Economic pressures of Covid-19 lockdowns result in increased timber extraction within a critically endangered region: a case study from the Pacific Forest of Ecuador

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Abstract

Although the COVID-19 lockdowns in 2020 had some environmental benefits, the pandemic's impact on the global economy has also had conservation repercussions, especially in biodiverse nations. Ecuador, which is heavily reliant on petroleum, agricultural exports, and ecotourism, experienced a rise in poverty in response to pandemic shutdowns. In this study, we sought to quantify levels of illegal timber extraction and poaching before and after the start of COVID-19 lockdowns throughout two protected areas (Reserva Jama Coaque [JCR] and Reserva Bosque Seco Lalo Loor [BSLL]) in the endangered Pacific Forest of Ecuador. We analyzed chainsaw and gunshot acoustic data recorded from devices installed in the forest canopy from December 2019 to March 2020 and October 2020 to March 2021. Results from generalized linear mixed effects models indicated less chainsaw activity before lockdowns (post.lockdown = 0.571 + 0.196 SE, p-value = 0.004), although increased average rainfall also seemed to negatively affect chainsaw activity (avg.rainfall = -0.005 + 0.001 SE, p-value < 0.001). Gunshots were too infrequent to conduct statistical models; however, 87% of gunshots were detected during the 'lockdown' period. Observational data collected by rangers from these protected areas also noted an increase in poaching activities beginning mid to late 2020 and persisting into 2021. These results add to the steadily growing literature indicating an increase in environmental crime, particularly in biodiverse nations, catalyzed by COVID-19-related economic hardships. Identifying areas where environmental crime increased during pandemic lockdowns is vital to address both socioeconomic drivers and enforcement deficiencies to prevent further biodiversity loss and disease outbreaks and to promote ecosystem resilience. Our study also demonstrates the utility of passive acoustic monitoring to detect illegal resource extraction patterns, which can inform strategies such as game theory modeling for ranger patrol circuits and placement of real-time acoustic detection technologies to monitor and mitigate environmental crimes.

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