

# THE OCCURRENCE OF INDIGENOUS FORESTS IN SOUTH AFRICA: HISTORICAL AND CURRENT

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## INTRODUCTION

Not more than 0.5% of South Africa's land surface is covered with natural closed canopy forest. The forests are, with few exceptions, limited to the south-western, southern and eastern coastal belt, bounded by the mountain ranges and escarpments that are responsible for precipitating relatively high rainfall, snow and mist, essential for rainforest to occur. Even in those relatively favourable climatic conditions, natural forest occurs in about 16 000 fragments, of which about 85% have an area of less than 10 ha, and only about 30 patches are larger than 500 ha.

There appears to be a widespread impression among even well informed South Africans that human influences during the past 300 – 400 years have been responsible for a drastic reduction in forest, and that before the first settlement of the Dutch East India Company at the Cape virtually all of the coastal plateaux and sea-facing mountain slopes have been clothed in natural forest, and that the current situation is the result of extensive destruction by humans, either directly or indirectly.

This article will show that this is a fallacy, and attempt to explain why it is a fallacy and how it came about.

## WHERE DID FORESTS OCCUR IN THE PAST?

Palaeontological evidence suggests that over the past ten to twenty thousand years natural forests, woodland, grassland and fynbos have occurred in mosaics, with forests expanding during wetter, and shrinking during drier periods. However, the climate of the past couple of thousand years has become drier, with the result that savanna woodland, fynbos and grassland have been favoured because they are better adapted to arid conditions and fire. Fire plays a major role in determining the pattern of forest occurrence.

Recent scientific studies also suggest that certain forest types in KwaZulu-Natal that are very fragmented, with small patches isolated from each other, have occurred like that for a few thousand years, because they exhibit very high biodiversity variation between the patches.

In more recent times, i.e. during the past 400 years, scant written evidence from accounts of Europeans describing the country, portrays a situation not much different from today. This is corroborated by scientific research and practical experience. This does not mean that there hasn't been forest destruction by humans. It is just that the scale at which this took place is much smaller than is generally believed.

## HUMAN IMPACTS: PAST AND PRESENT

It is a known fact that African tribes traditionally practised shifting cultivation as part of their culture, for time immemorial. However, population densities remained very low during historical times and only began to increase exponentially during the 20<sup>th</sup> Century. The impact of this shifting cultivation was small enough to allow for forests to recover. The afro-montane forests were less exposed to these practices than the sub-tropical coastal forests. However, with increasing population densities, such practices have become more permanently destructive during recent times, as is evident in the former Transkei.

The most extensive forest destruction took place in the KwaZulu-Natal coastal forests, to make way for sugar cane farms, commercial timber plantations, and housing and infrastructure development.

Relatively small areas of natural forest were permanently transformed in the southern Cape, where the largest continuous blocks of indigenous forest occur.

Generally, direct human impact on natural forests has been rather to degrade than to wipe out forest. However, forest degradation has made the forest more vulnerable to fire, as a secondary agent of destruction.

The European colonists that needed bulky timber for building purposes, carts and wagons, and later railway sleepers and mining struts, on the whole did less permanent damage to the forests because they intervened mainly in the forest canopy, which more closely resembles the natural dynamics. The reason is that the larger canopy forming trees, by allowing sunlight to penetrate lower into the forest, enable sub-canopy opportunist recruits to fill the gaps formed by their removal. As long as the forest soil is not destroyed, the forest will recover if allowed.

On the other hand, the African tribes utilised, and still do, mainly the under-storey of the natural forest for traditional purposes: Hut-poles, fence poles and kraalwood. Although the degradation isn't visible when looking at the forests superficially, the future generation of trees in the under-storey, needed to fill gaps when the canopy trees die or are removed, are slowly depleted and when the canopy trees eventually become senile and die, there is no replacement for them, and this has serious consequences. This form of degradation is therefore more detrimental.

Currently pressure on the forests in the traditional rural areas for subsistence use is increasing. Elsewhere, uses are restricted to sustainable harvesting or recreation and tourism.

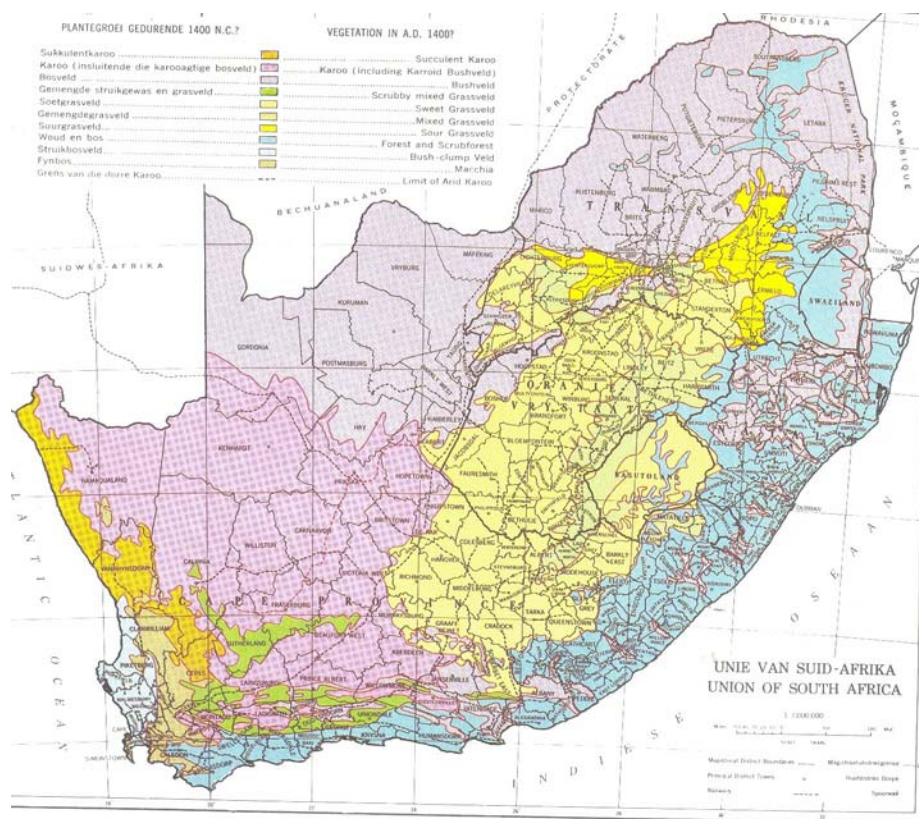
However, development is a major threat to natural forests in the coastal areas, especially close to the sea, and dune forests are particularly under pressure from up-market housing developments.

## THE ORIGINS OF THE MISPERCEPTIONS ABOUT THE DECLINE OF NATURAL FORESTS

Forests have always been associated with high rainfall. In fact, about 150 years ago scientists believed that forests could increase rainfall. We now know that the existence and development of forests is determined by a combination of habitat or site factors, such as climate (of which rainfall is but one aspect), physiography, geology and soils, and the sub-soil moisture regime.

However, rainfall has for a long time been (and still is being) used to determine the potential for forests to exist, without taking other habitat factors that restrict the development of natural forest, into consideration.

In more recent years, the first comprehensive vegetation classification for South Africa, attempted by J.P.H. Acocks in 1953 (“Veld Types of South Africa”), has probably contributed more than anything else to promote the quasi-scientific perception that the whole of the southern and eastern coastal belt was covered in forest in about AD 1400. A map in his book illustrating this, is titled “Vegetation in AD 1400?” (see map below – forest in blue). Unfortunately few readers notice the question mark and realise that both the text and the map are based purely on assumptions. This assumption was presumably based on the rainfall potential.



Acocks Map No. 1

This publication, revised in 1988, was, although based on agricultural potential, for decades the standard classification for vegetation in the country and has only recently (since the 1980's) been replaced by more modern scientific classifications. The area on the above map coloured in blue, is supposed to have been the extent of the indigenous forests before the advent of Europeans and the Black peoples, which suggests that large scale destruction of forests has occurred since then.

### WHAT IS THE TRUE SITUATION?

That the situation depicted by Acocks is a fallacy, is realised by few people today. Amazingly even natural scientists have been misled.

The true facts are based on historical evidence, scientific evidence and practical experience.

#### ***Historical evidence***

Even the most educated naturalists of the eighteenth and nineteenth centuries were not ecologists and had a limited knowledge of vegetation as units. They were mostly systematic botanists who collected plant specimens to preserve and name them. Some of them recorded their travels through South Africa in vivid terms, but the descriptions of vegetation were very primitive and scant.

However, two eminent Swedish scientists that travelled through the southern and eastern Cape in the second half of the eighteenth century, about 100 years after Van Riebeeck established the first European settlement in Table Bay, described the vegetation of the southern Cape coastal areas in such terms that it can be interpreted by us today. They were Anders Sparrmann and Carl Peter Thunberg (1770's). This was when European settlement had just begun.

Particularly Thunberg left behind descriptions that show that the area consisted of a mosaic of forest and fynbos, much as today. An excerpt describing the countryside around George follows below:

*“The country here, in general, consisted of extensive plains full of rich pasture, interspersed with hillocks, and valleys, that abounded in wood and water.”*

This is still the situation today. The rivers form forested valleys and between the rivers there are wide ridges that form “plains” on which the grazing farms are situated today. That the pasture was obtained by burning the generally unpalatable fynbos, is clear from the following description:

*“Divers plains here, produce a very high sort of grass (anyone that is familiar with the southern Cape fynbos, knows that it grows to a height of 2m or more when in its climax stage), which being of too coarse a nature, and unfit food for cattle, is not consumed and thus prevents*

*fresh verdure from shooting up (again, this typically describes the grazing potential of mature fynbos)...Such a piece of land as this, therefore, is set on fire, to the end that new grass may spring up from the roots (this is what happens after a fynbos burn, sprouters, grasses and other pioneer vegetation form the first successional stage, and these are palatable for grazers for some time after a fire)."*

In the area around Plettenberg Bay, the following description of habitat for buffaloes similarly indicates a mosaic of forest and fynbos:

*"The fields hereabouts were full of wild buffaloes, so that it was not uncommon to see a hundred or two of them in a herd (which wouldn't have been possible if all was forest). They generally lie still in the thickets and woods in the day time, and in the night go out into the fields to graze."*

In the eastern Cape, the mosaic consists of forest, grassland, thicket, savanna woodland and in places even of fynbos. There is no indication that it would have been substantially different from today 400 years ago.

Further along the east coast grassland and savanna woodland forms a mosaic with coastal forest types, while further inland at higher altitudes forest patches are embedded in grassland.

### **Scientific evidence**

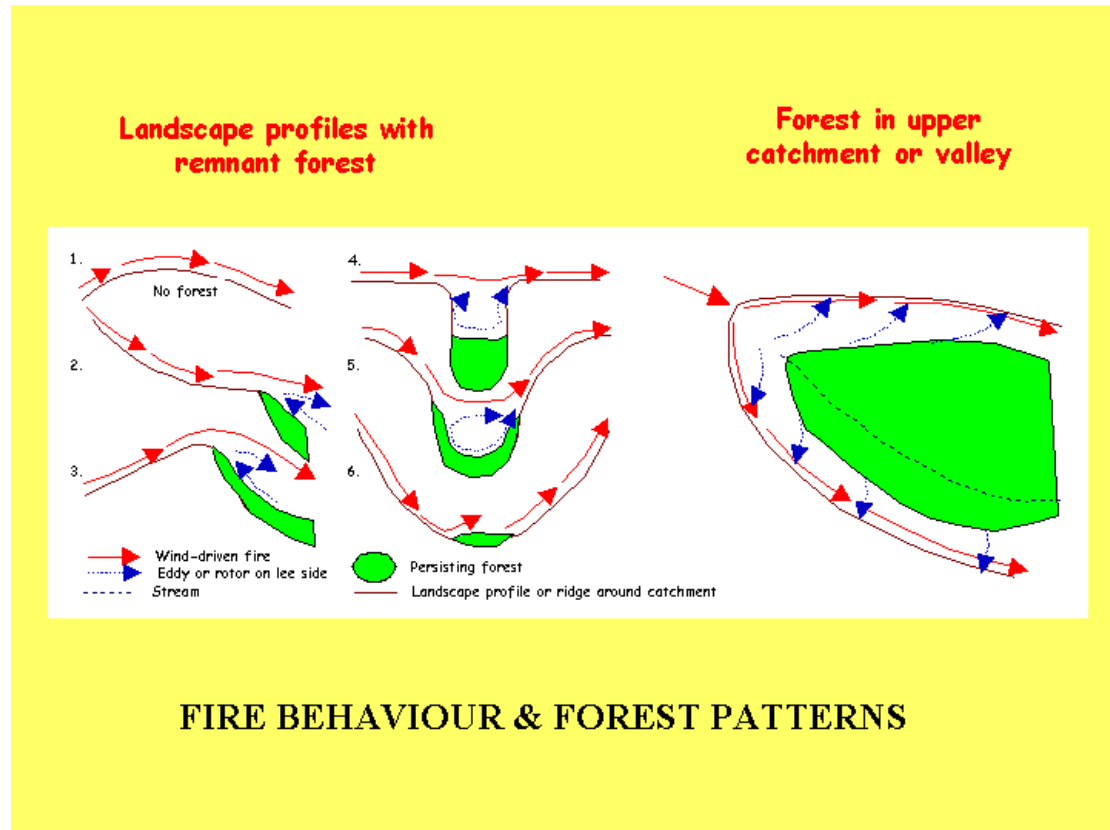
Some recent scientific studies done in the southern Cape/Tsitsikamma provide evidence about the occurrence and distribution of indigenous forests, past and present.

A scientific article by Bond and Midgley (1990) about studies done on the origins of the Knysna fynbos "islands", reveals that, contrary to popular belief, the islands of fynbos inside the sea of natural forest are not the result of anthropogenic disturbances of forest, but are remnants of a once (very long ago) continuous expanse of fynbos, now isolated by expanding forest. Whereas some forest species are able, in the absence of fire, to colonise fynbos, fynbos species are not capable of invading forest. They concluded that fire was the major factor determining the forest/fynbos boundary.

However, the most convincing work has been that of Dr. Coert Geldenhuys, who did his Ph.D. on the environmental and biogeographic influences on the distribution and composition of the southern Cape forests (1989). His findings were also published in the Journal of Biogeography (1994).

Dr. Geldenhuys has shown in his studies that the location pattern of forest patches is determined by fire (see illustration below). Although c. 500 mm of annual rainfall seems to indicate the lower limit of forest occurrence, higher rainfall doesn't necessarily mean that forest can expand unlimitedly, and persist. Under the current climatic regime and surrounded by vegetation adapted to regular fires, indigenous forest habitats are determined also by

other climatic (e.g. wind and atmospheric humidity), physiographical and edaphic factors, as well as availability of underground moisture. Niches provided by certain topographic features shelter the forest from fire. This means that fire, indirectly favoured by climate, has played a dominant role in determining the mosaic of fynbos and forest that developed over very long times.



## FIRE BEHAVIOUR & FOREST PATTERNS

*(With acknowledgement of Dr. Coert Geldenhuys)*

Dr. Geldenhuys' findings for the southern Cape and Tsitsikamma hold true for other areas in the country where vegetation with a fire driven ecology occurs, e.g. grassland, and his findings can be extrapolated to such areas. The dynamics are similar, but forests have adapted to different fire frequencies and intensities of the surrounding vegetation, i.e. grass.

His studies also show that the impact of man on the destruction of forest has been relatively insignificant, largely limited, in the southern Cape in the earlier uncontrolled woodcutter period, to certain areas around George.

### **Practical experience**

Contrary once again to popular belief, natural forests were never cleared to make room for commercial forestry plantations. The latter were invariably established countrywide in grassland or fynbos around the indigenous forest patches in the areas where the latter occur. A relatively small area of forest that had been seriously degraded during the woodcutter period in the Knysna area, was planted with exotic plantations. However, in that area there is, after

many years, the tendency for indigenous forest to re-establish itself aggressively.

Any attempts to try to establish natural forest in grassland or fynbos areas close to patches of natural forest, have been abortive. Even if the introduced tree plants grow, they never develop properly and only survive till the next fire wipes them out.

Small-scale reconstruction or establishment of natural forest in the southern Cape has been successful only where the local habitat conditions favour the development of natural forest. In cases where fynbos had been the natural vegetation before, the establishment of indigenous forest over larger areas had been unsuccessful. In cases where natural invasion of indigenous forest precursor species into adjacent fynbos took place because of an abnormal absence of fire, it did not develop into forest, either because of the absence of the optimal habitat conditions, or the forest margin having been set back to its original position by fire.

#### IMPLICATIONS OF PREVAILING POPULAR BELIEFS AND HOW TO REMEDY THEM

Popular beliefs, especially if scientists also cling to them, either through ignorance or because of established thinking patterns, are difficult to get rid of. It is often a case of: "Don't confuse me with the facts".

However, unscientific opinions can often lead to misplaced actions, which can have considerable financial implications, let alone wasted efforts.

It has become fashionable to plant indigenous trees. This has been promoted over a number of years for very good reasons, and is in itself commendable. However, the number of well meaning people wanting to "re-establish" indigenous forest where it never occurred, and at the expense of other natural vegetation types, is on the increase. It has even happened recently that a grandiose scheme under the slogan "Bringing back the Forest to the Garden Route" was promoted to form part of an IDP of a municipality, with the idea of job creation, restoration of destroyed forests and the earning of carbon credits to offset air pollution causing global warming.

It is expensive to propagate tree plants in nurseries, to transport and plant them out in the field, and then to lose them a few years later in a wildfire, just because they were planted where they could not survive.

The other aspect to bear in mind is that to plant indigenous trees on any scale doesn't mean that you create an indigenous forest. An indigenous forest is much more than a stand of indigenous trees. It is a complex ecosystem comprising the forest soil with all its biological components, including microbes, and the forest macro and micro fauna and flora associated with the tree species. Anyone endeavouring to establish "forest" will in all likelihood be disappointed if after a lot of expense and effort, years later finds him or herself

with a motley grove of dwarfed trees and shrubs, because of exposure to harsh climatic elements, and lacking the soil characteristics and underground moisture necessary for their development into forest. The required set of habitat conditions simply is not in place. Worse still, if it succumbs to fire some or other time.

Last but not least, the planting of indigenous trees where they do not naturally grow, is an interference with natural patterns and processes similar to that of any artificial (simplified) ecosystem, like plantation forests, horticulture or agriculture. If people are interested in restoring or rehabilitating natural ecosystems, they should realise that our natural environment doesn't comprise forests only, but other biomes are equally important. Efforts should be directed at rehabilitating whatever natural ecosystem has existed before. Anything else is artificial.

Misperceptions can be changed. There are various ways in which this can be achieved.

The first place to start is with the scientific fraternity and the conservation NGO's. The correct information needs to be disseminated in publications. Disinformation needs to be combated with the correct information at every opportunity.

Education of the population starts with the younger generation. Educational materials can be distributed to schools and tertiary education institutions. Awareness raising needs to be done in all levels of society. Greening campaigns, Arbor Week, etc. are all vehicles of conveying the right information. The Forestry Branch of the Department of Water Affairs and Forestry has an obligation and a responsibility in this regard, as the lead agent in the country regarding forests and trees.

## BIBLIOGRAPHY

- ACOCKS, J.P.H. (1953). *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa 28. Government Printer, Pretoria.
- ACOCKS, J.P.H. (1988). *Veld Types of South Africa*. 3<sup>rd</sup> Edition. Memoirs of the Botanical Survey of South Africa 57. Government Printer, Pretoria.
- GELDENHUYS, C.J. (1989). *Environmental and Biogeographic Influences on the Distribution and Composition of the Southern Cape Forests (Veld Type 4)*. Unpublished D. Phil. Thesis, Dept. of Botany, University of Cape Town.
- GELDENHUYS, C.J. (1994). *Bergwind fires and the location pattern of forest patches in the southern Cape landscape, South Africa*. Journal of Biogeography (1994) 21, pp. 49-62.
- MIDGLEY, J.J. & BOND, W.J. (1990). *Knysna Fynbos "Islands": Origins and Conservation*. South African Forestry Journal No. 153.
- THUNBERG, C.P. (1779). *Travels in Europe, Africa, and Asia, performed between the years 1770 and 1779. Volume I: Voyage to the southern parts of Europe, and to the Cape of Good Hope in Africa in the years 1770, 1771, 1772, 1773*. Richardson, Corneill & Egerton. Whitehall, London.