Estimation of aboveground biomass in mangrove forests using vegetation indices from SPOT-5 image

ABSTRACT

Mangrove forests play a pivotal role in climate change mitigation through biomass and carbon storage. Due to rising concern towards global climate change and carbon sequestration, a practical method to estimate the forest biomass and carbon stocks is necessary. Therefore, this study attempted to quantify aboveground biomass (AGB) within the mangrove ecosystem in Malaysia. A total of 150 sample plots at Matang Mangrove Forest Reserve were established in 2014. This study estimated and mapped the AGB based on Systeme Probatoire d'Observation de la Terre 5 (SPOT-5) satellite image. Four types of vegetation index were examined in this study. Simple and multilinear regression methods were employed which correlated field data with the derived vegetation indices for the estimation of AGB in the entire study area. Results demonstrated that the multilinear regression method improved the accuracy of estimation. Estimated AGB ranged between 33.65 and 437.46 Mg ha−1 with an average of 133.97 Mg ha−1. Total AGB for the entire study area was approximately 1.30 million Mg. Error of estimation largely occurred when AGB exceeded 300 Mg ha−1. The study showed that multilinear technique was reliable for the estimation of AGB in mangrove forests based on the SPOT-5 image.