

VEGETATION AND BIOMASS ASSESSMENT IN ULU KALUMPANG-MT WULLERSDORF FOREST RESTORATION AREA USING LIDAR TECHNOLOGY

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ABSTRACT

A deep understanding of forest structure is fundamental for creating and maintaining resilient and functional forest ecosystems in restoration projects. This study used field-based monitoring plots established within the 150 ha of Ulu Kalumpang-Wullersdorf restoration area to analyse its vegetative cover and biomass. Twenty-one 20-meter radius plots were established by systematic random sampling encompassing the various vegetative states of the restoration blocks. An Unmanned Aerial Vehicle, together with a three-return LiDAR system, was used to capture the aerial coverage of the restoration blocks. The data was further analysed for its vegetation cover and stratum and linearly regressed with field aboveground biomass calculated from the monitoring plots to develop a biomass model for the whole site. A total of six important land covers were classified: Bareland, Waterbodies, Built-up, Shrubland, Oil palm and Forest. Although subjected to past disturbances, forested areas still make up the majority of the site, with a coverage of 61%, followed by oil palms with 19%. Shrubland covers approximately 7% of the total area, which includes the trees planted during the restoration project and could be considered future planting areas. Two forest stratum maps were developed based on the canopy heights generated from the UAV-LiDAR and a spaceborne LiDAR. The forest stratum from the UAV-LiDAR captured finer details of the forest strata due to its higher spatial resolution. The final results showed the aboveground biomass in the restoration area covered with the LiDAR data (135 ha) is approximately 50.5 Mg/ha or 23.7 MgC/ha. This justifies the need for restoration activities within the area and can serve as a baseline for future monitoring activities within the UKW restoration area.