Estimating mangrove above-ground biomass in Sabah, Malaysia using field measurements, shuttle radar topography mission and landsat data

Abstract

Mangroves are one of the most productive forest ecosystems and play an important role in carbon storage. We examined the use of Shuttle Radar Topography Mission (SRTM) data to estimate mangrove Above-ground Biomass (AGB) in Sabah, Malaysia. SRTM-DEM can be considered as Canopy Height Model (CHM) because of the flat coastal topography. Nevertheless, we also introduced ground elevation correction using a Digital Terrain Model (DTM) generated with GIS and coastal profile data. We mapped the mangrove forest cover using Landsat imagery acquired in 2015 with the supervised classification method (Kappa coefficient of 0.81). Regression analyses of field AGB and the CHMs resulted in an estimation model with the corrected CHM as the best predictor (R^2: 0.73) and cross-validated Root Mean Square Error (RMSE) was 19.70 Mg ha-1 (RMSE%: 11.60). Our study showed Sabah has a mangrove cover of 268,631.91 ha with a total AGB of 44,163,207.07 Mg in 2015. This substantial amount of carbon storage should be monitored over time and managed as part of the climate change mitigation strategy.