

Variability and Uncertainty of Biogenic Greenhouse Gas Emissions of Palm Oil production

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1. Introduction

- Palm oil is the most widely used of oils and fats worldwide; its production represents 30 % of global supply¹.
- Biogenic GHG footprints of palm oil production are characterized by high variability and uncertainty. Better understanding is needed to guide actions to lower emissions.

Current LCA assessment on Land Use Change (LUC) ^{2,3}

If previous land use and country known

- Carbon stock difference between previous and current land classes
- **Amortized by 20 years** (or cultivation period) and multiply by 3.664 ton CO₂/ton C

If previous land use unknown but country known

- Country-level average LUC emissions using national statistics **from past 20 years** (or cultivation period).
- Emissions allocated to crop using **the crop-specific approach/shared responsibility approach**

Limitations

- Limited data availability
- No consideration of forest edge effects
- Coarse resolution
- No consideration of spatial variability within country

LUC assessment using satellite data provides an improvement, but variability and uncertainty are still substantial.

Goal: To quantify variability and uncertainty of biogenic greenhouse gas footprints of palm oil production

Indonesia as a case study
Functional unit: 1 tonne of fresh fruit bunches

2. Research questions

Combine with different sources of carbon stock data

Spatial variability and uncertainty of locations of LUC

Variability and Uncertainty of biogenic GHG footprints

Inclusion/exclusion of edge effects

Spatial variability of forest edge effects

- Level of agreement between different land cover maps at different resolution

Temporal variability of forest edge effects

- Influence of the age of the forest edges on carbon degradation

Variability of yield

- Yield maps vs annual country-level averages

Table 1: Spatial and temporal resolution of the maps of land/forest cover and palm oil plantations.

Data type	Possible Data sources	Time period	Resolution
Land/Forest cover maps	MODIS ⁴	2001-2013	500 m
	Ministry of Forestry ⁵	1990, 1996, 2000, 2003, 2006, 2009, 2011, 2012, 2013	100 m
	Global Forest Watch ⁶	2000-2014	30 m
PO maps	Global Forest Watch ⁷ Cifor ⁸	2010 2015	

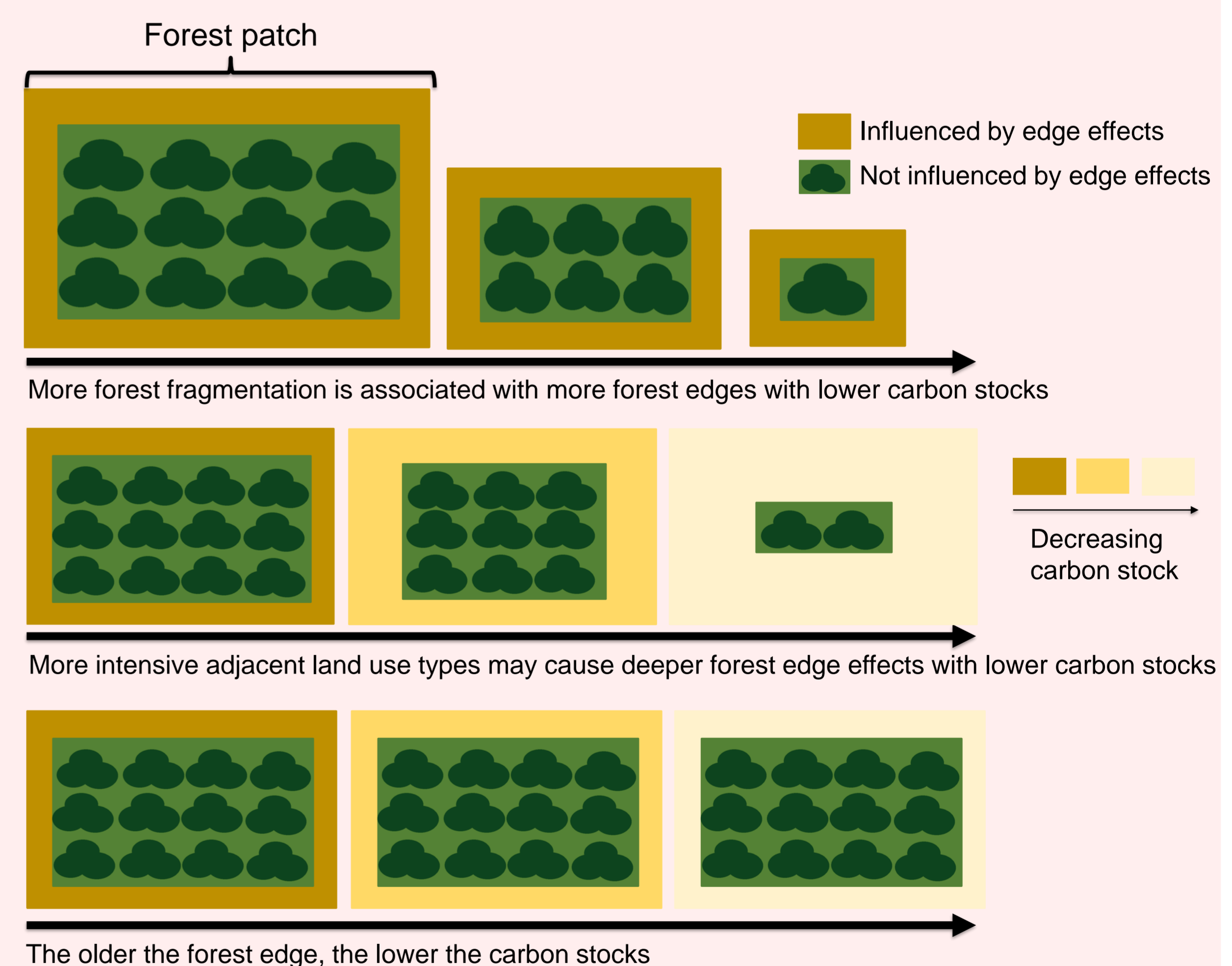


Figure 1: Illustrations of the hypothesized variability of forest edge effects, adapted from Sadava⁹.

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