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An ecological evaluation of the sustainability of bark harvesting of medicinal plant species in the Venda region, Limpopo province, South Africa

by

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Submitted in fulfillment of the requirements for the degree

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In the Faculty of Natural and Agricultural Sciences

Department of Plant Science

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Dedication

This work is dedicated to my biological parents, Tshamano Sarah and the late Maanda Andries Tshisikhawe.

DECLARATION

I declare that the thesis, which I hereby submit for the degree of Philosophiae Doctor (Department of Plant Science) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

SIGNATURE:…….

DATE:…….

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The study evaluated the extent and threat of bark harvesting of plant species for medicinal purposes in the Venda region and investigated possibilities of the sustainability of these practices. Approximately 30% of the woody plant species in Venda were found to have medicinal properties in their bark, but only about 12% of these species are commonly traded in muthi shops in the region. Fifty-eight medicinal plant species are commonly harvested for medicinal properties in their bark and found in muthi shops in the region. These 58 species were scored for the possible threat of bark harvesting to the species' survival using 20 ecologically relevant plant population traits. The most vulnerable species were *Adansonia digitata, Adenia spinosa, Albizia adianthifolia, Albizia versicolor, Brackenridgea zanguebarica, Croton megalobotrys,* and *Warburgia salutaris.* Of these species *Brackenridgea*

zanguebarica and *Warburgia salutaris* are amongst the ten most traded medicinal plant species in Venda region.

Elaeodendron transvaalense and *Brackenridgea zanguebarica*, the two species investigated in detail in this study, were amongst the most commonly traded medicinal plant species in Venda region. Analysis of size class distributions showed that both species had growing and healthy populations, exhibiting J-shaped population curves, centroids left-skewed from the midpoint of the size class distribution, and a fine-grained status. However, size-class distributions in both species revealed certain classes that needed monitoring since they were negatively affected by bark harvesting. Adult individuals of *B. zanguebarica* showed a high degree of bark regeneration as a response to bark removal from medicine men. The crown health status of *E. transvaalense* was generally good although some individuals, contributing 9% of the sample, had dead crowns. A linear relationship was noticed between areas harvested and stem circumference, which is understandable considering the large surface area of harvestable bark on bigger individuals. Matrix modeling of *E. transvaalense* revealed that the vegetative stage should be targeted for management action.

An assessment of the adequacy of the Brackenridgea Nature Reserve, an initiative aimed at protecting *Brackenridgea zanguebarica,* revealed that the reserve size is not enough for conservation of a viable population. The method flagged out potential growth habitat for *B. zanguebarica* around the current reserve, which could be incorporated to enlarge the conservation area, which could be incorporated to enlarge the conservation area. Four different scenarios were analysed on how best to conserve the species. Assuming a 50% reduction in human-related activities, such as

cultivation, harvesting and livestock grazing, it is recommended that the reserve be enlarged from its current 110 ha to 366 ha to maintain a viable population into the future.

Finally, the study recommended the adoption of an integrated approach to achieve sustainability of bark harvesting in the Venda region. Only by selecting best practices from both indigenous and conventional conservation techniques will the conservation of natural resources that are of important to local communities, be successful. An action plan that will involve the formation of an association by all stakeholders interested in the sustainable utilization of natural resources must be developed. The association must be governed by a constitution with a clear mission statement and the harvesting of natural resources should be done in line with a collection policy.

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