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Land use change effects of oil palm expansion on ecosystem services in Tapi river basin, Thailand

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Abstract: The last decades have shown a strong increase in oil palm production in Thailand. This is increasingly leading to land conversion including loss of forest habitat. However the specific direct and indirect land use effects of oil palm expansion in Thailand are as yet insufficiently understood. We selected the Tapi river Basin and model land use change caused by oil palm expansion. We analysed both direct and indirect land use change effects, using spatial analysis in ArcGIS 10.0 in combination with farmer interviews. Our analysis shows that in the first decade after 2000, direct-land-use-change (dLUC) amounted to 102,000 ha, and exceeded the number of hectares that were converted due to indirect-land-use-change (iLUC). Rubber was most frequently replaced by oil palm, but there was also conversion of natural ecosystems. More recently, in particular between 2009 and 2012, iLUC strongly increased. Forests were cleared for rubber production as an indirect effect of oil palm expansion. We also quantified the land use change effects on selected ecosystem services; including crop provisioning service, carbon storage and biodiversity conservation. The crop production (in ton), habitats loss (in ha) and carbon stocks (in ton C) are used as indicators for modelling these services. The stock different method from the 2006 IPCC Guidelines is employed to quantify carbon stocks. The result shows that oil palm expansion increased fresh-fruit-bunch production, however, it reduced other crop production, such as latex, rice and fruits. Carbon storage and biodiversity conservation services were adversely affected due to the conversion of natural forests to oil palm and rubber plantations. Our concern is that the clearance of natural forest significantly increased in the second period compared to the first period. This reflects that arable land available for oil palm in the basin has become very limited. We, therefore, recommend the government to aim for increased production in existing plantations rather than promoting further land use conversion.

IMPORTANT NOTE: *This abstract is based on the manuscript entitle "Effects of oil palm expansion through direct and indirect land use change in Tapi river basin". This manuscript was submitted and accepted to publish to the International Journal of Biodiversity Science, Ecosystem Services & Management.*