

Researchers warn against high emissions from oil palm expansion in Brazil

November 13 2013

Expanding millions of hectares of Brazilian land to produce palm oil for food or for renewable, clean-burning biodiesel could result in extremely high emissions of carbon dioxide (CO₂) unless strict controls are put in place.

This is according to a new study published today, 14 November, in IOP Publishing's journal *Environmental Research Letters*, by a group of researchers from the University of California, Davis.

The researchers found that unless the [oil palm plantations](#) are strictly confined to previously deforested land and not allowed to spill over into conservation or indigenous areas, the total amount of CO₂ emissions from biodiesel, made from [palm oil](#) produced in that region, may exceed the carbon intensity of petroleum diesel, which biodiesel intends to replace.

Focussing on the Brazilian region of Pará, the researchers employed a "bottom-up" model to arrive at their conclusions, which accounted for the complex interactions of drivers at the regional and local scale that can influence emissions, such as neighbouring land use, access to infrastructure, the distance to local markets and the suitability of land.

Brazil has drastically increased its production of biodiesel over the last decade. In 2006, the country produced 69 million litres of biodiesel; today, it produces close to 3 billion litres, the majority of which is produced from soybean oil.

Oil palm has become an increasingly attractive crop for the production of biodiesel as it has a much higher yield than other crops, requires barely any new technology to produce and harvest, can grow in poor soil conditions and is very labour intensive—ideal for job creation and security.

The Brazilian government has recently approved a bill to expand 4.3 million hectares of previously deforested land to [oil palm](#) plantations and has found over 30 million hectares that may be suitable for the expansion, the majority of which are in the northern state of Pará.

In their study, the researchers created three different scenarios of land use change over a 30 year period in Pará and used a land use change model and spatially explicit carbon maps to assess the amount of CO₂ emissions that may occur as a result of each scenario.

In the first scenario, only a third of plantations occurred on previously deforested land with the rest occurring on conservation and indigenous areas; in the second and third scenarios, a larger proportion of plantations (46% and 78%, respectively) occurred on previously deforested land.

In each of the scenarios, 22.5 million hectares of land were converted, creating 29 billion gallons of biodiesel each year. In the first and second scenarios, where there was little or no enforcement, the land use change resulted in 84 and 60 grams of CO₂ emitted per megajoule (gCO₂e/MJ), respectively—the European Commission has rated the carbon intensity of diesel as 83.8 gCO₂e/MJ.

The researchers point out that if the extraction, refinement, transport and actual combustion of the biodiesel is taken into account and added to emissions from either of these two scenarios, the total carbon intensity of [biodiesel](#) will greatly exceed that of diesel.

Co-author of the study, Dr Sonia Yeh, from the UC Davis Institute of Transportation Studies, said: "If the Brazilian government is to promote policies that encourage land conversion next to environmentally and ecologically sensitive areas, then they should also weigh in on the consequences associated with the lack of enforcement if they are to avoid irreversible damage to the environment."

Sahoko Yui, a UC Davis graduate student researcher, completed the work under Dr Yeh's supervision.

More information: 'Land use change emissions from oil palm expansion in Pará, Brazil depend on proper policy enforcement on deforested land' Sahoko Yui and Sonia Yeh 2013 *Environ. Res. Lett.* 8 044031 iopscience.iop.org/1748-9326/8/4/044031/article

Provided by Institute of Physics

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