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LETTER

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Success of the emerging Low Emissions Development paradigm in Southeast Asia depends on mitigating impacts of oil palm (OP) expansion on carbon-dense ecosystems, especially tropical peatlands. To this end, Koh et al. (1) mapped OP planted before 2002 across Peninsular Malaysia, Sumatra, and Borneo to estimate emissions and biodiversity losses from peatland conversion (≈880,000 ha). Unfortunately, emissions scenarios are oversimplified, remote-sensing (RS) methods are unsuitable for OP monitoring, and recommendations for peatland restoration are overstated.

The article risks misinforming national and international climate change policies under development.

Koh et al. overestimated emissions from aboveground biomass (AGB) conversion to OP (136 million MgC) by assuming that all plantations replaced primary forest. Previous studies show that ≈40% of OP planted before 2000 replaced disturbed vegetation (2) with 40–97% less AGB than primary forest (180 MgC ha^{-1}). Accounting for alternative conversion pathways, we estimate emissions from AGB losses as 75–111 million MgC, 18–45% less than the authors' mean estimate.

Conversely, Koh et al. underestimated belowground C emissions. Potential emissions from burning for land clearing (100 ± 50 MgC ha^{-1}) were excluded from their analysis. Additionally, their C flux estimate from peatland oxidation (5.2 MgC $ha^{-1}y^{-1}$; based on two studies from Sarawak) is three- to fourfold lower than measurements collected across Southeast Asia at typical plantation water depths (14.9–23.6 MgC $ha^{-1}y^{-1}$) (3, 4). We estimate belowground C flux (annualized burning, oxidation, and foregone sequestration) as 15.3–26.9 million MgC $ha^{-1}y^{-1}$, ≈300–400% higher than the mean flux reported by the authors.

Their unique use of radar to map OP advances RS methods for regional land-cover inventories. However, this method is inadequate for monitoring "future land-use change driven by oil-palm" to "facilitate…sustainable development." In Indonesia, the ≈4.97 million ha of mature plantations mapped by Koh et al. in 2010 missed ≈2.7 million ha of OP evidently too young (<8 y) or in patches too small (<200 ha) to be detected with their methods. RS-based OP monitoring must identify OP expansion in real-time and at spatial resolution commensurate with OP development patterns [e.g., Landsat, Satellite Pour l'observation de la Terre (SPOT)].

Finally, the authors markedly overstated potential for rehabilitating ≈2.3 million ha of "clear-felled peatlands." First, most "cleared" areas may already be planted with OP. Recent work in Sarawak (www.sarvision.nl) shows that 65% of peatlands deforested from 2005 to 2010 were planted to OP and are unavailable for restoration. Additionally, rehabilitating deforested tropical peatlands is far more difficult and costly than appreciated (5). Enormous investments are required to raise water levels, control fires, and replant native species within the complex sociopolitical milieu of rural Southeast Asia. Finite dollars for peatland conservation must prioritize protecting forested peatlands, not restoring deforested ones.

We laud scientists like Koh et al., who wish to engage policymakers. However, clearly communicating uncertainties and assumptions of policy-oriented research is essential. Instead, the authors oversimplified a complex story, with no sensitivity analysis to explore uncertainty in peatland oxidation emissions or alternative land-cover change pathways preceding OP development. Southeast Asian countries developing emissions reductions strategies face tough choices balancing agricultural expansion with forest protection; proper treatment of uncertainty surrounding emissions from OP will help countries plan for worst- and best-case scenarios and design research aimed at informing policy decisions.

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