INDICATIONS OF PROGRESSIVE DESICCATION OF THE TRANSVAAL LOWVELD OVER THE PAST 100 YEARS, AND IMPLICATIONS FOR THE WATER STABILIZATION PROGRAMME IN THE KRUGER NATIONAL PARK

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Abstract — All available rainfall statistics recorded for the Kruger National Park area since 1907, coupled with an analysis of all the historical climatological data on hand, appear to confirm the quasi-twenty-year rainfall oscillation in precipitation pattern for the summer rainfall area. This was first pointed out by Tyson & Dyer (1975). The dendrochronological data obtained by Hall (1976) from a study of growth rings of a very old yellowwood tree (*Podocarpus falcatus*) in Natal, also appear to indicate a superimposed, long-term (80-100 years) pattern of alternate below-average and above-average rainfall periods. The historical data relating to climate in the park, during the past century or two, seem to bear out such a pattern. If this can be confirmed, it will be an enormous aid not only in wildlife-management planning, but also to agriculturists, demographic planners and others.

- It would appear that the long, relatively dry rainfall period of 1860-1970, with its concomitant progressive desiccation of the area in question, has passed over into the next above-average rainfall era. This does not mean that there will be no further cataclysmic droughts during future rainfall trough periods. It is therefore wise to plan ahead to meet such contingencies. The present water distribution pattern in the park (natural plus artificial water) is conspicuously still well below that which pertained, during dry seasons, at the turn of the century, when the Sabi and Shingwedzi game reserves were proclaimed. It is the declared policy of the National Parks Board of Trustees to simulate natural regulating mechanisms as closely as possible. In consequence the artificial water-for-game program is a long way from completion.

The large numbers of game animals in the park (including dominant species such as elephant *Loxodonta africana* and buffalo *Syncerus caffer*) can no longer migrate out of the area to

escape natural catastrophes (such as the crippling droughts of 1911-1917, the 1930s, 1940s and 1960s), and a reliable supply of artificial water in all the areas where natural supplies have dried up since 1902 should be provided, to prevent an irreversible population crash of many animal species during future periods of protracted drought. Such a catastrophe could well spell the end of the park as a viable, self-sustaining wildlife sanctuary and destroy its well-established tourist industry.

Special measures will have to be taken to safeguard the perennial rivers of the park and their unique aquatic life from the calamitous effects of progressive desiccation or serious pollution.

1. Introduction

A fundamental question confronting weather experts and climatologists throughout the world is whether or not the climate is changing. In the absence of a substantive series of climatological (and especially rainfall) data, any assumptions concerning changes in climate or endeavours to predict climatological fluctuations, are, to a great extent, speculative. Although various researchers have studied the tendencies in the South African rainfall pattern, until fairly recently there has been little consensus over weather patterns and climatological cycles.

Nevill (1908) claimed that the weather pattern in Natal indicated a marked 18-year periodical rainfall fluctuation similar to that found in other parts of the world. Schwarz (1918) was convinced that South Africa was undergoing progressive desiccation and speculated on the causes and remedial measures. Schulze (1965) concluded that there are undoubtedly long-term fluctuations in the rainfall, but that these are extremely irregular and mathematical analysis shows that no regular cycles exist and that no significant alteration has taken place in the rainfall regime since measurements are available. Kokot (1948) came to the same conclusion after investigating climatic changes over southern Africa and having made comparative studies on the testimony and published information of old residents and travellers, on rainfall.

Intensive statistical analysis of the rainfall data of the past decade, on the other hand, gives convincing proof of fundamental oscillations in the rainfall in the summer rainfall area of South Africa (Tyson 1971, 1972; Tyson, Dyer & Mametse 1975; Tyson & Dyer 1975). Tyson, Dyer & Mametse (*op. cit.*) analysed the rainfall statistics of 318 meteorological stations for tendency, follow-up correlation and spectral features, and came to the conclusion that although they could find no indication of a progressive decrease in the rainfall in South Africa, there was undeniable evidence of cyclic rainfall fluctuations which varied geographically.

Tyson & Dyer (1975) made an intensive study of these fluctuations and concluded that as far as the summer rainfall area is concerned, "...of all the long period oscillations the quasi-20-year oscillation is the most strongly developed".

Dyer (1975) found a correlation between high and low rainfall cycles, and the number of sun spots present on the sun. However, factors influencing the

rainfall patterns of a particular area, such as the incidence of cyclones in adjacent oceans, the drought-determining influence of the "El Nino" phenomenon in the Pacific Ocean, the effect of large-scale eradication of rain forests, deforestation, pollution of the ionosphere and other factors have still to be determined with greater accuracy.

Gertenbach (1980) used the method of Tyson & Dyer (1975) to analyse the rainfall statistics of the Kruger National Park (KNP) and found the same cyclic pattern of above- and below-average rainfall periods which had been noted in other summer rainfall areas in the Republic of South Africa.

The rainfall data for Skukuza, over the past 72 years, was available. However, some of the other localities within the KNP could provide statistics for a limited period only. The annual average rainfall for the entire region showed distinct fluctuations lasting from 8 to 10 years above and below the long term rainfall average of the region. According to Tyson & Dyer (1978), the regularity of the pattern (present as far back as 1750 according to Hall (1976)) was disturbed round about the end of the 19th century and a double dry cycle of some 20 years was experienced (1897-1915).

The recapitulative rainfall pattern of the KNP reads as follows (Gertenbach *op. cit.*):

<i>Period</i>	<i>Average annual rainfall percentage</i>	<i>Remarks</i>
1897-1916	Information incomplete	Possible double dry cycle of 19 years
1917-1925	119,1%	9 wet years
1926-1933	90,3%	8 dry years
1934-1942	108,1%	9 wet years
1943-1951	86,8%	9 dry years
1952-1960	106,0%	9 wet years
1961-1970	83,4%	10 dry years
1971-1978	120,4%	8 wet years
1979-?1988	Information incomplete	Possible 10 dry years

Although no indication of a progressive decrease in rainfall over the past 70 years could be found in Tyson, Dyer & Mametse's (1975) statistic analysis of rainfall figures in the rest of the summer rainfall region, a marked long-term tendency in the processed information of the KNP's present rainfall data is noticeable. It is clear that the average percentage rainfall has *progressively decreased in both dry and wet cycles from 1900 to 1970*. The conspicuous increase in the mean annual precipitation for the period 1971 to 1978 might suggest the beginning of a new long-term above-average wet rainfall cycle.

It is also clear — despite the validity of Tyson & Dyer's studies and Gertenbach's results — that the possibility exists that *long-term fluctuations* in the rainfall patterns of specific regions do, in fact, occur. In the absence of reliable rainfall statistics prior to 1900 it cannot merely be assumed that the fluctuations which were indicated for the past 80 years or more, have been the dominant feature of the climate over the past 500 years or longer.

In the Republic of South Africa, as elsewhere in the world, information concerning the pattern of present and past climatic changes is of the utmost importance to man's various activities such as agriculture, water conservation,

afforestation, demographic planning, urban development and industrialisation, and also to determine rational nature management strategies.

Because it is impossible to extrapolate present rainfall statistics from the past, and because historical facts recorded in connection with rainfall and water distribution in a specific area point to distinct deflections of the rainfall pattern determined over the past 80 years, it is of great importance that an independent source of information be found which is also historically reliable. Such information can be provided by dendroclimatological analysis, and the correlation of dendrochronological data with available rainfall statistics and historical facts on rainfall and water distribution.

Fritts (1971) defined dendroclimatology as "dendrochronological studies that use climatic information in dated growth layers..." (of trees) "...to study variability in present and past climates". Stokes & Smiley (1968) determined the parameters for meaningful dendroclimatological studies and sensitivity levels. Valuable historical climatic information was obtained in America and elsewhere by the use of this method by Douglas (1914), Hoeg (1956), Hollstein (1965), Schmidt (1973) and others.

Gillooly (1975) investigated the growth-increment pattern of a number of tree species in the Rustenburg district of the Transvaal and found a strong correlation with the annual rainfall over a period of 60 years. Lilly (1977) investigated the dendrochronological potential of 108 South African tree species in the light of stipulated criteria. This researcher came to the conclusion that when the tubular drill method is used, there are five tree species which are exceptionally suitable for dendrochronological studies, viz. *Albizia forbesii* Benth., *Burkea africana* Hook., *Ekebergia capensis* Sparrm., *Zanthoxylum davyi* (Verdoorn) Waterm. and *Vepris lanceolata* (Lam.) G. Don. If complete sections of boles can be obtained, certain hardwood species such as *Azelia quanzensis* Welw., *Lonchocarpus capassa* Rolfe, *Ptaeroxylon obliquum* (Thunb.) Radlk. and even *Olea europaea* subsp. *africana* (Mill.) P.S. Green, *Combretum imberbe* Wawra, and the *Podocarpus* spp. (which can become very old) have great potential. Species still to be explored include *Faurea saligna* Harv., *Bolusanthus speciosus* (H. Bol.) Harms, *Breonadia salicina* (Vahl) Hepper & Wood, *Androstachys johnsonii* Prain and *Parinari curatellifolia* Planch. ex Benth. It is well established that certain South African tree species can shed light on the rainfall patterns dating from historic and prehistoric times.

It is, therefore, almost unbelievable that the excellent preliminary work done by Gillooly, Lilly, and others, have not yet been followed up by researchers in the departments of Agriculture, Forestry, or by any of the country's nature conservation bodies. If this had been done there would at present have been less speculation about past and anticipated rainfall patterns and historic water distribution in specific regions, and there would have been more backing for planning or determining management strategies.

One piece of research work has, fortunately, come to light which confirms the indisputable value of dendroclimatological studies in determining long-term rainfall regimes for a particular region. Hall (1976) based his studies on a large example of an indigenous yellowwood, *Podocarpus falcatus* (Thunb.) R.Br. ex Mirb., which was felled in the Karkloof Forest in Natal in 1916, of which a section was given to the Natal Museum in Pietermaritzburg. The exact locality

where the tree had grown could not be determined, although it apparently grew in the catchment area of a tributary of the Mpolweni River. The topography of the area is broken (rough) and deep indentations occur on the southern mountain-sides. Annual growth increments of trees growing in similar areas are expected to reflect climatological changes more accurately than trees growing in valley floors where constant high water tables "obscure" the growth ring patterns (Stokes & Smiley (1968)). Initial examinations of the tree section revealed that 597 growth rings could be identified in the example — an indication that growth must have started in the early 14th Century A.D.

The annual growth increments also showed clear perceptible variations, and the tree complies with the basic dendroclimatological sensitivity principle applied by Stokes & Smiley (1968).

The oscillation pattern (coupled with the rainfall pattern) that Tyson and his co-workers indicated for the summer rainfall areas, was also clearly perceptible in the annual rings, and the passage of time between consecutive periods ranged between sixteen and twenty years. A more meticulous analysis of the histogrammatic representation of growth increments reveals another, more illuminative phenomenon — *i.e. long term cycles* of relative retarded and accelerated growth. If these periods can throughout be linked to the rainfall, it would appear that this part of South Africa (and possibly also the rest of the summer rainfall area) experienced the following long-term climatic cycles since 1320:

<i>Period</i>	<i>Long-term Rainfall Pattern</i>
1320-1340	Part of a long, wet cycle
1340-1420	A relatively very dry cycle of 80 years
1420-1500	A relatively weaker developed wet cycle of 80 years
1500-1580	A moderately dry cycle of 80 years
1580-1690	A very wet cycle of 110 years
1680-1760	A moderately dry cycle of 80 years
1760-1860	A very wet cycle of 100 years with major fluctuations between very wet years and extremely dry periods such as the early 1820s, late 1840s and early 1860s which coincide with recorded times of widespread famine in Natal — <i>cf.</i> the so-called "Mahlatule" famine at the beginning of the 1800s
1860-1970	A dry cycle of 110 years in which some of the drought intervals of 8 to 10 years took on critical dimensions
1970-?2050	Next wet cycle of 80-100 years?

It is of the utmost importance that the above dendroclimatological data, interpreted from a single source be tested thoroughly in view of further replications of the same, and possibly other more suitable tree species (*cf.* Lilly). Surveys of this nature will have to be extended to other areas in the summer rainfall region to confirm the validity of the intimated long-term climatic cycles.

Curtis, Tyson & Dyer (1978) and McNaughton & Tyson (1979), all hold the view that in spite of certain problems, the dendrochronological age determination of yellowwood trees (*Podocarpus falcatus*) in both the Witels Wood area of the southern Cape, and the Magoebaskloof area of the north-

eastern Transvaal, have sufficient potential for the determination of historic weather patterns in a given area, and that further research in this direction can be continued productively.

Guy (1969) too, was convinced of the fact that there is a distinct correlation between the growth tempo of the baobab tree (*Adansonia digitata* L.) and the prevailing rainfall pattern of the area in which it grows. Walter's (1940) study of camelthorn trees *Acacia erioloba* E. Mey. in South West Africa also indicates a feasible correlation between growth-ring increments and rainfall in this area.

Surveys of this nature are long overdue in the KNP and would, most probably, offer explanations for the numerous documented rainfall and water distribution data for the area. These surveys may also provide a decisive answer to the misconception of certain individuals who suggest that no significant change in the KNP's rainfall pattern can be discerned and that the area has not been desiccating progressively since the beginning of the century.

Until the time that well controlled dendroclimatological studies in the KNP can (or not) provide adequate proof of the existence of long-term climatic oscillations in the area, *there must necessarily be a reversion to a thorough analysis of the existing historical facts which point to rainfall and water distribution in the area as a whole*. For the sake of completeness the rest of the Lowveld area can be included as well. A fair amount can be learnt from historical sources, and information points to the fact that the Transvaal Lowveld is not the only region which has been subjected to long term climatic changes (as is indicated in Hall's yearring data of the Karkloof yellowwood tree). The Lowveld, prior to the outbreak of the Anglo-Boer War in 1899, until 1970, became progressively desiccated (in spite of the good rainfall periods of 1917-1925, 1934-1942, and 1952-1960). Col. J. Stevenson-Hamilton, Warden of the conservation area from 1902 to 1946 was convinced of the desiccation phenomenon, and all the available historical information indicates that he was not mistaken, and that he made the correct decision to stabilise the steadily weakening natural water resources and to supplement them with artificial water (dams and windmills).

2. An overview of historical indicators of long-term climatic cycles and desiccation of the Transvaal Lowveld over the past 100 years

Inhabitants of the Lowveld have been speculating for many years on the decrease in rainfall since the beginning of the century, the drying up of old, established water sources such as springs, and the weaker flow of the once perennial rivers in the area.

Col. J. Stevenson-Hamilton, one-time warden of the KNP, firmly believed that the cause of the conspicuous desiccation of the area was the large scale deforestation of catchment areas by Black and White lumbermen, as well as the large numbers of uncontrolled grass fires that destroyed vast grazing areas each year. Others sought the causes in the extensive afforestations in the mountain catchment areas, the excessive withdrawal of water from perennial rivers for agriculture and industrial development, mismanagement of the natural resources by the Self Governing National States coupled with

sustained overgrazing of the areas and erosion, incorrect burning programs, and even the excessive damming up of supply streams in the catchment area. That all these factors could have been instrumental in the gradual weakening in the flow of perennial rivers which drain from west to east, can be readily accepted.

Poor management procedures in the catchment areas of some of the larger seasonal rivers such as the Shingwedzi, Mphongolo, Phugwane, Little Letaba, Timbavati, Nwaswitsontso and Sand rivers, whose sources are outside the boundaries of the KNP can certainly be held partly responsible for the silting-up of large numbers of so-called "permanent" pools in these rivers. But the progressive reduction in the distribution of perennial water holes in the seasonal rivers which have their sources in the park itself (*cf.* the Shisha, Tsende, Nwanedzi-Sweni complex, Mlondozi, Nwaswitsbaka, Mbyamiti, Mlambane, Bumi and others), the drying up of once perennial springs, and the draining of vleis and marshes can only be attributed to a natural desiccating process over a very long period.

Numerous indicators, which prove the occurrence of such a desiccation process and that the Lowveld has undergone major long-term climatic oscillations, are to be found in the historical documents and archaeological information on the region. The distribution and availability of surface water for use by man and beast which is in itself the result of the prevailing rainfall regime, can be reviewed in different epochs.

2.1 *Prehistoric times and the San (Bushman) era*

Judging from the distribution of stone implement 'factories' found in the KNP, it is clear that in the past there had been a different distribution of natural open water than at present. Many of these implement sites are situated far away from present perennial water sources. The same situation must have prevailed at the time when the San populated and inhabited the Lowveld. An intensive survey of San shelters in the park by Senior Game Ranger M. English (*in litt.*), provides incontrovertible evidence that some of the more important shelters are situated far away from existing water sources. The San were a nomadic people and it can readily be assumed that they effortlessly shifted their homes in times of drought when they were forced to move to where water and game were available. Various shelters show signs of prolonged habitation such as those found at Renosterkoppies, Boesmanklip (on the Mbandswe Spruit), Boesmankoppies (on the Sweni), Shantangalane and others where today there is no potable water during the dry season.

2.2 *The era of Black populations in the Lowveld during the Iron Age*

The Iron Age in southern Africa is considered to be the phase ushered in by the entrance of the first metal-working communities from across the Zambesi River at the beginning of the Christian era. This ended during the 15th century when indigenous artefacts were replaced progressively by articles produced by western man. Without considering in detail the chronology of different population phases of the Transvaal Lowveld by various Black tribes invading from the north and east, and later also repopulation from the south,

it is clear that — except for changing periods of instability as a result of wars of conquest during especially the late 18th and 19th Century — there had been periods of relative stability among some of the Black communities in the Lowveld. At the beginning of the 1970s, Van der Merwe and again between 1974-1978 Eloff, made excavations at Phalaborwa, Masorini and Shikumbu, and found signs of uninterrupted development in the materials and techniques used by potters from *ca* 1 000 A.D. until the 19th Century. It has not yet been established without doubt that the Black inhabitants of the area were the ancestors of the Sotho-speaking baPhalaborwa who are at present still residing in the area adjacent to the Kruger National Park. Not only were these people iron and copper founders, but also stock farmers (where the tsetse fly permitted it) and cultivators on a small scale. To safeguard themselves from being attacked by their enemies, they often built their permanent settlements on the slopes and even on the top of koppies, and surrounded their dwellings with stone walls. To live permanently at these sites they needed a dependable source of water within easy reach, especially as the large numbers of livestock had to be watered daily.

There would certainly have been times — periods of intense drought or famine — when they were forced to move away with their animals, but it is also clear that they had resided for long periods in the same place. Today very few of the archaeological sites where Blacks resided long ago (especially between 1500 and 1850 A.D.) show signs of surface water that could have sustained man and beast even during normal dry seasons.

The Venda culture which is related to the Rozwi of Zimbabwe, is innate to the northern parts of the KNP and adjacent Soutpansberg area. The Venda arrived in the northern Transvaal during the 17th Century, and subjected the smaller tribes (probably Sotho and Karanga) which had settled there. In this way they acquired foreign elements in their population system and culture. Artefacts from their strongholds from this time until they were ousted during the 19th Century by the impis of Manukosi and Gungunyane, are still to be seen in many places in the northern section of the Kruger National Park. In the southern parts of the park the strongholds constructed by the Mambayi and other smaller Tsonga tribes which were overpowered and massacred during the 18th and 19th centuries by the Swazis from the south, and Manukosi (Soshangane) and Gungunyane's hordes from Moçambique, are still to be seen. A large number of the ruins of the earlier Black inhabitants are situated in areas where today there is no permanent water for man and beast during the dry season.

Ruins which are of importance include those situated at the following sites: Macili Hill, Khandizwe, Mangake Hill, Ngulene Hill near Skatkoppie, Ship Mountain, Shithlave, Matupa, Tlapa-la-Mokwena, Mlalani, Makhuthwanini hills, Shirimantanga, Timfenene hills, Muntshe, Nungweni and Mrunzuluku (Dzunzulukweni) — where some of the holes which were used for trapping game can still be seen — Mshatu hills, the Pumbe Plateau, Vudogwa, Masorini, Shikumbu, Nwanedzi hills (Letaba Section), Mbhandweni, Shilowa, Mooiplaas hills, Manghoto and Shibayatsangela (Lebombos), Kostine, Kharige hills, Marhungulwane, Milavamisi and Macetse (Mbyashishe/Little Letaba), Phondo hills, Nalatsi Spruit, Zari area, Lebombos north of Beacon 5 at the baobab tree, south of the Cabora Bassa

power line, along the upper reaches of the Mananga-nanga, Dzundweni Hill, Nwakama's (the 'rainmaker') kraal on Gumbandevu, Shitsovaridge south of Matukwala, Matjigwili Hill near Baobab-windmill, Nkovakulu between the Nkovakulu and Nkovakulu-north windmills, Mashikiri hills, Matekevele Hill, Hutwini Hill at Pafuri, and the ruins in the hills south of the Tambye — WNLA road (to the east of Tambye Drift).

After the arrival of the first Whites and the establishment of White communities at Ohrigstad, Lydenburg and Schoemansdal (Zoutpansberg), hunters and explorers discovered large Black settlements in the area which is today the Kruger National Park. Many of these dwellings or kraals were situated on sites where today it would be impossible to establish a settlement, due to a lack of permanent water.

In 1860 on a journey through the KNP area to Zoutpansberg, a Portuguese trader, Diocleciano Fernandes das Neves (1879) found a Black settlement in the vicinity of Kumane, where a Valoi chieftain with the name of Maximba-jà-indlofu and his followers lived. At Masorini in the Phalaborwa region another large settlement was found.

The Natal surveyor and explorer, St. Vincent W. Erskine (1875) encountered large numbers of Blacks during 1869 on the Lebombos in the vicinity of Pumbe, where perennial water sources were shown to him.

On the map compiled by Bechtle and Marais entitled "Schetskaart van de Lebombo-vlakte tusschen Olifants- en Krokodilrivier", dated 1891, the following Black kraals are indicated: a kraal on the western side of Muntshe, Magange's kraal on the upper reaches of the Nwaswitsontso and Hlanganise, and Manyuki and Omaquai's kraals on the Timbavati.

The hunter, E. Vaughan-Kirby (1896) found a large kraal (that of Makatsha) on the Nwanedzi (near the place where the high-water bridge has been built over the river). In those times Blacks lived on the Nwaswitsontso in the vicinity of the Malau mouth, near the Metsi-metsi mouth, and at Sityana's Hill (Mshatu hills).

A land surveyor, W. Vos, who, in 1890, surveyed the border between Moçambique and the Zuid-Afrikaansche Republiek (Transvaal) together with G.R. Von Wielligh, came across Black settlements on the Mlondozi spruit and at Muntshe, Nkuane, Nwaswitsontso (Metsi-metsi area), Nwanedzi, Gudzane (Magabain's kraal), Pumbe, Letaba River and Phalaborwa. They also found remains of kraals and skeletons of Blacks who were murdered at Shilowa (probably by Gungunyane's impis).

In 1903 the Swiss missionary, H. Berthoud of the Valdézia mission station, drew an excellent map of northern Transvaal, and indicated Black settlements at the following places: Masega (Selati River near the Olifants River); Makhuva (upper reaches of the Makhadzi/Mbandzweni); Shilowa (Shilowapoort); Nwambeyabeya (Ngotsa Spruit); Matshete (Little Letaba at Mbyashishe mouth); Manoro (Lebombos at Shibyatsangela); Mavumelane (Mambaule or Shamangombe upper reaches of the Phugwane); Dimbo (Punda Maria).

Yates (1935) places Nhliziyo's kraal (the headman who killed the Swazi warrior chief, Mafatin, in the 1880's) south of Ship Mountain on the upper

reaches of the Komapite Spruit. The site of this kraal was recently determined by Senior Game Ranger M.C. Mostert (*in litt.*).

After the reprocclamation of the former Sabi Reserve and the Shingwedzi Reserve following the Anglo-Boer War, a Black population of between 2 000 and 3 000 was found in the area by the then Warden, Col. J. Stevenson-Hamilton, who made a thorough survey of the area (*vide* his Annual Report, 1902). In 1911 he reported the number of Blacks in the Sabi Reserve as being 600 taxable men, plus 3 500 other males, women and children. In Shingwedzi, outside the Mhinga and Makuleke locations, there were, at the time, only some 200 Blacks. In addition to the settlements along the perennial rivers such as the Crocodile, Sabie, Olifants, Letaba and Luvuvhu, he also found large numbers of Blacks (with herds of livestock) settled in places where human habitation would today be impossible without an artificial water supply (*Vide* Map).

Some of the most important Black residential areas at that time (1902-1920s) were Gomondwane; Mativuhlungu; Doispan (Bassopè) on the Mtshawu Spruit; Hobo and Mahalane on the Mbaduankomo, Shinkwehe and Mahoshangwembe spruits (all tributaries of the Mlondozi); Gaben at Saliji; Malopene on the Mutlumuvi Spruit; Chokwane, Jafta, Jakkalase and Maruba between Tshokwane and Mafagalamba and Matibsini on the Nwaswitsontso; Kumane-ku-muri at Kumane (whose ancestors were in the area before 1860); Mahlobyanine on the western boundary (Nwaswitsontso); Sockis at the Timbavati upper course; Jaze in the Nwanedzi Poort; Gentleman and Homu on the Nwanedzi at Shibotwane and Msassane; Mahlhane on the Mavumbye near Mananga; Mnyamane on the Ngotsa upper reaches (Nyamari); Mbangeni and Jacket on the Bangu Spruit; Mlambo on the Nwanedzi upper reaches (Letaba Section); Makuba on the Makhadzi upper reaches; Shilowa at Shilowa; Manjoro at Shibyatsangela in the Lebombo; Mahlati on the Shihloka Spruit (tributary of the Dzombo); Idindane (upper reaches of the Mbyashishe at Matiwotsuka and Pambi); Mupudhlu at Nkokodzi; Pumbuta, Kaingane and Makananane on the eastern Bubube; Mbayinbayi on the Bububu (western boundary); Salane at Dhili on the Phugwane; Shijabane on the Phugwane (western boundary); Mavumelane in the Mambaule region; Babalala at Babalala; the Maluleke Kraal at Stangene; Mowisi at Dzundweni and Shikokololo at Punda Maria.

Some of the Black communities kept only sheep, goats, donkeys and fowls, though others owned large cattle herds. In 1935 Col. J. Stevenson-Hamilton informed the National Parks Board of Trustees that, in his opinion, it was unnecessary to erect a cattle dip at Saliji (which had been recommended by the Department of Agriculture to control East Coast fever), because through the years lions *Panthera leo* had thinned out the cattle owned by the Black inhabitants of the area from 800 to 300 animals. At the time these large numbers of cattle invariably drank water from water holes in the Saliji, such as Gaben and Pelandlopfu, which now dry up completely during the winter months. During the years 1912-1923 farmers of the Highveld, through representations, again obtained grazing rights for their sheep and goats in the Pretoriuskop area. It was an old custom dating from before the Anglo-Boer War. Special autumn burnings of the veld were carried out for this purpose, and the natural water holes around Pretoriuskop had to provide water for the

local game and some 10 000 head of small stock throughout the winter months. Today the natural water sources in the area are unable to meet the demand in dry years.

2.3 *The old trade routes through the Lowveld along perennial water*

According to the map and description given by De Vaal (1984) of the old trade trails and wagon roads in the eastern and northern Transvaal, there existed some seven age-old trade routes which, since the 15th and 16th centuries, stretched from the coast (Delagoa Bay, Inhambane and Sofala) through the present KNP to the interior of the country. Four of these routes meandered along courses which would not provide reliable sources of water under present climatic conditions.

2.3.1 The most northerly route from Soutpansberg was also linked to the northern trade routes to Zimbabwe. The route lay south of the southern foothills of the Soutpansberg and eastwards past Shikundukop to Shikokololo (Punda Maria). From there it went over the present Kloppefontein to Malonga Spring and beyond the Lebombo in Mozambique to Matiwane (in the pan area south of the Limpopo River) and Chicuala-cuala on the Limpopo River (Vembe). The route then meandered *via* Massangena to Sofala, and there was another route *via* Mapai to Inhambane.

According to two elderly Black employees of the KNP — James and Samuel Maluleke — who lived, during the 1920s, in the present KNP at Stangene, there was another route from Shikundukop *via* Dotholi and Mananga-nanga to the Dzundweni springs. From there it ran across the Lebombo flats to Malonga or Shirombe and on to Matiwane and Chicuala-cuala.

2.3.2 There was also a well known route that ran from the Soutpansberg in the vicinity of Mashao Hill (east of Elim), along the upper reaches of the Little Letaba, and turned eastward across the Lebombo plains, through Shilowapoort to Matsambo on the Limpopo (near the confluence with the Olifants River). From there it went on to Inhambane on the East Coast. This was the route that was followed in July 1836 by Hans van Rensburg, the Voortrekker leader.

2.3.3 The third route started in the vicinity of the old Schoemansdal area and ran in a south-westerly direction from Mashao Hill over Modjadji Neck and the Great Letaba past the Kasteelkoppies to Phalaborwa. Here it crossed the Olifants River and continued on to Pumbe (on the eastern border), and from there east of the Nwanedzi in Mozambique on to Magude and Delagoa Bay.

2.3.4 The fourth route of which part was later improved to form the old transport wagon road between Lydenburg and Delagoa Bay, also linked up with the northern trade routes to Zimbabwe in the vicinity of Marabastad. From there it went past Platnek across the upper reaches of the Olifants and Steelpoort rivers to Ramakok's Kraal, crossed the upper reaches of the Blyde and Treur rivers, and along the Sabie to Magashula's Kraal. From there a route went along the Sabie River to the Sabiepoort, and on to Moamba and Delagoa Bay. The other route, which in the course of time became the most important trade route between the Z.A.

Republic and the Portuguese traders in Delagoa Bay, went from Magashula's Kraal (where João Albasini settled in 1846) southward to Pretoriuskop. From there the route turned in a south-easterly direction and passed just north of Ship Mountain (Langkop of the Boers), *via* Josikhulu, and crossed the Crocodile River at the place that later became Nellmapius Drift. From there it ran in a south-easterly direction across the Komati River (at the later Furleys Drift), and through the Lebombo mountain range at either Mathalapoor or Matibiskom, and then past the later Progresso de Guedes and Pescene to Delagoa Bay.

It is obvious that there must have been sufficient permanent (perennial) water at intervals along these routes to supply the traders on their way into the interior (and later the transport riders' spans of oxen) with sufficient water during the dry winter months.

When one considers the most northerly and southerly routes (which in later years became the most important connecting routes with the East Coast), then, in those years, there must have been sufficient permanent water sources along the routes and passing the places which today are part of the Kruger National Park.

The northern route had strong, lasting springs at Shikokololo (Punda Maria), Dzundwini, Klopfontein and Malonga. Permanent sources of water along the southern route were available at Pretoriuskop, the Ntomene water holes (where the present Voortrekker-windmill is situated), Josikhulu Spruit, and the Fihlamanzi Spring. Of all these water sources the only dependable one now is the Malonga Spring which, even under the best of circumstances, can provide a very limited amount of water for the parched traveller or animal. Since the 1960s all the other sources dry up completely in winter — even during normal rainy seasons.

2.4 The arrival of the first Whites in the Lowveld

According to Punt (1958), Jan van de Capelle (Commander of the United East India Company's Fort Lagoa during the Dutch occupation of Delagoa Bay), in June 1725 ordered his assistant, Frans de Kuiper (also spelled De Cuiper) and Sergeant Joannes Monna to take 31 men (including 21 soldiers and five sailors), ten pack oxen and eight slaughter-cattle, and explore the interior of the country to the other side of the "Blaauwe Bergen" (Blue mountains, *i.e.* the Lebombos). On the 27th June 1725 the expedition departed from Delagoa Bay. They crossed the present Transvaal border about 5th July 1725, according to De Kuiper's journal. It is an important date in the history of the Lowveld and the KNP, because on that day the first persons of European descent set eyes on the area. The purpose of the expedition was to gain information on the Black tribes living in the interior, to examine possible trade ties, and to locate the legendary gold smelters of Monomotapa (in the later Zimbabwe). On the 10th July 1725 the expedition reached the Chief Dawano's Kraal at Gomondwane, and stayed there to rest and gather information. On the 12th July 1725, De Kuiper and his company were unexpectedly attacked by Dawano's warriors. They managed to ward off the attack but lost all their pack- and slaughter-oxen, and were forced to return over the Lebombo Mountains. Their musket fire killed seven Blacks and wounded ten. Two men in De Kuiper's company were wounded. The

return journey was without incident, and they reached Fort Lagoa safely.

It was evident that Chief Dawano had a large kraal at Gomondwane, and a multitude of followers and cattle. At present there is no perennial water at Gomondwane, and in dry seasons even the established waterholes in the lower reaches of the Vurhami Spruit, such as Mpemane, Zabala and Nsosweni, dry up completely.

2.5 The settlement by Voortrekkers and other Whites in the Lowveld

Lang Hans van Rensburg and his people were the first of the Voortrekkers to arrive in the Soutpansberg area in 1836. He decided against waiting for the trek under the leadership of Louis Trichardt and set out for the East Coast and Portuguese ports. In July 1836, Van Rensburg and his followers entered the Lowveld. According to available information (Punt 1960) he followed the old trade route to the east, and passed somewhat south of the Ysterberg, trekking along the left bank of the Little Letaba, across the Lebombo Flats and through Shilowa Poort to the Limpopo.

Sufficient water and grazing were available for the Trekkers' herds of large and small stock, and there were no major rivers for the Van Rensburgs to cross. They followed the broad footpath from the Shingwedzi Drift to the well-known drift across the Limpopo at Chief Masambo's Kraal. They must have arrived at Manukosi's (Sakana's) Kraal during the last week of July 1836. It was while encamped south of the Djindi-Limpopo confluence, on the western bank of the Limpopo, that Van Rensburg and his whole company were massacred in a surprise attack (*cf.* the site of the massacre shown on St. Vincent Erskine's map of 1875).

At the end of July 1836, Trichardt and a patrol, searching for the Van Rensburgs, reached Sakana's kraal, but not the actual site of the massacre. They suspected that the Blacks intended murdering their party too, and wisely decided to return to the Soutpansberg. Their route lay in a northerly direction along the Limpopo through the Nyandu Forest and the pan region to the east, and *via* Malonga Spring and Dzundwini. On the 7th and 8th of August 1836 they passed through the Nyandu Forest (Elephant Bush) and probably reached Dzundwini (Matibeetuyn) on the 10th of August. There was sufficient water available throughout the journey. Under present day conditions a mounted patrol, in August, along this route would certainly be a hazardous undertaking.

On the 18th August 1836, Jan Pretorius, Gert Scheepers, Hendrik Botha and Izak Albag and their families renewed the search for the Van Rensburgs. They followed the wagon spoor of the Van Rensburgs and the Trichardt patrol with ease. The distance from the saltpan at Soutpansberg (where their laager had been) to Masambo, on the Limpopo, was about 350 kilometres, and this distance was covered in 45 stages. It is assumed that they reached the Limpopo towards the end of September. Here Pretorius and his people met Sakana, and came to the conclusion that the Van Rensburgs had definitely been murdered. They heard White children crying in Sakana's huts. One of the chiefs admitted that Sakana (Manukosi) was holding two White children prisoner. They were, presumably, the Van Wyk children — a boy of six, and a girl of four. The search party chose not to visit the scene of the massacre,

and after staying for a short time on the banks of the Limpopo River, they headed back. Heavy rains delayed them during their journey across the Lebombo Flats and they arrived at Mashao Hill (in the region of the present Kurulen) on the 1st January 1837. Their oxen died of nagana, and Pretorius wrote to Louis Trichardt appealing for help. Trichardt sent a team of oxen to bring the stranded people back to the saltpan. (Gert Scheepers died of malaria and was buried somewhere in the KNP in an unmarked grave).

While Louis Trichardt's party were at the salt pans, a mounted commando under the leadership of General Andries Hendrik Potgieter arrived there on a scouting patrol from the Orange Free State to look for a suitable trade route to Sofala on the East Coast. Sarel Celliers and Johannes Bronkhorst were in the commando. According to Preller (1917), the Potgieter/Bronkhorst scouting patrol arrived at Louis Trichardt's laager on the 24th June 1836.

Bronkhorst kept an extremely interesting journal while with the patrol, and wrote: "Nege skofte van Trechard af bereik ons lopende rivierwater, omtrent twee voet diep en 1 780 tree breed." He was referring to the Limpopo River and the only places where the river is so wide are just east of the Buby Mouth and opposite the present Manxeva picket in the Pafuri area. Bronkhorst wrote further: "Nog 'n skof daarvandaan is ons oor nog 'n grote rivier..." (the Nuanetsi) "...en krij daar bome van dieselfde aard" (as along the Limpopo).

They penetrated as far as the Great Save (Massangena area) in Moçambique, and turned back on about the 18th July 1836, and returning *via* Chicuala-cuala, Malonga and the present Punda Maria to the saltpan where they arrived at the end of July.

General Potgieter's mission returned on the 17th August 1836, and arrived at their laager in the Orange Free State on the 2nd September 1836.

Bronkhorst made the following notes in his report on the area south of the Soutpansberg: "Die klimaat is wel 'n bietjie warm, en weinig verskil tussen winter en somer; groente groei oral vanself en welig. Ons was daar in die maand Julie, en het allerlei soorte vrugte sien groei en in bloeisel, en van die tuine het ons patatas, mielies en allerlei groentes gekrij. Daar is *oorvloed van water* om die lande te besproei, en mens kan amper sê: nie genoeg land vir die *menigte fonteine* nie. Daar sou 'n grote stad gebou kon worde als daar bewoners was, en elke erf sou sijn eie water kon hê. Hout is volop, die landerij gronde groot en uitgebreid, sodat daar duisende gesinne sou kon bestaan, terwijl die land ook geskik is vir die veeteelt."

One can only speculate on what Bronkhorst's impressions of the area would have been if he had trekked through the area in the winters of 1982-1984!

In 1846 the trader and pioneer, Joao Albasini, commissioned Johannes Joubert to build a trading post on the left bank of the Phabeni Spruit near to where it flows into the Sabie River. The post was situated near Chief Magashula's Kraal, and was called Mokômeng or eMngomeni. Albasini was the first White man to inhabit the Lowveld. His intention was to trade with the farmers who had settled in Andries-Ohrigstad since 1845, and to stimulate trade between the farmers and the Portuguese traders of Delagoa Bay. (Albasini used the old trade footpath which went past Pretoriuskop and Ship Mountain across the Crocodile River and Komati to the coast). He

established outposts and small trading stores at Pretoriuskop and Jozikhulu Spruit where he put his indunas, Manungu and Josikhulu (Big Joseph), in charge. Manungu had the additional task of taking care of Albasini's cattle herds at Pretoriuskop. Albasini later disclosed the particular route he used to his friend Carolus (Karel) Trichardt when the latter was commissioned to find a passable wagon route from Ohrigstad and Lydenburg to Delagoa Bay. Before this exploration was made, a second route was marked out by Andries Potgieter and Trichardt. It stretched from Pretoriuskop, passing north of the Mbyamiti, past the present Kwaggaspan and Renosterkoppies, and Godleni Poort to the coast. This "Oude Wagenweg" (Old Wagon Road) was never used as much as it was intended to be because of the lack of water during the winter months.

At his Magashule trading post Albasini dug a water furrow which was fed by the Phabeni Spruit, a small flowing river at the time, and irrigated his wheat and other lands. He also planted fruit trees and vegetables which thrived in the fertile soil. Under present day conditions the most local Blacks can hope for is a good maize crop during years of good rainfall. The Phabeni Spruit now dries up completely during the winter season.

Albasini lived at Magashula until 1847 and then settled at Rustplaas near Ohrigstad. In 1853 he moved to the farm Goedewensch near Piesangkop in the Soutpansberg where he lived until his death in 1888.

Because of the unhealthy climate (malaria) and other problems, the restless General Andries Hendrik Potgieter left Ohrigstad and settled at the foot of the Soutpansberg some 18 km west of the present town of Louis Trichardt. Here, in 1849, he and his followers established a settlement which they named Zoutpansbergdorp, but in 1852, after the death of General Potgieter and the death of his son, Piet, in the war against Makapan, the town was renamed and called Schoemansdal in honour of the controversial General Stephanus Schoeman who succeeded Potgieter as community leader.

Six years after its establishment, Schoemansdal was a prosperous town (Preller 1923). In 1855 trade relations with Natal and the Eastern Cape were on a sound basis and of such importance that the Portuguese also wished to establish permanent trading relations. They sent a commission, led by Father J. de Santa Rita Montanha, from Inhambane to Schoemansdal to arrange a trade and friendship treaty with the Voortrekkers. In his report Father de Santa Rita Montanha wrote about Schoemansdal: "Die dorp is reghoekig uitgelê en die strate van 'n goeie breedte. Die strate word mooi skoon gehou, en stroompies helder water loop aan weerskante af."

The Portuguese trader, Diocleciano Fernandes das Neves (1879) who visited the town in 1860, also gave a favourable description of the town in those days:

"Zoutpansberg (Schoemansdal) is a small town, containing about seventy houses, situated on the extreme north of the Transvaal Republic, and is the capital of the district. It is built on an extensive plain. The soil is red and very productive, because of the *great quantity of water* which irrigates it. All the streets have a rill of water on either side, close to the houses, which flows constantly. Each Dutchman cultivates a piece of ground large enough to provide a sufficient quantity of corn for a whole year's consumption for himself, family and household. All the *pracas* have a long trench built along

the highest part of the land, through which water flows always in abundance. When a portion of land has been dug and harrowed they open traps in this trench and the water flows down and irrigates the land."

The Reverend Stefanus Hofmeyer (1890), who was a missionary in Zoutpansberg for twenty years, and who also ministered Michael Buys and his clan, wrote of Schoemansdal as follows: "In 1865, was het een wel niet groot, maar toch bloeiend dorp. Duizende ponden ivoors werden er jaarliks van de Boeren olifantjagters ingekogt, en naar Natal gezonden. Schoemansdal was, zoo als gezegd, noch bloeiend, vruchtbaar en waterrijk."

Unfortunately the town was badly situated from a strategic viewpoint and could not be defended successfully during the Bavenda rebellions of 1866-1867. Eventually it had to be evacuated and the residents were forced to move back to Marabastad and Potgietersrus. The town was burnt down by the marauding Blacks and left to become desolate and wild. It was never rebuilt, and the new town of Louis Trichardt was later established to the east of Schoemansdal.

There have been modern attempts to restore the Voortrekker town but today any plan to establish a town there must be considered foolish. Of the abundance of water mentioned in the old records there is nothing left, and even the Dorps River which provided water for the Voortrekkers' strong water furrows is today a dry river bed.

2.6 Early Explorers

During his journey, in 1860, from Delagoa Bay to Soutpansberg and the Limpopo area, Diocleciano Fernandes das Neves, a Portuguese trader and explorer, made various notes on the water conditions in the area.

He started his long journey on foot, and with a large number of bearers, on the 3rd September 1860 from Lourenço Marques. Tracing his journey according to day shifts from certain identifiable places and names along the route, landmarks in the KNP can be identified.

He left the Sabie River near Sabie Poort and recorded in his diary: "When we had proceeded for about four hours on our journey, we came to a valley through which coursed a *stream of excellent water*. This valley was very picturesque, a long dense forest of large trees, whose branches were knit together, extended along the south of the valley." This was the patch of trees where the recent road camp was situated next to the Mlondozi on the northern side of Muntshé. He wrote the following about the Ngotsa and Timbavati rivers: "In the early morning we continued our journey for a very long distance, walking without halting for several hours, reaching a thickly wooded part through which *flowed a stream of clear water* (the Ngotsa Spruit). Here we all bathed, and after breakfast continued our journey until we came to a large tract of level ground, through which flowed an affluent (the Timbavati) of the great river Imbélulé (Olifants River), where we camped under majestic trees. The following morning we reached the great river Imbélulé, called by the Dutch 'Elephant river'. I crossed this river on the shoulders of two men, the water reaching *up to their chests*".

After Das Neves had arrived at Albasini's place in Spelonken, he decided to

hunt elephant in the Portuguese region on the Limpopo River. He left on the 2nd November 1860 to join his hunters at Chicuala-cuala (or, as Das Neves wrote 'Chiquara-quara') where there was an important chieftain who was under the suzerainty of both the Soutpansberg Boers, and Mawewe (the cruel son of Manukosi) chieftain of the Shangaan tribes south of the Great Save. During his stay at Chicuala-cuala, Das Neves was informed that an impi of Mawewe's warriors were on their way to murder him. It was on the 6th December 1860, and a thunderstorm was imminent. He decided to cross the Limpopo with his followers and to hasten back to the Transvaal. When crossing the river the water reached up to their waists, but the storm broke during the night, the river was flooded, and crossing was impossible. When Das Neves awoke the following morning after a restless night he saw Mawewe's warriors on the northern side of the river. Because the river was in flood the warriors had not been able to reach the fleeing party, who travelled as fast as they could along the old trade road through the Nyandu Woodland to Malonga.

Das Neves describes the gruelling walk as follows: "Our next day's march was the longest we had made during our expedition, for we walked nearly thirty-three miles, arriving about six in the evening at the base of a 'granite' mountain (*sic*). From the centre sprang a torrent of water that fell in a crystal cataract into a deep pool of excellent water, and then coursed into a running stream". (Malonga Spring looked totally different in 1860. The prospector, C. Gerber, found sufficient water there in the 1920's to dig for and wash for diamonds on a large scale (without success). In 1959 the spring was still strong enough to supply enough water during the winter to a small, newly constructed dam in the valley at the base of the series of springs. Today there is only a sluggish spring that becomes progressively weaker during dry periods, supplying water to a limited number of game).

Das Neves' company rested at Malonga Spring for a short while, and then moved further across the Lebombo Flats to Dzundwini Hill. He described his journey thus: "Soon after we started with renewed vigour reaching, about six in the evening, a huge mountain (Dzundwini) at the foot of which there was much greenery. Here we camped. Towards one o'clock in the night we had a good downpour of rain. The water we found here was *most excellent*". The springs at the base of Dzundwini were well-known watering points on the old trade route from Soutpansberg *via* Malonga to Chicuala-cuala and Inhambane. J.J. Coetzer, who was the first game ranger to be stationed in the northern part of the old Shingwedzi Reserve, had an outpost there in the early 1920s, and remains of his camp can still be seen. At that time a Black man, Mowisi, lived there. The springs dried up during the drought of 1961-1970, and now only have a little water during extremely good rain years such as those of 1971 to 1978.

In 1869 St. Vincent Erskine (1875), a land surveyor from Natal, journeyed through the Lowveld and Portuguese East Africa. He started out on the 6th May 1868 from Pietermaritzburg and travelled to Potchefstroom by ox wagon, and from there to Pretoria, Lydenburg and the desolate Ohrigstad. He travelled to the Olifants River and eastwards to the Transvaal border. Describing that particular part of his journey, Erskine wrote:

"Passed the 'Umtataseera' river..." (Klaserie, according to his excellent

map), "...the only *running* stream encountered since the Umchlas river (Blyde River). It was a fine stream, as clear as crystal, flowing over a sandy bed. The country from here (Klaserie) to the Sorgobiti river (Nhlarulumi) swarms with game consisting of giraffe, *eland*, buffalo, koodoo, zebra, brindled gnu, *bastard hartebeest*, pigs and other kinds. We arrived at the banks of the Imbabati river (Timbavati) passing three or four waterholes on the way." (Probably waterholes in the Nyameni Spruit). "As is usual with these streams it had a few pools here and there — the rest was a bed of dazzling sand. On starting in the morning, I crossed a stream of water..." (the Hlangene Spruit at Game Ranger Whitfield's post) "...running into the Imbabati river, which immediately lost itself in the sand. From here we emerged in 'open forest', a distinct thing from 'open bush', and consisting of large trees between the trunks of which you could see a great distance, the ground being destitute of undergrowth. I saw some spoor of *rhinoceros* and lion here. I also met here the 'Zenonondo' called by the Dutch 'baster hartebeest' — a scarce antelope."

"The country continues to improve. The trees are more scattered and the grass grows higher and thicker. I here left the usual low plain and ascended a rise (the Lebombos) which appeared flat on top. The country is thickly inhabited, and is well cultivated (the Pumbe Plateau). After proceeding some distance I came upon a spring which the caffres informed me was only allowed to be drunk out of by 'inkosi' (chiefs), and that 'abafokazan' (poor men) were killed if they drank from it! Next morning I went to visit the chief Mnondune by a path through impenetrable scrub for about two miles."

When one contemplates the broad, dry river bed of the Limpopo River during the winter months it is difficult to believe that, more than a century ago, one could travel by flat-bottomed boat all the way from the Shashi confluence to the Tolo-Azime falls, just west of Beit Bridge during the dry season.

This was exactly what the British explorer, Captain Frederick Elton did during July-August 1870 and he lost his boat and almost his life in the process. From the Tolo-Azime falls where he lost his boat and most of his equipment he proceeded on foot, with pack-oxen along the rest of the Limpopo to its confluence with the Olifants River in Moçambique. In the process he also traversed the 'Crooks Corner' portion of the present KNP during mid-August.

At the Limpopo-Shashi confluence Elton describes the Limpopo as a broad stream, some 200 metres wide and 2-3 metres in depth.

Just above the falls he gives the following description of the river:

'Here the Limpopo, stretching out to more than a mile in width, rushes in a dozen different channels over large boulders, in seething and foaming rapids, interrupted by circling eddies and deep silent pools, the abode of hippopotami, who feed on the long waving grass of the thickly wooded islands. At a distance of five miles the river culminates in the cataracts of Tolo Azime.' (Elton 1872).

After completing his journey he conjectured in his report that it would be possible to negotiate the entire length of the Limpopo, from its mouth to

Chicuala-cuala with flat-bottomed steamers in less than 15 days. From Chicuala-cuala a wagon trading route could be established westwards as far as Schoemansdal.

Between 5th and 9th September 1870, the famous German scientist and explorer, Carl Mauch, travelled through the present KNP on his return journey from Lourenço Marques. He passed the confluence of the Crocodile and Komati rivers, crossed Renosterkoppies and proceeded along the Sabie in a westerly direction to the ruins of Albasini's old trading post on the Phabeni Spruit (Bernard & Bernard 1969).

Near the present Crocodile Bridge Rest Camp he came across thousands of head of game — zebra *Equus burchelli* and blue wildebeest *Connochaetes taurinus* "...which apparently have no knowledge of firearms". Before passing the watershed between the Crocodile and Sabie rivers, he crossed a spruit (probably the Bumi) "with numerous small pools and rhinoceros spoor". In the western section of the Nwatimhiri Bush (Renosterkoppies area) Mauch was pestered by tsetse fly *Glossina morsitans*.

On Friday 9th September 1870, Mauch made the following notes on his journey along the Sabie: "A four hour's march on the level brought me to a big, or rather sharp corner in the river, which bend is embellished with a group of very tall trees with thick foliage, which afford a pleasant coolness underneath their leafy roofs. A little over one mile's distance from here lie the ruins of a house which belonged to Albasini. A tree, about 15 feet tall, the trunk about six inches thick, already grows within the walls; of the erstwhile cultivation of the ground nothing can now be seen. On the nearby height, which I explored while hunting, I found many heaps of stone which indicated that many Kaffirs must once have lived here".

During 1868 Carl Mauch journeyed from Lydenburg northwards across the Olifants and Letaba rivers, and from there on to Inyati and the present Zimbabwe. He reported that all tributaries of the Olifants River arising in the Drakensberg were flowing rivers, while those that arise in the foothills of the Drakensberg were seasonal rivers. He described the Olifants as a picturesque stream some 80 m wide, and whose banks were seamed with dense stands of reeds and large trees such as wild fig. He also found the banks of the Letaba and Little Letaba densely grown with common reed *Phragmites communis* Trfn. In the Phalaborwa region he encountered Black tribes who manufactured copper ornaments which they smelted themselves. On the Olifants River he found game in abundance — giraffe *Giraffa camelopardalis*, buffalo *Syncerus caffer*, kudu *Tragelaphus strepsiceros*, waterbuck *Kobus ellipsiprymnus* and zebra. The river teemed with hippo *Hippopotamus amphibius*, although they were seldom seen. The area between the Letaba and Luvuvhu rivers was sparsely inhabited. The only kraals to be found were near the rivers or springs. With the exception of dogs, there were few domestic animals — a result of the lethal effects of the tsetse fly.

Mauch found that the Luvuvhu River with its various tributaries from the west (among others the Mutale) was an important river. He crossed the Limpopo on the 31st August 1868. The river was 381 m wide, although the water, though reaching up to his knees, only flowed over a width of some 45

metres. The grass on the banks of the Luvuvhu River grew lusciously and attained a height of 4,5 m to 5,5 m — with game paths crisscrossing it, forming a real labyrinth. On the upper reaches of the river he found wild banana trees bearing ripe fruit, and orchids — a truly tropical paradise.

The German geologist, E. Cohen (1875), also journeyed from Lydenburg to Lourenço Marques in 1873. He made notes of his observations in the area which is today the southern part of the Kruger National Park. His journey took him north of Lozieskop (Legogote), past Pretoriuskop, Ship Mountain and Newu to the Crocodile River. He came across large numbers of game in the Setigalangakop area (Shithungwane), predominantly zebra, wildebeest, kudu, waterbuck, reedbuck *Redunca arundinum* and sable antelope *Hippotragus niger*. The party never actually came across lions, although their roaring was often heard at night.

On the 28th June 1873, they camped west of Ship Mountain near a vlei-like depression. They found standing water among large granite slabs, and also a stream with running water which flowed through the granite (possibly the Samarhole Spruit). The party encountered giraffe near Ship Mountain, and reached Newu Hill on the 30th June. The Blacks accompanying him asserted that Newu Hill was the western border of the tsetse fly's distribution in that part of the Lowveld. He also came across the tracks of a large number of buffalo. The area between Newu and the Makhuthwanini hills teemed with game but it was almost devoid of water. There was, however, sufficient water in a pool in a dry water course to serve them for the night (probably the Ntomene Pools). During the night there was a downpour. The following day the party reached the Makhuthwanini hills. The large diabase reef east of Makhuthwanini is described in detail by Cohen, and the upper reaches of the Mthlwa Spruit, which was crossed afterwards, was characterized by large pools of standing water. Cohen gives a vivid description of the lovely surroundings and game species (among others, giraffe) along the last portion of the route before reaching the Crocodile River.

During June 1889 the Swiss missionary, Henri Berthoud of Valdézia mission station at Spelonken, and an assistant H.E. Schlaefli, undertook a journey on foot to Moçambique and in the process traversed a large portion of the north-central area of what is today the Kruger National Park. Schlaefli (1889) kept a diary of their journey which makes interesting reading. The route they followed led straight to the east from Thabina and followed the Murchison range for about 30 kilometres to Spitzkop, north-east of Leydsdorp. From here they travelled south-east to the Selati River and followed it to its confluence with the Olifants River. They found the Selati River full of water. On reaching the Olifants River they were unable to cross in view of the depth of the water and had to follow its course along the north bank to a place called Phamahomo (near the confluence of the Tsutsi Spruit with the Olifants) and only there found a drift shallow enough to cross. They decided to continue on the north bank however, and finally crossed the Olifants River between its confluence with the Ndziyo and Timbavati tributaries. The tributaries of the Olifants on the northern side had only pools of water but both the Ndziyo and Timbavati rivers were running streams and had to be forded. After crossing the Timbavati they followed the age-old trading foot path that led over the Lebombo Mountains at Pumbe. Along the way they crossed the Ngotsa,