RELATIONSHIP BETWEEN WOODY BIODIVERSITY AND USE OF NON-TIMBER FOREST PRODUCTS IN THE SAVANNA BIOME OF SOUTH AFRICA

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ABSTRACT

This study seeks to combine the knowledge of science and society to elicit the relationship between the harvesting of woody plant species and the local availability of woody species in South African savannas. Ten villages located in the former communal areas and homelands within three broad vegetation types (i.e., Mixed lowveld bushveld, Eastern thorn bushveld, and Natal lowveld bushveld) were studied. The study, conducted in the framework of the coupled human-environment system poses challenges to both scientists and managers (e.g., setting common goals). Data were collected using modified Whittaker plots (MWP) and focus group discussions (FGD), denoting ecology and society, respectively. There were nine 1000m² MWP plots sampled per village, each having nested 1m², 10m² and 100m² subplots. The FGD involved six groups of local people based on gender and age. The study revealed that the harvesting of woody plant species is a source of local disturbance to woody vegetation. Generally, there were more woody species in locations farther from settlements, having a mean of 41.97 ± 3.9, than for the intermediate (38.27 ± 5.6) and near locations (19.9 ± 4.2) within the 1000m² plots, the result of the reduction in species closer to settlements from higher harvesting levels. The larger sampling plot size of 1000m² of the MWP had the highest diversity, decreasing sequentially to the smallest scale (1m²). The density of the woody species was highest in the intermediate locations (517 ± 80 plants/ha), followed by the far and near, relative to the settlements. The Natal lowveld bushveld broad vegetation type had the highest mean density of trees (573 ± 71 trees/ha) compared to the Mixed lowveld bushveld (366 ± 64 trees/ha) and the Eastern thorn bushveld (312 ± 40 trees/ha). The stem diameters of trees were generally higher in the villages of the Mixed lowveld bushveld than the other two vegetation types. The study reaffirmed that anthropogenic disturbances within savannas impact vegetation and need to be studied concurrently with other disturbance factors (e.g., biotic and abiotic or environmental). The mean total coppice shoots of stumps within the 1000m² plots was relatively higher in the near locations (38.4%), than the far (33.0%) and intermediate (28.7%). This difference in coppicing shows that although near locations were less species rich, which is a result of disturbance, the growth of shoots may nevertheless be greater. Harvesting disturbance will possibly favour the regeneration of some species, as well as the maintenance of biodiversity. Whilst 135 woody species (from a total

191 from 42 plant families) sampled in the field were used by the local people, the community knowledge yielded almost twice as many (267 species, from 69 plant families). The ratio of mean useful woody species to total woody species remained relatively constant at about 1.0:1.1 from the near to far locations around the villages and accompanied by increased woody species diversity with distance from village. The MWP sampling yielded eight broad use categories (i.e., medicinal, wild edible fruits, fuelwood, housing and fencing poles, craft (e.g., carving), cultural, local beverages (e.g., alcohol)), and nine for the FGD (the eight for the MWP plus indigenous furniture). According to the local people, the highest number of species was used for medicine (27.8% of species), followed by fuelwood (19.2%) and wild edible fruits/seeds (19.1%). Over half of the species had multiple uses (i.e., three to eight uses), raising questions of possible threats to their persistence. Useful woody species were not restricted to any particular location or vegetation type. Large sized trees were subjected to even more uses than smaller trees, another source of conservation concern. Fifteen of the woody plant species are presently protected by law in South Africa (e.g., *Adansonia digitata, Podocarpus latifolius, Mimusops caffra, Philenoptera violacea*), while others are facing various forms of regional threats (e.g., *Alberta magna, Catha edulis, Ocotea bullata*). There is the need to popularise and make people (both local and outsiders) aware of the state of NTFP species, using local and village level information as an additional criterion for describing conservation threat (e.g., proposed "Locally Brown List" – Chapter 4). The older generation of local people were highly knowledgeable in terms of the woody species used for medicine, craft, fencing and housing poles, the middle aged in beverage making species, and the younger generation in fuelwood species. Overall, older males were highly knowledgeable of the useful species. The generally strong correlation ($r = 0.99$, $p < 0.0001$) between the cumulative woody species diversity from field and community knowledge suggests the need to integrate data using multi-disciplinary approach and also to manage NTFP species. Although threat reduction assessments (TRA) and monitoring have previously been suggested, the participation of local people, harvesters and users will be crucial in making TRAs effective. In conclusion, the harvesting of NTFPs, and the impacts of the changes in the NTFP species on total diversity in savannas need to be understood in order to move towards a more holistic approach to conserving the woody species that may be at risk of extinction through harvesting. Disturbance criteria that describe harvesting levels should be set to guide research and management protocols. Finally, when discussing NTFPs and the species from which they are harvested, management should aim at incorporating all the factors that affect sustainability, such as land and resource tenure and local participation, the political economy, appropriate production and development cycles.