CHAPTER 3
GENERAL METHODS

Fieldwork details

This section only describes the fieldwork methodology of the study. The analytical phase is presented in each relevant chapter. The research was conducted in northern Maputaland in the Tembe Elephant Park (Tembe) and the community of Manqakulane.

Timeline

In the present study, fieldwork was conducted over two periods. The first period was during 2001 from January to June, when 48 plots were sampled in the Tshanini Community Conservation Area (Tshanini) and 25 plots in Tembe to describe the distribution and abundance of hardwood species as part of a Masters research project by the author of the present thesis. While many other aspects were evaluated during the remainder of the 2001 research phase (July – December) only the data on abundance and distribution of woody species of Tshanini and Tembe were re-analysed within the present study, along with new data collected during the 2004 fieldwork period.

In 2004 the Manqakulane village zone (Manqakulane) was sampled. From March to April, 42 plots measuring abundance and distribution of woody species as well as parameters of vegetation utilisation by herbivores or people were surveyed and from May to October 141 plots were sampled in Tembe, 107 of which measured vegetation utilisation by herbivores in addition to standard woody species abundance and distribution information.

Plot placement in the field

While it was relatively easy to travel wherever required by vehicle or by foot outside Tembe, vehicle movements inside the park were restricted to management roads and movement on foot was prohibited unless accompanied by an armed ranger. Unfortunately, due to financial constraints and particularly dire conditions faced by the Tembe management, it proved difficult to impossible to obtain armed rangers when required and plot locations in Tembe were therefore restricted to the areas accessible by the road network. Therefore and for safety reasons due to the dangers associated with working in a “Big Five” environment inside Tembe, the park manager suggested restricting plot placement to areas alongside the road network of the park. The plots in Tembe were placed at least 50 m away from little-used management tracks and at

least 100 m away from more established tourist tracks to avoid road-induced bias as much as possible. The southern section of Tembe is relatively well covered by the road network and therefore fairly well represented in terms of surveys (Figure 1). However, the northern section is less extensively accessible and could not be sampled in the same detail as the rest of the park (Figure 1).

In the Manqakulane community village zone (Manqakulane) and in Tshanini, driving and walking were allowed anywhere as long as prior permission was obtained from either the steering committee or the head of the household using the land. Due to the exceptionally dense vegetation, plot placement was restricted to sites along the sandy track network, except in the western section of Tshanini where it was possible to travel through the open and sparse woodlands (Figure 2).

In Manqakulane and Tshanini, all sandy tracks were narrow (Figure 3) and were seldom used by vehicles. Mostly pedestrians and sometimes cattle-drawn carts use these tracks. Some vehicles were using the tracks getting from Manqakulane to Tshanini in 2004 as the fence lines for the reserve were being cleared to install the game-proof fence around Tshanini. In Tembe tracks were better-defined and designed for vehicles use (Figure 4).

Plot layout

Once on site, the exact geographical coordinates (map datum: WGS 84, Lat-Long coordinates) of the midpoint of the rectangular plot was recorded by using a Global Positioning System (GPS) device. Plot numbering followed a standard increasing count preceded by a coded suffix indicating the general location, season of the year, and purpose of the plot. For example, TWALL stands for Tembe, Winter, All purposes, where all purposes refers to surveys which included the evaluation of the vegetation utilisation by herbivores. The accuracy of the GPS unit was set to maximum, and averaged 4.5 m for the plot's midpoint coordinates. Plots were laid out by using a knotted rope with knots tied every metre (Figure 5). The fieldwork sampling was designed to gather a similar amount of information in all plots. Therefore, plot length and width were determined for each vegetation unit and varied between units. Some adjustments were made in the field based on a visual assessment of the general density of woody species while laying out the rope and the number of data sheets filled while walking the plot. The plot length and width varied from a minimum of 15 m by 2 m in length and width respectively in an extremely dense Short Sand Forest patch to a maximum of 100 m by 19 m in sparse woodland. The general direction, exact length

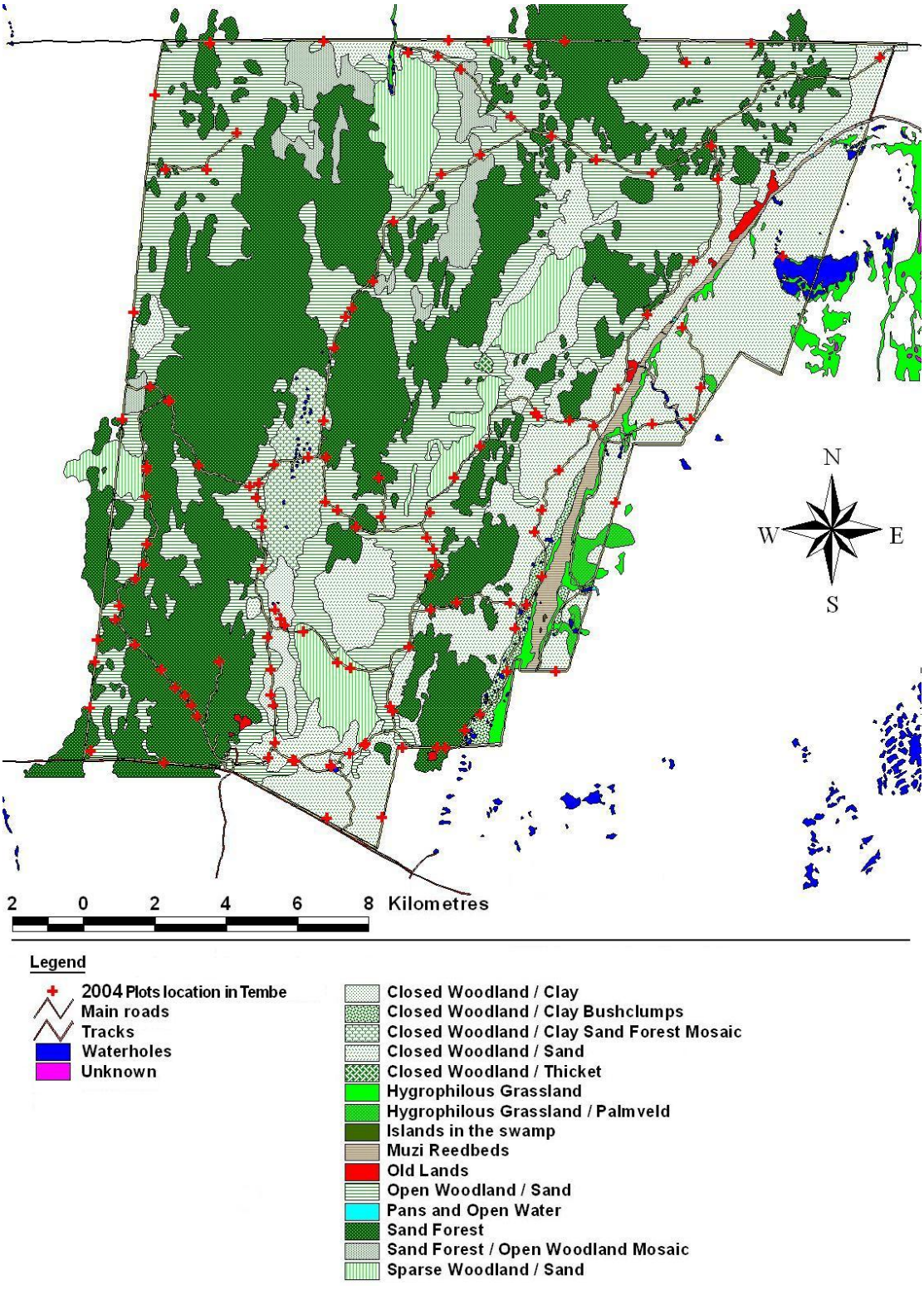

Figure 1: The location of 2004 survey plots in Tembe Elephant Park, Maputaland, northern KwaZulu-Natal, South Africa (map adapted from Matthews *et al.* 2001).

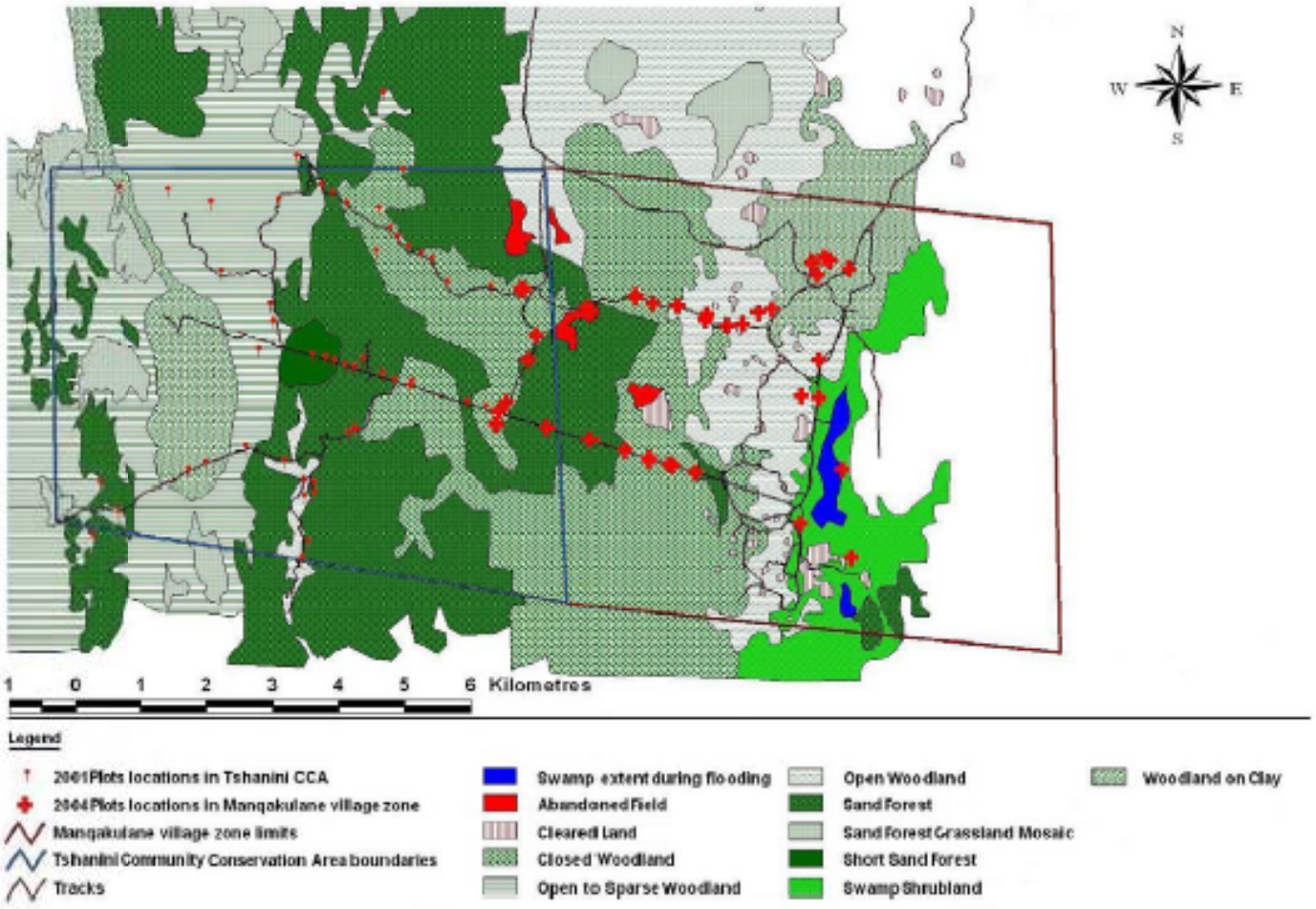

Figure 2: The location of 2001 survey plots in Tshanini Community Conservation Area, and 2004 survey plots in the village zone of the community of Manqakulane, Maputaland, northern KwaZulu-Natal, South Africa (map adapted from Gaugris 2004).

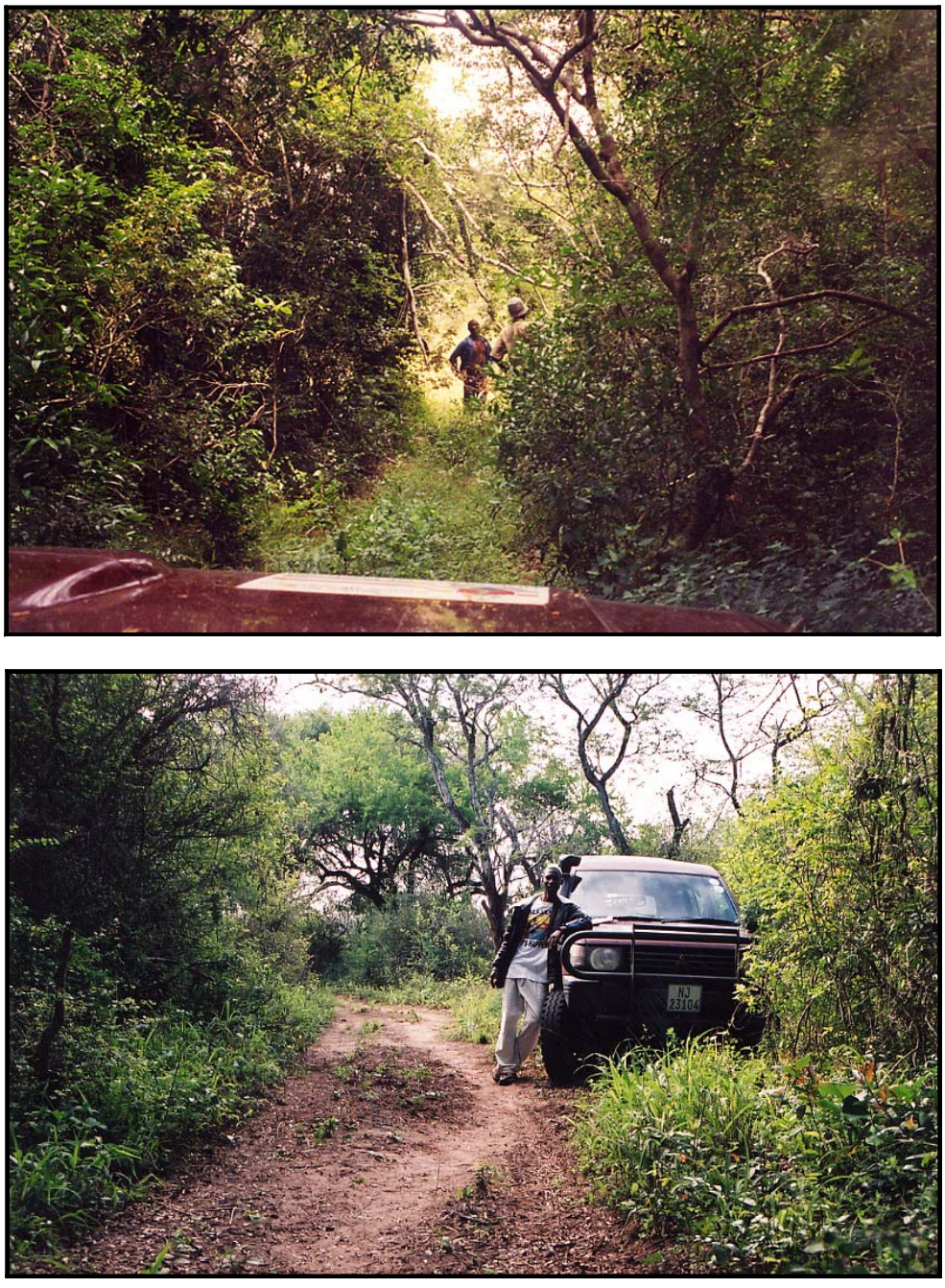

Figure 3: Aspects of the sandy tracks in the community of Manqakulane during surveys of 2001 (top) in Tshanini Community Conservation Area, and surveys of 2004 (bottom) in the village zone. Photos by J. Gaugris: Maputaland, northern KwaZulu-Natal, South Africa.

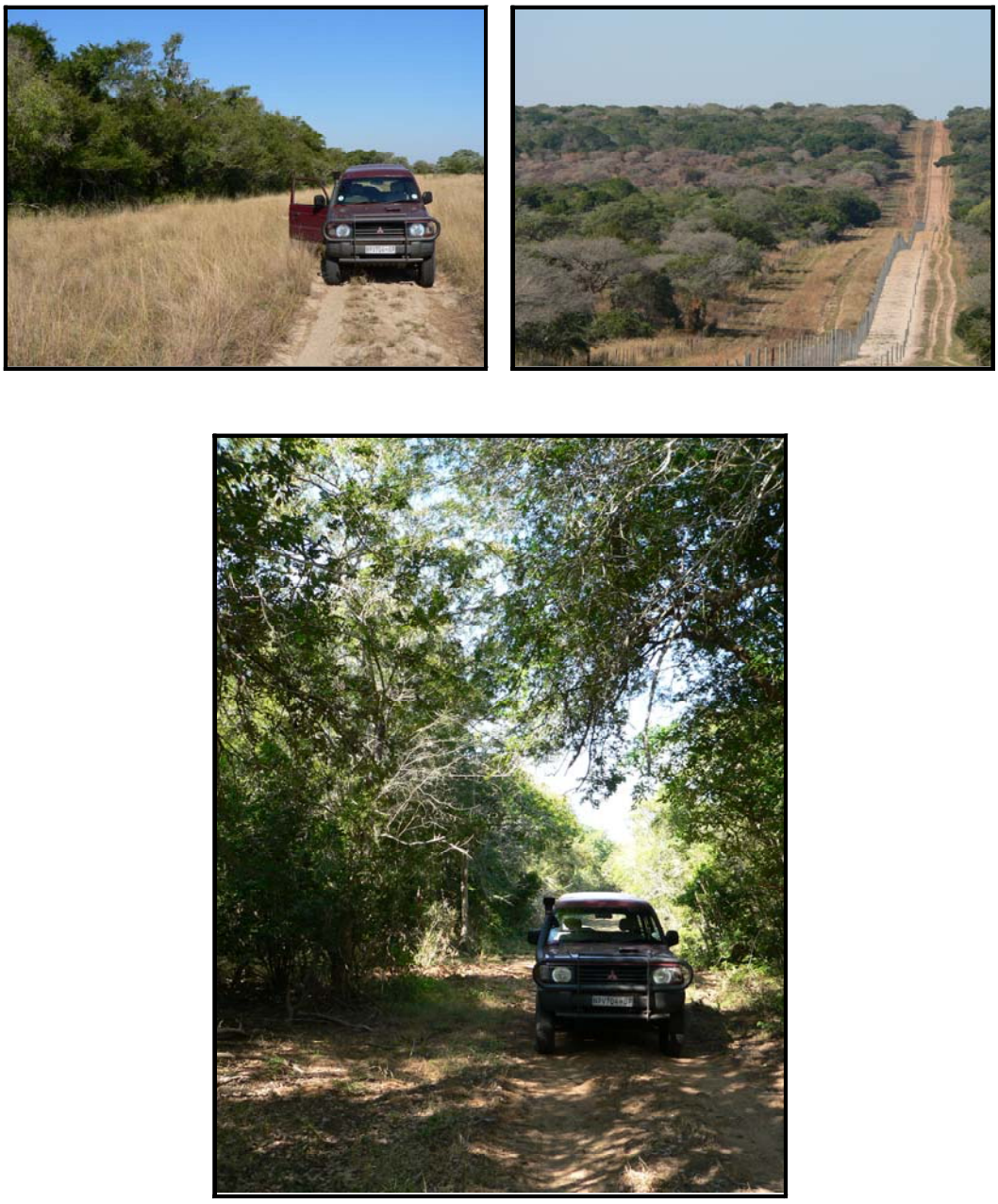

Figure 4: Aspects of vehicle tracks in Tembe Elephant Park. A tourist track in the western sparse woodland section (top left), a management track along the northern fence line with Mozambique (top right), note Mozambique to the left of the fence in the picture, and a tourist track through a Tall Sand Forest patch (bottom). Photos by J. Gaugris: Maputaland, northern KwaZulu-Natal, South Africa.

Figure 5: Laying out a plot in Tshanini Community Conservation Area during the surveys of 2001. Photo by J. Gaugris: Maputaland, northern KwaZulu-Natal, South Africa.

and width of the plot were noted. Following the environmental regulations of Tembe, no permanent plot marking was done. Therefore, a small descriptive sketch of the prominent features encountered along the plot was drawn to ensure some degree of repeatability in the future. The plots were walked on the one side of the rope first, measuring all woody individuals rooted within a set distance from the rope, regardless of the size of the individual. On the return leg, the other side was walked, measuring all woody individuals rooted within a set distance from the rope but measuring at least 0.4 m in height.

Measurements

In the present study only woody species were measured. Woody plants were defined as all plants with an erect to scrambling growth form and with a ligneous trunk. This definition therefore included some liana.

All woody individuals that met the above criteria encountered in the plots were recorded, identified (genus and species) and measured. The numbers of live and dead stems were counted and their diameters measured at the point where the stem becomes regular above the basal swelling. This was done using vernier callipers for plants with diameters up to 20 cm, for larger plants three graduated plastic rods held at right angles in such a manner as to form a large calliper were used instead. The tree height and the height to the base of the canopy (defined for the purpose of this study as the height where the larger lowest branches were found) were then measured, followed by the widest canopy diameter (D1) and the diameter of the canopy perpendicular to it (D2). Largest lower branches were regarded as the first branches supporting at least 10% of a tree's overall canopy. Standing dead trees were also measured, while fallen dead trees were tentatively reconstructed to give an estimate of the size and space occupied by the tree before it died and fell. The researcher and his assistant trained themselves to reliably gauge tree height in various environments prior to sampling in order to ensure the constancy and reliability of the measurements. Tree height was measured by using gradated plastic rods that can be set together to form a total length of 6 m (Figure 6).

In the plots evaluating the herbivore utilisation of the vegetation, each woody plant measured was also evaluated for signs of herbivore utilisation or natural damage. Akin to writing the history of the utilisation for each measured plant, any alteration or damage to the tree as a whole (canopy, trunk and roots) was labelled, described, and quantified by age class. For each utilisation episode, an index of canopy removal at the time of damage was estimated to indicate how much of the canopy was removed at the

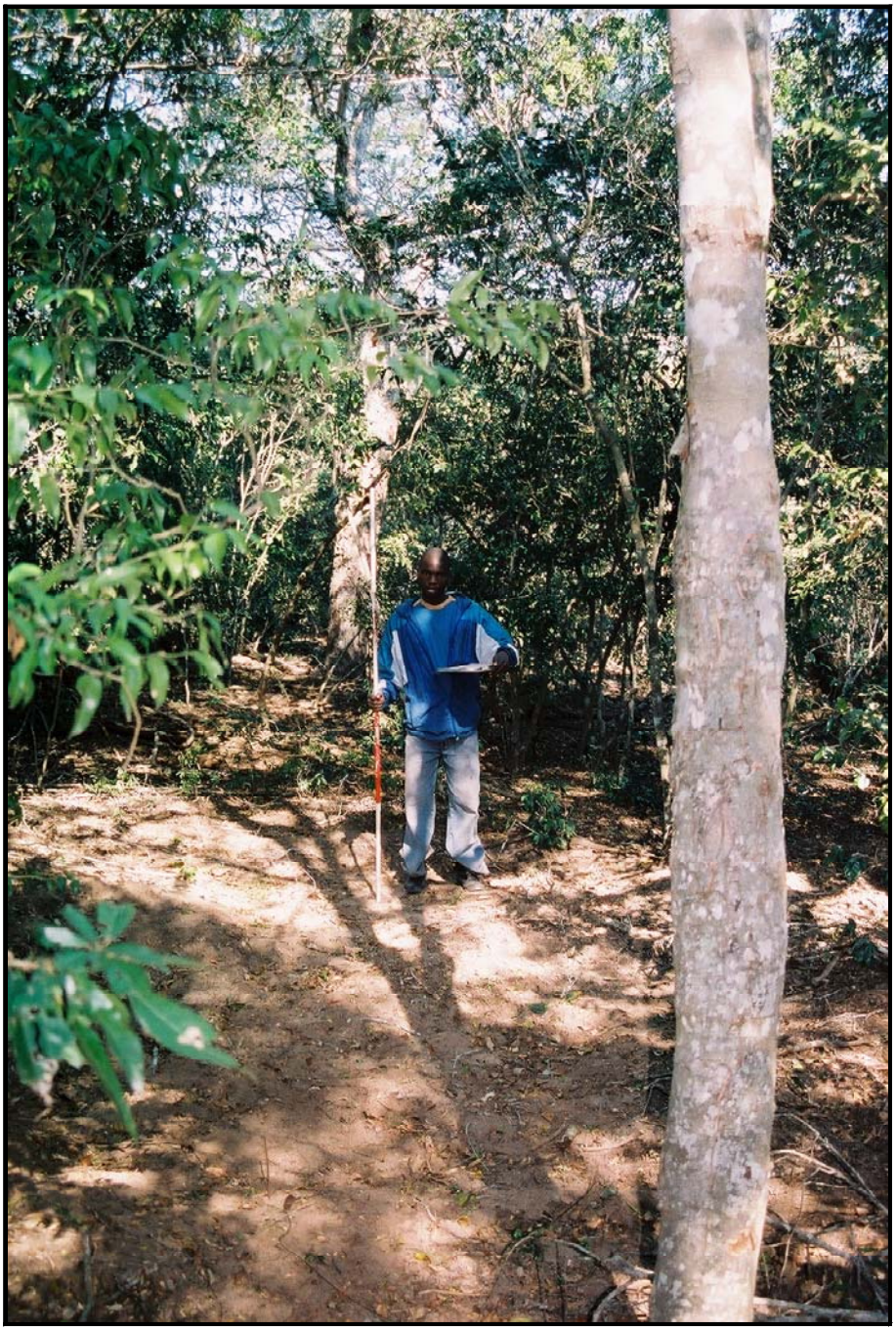

Figure 6: Measuring tree heights in a small elephant refuge (see Shannon 2001) in a Sand Forest patch of Tembe Elephant Park during the surveys of 2004. Note the ground cleared by elephant trampling. Photo by J. Gaugris: Maputaland, northern KwaZulu-Natal, South Africa.

time of the utilisation. Whenever possible, the agent responsible for the utilisation episode was identified to its species. While elephant *Loxodonta africana* (Blumenbach 1797) damage was easily recognised, the identification of other species often proved impossible, and the class of agent responsible for the damage was noted instead. The other herbivores were classified in four classes ranging from: insects, small herbivore mammals, medium herbivore mammals and large herbivore mammals. Human-related utilisation and natural damage were usually the most recognisable events during the field surveys, although the latter proved unclear once the analysis was over. Personal judgement of the researcher based on discussion with his assistant was used to define all these criteria.

Data capture in the field

The fieldwork team consisted of three people. The researcher and an assistant measured the plants and evaluated the utilisation by herbivores or man and the third person captured the data directly on site using a notebook computer. A portable table and chair allowed this person to capture the data comfortably in the field, and to follow the researcher and his assistant within the plot (Figure 7). This method saved a considerable amount of time and allowed on site data checks to be made and therefore considerably reduced the chances of data input errors frequently associated with capturing the data from survey sheets. The data were entered directly in Microsoft Excel spreadsheets designed for these surveys. Battery life shortcomings of notebook computers were overcome by using a portable power supply that could be recharged at the research facility every evening.

Maps and vegetation units described

As a result of the fine-scale mosaic character of the vegetation the units within which the plots appear on the maps, they do not always correspond with their present allocation. Rather than using the maps, the description of the vegetation communities made by Matthews *et al.* (2001) and Gaugris *et al.* (2004) were used to define the units within which the plot should be classified.

Fieldwork phase, important aspects and the lighter side

Doing fieldwork in northern Maputaland was not always easy. The dense to virtually impenetrable vegetation is for one extremely unsuited to such practice. The sight of a thick wall of green leaves when contemplating where to set out a line for the plots was sometimes very discouraging and made one wish for having chosen a

Figure 7: Portable office in the middle of Tembe Elephant Park during the surveys of 2004. Due to the presence of a group of elephants nearby the data capture person remained near the vehicle in case a speedy retreat would have been needed. Photo by J. Gaugris: Maputaland, northern KwaZulu-Natal, South Africa.

research site where tree density was measured in single digits per square kilometre. The animals (in decreasing order of annoyance: ticks, wasps, ants, caterpillars, elephants, lions and buffaloes) were most unfriendly and never missed an opportunity to give the team a harder time, especially when crawling through the Short Sand Forest.

This should not detract from the fact that northern Maputaland is a magnificent place and doing fieldwork in this region was a pleasure for most of the time. From the friendly people to the beautiful landscapes and amazing wildlife (especially when observed from a comfortably safe distance), the fieldwork phase was a thoroughly enjoyable experience and a great learning curve for the whole team. Some aspects merit further mention and are presented below.

The assistants

The present study would not have been as thorough and complete without the invaluable input from two exceptionally knowledgeable young men from the Manqakulane community. Thabani and Sabelo Mthembu are brothers and were the field assistants for the 2001 and 2004 surveys respectively. Their skills at identifying and recognising local trees as well as signs of various animals in the bush were of exceptional help. These field research phases provided them with a working and training opportunity and allowed them to interact with a mix of cultures and genders un-habitual to them and thus broadened their views considerably. Besides the enjoyable aspect of a meeting and understanding a different culture, the value of working with local people in the field cannot be ignored and allowed a great wealth of additional information to be collected. Their eye for detail in the field is nearly beyond the limits of understanding.

Caroline Vasicek played the un-envious role of data capture assistant during the 2004 fieldwork phase. My companion, friend and fellow researcher endured stressful moments behind the notebook in some of the most inaccessible places of Tembe Elephant Park. Capturing all the information directly in the field saved considerable time, allowed the addition of many comments on the spot that later helped to refine the analysis, but also avoided many errors. This method of data recording is recommended whenever it is safely and logistically possible.

Time and field encounters

Research in Maputaland during the 2001 surveys was greatly affected by the abundant rainfall that year, and took much longer than expected as many days and

sometimes weeks were written off due to rain. Even when the rain had stopped it was sometimes necessary to wait an additional day or two for the vegetation to dry up a bit, thereby avoiding much unpleasant time spent crawling through wet bushes. The 2004 surveys were not too affected by rainfall, but the safety factors of working in a park where large and dangerous animals occur did sometimes take a toll. Some sites had to be visited several times as the team was kept off by various animals that did not take kindly to sharing their space with three noisy (as noisy as possible) people, especially around water holes and the Muzi Swamp. Noise was identified as a good helper to keep animals aware of the team's presence and to avoid any further interactions. Working noisily kept the peace most of the time, only on three occasions was a speedy escape needed from a total of 141 potential sites for encounters sampled in 2004. Working silently led to trouble at an alarming rate, and required a sometimes un-elegant escape on seven of 25 surveys sites of 2001.

Of distances, coffee breaks, food, vehicles and how it affects time, and money

Over the two study periods, an average of 51.22 km was driven every day for what amounted to 11 months in 2001 and nine months in 2004. Accommodation had to be paid for these periods for the researcher and his assistants. Coffee breaks were highly needed after every two plots sampled (Figure 8), and so were regular snacks. Snacks had an additional value for the local assistants. People in the northern Maputaland region cannot afford to eat more than one meal per day, and in most cases this meal is rarely nutritious enough to fulfil the body's dietary and energy requirements. When working in the rural community the effect of the lack of food was initially not noticeable as workdays rarely exceeded six hours and the assistants stayed home afterwards. However, when the distance from the community increased, the duration of workdays often exceeded six hours and the assistants could not cope with their usual food intake. While having regular snacks appears common sense to most, small but rich and sweet snacks were needed in addition to a solid breakfast and large lunches and dinners to keep Thabani and Sabelo through a normal day's work of a regular well-fed person. The vehicle used did not break down (thankfully) and saved the team long walks, but driving in the community area, off, but especially on roads meant many punctures. The people have a peculiar way of cutting down trees along the tracks, but leaving the stumps with sharp edges at exactly the right angle to pierce

Figure 7: A mid-morning coffee break after emerging from a sample plot in the Sand Forest of Tembe Elephant Park during the surveys of 2004. Photo by J. Gaugris: Maputaland, northern KwaZulu-Natal, South Africa.

straight through even the most robust tyres. All these aspects can be summarized by the fact that research takes time, and as the adage goes, money. The cost of doing extensive fieldwork research should not be underestimated.

References

Gaugris, J. Y., W. S. Matthews, M. W. van Rooyen and J. du P. Bothma (2004). "The vegetation of Tshanini Game Reserve and a comparison with equivalent units in the Tembe Elephant Park in Maputaland, South Africa." *Koedoe* 47: 9-29.

Matthews, W. S., A. E. van Wyk, N. van Rooyen and G. A. Botha (2001). "Vegetation of the Tembe Elephant Park, Maputaland, South Africa." *South African Journal of Botany* 67: 573-594.