

Estimation of aboveground biomass of a production forest reserve in Malaysian Borneo using K-nearest neighbor method

Abstract

This study examined the use of the k-nearest neighbour (k-NN) method to estimate aboveground biomass of a logged-over tropical forest in Sabah, Malaysia. To estimate aboveground biomass, field data as well as digital number and normalised difference vegetation index (NDVI) values from Landsat TM-5 data were used to determine the optimum horizontal reference area and the number of reference sample plots (k). An accuracy assessment showed that enhancing the digital number value was superior to enhancing the NDVI value. Root mean square errors of no filtering and 3 × 3 filtering were minimum when k = 4 and k = 5 respectively, when a horizontal reference area of 17 km was applied. The bias was underestimated by 2.01 and 1.62 tonnes ha⁻¹ for k = 4 and k = 5 respectively. Total aboveground biomass of the forest management unit estimated by enhancing the digital number value was 6,873,299 tonnes and average biomass density was 248.8 tonnes ha⁻¹. The results suggest that the k-NN method is an alternative way to estimate and map aboveground biomass of a forest management unit.