought to light a fire in a declared area. However this act applies to only one area in the country therefore it needs to be reviewed so that other areas can be included.

ii) Coco de mer (Management) Act (1994):

This act provides for the management of the coco de mer nut (*Lodoicea maldivica*). This is a flagship specie. Many attributes have been associated with the nut and it fetches a very high price in certain market in the Fareast. This species is endemic to the Seychelles and grows natural in a couple of locations only. A key aspect of its management is its replanting programme. Much doubt is being shed on the future of the species as illegal harvesting is threatening its existence. The competent authority is currently looking into ways and means to curb this illegal activity and better preserve the species. The Act is currently under review.

iii) Forest genetic resources improvement and breeding programs

No scientific plant breeding is done locally through lack of expertise, infrastructure and financial support.

The Seychelles Agricultural Agency which is the competent authority only perform evaluations that are geared at assessing adaptability to soil, climate, disease resistance and yield on the imported or local varieties being tested. The Ministry of Natural resources, previously the Ministry of Agriculture introduces high yielding cultivars, varieties adapted to soil/climate with relative good pest tolerance.

4.3 Delivery/deployment systems; availability of reproductive materials:

Within the Ministry of Agriculture and Marine Resources, the Crop Research and Development Division uses the bulk of genetic resources kept. The medicinal plant project had collected and keeps a certain amount of local plants for extraction of ingredients with medicinal properties. This was a local project with counterparts in Mauritius, Reunion, Madagascar and the Comores.

In the genebank all species with potential commercial significance have been used and they will be used more frequently especially samples from tropical fruits as they are proven varieties and demand for those are on the rise. Their importance has increased gradually.

Forestry nurseries and genebanks are financed by the forestry section. The plant genetic resources collections (field genebanks) are not protected by any legislation, or by national decree or by any international commitment. It is difficult to say whether any legislation giving the collections a legal status would increase their security.

5.0 The State of National Programmes, Research, Education, Training and Legislation

5.1 National Programmes:

Different stakeholders are involved in forest genetic resources conservation.

Ministry of Environment

The main responsible authority for forests is the Department of Environment (DoE) within the Ministry of Environment and Energy. The new role of the forestry section within the Ministry of Environment is to act as a facilitator, enforcer of regulations and spearheading the development of relevant policies. The mandate however to manage, assist in the protection of and exploit the public forests and plantations in the Seychelles was passed on to the SNPA after the reorganization in the public service in 2008.

The section responsible for dealing with the management of public forests in the SNPA is headed by a director and is divided into five geographical units.

Fond B'Offay unit covers the whole of Praslin and La Digue, *Grand* Anse unit covers the southern and western parts of Mahé, and the Sans Soucis unit covers the Northern and Eastern parts of Mahé, including the Morne Seychellois National Park. Their responsibilities include reforestation activities from rising of seedlings to planting and tending, local supervision of harvesting operations, some harvesting, thinning particularly in timber plantations, and forest protection with particular reference to forest fire prevention and control.

Ministry of Education,

The Ministry of Education has a critical role to play in raising awareness of students on plant species through environmental education and promote environmental micro-projects/activities. Topics on plants are part of the curriculum in both Primary, Secondary and Post Secondary schools. Students learn about the different plant species and embark on small projects of beautifying school ground with some of the local plant species through the Eco-School program. This contributes to one of the program's criteria regarding conservation through environmental education and environmental management projects/activities.

Other ministries:

The technical advisor to the Ministry of Environment and Energy chairs the Planning Authority (PA), which is responsible for the implementation of the Town and Country Planning Act. PA therefore develops local and national land use plans (planning system and the land use approval process). It is also responsible for reviewing requests for any buildings or constructions.

Local organizations:

Some governmental and non-governmental organizations outside SNPA are relevant for forest management too:

- SIF (Seychelles Island Foundation) manages the Vallee de mai and Aldabra world heritage sites
- PUC (Public Utilities Corporation) i.e. builds roads and manages water supply and various interdependencies where forests exist.
- IDC (Islands Development Company) manages some outer Islands and is responsible for their development, although some of these islands have been handed over to private hotel companies in between.
- SEnPA (Small enterprises promotion agency) is not involved in forestry at present, but as a promoter of small and cottage industries it might play a pivotal role in NTFP and timber processing.

Table 11: International Organisations

Organization	Roles and Responsibilities	Activities regarding sustainable land use management
World Bank		Mostly limited to economic sector
European Union	Donor organization.	Funding
UNDP	Work closely together UNDP is implementing agency of donor organization GEF, jointly most prominent international actor in ecology sector	Various implementations, implementing results of Common Country Assessment Various consultancies (prevention and control of introduction and spread of invasive alien species, biodiversity management…)
GEF	Donor	Funding

Sources: Wenzel and Grulke, (2010)

Stakeholder landscape

Most forests in the Seychelles are state owned and state managed, either directly or indirectly via parastatal organizations. Hence governmental institutions are the most important stakeholders. Governmental attitude towards forests can be summarized as follows: "*Forestry is not considered a major economic sector, although it has the potential to reduce wood importation and create employment. (..). Forests are mostly considered important for their environmental services including their primordial support to biodiversity and the tourism industry*." Other stakeholder groups include the Private Sector (Table 12) and the NGOs

Table 12: Associations and private sector

Organization	Roles and Responsibilities	Activities regarding sustainable land use management
SCCI	Represents the interests of the private business community including tourism	Policy development and consultation for legislation, interest in durable supply with commodities from the forest especially high value timber and palm leaves
Seychelles farmers association	Represents members 'interest	No specific activities
Construction Association	Represents 150 companies working in the construction sector	No specific activities regarding SLM, stating that importing timber for construction is cheaper than locally produced timber
Luxury hotels and resorts especially on private islands	Custodian of a near to nature status on their private island/ hotel area	Conservation activities within their respective area of responsibility
Private landowners	Manage and protect their land	Diverse interests: some have a view to forests as a land reserve for building and no interest in SLM, some are very engaged in conservation and rehabilitation efforts and most of them use their timber resources and are interested in their maintenance

Table 13: Non-Governmental Organisations

Organizations	Roles and Responsibilities	Activities regarding sustainable land use management
Island Conservation Society (ICS)	Biodiversity conservation, public education and awareness	It manages Aride Island Special Reserve and was leading the eradication and habitat rehabilitation work on North Island in partnership with North Island Company Ltd. ICS has a special interest in biodiversity conservation on the Outer Islands in collaboration with the Islands Development Company.
Nature Protection Trust of Seychelles (NPTS).	Biodiversity conservation, research, awareness raising and management	It was based on Silhouette Island. They undertake small scale conservation, research and rehabilitation work, some in collaboration with volunteers from Global Vision International and received support from Islands Development Company (IDC).
Nature Seychelles	Supports conservation, research, public awareness and training	It is affiliated with Birdlife International. They have developed partnerships with tourism operators/islands owners (Frégate, Denis, Cousin, Cousine and Bird Island) where they have done work on IAS eradication and habitat restoration.
Plant Conservation Action Group (PCA)	Main focus is plant species, habitat and ecosystem protection/rehabilitation and education/awareness.	Natural History Museum, North Island Company Ltd, ETH, Zurich and other NGOs.. It published the National Plant Conservation Strategy in collaboration with MENR and has developed a plant database. It is working with the Natural History Museum to upgrade the National Herbarium
Wildlife Clubs of Seychelles	Environmental education for young people along with broader public education and awareness	The main partner is the Education Department of the Ministry of Education. They conduct annual competitions among schools and other environmental awareness programs and activities for youths.
Green Island Foundation	Biodiversity conservation, public education and awareness.	It is a coordinator for environmental initiatives and works with Denis and North Island Company Ltd. GIF seeks to bridge the gap between the private sector and national environmental programs.

Sources: (Wenzel and Markus 2012)

5.2 Conservation of Biodiversity

Forests have a critical role to play in the conservation of biodiversity. They provide habitats, food as well as contribute to the environmental services which are important for the survival of most of the species. These areas must be identified and classed into zones with the right management practices.

There is presently some works being done to identify key biodiversity areas both within and outside protected areas. The work is being funded by the GEF and these areas are being classified into biodiversity zones. Biodiversity Zones have been selected on the basis of existing botanical information, including presence of rare species, with consideration given to altitudinal range, size, physical isolation and whether conservation is feasible. A detailed management plan for the park should be also prepared, and the plan implemented. It is proposed that the plan be prepared for a period of ten years. Thereafter the plan should be reviewed and up-dated. The first management plan could be a simple one. Early in the planning process, it should be possible to draft park regulations, which should be gazetted as soon as possible. The regulations may refer to the different zones of the park. Certain regulations, e.g. on planting exotic species or lighting fires, will apply also within this zone.

The inhabited zone should not be allowed to continue creeping along the roads. Such development would affect catchment protection, scenic value and also biodiversity conservation. Seychellois forests are already small and division of the forest into smaller areas could subdivide populations of some rare species, with adverse effects on their long-term viability. The plan should also clarify management responsibilities, so that there can be accountability in plan implementation.

One of the key problems to be tackled is the invasion of exotic species. The most cost effective approach to improve the biodiversity zones is probably to focus effort on sustained management of forest gaps, whether natural or made by clearing exotics. By tending indigenous seedlings (planted or spontaneous) and removing exotics in the gaps, a gradual reversion back towards indigenous forest may be achieved. An anti-albizia ring-barking campaign would help stop the spread of albizia, but it should be followed by several years of gap management. Otherwise the albizia will be replaced by cinnamon, agati and more albizia.

The ability of prune de France to invade indigenous forest needs to be assessed. Where prune de France and bracken fern are colonizing a bare area, which would otherwise suffer erosion, they should probably be allowed to do so. Once the soil is sufficiently stabilized, contour lines could be cleared for trees to be planted and tended until they grew over the invaders. Because of lower rates of re-invasion, the work to prevent re-invasion of a forest cleaned of exotics should be less in physically isolated areas, i.e. small islands, than in a Biodiversity Zone surrounded by cinnamon-dominated forest in Mahé. The task can be made easier by avoiding planting invasive species and by tightening up controls to prevent the introduction of new problem species.

The control of invasive species is inevitably, labour-intensive. FS policy must therefore explore possibilities for additional manpower. FS personnel policy should

include identification and training of some labourers in the particular skills required. There should be official recognition of, and payment for, this special skill.

Management plans should be gradually prepared for all the Biodiversity Zones. The following management issues should be addressed in these plans:

- Removal of exotic species and subsequent management of forest gaps. This should focus initially on the best patches of indigenous forest within the zone, and then gradually expand outward to cover the whole zone. This will be a long-term activity
- Fire prevention and control, and treatment of burnt areas, especially for Praslin National Park
- Protection against harvesting of timber, medicinal plants and other non-wood products, through boundary marking, patrols and the use of honorary wardens/rangers
- Management of park visitors, to protect the environment, ensure visitor satisfaction, and, where appropriate, collect revenue
- Extension and education work with forest neighbors, tour operators using the forest, local leaders, teachers, NGOs and interested individuals. The aim is to encourage wide, active participation in conservation of these biodiversity zones
- Promotion of a specific public image for each park or biodiversity zone, to motivate people participating in conservation and to help generate revenue, e.g. Morne Seychellois National Park = the protector of water, and hence life, for Seychelles
- Gradual replacement of exotic plantations with mixed indigenous forest, which will never be harvested
- Rehabilitation of degraded areas with a mixture of indigenous species, combined with mechanical means (e.g. terracing, lock-and-spill drains) where appropriate
- Monitoring of the ecological state of the zone, the status of rare or ecologically important species, and the achievement of management targets
- Research on the dynamics of forest regeneration, auto ecology and propagation of rare species, the process of invasion by exotics, fire ecology and the distribution of flora and fauna
- Protection of water catchment

Where the Biodiversity Zone is on private land, DOE should seek a management agreement with the landowner, to ensure appropriate management. Gazettement as a Special Nature Reserve could be considered, if agreed with the owner.

5.3 Research institutions involved in forest genetic resources:

Institutions that deal with research on day to day basis on forest are not present in the Seychelles. Capacity is lacking in the country and it has to rely on visiting researchers or collaboration with foreign research institute. Numerous researches were conducted in collaboration with universities from abroad (e.g. ETH Zürich). The

newly founded University of Seychelles might fill this gap in future. SIF is researching in coco de mer.

Nevertheless a large part of the international institutions support research in the forest sector in Seychelles. The National Parks and Forestry Section of the Ministry of Environment and SNPA work in close collaboration with the University of Zurich, the Natural History Museum of Paris, the FAO, and Alice Holt Lodge to ensure that research is integrated in the forest management. Indeed the government recognized that the lack of research is one of the forest sector weaknesses. There are many topics on which research is needed.

The priorities are:

1) The techniques for propagation of indigenous species and their survival and growth;
2) The distribution and auto ecology of rare species;
3) Forest dynamics (regeneration in gaps, patterns of invasion on the natural forest);
4) Detailed surveys of flora and fauna in Biodiversity zones;
5) Post-fire ecology and the suitability of various species;
6) The effects of albizia and other fast-growing exotics on dry season stream flow.
7) The geographic variation in individual species in order to guide conservation of genetic diversity within species.

In June 2007, the government organized a plant conservation research workshop entitled "Synergies between Plant Conservation and Ecological Research". The conclusion was that Seychelles has achieved much in plant conservation. A plant conservation research agenda was the output 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 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.

5.4 National Legislation:

The analysis of the policy context starts with the Seychelles Constitution. Art. 38 states that:
"The State recognizes the right of every person to live in and enjoy a clean, healthy and ecologically balanced environment and (…) the State undertakes to take measures to promote the protection, preservation and improvement of the environment; to ensure a sustainable socio-economic development of Seychelles by a judicious use and management of the resources of Seychelles; (…)."

Nevertheless there is no explicit Forest Policy in the country. However, DOE and FS have been following an implied policy of cautious forest utilization and afforestation

of all barren areas whenever the resources allow. The policy can be said to have led to sustainable, yet not financially profitable, forestry in public forests. The Forestry Section has also certain controlling powers, in case of 23 commercial species, over the private forest and tree owners. There is an intention to expand the list, or to prepare another list, of controlled species to cover all the indigenous trees.
Moreover the forest legislation is not written down in one coherent law but rather in several different ones, efforts have been made to merge all the existing legislation into one framework law: the Biodiversity Act. Forestry is indeed strongly influenced by the environmental legislation and especially by:

- Environment Protection Act (EPA, 1994);
- National Parks and Nature Conservancy Ordinance (1971, amended in 1973 and 1982);
- Plant Protection Act (1996);
- State Land and River Reserves Ordinance (Cap 150), 1903, containing the concept of watershed protection zones along rivers where no tree must be cut unless it is a threat.
- Breadfruit and Other Trees Act (Cap 122), 1917, amended in 1994. It gives minimum diameters and rules for cutting distinct tree species;
- The Coco de Mer Management Decree, 1979, amended in 1994.

Many of the existing laws listed in the present chapter are currently being merged in the forthcoming Bio-security Act, Biodiversity Act and Physical Planning Act respectively.

Policy Document
In addition, the former forest management plan (Indufor 1993) and subsequent adaptations (Fourmy 1999) are important policy documents.

One of the most strategic document being used is the Seychelles Sustainable Development Plan 2012-2020 (GoS 2012). The SSDS replaces the Environmental Management Plan of the Seychelles (EMPS) which was produced from 1990 to 2000 and 2001-2010 respectively. The document is more comprehensive and has the following goals for Forestry
:

I. Conserve and manage terrestrial and aquatic biodiversity to ensure sustainable use and equitable benefits to the people;
II. Improve our understanding of biological diversity and ecosystem functioning in a changing environment
III. Achieve sustainable forest management using an ecosystem approach which further strengthens ecosystem services.

The National Land Use Plan (NLUP) is being developed for the three main islands of Mahé, Praslin and La Digue. The plan focuses mainly on the development areas, but it also proposes a rough zonation of the non-development areas into classes. It also identifies areas suitable for housing. This is important given that there are shortages of suitable land for housing and other development purposes, there are often conflicts between development and conservation interests. The Plan's basic

classification criterion relevant for forestry is to limit Development Areas below the altitude of 50-200 m above sea level, according to location. Consequently, all the areas above this altitude are basically designated for forestry and/or for conservation purposes. The underlying rationale is the crucial importance of water and soil conservation in the sensitive uphill areas.

The main weakness of former land use plans has been that they were not legally binding allowing competing stakeholders to grab land left right and centre, the hope is that the one being prepared will be able to bite when required.

Within land use planning forest reserves can be declared, by defining areas where no settlement is allowed. Of special importance:

- Town and country planning act, 1972; which is currently under review
- Forest Reserves Ordinance (Cap 153), 1955.
- The White Paper on Conservation Policy in the Seychelles (1971) focused on the creation of a number of conservation areas. Several of these have since been created (Proctor, . Regarding implementation, the 1971 Policy proposed that a Department of Nature Conservation and Forestry be established, with the help of a Conservation Officer, whose duties would include training of Seychellois staff in conservation. That was the origin of what is now the Conservation and National Parks Section (CNPS) of DOE. The 1971 Policy gave little indication of how the various conservation areas were to be managed. No regulations have been gazetted for the terrestrial national parks, except for Curieuse (in 1991). Management practices of FS, who is, in principle, in charge of the land national parks, have emphasized plantation establishment for production or catchment protection. The FS is concerned about the decline of indigenous trees and invasion by exotics, but this has not been reflected in management practices. This policy is being reviewed to accommodate some of the present changes.

5.5 Public Awareness:

The Forestry Section with the support of NGOs mainly carries out Forestry education, which is very important as it sensitizes the general public about the environmental issues. The Government of Seychelles is putting more emphasis for the Ministry of Education to include environment education in school. The environmental awareness is generally very high in Seychelles. Planned conservation education initiatives were started in 1991. They have been individual and NGO initiatives through local media. The Environment Education Unit under the Ministry of Environment has a good cooperation with the media. Nevertheless public participation in forest conservation is very limited. It is important to identify who are the key people to reach and work out how they can contribute to conservation. There are three target groups to reach by DOE including national park neighbors, land-owners and forest owners, local leaders and people interested in conservation.

The extension work (working with people for instance) should be helped by an education programme. The target groups are in this case politicians, schoolchildren, teachers, journalists, industrialists... the education programme would first generate

the interest and the understanding so more people will want to participate in forest conservation and other environmental actions. Concerning the forest conservation, topics for the education programme could include the wonder of Seychellois endemic flora and fauna, their vulnerability to invasive species, the origin of water, fire prevention and what work the rangers do.

The priorities for ecological monitoring vary according to the management zone. In biodiversity zones, assessments should be made of the total areas under predominantly indigenous, mixed and predominantly exotic vegetation. The species need to be identified and classified (keystone species). In Catchment zones where ground cover is the key issue, monitoring should be provided to assess total areas under forest, other vegetation or no vegetation. Monitoring should also cover the status of sensitive areas especially river banks and the measurement of dry season stream flows. Nevertheless elements such as poaching and unsustainable use of species are not being adequately handled in public education programs. A long term biodiversity conservation information and education program plan has to be formulated and an assessment procedure put in place to determine its effectiveness.

Public understanding of environmental protection and community participation in decision making about land and resources management is still being developed in Seychelles and needs to be enhanced to encourage the conservation and sustainable use of biodiversity .The public involvement provisions in the EIA process and in the various land and resource management planning processes provide opportunities for public involvement but there are concerns about the effectiveness of some of these opportunities. There is a need to promote awareness of public involvement opportunities, and to expand the participatory processes in a manner that will improve community ownership of biodiversity conservation.

5.6 Information systems:

Seychelles has been involved in several initiatives related to environmental information management including the National Clearinghouse Mechanism (NCHM) related to the implementation of CBD, UNEP Pilot Project on Harmonisation of information management and reporting for biodiversity related treaties' in 2001 and a pilot project for the African Environment Information Network (AEIN) implemented by UNEP management.

Challenges with regards to information exchange and flow between within biodiversity stakeholder agencies:

Inter-agency rivalries and mistrust,
Over-lapping portfolios., Conflicting interests, Empire building
Tendencies and personalities all conspire to make much, even basic baseline information treated as a jealously guarded commodity.

Priorities:
Some priorities for the country include:

- Strengthen and establish new collaboration between organisations involved in the environmental management and sustainable development.
- Establish of a 'National Directory of Institution and Information Sources for environmental management' (a metadata system) and a mechanism to keep the Directory up to date.
- Pooling together the lessons learned from the various pilot projects and initiatives currently being tested in the country and drawing upon the various synergies between them so that information management can be addressed as a whole rather than as separate entities.
- Creation of a network for information management as each institution currently manages its own data and information; there is clearly a need for better integration between organizations.
- .Establishing of a network (eg. a central biodiversity database) taking into account the expertise that already exists in the country and proper protocol for the sharing and exchange of information be put into place..
- Review update of forest legislation to bring them up to date with the current state of affairs.
- Define a clear forest policy.

6.0 The State of Regional and International Collaboration

6.1 Regional intergovernmental initiatives

Seychelles was the second country to ratify agenda 21. While no steps have been taken to implement 14G per se, a number of projects are being formulated within the Indian Ocean Commission (IOC) to tackle Chapter 15 (conservation of biological diversity).

A regional project financed by the EEC through EDF under the Indian Ocean Commission was initiated to evaluate the properties of medicinal plants of the regional countries namely Madagascar, Comores, Reunion, Mauritius and the Seychelles.

As we do not have a national genetic resources programme, the Seychelles is not participating in any regional collaborative arrangements. However, ground work is being done around chapter 15 of the Agenda 21 to involve collaborative work with the IOC countries. There is definitely potential for further regional integrated plant genetic resources programmes as the collaboration would provide the experience, possibly expertise and resources to enlighten and strengthen national programmes. We noted that our national programmes as such do not exist. Besides our activities are small and therefore these may not warrant transfer of responsibilities.

6.2 International Collaboration:

In 1993, thanks to the support of the international community, the Seychelles Forest Management Plan was prepared. This program proposed a framework for forest policy and another kind of development in the forest sector. Nevertheless any forest policy has been reached as of yet and the plan is considered as outdated and needs to be reviewed accordingly.

The Agricultural Development Strategy (2007-2011) and the Food Security Strategy (2008-2011) are the most important files concerning agriculture. The main objective of these documents is to increase food security with agroforestry considered to be an area to be considered. By international standards this strategy put a heavy emphasis on sustainable production rather than simple production. However the Strategy fall short of setting out a clear path to establish a modern and sustainable agriculture sector or address some of the structural challenges facing the agricultural sector in Seychelles.

In 1992 the state of Seychelles with the support of international partners prepared the National Land Use Plan. It provides guidance on the classification and use of land and on the allocation and management process. Concerning tourism, the policy and strategy methods have tried to group together economic benefits and protection of the natural resources. For instance the Tourism Policy and Vision encourages the

protection of natural resources to underpin tourism development. Today the aim is to increase and diversify the number of tourists and the revenue. Finally the little archipelago of the Indian Ocean is completing its process to accede to the World Trade Organization.

6.3 The principal stakeholders:

Concerning sustainability, the principal stakeholders are agencies under the Department of Environment (DoE, SNPA), agencies under the Department of Natural Resources (SAA), agencies under the Ministry of Land Use and Housing, other kind of state agencies, associations and cooperatives, NGO, governmental international partners (EU, UNDP, GEF, FAO, COMESA, the World Bank, the government of Japan) and finally SSDS implementation structure. Moreover the government of Seychelles has developed the concept of participatory forest management in its policy. NGOs are key players concerning management of forest resources. Indeed the Government has entered into partnerships and gives these organizations key government forested lands to manage. Here are some examples of these NGOs: Nature Seychelles (manages the whole island of Cousin improving education, sensitization and habitat restoration), Praslin Development Fund (manages the Fond Ferdinand Forest where the Coco de Mer grows naturally), Seychelles Islands Foundation (manages the Vallée De Mai which is a UNESCO World Heritage site), Wild Life Clubs (focus on environmental education in school and on the media).

Table 14: Various international instruments were signed or ratified

Names / Year	Main Provisions
United Nations Convention to Combat desertification (UNCCD)	Combat desertification, prevent or reduce or rehabilitate land degradation, reclaim desertified lands and mitigate the effects of droughts. Encourages states to have national action plans to address land degradation issues, such as erosion and loss of vegetation cover.
United Nations Convention on Biological Diversity (CBD)	Promotes conservation of biological diversity, reduction of biodiversity loss, sustainable use of its components and fair and equitable sharing of benefit arising from the utilization of genetic resources.
COMESA's Climate Change Initiative	Consolidate shared vision for Africa on climate change & common & informed voice for the continent in the Post Kyoto Climate Change negotiations & beyond. Mobilize African & international scientific and technical communities to increase knowledge base& its management to support informed decision making processes.
Maputo Protocol, 2005	Article 18: right to a healthy & sustainable environment; Article 19: right to sustainable development; Lack of participation by women in environment issues & activities
Mauritius Strategy for the Further Implementation of the Programme of Action for Sustainable Development of	Covers all sustainable development of SIDS and include environment, climate change. Focuses on special needs of SIDS to reach MDGs & sustain levels of development, emphasizing economic development, market shares, and

SIDS (2004)	vulnerability to climate change. It also calls on developed countries to support SIDS to address vulnerabilities of SIDS in meeting sustainable development goals. It also creates opportunities for cooperation.
Millennium Development Goals Status Report 2010	Goal 7: Ensure environmental sustainability: Target 7.C: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation The indicators: Proportion of population using an improved drinking water source Proportion of population using an improved sanitation facility
Cartagena protocol on Biosafety	International agreement between parties to the CBD seeking to protect biological diversity from potential risks posed by living modified organisms (LMOs). Key issues are: safe handling, use and transport of LMOs, provision of enabling environments for the environmentally sound applications of biotechnologies and reduction of any potential adverse impact on biodiversity, environment and on human health.
United Nations Framework Convention on climate Change (UNFCCC) 1992/ Kyoto protocol 1997	Stabilization of levels of greenhouse gases in the atmosphere at a level that prevents risks of man-made climate changes and promotion of sustainable development.
Convention on Migratory Species	An intergovernmental treaty aiming to conserve terrestrial, marine and avian migratory species as well as their habitats throughout their range on a global scale.
African Convention on Conservation of Nature and Natural Resources (1968)	It commits parties to adopt the necessary measures to ensure the conservation, utilization and development of soil, water floral and faunal resources in accordance to scientific principles for sustainable natural resource management (protect habitats and control water pollution)
Convention on International Trade in Endangered Species (CITES)	Ensuring that international trade in specimens of wild animals and plants does not threaten their survival, reduction of illegal trade in wild animals and plants between countries and the safeguard of certain species from over-exploitation through international cooperation.

7.0 Access to Forest Genetic Resources and Sharing of Benefits Arising from their Use

Being the second signatory to the Convention of Biological Diversity (CBD) the Seychelles Government has tried to put in place measures to regulate access, transfer and sharing of benefit arising out from the use of its genetic (including forestry) resources. The country has put in place the necessary access and benefit measures to fulfill this obligation under the CBD.

7.1 International framework regulating access to forest genetic resources and sharing of benefits

There are three main international frameworks that can be used to regulate access to genetic resources. Such resources include forest resources. They are the Convention on biological diversity (CBD), Trade Related Aspects of Intellectual Property Rights (TRIPS) and Nagoya Protocol.

i) CBD

Under article 15 of this Convention, the Seychelles is vested with the authority to regulate access to its genetic resources subject to its national legislation. The government is in the process of finalizing its legislation (See further below)

ii) Trade Related Aspects of Intellectual Property Rights (TRIPS)

TRIPS agreement requires member countries to provide patent protection for any inventions, whether processes or products. However, the Seychelles has not embarked on any plant breeding programmes to create new novelties to address the issue of food security.

iii) Nagoya Protocol

This objective of this protocol is to ensure fair and equitable sharing of benefits arising from the utilisation of the genetic resources, including access and also technology transfer. The Seychelles has signed this protocol and is putting in place the appropriate legal instrument.

7.2 Access to forest genetic resources:

Prior to the adoption and development of a law to regulate access, the Seychelles Government had a policy derived from measures adopted under the Bonn Guidelines with emphasis on Prior Informed Consent (PIC) and also mutually agreed terms. This policy was subsequently developed in to a Law to regulate access and to address the issue of benefit sharing.

International assistance was sought in the development of such a law. A comprehensive review on the process in the development of the Bill has been developed (Lewis-Lettington and Dogley 2006). This Bill was necessary since the country had no legislative framework to regulate access and also benefit sharing arrangements for the use of its biodiversity. A draft bill was prepared and to date has not yet gone to parliament.

With the signing of the Nagoya Protocol earlier in 2012, the Seychelles Government is reviewing the law to take into consideration provision under this international instrument which was not addressed. The Bill is presently under intensive review to make it in conformity with the protocol and other international obligation of the country.

Despite the Bill is not yet in force, the Government has put in place certain mechanisms. For example, access of genetic materials for commercial and/or non commercial use is being strictly regulated. Prior to granting access (for commercial or non commercial use), PIC must first be attained. The conditions of access are stipulated under a Material Transfer Agreement (MTA) which also addresses conditions relating to benefit sharing arising from the commercial use of the genetic diversity.

7.4 Sharing of benefits arising from the use of forest genetic resources

There are at least three case studies in the Seychelles which can be used to illustrate the sharing of benefit arising from the use of the country's biological resources. One example of such a case involved a collaborative research project done between the Government of Seychelles with the Eden Project based in the UK in 2001. The purpose was to try and understand more about an endemic plant species (*Impatiens gordonii)* and to make recommendations on how best to protect the species for an exotic 'relative'. Crossing experiments showed that the endemic and the exotic relatives can breed to produce a colourful hybrid, with potential for commercialization. Therefore, permission was sought from the Seychelles Government to sell the plant whereby each party receives 50% from the sales. The money collected from the sales are being used to undertake more conservation works on the species.

7.5 Conclusion

It is vital for the Seychelles to put in place the legislative and policy framework to regulate access of its genetic resources. This is important given of the continued interest in many of the endemic species with medicinal values. There is a need to train people in negotiation skills to benefit fully from any benefit sharing arrangement. Moreover, all policy makers should be educated on those international instruments and also on the benefits that could be derived from biodiversity use.

8.0 The contribution of FGR to food security poverty alleviation and Sustainable Development

8.1 Introduction

The contribution of forests and its resource to the country's economy is greatly undervalued. Whilst the value of the trade in timber from woodlands and plantations is recognized from the revenue it generates and the employment it creates, other less recognized forest values, however, often make more significant contributions to local livelihoods and the economy. Non- timber forest products for example makes a significant contribution especially to the poorer people.

In addition to forest products, forests supply a host of ecosystem services that are provided as 'subsidies' from nature. The most commonly recognized forest ecosystem services are carbon sequestration for global climate regulation, watershed functions (of which provision of clean, regular flows of water and flood control are but two), biodiversity and the aesthetic beauty of the landscape (which is linked to revenues from tourism). Forest ecosystem services generally go un-recognized in conventional economic accounting.

8.2 Food security and poverty alleviation

Food security remains one of the most important pillars to sustainable economic and social progress and Seychelles is no exception. One bench mark for measuring hunger is the *minimum dietary energy requirement* as stipulated by the UN- Food and Agriculture Organization (FAO) and based on an average of 2000 KCals per day for light activity. The 2006/2007 household expenditure survey for Seychelles show that 18% of Seychellois households are not able to meet basic caloric requirements on average and that 21% of household income is spent on food as compared to 10.8% in USA and 11.5% in Canada.

Local agricultural production has been steadily increasing to meet local demands and that of the tourism sector. The level of technology adopted by local farmers has also improved over the past decade and today, the latest global technologies in crop and livestock production is known to local producers although adoption may be limited due to cost. Seychelles produces between 50% and 60% of the national demand of fruits and vegetables.

The use of forest to enhance food security must be explored. This may include the development of agroforestry practices as a means to meet local food demand.

8.3 Protection of food supply through legislation:

The Breadfruit and other trees (Protection) Act were enacted to protect the emergency food supply. During the World Wars the legislation was passed regarding food security whereby certain fruits trees and trees of commercial values were encouraged to be planted and were protected under the law. Though still today,

those fruit trees are still under the protected law, most of the foodstuff consumed by human is imported.

In the year 2012 a national tree planting campaign was launched with the aim of planting 20,000 trees also forestry is undertaking the planting of indigenous trees on forestry plantations, the fruits, seeds and flowers shall most likely provide food for many forest dwelling animals. Nevertheless food Security for man will not be improved. This is partly remedied through a campaign that was launched by the Ministry of Environment and Natural Resources a couple of years back. This campaign called 'every home a garden' had the aim of encouraging each household to plant its own fruits or vegetables according to the amount of space available. However the success of the campaign depends on the commitment of the people involved.

Table 15: List of trees and other woody species that are important in the country for food security and livelihood.

Species Scientific name	Native/Exotic	Use for food security
Artocarpus altilis Breadfruit	Exotic	As a staple for human and livestock consumption and substitute for rice. Leaves can also be used for livestock feed
Artocarpus heterophylla Jack fruit	Exotic	As food for human and livestock consumption and substitute for rice. Leaves can also be used for livestock feed
Artocarpus camansi Breadnut	Exotic	As food for human and livestock consumption and substitute for rice. Leaves can also be used for livestock feed

8.4 Priorities to better understand the economic, social, environmental and other contributions of Forest Genetic Resources for food, agriculture and forest development

- To maximize on the limited opportunities within the sector for those activities with comparable advantages.
- To continue to provide opportunities for capacity building for the technical personnel of Seychelles Agricultural Agency, farm managers and other farm workers.

- To facilitate access to low interest loans and insurance to people who want to invest in the sector.
- To provide adequate infrastructure including farm access, irrigation system, and access to agricultural input supplies.
- To facilitate access to modern technologies.

8.5 The contributions of Forest Genetic Resources to the MDGs

Seychelles has met all its MDGs with more than 95% of the population having access to drinking water and electricity, but it is already obvious that existing infrastructures will not be adequate to meet 2020 demands. Food security will remain an issue in view of the country's dependence on imported food, and increased pressure to further convert existing agricultural land. There is an increasing trend towards consumption that creates ever larger ecological footprints, including increasing production of wastes, despite efforts to develop new sources of renewable energy such as solar and wind energy.

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Appendix 1: Stakeholders consulted for the preparation of the country report

NAME	ORGANISATION
Allen Cedras	Seychelles National Park Authority. Praslin Office
Antoine Moustache	Seychelles Agricultural Agency
Brenda Andigmignon	Department of Environment
Charles Marie	Department of Environment, Forestry Section.
Damien Doudee	Seychelles National Park Authority.
Denis Matatiken	Seychelles National Parks Authority, Secretariat
Didier Dogley	Department of Environment, Secretariat
Elvina Henriette	TRASS (NGO).
Emile Pool	Department of Environment, Praslin Office.
Elton Jeannevol	Seychelles National Parks Authority, Forest Ranger
Eric Sophola	Seychelles National Parks Authority, Forestry Unit
Flavien Joubert	Department of Environment, Wildlife Enforcement and Permit Division.
Jason Jacqueline	Seychelles National Parks Authority, Secretariat
Jeannette Larue	Department of Environment
Josiana Rose	Seychelles National Parks Authority, La Digue Unit
Juliana Legaie	Department of Environment. Legal Advisor
Hansel Simara	Department Of Environment, Forestry
Katy Beaver	Plant Conservation Action Group.
Marc jean Baptiste	Seychelles Island Foundation
Mermedah Moustache	Seychelles Agricultural Agency.
Moustafah Bristol	GLOBAROM
Rodney Quatre	Seychelles National Park Authority, Marine Section.
Ronley Fanchette	Department of Environment, Conservation Section.
Selma Magnan	Seychelles Tourism Board.
Shane Emile	Ministry of Education.
Shirley Joubert	Department Of Environment
Simon Dogley	Seychelles National Parks Authority
Terrence Athanase	Seychelles national Parks Authority
Terrence Belle	Seychelles national Parks Authority.
Terrence Vel	Wildlife clubs of seychelles.
Albert Nikiema	FAO

Appendix 2: Stakeholders who validated the country report

Name	Organisation
Eric Sophola	Forestry Section, Seychelles National Parks Authority
Simon Dogley	National Park Unit, Seychelles National Parks Authority
Nikiema Albert	FAO representative.
Terence Athanase	Forestry Section, Seychelles National Parks Authority
Terence Belle	Forestry Section, Seychelles National Parks Authority
Terence Crea	Ministry of Education.
Sabrina Florentine	Forestry Section, Seychelles National Parks Authority
Selma Magnan-STB	Seychelles Tourism Board
Damien Doudee	Forestry Section, Seychelles National Parks Authority.
Flavien Joubert	Wildlife, Enforcement and Permit Division, Department of Environment
Denis Matatiken	Secretariat, Seychelles National Parks Authority
Katy Beaver	Plant Conservation Action Group
Frauke Dogley	Seychelles Island Foundation
Elton Jeannevol	Forestry Section, Seychelles National Parks Authority.

Appendix 3: Information on forest types

Forest type	Description	Area
Plantation forests	Introduced tree species (esp. *Swietenia macrophylla*, *Alstonia macrophylia*, *Eucalyptus spec.*, *Acacia spec.*, *Sandoricum koetjape*, *Tabebuia pallida*, *Terminalia catappa*, *Calophyllum inophyllum*) are predominant and mostly produce high value timber. Santol and Mahogany are the most widely spread species. Plantation forests are not areas planted artificially in rows only. They may have also been created via natural regeneration. Common criterion is the dominance of exotic species, esp. high value timber species.	500 ha on Mainlands according to 1993 vegetation map (INDUFOR 1993) and HENRY (1976); nowadays possibly more
Semi-natural Albizia dominated forests	Semi-natural albizia dominated forests in combination with other different species; albizia is present as a nurse crop shading other species like cinnamon, rarely as a pure stand. >= 50% of standing volume is represented by albizia. Standing volume is high with albizia reaching diameter of 100cm and more.	1000 ha on Mainlands according to 1993 vegetation map (INDUFOR 1993); possibly more now
Semi-natural high forests	Semi-natural high forest have very different aspects; in general a mixture of (many) exotic and (fewer) native species is present and often cinnamon is a leading species. As a rule trees are > 10m high. The standing volume is moderate. SNH forests differ from plantations insofar as timber producing species have not been artificially introduced (but can be present) and differ from albizia forests insofar as albizia is not the dominating species.	5,170 ha of mixed forest on mainlands according to 1993 vegetation map; possibly less, because some areas have to be considered as low forest, some as plantations and some as montane rainforest. Estimation 2,000 ha
Riverine forests, montane rainforests and other natural forests	River reserves are within 10m on each side of a river. Frequently albizia is dominant, but albizia is also present outside river reserves. Area is protected by law from felling trees unless they constitute any danger. Montane rainforests cover practically every area above cloudline (= contour line of 500 or 550m a.s.l.) which is not a glacis area; they are very important for the water balance (horizontal rain) and without a perspective for timber extraction. Other reservation categories or natural forests (= all forests with endemic and native species dominating) without any timber management perspective would fall under this management type too	Riverine forests: 450 ha (225 km of rivers *20m) on Mahé, small area (50-100 ha) on Praslin/La Digue Montane rainforest: 650 ha over the 550m a.s.l. contour line
Semi-natural low forests	Low forest and bush land. Mostly dominated by cinnamon. Coco plum is present. Most trees are < 10m high. Moderate to little bracken fern, no signs of present erosion. One can at least imagine the area to become a Semi-natural high forest within some decades. Within a circular sample plot of radius 10m >= 3 trees are present with DBH > 10cm.	Area: 6.070 ha of bush land on the main islands according to 1993 vegetation map; less than half of it is still low forest nowadays, because of natural

		succession to high forest on one side and different categorization on the other side: a great part of 1993 bush land has to be considered degraded forest land.
Coco de Mer dominated forests	Coco de Mer represents >= 20% of volume. Occurs on Praslin (and Curieuse). In every other aspect CdM forests resemble Semi-natural High Forests or Semi-natural Low forests. Small CdM forest patches are often found in river valleys or next to rivers where they resist occasional forest fires.	Valley de Mai, Fond Pepe, Fond Ferdinand and a few other areas on Praslin; estimation 2012: around 250 ha
Degraded forest	Shrub- dominated or unstocked areas with only few and low trees; often former fire sites; in many cases erosion is present (< 3 trees with DBH > 10cm within sample plot, but lots of bracken fern and/or coco plum)	Area: 340 ha deforested land on Mainlands were documented according to the 1993 vegetation map; certainly more now because several 1,000 ha of the 1993 declared bush land category have to be considered as degraded forest land, according to the above definition. Moreover, several fires provided new degraded forest land since 1993.
Glacis vegetation	Glacis vegetation characterized by dwarfism; includes saxicolous forest	Area: 850 ha on Mahé(Duncombe 1996), little on Praslin & La Digue.

From (Wenzel and Markus 2012)

Appendix 4: List of 56 most relevant invasive creepers found in Seychelles:

Family	Species
Apocynaceae	*Allamanda cathartica*
Apocynaceae	*Beaumontia grandiflora*
Polygonaceae	*Antigonon leptopus*
Acanthaceae	*Asystasia gangetica*
Convolvulaceae	*Ipomea aquatica*
Convolvulaceae	*Ipomea cairica*
Convolvulaceae	*Ipomea mauritiana*
Convolvulaceae	*Ipomea obscura*
Convolvulaceae	*Ipomea quamoclit*
Asclepiadaceae	*Cryptostegia madagascariensis*
Fabaceae	*Clitoria ternatea*
Fabaceae	*Calopogonium mucunoiddees*
Gesneriaceae	*Episcia cupreata*
Nyctaginaceae	*Bougainvillea glabra*
Nyctaginaceae	*Bougainvillea spectabilis*
Spindaceae	*Cardiospermum halicacabrum var. mocrocarpum*
Moraceae	*Ficus pumila*
Melastomataceae	*Heterotis buettneriana*
Malpighiaceae	*Hiptage benghalensis*
Cactaceae	*Hylocereus undatus*
Oleaceae	*Jasminum fluminen subsp.mauritianum*
Oleaceae	*Jasminum multiflorum*
Fabaceae	*Lablab purpureus*
Curcurbitaceae	*Lagenaria siceria*
Caprifoliaceae	*Lonicera japonica*
Bignoniaceae	*Macfadyena unguis- cati*
Convolvulaceae	***Merremia peltata***
Convolvulaceae	*Merremia tuberosa.*
Oxalidaceaee	*Oxalis corniculata*
Passifloraceae	*Passiflora edulis*
Passifloraceae	*Passiflora foetida*
Passifloraceae	*Passiflora quadrangularis*
Passifloraceae	*Passiflora suberosa*
Piperaceae	*Piper betle*
Piperaceae	*Piper nigrum*
Convolvulaceae	*Poranopsis paniculata*
Fabaceae	*Pueraria phaseoloides*
Combretaceae	***Quisqualis indica***
Rosaceae	*Rubus rosifolius*
Rosaceae	*Rubus fraxinifolius*

Cucurbitaceae	*Sechium edule*
Acanthaceae	*Thumbergia alata*
Acanthaceae	***Thumbergia grandiflora***
Asparagaceae	*Asparagus setaceus*
Dioscoreaceae	*Dioscorea alata*
Dioscoreaceae	*Dioscorea bulbifera*
Araceae	***Epipremnum pinnatum***
Araceae	*Monstera deliciosa*
Araceae	*Philodendron cordatum*
Araceae	***Philodendron hederaceum***
Araceae	*Philodendron lacerum*
Araceae	***Syngonium podophylum.***
Orcidaceae	*Vanilla planifolia*
Gleicheniaceae	*Gleichenia lineaeris*
Schizaeaceae	*Lygodium japonicum.*

Source: Senterre B. (2009)

N.B The species shown in bold represent the main threat to the conservation of biodiversity.

Appendix 5: A list of Native plants of Seychelles:

FAMILY	SCIENTIFIC NAME
Acanthaceae	*Pseudotheranthemum tunicatun*
Amaranthaceae	*Lagreza madagascariensis*
Anarcardiaceae	*Campnosperma Sechellarum*
Apocynaceae	*Carissa edulis var. sechellensis*
Araceae	*Protarum sechellarum*
Arecaceae	*Deckenia nobilis*
Arecaceae	*Lodoicea maldivica*
Arecaceae	*Nephrosperma vanhoutteanum*
Arecaceae	*Phoenicophorum borsigianum*
Arecaceae	*Roscheria melanochaetes*
Arecaceae	*Verschaffeltia splendida*
Arialiaceae	*Gastonia crassa*
Arialiaceae	*Gastonia lionetti*
Arialiaceae	*Gastonia sechellarum var. seychellarum*
Arialiaceae	*Gastonia sechellarum var. curiosae*
Arialiaceae	*Gastonia sechellarum var. contracta*
Arialiaceae	*Schefflera procumbens.*
Asclepiadaceae	*Secamone sechimperiana*
Asteraceae	*Gynura sechellensis*
Asteraceae	*Veronia sechellensis*
Balsaminaceae	*Impatiens gordonii*
Begoniaceae	*Begonia sechellensis*
Bignoniaceae	*Colea seychellarum*
Brexiaceae	*Brexia microcarpa*
Boraginaceae	*Tournefortia puberula*
Concurbitaceae	*Peponium vogelii*
Convolvulaceae	*Ipomoea venosa*
Cyperaceae	*Mapania sechellaria*
Cyperaceae	*Lophoschoenus hornei*
Cyperaceae	*Thorachostachyum loribundum*
Ebenaceae	*Diospyros seychellarum*
Erythroxylaceae	*Erythroxylum sechellarum*
Euphorbiaceae	*Exoecaria benthamiana*
Euphorbiaceae	*Drypetes riselyi*
Flacourtiaceae	*Aphloia seychellensis*
Flacourtiaceae	*Ludia mauritiana var. sechellensis*
Gramineae?	*Garnotia sechellensis*
Hypoxidaceae	*Curculgo sechellensis*
Hypoxidaceae	*Hypoxidia maheensis*
Hypoxidaceae	*Hypoxidia rhizophylla*
Pittosporaceae	*Pittsporum senacia subsp. wrightii*
Icacinaceae	*Grisollea thomasettii*
Lamiaceae	*Achyrospermum sechellarum*

Loranthaceae	*Bakerella clavata ssp. Sechellensis*
Loranthaceae	*Viscum triflorum*
Medusagynaceae	*Medusagyne oppositiolia*
Melastomataceae	*Memecylon elaegni*
Mimosaceae	*Acacia pennata*
Moraceae	*Ficus reflexa subsp. Seychellensis.*
Moraceae	*Trilepisium madagascariense*
Myrsinaceae	*Rapanea seychellarum*
Myrtaceae	*Syzygium wrightii*
Nepenthaceae	*Nepenthes pervillei*
Dilleniaceae	*Dillenia Ferruginea*
Nyctaginaceae	*Pisonia sechellarum.*
Piperaceae	*Piper sp.*
Rubiaceae	*Canthium carinatum*
Orchidaceae	*Acampe rigida*
Orchidaceae	*Vanilla phalaenopsis*
Orchidaceae	*Agrostophyllum 0ccidentale*
Orchidaceae	*Angraecum eburneum subsp. brongniartianum*
Orchidaceae	*Angraecum maheense.*
Orchidaceae	*Bulbophylum intertextum*
Orchidaceae	*Eulophidium seychellarum*
Orchidaceae	*Hedororkis seychellensis*
Orchidaceae	*Platylepsis sechellarum*
Orchidaceae	*Platylepsis occulta*
Orchidaceae	*Malaxis seychellarum*
Pandanceae	*Pandanus hornei*
Pandanceae	*Pandanus multispicatus*
Pandanceae	*Pandanus sechellarum*
Pandanceae	*Pandanus balfouri*
Passifloraceae	*Adenia gummifera*
Poaceae	*Garnotia sechellensis*
Rubiaceae	*Psychotria pervillei*
Rubiaceae	*Amaracarpus pubescens subsp. sechellaruum*
Rubiaceae	*Craterispermum microdon*
Rubiaceae	*Psychotria silhouettae*
Sapindaceae	*Allophyllus sechellensis*
Sapotaceae	*Mimusops sechellarum*
Sapotaceae	*Northea hornei*
Simarubaceae	*Soulamea terminaliodes*
Rubiaceae	*Glionetia sericea*
Rubiaceae	*Ixora pudica*
Rubiaceae	*Paragenipa wrightii*
Rubiaceae	*Rothmania annae*
Rubiaceae	*Tarenna sechellensis.*

Rubiaceae	*Timonius sechellensis*
Triuridaceae	*Seychellaria thomasettii*
Rhamnaceae	*Smythea lanceata*
Urticaceae	*Procaris insularis*
Acanthaceae	*Justicia gardinieri*
Dipterocarpaceae	*Vateriopsis seychellarum*
Rubiaceae	*Canthium sechellense.*
Rubiaceae	*Psathura sechellarum*

Source: A. Carlstrom. 1996