Control of Soil Carbon Dynamic of Southeast Asian Ecosystems

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The tropical ecosystems have been estimated to be a large carbon source ($1.3$ Pg C yr$^{-1}$) due to deforestation and forest degradation, even the global terrestrial carbon sink has been large ($1.1$ Pg C yr$^{-1}$) in recent decades. Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for tropical region to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. The ultimate goal of this study is to update REDD mechanism through improved forest management by evaluation of effects of logging and land-use change on soil carbon emission of tropical forests. This study was conducted in a lowland primary forest at Pasoh Forest Reserve ($2^\circ58'N$, $102^\circ18'E$; 75˜150m a.s.l.) and a mountainous tropical forests at Temenggor concession area ($5^\circ33'N$, $101^\circ36'E$; 800˜900m a.s.l.) in Peninsular Malaysia. About 50˜65% biomass was harvested and soil temperature increased about $3^\circC$ with SMS, resulting value of the carbon stock lost about 2,577 US$ ha$^{-1}$ following the first year of logging. On the other hand, under low-impact harvest condition, only about 1,773 US$ ha$^{-1}$ was lost following the first year of logging. Result suggests that this low-impact harvest system would achieve about 804 US$ ha$^{-1}$ of REDD credit partially contributed from mitigating soil degradation of about 169 US$ ha^{-1}$.

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