

## Soil carbon dioxide efflux and atmospheric impact in a 10 years *Dipterocarpus* recovering lowland tropical forest, Peninsular Malaysia

### ABSTRACT

Recovering logged-over forest ecosystem increases CO<sub>2</sub> efflux into the atmospheric carbon pool in response of environmental factors to change in soil temperature and moisture. These CO<sub>2</sub> outbursts can have a marked influence on the ecosystem carbon balance and thereby affect the atmospheric carbon pool. The study was conducted in a 10 years logged-over forest of Sungai Menyala forest, Port Dickson, Negeri Sembilan, Malaysia. The measurements of soil CO<sub>2</sub> effluxes were conducted using a continuous open flow chambers technique connected to a multi gas-handling unit and infrared CO<sub>2</sub>/H<sub>2</sub>O gas analyser. The aim of this study is to determine the percentage of CO<sub>2</sub> contributed into the atmosphere from a recovering 10 year logged-over lowland forest. One-way analysis of variance (ANOVA) was used to test the significance correlation between soil CO<sub>2</sub> efflux and environmental variables. Post-hoc comparisons were made using Tukey test ( $p < 0.05$ ), and multiple linear regressions were used to determine the impact of environmental factors on soil CO<sub>2</sub> efflux. Soil CO<sub>2</sub> efflux range from 345.6 to 600.4 mg/m<sup>2</sup>/h with the highest efflux in the afternoon attributed to increase in soil temperature and moisture. Higher soil temperature and moisture recorded signify the influential factor. Furthermore, the predictor environmental variables; Soil Organic Carbon (SOC), Total Organic Carbon (TOC), Soil Moisture Content (SMC), Bulk Density, Below Ground Carbon Stock, Total Aboveground Carbon Biomass (TAGB), soil pH, Nitrogen to Carbon ratio account for the spatial and temporal variation in soil CO<sub>2</sub> efflux. These factors attributed to increase in CO<sub>2</sub> efflux into the atmosphere.

**Keyword:** Soil CO<sub>2</sub> efflux; Carbon pool; Biomass; Forest ecosystem; Carbon sink