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Floristic Composition and Carbon Sequestration of "Indikada Mukalana" Forest Reserve, Waga; A Lowland Wet Evergreen Forest in Sri Lanka

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Abstract

Tropical lowland wet zone forests hold the greatest plant diversity, promise high plant carbon stocks. This study examined plant and soil carbon stocks of Indikada Mukalana Forest reserve, Waga, Sri Lanka. Five representative sampling sites (20x20 m) in the forest were used for floristic survey and soil core sampling. Chemical and physical properties of soil samples were analysed for five years during 2011 and during 2014 to 2017. Vegetation survey documented 17 common tree species belonging to 15 genera and 12 families. Of the recorded species, 10 were endemics and 7 were native species. There were two species belonging to Dipterocarpaceae (*Diptrocarpus zeylanica* and *Hopea juncunda*). The mean total % C showed a negative correlation ($R^2=0.42$) ranges in value between 2.84% in 2011 and 2.16% in 2017. The soil C fractions were determined by Loss on Ignition (LOI) method and predominated by the fulvic fractions (68.88%) followed by the humic fractions (18.36%) and the free soil litter fractions (12.76%). The total ecosystem carbon in the "Indikada Mukalana" lowland wet zone forest was 625t C/ha (i.e. biomass C 573.57 tC/ha and soil C 51.68 tC/ha), which was comparatively higher than our previous studies conducted in a highland wet zone forest (361 tC/ha at Udawattakele forest reserve) and a dry zone forest (176 tC/ha at Sigiriya forest sanctuary). The above ground biomass carbon for the forest was 477.98 t C/ha and the below ground biomass was 95.6t tC /ha. The mean total N % showed a positive correlation ($R^2=0.84$) ranges in value between 0.14% in 2011 and 0.18% in 2017. Soil pH in Waga forest was acidic (<5) over the five-year period due to accumulation of more organic acids due to decomposed litter. In conclusion, we recommend this study to further extend towards other land-use classes to understand carbon sequestration in associated land-use classes for providing carbon benefits through carbon conservation via sustainable land management practices.

Keywords: Floristics, Carbon sequestration, Waga forest, Soil organic carbon