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Quantifying selective logging impacts in Central African forests using UAV imagery: from individual trees to canopy gaps

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The recently adopted EU Deforestation Regulation (EUDR) requires fine-scale verification of deforestation and forest degradation associated with timber supply chains. In Central Africa, however, region-specific data remain scarce, limiting the ability to distinguish the impacts of different logging practices and to differentiate regulatory definitions of degradation from actual ecological outcomes. This study addresses this gap by proposing a drone-based methodology to assess post-harvest impacts at the tree level. Focusing on FSC-certified selective logging, which typically removes only one to two trees per hectare, we aim to establish direct relationships between harvested tree characteristics and resulting canopy openings. Using high-resolution UAV imagery acquired before and after logging, combined with forest inventory data, canopy gaps are delineated and linked to individual trees. Gap size is analyzed in relation to species identity, tree diameter, felling conditions, forest type, topography, and crown-related traits derived from allometric equations. By identifying the key drivers of canopy opening at the individual level, this approach seeks to provide operational tools to better characterize forest degradation and support more robust monitoring frameworks under the EUDR.