

## **Committed carbon emissions from oil palm plantation expansion onto Kalimantan peatlands**

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Oil palm plantation expansion is occurring predominantly in Indonesia, where draining and burning of extensive peatlands causes substantial carbon emissions. Here, we report plantation development at nested regional (Kalimantan, 538,346 km<sup>2</sup>) and local (Ketapang, 12,038 km<sup>2</sup>) scales from 1990-2010, and project expansion to 2020 within government-allocated leases. With Landsat satellite imagery and above- and below-ground carbon accounting, we develop carbon flux estimates from plantations. Across Kalimantan, by 2010, 13% of total oil palm area (31,640 km<sup>2</sup>) occurred on peatlands, contributing 27-39% of 1990–2010 net oil palm emissions. Although peatland oil palm area expanded ~1,500% from 2000-2010, 86% of allocated peatland leases remained undeveloped. If these leases are cleared, Kalimantan peatland oil palm could contribute ~10% to Indonesia's CO<sub>2</sub> equivalent emissions by 2020. In Ketapang, plantation land sources exhibited distinctive temporal dynamics, comprising 81% forests on mineral soils (1994–2001), shifting to 69% peatlands (2008–2011). By 2007–2008, oil palm directly caused 40% of peatland deforestation. Business as usual scenario results indicate that ~40% of Ketapang peatlands will be planted with oil palm by 2020, with carbon emissions from peatlands projected to contribute 87% of total regional land-based emissions. While existing regulations prohibiting using fire to prepare lands for plantation agriculture may mitigate peat burning emissions, peat draining will result in committed carbon emissions that will continue beyond 2020.