THE KNYSNA AND TSITSIKAMMA FORESTS

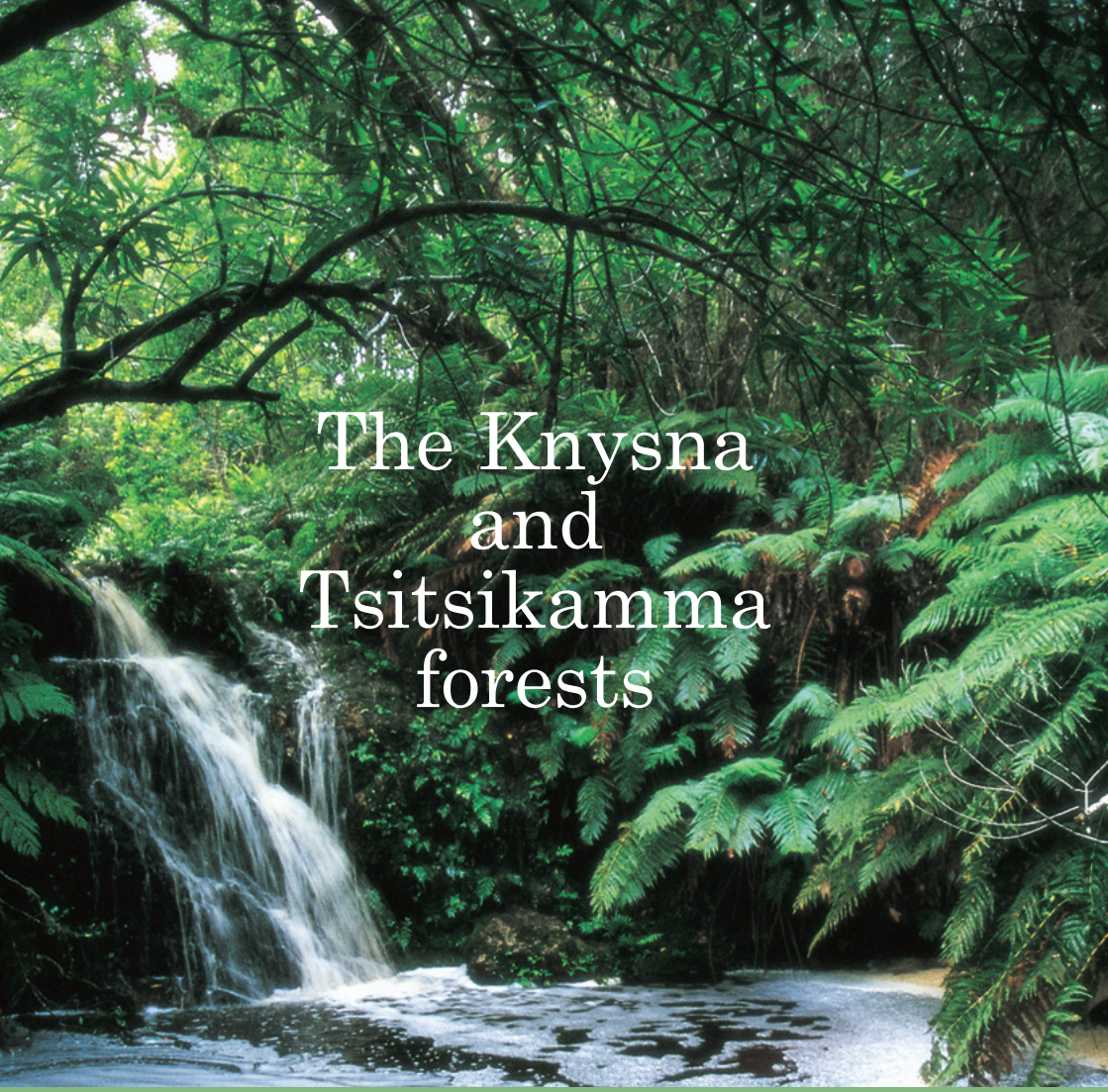
Their history, ecology and management

Water Affairs
Agriculture, Forestry and Fisheries

Update information October 2009

Since publication of this book the Management of the Knysna and Tsitsikamma Forests has been transferred to the South African National Parks.

The Chief Directorate Forestry of the Department of Water Affairs and Forestry has been restructured to the Branch Forestry of the Department of Agriculture, Forestry and Fisheries.



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ISBN 0-621-28846-2
Distributed by: Knysna Area Office, Private Bag X12, Knysna 6570

Branch Forestry: Department of Agriculture, Forestry and Fisheries

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National Archives of SA
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Kelvin Saunders (Studio Atrium)
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Tafelberg Publishers Ltd

Second Print
2002

Front cover: Forest interior
Back cover: Bark of white pear

The publication of this book was funded by **Danida** (Danish International Development Assistance) and by **DFID** (The Department for International Development) of the United Kingdom.

Under the Danish environmental programme in South Africa, **Danida** and the Department of Water Affairs and Forestry have embarked on a project titled Capacity Development in Participatory Forest Management in Indigenous State Forests, South Africa (2001 – 2005). This project aims at enhancing the ability of the Directorate: Indigenous Forest Management to manage its forests in a sustainable manner with increased community participation and development. The raising of awareness about goals and opportunities of participatory forest management is an integral part of these endeavours.

Danida

The UK Department for International Development has been supporting sustainable forestry development in South Africa since 1995. Its aim has been to support the refocusing of forestry policies and strategies to ensure that forestry contributes meaningfully to poverty reduction. Support to the development of participatory forestry policies and initiatives has been a core part of DFID's work. Participatory forest management (PFM) is now being undertaken by the Department of Water Affairs and Forestry, and the lessons and experiences from the Knysna-Tsitsikamma areas show that the poor are now benefitting from forestry in ways that were previously not possible.

DFID Department for International Development

Enchanted Forest Land

The longer you explore a rainforest the more captivating it becomes, and all the time its mysteries deepen. First encounters with the forest usually happens close to the forest margins – in thickets and woods tamed by axes and fire. Only through patient learning the trees and their names become familiar.

Later you venture through the deepest ravines towards the mountains, finally reaching untouched forest land where the old-time axes never rang, and where the gloom envelops you even in daylight. Here you tread with caution and speaks with a subdued voice, for you have entered a world that transcends human understanding – primeval forest.

Gradually your sense of wonderment becomes one of veneration. Even one of uneasiness. Here the felling of a single tree can tear a gap in the canopy and upset the balance of nature. Witness the bared patches of land nearer to town where noble trees once stood.

You stand in the understorey with its apparent chaos of diversity, ferns overtopping your head, orange bracket fungi as large as plates decorating an old trunk, delicate green moss in each shadow. Young trees exceeding ten, twenty, thirty years in growth crowd the understorey in the sheltered shadows of the giant parent trees. Only their crowns, the oldest and the tallest, may stand in the full sun. Some of them grew hundreds of years to reach the canopy.

The mind is overwhelmed by the complexity of this wonderworld. Schauberger once said that each green leaf is in reality a tiny factory – the forest in its entirety is a powerhouse that radiates its energy far beyond the limits of its margins. Each stream ripples with living water that ripened in the soil among the roots.

You stand in a biosphere – a self-sustained world from the high canopy down to the deepest roots. Soon the calls of the forest birds become familiar. Listen to the clicking of frogs resounding through the forest, or the monotonous chorus of cicadas in summer. Hear small rodents scurrying over dry leaves. Keep a keen eye open for the wary blue duiker or bushbuck. See the tracks of a bush-pig imprinted in the mud among the leaf litter. Sometimes you sense that the forest trusts you. Sometimes not.

On a hot summer day the cool shade offers refreshment. On a wet winter day, when the damp rising from the soil mixes with the vapour of your breath, a sunny glade offers relief from the coldness of the shadows. Spending the night in the forest brings a new sensation of total darkness, punctuated by night calls – secret stirrings among the leaves, the chirping of crickets, croaking of frogs and the hooting of owls. Being at the mercy of this enclosed world until morning induces a certain sense of fear. Daybreak brings its own rewards, however, for to hear the forest awake is an experience to savour.

Those who have experienced the forest in all its moods return home enriched. They do so in the knowledge that should man destroy the last of the forests, some of his inner peace, freedom and joy will be lost forever. The enchantment of the rainforest transcends its physical presence, leaving the human soul touched in mysterious ways that even science cannot fathom.

Dalene Matthee

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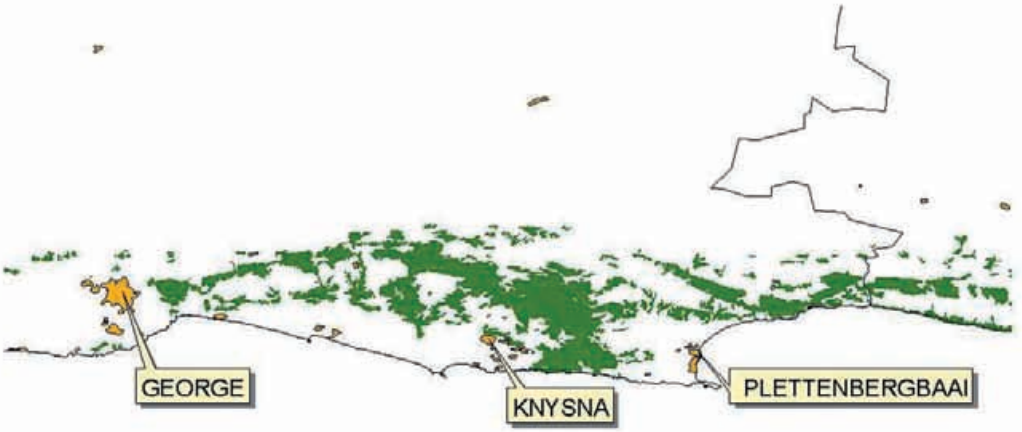
General map of forest region



Detailed map of Knysna and Tsitsikamma forests

The Forest Eden

Tourist on a boardwalk in the Tsitsikamma Forest. Boardwalks prevent the trampling of undergrowth and compaction of soil

On the southernmost reaches of the African continent lies a region of exceptional beauty. It is a land of imposing mountain ranges, shimmering lakes and a rugged coastline alternating with golden beaches. This is the setting of the largest complex of indigenous forest in southern Africa, a relic of the tropical forests that once carpeted the eastern parts of the continent from central Africa to the Cape Peninsula. As the climate became drier, the forests receded, leaving enclaves such as the southern Cape forests in the more sheltered and well-watered areas.

It took the forces of nature millions of years to shape the character of the land, but man left his mark in the span of a few centuries. The earliest traces of modern man found anywhere in the world were discovered at the Klasies River mouth, which meant that people had been living in the region for more than a hundred thousand years. The Khoikhoi clans of Outeniqualand and the Tsitsikamma lived largely in harmony with nature for many centuries. While their spartan needs and simple tools had little impact on the forests, the fires they lit to flush game out of the thickets and to obtain grazing for their cattle contributed to the current fragmented pattern of the forests. When the first Europeans began to settle in the region in the late eighteenth century, more damage was caused in the forests by their tree-felling, which tore huge gaps in the forests canopy.

Travellers and naturalists from all over Europe have left us descriptions of the region and its people. They marvelled at its natural beauty, and wrote in wonderment about the giant trees and the abundant wildlife. Over a period of about two centuries, however, the woodcutters and hunters seemed bent on the very destruction of this beauty by their wasteful practices and excesses. They might even have succeeded, had it not been for the relentless work of pioneers in forest management, who fought for a better deal for the trees and the wildlife.

The modern and effective multiple-use forest management system, implemented by the professional staff of the Directorate: Indigenous Forest Management, is built on more than one and a half centuries' pioneering work in forest management. A participatory management approach is followed, which focuses on the responsible and sustainable use of forest resources, and is responsive to the values and needs of the public. This approach is not only in line with international obligations, but also with the principles of sustainable management promoted by the 1996 government white paper titled *Sustainable Forest Development in South Africa*. The *National Forests Act of 1998* was promulgated to give effect to this white paper.

Visitors to the southern Cape's rainforests are over-

Giant Outeniqua yellowwoods tower above a forest canopy festooned with lianas and hanging threads of the epiphytic old man's beard. Once part of a tropical rainforest belt carpeting most of south and central Africa, the southern Cape forests retain a lush sub-tropical character

whelmed by the size and variety of the trees. Giant Outeniqua yellowwoods *(Podocarpus falcatus)* of up to 45m high and the renowned stinkwood *(Ocotea bullata)* are but two of the forest 'aristocrats' enjoying protection here. Over the years the timber of these trees, and others, was used extensively for mining timber, wagons, railway sleepers, building construction, furniture, telegraph poles and shipbuilding. Today timber is still harvested in limited quantities for the lucrative furniture industry in Knysna, which is famous for its prestigious Cape Dutch furniture made by expert craftsmen. The logs are slipped out of the forest by stocky Percheron horses along the slip-paths of the erstwhile woodcutters. In exceptional cases, valuable timber is extracted from inaccessible and environ-

Woodcutters in the Knysna forests shortly before the closure of the forests to the felling of timber in 1939. For 200 years these hardy and individualistic people carved an existence in the forests, adding much colour to the rich history of the region

A leopard (Panthera pardus) prowling through the forest - the most powerful and cunning of all forest predators
AHW Seydack

mentally sensitive areas by helicopter. Unlike during the era of the woodcutters, which lasted until 1939, the trees are now carefully selected and topped before they are felled by trained personnel of the Directorate.
Few of the old woodcutters are still living today. Over generations spanning about two centuries, this tough and isolated breed of individualistic people had developed in the depths of the Knysna forests. Their wasteful methods contributed to the (near) destruction of the forests, but the blame must also be lain at the door of the timber merchants who exploited the woodcutters, and poor government control during the nineteenth century. The singular way of life of these people, so vividly brought to life by Dalene Matthee in her three 'forest' novels, has now come to an end.

In the crowded rainforest where the plants jostle for space, the trees push vigorously upwards to fill the gaps left by dying or fallen trees. Beneath the sun-drenched canopy of interlocking crowns the forest grows in layers, each harbouring a unique range of animals and plants adapted to exploit that level. It is a self-contained ecosystem on a nutrient-poor substrate, which endlessly recycles the limited stock of nutrients in the thin humus layer. Glorious fungi of a variety of colours and shapes turn damp corners of the forests into enchanted fairy-tale worlds, where they help to reduce dead wood to humus - the cradle of life in which new plants will

grow. The dim floor of the southern Cape forests harbours the greatest variety of herbaceous plants of all the forests in southern Africa. Every tree supports a world of epiphytic plants - ferns, lichens, mosses, herbs and succulents - which form an incredibly rich 'garden in the sky'.

A neon-coloured horned spider (Gasteracantha species) suspended on a breeze-ruffled web above the forest floor

Forest mammals are notoriously elusive, and nothing seems to move in the brooding stillness of the rainforests. But they are there, lending a mysterious presence to the dim twilight world. Sheltering in the depths of the Knysna forests are three elephants, the remnant of a population that numbered few hundred at the close of the nineteenth century. Most of the mammals, from the bushpig to the tiny woodland mouse, lie up during the day, to emerge at dusk. Death, too, stalks at night, when the secretive leopard prowls the forest on padded feet. By morning the only signs left of this nocturnal passage are the tracks and droppings on the forest floor.

Tiny blue duikers and the fawn-coloured bushbuck browse in the forest glades and margins during the day. Snakes are seldom encountered due to their camouflage and retiring habits. But it is the invertebrates that dominate the forests. A multitude of insects, spiders, millipedes, centipedes, worms and snails populate every niche between the forest floor and the canopy, and many species are still unknown to man.

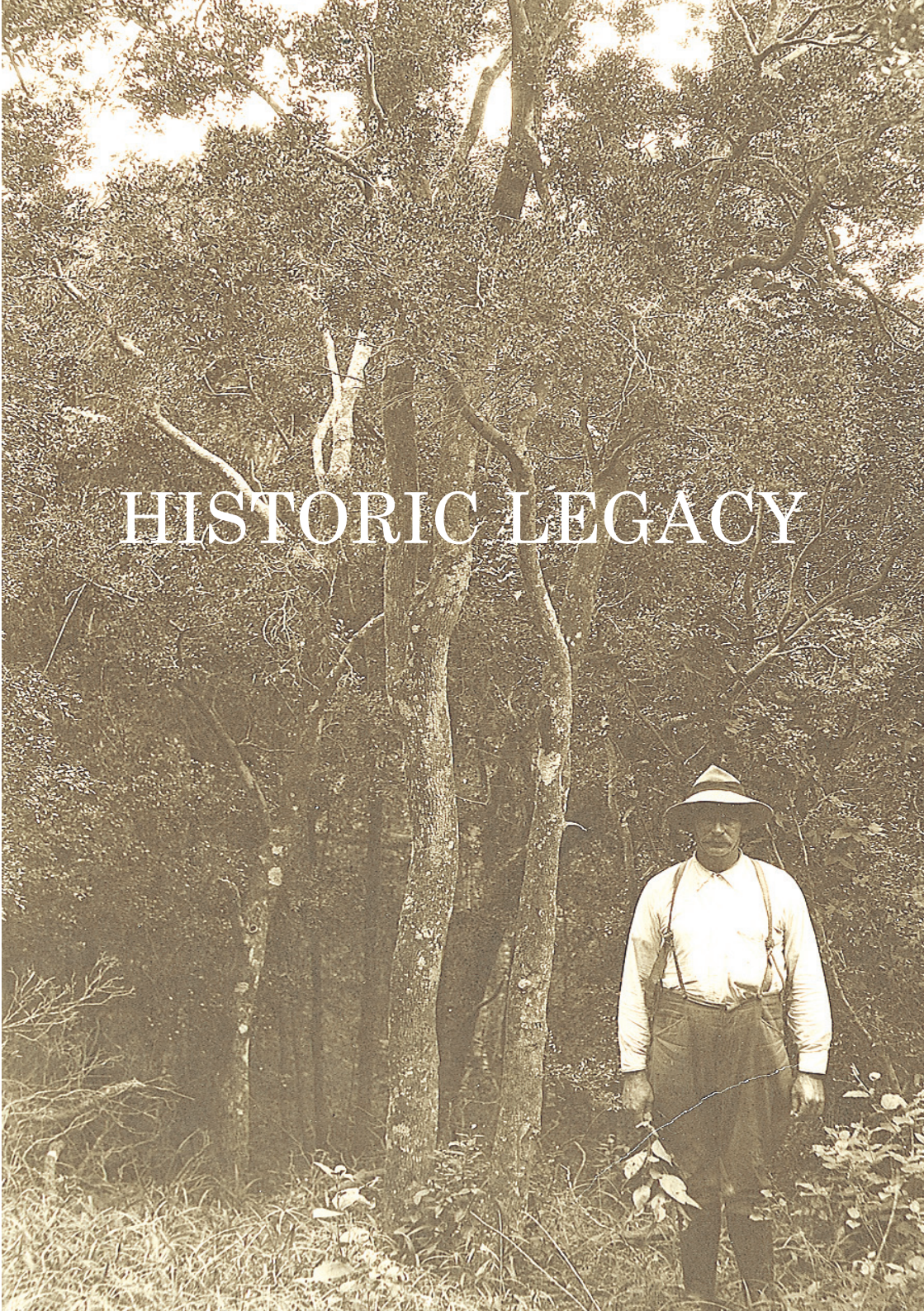
Despite their relative abundance, forest birds are usually easier to hear than to see. Most striking of these forest birds are the Knysna louries with their emerald-green and scarlet plumage. The brilliant display of their crimson wings in flight is an unforgettable sight. The forests resound to the occasional calls of sombre bulbuls, chorister robins and black-headed orioles, whose piercing calls aid communication in the dense canopy and undergrowth. A multitude of forest birds can coexist by feeding on different food sources in different strata of the forest.

Forest plants and animals have developed into a close-knit community over millions of years. Effective life-forms and survival strategies have evolved through intense and merciless competition. Camouflage and concealment are the most common survival strategies employed by the animal species, while many forest plants have developed chemical defences to cope with the multitude of leaf-eating insects. The close relationship between the plants and animals is vital for the survival of the forest community as a whole. Plants provide the animals with food and shelter, while insects, birds and mammals reward them by pollinating their flowers and carrying their seeds to all corners of the forest.

Time is the great healer of forests. Since the closure of the forests to the woodcutters, they have recovered largely under the caring hand of a new generation of forest managers. Ongoing research has greatly advanced understanding of the forest ecology, and on this knowledge the new multiple-use management system is based. The forests are protected and managed for the benefit and enjoyment of increasing numbers of visitors and tourists, who come from all corners of the world to delight in their majestic beauty. They come, in their thousands, to enjoy the picnic sites, viewpoints, hiking trails, day-walks and cycling trails. Careful management ensures that the impact of these activities are minimised.

The modern-day visitor, when standing within the ramparts of the southern Cape forests, can still share the wonderment and praise of the early naturalists and travellers who explored the region more than two centuries ago. The more we learn about the rainforests, the more we are amazed at their diversity of life-forms, so delicately intertwined in a finely balanced system. To those with the patience to look and listen, it is a world full of wonders. To quote the novelist Dalene Matthee: *...between man and the forest lies but a thin veil. Like a cobweb. Like an invisible mist through which you can see if you could open your eyes wide enough...* The forests are reluctant to reveal all their secrets, however, and they retain some mysterious character even to the scientists who study them. *…The Forest is like someone you can hear talking, but whose language you do not understand. You hear him, you see him, you touch him, you see the signs he makes, but you do not know what he says…*

Right: A 19th century botanist collecting leaf samples. Naturalists and explorers steadily advanced knowledge and understanding about the plant and animal life of the region, but suffered many deprivations in this wild and untamed land
Directorate: Indigenous Forest Management


HISTORIC LEGACY

Early travellers and settlers

...from Europe in this period came men bent on exploration - scientists, botanists, anthropologists, geologists, cartographers and other scholars to whom is owed much of what is known about the opening up of the country east of George, where civilisation gave way to the law of the forests. The stock farmers, hunters and fearless frontiersmen who gained a foothold in these parts between the middle and the end of the 18th century were not, in the main, men of culture. They were too busy wresting a living from the land...

Patricia Storrar - Portrait of Plettenberg Bay, 1978

Before the invasion of European settlers and explorers, the southern Cape was sparsely populated by Khoikhoi pastoralists and hunter-gatherers. These people would frequently set fire to the veld and scrub to obtain grazing for their cattle, to get honey and to flush out game. The coastal plains and forests had teemed with wildlife, including large herds of elephant and buffalo. The fires, lit usually during dry periods, and often fanned by warm bergwinds, contributed to the fragmentation and location pattern of the forests.

Brackenhill forest woodcutters working up an assegai tree ***(Curtisia dentata)*** *into billets from which spokes were made (1887)*
Directorate: Indigenous Forest Management

The intrepid Portuguese seafarers

of the fifteenth, sixteenth and seventeenth centuries sailing along the Cape coast showed little interest in exploring or exploiting the beautiful land they observed from the sea. They were pre-occupied with the lucrative spice trade and other riches in the Far East and other parts of Africa. Moody weather and rugged cliffs made the coastline treacherous. Thick fog and south-easterly gales claimed many ships, but only few survivors reached civilisation with their tales of unimaginable hardship.

In 1630 the Sâo Goncales sought shelter at Formosa Bay, now known as Plettenberg Bay, for repairs. The ship eventually perished in a strong gale, with great loss of life, leaving about a hundred survivors ashore. These survivors are the first Europeans on record to have cut timber from the southern Cape forests. This was used to construct two boats, houses and even a church. One of the boats reached safety in Mocambique. The only legacies of this short-lived European settlement are a wooden cross on an inscribed sandstone block, and a detailed account by Friar Francisco dos Santos. This fascinating account gives valuable insights into the pristine state of the environment and the culture of the Khoikhoi inhabitants at the time.

The ruins of a timber shed built under supervision of Johann Friedrich Meeding at Plettenberg Bay more than two centuries ago. It is a declared national monument

A supply post was founded at Table Bay in 1652 by the Dutch East India Company. The limited timber resources on the Cape Peninsula were quickly depleted, and the expanding settlement, which eventually became known as Cape Town, began to rely on newly discovered forests to the east as far as the present-day Riviersonderend. The first news of the existence of vast forests in the unexplored Outeniqua and Tsitsikamma regions (the southern Cape) reached Cape Town in 1711. Yet so rugged and isolated was the region that the first European pioneers began to settle there only by the mid-eighteenth century. Early travellers and settlers balked at the seemingly insurmountable obstacles imposed by the deep gorges, thick forests and rugged coast. Many bypassed the area by cutting across the Outeniqua Mountains near the present-day town of George and advancing eastwards along the Langkloof valley.

Little was known about the southern Cape forests until the expeditions undertaken by the Swedes Carl Peter Thunberg and Anders Sparrmann in the 1770s. Their reports revived the interest of the Dutch East India Company in the forests, which eventually led to the establishment of two woodcutter's posts, at Swartrivier in the George district (1776) and at Plettenberg Bay (1787) respectively. Dense forests and deep gorges severely taxed the strength of these explorers, who occasionally had to crawl through thickets on all fours in their quest to discover and record the natural wonders of the region.

Carl Peter Thunberg, Doctor of Physics at the University of Upssala and a renowned botanist, visited the region in 1772. His impeccably scientific and tersely written notes gave valuable information on the geology of the area and on the forest trees and their uses. A year later Thunberg visited the region again in the company of Francis Masson, sent by King George III to collect plants for the Royal Kew Gardens in London. Masson waxed lyrical about the

area in his *Botanical Travels*, declaring that the beauty and diversity of the plant species exceeded that of any other region he had seen. He also mentioned the abundance of wildlife, including herds of buffalo and elephant.

Professor Anders Sparrman, a Swedish scientist and traveller who had sailed around the world with Captain Cook, explored the southern Cape in 1775. He estimated the number of elephants at between 400 and 500, and noted that they had been driven into the forests by hunting. He accurately predicted that the forest timber would be exploited profitably once a suitable port could be established. He also described the few Khoikhoi clans and hardy European pioneers who by that time had already settled on the open coastal plains and in the forests at intervals of 20 to 30 kilometres. The farmers were generally wealthy, and had many Khoikhoi servants, large herds of cattle and sturdy homes of stone, whitewashed with lime obtained from sea shells. Forest dwellers and the early woodcutters, on the other hand, were impoverished. Sparrmann noted that they lived in humble dwellings of reed and clay, and

The grave of the legendary George Rex, who settled on the farm Melkhoutskraal at Knysna in 1804. Much controversy raged in the light of persistent rumours that he was the illegitimate son of George III of England

that there was only one proper timber house to be found in the whole forest.

The early settlers arrived from all over Europe. The surnames of these Dutch, German, and French pioneers - Terblans, Botha, Duminy, Van Rooyen, Järling and others - are still common in the southern Cape. Johann Jacob Järling and Cornelis Botha were the first European pioneers to settle at Plettenberg Bay, where they played an important role in the establishment of a woodcutter's post in 1787. Piet and Stev Terblans farmed on large expanses of land around the Knysna estuary, much of which later passed into the hands of the legendary George Rex. The landed English gentry - the Newdigates of Forest Hall, the Barringtons of Portland, the Darnells of Westford, the Duthies of Belvidere, and others - settled much later, from the 1830s onwards.

The teeming wildlife of the southern Cape attracted prominent hunters and naturalists. Robert Semple, president of the Hudson Bay Company in America, left an account of his eighteenth century hunting and exploration adventures in a book titled *Sketches of the Cape of Good Hope*. Hunting expeditions in those days were noted for their excesses. Buffaloes and hippopotami were slaughtered to extinction, and the few remaining elephants sought shelter deep in the forests. The hunters did not have it all their way, however. Jacob van Reenen gave a dramatic account of an elephant hunt in 1790, which ended in the death of one Lodewyk Prins who was thrown from his horse and trampled to death by a wounded elephant bull

The French naturalist Francois le Vaillant was undoubtedly the most eccentric and colourful hunter-explorer ever to set foot in the region. He wore extravagent garments, powders and perfumes, even while living among Khoikhoi clans in the bush. His visit to the region is described in his five volumes of *Travels Into the Interior*

Parts of Africa by Way of the Cape of Good Hope. Written in a lively and entertaining style, his books, which unfortunately contain numerous exaggerations and historic inaccuracies, were widely read. Le Vaillant shot many game, including elephants, and added dozens of birds to his collection. He also discovered the beautiful narina trogon, a forest bird that he named after a Khoikhoi woman, Narina, whose beauty he admired.

Throughout the first half of the nineteenth century other naturalists and explorers continued their journeys into the forested areas of the Outeniqua and the Tsitsikamma regions - Henry Carl Lichtenstein in 1803, William Burchell in 1811 and the young Swedish botanist GF Victorin in 1854. All of them left valuable accounts of the region and its people, without which we would have been much poorer today.

The woodcutters

The swing of an axe, the sound of a saw, had been rooted into them too deeply for generation after generation, that was all. Hardship had become like breathing to them.'

Dalene Matthee - Circles in a Forest, 1984

Few of the old woodcutters are still living today. The last men who were pensioned off in 1939 were somewhat like bearded Rip van Winkles – suddenly exposed to a modern world from which they had been secluded. They were the last of a tough and isolated breed of people who had made a living in the depths of the Knysna forests for more than a century and a half. A few were of English or Scottish descent, but their language and culture merged with that of the mainstream of Afrikaner-Dutch with time.

The first woodcutters to arrive in the Outeniqualand were employed by the Dutch East India Company, who established a woodcutter's post at Swartrivier in the present-day George district in 1776. By then the area was already fairly populated by Europeans, and many took to the forests as independent woodcutters to capitalise on the insatiable demand for timber. When Governor Joachim van Plettenberg visited the region in 1778, barely two years later, he found many families earning a living from woodcutting. He decried the impoverished state of woodcutter families and blamed them for the destruction of the forests and the huge wastage of timber. Le Vaillant (1783) described them as 'degenerate hewers of timber.' John Barrow on the other hand, who investigated conditions in the region in 1797, described them as '... the only class of people, in the whole colony, that deserve the name

of being industrious. To fell the large trees ....and then drag them out, is a work of labour and toil; and their profits are so trifling...'

Despite the tough trade of woodcutting which taxed the strength of man and beast, the woodcutters stubbornly clung to their independent way of life in the forest. All attempts by successive governments to employ them or to turn them into farmers failed. The woodcutters did not see further than the dense wall of forest vegetation, neither did they see any other future for their children. Very few had any schooling, but they did not consider education of any value in a world where the axe and double-handed treksaw reigned supreme. From an early age the boys had to start learning the trade of woodcutting. Marriages took place at a young age, and intermarriage in such an isolated community was inevitable. The women were burdened by raising large families on

An old-time woodcutter family in front of their home of mud and canvas. Facing an uncertain future because they settled on government land, few woodcutters invested in proper homes

Directorate: Indigenous Forest Management

Oxen pulling log sections along slip-paths in the Knysna forests in the late 19th century. Some of the old slip-paths are still in use today, mainly to extract timber for the furniture industry
Directorate: Indigenous Forest Management

meagre resources. Few homes had more than two rooms, and the structures were dilapidated.

Despite their meagre lifestyle, the woodcutters were not merely 'decadent scamps' living in 'hill-billy poverty' as many accounts portrayed them. Most of them were religious and hard-working people who took great pride in their work. They used axes and saws with such skill and precision that the planks, sleepers or billets delivered to timber merchants equalled those cut and planed with machinery. The woodcutters were exploited by the merchants, who underpaid them for their timber and kept them in debt with vouchers for buying goods in advance (called 'goodfors'). A few wily woodcutters, however, managed to play the sawmillers and merchants off against one another.

The woodcutters and their families lived so deep in the forests that some never saw a village in their lifetime. Few moved beyond the borders of their district, and such was the spell of the forests that they always returned. A working party, usually a father, his sons and other family members, camped near the tree they were busy felling. Felling a large tree and working it into planks or sleepers could last many days, even weeks. They slept in primitive

shelters of branches and subsisted on sweet potatoes, bread and black coffee. This diet was supplemented with the meat of buck or bushpig, which they hunted or snared occasionally. Honey was plentiful, and a potent honey-beer called 'karrie' was brewed for festive occasions such as New Year's Day.

Once felled, a tree would be cut into manageable sections and slipped along slip-paths to a work station - usually a forest clearing - with the aid of oxen. There the timber would be sawn into planks, beams or sleepers before being transported to the timber merchants on ox wagons. The log sections of very large trees were sawn on site in saw-pits before being hauled out of the forest. The sides of a log section would be 'squared off' with a hand-axe, before being hauled onto cross-beams over a saw-pit dug nearby. A pitsaw with handles on both ends was used to saw the planks. One man stood on top of the log and one or two in the saw-pit, drawing the pitsaw up and down along charcoal lines. These lines, marking the sides of planks and beams to be cut, were drawn using a wet cord dipped in powdered charcoal.

Woodcutters had an uncanny ability to find their way in the twilight world of the forest. The forest, dreaded by many city-bred people who sense a sinister or mysterious presence, was the home of the forest people. When thick fog blanketed the forest, however, it was a dangerous place, where even the forest-wise woodcutter children could lose their way. A few lost children were never found again. Woodcutters lived in close association with nature. Yet they treated trees and wildlife with the same abandon observed among the Amazon Indians or African pygmies. A man would think nothing of felling a tree simply to get some honey.

For more than a century the woodcutters worked the forests in their own manner. From 1874, with the appointment of Christopher Harison as Conservator of Forests, they were subjected to increas-

Woodcutters drawing lots to determine the forest section alotted to each. This quota system was introduced in 1913 to manage and limit the activities of woodcutters.
This photograph was taken in 1926
Directorate: Indigenous Forest Management

ing restrictions. Since the beginning of the twentieth century the woodcutters were regarded as a prominent and difficult part of the Poor White problem. The government intended to settle them into communities in areas where labour was needed for afforestation and other capital projects. The woodcutters stubbornly stuck to their trade, and their numbers gave them political clout. The Forest Act of 1913 required the remaining woodcutters to register, and no new names could be added to the list. More than 1260 were

registered, on whom several thousand helpers and family members depended for their livelihood.

A system was also introduced in 1913 whereby trees in different forest sections to be cut by woodcutters were numbered by forestry officials. The woodcutters, having inspected the sections, then gathered at a forest station to draw lots. Some sections contained better trees than others, and the element of chance appealed greatly to the woodcutters.

In 1932 the Carnegie Commission conducted a socio-economic study of impoverished rural communities in South Africa. The Knysna Woodcutters were regarded as the most important study group. This study found that certain groups of woodcutters were better off and more progressive than others. The woodcutters were also seen as a classic example of an isolated people shaped by their particular environment. In 1939 the forests were finally closed and the remaining woodcutters, 258 in total, were pensioned off. With their families they were brought out of the forests and relocated in communities within reach of schools, churches and medical facilities. Many found new employment as forest workers in timber plantations. A unique way of life, so harmful to the forests and yet so much part of it, finally came to an end.

The Great Fire

...above the smoke I saw the liquid fire pouring over the great wooded krantzes...This was a clean sweep of everything - houses, trees, gardens, orchards, forests all gone...

Bryan Henry Darnell, 1869 (in Margo Mackay: The Knysna Elephants and Their Forest Home, 1996)

Disaster struck Outeniqualand early in February 1869. Bush fires had started all over the area during several weeks of exceptionally hot weather. On the ninth of February a hot bergwind blowing from the north swept the fires through the mountains, gorges and lower coastal plateau. From Riversdale in the west to Uitenhage in the east the land was ablaze.

One branch of the fire swept down a gorge and raced through the hills towards Knysna. Then, by a miracle, the wind changed and thus saved the town from certain destruction. The rural people were less fortunate. In the Humansdorp district alone 27 people died and many homes were razed to the ground. The Barringtons of Portland Manor and the Darnells of Westford escaped with their lives, but lost everything they owned. People took refuge in dams and rivers, covering themselves with blankets against the falling cinders.

Henry Barrington's account of the fire is a lamenting cry from the heart : 'My God! To what state are we now reduced! Every nook of Portland is on fire. I have lost the labour and collections of a lifetime...' Yet, with great courage and energy he started rebuilding his estate the very next day. Bryan Darnell ran towards the Knysna River with the women and children as the fire made a clean sweep of Westford. Walking along the river after the fire he found no signs of life, except for '…an old baboon, crooning

over the desolation'. Bushbuck were roasted alive, and huge forest trees lining the banks of the river crashed hissing into the water. It caused Darnell to remark that : '…one might as well be in the barest Karroo place as on the banks of the Knysna'.

The belt of dense forests along the upper coastal platform were hardly touched by the Great Fire, for fire seldom penetrates deep into moist forest. Dry coastal forest, wooded valleys and isolated mountain forests were, however, destroyed beyond recognition. Soon after the fire, certain individuals, who greatly exaggerated the damage, strongly agitated for the sale of Crown forests. The fire had quite an opposite effect on the Cape government. Shaken by the events, the Government launched an investigation, which would lead to strengthened control over the forests and the appointment of Christopher Harison as the first full-time Conservator of Forests at Knysna.

Several factors contributed to the disastrous fire of 1869. From 1865, under the influence of the Colonial botanist Dr J Croumbie Brown, burning was restricted on the Crown forest lands. The consequences of injudicious protection and the need for controlled burning were not yet known. Several years of plant growth in the fynbos surrounding the forests, dried out by the unusually dry weather, provided an abundance of burning material. The controversy between the government and scientists on the one hand, who viewed the burning of fynbos as detrimental, and the farmers and landowners, who considered fire to be necessary for grazing and avoiding catastrophic accidental fires, raged until the 1940s. Based on scientific observations, controlled burning is now accepted as part of catchment and conservation management for state forests.

Millwood gold rush

If there is gold here, it's everybody's gold. The whole world's !
Dalene Matthee - Circles in a Forest, 1984

In 1876 James Hooper, a farmer of Ruigtevlei, went searching for grit to feed to his ostriches. He found a small gold nugget in a tributary of the Karatara River. Hooper sought advice from Knysna apothecary William Groom and Government Roads Inspector CF Osborne. Both confirmed the find, which weighed 'seventeen pennyweight'.

Osborne, having received a small government grant, started to prospect for gold and by 1879 had found promising traces of alluvial gold in the creeks of the Millwood forest. The news of the finds spread like wildfire, and prospectors poured in from all corners of the world – even as far away as California, Australia and Britain. Osborne was transferred to Lydenburg to serve the Roads Department of the Zuid Afrikaansche Republiek (ZAR), where he gained valuable experience in prospecting before returning to the southern Cape five years later.

The Cape Government would not approve of any prospecting before the productive capacity of the gold-field could be properly assessed. Yet it failed to act against the prospectors who invaded the forested creeks. The prospectors were in fact granted timber concessions. By 1885 about 2 000 claims had been pegged, and a small town grew up in the heart of the forest. Some 200 diggers lived in tents around Millwood, with many more living in small encampments along the creeks.

The search for the 'mother lode' continued, and in 1886 John Courtney found the first reef gold in quartz veins above the creeks.

Millwood in 1886 at the height of the gold-rush. Within a decade the booming mining village was to become a depopulated ghost town, since no substantial gold-bearing reefs were found following the early successes of prospectors
Knysna Museum

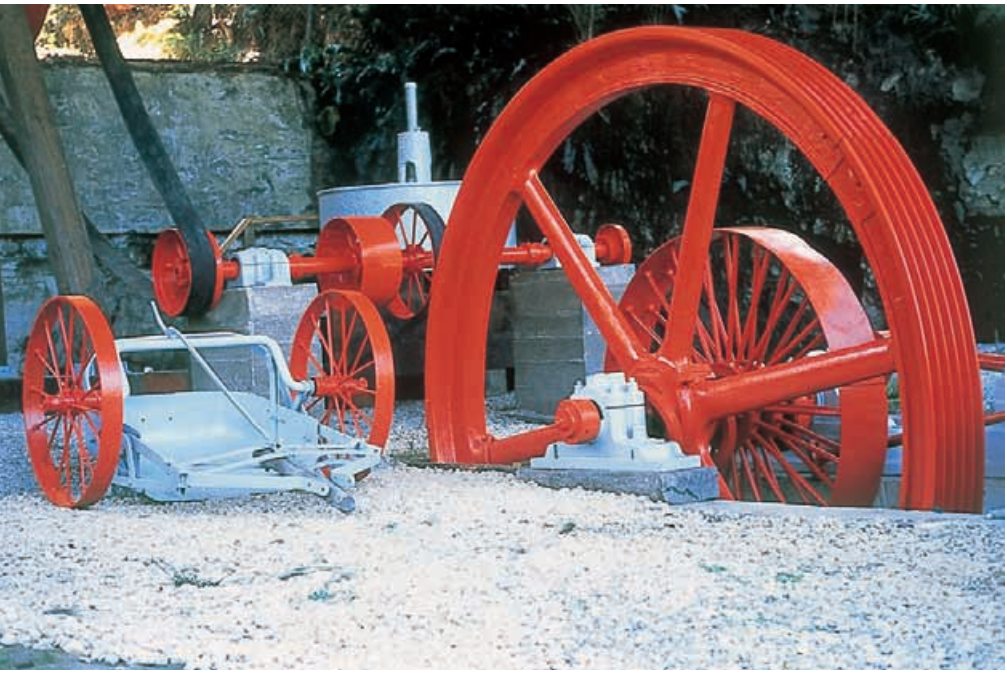
Altogether 135 erven were surveyed in Millwood, and the tents were fast being replaced by corrugated iron and timber buildings. Banks, hotels and boarding houses appeared, and a regular coach service was established. The town of Millwood bore many similarities to the rugged mining towns that mushroomed in the wild frontiers of Australia and North America.

The first newspaper, *The Millwood Sluice Box*, was soon followed by the Millwood Eaglet and the *Millwood Critic*. There was no shortage of news. Elephants occasionally appeared at the town edge. Prospectors spent their money with rough abandon. The Prospector's Committee, tasked with maintaining law and order, had to deal with fist fights, the discharge of fire-arms and even the odd assault or murder. Yet the town grew more civilised as traders, bankers, hotelkeepers and their families began to settle there.

In 1886 the Cape Government informed the prospectors in the forest that they were trespassers, and ordered them to leave. It almost caused a riot. Stormy protest meetings were held, and the

government had to bow before the determined miners. Millwood was officially declared a gold-field in January 1887.

By 1887 about 40 mining syndicates such as Bendigo and Temperance were active in the Millwood area, sinking shafts and boring tunnels. More than a thousand people were living on the goldfields by then. There were six hotels, a banking agent, post office, shops and a music hall in the business centre. The steam ship Venice, loaded with prospectors, goods and mining machinery, plied the waters between Cape Town and Knysna. The road from



Mining machinery recovered from the forested ravines, lovingly restored and housed in the Millwood Mining Museum at Bendigo

Knysna to Millwood was treacherous, and transporting the goods and machinery by wagon taxed the endurance of man and beast.

The promised massive reef strikes never materialised, and overnight Millwood turned into a ghost town. Some prospectors took to hunting for ivory, but the majprity left for the Witwatersrand goldfields in the ZAR. The German mining engineer Gustav Duft described Millwood as a fiasco, brought about by huge capital investments in mining even before the existence of substantial gold bearing reefs was properly investigated. Most of the Millwood mining companies went bankrupt, and by 1893 only 73 residents remained in the town. The gold fever flared up for a short while in 1917 when the Forest Creek Gold Dredging Company attempted to revive the goldfield, but it was all in vain. The goldfield was finally deproclaimed in 1924.

In 1987 the Forestry Branch of the then Department of Environment Affairs started salvaging the rusty mining machinery from the deep ravines. Stamp batteries and a steam engine, lovingly restored, can now be seen in the Millwood Mining Museum. The area is still pock-marked with shafts and tunnels, some of which now serve as roosting places for thousands of bats. Visitors to Millwood find it hard to visualise the hustle and bustle of people, horse-carts and ox wagons which once banned the silence. In the distance, stamp batteries would have added to the din. Silence reigns supreme once more. Of the more than 70 permanent buildings only one - Monk's Store - remained on site.

Pioneers in forest management

In the Colony wood was a much needed commodity and the forests were greatly abused. Dedicated men such as the Frenchman De Vasselot de Régné later contributed to a scientific attitude towards the forests...By the time Count De Vasselot left South Africa...the indigenous forests of the Southern, Western and Eastern Cape were well protected and their management well organised.

Lantern, May 1990

Until the late nineteenth century control of the southern Cape forests remained in the hands of officials who had neither the training nor the time and inclination to ensure their efficient management. There were some notable exceptions, however. A handful of dedicated men stood between the forests and the forces bent on their wholesale destruction. Undauntedly they forged ahead in the face of opposition from the woodcutters and timber merchants, and with little support at first from the vacillating government. The foundation for the present scientific forest management system was laid by these men in more than two centuries.

Johann Friedrich Meeding can be regarded as the first forest management pioneer in South Africa. In 1778 he was transferred from the Swartrivier woodcutter's post at the present-day town of George to take command of the newly created post at Plettenberg Bay. He was directly in charge of the extensive forests around Knysna and Plettenberg Bay, where a number of woodcutters were already active. Under his supervision a timber storage shed was

Top left: Count Medéric de Vasselot de Regné, the first Superintendent of Woods and Forests of the Cape Government. De Vasselot laid the foundation for the scientific management of forests by professional officers
Directorate: Indigenous Forest Management

Top right : Captain Christopher Harison, Conservator of Forests from 1856 to 1874. He introduced a cyclic system for timber harvesting
Directorate: Indigenous Forest Management

built close to the bay, where the timber was loaded on to ships bound for Cape Town.

After Meeding's appointment, no woodcutters were allowed to cut timber in the Knysna forests except under contract with the ruling Dutch East India Company. That Meeding ensured the orderly and profitable exploitation of the forests is proof of his dedication and diplomatic skills, for the woodcutters were a stubborn race to deal with. His strictly enforced protective measures greatly diminished the wasteful and destructive practices of the woodcutters.

Meeding was one of the few officials who never lost his position during the subsequent changes of government - the first British annexation of the Cape in 1795, the return of the Dutch in 1803 and the second British annexation in 1806. A year before his death in 1812, control of the forests went to the British Navy, who managed them as a reserve for the timber requirements of the shipyards.

After the Navy's interest in the forests ceased in 1825, an era of uncontrolled exploitation by an increasing woodcutter population followed. The control of the forest reserves was entrusted to the local landdrosts, commissioners of oaths and postmasters as a part-time responsibility. It amounted to a *laissez-faire* policy, for these officials lacked the necessary training and dedication for this task. From 1847 onwards the situation improved somewhat with the appointment of the first part-time Conservator of Forests, L Haswell, and four forest rangers.

In 1856 Captain Christopher Harison was appointed part-time Conservator at Witelsbosch in the Tsitsikamma. This proved to be a turning point in the history of forest management. Harison had fought on the eastern Cape border as an officer in the Perthshire Regiment in 1850-51, before settling in the southern Cape. Although ignorant about forest management at first, he was a devoted man and an avid learner, who was destined to play an important role in the establishment of a scientific forest management system.

Captain Harison developed the first concept of the 'section system' - a system whereby the forests could be worked in sections, allowing part of the forests to regenerate and rest. This system, very similar to that introduced by Meeding between 1787 and 1812, was first implemented on an experimental basis in the Tsitsikamma forest. Dr Henry White, a prominent member of the Legislative Assembly, refined Harison's ideas and advocated their official implementation.

A government commission led by Captain Harison and Thomas Bain was appointed in 1867 to investigate the plight of the forests. This commission advised the implementation of the section system and the consolidation of the George, Knysna and Tsitsikamma forests under a full-time conservator at Knysna. In 1874 Harison was appointed as the first full-time Conservator of

Forests at Knysna. Unfortunately the area proved to be too extensive for efficient control by one conservator and a handful of rangers. Harison's difficulties were also compounded by the influx of miners to the Millwood forest, after the discovery of gold in 1876.

Henry Fourcade
Directorate: Indigenous Forest Management

Another turning point came when the Cape government appointed the Count Medéric de Vasselot de Regné in the newly created post of Superintendent of Woods and Forests in 1880. He was a forestry expert of international distinction, well qualified to draw the forests back from the brink of disaster. A year later the French-speaking Count took up his post in Knysna with his professional assistant and interpreter, A W Heywood. He immediately set to work to develop a more efficient management system based on the previous concepts of the section system, and on the principle of matching timber removal with the rate of forest growth.

Although De Vasselot did not succeed in completely arresting the exploitation of the indigenous forests during his twelve years in office, he greatly improved their management in many respects. Under his auspices a Forestry Department was developed with professional officers on its staff. Many of the forest officers were graduates of the Nancy School of Forestry in France, like himself, and they were destined to play an important role in forest management and forestry in the country.

In 1883 Forest Regulations were promulgated to put the new forest management system of De Vasselot into operation. This was followed by the first Forest Act in 1888, by which demarcated forest became inalienable. De Vasselot also published manuals on forest management and timber harvesting to guide management practices in the field. Under his supervision the first timber plantations were established near Knysna. It was a long-term investment aimed at reducing the burden of timber demand on the indigenous forests.

Among the trained officers on De Vasselot's staff was Colin McNaughton, who started with experimental forest research and drew up a scientific plan for forest management. Henry Fourcade, who joined the Forestry Department in 1882, was perhaps the most talented and versatile of the young professionals. For some years he was engaged in surveying and sectioning forest areas. Before the turn of the century he invented, and started applying, stereoscopic photography and projective geometry to topographical mapping.

Fourcade completed the first checklist of trees and shrubs in the southern Cape forests at the young age of twenty. In later years he became known at the Royal Botanical Gardens in Kew and at the Bolus Herbarium at Kirstenbosch, Cape Town, as an outstanding amateur botanist. He was awarded Honorary Doctorates of Science by the Universities of Cape Town and of South Africa in 1930 and 1947 respectively, the latter a year before his death at Witelsbos in his beloved Tsitsikamma region. His work is commemorated in the names of 27 plants.

A new era in systematic forest research began with the appointment of John (JFV) Phillips as Forest Research Officer at Diepwalle in 1922. Phillips was the first South African to receive a doctorate in the field of forest ecology, viz from the University of Edinburgh. His thesis, *Forest Succession and Ecology in the Knysna Region*, was published as a memoir of the Botanical Survey of South

Africa in 1931. This research greatly improved upon the then existing scientific knowledge of the forests. FS Laughton succeeded Phillips as Forest Research officer at Diepwalle, and contributed much practical knowledge through his experimental forest management scheme within a reserved part of the Knysna forests.

In 1963 Dr Friedrich von Breitenbach joined the then Department of Forestry as a research officer for the indigenous forests. He was to play a prominent role in the development of the present multiple-use management system for the Knysna forests. When the Indigenous Forest Research Station was established at Saasveld in 1964, Von Breitenbach supervised the preparatory research for the development of the new management system, as well as the training of specialised personnel. With the support of his wife Jutta he initiated the formation of a tree - oriented conservation group called the Dendrological Society and produced several valuable publications on the trees and forests of South Africa and the southern Cape.

All these personalities, whose lifetimes span more than two centuries, richly deserve recognition for their role in ensuring the future of the southern Cape forests. Yet they are not the only ones deserving recognition. Among them, in every age, men and women from a variety of cultural backgrounds worked quietly and loyally and unseen by the public eye, as forest guards, scientists and forest managers. The soaring trees are their tribute, for without their efforts the forests would have ceased to exist long ago.

Knysna forest railway

There is something romantic about forest railways.....coffee-pot locomotives, belching out smoke and showers of sparks, as they laboriously toil through the gloom of primeval forests with their heavy loads of logs.

HA Lückhoff - Forest Railways in South Africa, in Forestry in SA, July 1961

When a 35 km forest railway between Knysna and Diepwalle was completed in 1907 by Swedish engineer Carl Westveldt, it was cause for great celebration. The train was bedecked with flags and bunting, and dignitaries gathered at the station for the opening ceremony, before guests were taken on a trip into the forests. The travellers were treated to magnificent views as the two feet gauge (66 cm) tracks skirted the estuary, then climbed steeply through the bracken-covered hills to a height of 450 metres, until it finally entered the cool depths of the main forest.

The train ran three times a week, making three stops in the forest - at Bracken Hill, Parkes Station, and Templeman's Station at Diepwalle. It left Knysna at 7 a.m., arriving at Diepwalle four hours later. Besides timber, it carried passengers, mail and other goods. Up to 70 tons of timber were carried on the return trip. Three Orenstein & Köppel side-tank locomotives (0-4-0, 0-6-0 and 0-8-0) were used, with a British built model added in 1930. The locomotives with their cone-shaped chimneys were affectionately known as the 'coffee-pots'. The driver was Tom Kennett, who named his four sons after the biblical disciples Matthew, Mark, Luke, and John.

The forest railway was owned communally by local bussinessmen Thesen, Parkes, Templeman and others, who formed the South-Western Railway Company Ltd. with the aid of a Government subsidy. Building of the railway started in 1904, when transport by ox wagons alone could not meet the demand for timber required by the sawmills any more. In the 1930s cheap timber transport by motor lorries began to compete with the railway, which eventually forced it to close down in 1949.

The railway played an important part both in the timber industry and in the entertainment of visitors. Packed lunches,

An early Orenstein & Köppel 'coffee-pot' locomotive and passenger coach of the South-Western Railway Company departing from a station near Knysna
Knysna Museum

folded chairs and servile attendants provided a true colonial experience for the well-to-do, who travelled in closed passenger coaches. Woodcutters and sailors, known to the locals as 'navies', preferred to rough it in the open trucks. Surviving forest workers still remember a certain Mrs Perks, known as the 'Forest Fairy', who had to travel on two chairs in an open truck because her overweight frame could not fit through the doorways of the passenger coaches. A young boy frequently rode in the leading truck, to pelt cattle or game straying on to the track with stones.

Standing on the right is train driver, Tom Kennet en route to Diepwalle in one of the 'coffee-pot' locomotives
Knysna Museum

The railway was a financial failure throughout its operating years, except for the two world war periods. When it was opened in 1907 the charge to transport one ton of goods or timber was a mere 'four pennies per mile'. By 1949, when the railway was closed and the rolling stock sold to a sugar mill in Natal, the fees had hardly risen. Knysna thus lost one of its major assets, which could have been a unique tourist attraction today. All that remains are few sections of overgrown tracks, known only to the select initiates.

Roads into Eden

...travellers had struggled as best they could through a wild tumbled country...sand dragged at the wagon-wheels and each river had to be forded. Inland the kloofs, gouged out to great depths, and thick forests with innumerable streams and morasses, were obstacles just as great...Roads and communications with the outside world which were so long in coming, are now coming with a vengeance!

Arthur Nimmo - The Knysna Story, 1976

Modern-day motorists coasting over gorges and drifts on the tarred national road (N2) between George and Humansdorp are blissfully unaware of the hazards this terrain posed to early travellers. Facing a turbulent sea of deep gorges, thickly forested hills, deep sands and hazardous drifts many of the eighteenth and nineteenth century explorers chose to bypass the region. They crossed the Outeniqua Mountains to the Langkloof, which took them along a much easier route to Humansdorp and the eastern Cape beyond. A few thousand wood-cutters and a handful of farmers and timber merchants did settle in the region, following on the heels of hunters and explorers. Yet the Outeniqua and the Tsitsikamma regions remained isolated and neglected well into the twentieth century.

Despite the isolation of the Knysna and Tsitsikamma forests, they were far too valuable to the timber-starved Cape Colony to be ignored. At first the timber was shipped to Cape Town from Johann Meeding's timber post at Plettenberg Bay. Loading the ships through the surf at the bay was risky, however, and the British Government sent a Captain Jones to the region in 1811 to investigate the suitability of the Knysna estuary as a port. A naval

vessel, the Podargus, was the first to enter the estuary. Soon the port grew in importance, and more than a thousand tons of timber were shipped to Cape Town each year, along with other commercial produce. The passage through the Heads was dangerous due to submerged reefs, and several ships were smashed on the rocks. In 1870 the newly arrived Norwegian Thesen family began coastal trading with their sailing ship Albatross, which soon expanded to a fleet of steamships.

Road transport routes developed at a snail's pace. By the early nineteenth century a rough wagon road had been blazed from George to Knysna and from there to Plettenberg Bay.

Nineteenth century travellers on a Cape cart. The journey by cart between Knysna and George took 14 hours

National Archives of South Africa

The pass through the Kaaimans gorge just east of George was considered the most difficult in southern Africa, dropping more than 250 metres to the river, with an equally steep incline on the other side. William Darbyshire wrote in 1849 that his 'blood froze with horror' when his wagons reached the Kaaimans. Many wagons and oxen came to grief in this gorge over the years, hurtling down the steep incline and dashing to pieces in the gorge below.

An ox-wagon negotiating Homtini Pass (Barrington Pass) between Knysna and George in 1880
National Archives of South Africa

Large boulders in the river threatened to shake wagons apart during the crossing. It meant hours of strenuous toil - men and oxen straining on riems (leather thongs) amidst much shouting and bellowing.

From there the wagons descended down the Wilderness Heights and then ploughed through thick sand along the inland side of the lakes. An alternative route further inland avoided most of the sand and the wide drifts, but cut through several deep gorges, to emerge near Groenvlei. Thereafter the wagons had to brave the Goukamma and Knysna rivers. The *Cape Argus* reported in 1858 that Plettenberg Bay could only be reached by 'toiling over roads unparalleled in the Colony for its difficulties.' The journey of 75 km between George and Knysna took several days by ox wagon and about 14 hours by postcart or on horseback.

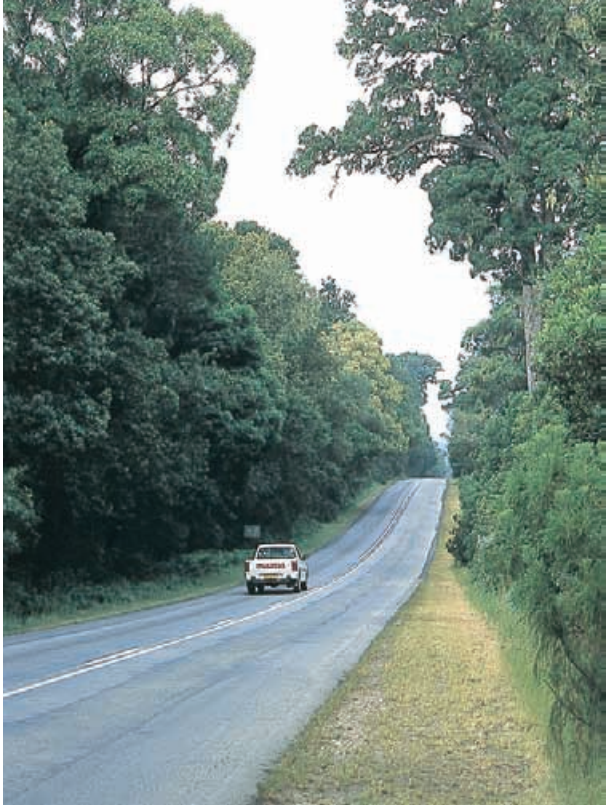
The first passes linking George (Montagu Pass) and Knysna (Prince Alfred Pass) to the interior aimed at evading the hazardous

route through Outeniqualand and the Tsitsikamma. Andrew Bain began building the Prince Alfred Pass in 1856 and his son Thomas completed it in 1867. This pass contributed little to trade and communication in the region, and it remains an unimproved, though scenic, relic of the nineteenth century. The first proper road to be built in Outeniqualand was the old 'Passes Road' between George and Knysna, named after the many passes traversing the deep gorges. Thomas Bain and the government road engineer CF Osborne started on the construction of this road in 1868. Up to that time all the roads and passes were built by convict labour, many of whom died in the process.

Construction on the 'Passes Road' progressed painfully slowly. At one stage a section through deep sand near the lakes had to be switched to Homtini further inland. It took 19 years to complete this 75km road. By then the Cape government had taken an interest in the region, and the 200 km road between Knysna and Humansdorp took only five years to complete. The latter route included the scenic Grootrivier and Bloukrans passes, built under the supervision of Thomas Bain, and a pontoon at the Keurbooms River. The roads now opened up previously inaccessible parts of the forests to woodcutters and hunters.

The seemingly primitive road-building methods applied by Bain and his contemporaries in the construction of these roads - manual labour, minimal infillings and excavations, the narrowness of the roads – unwittingly resulted in a lesser impact on the environment than later construction of the kind. Building of the Bloukrans Pass actually promoted the regeneration of locally rare red stinkwood (Prunus africana) on the few landslides caused by the road, which passed through the centre of that population.

The Passes Road remained the only route between George and Knysna until 1951. The tourist of 1914 had to negotiate 58 gates along this route!



A monument to modern demands, the N2 Garden route cuts through the ancient Tsitsikamma forests. Although the road was built at the cost of many stately trees, knowledge gained through scientific studies helped to limit the damage

The first permanent bridge to replace the drift at the Knysna River was built in 1915. As the roads improved the outside world began to penetrate the region to admire its beauty. Yet motorists still faced the hazards of drifts and narrow roads that turned slippery in rainy weather. Irish-born playwright George Bernard Shaw was injured when his vehicle left the road near Wilderness in 1929. Confined to bed with a broken leg, he wrote the Adventures of the Black Girl in Search for Her God.

Railway sleepers cut from the Knysna forests (mostly yellowwood) were shipped to the rest of the country in their hundreds of thousands during the nineteenth and early twentieth centuries. What a touch of irony that railways were being built everywhere except in the southern Cape! A railway link between George and Knysna was only completed in 1928. For the next decade, until the

forests were closed to the woodcutters, Knysna station served as a huge depot for railway sleepers and other timber.

During the Second World War the Outeniqua Pass linking George with Oudtshoorn in the interior was built with the aid of Italian prisoners of war. When in 1951 Knysna suddenly had a tarred national road linking the town with George and Cape Town to the west, and to Humansdorp and Port Elizabeth to the east, the dream of Henry Barrington had come true. (He was a British nobleman who had settled near Knysna in 1842, and had played an influential role in the development of the district.) Now the cars of holiday-makers and commercial trucks began to rumble down the main street. Improved communications brought great rewards, especially in the emerging tourist and real estate industries. But it exacted a toll on the environment, since the smooth road curves of modern engineering standards were obtained at the expense of many stately forest trees.

Plans for a new road slashing through the tall forests of the Tsitsikamma drew vehement opposition in the early 1970s. This was the beginning of a new era of environmental awareness and concern. Public opinion was not strong enough to stop building of the road, however, and construction of what was to be the first toll road in South Africa began in 1972. More than 40ha of high forest were sacrificed to obtain smooth and quick communication, although care was taken to minimise the gaps torn in the canopy and to revegetate road verges. Detailed studies done during the building of this road guided subsequent road-building projects.

Although the road certainly reduced traffic congestion during the holiday seasons and brought some benefits to tourism, future developments of this kind will understandably face strong public opposition. Nowadays such projects are subject to compulsory environmental impact studies in terms of new legislation.

Our goal should not be blind opposition to progress, but rather opposition to blind progress. This universal piece of advice given in 1892 by John Muir, founder of the Sierra Club, is even more relevant today. The sea, lakes, mountains and forests of Outeniqualand and the Tsitsikamma are resources to be used, enjoyed and developed with the utmost care, lest the very attributes that attract tourism and development to the region be lost for future generations.

Generalised climate zones of the southern Cape

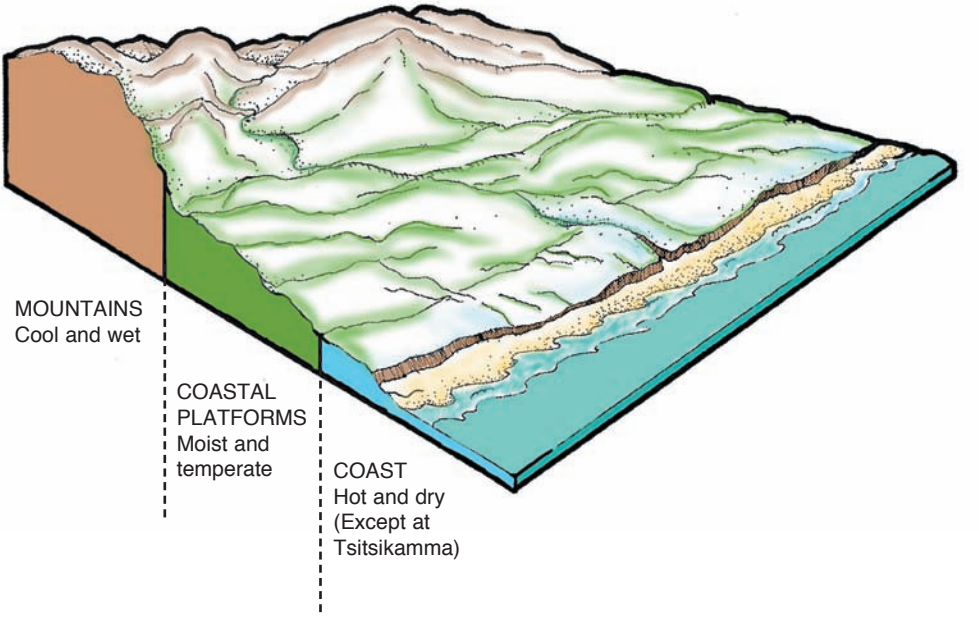


Illustration by Francois van der Westhuizen

A panoramic view over the Wilderness towards the hazy outline of the Tsitsikamma Mountains in the distance
Kelvin Saunders (Studio Atrium)

SETTING AND ECOLOGY

Between the sea and the mountains

The whole forest region is one of exceptional natural beauty, with imposing mountain ranges, enchanting lakes near the sea and a coastline of precipitous cliffs, broken only at Plettenberg Bay, Knysna and between the lakes and the Wilderness.

A C Mundy-Castle & G K Nelson - Psychologia Africana, 1962

Wind bearing moisture from the southern Cape coast rises inland over a series of terraces until it hits the jagged peaks of the Outeniqua and Tsitsikamma mountains inland. The high rainfall all year round nurtures the largest forest complex in southern Africa. It generally increases from 500mm along the drier coast to about 1 220mm in the wetter mountains, although high rainfall (1 200mm) also occurs at Diepwalle high on the coastal platform, and at Storms River, where a narrow coastal platform separates the coast from the Tsitsikamma mountains. The forest region stretches in a narrow coastal strip of 220km from Ruitersbos at the Robinson's Pass west of George to the Tsitsikamma River near Humansdorp. Its width from the coast to the mountains varies between 15 and 40km. The forests, some 60 500ha in extent, occur in a broken belt of several large complexes on the coastal platform, together with numerous smaller forest patches in the mountains and ravines.

A steep coastal scarp rises up from the rocky shores of the southern Cape, alternated by estuaries, lakes and sandy beaches in a few places. Many ships have run ashore on this particular coastline, which is battered by a notoriously temperamental sea. Above

The steep rocky coastal scarp rises to a series of coastal platforms sloping towards the mountains inland. The treacherous coastline has claimed many ships and lives since the Portuguese seafarers rounded the Cape of Good Hope five centuries ago
Coert Geldenhuys

the escarpment the wave-cut coastal platform rises from 150 to 350m above sea-level, dissected by deeply incised river gorges.

The upper platform and foothills start approximately 5 to 15km inland, rising to a height of more than 1 200m. Although the indigenous forests occur from sea level to heights of 1 000m or more, most of the high forest is confined to the coastal platform and foothills.

Temperatures in the southern Cape vary from an average daily minimum of 7.4 °C in July to an average daily maximum of 24.5°C

in January. From the mountains to the sea the temperature rises several degrees. Hot bergwinds often blow from the north-west, sometimes fanning fires that sweep through the mountains and lap at the forest margins. The highest mountain peaks are occasionally capped by snow, following very cold spells during the winter months when cold fronts sweep in from the south-west.

The soils of the southern Cape are mainly derived from a bedrock of quartzitic sandstone. A thin layer of topsoil (scarcely 30cm deep in places) underlain by clay or bedrock sustains the forests. This limits the effective rooting depth of trees severely. The soils are generally acid and poor in nutrients, partly due to the leaching or washing out of nutrients by the high rainfall. Deep aeolian sands occur in a few areas near the coast.

Apart from quartzitic sandstone, a variety of other geological formations occur in some locations. Those which have a notable influence on forest type and plant species composition include conglomerates (western end of Knysna and Plettenberg bay), granites (George) and schists, phyllites and shales (Old Passes Road, Kaaimans River gorge and Bloukrans Pass), which harbour drier forests.

Generalised classification of forest types

medium moist - High Forest

moist - High Forest

dry - High Forest

wet - High Forest

very dry - Scrub Forest

very wet - Scrub Forest

Dry scrub forest and dry high forest occur in dry locations near the coast or on northern and western slopes higher up. Medium-moist and moist high forests occur on the lower coastal platform, while wet high forests and scrub forest extend from the upper platform into the mountains and down into valleys

Sketch by Francois van der Westhuizen

Forest types

For several decades foresters…have been considering the possibility of classifying forests into types, with the objects of facilitating mapping, description, management…and the study of forest biology.
JFV Phillips – SA Journal of Science, Vol 25, 1928

The composition of the indigenous forest varies from place to place, depending on height above sea-level, rainfall, type of soil, aspect and other factors. The forests are therefore divided into six forest types which vary from dry forest to moist and wet types of forest.
Kito Erasmus - Ecological Summer School, 1989

The southern Cape forests are by no means uniform. Local differences in climate, soil type and soil depth generate a variety of forest plant communities, each with its own particular mix of species and forest form. Plant species with similar habitat preferences tend to grow together, although some species with a wide habitat tolerance may occur in several forest types.

Scientists divide the southern Cape forests into six types which occur in three major climate zones. Both the forest types and climate zones are simplified models of reality, created to aid forest management. The rainfall increases from the warm, dry coast over the moist platform to the cold and wet Outeniqua and Tsitsikamma mountain ranges inland. Dry forest types with a scrub-like appearance occur in the dry coastal zone (although wetter forests occur along the coast at Storms River where the coastal belt between the sea and the inland mountain range is at its narrowest). Moist forest types with high canopies and valuable timber trees occupy the higher coastal platform and hills. Wet forest types with a dense

undergrowth of ferns are found in the deep, perennially damp ravines and on the mountain slopes inland.

Thorny bushes such as the num-num *(Carissa bispinosa)* and woody vines abound in the **dry scrub forest** which grows in the warmest sites close to the coast. Leathery leaves enable the plants to withstand salt-spray from the sea and to limit water loss. White milkwood trees *(Sideroxylon inerme)*, candlewood *(Pterocelastrus tricuspidatus)* and the Cape or bastard saffron *(Cassine peragua* subsp. *peragua)* form part of the low canopy of between 6 and 12m high. Stunted trees and shrubs such as the aromatic sagewood *(Buddleja salviifolia)* abound, while ferns and epiphytes are usually rare.

Dry high forest of up to 18m high is found on the moderately warm western and northern slopes of the lower coastal platform. Candlewood, white pear *(Apodytes dimidiata)* and quar *(Psydrax obovata* subsp. *obovata)* are some of the common canopy trees. A variety of ferns, grasses and herbs occur on the forest floor, topped by an understorey of thorny shrubs. Carpets of forest grass *(Oplismenus hirtellus)* and wild asparagus (*Asparagus* species) can be found in some parts of the forests.

Medium-moist high forest occurs on the coastal platform in deep loamy soils kept moist by sufficient rainfall. Large trees such as stinkwood *(Ocotea bullata)*, real yellowwood *(Podocarpus latifolius)* and Cape beech (Rapanea melanophloeos) form a canopy of up to 22m high. Ironwood (Olea capensis subsp. macrocarpa) and Outeniqua yellowwood *(Podocarpus falcatus)* reach such a tremendous height that their crowns frequently tower above the forest canopy. Immature canopy trees and lower trees such as the kamassi *(Gonioma kamassi)* form a loosely defined intermediate canopy. Black witch-hazel *(Trichocladus crinitus)* usually forms a dense shrub layer in the understorey. Small ferns, forest grasses and flowering herbs occur scattered on the forest floor, but become

more abundant in the glades and forest margins. This forest type comprises about 40 per cent of the southern Cape forests, and produces most of the valuable indigenous timber species harvested for the furniture industry.

Moist high forest occurs on higher parts of the coastal platform than the medium-moist forest, in poorly drained loamy soils that are wet throughout the year. Huge trees soar up to the canopy, which may be up to 30m high. The canopy is topped in places by even taller Outeniqua yellowwood giants. The dominant species resemble those in medium-moist high forest. A very rich diversity of ground flora occurs, while the height and density of witch-hazel in the shrub layer vary. Ground flora include the stinkleaf (*Plectranthus fruticosus)*, seven weeks fern (*Ruhmohra adiantiformis)* and blue sourbulb *(Aristea ensifolia)*. Multi-stemmed stinkwood and white alder trees *(Platylophus trifoliatus)* growing from grotesque old stumps are frequently found in the moist high forests.

Sparse sunlight filters through the foliage of tall canopy trees in a moist high forest on the coastal platform.

Wet high forest is found on permanently wet shallow soils where the rainfall is high. These sites include the eastern and southern slopes of the foothills and higher platform bordering the mountains. The canopy of between 12 and 20 m is formed by high stinkwood, red alder *(Cunonia capensis)* and real yellowwood trees interspersed with middle-sized trees such as the kamassi.

The relatively dry forests along the coast, battered by wind and sea spray, have a much lower and less stratified profile than the high forests inland

Small trees include the tree fuchsia or notsung *(Halleria lucida)*. High ferns such as Blechnum capense carpet the forest floor while dense thickets of tree ferns *(Cyathea capensis)* grow in the wettest and darkest parts.

Wet scrub forest grows in the very wet shallow soils high on the sheltered mountain slopes and in deep ravines. Red alder, stinkwood, real yellowwood and Cape beech are among the stunted trees forming a low canopy of between 6 and 10m. Ferns are abundant, and many tree ferns and shrubs such as the Cape stock rose *(Sparmannia africana)* occur here.

The forest type classification not only enhances our understanding of the variety of growth forms in the southern Cape, but also serves as a management tool. Although valuable timber does occur in the wet high forests, management of these forests is not directed to the exploitation thereof, due to their ecological sensitivity (steep slopes and wet soil). The greatest care is therefore given to the less sensitive medium-moist and moist high forests which also yield valuable timber trees, harvested in small quantities. Both occur on the coastal platform where the topography is more gentle and the moisture content of the soil is lower. Soil compaction and damage to the canopy are the greatest dangers to be avoided in these forests. Dry and wet scrub forest require less intensive management because they do not contain productive timber compartments. They are nevertheless very sensitive. Regeneration does not occur easily, and much effort goes into the eradication of exotic invader plants in disturbed areas. These forests are also protected for their scenic value, their occurrence within water catchment areas and their role in stabilising soil.

The layered forest

...the tropical climax forest consists of a number of distinct layers, or strata, of vegetation. We can divide the space between the forest floor and the open sky in roughly five zones, each occupied by its own plant species.

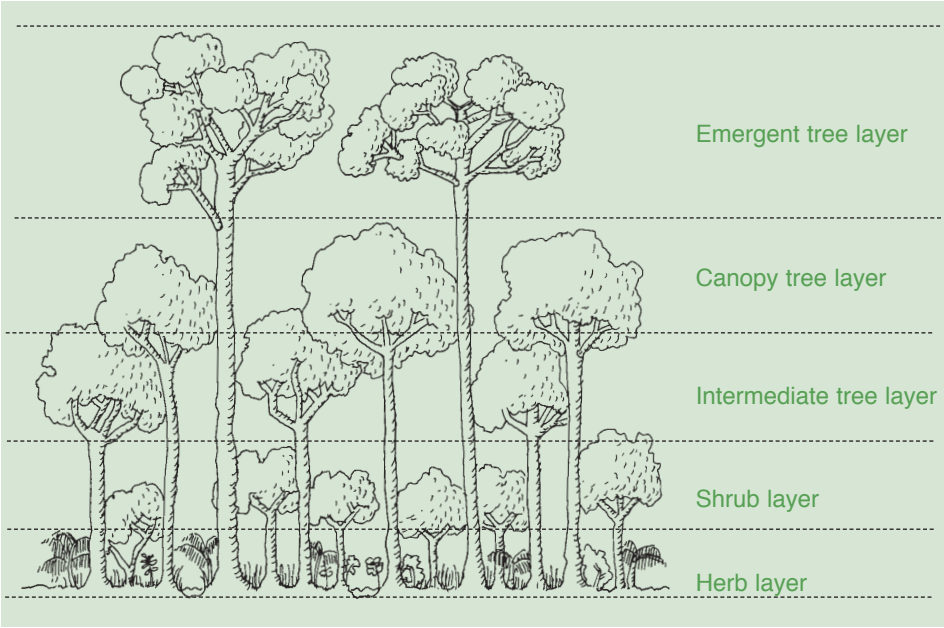
Chris & Tilde Stuart - Africa: A Natural History, 1995

In the crowded rainforest where plants jostle for space, the trees push relentlessly upward to fill the gaps left by dying or fallen trees. Beneath the canopy of interlocking crowns the forest grows in layers, each harbouring a unique range of animals and plants adapted to exploit that particular level. The moist high forests bordering parts of the Garden Route have a more layered structure than either the drier forests and scrub near the coast or the very wet forests sheltering high on the mountainsides or in the shaded parts of deep valleys.

A moist high forest typically has a herb layer at ground level, followed by a layer of shrubs 3 to 6m high and then a loosely defined layer of trees 6 to 12m high, topped by a canopy formed by trees 16 to 22m high. In some parts gigantic trees of up to 45m, usually Outeniqua yellowwoods (Podocarpus falcatus), emerge above the canopy to form a fifth and final layer. Each layer filters out more sunlight, from the sun-drenched canopy to the dank, shaded forest floor.

Canopy trees form the bulk of the forest. Their crowns, borne on long, slender trunks branch out high above the forest floor, with leaves arranged in a light-trapping mosaic. The canopy, where 90 per cent of the photosynthesis takes place, is the 'driving force' of the rainforest.

Forest layers



The rainforest grows in five layers - a herb layer, shrub layer, intermediate layer of trees, canopy trees and emergent forest giants. The microclimate of each layer is different in its exposure to wind and sun, moisture and temperature, and each harbours a unique range of animal species and epiphytic plants

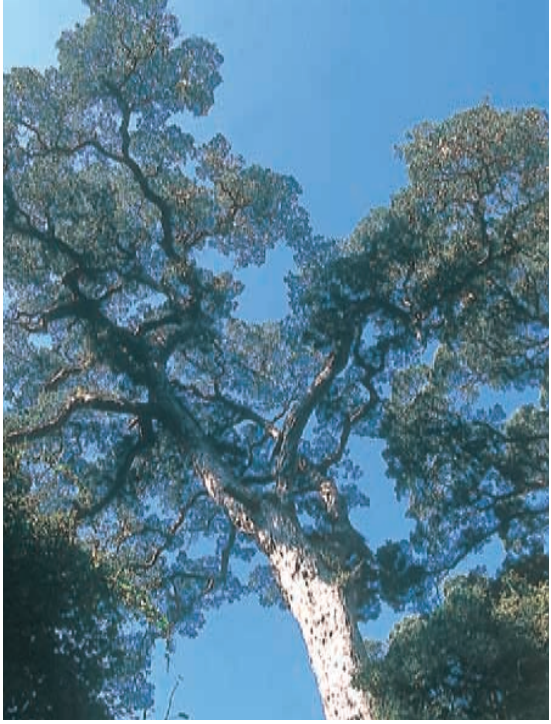
Sketch: Francois van der Westhuizen

Although temperatures in the fully exposed canopy can be much higher than on the shaded forest floor, observations in the Groenkop forest have shown a difference of only 2°C, possibly due to local climatic conditions. Much higher wind speeds in the canopy (wind chill factor) contribute to this small difference. When the occasional winds whip the crowns of canopy trees, the sheltered plants beneath the canopy hardly even stir.

An ancient symmetry of fronds radiates from a forest tree fern in the moist understorey - one of the oldest plant forms

Many fruit-eating birds, such as the rameron pigeon (Columba arquatrix) and the Knysna Lourie *(Tauraco corythaix)* keep to the forest canopies, where they feed on the abundant fruits of trees such as the real yellowwood *(Podocarpus latifolius)*. Others such as the chorister robin *(Cossypha dichroa)* search for fruit, seeds or insects in the lower strata of the forest. Different kinds of mammals, insects and reptiles also populate different strata of the forest, although many occur in more than one layer.

The ferns and flowering plants in the herb layer are adapted to make the best use of the dappled shafts of sunlight reaching the forest floor, although they are most prolific near the forest margins where more sunlight reaches the ground. In the forest gaps they are replaced by more hardy pioneer species. The shrub layer contains many attractive plants such as the wild pomegranate (Burchellia bubalina), which bears brilliant red flowers between spring and autumn.



An emergent Outeniqua yellowwood (Podocarpus falcatus) soars to the sky above the canopy. These giants can grow up to 45 metres

Top honours for the most prolific shrub go to the black witch-hazel or 'onderbos' *(Trichocladus crinitus)*, which frequently occurs in densely concentrated stands, although not on wet sites or in forests recovering from major disturbances such as fire.

Both the herb and shrub layers harbour many seedlings and saplings of forest trees. These grow into stunted trees, which form the intermediate layer underneath the canopy. There they sit tight and wait for a chance to race to the sunlight as soon as a gap is torn in the canopy by a dying or falling tree. Many never get that chance, and remain suppressed in the shadows of their more fortunate neighbours.

Epiphytic plants occur in all the strata of the forests, together with woody lianas and herbaceous creepers. This profusion of orchids, ferns, herbs, mosses and lichens growing on the trunks and branches of forest trees between the forest floor and the tree-tops greatly add to the biodiversity and luxuriant appearance of the moist forests.

Nutrient recycling, litter fall and root systems

So the living community in the forest grows, drawing in elements from air and water, and energy from the sun, building them into life...

John H Storer - The Web of Life, 1956

Two solid walls of high forest border the road verges along parts of the Garden Route. The luxuriant and robust appearance is typical of the African rainforests. Yet appearances are deceptive, for rainforests throughout the world are fragile. The luxuriant growth is supported by but a thin layer of topsoil. The substratum is relatively infertile, having been washed out by the rainwater percolating through the soils for many centuries. How then do these forests exist? The three major components are: nutrient recycling, litter fall, and root systems.

Nutrient recycling

Rainforests are virtually self-contained ecosystems which endlessly recycle their limited stock of nutrients. Most of the nutrients are hoarded within the bulky masses of the plants. The evergreen trees shed part of their leaves throughout the year, to constitute most of the humus layer.

There is almost no buildup of litter on the forest floor. The rapid recycling of nutrients is vital to the survival of rainforests. Forest trees grow shallow roots in the thin humus layer, which quickly re-absorbs the nutrients (mostly nitrates) released through decay. An abundance of fungi and microbes accelerate the process

of decay, which takes place many times faster than in other habitats such as woodland (bushveld or savanna). In the southern Cape the litter mass on the forest floor varies between 9 000kg and 12 000kg per hectare. Most of the organic material decays fully within two to four years. The rates of decay in drier forests are considerably slower.

A chorister robin (Cossypha dichroa) scratching for insects among leaf litter

Litter fall

The total mass of litter falling to the ground in a year amounts to between three metric tons (3 000kg) per hectare in drier forest to five metric tons (5 000kg) in moist forest. Leaves form 80 per cent of the litter in the humus layer, and twigs and bark between 10 per cent and 15 per cent. The rest consists of fallen flowers, fruits and animal matter. Although the leaf fall of evergreen trees occur throughout the year, it peaks significantly in summer. This coincides with the period of moisture stress when the water loss through transpiration exceeds water gains through rainfall. The few deciduous forest trees drop their leaves just before the flush of new leaves and therefore stand without leaves for a very short period.

Evergreen forest tree species adapted to the scarcity of soil nutrients synchronise their flush of new leaves with leaf fall (the leaf flush occurs in spring). This allows nutrients to transfer inside the plant from the old to the new leaves, before the old leaves are dropped. Leaf fall in mid-summer has the advantage of rapid breakdown, release and uptake of nutrients by roots, for micro-organisms are particularly active during the warm, humid summer.

Root systems

The forest trees generally have shallow root systems, even if the soil happens to be deep. A typical root system reaches a maximum depth immediately below the root-stock, which decreases outward to the edges. The roots seldom grow deeper than 30cm. This can be seen where large trees fall over, next to a forest walk. Large standing trees of the Outeniqua yellowwood *(Podocarpus falcatus)* have shallow root systems that appear partly above the soil surface and extend horizontally in excess of 40m away from the bole.

A strong wind toppled this forest tree, exposing its shallow root system

The shallow roots of the forest trees are adapted to the typical conditions in the forest soil. Firstly the nutrients are concentrated in a shallow, well-drained humus layer, underlain by heavy clays in many parts, which causes waterlogging up to 30cm below the soil surface. This inhibits root growth deeper than the topsoil or humus layer. Secondly the nutrients are constantly leached from the subsoil layers by copious

amounts of rain-water, hence the feeder roots of trees concentrate near the surface to absorb nutrients from the decomposing litter. The root mat on the soil surface is therefore one of the most important mechanisms for direct nutrient recycling and nutrient conservation in a rainforest. Disturbance of the root and litter layers will have significant negative effects on forest nutrition and will accordingly affect forest regeneration and recovery.

In the closed forest the shallow-rooted trees are supported by the surrounding trees. When gaps or forest edges are created, the trees are more prone to windfalls, especially when part of the root system is removed (eg in excavation for roads). The trees are also sensitive to poor soil aeration due to soil compaction caused by trampling (such as at picnic sites). The board walks around big trees and along forest walks near picnic sites are there to protect this feeding root system against trampling and soil compaction.

Thus the forest litter, root systems and nutrient recycling form part of a tender lifeline that needs protection from human interference. In the southern Cape the roots of forest trees frequently colonise rotting logs even before the latter become part of the humus layer. In this way death becomes part of life, and the rainforest feeds on itself to spawn endless generations of plants and animals.

Forest gaps and margins

When a canopy tree dies, rots and falls...sunlight pours through to the normally darkened forest floor and encourages the rapid growth of herbaceous plants and shrubs...

Chris & Tilde Stuart - Africa: A Natural History, 1995

The fast-growing indigenous trees and shrubs that border a forest serve as a buffer...They protect young trees against fires and browsing animals...

David Bristow & Gerald Cubitt -The Natural Heritage of South Africa, 1988

In the dark interior of a rainforest it seems as if the trees have remained rooted to the earth since the beginning of time. Yet the forest is constantly changing. Gaps appear when trees killed by lightning or disease shed their leaves. Trees toppled by wind tear even larger gaps in the canopy. These gaps or glades harbour new plant communities in various stages of regeneration, and are part of the natural cycle of growth and renewal in a forest.

About ten times more sunlight strikes the canopy of a rainforest than the forest floor. As soon as a gap appears in the canopy, sunlight pours through to increase the temperature and lower the humidity of the forest. In these sunlit glades shade-loving plants such as the fern *Asplenium simii* are replaced by hardier ones such as the stinkleaf *(Plectranthus fruticosus)*. The seeds of pioneer plants and their successors lie dormant in the soil for decades, until the right conditions develop. As the pioneers grow they improve the soil and restore the humidity, thus preparing the way for a next generation of forest trees to make their way to the top.

Seedlings of the forest trees grow to become saplings, which compete with one another to replace the old trees that once filled the gap. Established saplings waiting for a gap to appear have the best advantage in this battle for supremacy. Only a few eventually reach the canopy to close the gap. The losers remain in a suppressed state in their shadows. There they wait patiently for the next gap to appear, should they be lucky enough to have another chance within their lifetime. The process of plant succession from the appearance to the closing of a forest gap may take more than a hundred years. Huge gaps caused by catastrophic events may never recover completely. A few very large gaps or 'islands' caused by natural and human-induced fires (eg 'Petrus se Brand' island) have over centuries been colonised by fynbos and are kept in that state by recurrent fires. Most of these 'islands', however, seem to be the result of the cycles of forest expansion and reduction over thousands of years.

Another vegetation zone that enriches the diversity of rainforests is the forest margin. The forests are fringed by belts of hardy pioneer plants that protect the forest interior from wind, fire and the drying effects of the sun. These plants are able to recover or regenerate rapidly after being damaged by fire or grazing.

Low scrub of hardy pink blossom trees ***(Virgilia divaricata)*** *recolonising a forest margin, once bared by fire and overgrazing on adjoining farmland. Forest margins serve as protective screens against fires and wind*

Large gaps are opened up when old trees crash to the forest floor, taking many other trees with them

Frequent disturbances can destroy a forest margin, however, thus exposing the more sensitive forest plants to the elements and to fires. Recurrent disturbances can actually cause a decline in forest size and in the diversity of plant and animal life at the forest edge.

Forest management plans in the southern Cape afford high priority to the protection of forest margins. Alien invader plants penetrating the forest margins are eradicated, and indigenous seedlings are planted to re-establish and consolidate a few forest areas. Teams of fire-fighters are constantly on stand-by to combat uncontrolled fires that may threaten the forests, especially in areas where they are bordered by plantations.

Hardy colonisers of the margins include the Cape beech *(Rapanea melanophloeos)*, dogwood *(Rhamnus prinoides)* and sagewood *(Buddleja salviifolia).* The most striking and prolific of these pioneers is the pink blossom tree or keurboom *(Virgilia divaricata)* conspicuous from spring to autumn when covered in sweetly scented, pink-coloured blossoms. Under ideal conditions the stands nurse the growth of forest trees and then die because they cannot tolerate the shade of the developing forest. Their long-living seeds remain dormant in the soil until yet another disturbance such as a fire destroys a patch of forest and triggers germination of the seeds. In the Witelsbos pink blossom seeds remained alive for 230 years before germinating when a hot fire destroyed the understorey. Most of the nutritious forest grasses and herbs grow in the forest margins and glades, which greatly contributes to the diversity of the animal life.

Wind, fire and water

...the actual forest location is (partly) determined by fire,...which in turn is determined by prevailing winds during dry periods and terrain physiography...the protective forest cover ensures a sustained flow of water from catchments...

Coert Geldenhuys - Southern African Forests: Their Biogeography, Conservation and Utilisation, 1996

Early Portuguese sailors rounding the Cape stared in wonderment at huge columns of smoke inland of the distant shoreline. These fires - some caused by lightning - lapped at the margins of the southern Cape forests. Many fires were deliberately started by Khoikhoi hunters and herdsmen to clear land for settlement and grazing or to flush game from the forest margins. Attempts to smoke out bees have occasionally resulted in disastrous fires.

The first explorers reaching the Outeniqua area marvelled at the vast forests carpeting the coastal platforms and valleys. The wholesale destruction caused by settlers during the eighteenth and nineteenth centuries, woodcutters and hunters in particular, tore many large gaps out of the forests and rendered their margins more prone to fire. The fynbos 'island' Petrus se Brand is alleged to have resulted from a fire started by the nineteenth century hunter Petrus Stroebel in an attempt to smoke out a wounded elephant.

The Great Fire which swept through Outeniqualand and the Tsitsikamma in 1869 devastated outlying forests on the mountain slopes, in the gorges and along the coast. The high forest on the coastal platform escaped relatively unscathed, for fire seldom penetrates deep into moist rainforest. It only happens with lightning

A forest margin destroyed by fire during hot bergwind conditions in 1998

strikes during unusually dry weather spells. Occasionally a bergwind-driven fire could run through a forest, as happened in the Klein Witelsbos in 1996. This is usually preceded by the accumulation of dry litter on the forest floor, such as heavy falls of leaves and twigs caused by strong winds, followed by very dry weather.

The belts of fast-growing shrub and tree species on the forest margins protect the forest interior against the drying effects of the sun and the wind, and thus against fire. These plants are able to regenerate rapidly after a forest margin has been scorched by fire. Continued disturbances such as repeated fires can destroy the margin, however, and render the adjacent forest vegetation vulnerable to fire.

In the southern Cape fires driven by hot, *föhn* - like bergwinds follow the wind-flow patterns over the rugged mountain topography. Forests shelter on the leeside of steep ridges or in narrow gorges, where eddies branching from the main wind prevent the fires from burning down the lee slopes. Such eddies do not develop on the gradual slopes of rounded hills, which are consequently covered with fire-adapted fynbos.

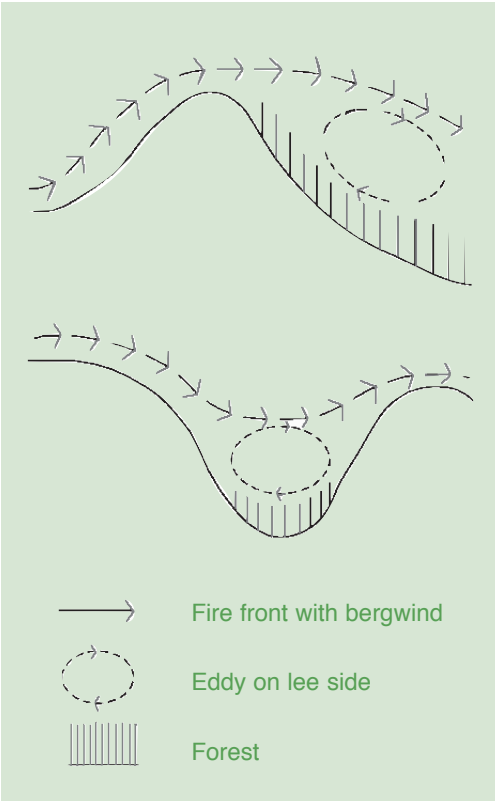
On the coastal platform the north-westerly winds are channelled through breaks and valleys in the mountain chains, and the forests occur only between these pathways. The pointed-finger pattern of the forests result from wind-driven fires of lesser velocity that branch away from the main north-westerly course.

Good examples of this fire-caused pattern around the Storms River bridge can be observed from high vantage points on the coastal platform and mountain range. The high forest stops abruptly west of the bridge while the fire-exposed eastern side is completely devoid of indigenous forest.

Fires have kept the advance of the forests in check for centuries, especially so from the time that the Khoikhoi began to use them to their own advantage. Lighting usually occurs during wet or humid conditions, therefore causing relatively small burnt areas. Most of the destructive fires originate immediately north of the Outeniqua and Tsitsikamma Mountains, started by humans, and are swept over the mountains by the winds.

If fire is the arch-enemy of the forests, then water is their lifeblood.

Fire patterns



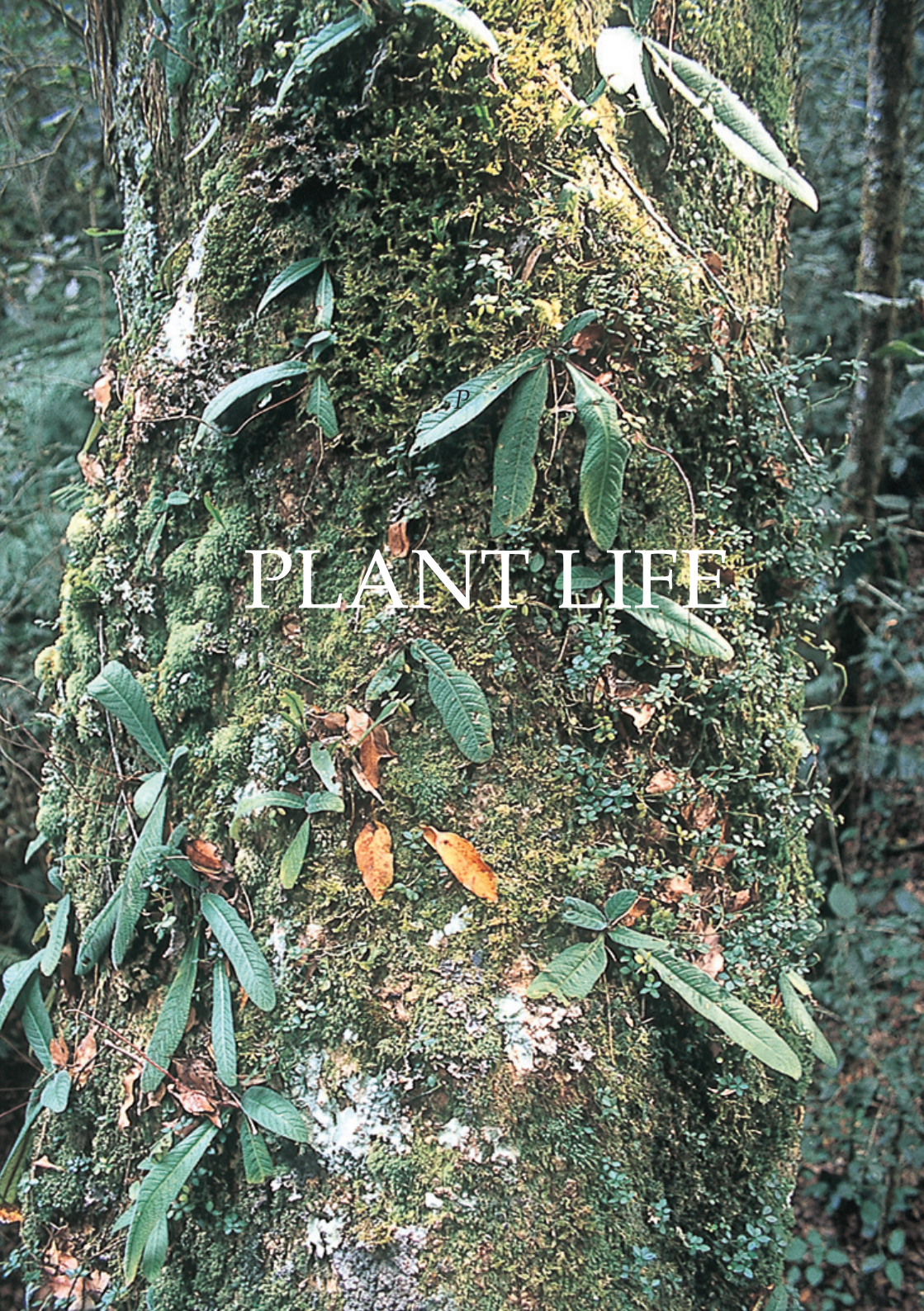
Fires driven by hot, desiccating winds are the major agents that keep the forests in check. Forests sheltering on the lee side of steep ridges and in narrow gorges escape destruction through the intervention of eddies branching from the main wind

A narrow belt of forest survives in a sheltered valley due to wind eddies. which causes fire to jump the valley
Coert Geldenhuys

A translucent forest stream cascades through a forested ravine. Like giant sponges the forest absorbs rain-water into underground aquifers, releasing it slowly into the streams

Nimbus clouds driven from the sea by south-easterly and south-westerly winds shed their precious cargo over the coastal platforms and the mountainsides of the interior, which nurture the large forests carpeting the basin bordered by the Outeniqua and Tsitsikamma Mountains. (The Tsitsikamma region takes its name from the Khoikhoi word which means 'running water').

The forests act as natural sponges, absorbing rain-water into subterranean aquifers and releasing it slowly into rivers and streams throughout the year. Numerous translucent streams of crystal-clear water cascade through the many deep gorges between the mountains and the sea, carved by the turbulent waters over millions of years. The forest streams, like those in fynbos areas, have a characteristic dark-brown colour like black tea or coffee, tainted by dissolved tannins and humic acids leached from the leaf litter on the forest floor.


PLANT LIFE

Trees and shrubs

The traveller in the forest will find trees of varied forms, dimensions and colours all around him...Its myriad plants and animals compete and co-exist by developing subtle and complex relationships and survival strategies that have brought forth a great variety of fantastic forms...

National Geographic Society - The Emerald Realm, 1990

Upon entering a rainforest the visitor is overwhelmed by the size and variety of the trees. Trees completely dominate a forest ecosystem, even though the herbs, mosses, epiphytes and ferns far outnumber them in diversity and abundance. About 90 per cent of the biomass (volume of plant matter) in a forest belongs to the trees and the shrubs. The southern Cape forest flora include almost 90 tree species and 55 woody shrub species. Identification of these trees can be very difficult, owing to their similarity in appearance. Leaves are frequently hidden in the canopy, and foresters learn to identify the trees by their bark.

Being of tropical origin, the vast majority of forest trees in the southern Cape have adapted to the rainforest environment over millions of years. Both the genus Ocotea and family Lauracea to which stinkwood *(Ocotea bullata)* belongs, are pan-tropical. Eighteen Ocotea species are known to occur in Madagascar. Non-tropical species of an older local floral kingdom, such as the white alder *(Platylophus trifoliatus)* and red alder *(Cunonia capensis)* successfully established themselves in these forests thousands of years ago.

Forest trees and shrubs grow up in an environment of intense competition for light, nutrients and space, which has brought forth a variety of survival strategies. Almost all species of rainforest trees are

evergreen. By shedding their leaves gradually and intermittently these trees lose much fewer nutrients than deciduous species. This is a decided advantage in the forest with its nutrient-poor topsoil. Canopy trees such as the white pear *(Apodytes dimidiata)* have leathery leaves, to limit water loss and to withstand the continuous radiation of the sun. The leaves are usually pointed, and some have elongated 'drip-tips' to facilitate water run-off. This is an important adaptation in high rainfall areas where branches weighed down by water may break off from the stem.

Forest trees grow matted shallow roots in the thin layer of topsoil to absorb nutrients rapidly. These roots may not be sufficient to support large trees with top-heavy crowns, and some trees grow flattened buttress roots at the base of the trunk. Good examples of buttressing can be seen in stinkwood, ironwood *(Olea capensis* subsp. *macrocarpa)* and Cape holly *(Ilex mitis)*. This feature might have developed in swampy areas, since the buttress roots of these trees are most conspicuous in the moister sites. Canopy trees have long, straight trunks that branch out high above the forest floor, thus exposing most of the leaves to the sun. Most of the photosynthesis in a forest takes place in the canopy. Large amounts of oxygen are released in the

A flowering forest elder ***(Nuxia floribunda)*** *covered in sweetly scented creamy flowers attracts numerous insects. Forest trees flower once every two or three years to conserve the limited energy available in the nutrient-poor soils*

process while carbon dioxide is absorbed. Thus forest trees play a vital role in reducing the impacts of pollution.

A large canopy tree loses hundreds of litres of water through transpiration on a clear day. This creates a negative pressure at the top, resulting in water and nutrients being drawn through the roots and the capillaries in the trunk upwards to the leaves. The long trunks are hardened with lignine to withstand the enormous pressures. A species particularly renowned for its hardness and durability is the ironwood.

The energy and nutrients needed for flowering and fruiting are in short supply in the thin topsoil layer that supports the forest trees. For that reason most of these trees flower and fruit at intervals of two years or more. Intermittent mast-flowering and fruiting also serve to limit the numbers of seed predators (mainly insects and bacteria). Forest trees of the same species set seed at the same time, providing such a glut for insects, birds and mammals that at least some seeds survive and germinate eventually.

Being dispersed throughout the forest, most forest trees rely on insects and birds to pollinate their flowers. Wind pollination is largely inefficient due to the considerable distances between trees of the same species and the density of the canopy that obstructs windflow. It is, however, the way in which Podocarpus species *(yellowwoods)* are pollinated as the male and female 'flowers' are borne on separate trees.

Sunbirds are attracted by bright colours such as the showy red flowers of the wild pomegranate *(Burchellia bubalina)*, which grows in the wind-still understorey. The majority of trees and shrubs bear white or cream-coloured flowers, which are pollinated by insects. Pollinators are rewarded with nectar while seed dispersers are mostly rewarded with fleshy fruits. Monkeys, baboons, bush-pigs, bats and birds feeding on wild figs and other fruits carry seeds

within their digestive tracts for considerable distances before they are defecated. A protective layer protects most of the seeds against gastric juices. Larger seeds have a longer passage time through the gut and are therefore carried further than smaller ones. Seeds are often destroyed by animals such as bush-pigs and various rodents. Masses of broken seed shells are often found below logs or holes in tree stems, which indicates how destructive rodents such as the woodland dormouse *(Graphiurus murinus)* can be.

Left: The marbled, smooth trunk of a Cape plane ***(Ochna arborea)****. It occurs as a small to medium-sized tree in the dry and moist forests*
Right: The trunk of the bastard saffron ***(Cassine peragua)*** *flares bright orange where the upper layer of bark peels off*

Ironwood is the most numerous canopy tree of the high forests. This large tree of between 15 and 40m high has a grey fissured bark which exudes a characteristic blackish gum from bark wounds. The heavy, fine-grained wood is difficult to work, but has been widely used as railway sleepers. Stinkwood is a medium to large tree of up to 30m, with a cylindrical trunk. The trees usually grow coppice shoots after being cut,

and some of these old multi-stemmed trees can be seen in the moist high forests. Belonging to the laurel family the tree has large aromatic leaves with characteristic pocks or *bullata* in the angles formed by the veins. Once heavily exploited, the renowned timber is still used in strictly limited quantities in the manufacture of elegant furniture.

The bright red flower clusters of the wild pomegranate (Burchellia bubalina)

The monarch of the forest is the Outeniqua yellowwood *(Podocarpus falcatus)*, which can reach a staggering height of more than 45m. Its bark flakes in irregular strips, which makes it easy to distinguish from the abundant real yellowwood *(P. latifolius)*, another canopy tree of up to 30m high, with bark flaking in narrow vertical strips. Both trees produce beautiful pale yellow timber that is much in demand for fine furniture, flooring and panelling. The kamassi *(Gonioma kamassi)*, although a much smaller tree growing in the shadows of the high forest canopy, once also played an important role in the timber industry. Large quantities of its timber were exported to Europe to make measuring equipment and spools for the weaving industry, for which its fine-textured and very smooth wearing wood was excellently suited.

The Cape beech (Rapanea melanophloeos) is another abundant medium to tall forest tree, with a straight cylindrical trunk.

The greyish bark of old trees is thick, corky and fissured, and the wood once popular with cabinet-makers, is nowadays used for making violins. Traditionally a decoction of the bark was used to treat stomach disorders and as a love potion. The medium to large assegai tree *(Curtisia dentata)* can best be identified by its coarsely toothed leaves, which have shiny dark green upper surfaces and light green under-surfaces with fine woolly hair. The tough elastic wood was once used extensively for various parts of ox wagons and is said to have provided the early African tribes with shafts for their spears.

The white pear, occurring abundantly in the forest, is a medium to large tree with a straight trunk and smooth, pale grey bark. Lichens growing on the bark usually give it a mottled appearance. Until some 50 years ago its timber was valued for the production of ox wagon parts. Today the Zulu people still use an infusion from the outer layer of its roots to expel intestinal parasites. The glossy leaves are used in the treatment of ear inflammation. The white alder is a small to large tree which usually grows from an old knotty stump in multi-stemmed shoots. It is probably the most important honey tree in the Knysna forests. Swarms of bees and other pollinating insects can be seen hovering around the trees when they are in flower.

Dense stands of black witch-hazel *(Trichocladus crinitus)* carpet the understorey of moist high forests, where they occur as shrubs or small trees up to 4m high. Their large elliptical leaves have characteristic brown, velvety hairs below, which trap moisture rising from the forest floor. The dense stands of this shrub is the most striking feature of the forests in the southern Cape, except for those in wet sites or recovering from some disturbance.

Gardens in the sky

Epiphytes are non-parasitic plants that grow on the trunks and branches of the forest trees, often in great profusion...and all form an incredibly rich garden in the sky...

Chris & Tilde Stuart - Africa: A Natural History, 1995

Lianas may be the delight of monkeys and of boys playing at being Tarzan, but to the forest trees they are a curse.

TV Bulpin - Southern Africa: Land of Beauty and Splendour, 1976

A striking feature of the wet and moist forests of the southern Cape is the profusion of plants growing on forest trees. A single tree can be a world in itself, harbouring orchids, ferns, lichens, mosses, herbs and succulents. These are the epiphytic (air-loving) plants which, unlike the parasitic mistletoes (*Viscum* species) that feed on their hosts, merely use the trees as props.

The quar *(Psydrax obovata)* characteristically hosts many epiphytic orchids, ferns and other small plants on its fluted stem. Epiphytes also favour the large branches of Outeniqua yellowwoods *(Podocarpus falcatus)* and veld figs *(Ficus burtt-davyi)*, as well as arum lilies. The sheer density of epiphytes can become a burden to their hosts, however, causing waterlogged branches to break. Some forest tree species rid themselves of epiphytes by periodically shedding bark. Others deter these hangers-on with very smooth or poisonous bark.

Epiphytic plants avoid competition on the shady forest floor, but their lofty perch poses problems of its own. With no roots in the soil they have to draw their moisture from the humid air. Many epiphytes such as the tree club moss *(Lycopodium gnidioides)*, grow

aerial roots for this purpose and store the water in thick, leathery leaves. Nutrients are obtained from the rainwater and debris sifting down from the canopy and accumulating in the hollows and fissures of the branches.

Epiphytic tree club moss (Lycopodium gnidioides) growing on a stinkwood trunk

Orchids are relatively rare and difficult to spot in the Knysna forests, but colourful lichens and delicate flowers such as the more common Cape primroses (*Streptocarpus* species) are ample compensation. A large variety of lichens grow on the trunks and branches in flat or crumpled shapes. One exception is the striking light-green old-man's beard (*Usnea* species) that hang in threads from the leaves of the Outeniqua yellowwood and other emergent trees such as the white pear *(Apodytes dimidiata)*. Lichens are actually dual plants consisting of fungi and algae which live in perfect symbiosis. Apart from the lichens which are common throughout, the epiphytes prefer moist to wet forest conditions. Epiphytic ferns are common in the river scarp and coastal platform forests, in particular towards the drier end of the spectrum. In this sense the southern Cape forests differ remarkably from the Escarpment forests in the north-east of South Africa, where the forests in the mist belt are heavily covered in epiphytes of all kinds.

The veld fig starts life as a seed deposited by a bird or a monkey in a tree fork high above the forest floor. From its lofty perch the tree sends its roots down to the forest floor. Unlike the strangler fig (F. craterostoma) of the Woodbush and Soutpansberg forests in the north of the country, the veld fig does not envelop its host,

robbing it of nutrients and sunlight. Numerous woody lianas (monkey ropes) and herbaceous creepers festoon the more exposed forest areas. Monkey ropes - the transport medium of the legendary Tarzan - are commonly associated with lush tropical rainforests. Yet, in the southern Cape they are much more common in the dry coastal forest and scrub than in the moist forest areas. These climbing plants use trees as trellisses to reach the sky, but remain rooted in the soil.

A forest grape ***(Rhoicissus tomentosa)*** *aggressively grows over young trees in a forest clearing. As the trees grow the liana is lifted skywards to the canopy, where it spreads to neighbouring trees*

Growing over the top of young trees, the forest grape *(Rhoicissus tomentosa)* is lifted skywards as the trees grow. Once in the canopy, it branches out to neighbouring trees. Dense tangles may eventually smother the host trees, weighing them down with their tremendous mass and blocking them from their vital source of sunlight.

Herbaceous plants of the forest floor

'The southern Cape forests have the...largest diversity of herbaceous flora of forests in southern Africa...The large flora diversity at this relatively high latitude in Africa can be attributed to the size of the forests and the variety of habitats, from the mountains to the coast.
Coert Geldenhuys - Ecological Summer School, 1989

Dappled shafts of sunlight penetrate to the dim twilight world of the forest floor, which is the home of a variety of ferns, flowering herbs and grasses. Apart from the shade-loving plants (sciophytes) growing in the shadows, the forest margins and glades abound with sun-loving plants (heliophytes). About 280 herbaceous plant species occur in the southern Cape forests, including 52 fern species, 25 grasses, and a variety of flowering plants and creepers. They come in many shapes and sizes, bearing a variety of leaves and flowers of all shapes and colours.

In the dark forest interior the plants on the leaf-strewn floor jostle each other for exposure to the sparse sunlight, and for a share in the nutrients. Some, such as the Cape primrose (*Streptocarpus* species), grow large leaves to deal with the dim light. In addition, the under-surfaces of the leaves are coated with a purple pigment. This catches the light after it has passed through the thickness of the leaf and reflects it back into the leaf tissue, so that little sunlight escapes the chlorophyll during photosynthesis. Most forest plants arrange their leaves in a light-trapping mosaic. The circular arrangement of the finely toothed fronds of the seven weeks fern (Rumohra adiantiformis) ensures that most of the fronds are periodically exposed to shafts of sunlight for photosynthesis.

Dappled shafts of sunlight play upon ferns in the Valley of Ferns, Prince Alfred's Pass

Like the trees and shrubs, the flowering plants on the forest floor have developed several strategies to deal with competition between the plant species for pollinators. Many vie for attention with brightly coloured flowers, like the glorious red-flowered George lily *(Cyrtanthus purpureus)*. Flowers pollinated by moths at night - when colour is of less importance - are usually sweet-scented. The markings of some flowers provide landing instructions for pollinating insects similar to the markings of an airport runway. The flowers of a few plant species are shaped to allow only certain kinds of insects access to their pollen, thus ensuring that the visitors will carry their pollen to flowers of the same species. In the quiet atmosphere of the protected understorey, wind play no role in cross-pollination.

Ferns crowd the forest floor of wet forest areas, producing breath-taking forest scenery in places such as the Valley of Ferns (Ysternek Nature Reserve). Fossil records show that the ferns existed on earth more than 400 million years ago, long before the advent of the flowering plants. Unlike the flowering plants the ferns reproduce through spores, which are patterned on the underside of the fronds. On germination the spores do not grow into a replica of the parent plant, but form small subterranean growths called 'gametophytes' or 'prothalluses' which carry the reproductive organs. Once fertilised, the gametophytes develop into fern-like plants called 'sporophytes'.

Wild Impatiens species bloom in the shady parts of the moist forests, usually along the banks of forest streams. The pink and

Many flowering forest plants have become popular garden plants ***(Plectranthus fruticosus)***

white flowers resemble little doves in flight. Wherever a gap is torn in the canopy by a fallen tree the shade-loving ferns and flowers are the first to disappear. Plants cannot run away from a bad site, and sudden changes in the microclimate are usually catastrophic. The glades and the forest margins are colonised by hardy sun-loving pioneer species, such as the Hottentot's bedding *(Helichrysum petiolatum)*. The stinkleaf *(Plectranthus fruticosus)*, being adapted to full shade and semi-shade, occurs in the less exposed parts of the sunlit glades. These evergreen perennials are also grown in home gardens for their plumes of dainty flowers which come in shades of pink and purple. Some species have white flowers.

A dense layer of Hottentot's bedding ***(Helichrysum petiolatum)*** *and plectranthus crowd a forest glade*

In the The *Mulberry Forest* Dalene Matthee describes '...a marsh covered with lilies as red as blood...Hundreds upon hundreds of lilies shimmering in the sunlight...' This marsh of George lilies occurred in the heart of the Knysna forests. Early in the twentieth century the then Department of Forestry erected a fence around the lilies to protect them against damage by stray cattle. This was a well-meant act, but unfortunately it sounded the death knell of the lilies. Unknown to the forestry officials, bushpigs are an essential link in the survival of the lilies. By eating the pupae of moths that attack the plants, the bushpigs helped to ensure their survival. This delicate ecological relationship ended with the erection of the fence, resulting in the gradual disappearance of all the lilies.

Yellowwoods - the forest giants

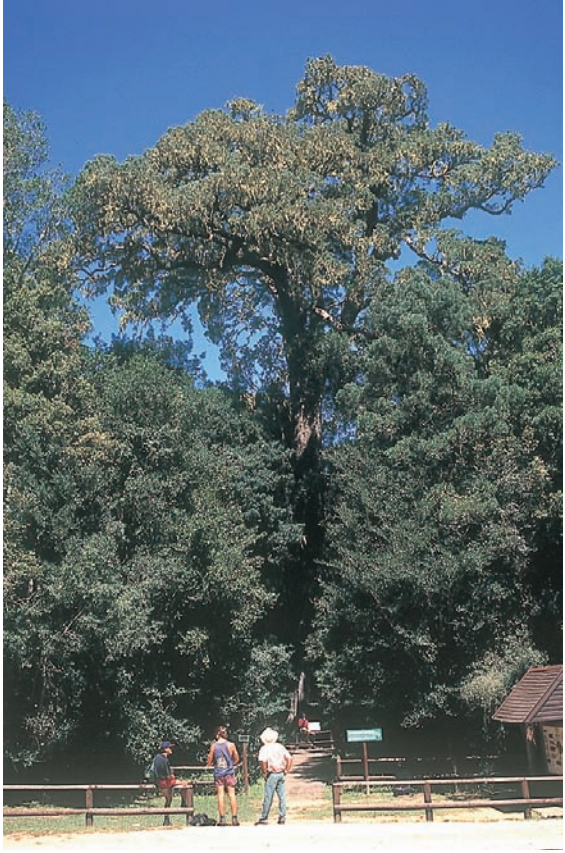
Like a mighty king it stood towering above the white alder and mountain saffron, stinkwood, assegai and hard pear. As if God had planted it long before the others. Its giant roots anchored it to the ground like giant arms.

Dalene Matthee - Circles in a Forest, 1984

In a forest of giant trees the Outeniqua yellowwood *(Podocarpus falcatus)*, also known as the 'kalander' (derived from the original name 'Outeniekwalander'), reigns supreme. Many of these venerable old monarchs tower above the canopy of the southern Cape forests. Massive trunks support their heavy crowns, draped with long threads of bright green beard lichens waving eerily in the wind. It is hardly conceivable that some yellowwoods germinated in the age of the knights and the crusaders, more than 800 years ago. The trees can reach a height of more than 45 metres, but many occur as medium-sized trees in the forests.

The *Podocarpus* species are generally considered to originate from southern temperate climates. The local yellowwoods are also believed to have a more ancient origin than the hardwood forest trees of tropical origin, having adapted to a forest environment from an older temperate floral kingdom. Some scientists however believe that these species may well have a tropical origin.

Podocarps occur in tropical forests in other parts of the world, such as Malaysia. Related to the conifers (pines, cedars and cypresses), they do not have flowers, but produce small primitive cones instead.



The King Edward VII tree (Outeniqua yellowwood)

Although the Outeniqua yellowwood starts life very slowly, it eventually grows quite fast to become a forest giant. The male cones take a year to mature before the pollen is released. Once the female cone is fertilised, it takes another year for the seed to mature and disperse. Those seeds surviving predation takes another one to four years to germinate. The seedling struggles to push its way through the dense understorey. Studies on yellowwoods planted in the decade 1920 to 1930 showed that the plant can easily take up to fifty years and even more to grow to a size of 5cm diameter at breast height (1.3m). Once the tree reaches the forest canopy, it grows much faster, especially by increasing the diameter of its trunk. Trees in a forest gap or clearing grow much faster than those in the dark understorey.

Another yellowwood species, the real yellowwood or 'upright' *(P. latifolius)* occurs in the southern Cape forests. 'Real' and 'upright' are both corruptions of the Afrikaans word for true (opreg), which indicates the superior quality of its timber to that of

the kalander. This canopy tree can reach a size of up to 30 metres. Although growing half as fast, the real yellowwood is much more plentiful than the kalander, despite its heavy exploitation for almost two centuries. This difference in abundance can be attributed to the differences in the fruit types of the two species and the way their seeds are dispersed. Real yellowwood carries the seed on a blackish-purple receptacle. The Knysna lourie and baboons are the main dispersers, and eat the fleshy receptacle, while mostly discarding the seed. The seed therefore does not develop a hard shell for protection and germinates easily within two months.

Outeniqua yellowwood carries the seed inside a yellow fleshy covering called the 'epimatium'. The colour and smell of the epimatium makes this fruit particularly attractive to its main disperser, the fruit bat *(Rosettus aegyptiacus)*, although the seed is also dispersed by the Knysna lourie and other birds, baboons and vervet monkeys. The seed develops a hard shell to protect it against the chewing teeth of the bat. This causes another problem of recruitment of this yellowwood. The seeds, cleared of the fleshy covering, accumulate under the bat perches in the forest. The hard shell around the seed causes delay of germination for about a year or more. During this period rodents such as the woodland dormouse *(Graphiurus murinus)* and the bushpig, searching for food, break the shell to eat the soft seed inside, thereby destroying most of the seeds. Only during the occasional years of mass seed production enough seeds remain intact to germinate and establish themselves to develop into young trees.

The soft yet durable yellow wood of both species was sought after for ship masts, beams and floor planks for houses, furniture, and wagon timber. With the scarcity value that yellowwood timber has today, it is unthinkable that yellowwood sleepers were used for the expansion of he country's railways by the hundreds of thousands! The timber, harvested in small volumes in the southern

Cape today, is now mainly used for the restoration of old buildings, arts and crafts and in the manufacture of elegant furniture.

In 1876 the Cape government allowed more wood volume on a timber licence for the felling of giant Outeniqua yellowwoods than before. This led to the disappearance of numerous big trees. Many survived in inaccessible places, however. Modern roads, blazed through once impenetrable forests, brought these stately monarchs within easy reach of tourists. A few trees, such as the King Edward VIIth tree at Diepwalle and the Tsitsikamma Big Tree near Storms River bridge, have become major tourist attractions.

A yellowwood can outlive several generations of forest trees, expanding its root systems as the shorter-lived trees die out. Eventually, after a number of centuries, the shallow roots in the thin topsoil cannot support the top-heavy crown anymore. In a dramatic moment the monarch crashes down to the forest floor, tearing a large gap in the canopy as it takes other trees down with it. Sunlight pours through the opening, sparking a new race to the sky between seedlings and young trees aspiring to replace the fallen giant. Should another monarch take its place, it may take centuries again before it raises its crown above the forest canopy.

The fabled stinkwood tree

...the finest wood of all the Forest was hidden under the bark of the stinkwood tree. The colour of brown forest streams and with the most beautiful grain, it was formed over thousands of days of sunshine and rain.

Dalene Matthee - Circles in a Forest, 1984

Stinkwood *(Ocotea bullata)* is the prince of the indigenous timber trees. It occurs only in South Africa, in a few scattered localities from the Cape Peninsula to the Northern Province. Yet its name is synonymous with the Knysna forests, where the timber is still harvested in limited quantities for the furniture industry. Early settlers were quick to recognise the value of its beautiful and durable timber, which was commonly used for wagon frames and building timber. The stinkwood takes its name from the disagreeable odour of the freshly cut wood, although some carpenters find the smell not that repugnant.

A stinkwood (Ocotea bullata) leaf with characteristic nodules in the axils of the leaf veins. This protected tree with its large aromatic leaves belongs to the laurel family

Stinkwood was grossly exploited during the eighteenth and nineteenth centuries despite efforts to protect it. At one stage it was sought after for shipbuilding. The brig Knysna, built locally for George Rex in the 1830's, was

constructed exclusively fom stinkwood timber! The forests became so seriously depleted of stinkwood trees that their felling was forbidden for a time. Young trees remained abundant, but it takes decades for the slow-growing trees to mature. Today the stinkwood is harvested in the southern Cape under strict scientific control. Only a small percentage of the timber offered annually at the public auctions consists of stinkwood, which endorses its scarcity value. It is not uncommon for prime grade stinkwood to fetch prices in excess of R9000 per cubic metre.

The round trunk of a stinkwood tree ***(Ocotea bullata)****, with attractive mottled patterns of pink and mauve on the smooth grey bark*

Young stinkwood trees have an attractive smooth, light grey bark, often with beautiful mottled patterns of pink and mauve. Older trees have a rugged brown and scaly bark. Hard pocks in the axils of the leaf veins make them easy to identify. Stinkwood flowers are often infected by fungi, while the fruits and seeds are vigorously attacked by maggots and microbes. Few seeds survive the onslaught. However, the old stumps of dead trees can spring to life again by growing coppice shoots. Such shoots have a great advantage above the seedlings of other forest trees in the struggle to grow tall, for they draw their nourishment from a well-established root system that may have been centuries in the making.

Stinkwood coppice shoots grow very fast. Up to 5m height growth has been measured within 15 months, but the average growth rate is 0.6 m per year. The coppice shoots are very nutritious and are heavily browsed by bushbuck if within easy reach. A tree growing from a seed, which requires about 300 to 400 years to reach maturity, can produce three to five coppice stems that could all reach the same mature size within 100 years, all with good quality timber.

Stinkwood grows best in moist sites, but it is also very susceptible to the roof-rot pathogen *Phythophthora cinnamomi*. Standing water caused by soil compaction and alternating moisture conditions between very wet and very dry both stimulate the fungus. Stinkwood trees in such areas suffer from crown die-back, and if severe, can cause the death of the tree. One way to ensure the survival of such a tree is to cut the struggling stem, which will then allow the tree to regrow from coppice.

The finely textured stinkwood timber ranges from a beautiful golden to a brownish-black, or a blend of these colours. The timber is fairly heavy, and has a natural lustre. The exquisite patterns of blended colours are shown to best advantage in the curved parts of furniture. Owners and collectors of stinkwood furniture find it unthinkable that thousands of stinkwood trees have been sacrificed in the past for railway sleepers, ships and even slipways. A solid stinkwood water-wheel was constructed more than a century ago for a sawmill owned by Henry Barrington of Portland. Once wasted with abandon, is now treated with the respect that befits its status as the prince of indigenous timbers.

Glorious fungi

Glorious features of Tsitsikamma's forests are the fungi...These bracket fungi help reduce dead wood to humus - the cradle in which new plants will grow.

René Gordon & Anthony Bannister - The National Parks of South Africa, 1983

Growing in a dank, sweet-smelling world of dismemberment and decay, usually more perceptible after a fall of rain, the forest fungi come in a large variety of colours and exotic shapes. Puffballs and mushrooms of all sizes grow unobtrusively in the damp and shaded parts of the forest floor. But the most visible and spectacular sights are the bracket fungi, which grow in colonies on dead branches and logs.

The half-moon shaped bright-red tropical cinnabar bracket *(Pycnoporus sanguinensis)* is a very common sight in the Knysna and Tsitsikamma forests. Also common but less obtrusive is the large orange-brown lacquered bracket *(Ganoderma lucidum)* which protrudes from standing tree trunks.

Growing in an underworld of dismemberment and decay, a dazzling array of fungi grow on the dim forest floor and on tree trunks in the Knysna and Tsitsikamma forests. The luxuriant growth of the rainforests can only be sustained by the fast recycling of nutrients, aided by the fungi and microscopic bacteria

Other fungi shapes resemble cups, turkey-tails and hand-held fans. Despite the visibility of bracket fungi, they are easily overlooked in their sheltered environment.

Forest fungi are mostly saprophytes, which means that they derive their nourishment from dead organic matter - mainly dead wood. They could, however, attack a dying tree and hasten its decline. Together with the bacteria they are a vital link in the processes of growth and decay, maintaining the endless recycling of nutrients without which the forest and its creatures cannot exist.

The visible part of a mushroom or bracket fungus is only one stage in its life cycle, namely the fruiting body. Underneath the surface of the organic matter on which the fungus grows exists a mass of fine filaments or hyphae. These hyphae release enzymes to dissolve the organic matter and to absorb the nutrients. When the humidity, temperature and other conditions are favourable, the hyphae of several individual fungi combine and swell into tiny

A paradise flycatcher feeds her young in a lichen-covered nest
M Goetz

knobs, which then grow into fruiting bodies. Some species of fungi require very specific environmental conditions, and only appear at certain times of the year.

Before they consume and destroy their growth medium, fungi ensure the survival of their species by releasing minute spores into the air. These float away to other locations, where new colonies of fungi will spring to life. Some species, such as the stinkhorn fungi, exude a smelly and gluey substance that attracts insects. They rely on the insects to transport their sticky spores to new locations.

As if conjured by a magic wand, the dainty mushrooms and colourful bracket fungi turn parts of the Knysna and Tsitsikamma forests into enchanted fairy-tale worlds during wet weather. Thus the imagination of Ruby Reeves was fed, whose paintings of fairies still captivate adults and children alike. It was these forests, it is said, that inspired JR Tolkien to write his famous tales about the Hobbitts and their world of fantasy.

Right: Cape ghost frog
Directorate: Indigenous Forest Management


FOREST
CREATURES

Forest mammals

One knows these forest wanderers best by their marks and their droppings and their spoor. They are there, but invisible and silent, lending a mysterious presence of excitement to the dark places.
Hjalmar Thesen - Country Days, 1981

Early naturalists exploring the southern Cape forests during the eighteenth and nineteenth centuries marvelled at the abundance, beauty and variety of the wildlife. Large numbers of elephants and buffalo roaming the coastal plains found shelter in the forests. Over the span of two centuries their ranks were decimated by the expansion of farms and by ruthless hunting. In 1883 the last buffalo fell to the gun of Hendrik 'Grootrivier' Barnardo at Bloukrans. Only three elephants remain today - a sad remnant of the large herds that once roamed the forests.

There is ample reason to believe that the elephants and buffalo were not confined to the forests, but extended their range over the open plains and mountainsides. In fact, the forest environment with its scarcity of edible browse in the under-storey cannot support herds of large plant-eaters or herbivores like the bushveld savanna does. The major part of the food grows high up in the canopy, and even that is not very palatable. Smaller mammals such as the bushbuck and woodland mouse abound, and they are still plentiful today, owing to the high standard of forest management achieved during this century.

Forest mammals are notoriously elusive, and nothing seems to move in the brooding stillness of the forest. A buck may pass silently through the dimly lit undergrowth within metres of unwary hikers without being noticed. To see these elusive animals with their

keen senses of smell and hearing requires stealth. Many mammals are nocturnal, resting motionless amidst the lush undergrowth by day and emerging at dusk. At night the darkness is charged with the eery stirrings and sounds of life. When the morning sun filters fitfully through the canopy, the only signs left of the night's activity are the tracks and droppings on the forest floor.

Bushbuck *(Tragelaphus scriptus)*, the most abundant antelope of the forests, usually browse at the forest edge in the early morning or late evening. Both the fawn-coloured females and dark-brown males blend easily with their forest environment. The few white spots and the light neckband on the body do not render the buck more visible, but seem to aid their camouflage. If danger threatens, the buck may utter a loud resounding bark before fleeing through the undergrowth, although a wounded or cornered male will not hesitate to attack with its deadly horns lowered like daggers.

A fawn-coloured bushbuck doe ***(Tragelaphus scriptus)*** *with 'speckled necklace'*

The dainty little blue duikers or blue buck *(Philantomba monticola)* which weigh a mere 4 kilograms, have been described by Dalene Matthee in her novel Circles in a Forest as '…the most beautiful of them all...So tiny, so nimble of foot that you seldom find their tracks...' These secretive animals live solitary or in pairs which remain faithful for life. Blue duikers keep within their small territories (between 2 and 6 ha), which they mark with chemicals secreted from well-developed eye glands. They live mainly on leaves, flowers and fruit that fall from the canopy - often dropped by birds or monkeys feeding in the trees.

A bushpig sounder (Potamochoerus porcus) feeding in the Knysna forests presents a fearsome, ghost-like spectre
AHW Seydack

Patches of disturbed soil near the forest trails betray the presence of bushpigs *(Potomachoerus porcus)*, which use their hard snouts to root for bulbs, tubers, rhizomes and insect pupae. These gregarious creatures live in sounders of up to 12 animals, led by a dominant boar. To find enough food in the forest, such groups of large creatures have to cover much larger territories than the small and solitary ones. They roam the forest at night, but will venture into the open to raid vegetable gardens and crops. Bushpigs have a fearsome reputation as tough and courageous animals with few enemies apart from the leopard - and man.

Of the more than 50 primate species in Africa only two - the vervet monkey *(Cercopithecus aethiops)* and chacma baboon *(Papio ursinus)* - occur in the southern Cape forests, and neither is confined to the forest environment. Baboons seldom venture deep into the forests, but will rather keep to the open areas and mountainous terrain. Fruit is the main dish of the greyish vervet monkey, although their omnivorous diet includes birds' eggs and nestlings. They are one of the most important seed-dispersal agents of forest trees, especially in the drier forests near the coast where they occur in the greatest numbers. Dexterous feet serve as a second pair of hands, while the three-dimensional vision of front-facing eyes (binocular vision) enables the monkeys to judge the distances between branches when they take the jump.

At nightfall the solitary, secretive leopard *(Panthera pardus)* leaves its mountain lair and enters the forest to hunt for bushbuck, bushpigs and all kinds of smaller mammals, including mice. Most of their hunting is done on the ground, although these leopards are agile climbers. Predators also have binocular vision like the primates, and it is used to judge the distance to their prey. The large-spotted genet *(Genetta tigrina)* is a smaller, a slender cat with short legs, hunting in the trees and on the forest floor for insects, mice and small birds. Its elongated body - shaped for balancing on branches - has equipped it for a life in the trees.

An infant vervet monkey ***(Cercopithecus aethiops)*** *embraced by its mother.*

The southern Cape forests also harbour predators adapted to a variety of habitats, from semi-desert to moist high forest. These include the long-legged, earthbound caracal *(Felis caracal)* with its tufted ears. Ill-tempered and fearless honey-badgers *(Mellivora capensis)* enter the forests occasionally in search of rodents, insects, fallen fruit, honey and a variety of other foods. Their jet-black bodies with white saddles resemble that of the smaller and slender striped polecat *(Ictonyx striatus)*, which can spray an attacker with a jet of foul-smelling fluid from an anal gland.

At the bottom end of the food chain in the forests are a host of smaller mammals such as bats, mice and shrews. The long-tailed forest shrew of the Knysna forests *(Myosorex longicaudatus)* was

only discovered in 1978 - the latest mammal to be described in South Africa. Verraux's mouse *(Praomys verrauxii)*, which shelters underneath fallen trunks in the Knysna forests, was discovered and catalogued more than one and a half centuries ago. Both subsist on a main diet of insects, supplemented with seeds and other plant matter. Fruit-eating Cape fruit bats *(Rousettus aegyptiacus)* are also active at night, relying on their large, binocular eyes and the radar-like echoes of their metallic sounds to navigate between the trees.

Leopard spoor imprinted in the mud of the forest floor

Between the forest and its animals there is a very close bond. Neither can exist without the other. Plants provide the animals with food and shelter, and the animals reward them by carrying their seeds and controlling their enemies. Thus they ensure the renewal and survival of the very habitat that sustains them.

The Knysna elephants

...they're bigfeet. When you talk about them, you must do so in respect because in this forest they go first and you go second
Dalene Matthee - Circles in a Forest, 1984

Numerous herds of elephant roamed the sheltered forests and open fynbos of the Outeniqua and Tsitsikamma regions at will for centuries, using the forests as shelter and refuge. To the semi-nomadic Khoikhoi, who hunted them with poisoned arrows, elephant meat was a staple food. Elephant skins were used to cover their rudimentary huts as extra protection against the elements. Then came the early settlers from about the middle of the eighteenth century. Steadily the stream of invading European farmers and hunters pushed the elephants into their forest retreats. By 1876 the elephants still numbered about 500, according to an estimate by the Coservator of Forests, Captain Harison. Their numbers declined rapidly as increasing numbers of woodcutters and hunters invaded their forest home. Today three elephants still roam the forests – the last survivors of the silent giants that once ruled the forest domain. For many years it was believed that only a single cow, called the "Matriarch", remained in

One of five elephants shot during Major Pretorius's bungled hunt in 1920. He had permission to shoot one elephant for the South African Museum
George Museum

the Knysna forests. Late in 2000 news that another young bull had been sighted caused a stir in the media. Then in 2001, the sighting of a third elephant was confirmed.

The remaining Knysna elephants belong to the same species (Loxodonta africana) as their kin roaming the open woodland of the Kruger National Park. They have the distinction of being the southernmost wild elephants on the continent of Africa. Until three decades ago the Knysna elephants occasionally surprised motorists and hikers in the Harkerville, Diepwalle and Gouna forests. Unlike the fenced-in Kruger and Addo elephants, they were the only free-roaming elephants in South-Africa. This brought the elephants into conflict with landowners and small farmers at the forest edge, for they frequently foraged in the forest margins and occasionally raided crops.

Travellers such as Anders Sparrman (1772) and E J Layard (1858) penetrated the forests partly along elephant paths. Layard praised the elephants as the road engineers of the forests. Quite often wagon roads were partly blazed along the gentle gradients of elephant tracks. These tracks were the elephant's own undoing, for they paved the way for hunters. The Knysna elephants had a fearsome reputation, however, Lodewyk Prins, thrown from his horse and trampled by a wounded elephant bull in 1790, was but one of many hunters who died in the quest for ivory and adventure.

Numerous elephants fell before the guns during the nineteenth century. Many more wounded animals suffered in agony, or died a slow death in the depth of the forests. Captain Harison pleaded in vain with the Government in 1876 to protect the forest wildlife against the slaughter. Until 1908 permits for the hunting of elephants were freely issued by the Government, even though trade in elephant tusks was illegal. The number of tusks smuggled out of the forests beneath wagon-loads of timber will remain a secret for ever.

Prince Afred, the Duke of Edinburgh (on the right), with hunting companions during the royal hunt of 1867
George Museum

In 1867 Prince Alfred, the Duke of Edinburgh, arrived at Knysna by ship amidst much pomp and ceremony. He then embarked on an elephant hunt, accompanied by a large hunting party. The prince had a narrow escape when a mounted Khoikhoi hunter galloped straight at him with an elephant in pursuit. His first shots stopped the elephant at barely 20 yards, whereafter a volley by other hunters brought the giant to earth. Many animals were wounded. Such brutal accounts abound in the literature, yet in those days elephant hunting was regarded as a 'rather good sport'. In 1908 only 20 elephants remained in the Knysna forests, and the government acted at last by proclaiming them royal game. Thus they were protected from being hunted, except by the British royalty.

The last hunt took place in 1920, when Major P J 'Jungle' Pretorius obtained permission to shoot one Knysna elephant for the South African Museum. Five animals died during this bungled hunt, later called 'the Pretorius massacre'. It dealt a blow to the small nucleus of Knysna elephants from which they would never recover. Between 1968 and 1969 an expert on elephants, Nick Carter, carried out a study on the Knysna elephants for the Wildlife Society. In very difficult terrain he managed to find the elephants with the help of tracker 'Aapie' Stroebel, descendant of P Stroebel who acted as tracker for the Royal hunt in 1867. In a further survey during 1970, Carter established the number of surviving elephants at eleven. Their numbers suddenly plummeted to a mere three individuals by 1980. An Elephant Working Group was established in 1981, which found harassment (sniping by smallholders or poaching) and a restricted habitat to be the main probable causes for the

A Knysna elephant photographed at close range in 1968. This was 'Aftand', a mischievous old elephant with little fear of humans
Major B Kinloch (George Museum)

decline. Research by forest scientist Julius Koen found a phosphorous deficiency in forest plants, which could have impaired the breeding of the elephants.

The decline in elephant numbers caused increasing public concern, following active campaigning by the Wildlife Society and the Endangered Wildlife Trust. Support mounted for the idea of introducing elephants from elsewhere to establish a viable breeding population. In April 1991 Gert Kotzé, then Minister of Water Affairs and Forestry, gave approval for the introduction of young elephants from the Kruger National Park to the Knysna forests. Three young elephants duly arrived in July 1994. The project was not met with success, however. One elephant died of stress-related pneumonia. The remaining two could not adapt to the forest environment and kept to the clearings and adjacent farmland. By that time only one of the original Knysna elephants could be found, followed years later by the discovery of another two survivors.

In January 1997 it was decided to move the remaining Kruger elephants to Shamwari Game Reserve in the Eastern Cape. Within two and a half centuries the hundreds of elephants that had moved through the forests were decimated to three survivors. The only reminder that elephants once reigned supreme is the rash of warning signs that greet motorists and hikers along the forest roads and pathways.

Forest birds

...the large green bird came gliding down silently, the scarlet feathers of its wings glowing for a moment in the spatters of sunlight.

Dalene Matthee - Circles in a Forest, 1984

More than 60 species of birds populate the Knysna forests, of which about 35 species are commonly associated with forests. Some occur over a wide range of habitats. These birds fill every niche in the forest, from the forest floor to the canopy. The drier forests near the coast and forest margins offer a greater variety of suitable habitat conditions, and therefore harbour a greater variety of birds than the interior of moist and wet forests. Bird-watchers need patience to spot the elusive birds in the dense vegetation, which often reveal their presence by loud piercing calls or sudden movements.

The multitude of forest birds can co-exist through hunting different food sources, and in different strata of the forest. Most famous of all the forest birds are the Knysna louries *(Tauraco corythaix)* with their emerald green and scarlet plumage. The brilliant display of their crimson wings in flight is breathtaking.

Knysna lourie
N Brickell

Crowned eagle
A Froneman

Their raucous 'kok-kok-kok' calls and guttural alarm calls resound through the forests as they hop about the branches with amazing agility. These medium-sized birds have short, stubby beaks, adapted to a diet of fruits and berries.

Another brilliantly coloured forest bird is the narina trogon *(Apaloderma narina)*, named by the eighteenth century naturalist Francois le Vaillant after a young Khoikhoi woman whose beauty he admired. Despite its emerald-green plumage and bright-red belly it is a notoriously difficult bird to spot. The sluggish bird can sit motionless in one spot for hours, but it is agile when it dashes after flying insects in the lowers strata of the forest.

The paradise flycatcher *(Terpsiphone virides)*, like the narina trogon, is a sallying insect-eater (insectivore) of the lower forest strata. Unlike the passive narina trogon it is an excitable bird, trailing long tail-feathers as it flits underneath the canopy in pursuit of insects. This warbling summer visitor to the southern forests usually keeps to the forest edge.

Dusky flycatcher

Black-headed orioles *(Oriolus larvatus)* announce their presence from the highest tree-tops with loud liquid calls. They are past masters in the art of camouflaging nests, which are built among the beard lichens in the canopy to avoid the many predators preying on birds' eggs and chicks. Subdued chippering notes follow flocks of Cape

white-eyes *(Zosterops pallidens)* as they move through the trees in search of insects, fruit and berries.

Chorister robins *(Cossypha dichroa)* are among the best songsters of the forest, and they include much mimicry of other birds in their loud and bubbly songs. They feed on insects and berries in the mid-stratum, but descend to the ground during the winter months. Flocks of quietly chattering terrestrial bulbuls (Phyllastrephus terrestris) search for food among the dry leaves on the forest floor, while seed-eating cinnamon doves *(Aplopelia larvata)* forages singly or in pairs in utter silence.

The musical 'Willy' call of the sombre bulbul *(Andropadus importunus)* pierces through the drier forests near the coast, but the bird is unobtrusive and difficult to spot, as its name implies. The tiniest of the forest birds is the lesser double-collared sunbird *(Nectarinia chalybea)*, which hovers above the flowers of the trees and shrubs in search of nectar. At the other end of the spectrum is the ferocious crowned eagle *(Stephanoaëtus coronatus)*, the undisputed king of the forest. This huge bird of prey can dive through a gap in the forest canopy to pounce on a monkey or small antelope, then lift it vertically into the air with graceful beats of its powerful wings. The night belongs to the wood owls *(Strix woodfordii)* - sharp-sighted hunters that swoop down on scurrying mice with silent flight.

Forest birds play an important role in the forest ecology as pollinators, carriers of seeds and predators. Many are not restricted to the forest habitat, but also occur in other veld-types, and even in urban gardens. Birds inhabiting the canopy or mid-stratum of the forests usually sport bright colours or have loud, piercing calls which aid communication between them, and help them to locate one other.

Reptiles and amphibians

There are numerous snake species that spend most, or all of their time hunting prey in the understorey and as high as the canopy... There are also numerous amphibians lying in the ground litter and the shallow soil as well as the streams and swampy areas.

Chris & Tilde Stuart - Africa: A Natural History, 1995

Snakes are seldom encountered in the forests, due to their camouflage and retiring habits. Most snakes in the southern Cape forest are non-poisonous. The sleek green body of the African tree snake or boomslang *(Dispholydus typus)* is adapted to a life in the trees, where it hunts birds and chameleons. Although very poisonous, the snake is not aggressive, and will rather glide away silently at the approach of people. The poisonous night adder *(Causus rhombeatus)* and puffadder (Bitis arietans) may be encountered in the drier coastal forests, but they are ground-living creatures which avoid the damp floor of the moist forests.

Young African tree snake
Wulf Haacke

The olive house snake *(Lamprophis inornatus)* is one of several non-poisonous species hunting rodents on the forest floor at night. Brown water snakes *(Lycodonomorphus rufulus)* are also active at night,

hunting frogs in and near forest streams. Both species kill their prey by constriction. Some non-poisonous snakes put up a ferocious display or imitate poisonous species to deter predators. When threatened the Herald snake *(Crotaphopeltis hotamboeia)* flattens its head to resemble an adder. This snake was first described in the Eastern Province Herald, hence its common name.

Knysna dwarf chameleon
Wulf Haacke

The marbled leaf-toed geckoes *(Phyllodactylus porphyreus)* live underneath the bark of trees and emerge at night to hunt insects. They have many enemies, including snakes and spiders, and can shed their tails to escape when danger threatens. These geckoes have also adapted to urban areas and can be seen hunting insects on walls in the glare of outdoor lights.

The master of camouflage in the wet forests is the Knysna dwarf chameleon *(Bradypodion damaranum)*. Its painfully slow swaying movement along branches in search of insects enables light-sensitive pigments to adapt its skin colour to different backgrounds as it moves along. It is a complicated process that involves changes in light intensity, temperature and the emotions of the creatures themselves. Once detected and threatened, the chameleon puts up a ferocious display. The lungs are inflated to swell the body, and the mouth is opened to expose the red inside.

The chameleon turns white at night, and favours the middle of a tree fern as resting place.

A variety of frogs inhabit the streams and floor of the southern Cape forests, but they are more often heard than seen. Most have light to dark brown or green bodies with cryptic patches that blend with the forest environment. Cape ghost frogs *(Heleophryne purcelli)* living in the fast-flowing streams of forested gorges in the mountains have depressed heads and bodies that facilitate concealment in narrow rock crevices. Clicking stream frogs *(Strongylopus grayii)* are common in the streams of the high forests, where they feed on a variety of insects. 'Wooden' clicking sounds emitted with monotonous regularity betray the presence of these frogs, which usually remain well concealed. Even more elusive are the plain rain frogs *(Brevisceps fuscus)* which live in shallow tunnels in the forest floor. Repeated 'chirrup' sounds emanate from the burrows, from which the frogs emerge only during rainy periods. These squat bulldog-like creatures lay their eggs in shallow holes where the froglets grow up without coming into contact with water.

The invertebrates

...it is the invertebrates that dominate the forests...This is truly the realm of the invertebrates! They range from the subterranean world to the highest point of the canopy and everywhere in between.

Chris & Tilde Stuart - Africa: A Natural History, 1995

Most of the forest plants, mammals, birds, reptiles and amphibians have been discovered and named; yet the forests still harbour thousands of invertebrate species unknown to man. A multitude of insects, spiders, millipedes, centipedes, worms and snails populate every niche between the forest floor and the canopy. Every tree harbours a whole world of insects. Turn over a rotting stump and you will most likely find it crawling with wood lice and other decomposers.

The invertebrates serve as a food source for a vast number of mammals, birds and amphibians. Shrews hunt them under the leaf mold. Bats feed on the night-flying moths while woodpeckers pick out the woodborer larvae underneath the bark of trees. The omnivorous bushpigs turn up the soil for bulbs as well as the pupae of various insect species. Numerous invertebrate predators such as spiders populate

A poisonous garden acraea poises delicately on a bracken fern

the forests, and struggles for life and death are played out in every corner. Perhaps the most intimidating of these creatures are the scorpions of the genus *Pandinus*, which emerge at night to hunt for prey on the darkened forest floor.

The most common survival strategy of the forest invertebrates is camouflage. Bark-coloured moths merge so well with their surroundings that they virtually defy detection. Predators also use this strategy against their prey. The *Caerostris sexcuspidata* spider living in the shrub layer resembles a crinkled leaf to escape detection both by its enemies and its prey. False eye spots on the wings of some butterfly and moth species serve to startle or frighten predators temporarily, thus enabling them to escape.

Poisonous or bad-tasting creatures need no concealment. Many caterpillars (mostly moth and butterfly larvae) sport bright colours and hairy protrusions to warn predators to leave them alone, and to make them appear less attractive as a prospective meal. The red wings of the garden acraea *(Acraea horta)* flash unmolested among the greenery, for birds learn to respect the warning signals of this poisonous butterfly species through trial and error.

A few non-poisonous butterfly species deceive their prey by mimicking the colour patterns of poisonous species. Females of the mocker swallowtail *(Princeps dardanus)* can assume several forms that differ markedly from that of the male. One form resembles the colour patterns of the unpalatable African monarch *(Danaus chrysippus aegypticus)* while another resembles the equally unpalatable layman butterfly *(Amauris albimaculata albimaculata)*.

Spiders of all shapes and sizes occur in the different levels of the forest, employing a variety of hunting techniques. Trapdoor spiders ambush their prey from a concealed burrow on the forest floor. Higher up on the tree trunks flattened and camouflaged bark spiders lie in wait to dash out at passing prey. The webs of

grotesque and colourful horned kite spiders (*Gasteracantha* species) festoon most forest trails during summer.

Many beetles, some gleaming with the emerald-and-ruby fire of gems and the metallic lustre of copper, live in the treetops and understorey. Longicorns (*Cerambicidae*) attack the stems of trees, most notably stinkwood. Leaf beetles (*Chrysomelidae*), like cutworms, are most destructive consumers of foliage. Fruit bugs (*Antesta variegata*) and stink bugs (*Holopterna vulga*), in turn, attack the fruits and new shoots of some tree species.

Non-poisonous forest insects rely on speed or camouflage for survival. Some spider species imitate knotty branchlets to escape predators - even extending a leg to lend realism to the illusion

Various forest plants have evolved chemical defences to cope with this pest problem. Their leaves are rich in toxic or bad-tasting chemicals such as tannin and phenol. Insects, again, have evolved to overcome these defences. Many species are specialist herbivores that developed digestive enzymes to render the toxins of certain plant species harmless. Forest trees do not flower and fruit every year, and this is thought to disrupt the populations of fruit and seed predators. When the trees of a species do flower and fruit, these occur simultaneously, providing such a glut that some seeds at least will survive the onslaught of the insects.

Pollinators such as bees and butterflies and decomposers such as wood lice repay the forest with interest for all the damage done by the herbivores. Relatively great distances between individuals of a plant species creates the need for effective and energetic pollinators. Hence certain plants developed mutually beneficial relationships with certain insect species over millions of years in a process of co-evolution. In the rainforests the life of plants and insects are so intertwined that the disappearance of a plant species may precipitate the loss of one or more associated insect species.

Wild fig tree species such as the veld fig (*Ficus burtt-davyii*) each has its own tiny wasp species that pollinates the minute flowers inside the figs. The barely visible entrance to the inside of a fig - guarded by overlapping scales - is custom-made to allow entrance only to females of that particular wasp species. Once inside, the wasp, laden with pollen from male flowers of another fig, crawls to the female flowers. There the pollen is rubbed off. The wasp inserts her ovipositor like a hypodermic needle into a stigma of the female flower to lay her eggs in the safety of a small chamber. When the eggs hatch the young insects feed on the fruit and eventually eat their way to the outside. The females crawl over the mature male flowers and, laden with pollen, fly to other figs. And so the cycle starts anew.

One ancient life form has survived unaltered in the damp forest areas beneath the rotting logs and humus for some 500 million years. This velvety reddish-black creature moving like a caterpillar on stumpy legs is known as the 'peripatus'. Its kidneys and blood system resemble those of worms, but its breathing organs those of an insect. This 50 millimetre long creature can possibly be the missing link between worms and insects. It occurence in the forests of South America, Australia and Asia as well supports the theory that these continents once formed a single land mass (Gondwanaland) 100 million years ago. As the continents drifted apart to their

present positions, they must have carried the peripatus to all the corners of the tropical world.

Another discovery supporting the continental drift theory is the close resemblance between the swift moth (*Phalaena venus*) endemic to the southern Cape forests and the Australian swifts. This moth occurs in close association with its larval host tree, the pink blossom tree (*Virgilia divaricata*). Almost every sizeable pink blossom tree is infested by the larvae, which bore into the roots and the base of the trees. Some trees die as a result. However, the moth itself is seriously threatened by the spread of the exotic Argentine ant.

The loss of a few insect species may be hardly noticeable, but in a forest environment where everything is interconnected it may precipitate ever-increasing changes that could shake the forest to its foundations. For that reason forest management and research include even the tiniest creatures, however insignificant they may seem. People tend to overlook them in search for the big and dramatic things, and the squeamish avoid them like the plague. The fact is that very few of the thousands of invertebrate species are poisonous or aggressive, and their study can be very absorbing and rewarding.

FOREST UTILISATION AND MANAGEMENT

Multiple-use management

The management of such forests is an extremely complicated scientific business. Steadily they are being brought under control, composition and conditions in each area studied, salients closed, burns healed, exotic invasions repelled...

Arthur Nimmo - The Knysna Story, 1976

After their closure to woodcutters in 1939, the southern Cape forests recovered gradually from the wounds inflicted by two centuries of exploitation. When the Forestry Department once again turned its attention to the forests in 1964, it had to face the fact that very little research was done on the forests, except for the pioneering work of JFV Phillips and FS Laughton. Little was known about the potential and management requirements of the forests. This would lead to the establishment of the Indigenous Forest Research Station at Saasveld in the same year. Dr Friedrich von Breitenbach was appointed to supervise preparatory research for the development of a modern management system as well as the training of specialised management personnel.

Forest workers 'topping' a large tree. Only old and diseased trees are harvested

A forest worker with chain saw trimming branches from a tree selected for harvesting. Once stripped of all its branches, the tree trunk is carefully felled to minimise damage to the canopy and surrounding vegetation

Directorate: Indigenous Forest Management

On the basis of this research the forests were ecologically classified into six forest types. The state-owned indigenous forests were then subdivided into management classes, aimed at the optimal and sustainable use of the forests. Forest areas were allocated to one of five management classes, namely timber utilisation, protection, nature reserve, recreation and research. Thus the concept of sustainable multiple-use management was born. It formed the basis of the first proper forest management plan, which has been applied to the Knysna forests since 1970.

The Directorate Indigenous Forest Management of the Department of Water Affairs and Forestry manages 35 800 ha of forest in the southern Cape, out of a total of 60 500 ha of forest occurring in that region. This Directorate harvests timber from about 26 per cent of the state-owned forests. Only medium-moist and moist high forest types are included in the timber utilisation management class. The other forest types do not have sufficient marketable timber, or are ecologically too sensitive.

The forests are divided into blocks, compartments and sub-compartments for management purposes. Highly skilled personnel select individual trees for felling within a compartment, in accordance with scientific criteria based on the findings of continuous research and monitoring. Each compartment is rested for intervals of ten years between harvests. Only trees with visible signs of senility (old or diseased trees which are within the last ten years of

their life cycle) are selected. Large trees are topped before felling to reduce damage to the canopy. Forest workers scale the trees with climbing devices to remove the branches with chain-saws - certainly not a job for the faint-hearted! This harvesting system, called the Senility (Mortality) Criteria Harvesting Yield Regulation System, is aimed at the optimum utilisation of timber with the least possible impact on the forest ecosystem.

Nature always delight young minds. These children share an encounter with a brown water snake

Great care has to be taken to minimise damage to the forest floor and the shallow root systems of trees during the removal of logs. Strong Percheron horses and winches are used to pull the logs to the nearest slip paths. A network of these paths, left by the erstwhile woodcutters, criss-crosses the forests. Specially designed log-carrier tractors transport the logs along the paths to the nearest roads, where they are loaded on to trucks and taken to the nearest depot. Timber is only harvested in dry weather, when the soil is least susceptible to compaction. Steep and sensitive areas are avoided.

The protection management class covers 44.8 per cent of the forest surface, including very wet and very dry forest types and all other steep, inaccessible or ecologically fragile areas. Natural regeneration does not easily occur in these areas. They are also protected for their valuable role in soil and water conservation, and as important habitats for animal and plant species. Much effort is expended on the control of exotic invader plants in this management class. Recreation and the harvesting of seven weeks ferns (*Rumohra adi-*

A powerful Percheron horse, guided by his handler, strains against a load of logs

antiformis) are restricted to less vulnerable sections.

A number of forest areas enjoy an enhanced conservation status as nature reserves. Forests of all types with features of special conservation interest (eg. rare or endangered plant or animal species) are included within the nine declared nature reserves. No timber or fern harvesting is allowed, but less sensitive parts of the reserves are set aside for recreation. Ecological research areas comprise 1.2 per cent of the forest area. Their purpose is mainly to develop an understanding of forest dynamics for practical application in forest management.

Numerous recreation facilities such as hiking trails, day-walks, scenic spots and drives, picnic sites, cycling trails and bridle trails have been developed within the forests (see reference section *Recreation in the forests*). Overnight facilities vary from basic-budget to luxury accommodation. These facilities enable the public to enjoy close contact with the forest. Growing numbers of visitors are drawn to the forests each year, and the management of recreation facilities and their impact on the forests has become increasingly important. The shallow root systems of the forest trees are vulnerable to soil compaction, and boardwalks have been constructed on sites that attract large numbers of tourists.

Other conservation activities apart from the five main management objectives or classes include the reconstruction of indigenous forests where it has been severely damaged. Alien vegetation, which interferes with the natural development of the forest, is removed. These areas are then sometimes replanted with young

cultivated trees of pioneer species such as the pink blossom tree (*Virgilia divaricata*). Several years later these trees are thinned and other species with pioneer characteristics such as the Cape beech (*Rapanea melanophloeos*) are planted to speed up the process of plant succession. Deeply incised forest margins are also straightened in this manner to render them less vulnerable and more manageable. However, care is taken not to establish indigenous forests in unsuitable habitats.

Forest workers eradicate alien plants threatening to smother the indigenous vegetation along a forest margin
Directorate: Indigenous Forest Management

About 10 per cent of the forest area is infested or threatened by alien vegetation. Very wet and very dry forests are particularly vulnerable since the abundance of ferns in the former and weeds in the latter can retard the rejuvenation of disturbed areas. Most invaders are, however, sun-loving plants that respond to disturbance. Therefore they do not spread in well-managed forests with small canopy gaps. Alien plants such as the bugweed (*Solanum mauritanium*) and black wattle (*Acacia mearnsii*) are killed through the application of herbicides or by ringbarking. Australian blackwood (*Acacia melanoxylon*) which was extensively planted in exploited parts of the indigenous forests after the turn of the twentieth century, is harvested for its very popular and valuable timber. Between 1 000 and 2 000 cubic metres are harvested annually, compared to roughly 1 500 cubic metres of indigenous timber. This yield of blackwood timber is expected to drop to 500 cubic metres in the long term as the population of mature trees declines.

During March 2002 a team of assessors of the international Forestry Stewardship Council (FSC) visited Knysna to evaluate the management of the southern Cape forests. Their visit followed upon a decision by the Department of Water Affairs and Forestry to pursue FSC certification for the southern Cape forests. The goal of the FSC is to promote the environmentally appropriate, socially beneficial and economically viable management of the world's forests by establishing a world-wide standard of recognised and respected principles and criteria for forest management. The FSC is internationally recognised as one of the best systems to ensure credible certification for good forest management.

The FSC team rated the southern Cape forests as High Conservation Value Forests. Stricter standards than normal have to be met to obtain certification for this forest category. The team assessed all aspects of the management of the southern Cape forests according to their criteria. They found that the Directorate Indigenous Forest Management in the southern Cape conformed to the criteria with a number of corrective actions requested (the lowest number of corrective active requests ever issued during a first assessment in southern Africa). Based on this assessment the team recommended that FSC certification be granted for the southern Cape forests.

Once almost doomed to extinction by ruthless exploitation and mismanagement, the southern Cape forests are now being cared for through one of the best rainforest management and timber yield regulation systems in the world. This system is certainly unequalled in Africa for its efficiency, its professional scientific approach and the dedication of the personnel involved. In a world being stripped of its protective cloak of forests this is a significant achievement. The future of the southern Cape forests is secure, and coming generations will still be able to marvel at the beauty of these forests as early explorers did centuries ago.

Custodians of the forests

The motto chosen for Saasveld College is Mihi Cura Futuri (My care is for the future), and this could well be applied to the whole of the Department of Forestry (now the Chief Directorate of Forestry). These foresters are dealing with trees which were growing long before Europeans came to South Africa...

Arthur Nimmo - The Knysna Story, 1976

The State-owned forests of the southern Cape belong to the people of South Africa, and are managed for their benefit and enjoyment. It is a vast and delicate ecosystem which requires careful scientific management by a large corps of skilled manpower. The Directorate Indigenous Forest Management employs a range of specially trained people. Each one, from the forest guard to the forest scientist, is a cog in the clockwork that makes the organisation tick.

The Knysna Area Office is one of several regional offices that fall under the Directorate: Indigenous Forest Management of the Chief Directorate: Forestry (Department of Water Affairs and Forestry). The management tasks are divided into three main line functions namely planning, management and information. A small team of forest scientists and foresters is responsible for planning the management of the forests and exercising control over harvesting.

The planning section also monitors changes in plant and animal communities, tree growth and other dynamics of the forest ecosystem. The major part of the monitoring activities is aimed at determining the effects of tree and fern harvesting and recreation activities on the forest. The scientific database created in this manner is indispensible to all planning activities, including the drawing

Diepwalle nursery where indigenous plants of the area are cultivated

up of management plans for nature reserves and the refinement of timber-harvesting systems.The allocation of a specialist scientist to the Area Office in Knysna has made an important contribution towards the understanding and scientific management of the forests.

The officer in charge of the management section supervises the activities of foresters at the State Forests of Farleigh, Diepwalle and Tsitsikamma. Each forester in turn is responsible for timber harvesting, the eradication of invader plants, fire management, forest guards, and the maintenance of roads and recreation facilities in his forest area. More than 20 forest guards are employed throughout the area. They have to ensure that all people entering the forests are in possession of the necessary permits and that forest regulations such as prohibitions on the removal of plants are obeyed. Being responsible for so large an area, the mere presence of the guards as well as their occasional appearance at a given spot serve as a potent deterrent. Fern harvesting done by private contractors has to be monitored. The forest guards also have to keep close track of the remaining Knysna elephants.

Harvesting teams are responsible for felling the trees marked for harvesting, for slipping the logs out of the forest, and for stacking them at the depots. It is hard and dangerous work, and the men are experts. They scale the trees with climbing devices to cut the limbs off with chain-saws, before the remaining trunk is felled and cut into smaller logs. The log sections are marked and recorded

in a database and then slipped out of the forest. Officials from all the line functions are involved in the auctions, sharing the responsibilities to act as auctioneers and recording the prices fetched for the timber lots. Through these auctions, unique in South-Africa, a rich tradition has evolved over the years, while a very special relationship has developed between seller and buyers.

Teams of forest workers are constantly involved in tasks such as the eradication of invader plants and the maintenance of fire-breaks. In some disturbed areas forest regeneration is aided by the planting of pioneer plants, interplanted with forest tree seedlings at a later phase in the plant succession. Nurseries at the state forests provide the seedlings, which are also provided to the public at affordable prices. A large variety of species is grown, and the nursery staff have to be knowledgeable about the different requirements of each species for germination and survival.

The rapid increase of recreation activities in the state-owned forests makes the development and maintenance of

Two forest guards on patrol in the Gouna forest near Knysna. Forest guards have been employed for law enforcement since the mid-19th century. Nowadays their duties include the monitoring of elephant movements, supervising fern harvesting and dealing with the public

recreation facilities increasingly important. Board walks and information boards have to be erected in those areas carrying heavy tourist traffic. Money collected at entry points at the Garden of Eden and the Tsitsikamma Big Tree is appropriated to finance many other recreation facilities where it is not feasible or practical to charge entry fees.

An information section caters for the increasing public need for information. When the three elephants from the Kruger National Park were released in the Knysna forests in 1994 for instance, the Knysna Area Office was inundated with a flood of calls by journalists and the public for information. This section handles press releases, public enquiries and the development of information and educational material. Environmental education has become an increasingly important function. Hundreds of name plates are fitted to trees along some of the forest trails. Information boards explaining the basics of forest ecology and management have been erected at strategic points, together with statistics on the height and age of the venerable old yellowwood giants (viewpoints such as Woodville, Diepwalle and the Tsitsikamma Big Tree).

Last but not least is the all-important administrative support, without which no organisation can function efficiently. These are the first people one will meet at the reception desk or talk to on the telephone, friendly and ready to respond to enquiries. The Knysna Area Office is thoroughly modern, using the latest technology in computer equipment. Accounts have to be kept of millions of rands expended and earned, training courses are arranged for personnel and provision has to be made for the maintenance of many millions of rands' worth of vehicles, machinery, buildings and infrastructure. Much of the annual budget is expended on the maintenance of decent living conditions at state forest centres, providing housing, electricity, sanitation, education facilities, child care centres, transport and recreation to employees.

The management of the indigenous forests of the southern Cape is a mammoth undertaking, but it is all the money and the efforts well spent. The forests have recovered from centuries of mismanagement, and now they are maintained in a healthy state by a new generation of custodians. When the forests were re-opened in 1964 for public recreation and limited harvesting, they were protected by a handful of ill-equipped foresters and assistants with no guiding policy or management plan. Within the space of 30 years the Directorate: Indigenous Forest Management has grown into a large body of skilled and dedicated men and women, implementing a modern scientific system of multiple-use forest management.

Participatory forest management

Contrary to the traditional view of forestry as the science of managing forested land, forestry today is about the relationships between people and the resources provided by the forest…
White Paper on Sustainable Forest Development, 1996

Before the arrival of the European pioneers to the southern Cape region, the rich resources of the forests were there for the taking, and everyone had access to them. The small numbers of Khoikhoi barely made an impact (except for the fires they lit to obtain grazing or to flush out game), and they lived more or less in harmony with nature. With the arrival of the European pioneers came the Western model of land use and ownership, which gradually excluded many of the local people from deriving benefits from the forests.

From the early nineteenth century until today, most of the indigenous forests in this region were owned and managed by the government, first as Crown forests, later as State forests. Until the middle of the 20th century, forest management was focused on protecting the forests as timber resources for the Cape (and later the Union) government. A few of the forests were owned by private companies. Although people had access to the forests untill well into the twentieth century, the timber was mainly reserved for harvesting by the State and the timber companies. However, hundreds of woodcutter families settled in these forests since the eighteenth century, presenting a formidable social and political obstacle to the government, which reluctantly allowed them to cut

timber. Continuous efforts were made to resettle them, in order to place timber harvesting on a more controlled and sustainable footing. These attempts continued for more than a century, until the closure of the forests to woodcutters in 1939.

With the advent of outdoor recreation activities during the second half of the twentieth century, the policy to reserve forests only for purposes of protection or for timber utlilisation, began to change. A multiple-use management system began to take shape during the 1960's, of which the rapidly expanding network of recreation facilities formed an important part. For more than two decades a policy of separate facilities for different race groups was followed, and the benefits of outdoor recreation facilities were mainly reaped by a privileged minority. Social upliftment at the time was limited to housing schemes and other social benefits for forestry employees and the pensioned woodcutter families. Although not reliant on forest resources, many local people living in rural and urban areas near the forests continued to suffer from the effects of poverty and a lack of basic services. Informal settlements in the region mushroomed, and the responsibility of social upliftment soon became more than a local authority issue, involving the forestry sector as well.

Real change in the forest management policy only came about with the rapid transformation of South African society since the first democratic elections in 1994. The Department of Water Affairs and Forestry adopted Participatory Forest Management (PFM) in 2000 in response to the political and pragmatic demands brought about by the changing social climate. It followed on the 1996 White Paper on Sustainable Forest Development, which paved the way for the involvement of local communities and other stakeholders in decision-making and the development of policy on the use and management of the forests. Special emphasis is placed on improving the living conditions of the poor.

Three PFM forums were established in 2000 on the forest estates of Diepwalle, Farleigh and Tsitsikamma. These forums meet regularly and comprise representatives of local communities, estate managers or their assistants, and forest guards. The forums serve several functions, including to inform and educate the participants on forest management issues, to evaluate project proposals and make recommendations, and to establish mutual trust and cooperation between the stakeholders.

A participatory forest management meeting in progress in Knysna.

PFM is a new and innovative process with many teething problems. Yet the potential rewards are high. In the southern Cape, many gaps still need to be bridged, including a lack of jointly agreed goals and targets. Immediate priorities include the targeting of the poorest households for projects such as bee-keeping or wood-carving, and the reaching of community forestry agreements with as many stakeholders as possible.

Despite the obstacles encountered, progress has been made. Communities are now much better informed on forest management due to educational workshops held by staff of the Directorate: Indigenous Forest Management of the southern Cape, and they are consequently able to make informed decisions. Approved

PFM projects include the harvesting of ferns by a local contractor employing previously disadvantaged people of the area, and a project to promote skills development and employment opportunities for wood carvers. Contracts are also given to local people for services to the department such as catering and cleaning. Lease agreements can create spinn-offs for local communities, such a the forest canopy slide operated by a private contractor in the Tsitsikamma forests. This contractor is bound by a lease agreement to employ local people as guides, and to pay a percentage of the income into a community trust fund.

The concept of involving people in forest management is gaining ground throughout the world, and is actively promoted by international agencies involved in forest management. In South Africa, as in most parts of the world, this approach is still in its embryonic stage. The support of agencies such as Danida (Danish Internation Development Assistance) and DFID (Department for International Development), as well as the enthusiasm of forestry staff, contributed to the progress made in the southern Cape. Hopefully it may yet develop into a showcase equal to the excellent standard achieved in the management of these forests. While the forestry pioneers of the previous centuries became known for developing the science of forest management and for guarding the forests with fences and fines, the pioneers of today may one day be remembered for forging a new way of managing forests with the people, and for their benefit.

Research and monitoring

Ecological and silvicultural research projects have been carried out in the forests over a period of several decades, contributing greatly to our current knowledge of the forests and providing the basis for our present management systems.

GP Durrheim & BJ Vermeulen - Sustainable Multiple-use Management of Indigenous Evergreen Forests in the Southern Cape, SA, 1996

When JFV Phillips took up his post at Diepwalle as Forest Research Officer in 1922 it heralded a new era of systematic ecological and silvicultural research. Phillips and his successor at Diepwalle, FS Laughton, were true pioneers of systematic forest research. When the Indigenous Forest Research Station was established at Saasveld in 1964, however, little was still known about the potential and management requirements of the forests. From that year research on the southern Cape forests continued apace, as a team of forest scientists at Saasveld developed the scientific basis for a forest management plan. This research greatly enhanced the existing knowledge about the forests. The first management plan for the Knysna forests was ready for implementation in 1970.

Forest research is firstly aimed at understanding natural processes such as tree growth, seed dispersal and nutrient circulation. A second, important, aim is to develop management practices on the basis of this knowledge. The comprehensiveness of the research is illustrated by the list of current and past research fields, which include:

A forest scientist measures the diameter of a tree as part of ongoing scientific monitoring programmes

- Composition and biogeography of the forest

The plant community composition; the impact of fires in forest plantcommunities; animal communities

- Forest dynamics and ecological processes in relation to management requirements

Forest canopy gap dynamics; litter fall and nutrient recycling; regeneration processes in forest margins; the growth and mortality of tree species

- Population studies of key plant and animal species of economical and ecological value

Elephant habitat requirements and conservation; the ecology and management of the seven weeks fern (Rumohra adiantiformis); monitoring of bushbuck, blue duiker and bushpig populations.

Current monitoring is aimed at determining the effects of utilisation on the forest. All the trees measuring more than 30cm in diameter at breast height (dbh) are counted per species and recorded in each compartment. In permanent sample plots all the trees with a dbh of more than 10cm are counted and measured in circular 400 m^2 plots. Research compartments and nature reserves left in their natural state act as controls against which changes in the utilised forest areas can be measured. Strip plots of 10m wide are also set aside to count and measure trees of 10cm at dbh and more.

Long-term studies are undertaken in sample plots and research sites to provide data on the growth rate and mortality of various tree species, and the overall turnover in timber volume per annum. This data is essential to refine the timber-harvesting system and to ensure the optimum, sustainable utilisation of the forest resources.

Research on the seven weeks fern (Rumohra adiantiformis) helped to determine optimum harvesting cycles

Information obtained from field work and research is fed into a computerised data base, which is used to monitor the effects of timber utilisation and possible changes in species composition of various forest areas in the long term.

Rainforests are such complicated ecosystems that many more decades of exhaustive research are still needed simply to gain a basic understanding of their structure and dynamics. The existing knowledge of the vast insect population, for instance, covers but a fraction of the whole field, with the majority of the species not yet being discovered or described. For that reason it has been said that man knows much more about the surface of the moon today than about the rainforests. The forests are reluctant to reveal all their secrets, and they remain one of the last great frontiers of the natural sciences.

The Knysna furniture industry

There are presently several furniture industries at Knysna which manufacture furniture from indigenous timber...In this environment cabinet-making is usually, as in the early years, a family enterprise.

Lantern, May 1990

The first steam sawmill in Knysna opened in 1875 on the present site of the classy Woodmill Lane shopping complex. It was the heart around which the town grew. The mill changed hands several times before Birmingham businessman George Parkes bought it in 1892. By the end of the nineteenth century several mills had sprung up in and around the village. These mills worked the forest timber into planks, beams, sleepers and ox-wagon parts. Much of the wood was used in construction. Some of the old homes at Knysna still have stinkwood staircases and yellowwood floors and ceilings dating from the nineteenth century. During that time the mills produced mainly planks and sleepers. Only a small percentage of the wood was used locally to manufacture furniture.

Throughout the 18th and 19th centuries most of the Cape Dutch furniture was manufactured in Cape Town, and in the larger towns such as Swellendam, Oudtshoorn and Graaff-Reinet. The furniture was usually made from indigenous forest timber, mostly yellowwood and stinkwood. Exotic woods from the Far East such as teak and ebony were also used. The craftsmen made expert use of the colour contrast and mottled or striped grains of the timber

to produce elegant and priceless Cape Dutch furniture. The design of the furniture was based on the baroque style of the seventeenth and early eighteenth century Europe, but developed cleaner lines and styles analogous with the gables in architecture during the nineteenth century. Certain unique pieces of furniture developed locally, such as the jonkmanskas - a stinkwood cupboard with yellowwood doors, and two yellowwood drawers at the top. It became highly popular from the mid nineteenth century onwards. The massive armoire, used to store household linen, had a more sophisticated design, but its style gradually changed from the simple to the ornate and back to the simple, as fashions changed.

A public timber auction at Diepwalle

Despite the favourable location of Knysna near the very source of the prized timbers, the nowadays widely known Knysna furniture industry has only developed since the beginning of the twentieth century. In 1911 a school was established near the town for the training of cabinet-makers, where the well-known cabinet-makers of later years learned their trade. Many family concerns, such as Parkes & Sons, PJ van Reenen, Jonker, Kluyts and Fechters began to manufacture prestigious Cape Dutch style furniture from indigenous timber. Their craftsmanship placed Knysna on the map, and the demand for their furniture kept growing to this very day. Cabinet-makers manufacturing Cape Dutch furniture from indigenous timber also conduct business in Bellville,

Logs harvested from the forest are stacked at a depot

Bloemfontein, George and Kareedouw, but their numbers do not match the concentration of furniture craftsmen in Knysna.

Stinkwood, yellowwood and ironwood are the main indigenous timber species used in the local furniture industry, together with Australian blackwood. Other less important species include ironwood, assegai, Cape beech, white pear, hard pear and candlewood. The indigenous trees harvested in the medium moist and moist high forest types of the Knysna forests are carefully selected and felled with minimum disturbance of the forest ecosystems (see Multiple-use Management).

Between 2 000 and 4 000 cubic meters of timber are sold annually by tender and at auctions held in the open-air depots. More than half of this volume consists of Australian blackwood. This tree was introduced in the previous century to supplement indigenous timber, and has grown in popularity due to its beautiful dark and durable wood. In May 2001 stinkwood fetched an average price of R3 237 per cubic metre in log form, while yellowwood fetched R1 566.97 and Australian blackwood R1 065.53. High grade timber fetches even much higher prices. Only mature timber is used in the manufacture of furniture, obtained from fully grown trees that are often several hundred years old.

Cabinet-makers have an intimate knowledge of the properties of various types of timber. At the sawmill the raw logs of timber (also called "roundwood") are carefully studied to determine how they can be sawn into planks to obtain the optimum quantity and quality from each block. The planks then have to be air-dried for two to four years before they can be used, to prevent warping. Nowadays this process is speeded up by drying the planks in ovens in which the temperature and moisture level are regulated artificially. The moisture level in the wood is tested throughout the drying process until it reaches the required moisture content. Certain types of timber cannot be dried artificially without causing defects, and this timber is left to air-dry for two years before being kiln-dried.

An elegant stinkwood table takes shape under the expert hands of a craftsman

The logs are sawn in planks of a pre-determined thickness, accurately measured to ensure the minimum wastage of valuable wood. The colour and the mottled or striped grain of the planks are carefully combined to produce even-coloured and grained furniture, or to achieve desired contrasts. Highly skilled craftsmen are used to manufacture stinkwood furniture by hand.

Completed furniture is treated with wood oil or spray-painted with sealer. Stinkwood in particular has a natural lustre that is enhanced with the right treatment. Only about 35 per cent of the wood in each log is worked into furniture, since the best wood

without stains, knots or other weaknesses has to be selected. Discarded wood and even roots are used to manufacture small items such as pen holders, place mats and clock stands.

Furniture manufactured from the indigenous timbers and Australian blackwood has gained a scarcity value and prestige throughout the years. Yet the manufacturers in Knysna have managed to keep their prices affordable by selling directly to the public. That their products are so much in demand both nationally and abroad is a tribute to the skill and devotion of the craftsmen and to the magnificence of the forest trees. Forest timber that was centuries in the making is imbued with the magic of the forests, as Knysna writer Winnifred Tapson wrote of stinkwood: 'Dark brown and lambent as a peaty forest stream, with a grain patterned by centuries of days that flamed with sun, and nights that shimmered with alternate stars and darkness, and rains, and the forests' rich depths.'

Seven weeks ferns - the 'green gold'

Seven weeks ferns have been growing in the forest for centuries, but man has only now discovered the long life of its leaves, which carries the beauty of the forest to cities throughout the world.

Sue van Waart - Translated from Briewe uit die Tuin van Eden, 1993

A small part of the Knysna forests can be found in the flower arrangements of the foremost hotels and restaurants of Europe and the Far East. Fronds of the seven weeks ferns (Rumohra adiantiformis), sought after by florists for their beauty and long cut life, are the green gold of the Knysna forests. The fern species occurs widely distributed in Australasia, South and Central America, southern Africa and some Indian Ocean islands. Most commonly it is a terrestrial fern, but also grows on boulders and rocks (chasmophyte), and occasionally as an epiphyte on trees. However, it reaches their optimum size and splendour only in the moist and well-drained parts of the Knysna forests. The fern is particularly prominent in areas which burnt 20 to 50 years ago.

Fronds of seven week ferns are picked under the watchful eyes of a forest guard

Directorate: Indigenous Forest Management

Private contractors began to harvest seven weeks fern fronds under permit in the Knysna forests in the early 1980's. By then a lucrative black market had developed, with fern-pickers illegally invading the forests at night. For many years forest officials battled to curb these activities, which

ceased once strict fines were introduced and better control was established of the industry.

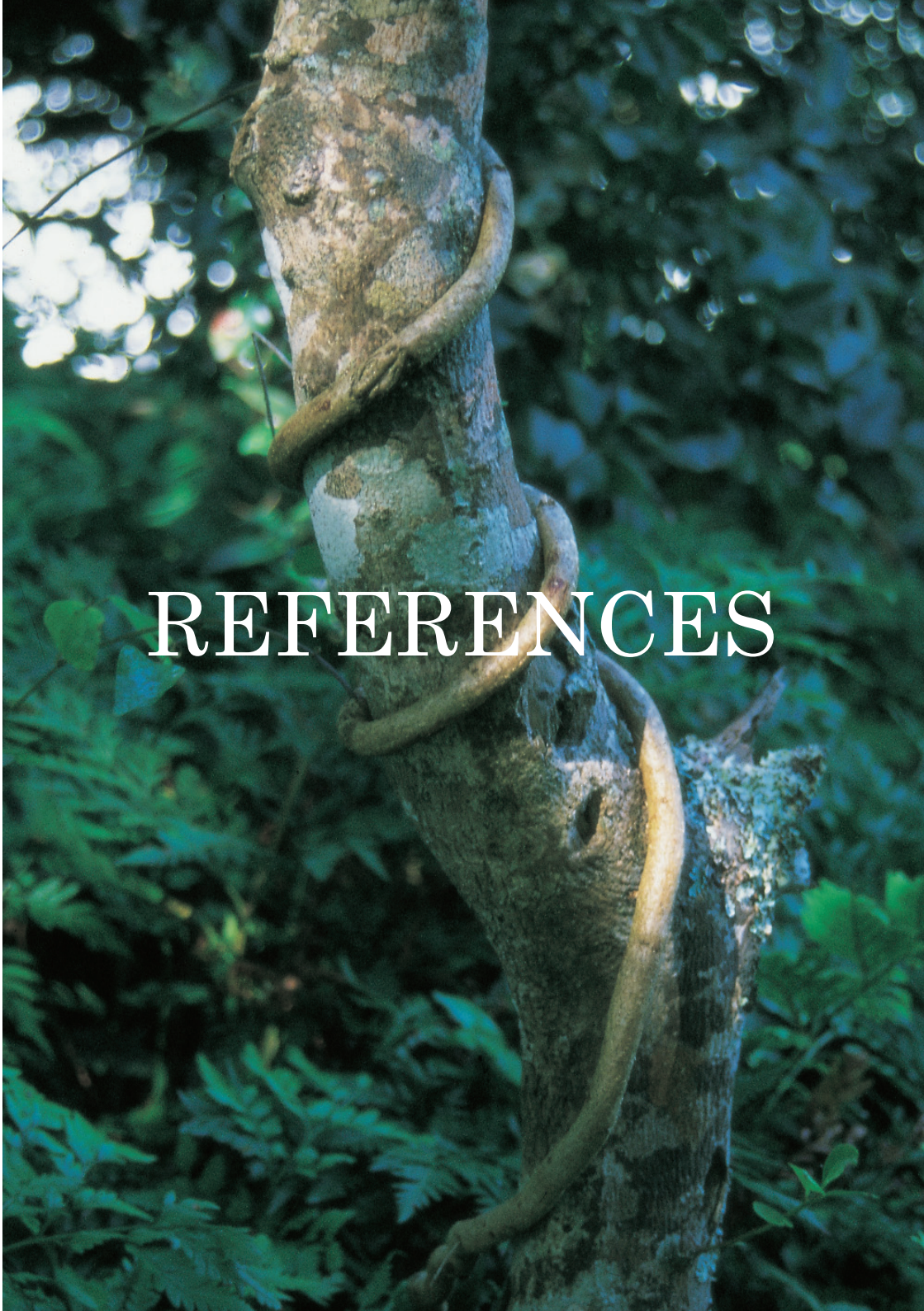
Fern leaves are cut for export to the flower markets of Europe
Directorate: Indigenous Forest Management

Short resting periods for the ferns to recover between harvests (harvesting cycles) from five to 25 weeks led to an initial over-exploitation of the resource. The quality of fern fronds reaching the flower markets gradually declined. Consequent extensive research on the characteristics of the ferns revealed that most of the leaf growth occurs between September and November, and that the living leaves remained vigorous for up to two years. The optimum harvesting cycle was hence set at 12 months, and finally increased to 15 months.

Fern harvesting is still carried out by private contractors under permit, but their activities are closely monitored to ensure adherance to the prescribed restrictions. Experienced teams of labourers pick the fronds under the watchful eyes of forest guards. Fern are harvested in an area of some 18 600 hectares of moist and wet high forest, excluding steep slopes and other sensitive areas. To meet the growing demand of the flower markets, several private nurseries have been established at great cost under shade-nets and in thinned pine stands. Similar nurseries have been established overseas, but none can beat the size and quality of the fern fronds harvested in the southern Cape indigenous forests.

Only two decades ago the seven weeks fern was virtually unknown outside its forest home. Within that time the export of seven weeks ferns fronds to the overseas flower markets has become a lucrative industry, providing employment to more than 200 people and earning almost R10 million in foreign currency. More 'green gold' may be sheltering in the shade of the Knysna forests - medicinal plants perhaps, guarding their secrets until the day their value is discovered.

The weathered face of a forest patriach. The memories of the bygone era of the woodcutters of the Knysna forests live on in the novels of Dalene Matthee
Francois le Roux



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Dalene Matthee's 'forest' novels

Hartenbos author Dalene Matthee introduced the splendour of Knysna and its forests to many people.

Lantern, May 1990

When Dalene Matthee's first 'forest' novel *Circles in a Forest* was published in 1984, it caused a worldwide sensation. Literaries described it as reminiscent of DH Lawrence and Thomas Hardy. Then followed two equally powerful and haunting novels: *Fiela's Child and The Mulberry Forest*. It is a marvellous trilogy which brings to life the nineteenth century settlers and woodcutters of Knysna and the surrounding forests.

Circles in a Forest is the moving story of Saul Barnard's lonely fight to save the vanishing forests from destruction. It is also a search for truth and justice in a world of prejudice and superstition which branded Saul a traitor, and banished him from his forest home and his beloved Kate. Well-known South-African and literator André P Brink wrote that the novel is '...as deep and dark and luminous and wise as the world she (Dalene Matthee) so generously evokes'.

Dalene Matthee
Tafelberg Publishers Ltd

Fiela's Child is the haunting tale of one boy's search for his identity, and of a mother's undying love. Found on her doorstep as a baby, the coloured woman Fiela Komoeti raises the European boy as one of her own family. In an evil twist of fate he is snatched from her care and entrusted to a woodcutter family by the local court, in the belief that he is Lucas van Rooyen, a boy that went missing in the forest many years before. He is thrown into an alien world with a different identity. *'He was like a snake slowly shaking off its old skin and growing a new one...'*

The Mulberry Forest tells the story of Silas Miggel and his beautiful daughter Miriam, living at the edge of the Knysna forest. Their secluded existence is thrown into turmoil the day a group of Italian silkfarmers arrives, lured there by false official promises. The book is written in the beautiful metaphor of the forest people, with a wonderful sense of humour, subtly exposed in the meeting of the Italian and woodcutter cultures and in the remarkable relationship between Silas and the Honourable Henry Barrington.

Dalene Matthee's 'forest' trilogy conveys a wealth of accurate historic detail. She knows the Knysna forests intimately, and vividly portrays their plant and animal life. Her novels are a cry from the heart against the destruction of nature and the abuse of human rights.

Dalene Scott was born in Riversdale (Western Cape) in 1938. Three children were born from her marriage with Larius Matthee, a banking official. She wrote short stories for many years for the leading Afrikaans magazines before publishing her first children's book in 1970. In 1982 her first volume of Afrikaans short stories was published.

Two of the 'forest' novels, *Fiela's Child* and *Circles in a Forest* have been filmed. Many local people acted in both films as extras, and trained elephants were brought from America. The novels

have now been translated into 17 languages, which has created an awareness of Knysna and its forest heritage far beyond the country's borders.

Through these novels the reader comes to a closer understanding of the forests. And yet this complex ecosystem has an elusive and mysterious quality which contributes to its appeal. *'The forest never gives up its secrets...*[it] *is like someone you can hear talking, but whose language you do not understand.' (Circles in a Forest).*

Recreation in the forests

A trail is remote for detachment
narrow for chosen company
winding for leisure
lonely for contemplation
the trail leads not merely north or south
but upward to the body, mind and soul of man.

Anonymous

Set in a landscape of beautiful beaches and rocky headlands, shimmering lakes, green pastures and jagged mountains, the southern Cape forests add to the splendour of this popular tourist region at the southern tip of Africa. The forests themselves attract increasing numbers of tourists, and numerous picnic sites, viewpoints, hiking trails, day-walks and cycling and bridle trails have been developed. It is remarkable that this large network of recreation facilities has been developed in the span of thirty years only.

Each year thousands of hikers take to the overnight trails that traverse the forests, mountains and fynbos on state forest land. Many more tread the shorter walks. In 2000 more than 90 000 people visited the Garden of Eden and the Tsitsikamma Big Tree near Storms River. Yet the impacts of tourism and recreation are properly controlled through, for instance, the installation of board walks in areas with high visitor concentrations, and siting facilities in less sensitive areas.

More information is available from the Knysna Area Office of the Directorate: Indigenous Forest Management and from the publications listed at the end of this book. Reservations can also be made through the Knysna office.

The following recreation facilities have been developed on state forest land:

Hiking Trails

The popular seven-day **Outeniqua Hiking Trail**, starting at Beervlei forest station near George and ending at Harkerville traverses mountainous terrain, tree plantations and large tracts of indigenous high forest. This trail can be hiked in shorter sections. A maximum of 30 people are allowed per day, and the huts offer shelter, firewood, water and rudimentary bedding. The two-day **Harkerville Coast Hiking Trail** traverses spectacular coastal scenery and cuts through a few small patches of dry forest.

Bookings for the hiking trails should be made several months in advance, and are confirmed on receipt of payment.

Day-walks

Day-walks are subjected to entrance fees during peak holiday seasons. Out of seasons self-issue entry permits, which are available at starting points, allow entry free of charge.

The 'Mecca' of the forest day-walks is the **Elephant Walk**, situated in the high moist forests of the Diepwalle State Forest. The walk offers a number of route options of between 6.5 and 18.2km long. They follow old woodcutter trails in some parts, taking the walker past some stately old Outeniqua yellowwood trees. The **Terblans Walk** in the Gouna Forest is a relatively short walk through high forest that was heavily exploited by woodcutters in the past, hence the absence of large yellowwoods. **Groeneweide** Forest Trail starting at the grounds of the Saasveld Faculty of

Forestry near George offers a network of lovely paths traversing the forest gorges along gentle gradients. The **Millwood Mine Walk** starting at the site of the old Millwood village in the Goudveld State Forest takes the walker on a trip through history. Interesting remnants of the gold rush of the 1880s are on display at the Millwood Mining Museum.

The 9km **Woodcutter Trail** starting and ending at the Krisjan-se-Nek viewpoint in the Goudveld forest offers some delightful natural swimming pools. A section of this trail follows an old mining path along the Forest Creek. Closer to the relatively dry coast the forests differ significantly from the moist forests on the coastal platform, both in the height of the canopies and the composition of plant species. The 3 to 9km **Kranshoek Walk** on the Harkerville coast leads through a range of contrasting environments and offers magnificent views of the coastline. It passes through a dry coastal forest and fynbos. **Perdekop Nature Walk**, a 9.5km circular route traversing high forest, starts and ends at the Harkerville Forest Station. **Rugbos Forest Walk** at the eastern end of the Bloukrans Pass offers an easy 1 km stroll through tall forest, ideal for anyone not able to walk very far, or with little time to spare. The 8.4km **Stinkhoutkloof Trail** situated at the western end of the same pass is a fairly demanding trail through moderately rugged terrain. The **Ratel Trail**, which starts at the Big Tree viewpoint in the Tsitsikamma region, offers a short route of 2.6km and a longer route of 4.2km through prime high forest with many giant yellowwood, stinkwood and ironwood trees. The 2km **Goesa Trail** which starts at the Storms River Forest Station nearby traverses equally impressive high forest.

Scenic Spots and Drives

Scenic spots or stop-overs offer visitors something special, such as viewpoints, big trees or waterfalls. At a number of these the visitor can enjoy a short walk, highlighted by information

boards and tree-name tags. The best-known of these scenic spots is the **Garden of Eden** some 20km east of Knysna on the N2. It is a prime example of wet high forest. A short trail and board walk take visitors through a fairy-tale landscape of tall trees and a lush understorey of ferns and herbs. **Kom-se-Pad** between Diepwalle and Gouna offers a scenic drive of more than 15km through indigenous forests and plantations. In the Gouna Forest it passes a small picnic site, which is also the start of the Terblans Trail. Other scenic routes are the road to Jubilee Creek Picnic Site in the Goudveld State Forest and the Kranshoek road at Harkerville.

The most popular scenic spot by far is the stop-over at the **Tsitsikamma Big Tree** near Storms River bridge, where a board walk winds through spectacular high forest to a magnificent old yellowwood giant. Environmental interpretation signs along this walk enlighten visitors on the trees and ecology of the forest. A raised platform offers an impressive view of a fallen yellowwood giant. Near the Diepwalle Forest Station on the Uniondale road stands the magnificent **King Edward VII** tree, an Outeniqua yellowwood tree estimated to be between 600 and 1 000 years old. A short forest walk has been laid out nearby. An even larger yellowwood towers over the small picnic site at **Velbroeksdraai** north of Diepwalle, with limited picnic facilities and a short walk. Another giant tree guards over Krisjan-se-Nek in the Goudveld State Forest, which also sports a few picnic facilities.

Picnic Sites

Many picnic sites have been developed in the state-owned indigenous forests, some with braai facilities, for family and other groups wishing to experience the forest environment at leisure. Short walks have been developed at a few of these sites. Limited picnic facilities, a short forest walk and information boards on forest ecology and management are enticing features at a viewpoint of a large Outeniqua yellowwood tree in the Woodville Forest.

Jubilee Creek picnic site

Three attractive picnic stes along the Knysna-Diepwalle-Uniondale road provide the visitor with memorable encounters with the indigenous forest:

- **Ysterhoutrug**, between Knysna and Diepwalle, situated on the site of the outward terminus of the narrow-guage foreat railway which was used to haul timber from the forests to Knysna.

- **Dal van Varings** (Valley of Ferns), to the north of Diepwalle. This site takes its name from the luxuriant undergrowth of ferns and tree ferns in the valley, which is traversed by a short walk. On the other side of this road a rough track leads to the spectacular Spitskop viewpoint with vistas over the Outeniqua mountains and the forests.

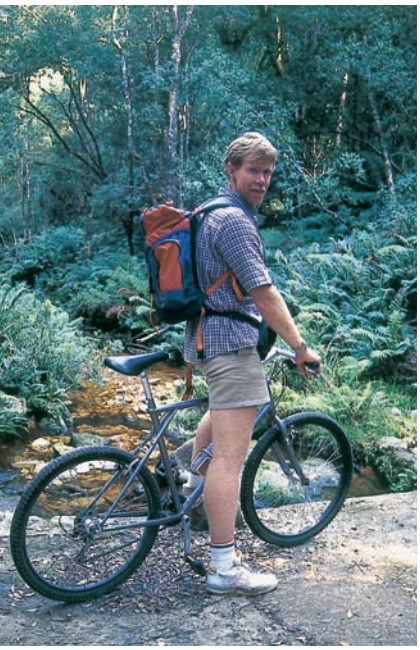
- **Diep River** , on the road to the Prince Alfred Pass.

Jubilee Creek in the Goudveld Forest, about 35km from Knysna is the largest and most popular of all the forest picnic sites. It is an exceptionally beautiful picnic spot on the banks of the Jubilee Creek, once the scene of alluvial gold workings in the 1880s. A short walk is linked to this picnic site. Nearby is the **Millwood picnic site** - adjacent to the last remaining house in the Millwood mining village. Close to the Garden of Eden on the N2 route east of Knysna is the shady **Witels picnic site**, with a short circular forest walk. **The Kranshoek picnic site** on the Harkerville coast, starting

point of the Kranshoek coastal day-walk, is situated near two picturesque waterfalls and a coastal viewpoint.

Cycling, bridle trails and adventure activities

Cycling has become very popular in recent years, and cycle routes for mountain bikes have been laid out in four state forests. The 19km circular **Homtini cycle route** starts and ends at the Krisjan-se-Nek picnic site. It is a demanding route which traverses indigenous forest, plantations and fynbos, and offers some lovely mountain views. The **Petrus-se-Brand cycle route** is a 24km linear trail from the Diepwalle forest station to the Garden of Eden; the major part passing through indigenous forests.



A cyclist admires the scenery along Petrus-se-Brand cycling route

Harkerville State Forest between Knysna and Plettenberg Bay offers some of the finest cycling for leisure in the southern Cape due to the diversity of landscapes. Three routes from 12 to 24km, colour-coded red, blue and green to give the cyclist a choice of different grades, all traverse sections of indigenous forest. Harkerville State Forest also offers bridle routes. A new cycle route was opened recently in the **Tsitsikamma State Forest.** Starting at the forest station, the route winds through indigenous forests and crosses the old Storms River bridge. **River tubing down the Storms River** from this bridge to the sea is a relatively new, but exhilarating, sport. Storms River Adventurers offer

organised tubing trips as well as the very first **forest canopy slide** in Africa. These activities are undertaken in terms of an agreement with the Directorate: Indigenous Forest Management.

The treetop forest chalet in the Harkerville forest

Overnight facilities

Apart from the huts on the hiking trails, a small range of overnight facilities are provided on state forest land. A camping site is available at Diepwalle forest station.The Treetop forest chalet, tucked away in the Harkerville forest, provides luxury up-market accommodation, while the Harkerville Youth Group Centre nearby offers basic-budget accommodation mainly for youth groups.

Many other forest-based trails and facilities are provided by SA National Parks, Western Cape Nature Conservation, forestry companies and other private concerns. Visitors to the state forests are advised to ensure that they are in the possession of the necessary permits and to obey the rules and regulations that apply to the forests. Stiff penalties applicable to the misuse of the forests have been introduced to ensure that the forests can be enjoyed in perpetuity without impairing their beauty and ecological balance. Enjoy the forests by all means, but take only photographs and leave only footprints!

Historic milestones: the southern Cape forests

Pre-modern history

Semi-nomadic Khoikhoi people, in particular the Outeniqua clans, inhabited the Outeniqua region for many centuries. They frequently set fire to the veld and scrub to obtain grazing for their cattle, to get honey and to flush out game. The coastal plains and forests teemed with wildlife, including large numbers of elephant and buffalo. Khoikhoi hunters had a small impact on the wildlife, due to their small numbers and primitive weapons. When the Europeans arrived, the clans gradually disintegrated, and their members ended up in the employment of farmers. The densely forested Tsitsikamma region further to the east remained sparsely inhabited until the late nineteenth century. A thinly scattered Khoikhoi population known as Strandlopers (Beachcombers) lived in caves along the rugged coast.

1630

The Sâo Goncales ran aground at Plettenberg Bay, then known as Bahia Formosa (beautiful bay). The survivors are the first Europeans on record to cut timber from the southern Cape forests. The timber was used for the construction of houses and the building of small boats.

1652

A permanent supply post and settlement, which would grow into the city of Cape Town,, was founded at the Cape Peninsula by the Dutch East India Company. As the settlement expanded it relied increasingly on the newly discovered forests to the east for its timber needs.

1730s

The first Europeans began to settle in Outeniqualand.

1772

Carl Peter Thunberg, a renowned Swedish physician and botanist visited the forests of the 'Houteniquas'. A year later he visited the forests again in the company of Francis Masson, a botanist sent by King George III to collect plants for the Royal Kew Gardens in Londen. Thunberg compiled a list of the most common timber trees of the Knysna forests, with their uses.

1776

A woodcutter's post was established at Swartrivier near the present-day town of George. A Commandant Mulder was appointed Post Holder, in charge of 16 men who cut and transported timber for the Dutch East India Company.

1786

Graaff-Reinet was founded in the Karoo hinterland and soon became an important market for wagon and constructional timber.

1787

A woodcutter's post was established at Plettenberg Bay under the supervision of Johann Friedrich Meeding, which brought the activities of the woodcutters there under efficient control.

1811

The town of George was founded, which resulted in renewed and increasing demands for timber. Forests immediately to the east and west of George were sacrificed to uncontrolled public use in an attempt to ease the pressure on the Knysna forests. Another consideration was the deep ravines to the east of George, which made the transport of timber from the Knysna forests very difficult.

1811

Captain Jones of the (British) Royal Navy inspected the Knysna forests and drew up a report on their timber potential for the navy. Despite the numerous obstacles he pointed out, such as the lack of safe anchorages and deep ravines that made overland transport hazardous, the authorities decided to manage the forests as a timber reserve to provide in the needs of the naval shipyards of the Cape Colony and Britain.

1817

The SS Podargus was the first ship to enter the Knysna estuary through the hazardous entrance between the Heads. A port was developed at Knysna to speed up the transportation of timber to the shipyards, after an investigation by Sir Jahleel Brenton (Naval Commissioner) found it to be feasible. By 1839 about 24 000 tons of timber had been transported from Knysna to Cape Town.

1825

Timber provision to the naval shipyards ceased. The demand for timber was temporarily reduced, resulting in weakened control of the exploitation of the Knysna forests. The Cape government finally abandoned its monopoly of the timber trade, and opened up the forests to woodcutters on payment of licence fees.

1836

The Great Trek started. Dutch farmes left the Cape Colony to escape British rule. The demand for wagon timber greatly increased as a result.

1846

The Cape government decided to close the 'worked-out' forest sections and sell them by public auction for woodcutting and farming purposes. Being unable to organise proper controls over exploitation, the government thus sacrificed certain forests to ensure protection of others.

1847

The Crown forests (forests belonging to the state) were closed for future needs. To enforce their protection the first part-time Conservator of Forests, L Haswell, and four forest rangers were appointed to protect these forests.

1856

Crown forests in the southern Cape were opened for exploitation again, and regulations were promulgated to provide for the issuing of woodcutting licenses by Civil Commissioners. The system would prove to be corrupt and inefficient, thereby contributing to rampant forest destruction.

1856

Captain Christopher Harison was appointed part-time Conservator of Forests at Witelsbosch in the Tsitsikamma. Although ignorant about forest management at first, he was a devoted man and an avid learner, who was destined to play an important role in the establishment of better control of the Knysna forests.

1859

The Forest and Herbage Preservation Act was passed to regulate fire damage to forest and agricultural land in the Cape Colony. Although the Act also regulated the illegal cutting of timber, it was poorly enforced.

1867

On the recommendation of Dr Henry White, a prominent member of the Legislative Assembly of the Cape Colony, Captain Harison and Thomas Bain were appointed by Parliament to investigate the plight of the Knysna forests. They recommended that the section system be implemented officially. As part of their duties, Harison and Bain penetrated the hereto untrodden Tsitsikamma forests in search of a feasible road route to Humansdorp in the east.

1867

Queen Victoria's son, Prince Alfred, undertook a dramatic elephant hunt in the Knysna forests. He was escorted by more than forty men, including prominent residents of the area.

1868

The government authorised the application of Dr White's section system to all of the Southern Cape forests, and the closing of 'worked-out' sections.

1869

A catastrophic fire swept through Outeniqualand and the Tsitsikamma, from Riversdale in the west to Uitenhage in the east, devastating farmlands and outlying forest areas in the mountains and gorges. The town of Knysna miraculously escaped destruction when the wind direction changed, but many farmlands such as Henry Barrington's Portland Manor were burnt to the ground.

1870

Rich diamond deposits were discovered in the northern Cape Colony. Infrastructure development caused by the growing diamond mining industry at Kimberley resulted in great demands for sleepers and telegraph poles, and the Knysna forests had to bear the brunt.

1874

Control of the conservancies of George, Knysna and the Tsitsikamma was centralised under a first full-time Conservator of Forests, Captain Harison, with his headquarters at Knysna. However, the area would prove to be too extensive for efficient control by one conservator and a handful of rangers.

1876

JJ Hooper, a local farmer, discovered a gold nugget in a tributary of the Karatara River. Road engineer CF Osborne obtained a small government grant to prospect for gold, and found limited quantities of alluvial gold. Prospectors from all over the world began to invade the Millwood forest near Knysna.

1876

Bowing to the pressure of local lobbies, the Cape government authorised the sale of certain parts of the Knysna forests to private concerns. It inflamed public opinion. however, and the Government undertook not to alienate Crown forest land again.

1880

The post of Superintendent of Woods and Forests was created, and Count Médéric de Vasselot de Regné - a widely experienced graduate of the Nancy School of Forestry in France - was appointed.

1881

De Vasselot took up his post in Knysna, together with his professional assistant and interpreter A W Heywood. He immediately set to work to develop a more efficient forest management system based on the previous concepts of the section system, and on the principle of sustainable utilisation.

1882

Henry (HF) Fourcade, a French land surveyor trained in forest management by Count de Vasselot, started laying out sections within the Knysna forests for the application of the new section system. Fourcade, a genial person, also made contributions of international importance to the invention and application of stereophotogrammetry. He was also an accomplished amateur botanist.

1883

Forest Regulations were promulgated to put the new forest management system of De Vasselot into operation.

1883

The last buffalo of the southern Cape forests was shot at Bloukrans.

1885

The proclamation of the Witwatersrand goldfield marked the emergence of a world city, Johannesburg. The timber demand for mining props, headgear and railway sleepers soared as a result.

1885

De Vasselot published two forest management guides, An Introduction to the Systematic Treatment of the Crown Forests of the Cape Colony and the Utilisation Manual. The former dealt with forest management methods and the latter with timber harvesting and use.

1888

The first Forest Act was passed by the Cape Parliament. This Act made demarcated forests inalienable, and provided for the proclamation of forests on private land as protected areas.

1889

James Cooper became Acting Conservator at Knysna and introduced the 'Outright Licence System'. In terms of this system felling operations within certain forest sections would become the responsibility of a single contractor. It was hoped that the woodcutters would gradually become employed by such contractors, which would simplify control of the cutting of timber and improve the lot of the woodcutters. This did not realise, with the result that even more timber was cut under the combined impact of outright and public licences.

1892

George Parkes formed the Knysna Forest Company, which was to play a central and lasting role in the timber industry of Knysna.

1898

Colin Mc Naughton, who succeeded Heywood as Conservator at Knysna, laid out the first permanent sample plots in the forests to study the composition and growth rates of tree communities.

1903

McNaughton's model working plan for the Sourflats Forest was completed and authorised. It was never put into practice, yet the plan provided a valuable foundation for further practical research into forest ecosystems.

1904

Work started on the building of a narrow- gauge railway line of 35 km between Knysna and Diepwalle to speed up timber provision to the saw-mills. It was completed in 1907, and was the first of only two forest railways to operate in South Africa. The railway, which belonged to the South Western Railway Company Ltd, operated until 1949, by which time it could not compete with lorry transport any more.

1908

Faced with the imminent extinction of the Knysna elephants, the Cape government declared them royal game. Their hunting was thus prohibited from all except members of the British royal family.

1910

The former colonies of South Africa were united into the Union of South Africa, and their forestry services were amalgamated into one forestry department. Joseph Storr Lister was appointed first Conservator of Forests for the Union of South Africa.

1911

A school was opened near Knysna for the training of cabinet-makers, which stimulated the growth of an industry making quality furniture from indigenous timber.

1913

The Union of South Africa promulgated its first Forest Act, which contained clear provisions regarding the protection of Crown forests. It prohibited the removal of forest products without permits.

1913

To establish greater control and phase out the remaining woodcutters in the southern Cape forests, a 'Registered Woodcutter System' was introduced. Existing woodcutters had to register, and no new woodcutters were allowed to cut timber. The woodcutters had to draw lots for demarcated forest sections, where they could fell trees selected by forestry officials.

1920

Major P J Pretorius, a professional hunter, received permission to shoot one elephant in the Knysna forests for the South African Museum. Five elephants were killed during the hunt, however, thereby dealing the remaining elephant population a severe blow.

1922

A Forest Research Officer, J F V Phillips, was appointed at Diepwalle in the Knysna forests. It heralded a new era of systematic ecological and silvicultural research.

1928

A railway line was laid from George to Knysna, which improved the transport of timber products to the hinterland considerably.

1931

J F V Phillips published a research memoir entitled 'Forest Succession and Ecology in the Knysna Region'. (Phillips was the first South African to receive a doctorate in the field of forest ecology).

1932

The South African School of Forestry, established in 1906, was transferred from Tokai to Saasveld near George. Saasveld would become the College for Foresters in 1957 and be incorporated with the Port Elizabeth Technikon in 1986 as the Forestry Faculty. Forestry was also introduced as a degree course at the University of Stellenbosch. It has since expanded into an independent Faculty of Forestry.

1932

The Carnegie Commission investigated the 'poor White' problem, of which the Knysna woodcutters were the main group. The finding was that the majority of woodcutters led a reclusive and poverty-stricken life.

1937

F S Laughton, Phillip's successor at Diepwalle, completed a working plan for the Diepwalle Forest. The intensive forest management scheme was implemented experimentally in a reserved area of the Knysna forests. The plan anticipated government execution of all forest operations, and employed more accurate techniques to determine the optimum timber yield and to improve forest growth in 'worked areas'.

1939

The Woodcutters Annuities Bill was passed, and the remaining woodcutters were pensioned off. The southern Cape indigenous forests were closed to further exploitation, except for the removal of dead trees and windfalls. The marking of trees for felling was now

the responsibility of unqualified foremen instead of knowledgeable forest officers, however, and many healthy trees were also selected. Yet timber removal was under direct departmental control, and the scale of destruction was much reduced. All the timber from the Knysna forests would be sold by public auction.

1951

A small expedition led by Bernard Carp investigated the composition and number of the remaining elephant herd. Their recommendation that an elephant reserve be created was rejected.

1964

An Indigenous Forest Research Station was established at Saasveld. Dr Friedrich von Breitenbach supervised preparatory research for the development of a modern forest management system as well as the training of specialised personnel. In 1990 the Saasveld Forestry Research Centre with its Indigenous Forest Research Programme was transferred to the Council for Scientific and Industrial Research (CSIR). It functioned for one year from Saasveld, whereafter the personnel moved to the main CSIR campus in Pretoria.

1965

The recovery of the Knysna forests had progressed sufficiently to allow limited timber harvesting for the furniture industry. The yield regulation method - a rotational harvesting system aimed at maintaining a balance of forest species in each forest sector - was applied for the first time, and timber was sold by public auction.

1966

The first completed management plan based on multiple-use conservation management (nature conservation, timber harvesting, recreation and research) - the Groenkop Management Plan - was applied in a part of the Knysna forests.

1970

The first multiple-use management plan covering all the Knysna forests was put into practice.

1973

The Green Heritage Campaign was launched, which sparked public interest in South Africa's trees and forests. The concept of a national hiking trail system was born from this noble initiative.

1976

Government proclaimed a number of indigenous trees protected, including six species of the southern Cape forests. The first official day walking trail in the Knysna forests, the Elephant Walk, was opened to the public by the Department of Forestry.

1981

An Elephant Working Group was appointed to investigate the decline in the number of the Knysna elephants and to make recommendations.

1982

The first harvesting of seven weeks fern fronds in the Knysna forests saw the birth of a lucrative export industry.

1984

The Forest Act 122 of 1984 was promulgated. This Act contained provisions for the proclamation and protection of forest areas.

1984

A best-selling novel by Dalene Matthee, entitled Kringe in 'n Bos (Circles in a Forest), was published. It was the first of three novels dealing with the lives of the colonists and woodcutters of the late 19th century in the Knysna area. These novels stimulated public interest in the Knysna forests and the region's history.

1993

State plantations were transferred to the newly created South African Forest Company Ltd (SAFCOL) to place the state's plantation forestry activities on a commercial footing. Major indigenous forests and other conservation areas were excluded from the land transfer. Management of the Knysna forests remained with the Chief Directorate: Forestry of the Department of Water Affairs and Forestry.

1994

Following much campaigning by environmental lobbies and deliberation by the government, three young elephant were transferred from the Kruger National Park to the Knysna forests. One eventually died of stress-related pneumonia, and the remaining two could not adapt to their new environment. Three years later a decision would be taken to transfer them to the Shamwari Game Reserve near Port Elizabeth.

1996

The Department of Water Affairs and Forestry published a White Paper titled Sustainable Forest Development in South Africa.

1997

The National Forestry Action Plan was launched, with working groups tasked to develop strategies dealing with urgent problem areas. The new policy principles and approaches of the White Paper were mostly aimed at addressing urgent needs and threats concerning forests and forestry.

1998

The National Forests Act, No 84 of 1998 was promulgated. This Act extended protective measures to privately owned forests and introduced a range of new measures to improve forest management.

2000

A second elephant was sighted in the Knysna forests followed by the sighting of a third elephant in 2001. For many years it was believed that only one Knysna elephant remained.

2000

The first participatory forest management forums were created to involve local communities in forest management issues and projects.

2002

A team of assessors of the Forestry Stewardship Council (FSC) visited Knysna to evaluate the management of the southern Cape forests for FSC certification.

The Groot River forges its way through picturesque high forest towards the sea near Nature's Valley

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The rugged Tsitsikamma coast at the Storms River

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An inventory of the southern Cape forest flora and fauna

English and Afrikaans common names; botanical/scientific names in brackets

Forest trees

Forest trees listed below are those most common or characteristic of the dry, moist and wet forest types in the southern Cape. A few notable but locally rare species have been included. The numbers used are those appearing in the *National List of Indigenous Trees for South Africa.* Some of these trees also occur as shrubs in the understorey. Please note that the botanical names of some trees have changed over he past few years as the taxonomic categories are constantly being reviewed. The Kooboo-berry *(Mystroxylon aethiopicum),* for example, was known as *Cassine aethiopicum* until recently.

2 Forest tree fern, Bosboomvaring (*Cyathea capensis*)
16 Outeniqua yellowwood, Outeniekwageelhout (*Podocarpus falcatus*)
18 Real yellowwood, Opregte geelhout (*Podocarpus latifolius*)
32 Cape wild banana, Kaapse wildepiesang (*Strelitzia alba*)
39 White stinkwood, Witstinkhout (*Celtis africana*)
49 Veld fig, Veldvy (*Ficus burtt-davyi*)
50 Broom cluster fig, Besemtrosvy (*Ficus sur*)
74 Terblanz beech, Terblans (*Faurea macnaughtonii*)
118 Stinkwood, Stinkhout (*Ocotea bullata*)
134 Forest bush-cherry, Witboshout (*Maerua racemulosa*)
139 Cheesewood, Kasuur (*Pittosporum viridiflorum*)

140 Red alder, Rooiels (*Cunonia capensis*)
141 White alder, Witels (*Platylophus trifoliatus*)
142 Black witch-hazel, Onderbos (*Trichocladus crinitus*)
143 White witch-hazel, Withaselaar (*Trichocladus ellipticus* subsp. *ellipticus*)
147 Red stinkwood, Rooistinkhout (*Prunus africana*)
201 Karroo boer-bean, Karooboerboon (*Schotia afra* var. *afra*)
204 Bush boer-bean, Bosboerboon (*Schotia latifolia*)
219 Cape laburnum, Kaapse geelkeur (*Calpurnia aurea*)
221 Blossom tree, Keurboom (*Virgilia oroboides*)
221.1 Pink blossom tree, Pienk Keurboom (*Virgilia divaricata*)
253 Small knobwood, Kleinperdepram (*Zanthoxylum capense*)
254 Forest knobwood, Perdepram (*Zanthoxylum davyi*)
256 Cape chestnut, Wildekastaiing (*Calodendrum capense*)
261 White ironwood, Witysterhout (*Vespris lanceolata*)
265 Horsewood, Perdepis (*Clausena anisata* var. *anisata*)
298 Cape Ash, Kaapse Essenhout (*Ekebergia capensis*)
307 Coalwood, Koolhout (*Lachnostylis hirta*)
366 Iron Martin, Ystermartiens (*Laurophyllus capensis*)
380 Red currant, Bostaaibos (*Rhus chirindensis*)
388 Thorny currant, Doringtaaibos (*Rhus longispina*)
388.1 Glossy currant, Blinktaaibos (*Rhus lucida*)
397 Cape holly, Without (*Ilex mitis* var. *mitis*)
398 Red silky bark, Rooisybas (*Maytenus acuminata*)
399.3 White forest spike-thorn, Witbospendoring (*Gymnosporia nemorosa*)
401 Cape blackwood, Kaapse swarthout (*Maytenus penduncularis*)
408 Red candlewood, Rooikershout (*Pterocelastrus rostratus*)
409 Candlewood, Kershout (*Pterocelastrus tricuspidatus*)
410 Kooboo-berry, Koeboebessie (*Mystroxylon* subsp. *aethiopicum*)
413 White silky bark, Witsybas (*Robsonodendron eucleiformis*)

414 False saffron, Bastersaffraan (*Cassine peragua* subsp. *peragua*)
415 Common saffron, Gewone saffraan (*Elaedendron croceum*)
418 Spoonwood, Lepelhout (*Cassine schinoides*)
422 White pear, Witpeer (*Apodytes dimidiata*)
423 False currant, Bastertaaibos (*Allophylus decipiens*)
438 False horsewood Basterperdepis (*Hippobromus pauciflorus*)
451 Cat-thorn, Katdoring (*Scutia myrtina*)
452 Dogwood, Blinkblaar (*Rhamnus prinoides*)
457 Cape stock-rose, Kaapse stokroos (*Sparmannia africana*)
479 Cape plane, Kaapse rooihout (*Ochna arborea* var *arborea*)
494 Wild peach, Wildeperske (*Kiggelaria africana*)
496 Red pear, Rooipeer (*Scolopia mundii*)
498 Thorn pear, Doringpeer (*Scolopia zeyheri*)
503 Wild mullberry, Wildemoerbei (*Trimeria grandifolia* subsp. *grandifolia*)
508 Glossy sourberry, Blinkblaarsuurbessie (*Dovyalis lucida*)
510 Dune sourberry, Duinesuurbessie (*Dovyalis rotundifolia*)
513 Hard pear, Hardepeer (*Olinia ventosa*)
566 False cabbage tree, Basterkiepersol (*Schefflera umbellifera*)
568 Parsley tree, Wildepietersieliebos (*Heteromorpha arborescens* var. *arborescens*)
570 Assegai, Assegaai (*Curtisia dentata*)
578 Cape beech, Kaapse boekenhout (*Rapanea melanophloeos*)
579 White milkwood, Melkhout (*Sideroxylon inerme* subsp. *inerme*)
594 Blue guarri, Bloughwarrie (*Euclea crispa* subsp *crispa*)
599 Sea guarri, Seeghwarrie (*Euclea racemosa*)
600 Bush guarri, Bosghwarrie (*Euclea schimperi* var. *schimperi*)
601 Common guarri, Gewone ghwarrie (*Euclea undulata* subsp. *undulata*)
603 Common star-apple, Gewone sterappel (*Diospyros dichrophylla*)
611 Bladder-nut, Swartbas (*Diospyros whyteana*)

615 Common pock ironwood, Gewone pokysterhout (*Chionanthus foveolatus* subsp. *foveolatus*)
616 Giant pock ironwood, Reuse pokysterhout (*Chionanthus peglerae*)
617 Wild olive, Olienhout (*Olea europaea* subsp. *africana*)
618 False ironwood, Basterysterhout (*Olea capensis* subsp. *capensis*)
618.2 Ironwood, Ysterhout (*Olea capensis* subsp. *macrocarpa*)
624 Cape teak, Kaapse kiaat (*Strychnos decussata*)
634 Forest elder, Vlier (*Nuxia floribunda*)
636 False olive, Witolienhout (*Buddleja saligna*)
637 Sagewood, Saliehout (*Buddleja salviifolia*)
638 Dune poison-bush, Duinegifboom (*Acokanthera oblongifolia*)
639 Common poison-bush, Gewone gifboom (*Acokanthera oppositifolia*)
641 Kamassi, Kamassie (*Gonioma kamassi*)
667 Tinderwood, Tontelhout (*Clerodendrum glabrum* var. *glabrum*)
670 Tree fuchsia, Notsung (*Halleria lucida*)
688 Wild pomegranate, Wildegranaat (*Burchellia bubalina*)
692 White gardenia, Witkatjiepiering (*Gardenia thunbergia*)
693 Wild gardenia, Wildekatjiepiering (*Rothmannia capensis*)
695 Bell gardenia, Klokkieskatjiepiering (*Rothmannia globosa*)
707 Thorny rock alder, Doringklipels (*Canthium spinosum*)
708 Common turkey-berry, Gewone bokdrol (*Canthium inerme*)
708.1 Mountain turkey-berry, Bergbokdrol (*Canthium kuntzeanum*)
710 Rock alder, Klipels (*Canthium mundianum*)
711 Quar, Kwar (*Psydrax obovata* subsp. *obovata*)
723 Black bird-berry, Swartvoëlbessie (*Psychotria capensis* subsp. *capensis*)
726 Malabar tree, Malbaar (*Brachylaena glabra*)
733 Wild camphor bush, Wildekanferbos (*Tarchonantus camphoratus*)

Forest birds

Many of the forest birds listed below occur in other habitats apart from the forests. Some species occur only in the forest margins. Sea and water birds that may occasionally be found in locations such as the Sinclair Nature Reserve have been excluded, because they are not typically associated with forest habitats. The updated South African bird numbering system is used.

94 Hadeda ibis, Hadeda (*Bostrychia hagedash*)
128 Cuckoo hawk, Koekoekvalk (*Aviceda cuculoides*)
141 Crowned eagle, Kroonarend (*Stephanoaetus coronatus*)
150 Forest buzzard, Bergjakkalsvoël (*Buteo trizonatus*)
152 Jackal buzzard, Rooiborsjakkalsvoël (*Buteo rufofuscus*)
155 Redbreasted sparrowhawk, Rooiborssperwer (*Accipiter rufiventris*)
158 Black sparrowhawk, Swartsperwer (*Accipeter melanoleucus*)
160 African goshawk, Afrikaanse sperwer (*Accipeter tachiro*)
169 Gymnogene, Kaalwangvalk (*Polyboroides typus*)
198 Rednecked francolin, Rooikeelfisant (*Francolinus afer*)
218 Buffspotted flufftail, Gevlekte vleikuiken (*Sarothrura elegans*)
350 Rameron pigeon, Geelbekbosduif (*Columba arquatrix*)
352 Redeyed dove, Grootringduif (*Streptopelia semitorquata*)
358 Emeraldspotted dove, Groenvlekduifie (*Turtur chalcospilos*)
359 Tambourine dove, Witborsduifie (*Turtur tympanistria*)
360 Cinnamon dove, Kaneelduifie (*Aplopelia larvata*)
370 Knysna lourie, Knysnaloerie (*Tauraco corythaix*)
377 Redchested cuckoo, Piet-my-vrou (*Cuculus solitarius*)
384 Emerald cuckoo, Mooimeisie (*Chrysococcyx cupreus*)
385 Klaas's cuckoo, Meitjie (*Chrysococcyx klaas*)
394 Wood owl, Bosuil (*Strix woodfordii*)
400 Cape eagle owl, Kaapse ooruil (*Bubo capensis*)

401 Spotted eagle owl, Gevlekte ooruil (*Bubo africanus*)
405 Fierynecked nightjar, Afrikaanse naguil (*Caprimulgus pectoralis*)
424 Speckled mousebird, Gevlekte muisvoël (*Colius striatus*)
427 Narina trogon, Bosloerie (*Apaloderma narina*)
452 Redbilled woodhoopoe, Rooibekkakelaar (*Phoeniculus purpureus*)
475 Scalythroated honeyguide, Gevlekte heuningwyser (*Indicator variegatus*)
476 Lesser honeyguide, Kleinheuningwyser (*Indicator minor*)
484 Knysna woodpecker, Knysnaspeg (*Campethera notata*)
488 Olive woodpecker, Gryskopspeg (*Mesopicos griseocephalus*)
536 Black saw-wing swallow, Swartsaagvlerkswael (*Psalidoprocne holomelas*)
540 Grey cuckooshrike, Bloukatakoeroe (*Coracina caesia*)
541 Forktailed drongo, Mikstertbyevanger (*Dicrurus adsimilis*)
545 Blackheaded oriole, Swartkopwielewaal (*Oriolus larvatus*)
566 Cape bulbul, Kaapse tiptol (*Pycnonotus capensis*)
569 Terrestrial bulbul, Boskrapper (*Phyllastrephus terrestris*)
572 Sombre bubul, Gewone willie (*Andropadus importunus*)
577 Olive thrush, Olyflyster (*Turdus olivaceus*)
598 Chorister robin, Lawaaimakerjanfrederik (*Cossypha dichroa*)
601 Cape robin, Gewone janfrederik (*Cossypha caffra*)
606 Starred robin, Witkoljanfrederik (*Pogonocichla stellata*)
640 Knysna warbler, Knysnaruigtesanger (*Bradypterus sylvaticus*)
641 Victorin's warbler, Rooiborsruigtesanger (*Bradypterus victorini)*
644 Yellowthroated warbler, Geelkeelsanger (*Seicercus ruficapillus*)
645 Barthroated apalis, Bandkeelkleinjantjie (*Apalis thoracica*)
657 Bleating warbler, Kwê-kwêvoël (*Camaroptera brachyura*)
690 Dusky flycatcher, Donkervlieëvanger (*Muscicapa adusta*)

700 Cape batis, Kaapse bosbontrokkie (*Batis capensis*)
708 Bluemantled flycatcher, Bloukuifvlieëvanger (*Trochocercus cyanomelas*)
710 Paradise flycatcher, Paradysvlieëvanger (*Terpsiphone viridis*)
736 Southern boubou, Suidelike waterfiskaal (*Laniarius ferrugineus*)
740 Puffback, Sneeubal (*Dryoscopus cubla*)
768 Blackbellied glossy starling, Swartpensglansspreeu (*Lamprotornis corruscus*)
769 Redwinged starling, Rooivlerkspreeu (*Onychognathus morio*)
783 Lesser doublecollared sunbird, Kleinrooiborssuikerbekkie (*Nectarinia chalybea*)
785 Greater doublecollared sunbird, Grootrooiborssuikerbekkie (*Nectarinia afra*)
792 Black sunbird, Swartsuikerbekkie (*Nectarinia amethystina*)
793 Collared sunbird, Kortbeksuikerbekkie (*Anthreptes collaris*)
796 Cape white-eye, Kaapse glasogie (*Zosterops pallidus*)
873 Forest canary, Gestreepte kanarie (*Serinus scotops*)
874 Cape siskin, Kaapse pietjiekanarie (*Serinus tottus*)

Mammals

Woodland dormouse, Boswaaierstertmuis (*Graphiurus murinus*)
Least dwarf shrew, Kleinste dwergskeerbek (*Suncus infinitessimus*)
Greater musk shrew, Groter skeerbek (*Crocidura flavescens*)
Long-tailed forest shrew, Langstertbosskeerbek (*Myosorex longicaudatus*)
Forest shrew, Bosskeerbek (*Myosorex varius*)
Verraux's mouse, Verraux se muis (*Praomys verrauxii*)
Woodland mouse, Woudmuis (*Thamnomys dolichurus*)
Hottentot golden mole, Hottentot gouemol (A*mblysomus hottentottus*)
Zulu golden mole, Zoeloelandse gouemol (*Amblysomus iris*)
Duthie's golden mole, Duthie se gouemol (*Chlorotalpa duthiae*)
Common molerat, Vaalmol (*Cryptomys hottentottus*)
Cape molerat, Kaapse blesmol (*Georychus capensis*)
Cape serotine bat, Kaapse dakvlermuis (*Eptesicus capensis*)
Lesser woolly bat, Klein wolhaarvlermuis (*Kerivoula lanosa*)
Kuhl's bat, Kuhlse vlermuis (*Pipistrellus kuhli*)
Cape fruit bat, Kaapse vrugtevlermuis (*Roussetus aegyptiacus*)
Tomb bat, Witlyfvlermuis (*Taphozous mauritianus*)
Chacma baboon, Kaapse bobbejaan (*Papio ursinus*)
Vervet monkey, Blouaap (*Cercopithecus aethiops*)
Porcupine, Ystervark (*Hystrix africaeaustralis*)
Leopard, Luiperd (*Panthera pardus*)
Caracal, Rooikat (*Felis caracal*)
Cape clawless otter, Groototter (*Anonyx capensis*)
Striped polecat, Stinkmuishond (*Ictonyx striatus*)
Honey badger, Ratel (*Mellivora capensis*)
Large spotted genet, Rooikolmuskejaatkat (*Genetta tigrina*)
Large grey mongoose, Groot grysmuishond (*Herpestes ichneumon*)
Cape grey mongoose, Kaapse grysmuishond (*Herpestes pulverulentus*)
Water mongoose, Kommetjiesgatmuishond (*Atilax paludinosus*)

Blue duiker, Blouduiker (*Philantomba monticola*)
Bushbuck, Bosbok (*Tragelaphus scriptus*)
Bushpig, Bosvark (*Potamochoerus porcus*)
African elephant, Afrika olifant (*Loxodonta africana*)

Reptiles

A number of the reptiles listed below are not confined to forest habitats. Some of the ground-dwelling species, such as the puff-adder occur in the warmer coastal forests and thickets, but avoid the cooler and wetter forest floor of the moist and wet forests.

Delalande's blind snake, Pienkerdslang (*Typhlops delalandei*)
Brown water snake, Bruin waterslang (*Lycodonomorphus rufulus*)
Olive house snake, Olyfkleurige huisslang (*Lamprophis inornatus*)
Aurora house snake, Aurora-huisslang (*Lamprophis aurora*)
Common slug-eater, Gewone slakvreter (*Duberria lutrix*)
Mole snake, Molslang (*Pseudaspis cana*)
Green watersnake, Groen waterslang (*Philothamnus hoplogaster*)
Natal green snake, Natalse groenslang (*Philothamnus natalensis*)
Common egg-eater, Gewone eiervreter (*Dasypeltis scabra*)
Herald snake, Rooilipslang (*Crotaphopeltis hotamboeia*)
African tree snake, Boomslang (*Dispholidus typus*)
Night adder, Gevlekte nagadder (*Causus rhombeatus*)
Puff-adder, Pofadder (*Bitis arietans arietans*)
Brown house snake, Bruin huisslang (*Boaedon fuliginosus fuliginosus*)
Knysna dwarf chamaeleon, Knysna-dwergverkleurmannetjie (*Bradypodion damaranum*)
Cape skink, Kaapse skink (*Mabuya capensis*)
Marbled leaf-toed gecko, Gemarmerde blaartoongeitjie (*Phyllodactylus porphyreus*)

Amphibians

The following frog species occur in the southern Cape forests. A number of the species are not confined to forest environments, and occur in other habitats as well. Some of the species listed occur in other coastal areas, scrub, mountain streams, ponds and marshy areas.

Cape ghost frog, Kaapse spookpadda (*Heleophryne purcelli*)
Clicking stream frog, Klikkende stroompadda (S*trongylopus grayi*i)
Common platanna, Gewone platanna (*Xenopus laevis*)
Knysna leaf-folding frog, Knysna blaarnespadda (*Afrixalus knysnae*)
Plain rain frog, Bruin blaasop (*Brevisceps fuscus*)
Raucous toad, Skurwepadda (*Bufo rangeri*)
Southern ghost frog, Suidelike spookpadda (*Heleophryne regis*)
Strawberry rain frog, Framboos blaasop (*Brevisceps acutirostris*)
Striped streamfrog, Gestreepte stroompadda (*Strongylopus fasciatus*)

View towards the Knysna forests from Spitskop

Those who have experienced the forest in all its moods return home enriched. They do so in the knowledge that should man destroy the last of the forest, some of his inner peace, freedom and joy will be lost forever - Dalene Matthee