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Developing an Operational Method for Assessing Forest Resources in *Abu Haraz* Reserved Forest in Kordofan, Sudan

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Abstract

Forest resources in Sudan play different roles in characterising the ecological and environmental changes as indirect benefit and satisfy a wide range of needs for the rural population (food, shelter, energy, income). The area under forest reserve is five million hectares, which is equivalent to 2.2% of the total area of the country. Forests in Sudan contribute to 82% of the total energy consumption in the country. Due to decline in forest resources in Sudan and the expected bad consequences, quantifying and appraising of the existing resources and their sustainable management is needed. The aim of the research is to develop an operational method to assess the forest resources in *Abu Haraz* natural reserved forest in Kordofan using cluster sampling method. *Abu Haraz*, which is selected as the study area, is the biggest natural reserved forest in Kordofan and located in low rainfall woodland savannah. Six systematic cluster sampling were used and distributed in the forest with equal distances. Each cluster covers an area of 60 ha, and includes 25 circular sample plots. Tree parameters such as tree specie, diameter, height, crown diameter were collected from trees with $dbh \geq 7$ cm. Step-wise regressions was used for developing the operational equations of tree species. Results showed that the reserved forest is dominated by two species, *Albiza amara* and *Lannea humilis* with 34% and 46%, respectively. The density of the trees is found to be of 37 trees ha^{-1} , volume is 24.13 $m^3 ha^{-1}$ and basal area is 2.25 $m^2 ha^{-1}$. 72% of the growing stock is found in diameter class between 27–31. Two equations were developed for the dominant species using volume as dependent variable and height and diameter at breast height as dependent variables. The sampling error and intracluster correlation coefficient error were found to be $\pm 10\%$ and 0.07, respectively. The study concludes that the forest is under heavy pressure of local use so a management plan must be formulated in order to reduce the degradation of the area.

Keywords: *Abu Haraz*, cluster sampling, forest reserve, step-wise regression