Prediction of forest degradation as a subsidy for mitigating actions to preventing fires and wildfires in a new Amazonian frontier

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Anthropogenic disturbances stand as the primary driver of degradation in the remaining Amazon forests, posing a significant threat to their future. Notable among these disturbances are edge effects, timber extraction, fire, extreme droughts and temperatures, which have been intensified by human-induced climate change. A pilot study aiming to integrate forest fire occurrence, timber extraction and climate change scenarios was developed for a new deforestation frontier in southwestern Amazonia. We integrated a series of remote sensing fire products, spatialized land tenure information, selective logging mapping techniques and Global Climate Models (GCMs) simulated projections of three SSPs (SSP climate forcing scenarios) for 2015–2100 period. The results showed that the increased deforestation trend occurred between 2003 and 2019 predominantly on public lands, following the implementation of the new forest code. This surge contributed to a spike in fires, escalating from 66% to 84% in 2019. Over the period from 2007 and 2019, 2.4% of the primary forest was logged. By 2022, precipitation values aligned closely with SSP 5-8.5, and temperature values neared SSP 3-7.0. Projections for 2100 indicated an alarming increase of 5.19 °C in overall temperature and a reduction of 55 mm in annual precipitation compared to 2003 baseline. The results indicate that the study region is already heading towards a

less sustainable future. Logging activities, as well as agricultural production, are threatened by both increase in economic losses by fires and temperatures, and rainfall reduction. Implementing mitigation measures, such as fire-free land management, traceability controls for all wood production from logged forests, and addressing issues of land tenure and regulation are pivotal in steering the current development pathway towards a more sustainable pathway.