

Project *brief*

Thünen Institute of Forestry

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From intact forests to agricultural-forest mosaics: implications of a landscape gradient for ecosystem services in the tropics

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- Reference forests provide most ecosystem services, which however decline over a landscape gradient characterised by increased deforestation and fragmentation
- The influence of this gradient on locally valuable ecosystem services in agroforestry systems and plantations as timber stocks and non-timber-forest products is country specific
- Forest management and restoration should be adapted to the resulting deforestation context

Background and aims

Moist tropical forests provide a wide range of forest ecosystem services (FES). These FES are partially backed by international commitments to mitigate climate change and conserve biodiversity, but an even wider set of these FES supports the livelihood of local communities. However, these forests are increasingly threatened by deforestation and degradation, which is expressed by the term landscape gradient from high forest cover (early transition) to agricultural-forest mosaics (late transition) (see fig. 1). The influence of this landscape gradient on FES has been less researched. Also, different types of forests and forms of succession can be found within the resulting gradient stages. We used inventory data (331 plots) representing five forest types collected in 24 landscapes of Ecuador and the Philippines. We analyzed how eight different FES change with respect to the landscape transition gradient and forest type, and with respect to specific landscape metrics.

Key findings

- Low disturbance forests provided the highest FES levels, hence, landscape-deforestation not only led to forest cover loss, but also to the reduction of carbon storage, timber depletion, and the disappearance of useful or red-listed species in remaining even ostensibly intact forests.
- Planted forest types (timber plantations and agroforestry) provided overall lower ecosystem services. However, the landscape influence was different between both countries: Commercial monoculture plantations with higher timber and carbon stocks were characteristic for late transition deforested landscapes. In contrast, agroforestry systems had increased non-timber forest products in these landscapes in Ecuador and reduced ones in the Philippines due to regionally specific forest product demands from multiple sources.

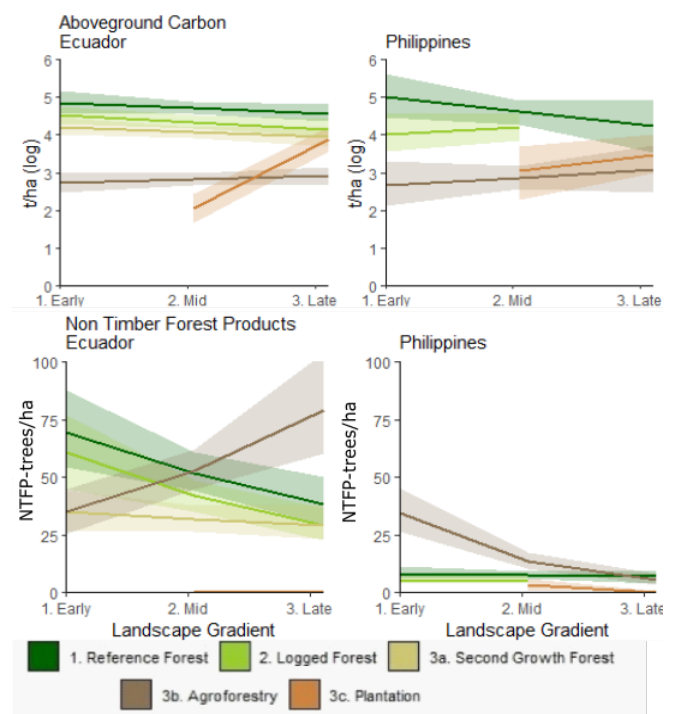


Fig 1: Increases and decreases of FES in different forest types along the landscape gradient.

Advice for policy-makers

Landscape fragmentation leads to a forest cover loss, and to a decline of FES in remaining natural and ostensibly intact forests. This showcases the risk of a gradual loss of important FES. Hence, forest monitoring e.g. under deforestation free-value chains and compensation for FES in REDD+ schemes should account for this decline of these multiple services, to avoid that low FES forests are considered as valuable as high FES-forests. Our results emphasize the need of mixed species restoration to foster landscape integrity and to address both local and global demands.

Further Information

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