UNIVERSIDADE DE SÃO PAULO
ESCOLA SUPERIOR DE AGRICULTURA "LUIZ DE QUEIROZ"

DEPARTAMENTO DE CIÊNCIAS FLORESTAIS

Av. Pádua Dias, 11 • Cep 13418-900 • Piracicaba, SP • Brasil
Fone (19) 3429 4110 • Fax (19) 3422 1733
www.esalq.usp.br

Piracicaba, November 24th, 2020

Dear Dr. Sugden,
Senior Editor of *Science*

We herewith submit the manuscript entitled "**COVID-19 mediated a 40% increase in tropical deforestation**" to be considered for publication as a "Report" in *Science*.

The international press has broadly reported the relaxation of environmental enforcement in tropical forests and the increase of illegal deforestation since the beginning of the COVID-19 pandemic, especially on Indigenous lands. Tropical deforestation is a complex and dynamic process that can change rapidly, and a quantitative picture of the possible effects of COVID-19 mediated societal changes on tropical deforestation is still lacking. Understanding COVID-19 impact on deforestation is crucial, given the reciprocal interplay with infectious disease emergence, climate change, and biodiversity loss. However, this major research challenge has not yet been addressed and requires disentangling COVID-19 impacts from the key confounding factors likely to affect interannual behavioral forest conversion responses and then identifying which areas and land-use regimes have been preferentially impacted by the pandemic.

In this paper, we estimated changes in deforestation across the tropics in the four weeks immediately following governmental confinement measures to control COVID-19 spread. We based our analyses on a robust analytical approach, the Difference-in-Differences (DiD) method, and accounted for key confounding factors likely to affect interannual behavioral forest conversion responses.

We found that COVID-19 mediated an increase in tropical deforestation of 3,339 ± 300 km² (41.5 ± 6%) during the first month of the pandemic, relative to a predicted 2020 no-COVID-19 deforestation scenario (i.e., 'relative difference'). COVID-19-mediated deforestation converted approximately 24.6 ± 2.2 Tg of aboveground carbon stock and would erode 42% of the reduction in CO2 emissions resulting from shifts in energy demand resulting from COVID-19 confinements. This impact was mostly driven by higher COVID-19-mediated deforestation in Africa (96% rel. diff.), as deforestation increased significantly, but less markedly (~20% rel. diff.), in the Americas and the Asia-Pacific regions. However, the smaller relative difference resulting from COVID-19 mediated deforestation in the Americas masked the footprint of deforestation leakage mediated by the pandemic into conservation hotspots and protected areas (~30% rel. diff.), and especially into Indigenous lands (~60% rel. diff.). While the impacts mediated by the COVID-19 pandemic on tropical deforestation were quite variable and spatially heterogeneous, the area of promoted deforestation was roughly three times higher than that of avoided deforestation. In this context, conserving tropical forests and protecting Indigenous lands from invasions and deforestation should be strategic global responses to the COVID-19 pandemic.

We hope you agree that this is a robust study of broad international importance that merits publication in Science, in order to bring our findings to the highest level of world attention and to help to guide effective actions in times of unprecedented challenges to humanity.

We declare that the enclosed work has not been published or accepted for publication and is not under consideration for publication in another journal or book. This submission has been approved by all relevant authors and institutions, and all persons entitled to authorship have been so named.

We look forward to receiving your response to our submission.

Sincerely,

Pedro Brancalion, on behalf of all the co-authors