

---

# Remote Sensing-Based Assessment of How Much Tropical Wetland Fires Contribute to Carbon Emissions and How Fast the Carbon Recovering Is

ABDI FITHRIA<sup>1,2,\*</sup>, SYAMANI D. ALI<sup>1,2</sup>, AND ARFA A. REZEKIAH<sup>1</sup>

<sup>1</sup>Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia

<sup>2</sup>Center for Geospatial Information Infrastructure Development, Lambung Mangkurat University, Banjarbaru, Indonesia

## ABSTRACT

This research had two objectives. The first objective was to quantify the carbon emissions from fires of various types of tropical wetland vegetation using Sentinel-2 imagery. The second objective was to measure how long the carbon stock will recover using Sentinel-2 imagery. Burned areas were extracted automatically using the Relativized Burn Ratio (RBR). Calculation of carbon emissions and carbon sequestrations were carried out by measuring the differences in Above Ground Biomass (AGB) before the fires, right after the fires, and a few months after the vegetation re-grows after the fires. Therefore, multitemporal Sentinel-2 MSI imageries from three different times are required. All imageries processing was carried out using the ESA SNAP software. The results showed that tropical wetland fires emitted an average of 121.61 Mg C/ha, or equivalent to 445.9 Mg CO<sub>2</sub>/ha. Furthermore, tropical wetlands had an average rate of about 9.27 months to restore their carbon stocks to their pre-burnt state. Peatland forests took the longest time to recover to its original carbon stock state after burning, which was almost 22 years to recover.

**Keywords:** *Tropical wetlands, fires, biomass, carbon emissions, remote sensing*