

Forestry Outlook Studies in Africa (FOSA)



Seychelles

MINISTRY OF NATURAL RESOURCES
AND TOURISM



Please note that the views expressed in this paper reflect those of the authors and should not be attributed to any of the institutions.

This paper has been minimally edited for clarity and style.

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SUMMARY

A Brief on the Forestry Outlook Study¹

by

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Forestry Contribution

The forestry sector is generally perceived as marginal. The sectoral GDP contribution, including wood industries, is no more than 0.4%. However, the indirect economic and environmental benefits of the sector are considerable.

Institutional Framework

The Forestry Section of the Division of Environment under the Ministry of Environment and transport is responsible for the controlling and management of the forest resources of the country. The Forestry Section has been mainly concentrated on production forestry and plantation establishment. The trend has now moved to forest management of conservation areas.

There is a forest policy document but the main policy framework is provided by the Environmental Management Plan of Seychelles and the National Land Use Plan. There are several acts and ordinances regulating forestry. However, part of the legislation is outdated or has not been ever enforced. For example, not a single forest reserve has been gazetted which effectively prevents the enforcement of respective legislation.

Recommendations

It is recommended that the forests of Mahé, Praslin, Curieuse, La Digue and Silhouette be classified in four zones and managed according the following management objectives:

| | | <u>ha</u> |
|------------------------------------|--|------------------|
| • Biodiversity Zones | Conservation of biodiversity | 2,050 |
| • Catchment/ Biodiversity Zones | Conservation of water, soil and biodiversity | 6,420 |
| • Catchment/ Production Zones | Conservation of water and soil, and production | 5,730 |
| • Production Zones | Production of wood and non-wood forest products | 520 |
| Total | | 14,720 |

¹ FOSA website available at: <http://www.fao.org/forestry/FON/FONS/outlook/Africa/AFRhom-e.stm>

Based on the proposed economic and environmental objectives and respective forest sector priorities, the following strategic guidelines are proposed:

- Define clear forest policy and improve and make use of legislation.
- Improve the planning, coordination and monitoring capacities of the forest administration.
- Promote formal education, on-the-job training, and short courses on special subjects.
- Mobilise human resources also outside the Forestry Section.
- Build up revenue sources for financial sustainability.
- Promote tree growing outside forests.
- Re-orient nurseries to produce more seedlings of indigenous species.
- Support the crafts, sawmilling and other industries using wood and non-wood raw materials.
- Participate actively in regional cooperation programmes.

Respective development programme is proposed to be implemented. The emphasis is on sustainable management and conservation of the various forest zones, and on institutional strengthening, particularly human resources development. The development programme is divided into 5 main programmes with 15 sub-programmes:

1. Conservation of Biodiversity:
 - Integrated Management of Biodiversity Zones
 - Propagation of Endemic Trees and Ex Situ Conservation
2. Conservation of Soil and Water Resources:
 - Integrated Management of Catchment Zones
 - Protection of River Reserves
3. Production of Forest Products:
 - Management of Production Zones
 - Management of Trees Outside Forests
 - Sawmilling
 - Carpentry and Crafts Industries
 - Non-wood Forest Products
4. Forest Protection:
 - Forest Fire Contingency Plan
5. Strengthening of Institutions:
 - Forest Policy and Legislation
 - Forest Administration
 - Human Resource Development
 - Financing
 - Monitoring, Information Systems, Research and Planning

1. INTRODUCTION

This FOSA document has been prepared to determine the outlook of Forestry resources for the country in the year 2020. In Seychelles, the responsibility to prepare the report was given to the Forestry Section of the Ministry of Environment, being the sector with the portfolio for forestry issues.

The section under the guidance of the FOSA focal point carried out various interviews and held a national consultative workshop with the participation of key stakeholders to have their views on the outlook of forestry in Seychelles. To simplify the matter prior to the workshop, a questionnaire was sent to all stakeholders involved so that they can understand before hand the concept that was to be discussed and hence get them better prepared for the discussion. This proved very fruitful in the end.

The report is divided into two parts, a description of the actual state of forest resources and a forecast of the likely state of those same resources in the year 2020.

2. ACTUAL STATE & TRENDS OF FOREST RESOURCES

2.1 COUNTRY BACKGROUND

The Republic of Seychelles comprises a group of 115 islands located in the Western Indian Ocean between 4° and 11° South of the equator. Its land area is 45,500 ha and territorial sea (Exclusive Economic Zone) covers an area of 1,374,000 km². The capital, Victoria, situated on the island of Mahé, is located 1,150 km Northeast from the furthest island, the atoll of Aldabra, 1,590 East km from Mombassa in Kenya and 900 km North from Madagascar.

41 islands are granitic with rugged topography. They include the so-called inner islands, of which Mahé (15,500 ha), Praslin (3,800 ha) and La Digue (1,000 ha) are the most important ones. All the granitic islands are situated within a distance of 50 km from Mahé. The rest of the islands are coralline, raising only few meters above the sea level.

The population of 70,400 is concentrated on the inner islands of Mahé (60,400), Praslin (5,600) and La Digue (1,900). It is notable that the 74 coralline islands support a population of only 300 people. The average annual growth rate of the population (1988-1991) was 0.8%, which is well below the developing country average.

The GNP per capita is US\$ 5,100 (1991). The country is classified in the middle-income group, and consequently has limited access to concessional development financing resources. However, due to the economy's vulnerability to external shocks and its small size, Seychelles has been able to attract grants and soft loans from various international and bilateral sources.

2.2 FORESTRY SITUATION

The forestry sector is generally perceived as marginal. The sectoral GDP contribution, including wood industries, is no more than 0.4%. However, the indirect economic and environmental benefits of the sector are considerable. The amenity provided by the forests is

extremely important for the tourism industry. The extremely vulnerable water supply is highly dependent on the vegetation cover provided by forests.

It is estimated that the forest area is 40,600 ha, i.e. 90% of the land area. About 90% of the forests are natural. Plantations, including casuarina forests, cover about 4,800 ha. More than 45% of the forests are within national parks or other conservation areas. The growing stock is estimated at 3.1 mills. m³. Due to the large conservation areas and poor accessibility, only 0.7 mills. m³ is accessible in the main islands. The respective annual allowable cut is estimated to be 13,700 m³. The demand, particularly for saw logs, is estimated to grow rapidly. The sustainable supply potential of timber to meet the growing demand will be endangered if no investments in more intensive forest management are done.

The main forest management problems include housing encroachment due to land pressure, invasive exotic plant species competing with endemic and indigenous species for the habitat, and prevention and control of forest fires, which have had disastrous effects on soil and water conservation. The main utilisation problems are the difficult access to the forests, low productivity of both harvesting and processing, and consequently high extraction costs.

2.3 INSTITUTIONAL FRAMEWORK

The Forestry Section of the Division of Environment under the Ministry of Environment and transport is responsible for the controlling and management of the forest resources of the country. The Forestry Section has been mainly concentrated on production forestry and plantation establishment. The trend has now moved to forest management of conservation areas.

There is a forest policy document but the Environmental Management Plan of Seychelles and the National Land Use Plan provide the main policy framework. There are several acts and ordinances regulating forestry. However, part of the legislation is outdated or has not been ever enforced. For example, not a single forest reserve has been gazetted which effectively prevents the enforcement of respective legislation.

2.4 RECOMMENDATIONS

Based on the proposed economic and environmental objectives and respective forest sector priorities, the following strategic guidelines are proposed:

- Define clear forest policy and improve and make use of legislation
- Improve the planning, co-ordination and monitoring capacities of the forest administration
- Promote formal education, on-the-job training and short courses on special subjects
- Mobilise human resources also outside the Forestry Section
- Build up revenue sources for financial sustainability
- Promote tree growing outside forests
- Re-orient nurseries to produce more seedlings of indigenous species
- Support the crafts, saw milling and other industries using wood and non-wood raw materials
- Participate actively in regional co-operation programmes

Respective development programme is proposed to implement. The emphasis is on sustainable management and conservation of the various forest zones, and on institutional strengthening, particularly human resources development. The development programme is divided into 5 main programmes with 15 sub-programmes:

- Conservation of Biodiversity
 - Integrated Management of Biodiversity Zones
 - Propagation of Endemic Trees and Ex-Situ Conservation
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- Strengthening of Institutions
 - Forest Policy and Legislation
 - Forest Administration
 - Human Resource Development
 - Financing
 - Monitoring, Information Systems, Research and Planning

2.4.1 Forestry Sector in National Development

The granitic islands of Seychelles, which are of continental origin, are some of the oldest oceanic islands in the world. Their flora and fauna have evolved, through tens of millions of years of isolation, to have a very high level of endemism (>50%). The environmental 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 economic importance of the forestry sector is generally perceived as marginal. The sectoral GDP contribution, including wood industries is no more than 0.4% (1990) but it has been increasing during the last few years. The Value Added in the sectoral gross output is significantly higher in forestry than in the economy on average. This adds to the justification of the utilization of forest resources in a sustainable way for meeting the country's internal demand.

Tourism is the most important sector of the economy and accounts for nearly 17% of the GDP, 41% of foreign exchange revenues, and contributes significantly to economic growth, both directly and indirectly. It is emphasized that tourism is highly dependent on the attractive

nature and scenic beauty of the nation, which are, to great extent, based on the forests. Consequently, one could say that, at least partly, the tourism sector is dependent on the forestry sector.

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%. 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 building construction and furniture, 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.

The employment effect of forestry activities is estimated at 350 person-years or about 1.5% of the working population. In addition, there are about 820 carpenters (1987 Census) and about 150-200 persons employed by various woodworking industries. Wood is also an important raw material for handicraft industries, which have important employment effects.

2.4.2 Land Use

Land-Use Trends:

The Government of Seychelles has adopted a conspicuously conservationist policy towards land use and natural resource utilization. There is also a pronounced environmental awareness among the public at large. This is incontestably a positive phenomenon in the highly sensitive environment of Seychelles where the isolation, very limited land base, difficult topographic conditions and fragile ecology set unusual constraints for the economy and the environment. Shortage of land, particularly arable land and land suitable for construction is indeed a major development constraint in Seychelles.

Conservation areas (Strict Nature Reserves, Special Nature Reserves, Areas of Outstanding Natural Beauty, National Parks, Marine National Parks) cover already 40% of the land area. This is internationally a very high figure. Consequently, it is likely that no major increase in these areas is to be expected.

Forest areas, including catchment forests, are mainly under the jurisdiction of the Forestry Section (FS) of the Division of Environment (DOE). Some of these areas face encroachment pressure, particularly for housing and related road construction. On the other hand, old abandoned cinnamon, vanilla and even some coconut plantations have been converted into forest plantations, or are in the process of spontaneous reforestation, mainly by exotic tree species.

Land Tenure:

Private farmers own most of the agricultural lands. Forest areas, both production and catchment forests are owned both by private people and the government, who owns the greater part.

2.4.3 Policy Context

Environmental Management Plan of Seychelles (EMPS) 1990-2000:

The Government of Seychelles was one of the first countries in the world to adopt sustainable development as a national policy. The government prepared the Environmental Management Plan of the Seychelles (EMPS) as the blueprint of this policy. EMPS provided overall policy framework, and proposed an investment programme worth of SR 360,405,000 over the period of 1990-2000. The Forest Management sub-programme proposed three projects (SR 1,460,000) all of which were given highest priority rating:

- Preservation of Endemic Tree Species
- Fire Prevention Measures
- Preparation and Implementation of National Forest Management Plan

The present Seychelles Forest Management Plan/Sector Study is the first step towards the implementation of the third project, and it also attempts to translate the overall policy framework of EMPS in the context of forestry sector. Other sub-programmes of EMPS particularly relevant for forestry include:

- Land Management
- Water Management
- National Parks and Wildlife Conservation
- Environmental Law and Enforcement
- Environmental Information, Education and Training

As it approaches the new millennium, the republic of Seychelles is preparing a major new initiative to manage its environment in a sustainable manner: the Environment Management Plan of Seychelles (EMPS) 2000-2001. The country has taken the step to prepare its second environment management plan, with the assistance from the World Bank so that the protection of the environment is undertaken in a planned and coherent manner involving all stakeholders. It is one of the first countries in Africa to prepare the so-called second generation of environment management plan.

The plan was to be more comprehensive than the previous EMPS. Ten thematic areas were chosen to cover all major social and economic sectors as well as certain key subjects of relevance to environmental management such as environmental economics. Other cross-sectoral themes that would cut across the main thematic areas were also identified.

National Land Use Plan:

The National Land Use Plan (NLUP) covering the three main islands of Mahé, Praslin and La Digue, has been under preparation since 1988. The plan focuses mainly on the development areas, but it also proposes a rough zonation of the non-development areas into classes: Natural Special Reserves (strict protection)

- National Parks (protection)
- Marine National Parks (protection against pollution or degradation)
- Potable Water Resources (strict protection)
- Main Catchment Areas (occasional carefully planned development)
- Forest Areas (sustainable utilisation)
- Agricultural Areas (sustainable utilisation)
- Mangroves and Swamps (protection)

- Beaches (occasional carefully planned development)

The NLUP is considered, by MCD, to have only indicative role in land use decisions. Due to the severe shortage 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.

Conservation Policy:

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. 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 emphasised 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.

Forest Policy:

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.

Forest and Conservation Legislation:

All environmental and forestry legislation has been reviewed by de Romilly in 1990. He recommends a comprehensive revision of legislation on forestry, which is fragmented and has a number of gaps, and on conservation areas. He drafted a Conservation and National Parks Act, but this was not considered appropriate and a consultant from FAO is now preparing a further draft.

2.4.4. Institutional Framework

Division of Environment:

The Division of Environment (DOE) under Ministry of Environment and Transport (MET) is the governmental authority responsible for environmental issues, including forestry. DOE is

headed by a Director General of Environment, and is divided into five sections: Forestry Section (FS), Conservation Section (CNPS), Botanical Gardens, Environmental Assessment and Pollution control (EA&PC) and the Education and Information section.

Forestry Section:

The Forestry Section (FS) of DOE is the responsible forest authority in Seychelles. FS is headed by a Director of Forestry, and is divided in five geographical units. *Timber Control Unit* provides and controls timber-felling permissions. The three field offices are in charge of the state forests in their respective areas. *Fond B'Offay* covers the whole Praslin and La Digue, *Grand Anse* the southern and western parts of Mahé, and *Sans Soucis* 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, particularly thinning, and forest protection with particular reference to forest fire prevention and control. The National Park business falls under the *National Park Unit*.

2.5. FOREST RESOURCES AND MANAGEMENT

2.5.1 Forest Resources

Soils and Climate:

The soils of the granitic islands are generally very poor and slightly acidic. This is due to the geologically very old granitic base rock, which is inherently poor in nutrients. The shallow, leached soils are typically short of organic matter. The soils of coralline islands suffer often of high salt content, and lack several nutrients and trace elements.

The climate is equatorial with an average annual rainfall of 2,200 mm. The highest parts of Mahé receive the highest rainfall, around 3,000 mm. The lower elevations, and particularly the southern parts of Mahé receive considerably less, less than 2,000 mm. Praslin (1,600 mm), La Digue (2,060 mm) and all the outer islands receive still less of rain. Humidity is uniformly high at an average 80%. Mean temperature ranges from 24 to 30°C. The prevailing winds are the Northwest (December to March) and Southeast (May to October) monsoons. Most islands are outside the cyclone region.

Vegetation:

The inner islands of Seychelles, which are of continental origin, are some of the oldest oceanic islands in the world. Their flora and fauna have evolved, through tens of millions of years of isolation, to have a very high level of endemism. More than half the indigenous plants are endemic, including many famous rarities like coco-de-mer (*Lodoicea maldivica*) and jellyfish tree (*Medusagyne oppositifolia*). In the inner islands, particularly in Mahé, the forest ecosystems can be divided in three categories:

- Lowland forests 0 - 300 m above sea level
- Intermediate forests 300 - 550 m above sea level
- Mountain moss 550 - 910 m above sea level

Mountain moss forests are characterised by *Randia-Nepenthes* society. The intermediate forests were supposedly characterised by *Excoecaria-Imbricaria* and *Deckenia-Memecylon*

societies. However, presently the intermediate forests are, to great extent, invaded by various exotic species. In the lowland forests species like bois de natte (*Imbricaria sechellarum*), takamaka (*Calophyllum inophyllum*) and badamier (*Terminalia catappa*) are supposed to dominate. The original lowland forests have practically vanished due to their conversion in agriculture and tree crop plantations, and due to the concentration of houses, roads, etc. in the narrow coastal belt, which was their habitat. Their species now occur mainly in the intermediate zone. Detailed description of the vegetation types of Seychelles is presented e.g. in "République des Seychelles, Ministère du Développement National, Etude des potentialités des principales îles granitiques" (1986).

Yet another important ecosystem is the mangrove forests. They have been mostly destroyed from the inner islands, but are still abundant in many of the outer islands, e.g. in Aldabra. The mangroves include species like *Avicennia marina*, *Rhizophora mucronata* and *Bruguiera gymnorhiza*.

Forest Area:

No systematic forest inventories have been carried out on Seychelles and the available data are limited to a study by P.T. Henry (1976), which can be considered outdated. Based on aerial photo interpretation and field checking during this study, it is estimated that the forest area of Mahé, Praslin Curieuse, La Digue and Silhouette islands is 17,600 ha, which is 78% of their land area. 20% of the forests are within National Parks or other protected areas. The other islands of Seychelles are estimated to have additional 23,000 ha of forests of which nearly 15,000 ha are within National Parks or other protected areas.

The bulk (4,400 ha) of the estimated plantation area (4,880 ha) is in "other islands". This information has been presented in several earlier studies. The amount of plantations on "other islands" may be a large over-estimate, but the situation could not have been checked, as field visits to the outer islands were not possible to be done. The above-mentioned plantation area of the "other islands" is assumed to contain largely non-planted casuarina forests. Some of them have been planted as a belt around the coconut plantations to protect the coconut palm from the wind. Their existence has not been possible to verify during the course of this study. Consequently, they may turn out to be less than previously estimated.

Most of Seychelles' forests are mixed which cover more than half of the total forest area. Bush vegetation is extensive in the inner islands accounting for a quarter of their total area. These lands are marginally used even if soil protection is provided.

Three quarters of deforested areas are found in Praslin mainly due to fires. Their rehabilitation is a key issue to be addressed by the Government and private landowners.

2.6 FOREST MANAGEMENT AND CONSERVATION ISSUES

2.6.1 Natural Forest Conservation and Management

Virtually all indigenous forest in Seychelles is mixed with introduced plant species. There are 600-700 species of introduced plants in Seychelles, but not all are capable of spreading naturally through the forest habitat and out-competing the indigenous plants. The two most serious threats appear to be *cinnamon* and *albizia*.

Another tree quick to colonize forest gaps and common in high altitude forest in Morne Seychellois National Park is guava (*Psidium guajava*). On Silhouette Island, an aggressive invader is agati (*Adenantha pavonina*). These fast-invading, smaller species are more problematic than the albizia, because they are more widespread, more abundant and smother any possible regeneration of indigenous seedlings in forest gaps. Bois jaune (*Alstonia macrophylla*) is another conspicuously tall forest invader. Prune de France (*Chrysobalanus icaco*) also called coco plum and bracken fern (*Gleichenia dichotoma*) are dominant on severely degraded land, which were presumably rare before the arrival of man, so it is perhaps not surprising that they tend to be colonized by exotics. Prune de France does not seem to be able to invade either high forest or dense secondary forest.

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.

The demand for land for settlement and associated road construction are the main forces causing encroachment into forestland. The system for handling planning applications may involve, at the discretion of the Planning Department, consultation with DOE, but gives DOE no power whatsoever to prevent, temporarily or permanently, unsuitable developments. The final decision rests with an individual civil servant, who may have no environmental training. In such a situation, the hapless civil servant is liable to be ill informed and is certain to be subjected to pressure from powerful people.

2.6.2 Soil and Water Conservation

Fire, house building and road construction are the main causes of erosion in Seychelles. The resulting losses are substantial. Obvious losses are of land productivity and of water quality or quantity, but perhaps the biggest economic loss will result from silt reaching the sea. Silt not only discolours beaches and swimming areas, it also kills the corals, upon which the beaches and the fish depend.

Due 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 FS have dug "lock-and-spill" drains. These are said have allowed some vegetation to grow but the drains need maintenance and may be too far apart.

Forestry Section has done much tree planting on eroded areas, especially in Praslin and Curieuse. Exotics have been used almost exclusively. Casuarina is the most widely used species, but an Australian acacia, eucalyptus and prune de France have also been tried. 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 (Murray 1992) 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.

2.6.3 Plantation Development

The existing plantations in the inner islands were reported to cover about 900 ha. However, in the course of the present Study, only 480 ha were found in the field. It is possible that some of the small plantations scattered in natural forests were not found. On the other hand, the 900 ha is based on the statistics on plantation establishment, in many cases calculated from the number of seedlings planted, and the figure does not take into account losses due to dying of seedlings, etc.

About 25% of the plantations have been established for protection purposes leaving about 75% for production. The Forestry Section has not fully met its annual reforestation target of 100 ha established in the National Development Plan. Records are kept on reforestation and other forestry activities. However, the records are not centrally stored nor do they include any maps.

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 indica*) and calice du Pape (*Tabebuia pallida*), have had only a minor share of the planting in the past decade. Eucalyptus has not been planted recently as its growth was found to be poor and mortality high due to inappropriate soil conditions. Albizia (*Albizia paraserianthes*) was planted for timber production more than two decades ago, but its planting has been discontinued due to widespread encroachment of the species. There are also three small pine (*Pinus spp.*) plantations established about 15 years ago. Pines have grown well. The species could not be identified.

About 40 ha of Casuarina (*Casuarina equisetifolia*) plantations have been established on the land reclamation area in Mahé since 1986. The main purpose of these plantations has been to

stabilize the reclaimed land. This has been the main plantation work of FS during the last five years. Casuarina has been used also for soil protection in Praslin.

2.6.4 Fire Prevention and Control

Fire can destroy in hours what it has taken decades to produce. Fire would have been extremely rare before the arrival of man, so it is not surprising that few indigenous species are adapted to withstand or take advantage of it. Instead exotics colonize the gaps.

People start almost all fires, deliberately or accidentally. There is a legal requirement for fire permits during certain seasons but it is not clear how fully this is adhered to.

One means of fire control is the maintenance of firebreaks. Another FS task is to control the spread of highly flammable exotics, notably bracken fern, except where they are the only colonizing vegetation in an erosion-prone area. Another element of fire control is early detection by means of fire towers. A third element is rapid response to the fire. On Praslin in the dry season, FS has half its 15 labourers on fire control stand-by during and outside working hours. It is increasingly difficult to mobilize local residents and other government staff to help fight fires.

Praslin has some fire-fighting equipment, donated by Australia, but there is a need for more there and also on Curieuse and Silhouette. Fire-fighting pumps need a good water supply, which few local streams can provide. The possibility of helicopters using big buckets to dump seawater on fires should be treated with caution. The salt could kill vegetation and prevent timely re-vegetation of burnt areas, leading to chronic erosion problems.

Many nutrients are released by burning; these can be quickly washed away by rainfall. FS does much reforestation work, but often this is not until the second or third rainy season after the fire, by which time many nutrients have been lost.

2.7. FOREST MANAGEMENT AND CONSERVATION

Forest management should depend on the objectives of a forest area. Therefore the basis of zonation should be the management objectives of the forest. This study has attempted to make a broad zonation, using existing information and limited field observations, according to four categories, each with a clear primary management objective: biodiversity zones, catchment zones, production zones, and non-forest zones. These categories could be applied to almost any country's forests. What is distinctive in Seychelles is that almost all the forest falls into one of the first two categories, biodiversity and catchment.

2.8. BIODIVERSITY ZONES

The Biodiversity Zones are primarily for conservation of biological diversity and indigenous ecosystems. Controlled tourism can be permitted, except where it is likely to harm conservation. Any timber exploitation should be of exotic species only and will aim at enhancing indigenous flora and fauna. Any planting will be of indigenous species, preferably rare endemics, wherever possible. Limited exploitation of minor forest products (fruits, nuts, leaves, medicinal plants) may be permitted in certain cases.

The inner islands of Seychelles have a very high level of endemism. The indigenous flora and fauna has been devastated by man's exploitation, exotic species and fire in a mere 250 years. Fortunately, most indigenous plants have avoided extinction, although there is virtually none of any original ecological community remaining. Instead, the indigenous flora survives in small inaccessible craggy areas or scattered in forests with a high proportion of exotic species. These remnants are of global importance and the challenge for Seychelles, with the help of the international community, is to stop the decline of the indigenous flora and fauna, and ultimately to restore examples of predominantly indigenous ecological communities. This is the primary aim of the Biodiversity Zones.

The proposed Biodiversity Zones cover 860 ha in Mahé, 390 ha in Praslin, 290 ha in Curieuse, 30 ha in La Digue and 480 ha in Silhouette. At present all of the zones include a significant proportion of exotic plants. Mangroves are included for their high biological and ecological value to the nation, although they are of less international significance, being similar to mangrove ecosystems elsewhere in the world.

- In addition to the current presence of indigenous vegetation and/or specific rare endemics, a number of factors have to be considered in selecting the areas:
Altitudinal range: Altitude is a major determinant of vegetation type. Since most of this mixed "natural" forest is at high altitude, some of the lowland species are surviving at the limit of their ecological range. This adds to the importance of any lower altitude conservation areas and of zones with a wide altitudinal range (Jasmin part of Morne Seychellois, and Silhouette). It also highlights a problem with concentric zonation schemes based on altitude.
- Size: Small patches of indigenous vegetation may not be viable in the long-term. Where feasible, management should aim to expand outwards from these relict patches to cover a wider area, perhaps linking two or more patches.
- Physical isolation: Zones which occupy whole islands can, once cleared of most exotics, have a lower rate of re-invasion than in forest patches surrounded by e.g. cinnamon and albizia. This makes them cheaper to conserve in long term.
- Practicability of conservation: This includes issues such as land ownership and the likely availability of funds and personnel to manage the area.

Local experts should identify accurate boundaries in field. As this study focused on forested areas only in the inner islands, other sites should be added to the list, i.e. those valued for birds or for other non-forest flora and fauna, marine areas etc., for the purposes of defining a comprehensive map of Seychelles biodiversity conservation areas. The network of biodiversity zones is not static. It should be reviewed regularly and areas added, if there is additional information, increased conservation capability, or specific opportunities.

2.9. CATCHMENT ZONES

Catchment Zones are primarily for conservation of water, soil and amenity. In Mahé, most of the forest falls into this category. All the Catchment Zones are divided into two sub-zones, according to the secondary aim of management. The secondary aims are:

- Biodiversity conservation, where feasible
- Production, where this is economic (e.g. close to a road) and appropriate (not close to rivers or in areas of notable beauty).

In addition, rehabilitation of productivity, particularly in degraded areas, will be an important issue. Exploitation will be of exotic species only, except in plantations and private lands, and will use sensitive, selective techniques. When planting, the choice between indigenous and exotic species will depend on the secondary aim. Invasive exotics will not be planted. This zone includes a number of small plantations of exotic timber trees, which mostly are not economic to harvest due to the difficult terrain and distance from roads. They will generally be left unused.

The Catchment Zones include all the main river catchment areas, including the River Reserves. The Catchment Zones include also most of the potable water resources as described in NLUP. It should also be noticed that the protection of Catchment Zones might have a direct positive impact on the protection of coastal areas by reducing erosion and subsequent siltation.

2.10 PRODUCTION ZONES

The Production Zones are primarily for production forestry. In Seychelles these zones will mainly be plantations. They may be of fast-growing species for construction timber or of slower growing, more valuable hardwoods. The production forests will always be managed in a manner compatible with soil and water conservation, so they are not located in steep areas. The species to be planted will be chosen mainly on economic grounds, so they are more likely to be exotics than indigenous species. However, invasive exotic species will not generally be planted.

- For forest management purposes, the main Production Zones are delineated in compartments, which should be relatively heterogeneous. The vegetation type is the main criterion for delineation. For operational purposes, the compartments will be further divided into smaller units, i.e. stands.

Production operations will be carried out so that the view to the forests remains undisturbed. Relatively small areas are harvested at a time. Strip fellings along contours and selective cuttings are favoured. The vegetation cover will be maintained continuously. Soil and water conservation is not, however, as important as in catchment forests. Anyhow, special care will be taken to ensure soil and water protection also during regeneration.

Management of production forests could include protection, monitoring, and exploitation whenever economically feasible. Production forests should be subject to detailed forest management planning. So far, no detailed management planning has been carried out, except that of P.T. Henry (1976), which concentrated on plantation forests. In the Forestry Section, management decisions have been based on thorough personal knowledge on the existing forests and long experience on forestry in the country. However, unforeseen changes in the senior forestry staff may put the forest management into peril.

The discussion on the management of production forests presented below applies also to the production sub-zone of Catchment Forests.

Exploitation of the 23 main timber species is controlled by a system of licenses (for merchants, issued by the Licensing Department) and permits. The control is labour intensive,

involving a site visit by the Timber Control Unit for each tree. Size limits are set according to species and site quality. The sites should be classified as good, medium or poor, but in the absence of clear classification criteria the site quality is generally ignored, or in practice almost always classified as "medium".

Most of the timber is obtained from private land, following an agreement between the landowner and timber merchant. It is widely felt that timber merchants pay poor prices to landowners. Merchants also cut some trees in forests on state land, paying a royalty. It is rumoured that significant numbers of trees are cut illegally, but quantities have not been estimated. Enforcement is difficult, because:

- FS usually hears about the illegal felling days or weeks afterwards
- Local residents are not authorised to ask to see permits
- FS chooses to use the police to arrest people and pursue prosecutions. It is said that some local police do not consider illegal felling to be an offence worth pursuing vigorously
- As the forests on state land have not been gazetted as forest reserve, there is no legal way to prosecute illegal timber fellers operating in state lands.

The threat posed by timber exploitation to soil and water conservation appears to be small. In forested areas secondary forest vegetation, almost always exotic, will usually re-grow. No felling is allowed in "river reserves", unless the tree poses a danger. In more open areas such risks should be detected by the Timber Control Unit, who would in most cases refuse permission for felling. The Timber Control Unit should also be able to prevent felling which will adversely affect the scenic beauty of an area.

Of the 23 species listed, 2 are endemic and a further 5 are indigenous. There is a policy against felling the endemic species. However, there is no legal basis to enforce this policy. An additional list of indigenous trees has been prepared to add to the schedule of the Breadfruit and Other Trees Act.

For time being, there should be no cutting of endemic species on state land. Cutting of non-endemic indigenous species should also be carefully controlled. The native trees are anyway fighting a losing battle against invasive exotics. On private land, the policy cannot be so rigid or it may discourage people from planting indigenous species. A landowner should be allowed to fell certain endemic or indigenous species, provided that (s)he can demonstrate a firm intention to replant and tend. This would only apply to non-endangered species, which are regenerating naturally or for which propagation methods are known. A requirement to wait one season to allow seed collection may be imposed.

On private land, replanting and tending has to be the responsibility of the landowner. A permit to fell a tree, which is not causing any problems, should be denied if the landowner has not fulfilled commitments to tend regeneration after previous fellings on his/her land.

On state land, a system for replanting and tending of gaps after felling should be established. In the Production Zones, which are or will become mainly plantations, this would be part of an intensive management system including an inventory. In Catchment Zones, most cutting would be within the sub-zones for which production is a secondary objective. Replanting in these sub-zones could be with indigenous trees or, in most cases, non-invasive exotics. There could be some cutting of invasive exotics in the biodiversity sub-zones, but the gaps would be planted with indigenous species, which would never be felled.

It is suggested that the FS should divide the total area of the Production Zones and production sub-zones of Catchment Zones into a number of compartments, to be exploited in rotation. This will facilitate the replanting and tending work. The allowable exploitation must be limited not only by sustainability but also by the primary objective of protecting the catchment area. The possibility of leasing concessions could be considered.

The present system of inspection and permit should be retained, but DOE should make additional use of the considerable investment of time and transport. To encourage private land tree growing, FS should help landowners get more money for their trees. FS could issue statistics on recent market prices for timber trees and inform the landowner of these prices during the inspection visit.

Honorary forest rangers should be appointed in various localities to help prevent illegal felling. Both they and FS rangers should be trained in how to require to see permits and to arrest people where necessary. The police should be made more aware of the need to enforce environmental legislation, including forest protection.

A list of highly invasive exotic species should be prepared, their royalties substantially reduced or even abolished, and the minimum harvesting size could be scrapped. Legal protection for endemic and indigenous trees should be reinforced.

2.11 NON-FOREST ZONES

Substantial amounts of trees can be found in agricultural and housing areas. In these non-forest zones, the primary objective for tree growing is amenity, particularly the conservation of scenic beauty, shade and production of non-timber outputs such as fruits, nuts, honey, etc. An important secondary aim is the conservation of the gene pool of indigenous species, many of which were once predominantly lowland species but are now confined to highlands. In the non-forest zones, tree cutting will be carefully controlled and the growing of indigenous trees will be encouraged.

2.12 DEMAND FOR AND SUPPLY OF FOREST PRODUCTS

2.12.1 Sawn wood

The sawn wood consumption is estimated at about 8,000 m³. Since the mid-1980s it has been growing at an average annual rate of 6.4%. About a third of the consumption is hardwoods, considerably less than in the mid-1980s. Softwood is entirely imported pine while hardwoods include several local species and imported mahogany, meranti and some other species.

2.12.2 Wood-based Panels

The total consumption of wood-based panels was 3,300 m³ in 1991. As there is no local production, all the panels are imported. Most (about 90%) of wood-based panels are plywood or block board while the share of particleboard and fibreboard has been marginal. In fibreboard, medium-density fibreboard (MDF) is increasingly imported replacing traditional hardboard and solid wood.

2.12.3 Further Processed Products

It was not possible to establish the market size in this sub-sector due to problems related to measurement of different products. This group includes such items as doors and door frames, windows, kitchen cabinets, roof trusses, furniture, pallets, craft products,... These products are mainly produced locally by carpenters, small-scale wood-working plants and a few medium-scale operations, which are part of larger construction companies mainly producing for their own projects.

2.12.4 Paper and Paper Products

The average annual consumption of paper and paper products has been at the level of 1,300 tons/year. There is a clear growth trend, which is a result of three main factors: (i) increasing educational level, (ii) higher disposable income, and (iii) the emergence of the multi-party system. In an international comparison, a higher than average share of converted products is imported. This is due to the small size of the market not allowing the necessary economics of scale needed in the establishment of local production. Paper and paper products are not discussed in the following as their future demand will be met by imports with the exception of a few further processed products which can be manufactured locally based on imported paper and board (e.g. toilet paper).

2.12.5 Fuel wood and Charcoal

Due to electrification and urbanization the use of fuel wood has been declining drastically. The current rate is estimated to be 8% of the energy consumption.

The National Youth Service (NYS) used to be a major fuel wood user as food in their villages was cooked by using fuel wood. The substantial consumption (estimated at about 3,500-4,000 m³) was largely met by casuarina supplied from the outer islands (Islands Development Company). In rural areas traditional bakeries still bake bread using fuel wood. Bakeries are also changing to use electricity and the consumption trend is downwards.

The main use of charcoal is in hotels and restaurants for barbecue. It is estimated that 40 tons of charcoal is consumed by this sub sector. The main users produced their own charcoal using wood from their own forests. Even this use is diminishing as the hotels and restaurants are turning more and more to gas or other fuels even for barbecue. Household consumption is negligible.

As a whole the wood fuels consumption is currently (1992) estimated at about 5,500 m³ in wood volume equivalent. The respective figure in the mid-1980s was probably in the range of 15,000 m³.

2.12.6 Non-wood Forest Products

It is estimated that there are 250 to 500 plants with curative properties in Seychelles. Traditional medicine is still widely practiced, particularly among the older people. The Technical Support Services Division of the Department of Industry is presently conducting a survey and analysis of the medicinal plants of Seychelles with financing from EC. The project is establishing a national data bank with information on species distribution, chemical and

pharmaceutical properties, and ethno-botanical knowledge. In-vitro propagation of the promising species will be introduced.

The most important non-wood forest product is however coco-de-mer which brings to the government more revenue than wood production. The market is controlled by the government, which buys and sells the nuts.

Palmiste (*Deckenia nobilis*), and other palms, are cut down for "heart-of-palm" salad. The total quantity of heart-of-palm salad consumed annually in hotels and airlines is estimated to be 9,000 palms per year (1993), but how much of this is genuine palmiste is doubtful.

Beekeeping has been developed on small scale, with 15 beekeepers on Mahé and 10 on Praslin with about 300 colonies. In spite of local production, honey is being imported. There is a taste preference for local honey, and the market demand is good. Beekeeping is mainly based on agricultural flowering plants. However, part of the nectar surely originates from forest trees and shrubs, and there could be scope for expanding beekeeping in forest areas. Beekeeping is a good example of sustainable multi-purpose land use, which can be practised jointly with forestry. Beekeeping, if properly managed, does not have a slightest degradation effect on the resource base. On the contrary, e.g. the incidences of forest fires could be reduced if controlled beekeeping was practised in forest areas because the beekeepers would take an interest in preventing and controlling fires in areas where they have invested in beehives.

Other important non-wood products are raw materials for craft industries: e.g. palm leaves and other fibres for straw hats. There are some bamboo reserves, which could be used locally for craft and furniture industries, but this resource has not yet been tapped.

2.12.7 Tourism and Recreation

The scenic beauty and amenity provided by the forests is the main, even if indirect, economic benefit of the forests of Seychelles. Without the forests, and the wildlife the forests provide habitat for, the tourism would not likely be there. Another aspect, not less important from the tourism's point of view, is the biodiversity of the forests; it is not only the beauty of the green tropical islands that lure the tourists in, but also the fame of the unique ecology and rare species of both flora and fauna of the country. The so-called eco-tourism is likely to be a rapidly expanding non-price sensitive industry, and Seychelles is in an excellent position to tap it.

The number of tourists using nature trails or going on nature walks in forests on Mahé is not known, but is probably small. Specialist groups of botanists or ornithologists are very few, probably less than 1% of the total market. Residents, especially expatriates, make use of the forests for recreation. The total number of visitors can be expected to resume its upward trend, when the global recession is over.

The Tourism Department plans to launch a new marketing image for Seychelles, with a stronger eco-tourism element added to the sun, sea and sand. This can be expected to stimulate demand for the easily accessible forest areas, with good visitor services. Limited nature tourism could help conservation by increasing forest monitoring by guides. Two points to emphasize are:

- Forest trails on Mahé and Silhouette should not be expected to make large profits from entry fees, though associated services (guiding, transport) may be profitable. The main motives for increasing tourist use of forests are to diversify the range of experiences open to tourists, to build up the image of Seychelles as an ecologically unique destination, and to increase Seychellois awareness and expertise in relation to the unique flora and fauna.
- Even with an eco-tourism campaign, specialist groups will always be a small minority, probably less than 5%. They are nevertheless an important market sector to cater for, because they help in building up the image and raising international support for, and scientific interest in, conservation of Seychelles' forests.

2.13 SUPPLY OF WOOD PRODUCTS

2.13.1 Timber

The vegetation type map was used for the estimation of the annual allowable cut, i.e. the timber supply. The present forest cover by forest types was reviewed using the existing aerial photographs, maps, registers and field visits in selected areas. The volume data was sampled from 35 plots and compiled with the data of Henry's (1976) permanent sample plots. The measurements of the present study were mainly done in plantations using relascope technique.

The annual allowable cut (i.e. sustainable production potential) of timber is estimated only for Production and Catchment/Production Zones. Biodiversity and Catchment/Biodiversity Zones are excluded, as commercial harvesting should not be allowed in them. The annual allowable cut is presented in Table 1. The volumes include all the species including coconut timber from coconut dominant forests. The Non-forest Zone includes the allowable cut from house gardens, coconut plantation, etc. The log volumes include stems and branches with minimum diameter of 20 cm and total volumes include, in addition to log volumes, stems and branches with minimum diameter of 5 cm.

Table 1: Annual Allowable Cut (m³)

| | Catchment/ Production | | Production | | Non-Forest | | Total | |
|--------------|--------------------------|--------------|--------------|----------------|---------------|--------------|---------------|--------------|
| | Total | Logs | Total | Logs | Total | Logs | Total | Logs |
| | | | - | m ³ | - | | | |
| Mahé | 6,710 | 2,880 | 1,050 | 580 | 8,620 | 3,080 | 16,380 | 6,530 |
| Praslin | 990 | 360 | 0 | 0 | 1,560 | 580 | 2,550 | 950 |
| Curieuse | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| La Digue | 280 | 120 | 0 | 0 | 570 | 210 | 850 | 330 |
| Silhouette | 0 | 0 | 0 | 0 | 140 | 50 | 140 | 50 |
| Total | 7,980 | 3,360 | 1,050 | 580 | 10,890 | 3,920 | 19,920 | 7,860 |

2.13.2 Local Production

Sawnwood is the main local wood product. There are three sawmills in the country, of which only one is in operation. All of them have circular saws. The mill in Desroches and the mill in Baie St. Anne, Praslin island, are no longer used. The only operational sawmill is situated in Grand Anse. In 1992 a team of expatriate specialists analysed the mill's development possibilities and the techno-economic analysis concluded that the sawmill is unlikely to be financially viable in the foreseeable future (CFTD 1992).

Most of local hardwood lumber is produced manually by chain saws or handsaws in the forest areas. There are estimated to be 26 teams of which 11 operate in Mahé and 15 in Praslin. The teams normally comprise 2-3 members and carrying of planks to roadside may be done by other casual labour. Three teams were interviewed during the course of study and the major characteristics of their operations can be summarized as follows:

- The surface quality of sawing is moderate, depending on the skills of the persons
- The dimensions of the sawn timber may have over 10 % of variation in thickness and over 5% in width, which causes considerable losses in further processing
- The amount of production depends on the species (i.e. hardness of the wood)
- Long blade chain saws are used which causes a lot of waste
- A group may work in any part of an island, or even move between islands
- The workers are paid by produced running feet
- The sawyers work quite permanently with the same group but the skidders may change with the change of the area
- The waste is normally left in the forest and local farmers may use it for their constructions

A team is estimated to produce on average 200 running feet of 1-2" x 8-10" planks or 0.4 m³/day. The total pit sawn production is 1,200 m³/year.

Part of local timber supply comes from individual trees cut in residential areas. In addition to teams working in the forest, there are some professional tree fellers who have specialized in this activity.

The total sawn wood production in the country is estimated to be 2,000 m³ (1992). The available production is insufficient to meet local demand, which clearly prefers local species. As a result, illegal logging occurs. The Forestry Section issued timber licenses to 2,240 m³ in 1992, which covers 45% of the total production (assuming a recovery rate of 45%). Illegal felling mostly takes place on Mahé as informal control in Praslin and La Digue makes it more difficult to carry out clandestine harvesting. It is also assumed that some pit sawing takes place in other islands but the volumes are likely to be rather marginal.

Charcoal is produced in the forest areas using logging waste and no permit is needed. The operating sawmill in Grand Anse converts part of its production waste into charcoal. Charcoal is also produced in Desroches and some other IDC operated islands based on casuarina. Also a few hotels and restaurants, which use charcoal for barbecue, produce charcoal of their own. The annual production is estimated to be 50 tons and it more than fully meets the demand.

Crafts: There is a small, but assumable growing, crafts industry using mainly local hard woods, often cut from trees outside forests. The wooden items include e.g. carvings and inlaid jewellery boxes. The market of the crafts industry is completely dependent on tourism. CODEVAR 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.

2.13.3 Imports

The main import sources are the Republic of South Africa in pine sawn wood and wood-based panels and Southeast Asia in sawn hardwood and plywood. The distribution by main sources

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.

2.13.4 Exports

There have been no recorded exports of wood products. Most of the wood-based handicraft souvenir production however serves the tourism industry and is exported. This important market could be developed further and a certain demand has been identified for knockdown smaller size furniture made of local timbers which visiting tourists are interested in buying. The about 100,000 tourists visiting Seychelles annually represent a market potential which can be tapped by small and medium-scale producers provided that raw material is available and quality meets the customer requirements. The market segment is not price-sensitive and can absorb the relatively high local production costs.

A major investment is being undertaken by the largest importer of wood products to substantially increase capacity for further processing of imported sawn wood. The company intends to serve both the local and regional export markets.

2.14 DEMAND AND SUPPLY BALANCE

In contrast to the annual allowable cut, the production potential estimates include only accessible forest areas. The accessibility was estimated by vegetation type. The production potential estimates for a period of twenty years are presented in Table 2.

Table 2: Annual Timber Production Potential from 1993 to 2012 (m³):

| | 1993 - 1997 | | 1998 - 2002 | | 2003 - 2007 | | 2008 - 2012 | |
|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|
| | Total | Logs | Total | Logs | Total | Logs | Total | Logs |
| Mahé | 11,540 | 4,440 | 11,600 | 4,480 | 12,570 | 5,060 | 14,800 | 6,400 |
| Praslin | 1,510 | 560 | 1,520 | 560 | 1,620 | 620 | 1,850 | 760 |
| La Digue | 510 | 190 | 510 | 190 | 510 | 190 | 510 | 190 |
| Silhouette | 140 | 50 | 140 | 50 | 140 | 50 | 140 | 50 |
| Total | 13,700 | 5,240 | 13,770 | 5,280 | 14,840 | 5,920 | 17,300 | 7,400 |

Production potential by species was not possible to estimate due to inadequate field information. Species composition in each stand should be studied when the detailed management plans are prepared.

The 8,600 m³ of hardwood saw logs would produce about 3,400 m³ of sawn timber, which is the estimated demand for hardwood sawn timber in 2002. There will be a growing deficiency of saw logs, which needs to be covered by increasing imports. In long term this deficiency may be reduced by investments in tree growing. Fuel wood surplus will continue growing with diminishing demand.

2.15 SECTORAL OBJECTIVES AND STRATEGIES

2.15.1 National Development Objectives

Economic objectives:

The development objectives of the forestry sector can be derived from the national development objectives, which have been largely expressed in EMPS. Consequently, the forestry sector should aim at:

- Enhancement of the amenity and conservation of biodiversity and environment at large, and thus improving the major comparative advantage of the national tourist industry
- Sustainability of the productive potential of land by providing adequate tree cover and thus protection of land from erosion
- Sustainability of water supply by improving the water retention capacity of soil, controlling erosion, and protecting rivers, waterways, dams and coastal areas
- Import substitution by producing wood- and non-wood based forest goods and services whenever economically feasible, producing sustainably high-quality raw material for local small-scale wood-based industry, including the artisanal sector
- Employment creation by providing challenging employment opportunities, particularly for youths

Environmental Objectives:

The forestry sector has the following long-term environmental objectives:

- Conservation of biodiversity and ecosystems
- Provision of habitat for endemic flora and fauna
- Prevent any further extinction of the unique flora and fauna of Seychelles
- Maintain or improve forest cover in catchment areas of the inner islands, thereby protecting the potable water resources, as well as the coastal areas against erosion and siltation.
- In defined zones of Mahé, Praslin, Silhouette and Curieuse, increase gradually the proportion of indigenous species until the forest becomes predominantly indigenous
- Maintain the beauty of the forested landscape of Seychelles
- Increase the commitment and capability of the local people to conserve their environment

2.16 SECTORAL DEVELOPMENT STRATEGIES

2.16.1 Priorities

It is expected that tourism, particularly eco-tourism, will continue to grow in global scale thus providing further development opportunities for the country. Forests are the backbone of this resource base. Consequently, environmental conservation and maintenance of the biodiversity should be the first priority of the sector. The following aims are recommended:

- Management plans prepared and implemented
- Forest Policy prepared and adopted
- Human resource development plan for DOE prepared and implemented
- Expansion of the quantity and diversity of indigenous, particularly endemic, tree seedlings produced in nurseries
- Conservation of the most endangered or valuable plant species

Due to the extremely limited land area, and sensitive soils and water balance in Seychelles, it is extremely important to conserve the limited soil and water resources of the country. If these resources are endangered, it is not only the Seychellois society and economy that will suffer, but also the nature. Consequently, conservation of soil and water resources should be the second priority of the sector. The second priority would require the following aims:

- Effective prevention and complete control of forest fires
- Adequate reforestation of deforested areas
- Effective protection of all the main rivers and their catchment areas

Due to the vulnerability caused by the high dependency on only one revenue source (tourism), and due to the risks involved in the future of long-distance travelling, it is important for Seychelles to attempt to diversify, to certain extent, its economy. As large-scale timber production would seriously conflict with the first priority objective, the development of small-scale wood industries and particularly industries based on non-wood forest products should be the third priority of the sector. The third priority would include the following aims:

- Increased knowledge on and use of the medicinal plants, including cultivation of selected species
- Increased production of high value-added wood and non-wood forest products to be marketed for local, tourist and export markets

2.16.2 Strategic Guidelines

The strategy for achieving the sectoral objectives has the following elements:

- Improve the planning, coordination and monitoring capacities of FS and DOE to enable them to fully benefit from the available external support and the national opportunities for increased mobilization of NGO and private sectors for conservation and sustainable utilization of forest resources.
- Promote formal education, on-the-job training and organize short courses on special subjects to improve the skills and efficiency of forestry staff on all levels. Training and short courses should be also made available for NGOs, district staff, guard civil, private sector, etc. as appropriate.
- Mobilize human resources also outside DOE as the implementation of this plan demands more skilled people than are available in DOE. Fortunately, environmental work is inherently participatory and there are many people who could be mobilized and given the basic skills. DOE needs an extension programme to motivate and facilitate participation by other individuals and agencies. DOE's training programme should combine intensive development of its own skilled personnel with a practical training service to non-DOE participants in conservation.
- Build up revenue sources for financial sustainability. Whilst EMPS 1990-2000 has successfully risen much capital funding, sustainability depends on adequate recurrent financing. Biodiversity conservation is particularly dependent on an increased, reliable income base. In addition to Government financing through DOE, the strategy should develop the capability of SIF and other NGOs to generate income for conservation, through tourism and other means.
- Define clear forest policy and improve and make use of legislation. DOE should prepare a forest policy, and an updated conservation policy and process them. DOE should incorporate the forestry legislation in the on-going conservation legislation review. The National Land Use Plan should be institutionalised, but not in a way which is totally rigid. The culture of using legislation has to be established in DOE.

- Zone the forests in the field according to their primary objective. This will help ensure that all management activities contribute towards a clear objective. The three objectives used are (a) conservation of biological diversity and indigenous ecosystems, (b) conservation of water, soil and amenity, and (c) production of wood and non-wood forest products.
- Prepare and implement Management Plans for Biodiversity, Catchment and Production Zones. The plans for different zones will differ in structure and contents, as the management objectives are different. Production Zones and Catchment/Production Zones should be covered with rather ordinary Forest Management Plans. Biodiversity and Catchment/Biodiversity Zones should be covered with plans focusing on biodiversity and soil and water resources conservation. Basically, all zones will be covered with respective plans irrespective their ownership status. As the Production Zones will include only state forests, the most detailed Forest Management Plans will be prepared only for state lands. The other zones include both state and private lands. The respective plans to be prepared are considered as zonal plans thus covering also private lands. However, prior to actual planning work, approval should be sought from the respective private landowners.
- Promote tree growing outside forests. Through awareness raising and extension work local people will be given information on various multipurpose tree species, including medicinal plants, suitable for home gardens. Forest nurseries will produce seedlings of such species for sale.
- Re-orient nurseries to produce more seedlings of indigenous species. An immediate effort must be made to increase dramatically the production of indigenous seedlings of trees and other plants for the management of the biodiversity and catchment zones. Since propagation techniques are not well known, and even less well recorded, the initial production efforts will have to be carefully monitored so that they can serve as research trials. Other institutions and landowners should be encouraged to participate in both propagating and growing indigenous plants.
- Provide support and technical assistance for the crafts, saw milling and other industries using both wood and non-wood forest products. This should include production development, processing techniques, and marketing. Some technical assistance should be given also for the wood processing industries from the sawmills to the carpenters. This should aim at improving the quality of the products, product development towards higher value-added products, reducing of the wastage, and use of non-traditional timbers, e.g. from fast growing plantations. Technical assistance should also be provided to the wood harvesting operators to improve their skills, productivity, and working safety.
- Participate actively in regional (Indian Ocean, Eastern African, etc.) cooperation programmes. This would bring in relevant experience and expertise needed in the country.

2.17 FOREST DEVELOPMENT PROGRAMME

2.17.1 Conservation of Biodiversity

Integrated Management of 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. Seychelles' 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 neighbours, 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, autecology and propagation of rare species, the process of invasion by exotics, fire ecology and the distribution of flora and fauna

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.

3. OUTLOOK OF THE LIKELY STATE OF FOREST RESOURCES IN 2020

3.1 CHANGES CONNECTED WITH THE FOREST RESOURCES

3.1.1 Socio-economic changes

Positive:

- Reclamation of land will eventually relieve pressure for development and construction on the narrow strip of coastal land e.g. Mangrove forest. It will reduce the demand for more land for development (housing) and construction, thus reduce the amount of encroachment into upland forest areas
 - Desalination could help to diminish the rising demand for fresh water

Negative:

- Rapid urbanization on the existing narrow band of coastal land destroying coastal forest biodiversity
- Progressive encroachment into forested areas as the demand for more land is increasing as the population is on the rise
- Reclamation of the east coast will lead to the destruction of the existing forest biodiversity
- With the increase in the distribution and density of population in forested areas, water catchments areas will be affected leading to disruptions in the water cycle

3.1.2 Overall economic performance - Eco-tourism development

Positive:

- Allow visitors to enjoy the rich biological diversity of the forest resources
- Add value to forest resources through upgraded of present infrastructures in your forest areas e.g. eco-tourism facilities
- Zoning of the forest areas, where different activities could be carried out sustainably
- Cater for specific groups to undertake scientific research/study for the benefits of the country
- Greater participation of other stakeholders in the promotion of eco-tourism

Negative:

- Bound to have illegal activity, including illegal poaching, harvesting of the species and other detrimental activities to the forest diversity
- Pressure due to increased activities in protected areas
- Disturbance of natural ecosystems through maintenance activities
- Conflict due to policy imposed on local populations

3.1.3 Development in the agricultural sector

Positive:

- Demand for forested land for agricultural production will gradually decrease as the Government continues to import some vegetables, fruits and meat
- The practice of upland farming is on the decrease, as most farmers are reverting to farming on the coast. The number of people practicing intensive/extensive farming is on the decrease-ex-farmers reverting to other jobs

Negative:

- Demand for practicing upland farming where specific crops such as yams and other crops thrive best in areas where forest is situated

3.1.4 Policy and institutional changes

Most particular changes with regard to ownership and management of forest resources:

Positive:

- A new Division, the Policy Planning and Services has been set up with the aim of meeting requirements of change
- Any development around the buffer zones around Protected areas needs EIA's
- Basically all the active NGO's in the country are for Conservation, protection and safeguarding of the environment natural resources
- Several organizations and bodies exist which are there to ensure that development is done in a sustainable way and in harmony with the environment e.g. Town and Country Planning, Planning Authority --Board, Seychelles Licensing Authority, EIA's etc
- Forestry related legislation are being revised/amended and will continue to be revised when there is the need. New laws are superseding old laws

Negative:

- Lack of harmony and coordination between the law and the juridical procedures

3.1.5 Industrial Development and its impact on Forestry

Even though industrial development is on the increase, the forest is still unscathed at present even though with the boom in construction:

Positive:

- Industrial development will not be permitted, as most forest areas are located within the protected areas and for any construction an EIA.s is requested

- For example the bottling of water follows strict guidelines, in the sense that the water catchments areas need to be protected. Trees are not felled and water collected in designated areas
- All industrial activities are concentrated on the old reclaimed area along the coast
- As most of the timber is imported, the demand for local timber will not rise significantly even though there is a deficit in the economy

Negative:

- Demand for raw materials from forestry goods will be on the increase. More local products will flood the local markets e.g. crafts work
- At least for the coming few years, there will be a demand for local timber with the construction of some five star hotels as the traditional architecture and Creole spirit are to be maintained
- The depletion of existing plantation due to non-replanting on commercial trees will put a pressure on indigenous stand

3.1.6 Development in the services and their impacts

Positive:

- Services will be on the increase. The trends of Hotel construction in forested areas e.g. islands are to develop and promote eco-tourism where nature can co-exist with tourist activity. Practice on Fregate and Bird islands

Negative:

- Trends of hotel buildings are on islands and higher upland where there is a splendid view of the coast
- Eco-tourism development where the forests are to be explored. As a result, new facilities such as tracks, buildings have to be built in the forestry areas to cater for the demand, thus clearing of the forestry areas
- Disturbances of the forest ecosystem through the every day activities that are associated with eco-tourism e.g. maintenance, noise, and people's presence...

3.1.7 Trends in investment in the Forestry Sector

Positive:

- Through the change of prioritisation from Forestry Plantations to Forestry biodiversity Conservation/protection, funding from both local and international donors have increased substantially and will continue to be
- More research work are being done by scientists on the resources that are found in the forest
- Investment will be more on aesthetic value, non-wood resources of the forest resources and control harvesting of species

Negative:

- With time the trend of commercial forestry will be very marginal. Fewer revenues will be generated as control on the number of species and type of species being harvested will be strongly regulated by the Government
- It is likely that in 10 years time the country will face a shortage of timber for local market and possibly force a trend to revert to indigenous tree species. This will effect negatively on indigenous stands

3.1.8 State of natural forest – Area under sustainable management

Positive:

- There is the restoration biodiversity programme with the aim of returning the forest to its native state
- More trees are planted as a way to increase the forest cover on the islands such as the replacement of trees being killed by diseases and the planting on the freshly reclaimed area
- With the new reclaimed area, more land will be made available to reduce the pressure from encroachment in forest areas for housing and other development
- The tree felling activity on private property is becoming more and more stringent where in certain areas trees are not allowed to be felled e.g. 30 m on either side of the riverbank
- In area under sustainable management, the state decides on the number of trees to be felled. Thinning is being practiced as a means to maintain a healthy stock of timber in the plantations

Negative:

- Aggressive invasive plant species are colonizing, displacing and killing the native tree species
- Several tree and plant disease are killing several of the endemic as well as the indigenous tree species, which have been in Seychelles for centuries
- With the demand for more land for development, encroachment into forest areas is still and will still occur
- Illegal activities through poaching especially of the endemic species

3.1.9 State of trees outside forest

Positive:

- Several landowners are aware on the needs to have some trees on the properties, as they know the benefits
- In Seychelles trees are not felled for fuel consumption, or for making charcoal or for timber. The majority of tree felling request is because of the potential danger to houses or are in the way where farming or construction activities are to take place
- It is the state that regulates the felling of trees, harvesting of goods on any property (private or government)
- Timber control activities are being expanded to cover also the environmental and forestry extension activities in private lands. The aim is to increase local awareness and to provide services to people who want to promote indigenous plants already growing on their land or who want to plant indigenous species
- Forestry is aiming at producing and developing a multitude of products including non-wood products and services for tourism and the local population

3.1.10 Conservation of biodiversity and protective functions of forest

Positive:

- Emphasis has been placed whereby no trees of indigenous and native species are to be felled for commercial purposes from state lands, if it is not done according to an accepted permit which ensure that the felling is not endangering the sustainability of the species in the area

- The responsibilities vis-à-vis forest fire prevention, detection and fighting is high on the agenda. The Division of Environment maintains stocks of equipment. Prevention of fire outbreaks and effective forest fire fighting is amongst the highest priorities amongst forestry Sections' tasks
- The existing Forest Fire contingency plan is revised on a yearly basis
- The awareness of fire hazards is being improved through media sensitisation to the public (especially during dry periods)
- Elimination and control of aggressive invasive exotic plant species is a priority in forestry

Negative:

- As more areas are placed under protected systems, resources to manage them will become more thinly distributed implying that fewer resources will be available to monitor and manage forest resources
- As people get less option to implement their activities, the stress on resulting forest resources outside Protected areas will be significant

3.1.11 State of park management and ecotourism

Positive:

- Some of the protected areas are being developed to become major centre for in-situ conservation of the indigenous native vegetation e.g. Vallee de Mai
- A seed and a national herbarium centres are being established at the Biodiversity Centre at Barbarons. The Barbarons Biodiversity centre and the Botanical Garden will act as a centre for promoting ex-situ conservation
- Enlargement of areas to be protected through designation of National Park, AONB statues

Negative:

- There is the general tendency to move away from commercial forestry plantation without realizing that this imply stronger pressure on native stands as soon as the existing plantations is depleted if no restocking is done

3.2 STATE OF FOREST INDUSTRIES

Positive:

- The forest industries will continue to exist but at a marginal level. Demand for the local market will be met through importation of timber (readily sawn into the sizes that you need)
- Wood workshop will exist on a small-scale (few carpenters...). They will not be processing large quantities of wood. The technology being used will be of low-tech. Right now in Seychelles there is only one sawmill. The technologies are outdated and worn out. There is no plan to upgrade or build a new one

Negative:

- Reduced employment on a socio-economic basis
- Alien invasive species, which could be commercialised, will be left to rot on the forest floor once removed

3.3 WOOD DEMAND-SUPPLY SITUATION

Positive:

- Biomass will always be available to supply the domestic market thus resulting in a reduction of same as fuel for forest fires

Negative:

- There will always be a need to import industrial wood and other products, thus putting a stress on the country's economy

3.4 SOCIAL AND ECONOMIC IMPLICATIONS

Positive:

Income/Revenue

- Timber prices are being revised, preferably through a process of competing bids or through studying the maximum prices that will be paid. The prices of non-preferred exotic species are being reduced and the prices of e.g. Albania the most valuable indigenous species have risen
- Employment
- Development of human resources to face the challenges of forest management for multiple purposes is to be given the highest priority. In addition to increasing the level of formal education and practical skills of present staff, new staff members with adequate and appropriate background for higher technical and academic studies will be recruited and given the opportunity for further studies. The new EMPS makes provision for that
- The level of motivation amongst the staff is continuously being improved through post upgrading, training, improvement of worker safety and introducing new incentives for extra work

Food security

- Food security for the forest animal dwellers will be on the increase. Through the planting of the indigenous trees in forestry plantations, the fruits, seeds and flowers provide food for many forest dwelling animals
- Carbon sequestration
- Maintaining the land areas under its present forest cover will be maintained and preferably increase. Planting trees for the above will be on the increase
- An increase in forest areas implies an increased carbon sink potential for carbon sequestration

Negative:

Food Security for man will be on the decrease.

- The Breadfruit and other trees (Protection) Act was enacted to protect the emergency food supply
- During the World Wars. This 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. Therefore planting trees for food the population security is not seen as important

It might be difficult to get all sectors to agree on a negotiation

3.5 FORESTRY AND ENVIRONMENT

Positive:

- Relevant forestry publications should be purchased and equipped in a library for reference
- Links with international forestry institutions should be established
- Encouraging forest researchers and research organizations to undertake research in Seychelles and directing it to be able to make good use out of it
- Local research has to be limited into simple trials and establishing and measuring sample plots for growth and yield data
- Whilst the conservation legislation is being revised, the Breadfruit and Other Trees Act is to be replaced by regulations which make a clear difference between species that need a) protected for conservation, b) controlled for sustainable utilization and c) unprotected due to their harmful impact on the indigenous species

Negative:

- Forestry Section needs be equipped adequately for the duties of forest fire fighting, forest conservation, reforestation, forest surveys and inventories in order to better-conserved biodiversity
- -The upgrading of the forestry section should through institutional strengthening (computers to the outstations e.g., for database storage) is necessary

3.6 OTHER FUNCTIONS OF THE FOREST

Land degradation

Rehabilitation of degraded forestry lands is now given high priority and will continue to be so after fires or erosion caused by waves. Native and indigenous plants are to be used for rehabilitation. Introduced species will not be used unless in the worst degraded areas where native plants will not thrive. Forestry has established a prompt response programme for the rehabilitation of state land after fire occurrence.

Watershed protection:

An assessment of the river reserves for GIS mapping will be carried out jointly with PUC and MLUH. Mitigative and preventive measures are being undertaken with regard to the protection. Awareness of proper watershed management, of the river reserve regulations and the importance of mangroves are included in the environmental extension scheme.

Mangroves:

The last remnants of existing mangroves are being preserved. Where it is possible their areas are being enlarged.

As more areas are converted to eco-tourism sites, their protective functions will be less, as people's presence within these areas will be more evident. As areas are opened up, species with socio-cultural values (e.g. medicinal plants) will be more exposed to poaching and in risk of danger to trampling, fires, and dynamic disturbances.

3.7 INSTITUTIONAL FRAMEWORK FOR FORESTRY

Positive:

- Greater involvement of the communities in forest management
- Contracting out work related to tree felling and monitored by Forestry personnel

Negative:

- Contractors do not necessarily have the finest work skills to prevent excess damage to remaining stock
- Not foreseen to be a major problem to Seychelles

4. LITERATURES CONSULTED

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|--|------------------------------|
| Seychelles Forestry Management Plan | 1993, INDUFOR Oy |
| Seychelles Biodiversity strategy & action plan | 1997, Republic of Seychelles |
