

CORRESPONDENCE

Enforcement Evasion Highlights Need for Better Satellite-Based Forest Governance

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Abstract

Our recent article, “Are Brazil’s Deforesters Avoiding Detection?” demonstrated that focusing illegal deforestation enforcement on the subset of forest monitored by the flagship PRODES system has caused PRODES to capture a declining share of deforestation in the Brazilian Amazon. Deforesters may be purposively seeking out forests not monitored for enforcement. Addressing the problem would help Brazil maintain a cutting-edge forest governance model worthy of transfer to other nations. Two commentaries questioned our decision to investigate solely PRODES and not additional government monitoring systems. We focused on PRODES because it is the most salient deforestation monitoring system. Other key deforestation monitoring systems are all either limited to the same monitoring footprint as PRODES, not used for enforcement, or are rarely used for measuring forest loss in the Brazilian Amazon. We do agree with the commentaries that Brazil’s new satellite monitoring protocol for greenhouse gas emissions estimation is critical progress of the type we were advocating in our original article.

Brazil earned praise for reducing the PRODES deforestation rate in the Amazon Biome from 2008 to 2013. However, we (Richards, Arima, VanWey, Cohn, & Bhattarai, 2016) demonstrated that two systems monitoring more of the Amazon’s forests showed no rate reduction in the period. Two additional studies corroborated our finding, each finding a similar amount of cryptic-to-PRODES forest disturbance (Barlow et al., 2016; Tyukavina et al., 2017). We suspect concentration of enforcement in forests monitored by PRODES prompted deforesters to target other forests including areas in the Amazon unmonitored by PRODES. Thus PRODES is no longer representative of Amazonian deforestation and enforcement evasion has rendered problematic interpretation of PRODES trends. Official deforestation rates must be reasonably certain, coverage reduces certainty, and some disturbance will always be cryptic to satellites (M. Bustamante et al., 2016). But advances now permit more comprehensive deforestation monitoring than PRODES. Dividing forest disturbance into PRODES-monitored vs cryptic to PRODES is antiquated.

Recent commentaries (M. M. C. Bustamante et al., 2017; Rajão, Moutinho, & Soares, 2017) found our methods “useful,” but questioned our focus on PRODES and not Brazil’s other government satellite forest monitoring systems. We focused on PRODES because of its unrivaled, but unwarranted salience. The PRODES deforestation rate: was the basis for Norway’s billion dollar deforestation performance payment to Brazil; annually attracts widespread international publicity; and is oft-used to characterize Brazil as a model for successful forest governance (Nepstad et al., 2014). The other systems discussed by both Bustamante et al. and Rajão et al. (Table 1) either are not used for enforcement (and therefore have no bearing on our enforcement evasion argument), monitor the same forest subset as PRODES, or aren’t publicly known. With one exception¹, those products which are used for enforcement monitor no greater a subset of Amazon forest than PRODES. This exception was not publicly known before Bustamante et al. (2017) and thus might not have triggered (much) evasion.

Table 1 Monitoring systems highlighted by Rajão *et al.* (2017) and Bustamante, *et al.* (2016), and their respective coverage, availability and usage

Data product	Coverage	Public	Enforcement	Deforestation estimates	GHG accounting
PRODES	Primary forest in Amazon biome	X	X	X	
DETER	Same extent as PRODES	X	X		
DEGRAD	Same extent as PRODES	X	X		
DETER-B	Same extent as PRODES	X	X		
System X ¹	Same extent as PRODES, higher res		X		
TerraClass Amaz.	PRODES deforestation	X			
TerraClass Cerrado	Entire Cerrado biome	X			
3rd National Com.	Brazil				X

¹It is unclear if, when, how, and to what extent System X may have triggered evasive behavior. Bustamante *et al.* state that the capability to perform finer resolution monitoring has existed since 2005, but it was ambiguous in their comment when this information began being supplied to enforcement officials. And even if this communication were implemented during our study period, we might not expect it to have triggered as much evasion as PRODES both because it did not influence all types of enforcement (some enforcement is tied to the official PRODES deforestation rate) and because it had not been revealed publicly to be an enforcement input until the Bustamante *et al.* comment.

We do join the commentaries in heralding improvements to the comprehensiveness of forest monitoring for terrestrial GHG accounting in Brazil. While our article was being finalized, Brazil revised its plan for accounting for deforestation emissions. The revised plan extended a PRODES-like deforestation monitoring approach to other biomes and over the entire Brazilian Amazon. The official results of the new system, however, are not publicly available, the methods divulged are insufficient for replicability, and estimates are not annual (Ministry of Science and Technology of Brazil 2016). Thus, the system is of limited use including for vital functions such as tracking the annual deforestation rate.

Ending deforestation requires high quality enforcement data combined with independent, rigorous evaluation of governance efficacy. There are many options for technologically and institutionally strengthening enforcement and evaluation. Our original article suggested that one such option is to ensure separation between deforestation evaluation and enforcement. We therefore hope that the proposal for the Environment Ministry to hire a monitoring contractor (Stokstad 2017) does not lead to a closer relationship between enforcement and evaluation.

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