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## Forest resource base and land use land cover dynamics in the Elgo sub-basin, southern Ethiopia

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### Abstract

The study aimed to investigate the small-holder farmer's dependency on forest products and the dynamics of forest resource base as a domain of land use land cover (LULC) changes that occurred between 2000 and 2021. A total of 240 household interviews and 5 focus group discussions were conducted in 12 villages of the catchment, an area where forest landscape restoration (FLR) intervention takes place since 2018. A hybrid of land cover signature and maximum likelihood algorithm was used to classify a total of 6 LULC classes. Overall, farmers are highly dependent ( $X^2 - 57.5$ ;  $P = 1.4e-10$ ) on forest products, specifically tree biomass for energy consumption than other alternatives such as electricity, crop residues, and cow dung. Tree and bamboo products mainly used for construction, energy, and furniture are identified. These products are mainly collected from remnant natural forests > woodlots > agroforests. The latter two are the dominant farmers-managed practices even with a high tendency of expansion. Farmers are integrating an average of tree seedlings  $2356 \pm 1200$   $0.5 \pm 0.2$  ha area converted into a tree-based farming system between 2018 and 2022. Here, the spatial distribution of these planted trees is higher ( $3174 \pm 2140$ ;  $p = 0.004$ ) in the higher elevated areas of the catchment. *Eucalyptus* spp, *Cordia africa*, *Mangifera indica*, *Cuppressus lusitanica*, and *Juniperus procera* are the leading tree species. As construction and energy ( $X^2 - 135.57$ ;  $P = 2.2e-16$ ) are the leading purposes of these tree-based practices, it vividly dictates the farmers' choice of tree species. To correlate the survey findings, LULC maps are created for the years 2000 and 2021 with overall accuracy of 67.2% and 72.3, and Kappa coefficients of 0.57, and 0.66 respectively. Reduction in areas is observed in grassland (90.5%), bare land (55.8%), and heterogeneous agriculture (26%), in contrary arable land, water bodies, and forest lands are increased by 91.1%, 59.8%, and 195% respectively. The LULC changes are consent with the expansions of tree-based systems in the catchment. The implication of these tree-based systems for accessing forest products is highly noted. Thus, wider adoption of these systems by integrating the most preferred tree species is advised.

**Keywords:** Forest landscape restoration, Lake-Chamo catchment , land use land cover change