BOOK OF
ABSTRACTS

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Influence of silvicultural scenarios on potential forest use, carbon storage and biodiversity in tropical forest landscapes

T1.3 Challenges for silviculture to meet demands from carbon sequestration to biodiversity conservation to forest restoration

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Abstract: Human-modified forest landscapes are widespread in tropical regions. They are important for climate change mitigation and biodiversity conservation, but also for food security and wood production. The multitude of initiatives aiming to protect and restore forests in these landscapes often faces the challenge of trade-offs between different objectives. On the level of forest stands, there is robust knowledge on trade-offs associated with different wood production systems. However, there is a lack of understanding about their landscape-wide impacts. Studying these impacts is challenging because land use in tropical regions is highly complex and empirical data on the landscape-level are scarce. Additionally, deforestation for agriculture has a huge influence on landscape-level outcomes. It is thus important to account for interactions between wood production and deforestation risks.

We extended the land sharing vs sparing framework to wood production in old-growth and restored forests and developed silvicultural scenarios of meeting wood demands in human-modified tropical forest landscapes with either high-intensity or low-intensity wood production systems. We then quantified impacts on carbon storage and biodiversity in different stylized virtual landscapes in Ecuador, Zambia and the Philippines for each scenario using a modelling approach. Our probabilistic and spatially implicit model simulates a time frame of 30 years and includes the following main components: 1) landscape-wide fuelwood and timber demands based on estimations of per capita demand and population; 2) biomass growth and wood production estimated using simple and robust growth equations; 3) different wood production systems with distinct deforestation risks estimated based on remote sensing data, and 4) changes in species richness due to loss or degradation of natural habitat estimated using a species-area relationship model. For each silvicultural scenario and landscape, we run 1000 iterations and present results from a sensitivity analysis that estimates the contribution of input parameters to the overall output uncertainty.

Preliminary results of our exploratory model suggest that it is more favourable for landscape-wide carbon storage and biodiversity to meet wood demands using low-intensity wood production systems. Our model shows the importance of considering landscape-level outcomes when comparing wood production systems in the tropics.