

## ABSTRACT

The value of ecosystems functions performed by forests in the climate change era has prompted increasing attention towards assessment of carbon stocks and fluxes in tropical forests. The aim of this study was to understand how forest management approaches and environmental controls impacted on soil CO<sub>2</sub> efflux in a tropical Eastern Mau forest which is one of the blocks of the greater Mau complex in Kenya. Nested experimental design approach was employed where 32 plots were nested into four blocks (disturbed natural, undisturbed natural, plantation and glades). In 10 m<sup>2</sup> plots, data were collected on soil CO<sub>2</sub> efflux, soil temperature and soil moisture using soda lime methods, direct measurement and proxy techniques, respectively. There was significant forest management type effect ( $F_{3,127} = 3.01, p = 0.033$ ) and seasonality effect ( $t$  test = 3.31,  $df = 1, p < 0.05$ ) on mean soil CO<sub>2</sub> efflux. The recorded mean soil CO<sub>2</sub> efflux levels were as follows: plantation forest ( $9.219 \pm 3.067$  g C M<sup>-2</sup> day<sup>-1</sup>), undisturbed natural forest ( $8.665 \pm 4.818$  g C M<sup>-2</sup> day<sup>-1</sup>), glades ( $8.592 \pm 3.253$  g C M<sup>-2</sup> day<sup>-1</sup>) and disturbed natural forest ( $7.198 \pm 3.457$  g C M<sup>-2</sup> day<sup>-1</sup>). The study concludes that managing a forest in plantation form is primarily responsible for forest soil CO<sub>2</sub> efflux levels due to aspects such as increased microbial activity and root respiration. However, further studies are required to understand the role and impact of soil CO<sub>2</sub> efflux on the greater forest carbon budget.