

Aboveground carbon stock potential of teak (*tectona grandis*) under different land use system in Balung plantation, Tawau Sabah

Abstract

Assessment of aboveground carbon stock in different teak plantation systems was conducted in Balung River Plantation, Tawau, Sabah. The objective of this study is to determine the potential of teak as the main tree components to increase the above ground carbon stock in different land use system. The above ground carbon stock of agroforestry and mixed plantation system of teak (*Tectona grandis*) were compared with natural forest and monoculture plantation of the species. The agroforestry combinations investigated are agroforestry system 1, teak (18 years) with snake fruit (8 years) and agarwood (8 years); agroforestry system 2, teak (17 years) with coffee (14 years); and also mixed timber plantation system, teak (18 years) with agarwood (8 years); while 20 years teak monoculture plantation and natural forest reserve was set up as a control. A random systematic sampling method was used in conducting field inventory. The methodologies used include the measurement of height and diameter breast height (DBH) of trees within a 50 m x 50 m plot dimension (for plantation) and 30 m x 30 m (forest). Allometric equations were used to derive the field measured attributes into stand biomass while carbon stock was estimated as 50 percent from the total biomass. The result shows the accumulation of carbon stock goes in the following order: forest reserve (213.84 t C/ha) > mixed timber plantation (69.94 t C ha⁻¹) > agroforestry system 2 (37.75 t C/ha) > agroforestry system 1 (37.34 t C/ha) > teak monoculture (34.53 t C/ha) witnessing the teak trees to increase the total aboveground carbon stock in agroforestry and mixed timber plantation system by more than 60 percent. This study suggested that teak has great potential in transforming a low biomass land use into a carbon-rich tree based systems.