PENENTUAN *BASELINE* EMISI DENGAN PENDEKATAN EMISI HISTORIS PADA AREAL PERSETUJUAN PERHUTANAN SOSIAL DI DESA BARUREJO BANYUWANGI

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INTISARI

Perubahan tutupan lahan di kawasan hutan memengaruhi dinamika cadangan karbon dan potensi emisi sektor kehutanan. Pemerintah Indonesia melalui kebijakan *Forestry and Other Land Use* (FOLU) *Net Sink* 2030 menargetkan keseimbangan antara emisi dan serapan karbon pada tahun 2030. Implementasi kebijakan ini memerlukan ketersediaan data *baseline* emisi pada skala tapak, khususnya di kawasan perhutanan sosial, yang hingga kini masih terbatas. Penelitian ini bertujuan menentukan *baseline* emisi berbasis pendekatan emisi historis serta menyusun skenario emisi dan mitigasi di kawasan Persetujuan Perhutanan Sosial (PPS) Desa Barurejo, Kabupaten Banyuwangi.

Penelitian ini menggunakan citra satelit Sentinel-2 MSI L-1C tahun 2015, 2020, dan 2025 yang diolah melalui *Google Earth Engine* (GEE) dengan algoritma *Random Forest*. Validasi klasifikasi dilakukan menggunakan data *groundcheck* dan citra *Google Earth Pro*. Estimasi cadangan karbon dihitung berdasarkan faktor densitas karbon KLHK, kemudian dianalisis menggunakan pendekatan *Historical Emission Trend* untuk menentukan *baseline* emisi serta menyusun skenario *business as usual* (BAU) dan mitigasi.

Hasil penelitian menunjukkan bahwa proyeksi baseline tahun 2025 sebesar 168.710 ton C pada hutan lahan kering sekunder, 133.580 ton C pada hutan tanaman, dan 22.664 ton C pada pertanian lahan kering. Pada skenario BAU, total cadangan karbon kawasan menurun dari sekitar 392.000 ton C tahun 2015 menjadi sekitar 305.000 ton C tahun 2025 dan berpotensi terus menurun hingga 2030. Sebaliknya, penerapan skenario mitigasi melalui rehabilitasi lahan dan penanaman kembali (RO-4), pengayaan vegetasi dan perlindungan hutan (RO-3 dan RO-8), serta pengembangan hasil hutan dan jasa lingkungan (RO-11) berpotensi menekan kehilangan karbon dan mendukung kebijakan FOLU *Net Sink* 2030 di tingkat tapak

Kata Kunci: *Baseline* Emisi, Tutupan Lahan, Simpanan Karbon, Perhutanan Sosial

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DETERMINATION OF EMISSION BASELINE USING A HISTORICAL EMISSION APPROACH IN THE SOCIAL FORESTRY PERMIT AREA OF BARUREJO VILLAGE BANYUWANGI

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ABSTRACT

Land cover change in forest areas influences carbon stock dynamics and the potential for emissions in the forestry sector. The Government of Indonesia, through the *Forestry and Other Land Use* (FOLU) Net Sink 2030 policy, aims to achieve a balance between carbon emissions and removals by 2030. The implementation of this policy requires the availability of site-level emission baseline data, particularly in social forestry areas, where such information remains limited. This study aims to determine an emission baseline using a historical emission approach and to develop emission and mitigation scenarios in the Social Forestry Permit Area (Persetujuan Perhutanan Sosial/PPS) of Barurejo Village, Banyuwangi Regency.

This study utilized Sentinel-2 MSI Level-1C satellite imagery from 2015, 2020, and 2025, processed using Google Earth Engine (GEE) with the Random Forest algorithm. Classification accuracy was validated using ground check data and Google Earth Pro imagery. Carbon stock estimation was conducted based on carbon density factors issued by the Ministry of Environment and Forestry, and subsequently analyzed using the *Historical Emission Trend* approach to determine the emission baseline and to construct *business as usual* (BAU) and mitigation scenarios.

The results indicate that the projected emission baseline for 2025 is 168,710 tons C for secondary dryland forest, 133,580 tons C for plantation forest, and 22,664 tons C for dryland agriculture. Under the BAU scenario, total carbon stocks are projected to decline from approximately 392,000 tons C in 2015 to around 305,000 tons C in 2025 and are expected to continue decreasing through 2030. In contrast, the mitigation scenario implemented through land rehabilitation and reforestation (RO-4), vegetation enrichment and forest protection (RO-3 and RO-8), and the development of forest products and environmental services (RO-11) has the potential to reduce carbon losses and support the achievement of the FOLU Net Sink 2030 policy at the site level.

Keywords: *Emission Baseline, Land cover, Carbon Stock, Social Forestry*

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