Theme 3 | Soil data for policy and decision-making

SOIL CARBON SEQUESTRATION POTENTIAL IN SELECTED INLAND FOREST ECOSYSTEMS OF MALAYSIA

Jeyanny, V, Elizabeth P, Norsheilla MJC, Rozita, A, and Mohd Syamin Aizat MY
Forest Research Institute Malaysia, 52109, Kepong, Selangor, Malaysia
Email: jeyanny@frim.gov.my

INTRODUCTION

The Conference of Parties (COP) has outlined the importance to develop and maintain a forest carbon inventory that feeds into national biennial transparency reports which implement several strategies to measure and report greenhouse gas changes according to several sectors. Based on the recent Biennial Update Report, Forest Land remaining forest land emission levels are -237,008.39 Gg CO_2 eq which is a net carbon sink. According to FAO (2015), the carbon density in Malaysian forests ranges from 89 - 276 tC ha^{-1}.

The forested area in 2020 for Malaysia is 18.05 million hectares. Soil carbon in inland forests are often overlooked for C estimation.

The aim of this study was

- **To compile historical and current data on soil carbon stocks in the inland forests which were categorized as undisturbed and production forests.**
- **To determine the change according to two different periods of time which will provide baseline information on the annual change in soil organic carbon stocks.**

METHODS

- ***Soil carbon stocks were calculated by multiplying the organic C (%) with depth interval (cm) and the bulk density values (g cm^{-3}).***
- ***Carbon stocks between two periods were estimated according to carbon stock change per unit area using the stock change method.***
- ***The below equation was used whereby***

$$\Delta C = \frac{Ct2 - Ct1}{t2 - t1}$$

- ***The is the annual carbon stock change (tC yr^{-1}), whereby carbon stock at t1 (≥ 20 years) and t2 (year assessed) were computed. The values were further multiplied with the molecular weight of carbon dioxide of 44/7 to report in tCO2 ha^{-1} yr^{-1}.***

Figure 1: Split core sampling at Pasoh Forest Reserve

RESULTS

Table 1: Summary of soil C stocks and changes in selected inland forests forests of Malaysia

FOREST TYPE	DESCRIPTIVE STATISTICS	SOIL CARBON STOCKS (TC HA^{-1})	ANNUAL SOIL C STOCK CHANGES (TC HA^{-1} YR^{-1})	CARBON EMISSION (TCO_2 HA^{-1} YR^{-1})
Undisturbed (n:11)	Mean	62.88	1.11	4.05
	Median	62.3	1.00	3.65
	Standard error	7.78	0.21	0.76
Production (n:8)	Mean	33.06	0.33	1.21
	Median	33.32	0.36	1.30
	Standard error	3.29	0.09	0.33

DISCUSSION

For undisturbed and production forests, values ranged between 34.12- 93.21 and 18.90-44.73 tC ha^{-1}, respectively (data not shown). The median value for undisturbed forest was close to 60 tC ha^{-1} default value as reported by IPCC (2006). Values for production forest was reduced by 45% due to prior timber harvesting activities but recorded annual changes of less than 0.5 tC ha^{-1} yr^{-1}. Overall, the annual C change recorded median values between 0.36 to 1.00 tC ha^{-1} yr^{-1}.

CONCLUSION

This preliminary data points out the requirement to use unique data related to tropical inland ecosystems of Malaysia for refined estimates of soil carbon stocks and emission levels. Default reference can be used for undisturbed forest but refinement of reference value are needed for production forest in order to avoid under or over estimation for national greenhouse gas reporting for the Agriculture, Forestry, & Other Land Use (AFOLU) sector.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the funding support for this research under "Pilot research on YASSO model for estimation of organic carbon in forest soils" which was funded by the Ministry of Natural Resources, Environment & Sustainability (NRES). The assistance rendered by all personnel from Soil Management Branch, FRIM for assisting in soil collection and laboratory analysis are highly appreciated. The authors acknowledge the various literature review provided by various workers.

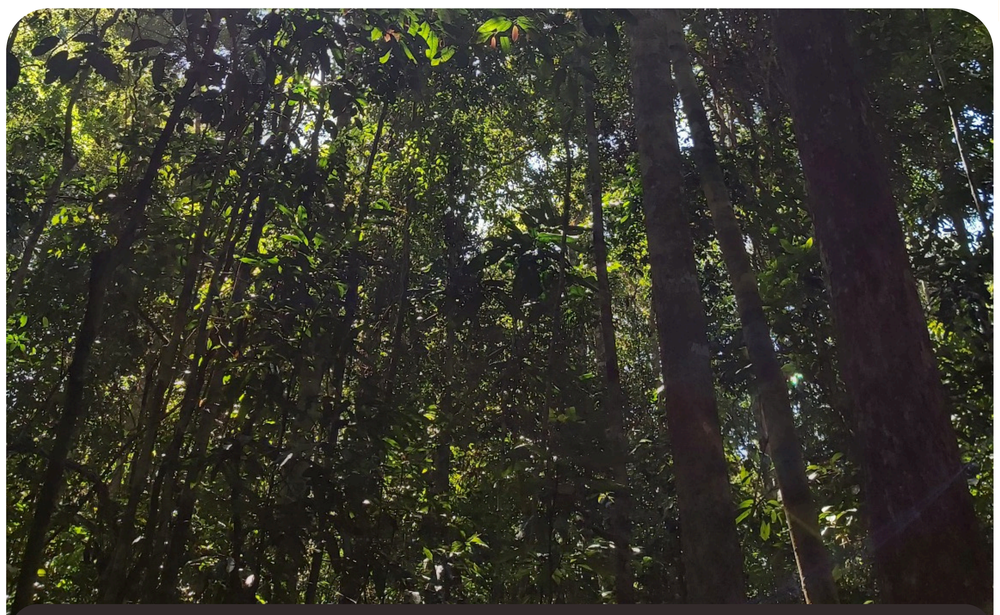

Figure 2: Dipterocarp forest at Pasoh, Negeri Sembilan

REFERENCES

- *Chan, Y. H. 1982. Storage and release of organic carbon in Peninsular Malaysia. International Journal of Environmental Studies, 18(3-4), 211-222.*
- *FAO. Global Forest Resources Assessment, 2015. Country Report, Malaysia; Food and Agriculture Organization: Rome, Italy, 2015*
- *IPCC 2006. IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4: Agriculture, Forestry and Other Land Use, Eggleston S, Buendia L, Miwa K, Ngara T, Tanabe K (eds) Published: IGES, Japan.*