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Trade-offs and synergies among multiple ecosystem services under future oil palm expansion scenarios in Indonesia

Keywords: Oil palm sustainability, landscapes, stakeholder, InVEST scenario generator, InVEST models

Abstract:

Oil palm plantation has considerably changed the natural landscape of Indonesia in the past three decades. Sustainable oil palm productions for both domestic and global markets is pivotal to Indonesia's national economic development and for supporting smallholder growers' livelihoods while achieving climate change mitigation and biodiversity conservation goals. We assessed sustainability of oil palm landscape under five plausible future land use scenarios: Business as usual, Moratorium, Sustainable intensification of oil palm, Spatial plan, and, Optimum oil palm scenarios. Five key ecosystem services: carbon storage and sequestration, habitat quality, water yield, oil palm and timber production were assessed for these scenarios using a spatially explicit ecosystem service modeling tool, Integrated Valuation of Ecosystem Services Tool (InVEST). The results show that except for the oil palm production other ecosystem services were diminished under the business as usual scenario whereas the sustainable intensification of oil palm, and moratorium scenarios ensured conservation of significant habitat quality areas and also increased carbon sequestration and storage. This suggests that there is scope for minimizing the trade-offs between oil palm development and conservation, yet all stakeholders involved including state and non-state actors have to understand the synergies among key ecosystem services to transition towards sustainable oil palm landscapes.