

Agricultural Intensification Escalates Future Conservation Costs

Asst Prof L. Roman Carrasco

Assoc Prof Edward L. Webb

Mr Jacob Phelps

Department of Biological Sciences

Land sparing for conservation through agricultural intensification – with higher yields from farmed land meaning that demand for crops can be met with less overall land use – is an appealing policy choice for governments in tropical developing countries. It is also a central strategy of the UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation (REDD+). Yet, the conservation cost implications of agricultural intensification policies are poorly understood.

In a recent breakthrough study, Asst Prof Roman Carrasco, Assoc Prof Ted Webb and PhD candidate Jacob Phelps, working in collaboration with researchers from ETH Zurich and the University of Cambridge, investigated the ways in which payments for ecosystem services and land sparing policies such as those proposed under the REDD+ scheme could escalate beyond expectations. Research student Mr Phelps was the first to realise just how important that escalation might be.

On behalf of the team, Asst Prof Carrasco explains that “we are reaching a point where global food demand is posing a serious threat to tropical ecosystems”. Most land sparing policies, he notes, are currently being implemented or are in the planning stages, but little attention has been paid to the opportunity costs associated with them. “In many cases empirical analyses are conducted but it is difficult to draw conclusions due to the many confounders.” Aware that a theoretical framework taking opportunity costs into consideration would provide an alternative source of policy insights, the team proposed a framework for modelling how the opportunity costs of conservation incentives paid to farmers shift spatially and temporally in response to agricultural intensification.

The team applied the proposed model to the Democratic Republic of Congo, host to one of the world’s largest remaining tropical forests in which cassava and maize intensification is being considered. They found that the conservation payments needed to protect these forests would escalate in response to intensification policies, rendering REDD+ payments unviable at current carbon market prices.

The team’s findings have significant implications for the conservation of tropical forests elsewhere, such as in Indonesia, which is currently combining agricultural intensification with incentive-based conservation. Asst Prof Carrasco notes that although it is difficult to make predictions about other countries without modelling their specific characteristics, higher agricultural rents associated with land sparing in Indonesia could also be allowing the expansion of oil palm plantations into hilly areas and steep slopes, “where agricultural activities were not possible before”.

It is vitally important to evaluate the potential unintended consequences of agricultural intensification. Although farmers are likely to gain welfare benefits, conservation strategies that are affordable today could become radically more expensive, and potentially more harmful to areas they are intended to protect, in the near future.

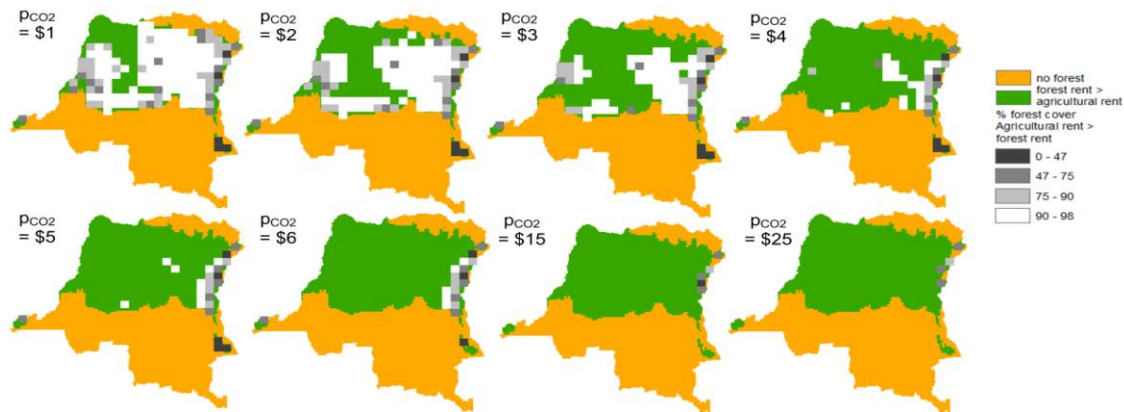


Fig. 1. DRC forests with rents below agricultural rents under intensive cassava/maize production in various annual payment per ton of CO₂ stored (p_{CO_2}) scenarios.

Publication:

Phelps, J., Carrasco, L.R., Webb, E.L., Koh, L.P., and Pascual, U., Agricultural intensification escalates future conservation costs. *Proceedings of the National Academy of Sciences of the USA* 110, 7601-7606 (2013).