REPLY TO WAMPLER ET AL.:

Deforestation and biodiversity loss should not be sugarcoated

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We determined that Haiti has less than 1% of its original primary (virgin) forest and will likely lose it all in the next two decades at the current rate (1). We focused on primary forest because of its close connection with species survival (2). The letter by Wampler et al. (3) mostly discusses peripheral issues not bearing on our conclusions, such as the extent and classification of forest in Haiti that is not primary forest and perceptions by policymakers. We disagree on all points, especially their suggestion that alarming conclusions should have a positive spin.

In our analysis, we mapped the entire country and did not do a "national extrapolation" as claimed, and made statistical—not subjective—extrapolations of future forest distribution. While it is possible that some of the earliest primary forest we defined is old secondary forest, this is unlikely based on its location and our use of ground-based verification. Even if true, it would mean that there is less primary forest in Haiti than we estimated, not more. Similarly, the exact percentage of Haiti covered with primary forest, before humans arrived, is not pertinent. Even using the lowest value (35%) noted by Wampler et al. (3), Haiti would still have <1% remaining and our conclusions would be unchanged.

We tested several methods to derive annual composite images, including dry-season medoid, wet-season medoid, annual medoid, and annual maximum normalized difference vegetation index. Although the different compositing approaches provided slight differences in absolute values of primary forest for a given year, the trajectories of primary forest loss were nearly identical across approaches. Because the annual medoid yielded more stable images across the time series, it is unlikely that our reporting of primary forest trends based on that method is biased, as suggested by Wampler et al. (3).

Wampler et al. (3) refer to our exclusion of other forest types, but these types were not relevant because the bulk of biodiversity is in the primary forest. For the same reason, their discussion of reforestation misses our point that loss of primary forest leads to extinction. Those extinct species will not reappear if denuded mountaintops are reforested. Although not mentioned by Wampler et al. (3), expansion of the last patches of primary forest through planting of native trees could slow or stop the mass extinction. Reforestation also could help prevent further extinctions of species that do not require primary forest.

We do not apologize that our results on the primary forests and biodiversity of Haiti are cause for alarm. Our surveys suggest that endemic species have been lost along with primary forest and that a mass extinction of biodiversity is underway, with evidence that protected areas are not slowing the deforestation. Wampler et al. (3) argue that these conclusions, being so alarming, will have "negative policy reverberations and implications globally." We disagree and believe that sugarcoating the truth is unacceptable. It could lead to delayed mitigation efforts, more environmental damage, and more extinctions. The best and most-effective policies will follow from unbiased conclusions.

1 Hedges SB, Cohen WB, Timyan J, Yang Z (2018) Haiti's biodiversity threatened by nearly complete loss of primary forest. *Proc Natl Acad Sci USA* 115:11850–11855.
2 Alroy J (2017) Effects of habitat disturbance on tropical forest biodiversity. *Proc Natl Acad Sci USA* 114:6056–6061.
3 Wampler PJ, Tarter A, Bailis R, Sander K, Sun W (2019) Discussion of forest definitions and tree cover estimates for Haiti. *Proc Natl Acad Sci USA*, 10.1073/pnas.1901163116.

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