

## CHAPTER 3

### GENERAL METHODS

#### Introduction

Some chapters in this dissertation are written in journal article format. Those that are written in this manner follow the style of the publication for which they were intended. The overall style of the dissertation follows the format of the *South African Journal of Wildlife Research*. The pages in the dissertation are numbered sequentially, but figures and tables are numbered as they appear in the prepared articles. The figures illustrating the climate data and location of the study area are repeated in some of the chapters. It was necessary to include them each time for the prepared journal articles. The specific methods used are explained in the journal articles as well as generally in this chapter. The references cited at the end of the dissertation are prepared according to the style of the *South Africa Journal of Wildlife Research*.

#### **The response of *Phragmites australis* to harvesting pressure in the Muzi Swamp of the Tembe Elephant Park, South Africa**

The reed beds in the southern section of the Tembe Elephant Park were sampled in a south to north direction 300 m from the gate at KwaMsomi Scout Camp for approximately 1 800 m, ending near the Umjangazi area. Harvesting sites were set out 30 m away from perceived edge of the reed bed to prevent any ecotonal effect that might arise from competition between reeds and the hygrophilous grassland community. Thirteen harvesting sites were selected and referenced using a Global Positioning System (GPS). Six quadrates at each harvesting site were destructively harvested using a square 1 m<sup>2</sup> frame.

The quadrates were set out in a rectangular pattern about 5 m from each other. Throwing the square behind the harvester ensured the random placement of

quadrates. All the reeds within the frame were harvested at water level, or at ground level in the absence of water, using secateurs. The mass (kg) of the reeds that were harvested in each quadrat was determined using an empty grain sack and a spring balance. The spring balance was calibrated to zero with the grain sack attached to get an accurate reading. The stem diameter (mm) and reed height (m) were measured for each individual reed. The stem diameter was measured at the base of the cut reed using callipers. The reed height was measured by using a tape measure, measuring from the cut stem base to the outstretched apical leaf blade. The water level at each harvesting site was added to the mean reed height. The number of reeds harvested per harvesting site was counted to determine the reed density per  $\text{m}^2$ .

Evidence of harvesting by reed cutters was estimated in two-monthly intervals. Environmental factors such as degree of trampling by man and animals as well as the water depth were noted. The water depth at each quadrat was calculated using a metal dropper attached to a thin aluminium plate (approximately  $0.10 \text{ m}^2$ ). The aluminium plate prevented the metal dropper from penetrating the soft peat, which would exaggerate the water depth. The mean height (m), diameter (mm), density per  $\text{m}^2$  and yield (kg per  $\text{m}^2$ ) of reeds produced were calculated for each quadrat. The mean mass per reed (g) was calculated by dividing the biomass of the reeds by the number of reeds per  $\text{m}^2$  of each quadrat.

The various means were plotted against distance to check for a possible degradation gradient in a south to north direction. The frequency distribution of reeds encountered in various height and diameter classes were plotted against distance away from the starting point. The reed characteristics at the various harvesting sites were compared using an Analysis of Variance (ANOVA), Bonferroni test of the Statistica 6 computer package (Statsoft Inc., Tulsa, Oklahoma, U.S.A).

## **The long term effects of burning and utilisation on *Phragmites australis* reeds in the Muzi Swamp, of the Tembe Elephant Park, South Africa**

Harvesting sites that had been sampled in 2000 were revisited in 2002. The areas that had been sampled in 2000 were part of a project conducted by the Botany Department of the University of Pretoria (Tosh 2000) to determine the effects of human harvesting and burning on *Phragmites australis* stands. These areas, prior to 2000, had undergone four different treatments, these treatments were: (i) utilised and burnt, (ii) utilised and unburnt, (iii) unutilised and burnt, and (iv) unutilised and unburnt. Six 1 m<sup>2</sup> quadrates were harvested at each of the four various harvesting sites in 2002. Burnt and unburnt sites with a specific utilisation regime were selected as close as possible to each other to avoid any differences that might occur through environmental variation.

All the reeds within a square 1 m<sup>2</sup> frame were destructively harvested using secateurs. Reeds were cut at water level, or at ground level in the absence of water. The mean water depth was added to the mean reed height at each harvesting site to get a more accurate indication of actual mean reed height. The mean water depth was determined by using a metal dropper attached to a thin aluminium plate. The basal stem diameter (mm) and the reed height (m) was measured for each reed harvested.

Results were analysed using a multifactor analysis of variance (ANOVA) with the General Linear Model of the Statistical Analysis Systems (Statistics Version 6. SAS Institute Inc. Cary, NC., USA.) computer package at  $\alpha = 0.05$ . Fischer's protected least significant difference (LSD) test was used to determine significant differences between means.

**Towards the development of a sustainable use management strategy for the Muzi Swamp, Tembe Elephant Park: an examination of trends in *Phragmites australis* reed use in the Sibonisweni Community**

A trained interviewer conducted discussions with a representative from each of the 170 households within the Sibonisweni Community, with the questionnaires being completed by one member of each household. The interviewer was a Zulu-speaking member of the local community and as such the members of the community were quite willing and responsive during the survey process. The use of a local interviewer was found to be less intrusive than using an outsider. The questions were based on information obtained during the interview stage of the study. It is important that the researcher first gains an insight into what aspects of the study are important to the respondents before posing quantitative questions to them (Pratt & Loizos 1992). Although such questionnaire data are not statistically significant because of the non-random character of the sample (Pelto & Pelto 1978) the aim of the present study was not to do a statistical analysis, but merely to quantify the qualitative data obtained during the study. The data from the questionnaires were analysed by using the SPSS (Statistics Package for the Social Sciences) for Windows® (Standard Version 11.5.0. SPSS Inc. South Africa) computer package.

With the help of a local assistant to act as a translator the researcher was able to conduct interviews with members of the Sibonisweni Reed Cutters Association. Interviews were semi-structured, having predetermined questions as well as interactive conversation. Several of these qualitative data were used to structure the questions in the household survey. Some questions had to be structured in such a way as to confirm interviewee answers. These questions were basic, with the interviewer already knowing the scientifically correct answer. This was to make certain that answers were honest and not what the interviewees perceived the researcher wanted to hear. The local community members do not favourably accept

research into the reeds in the Muzi Swamp as they believe that any findings will have a negative influence on their harvesting quotas. It was made clear that the research was done on behalf of an independent organisation without a vested interest in the outcome of the study.

### **The development of secondary industries through the sustainable utilisation of reeds and forest timber in the Tembe Elephant Park, Maputaland, South Africa**

Baseline data pertaining to the extent of use of forest timber by local rural communities was obtained during a previous study (Gaugris 2004). The number of harvestable units, or poles, in the size classes preferred by local communities was determined for the Sand Forest plant community within the Tembe Elephant Park. This data was obtained by subtracting the total area of Sand forest in the Tembe Elephant Park available by the minimum area to be set aside for conservation as well as the areas that are less than 200 ha in extent. The number of harvestable poles available in the benchmark Sand Forest vegetation was halved for the Tembe Elephant Park because of the unknown utilisation impact of large herbivores.

Quantitative data with regard to the number of reeds needed to construct a house of a certain dimension (2 x 4 x 2 m) was obtained from questionnaire surveys. These data were then used to extrapolate the required building materials needed to construct a reed hut made from prefabricated reed and forest timber panels. The panels would be 2 x 2 m in dimension and would be three layers of reeds thick. The panels' frameworks were to be constructed out of the harvested forest timber and some additional sundries explained in Chapter 7.

The building methods in this chapter are based on qualitative information obtained during the research phase of both studies. Although the explanations are hypothetical in that the authors have not yet constructed the prefabricated panels *per*

se, we feel that they are sound because local rural community members are currently implementing similar building methods (Gaugris 2004).

## References

- GAUGRIS, J.Y. 2004. Sustainable utilization of plants in the Manqakulane Conservation Area, Maputaland, KwaZulu-Natal. MSc (Wildlife Management) Dissertation. University of Pretoria, Pretoria.
- PELTO, P.J. & PELTO, G.H. 1978. Anthropological research: the structure of inquiry. Cambridge University Press, London.
- PRATT, B. & LOIZOS, P. 1992. Choosing research methods: data collection for development workers. Oxfam, Oxford.
- TOSH, C. 2000. The effect of human harvesting on the height and diameter of *Phragmites australis* in Tembe Elephant Park. Project, Department of Botany, University of Pretoria: Pretoria.