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Brazil's Highway BR-319 demonstrates a crucial lack of environmental governance in Amazonia

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Brazil's Amazon rainforest is being rapidly degraded by logging and forest fires, as well as by droughts that are increasing under a changing climate that both favours forest fires and kills trees even without fire (Aleixo et al. 2019). Although deforestation is well known, greenhouse gas emissions from forest degradation are also very large, and in 2016 they accounted for 38% of the total forest carbon loss in the Brazilian Amazon (Walker et al. 2020). The southern and eastern edges of the Brazilian Amazon is already heavily deforested and degraded (Fearnside 2017), but in the western portion of the region the forest is still almost entirely intact. However, forest degradation is shifting to the western portion of the Brazilian Amazon (Matricardi et al. 2020), which includes the area impacted by Highway BR-319. Here, we present evidence of forest degradation associated with illegal logging and mining in the highway's 'middle section' (Supplementary Appendix S1, available online), indicating the lack of governance even before the area has experienced the increased pressures that would result from reconstructing BR-319.

BR-319 was built in 1972/1973 and officially inaugurated in 1976, but the road was abandoned by the Ministry of Transport in 1988 due to its lack of economic viability. Today, the proposed reconstruction of BR-319 is one of the Brazilian government's priority projects (Ferrante & Fearnside 2019). With the BR-319 reconstruction and the opening of the planned roads that would branch off from this highway, the deforested area has been projected to increase by over 1200% by 2100 as compared to the area that had been cleared by 2011 (dos Santos Junior et al. 2018).

Fifteen years ago, the danger of unrealistic 'governance scenarios' for Brazil's proposed Amazonian highways was highlighted (Fearnside 2006). Since then, the assertions by highway proponents that the severe environmental and social impacts of these infrastructure projects would be avoided because government agencies and/or non-governmental organizations would bring governance and sustainable development to the affected areas have repeatedly proven to be false (e.g., Fearnside 2015). Despite the legal inconsistencies (Appendix S1), Brazil is now set to embark on what is probably the most consequential of all of its many Amazonian plans: the reconstruction of Highway BR-319.

Illegal logging

We made observations on BR-319 in two research modules of the Biodiversity Research Program of Brazil's National Institute for Research in Amazonia (PPBio/INPA) at 10 points experiencing forest degradation from logging (Fig. 1(a)). We observed disturbances in these plots such as drag trails, uprooted trees, damaged tree crowns and clearings, as well as log-storage decks, tree stumps left from logging and trees marked for cutting in the near future (Fig. 1(b)). The logging does not comply with the procedures and parameters for legal forest-management projects (Brazil, MMA 2009).

These logging areas show no signs of the required directed-felling techniques that avoid knocking down trees that are either not planned for harvesting or that are protected by law, nor are the logging trails and roads planned. The required planning of trails and roads in legal management projects is designed to reduce the impact of soil compaction that can last for decades (Dearmond et al. 2019). The stumps and logs we observed did not have tags, which are required to allow later identification of the origin of the wood.

Vila Realidade, a *vila* (town) near the southern end of the highway stretch to be reconstructed, sprung up with the arrival of two busloads of organized *sem-terras* (landless farmers) in *c.* 2004 (Fearnside & Graça 2006). A continuous flow of individual *posseiros* (squatters) subsequently expanded the occupation of the surrounding land and increased the population of the town. Occupied government land surrounding the town has been legalized as an official settlement project, and the area has been designated as a 'district' in the municipality (county) of Humaitá. An audit of the BR-319 'maintenance' project by the Federal Audit Court highlighted the Realidade area as a new frontier for logging, with a large amount of illegal logging and unauthorized transport of logs, according to information from the Brazilian Institute for the

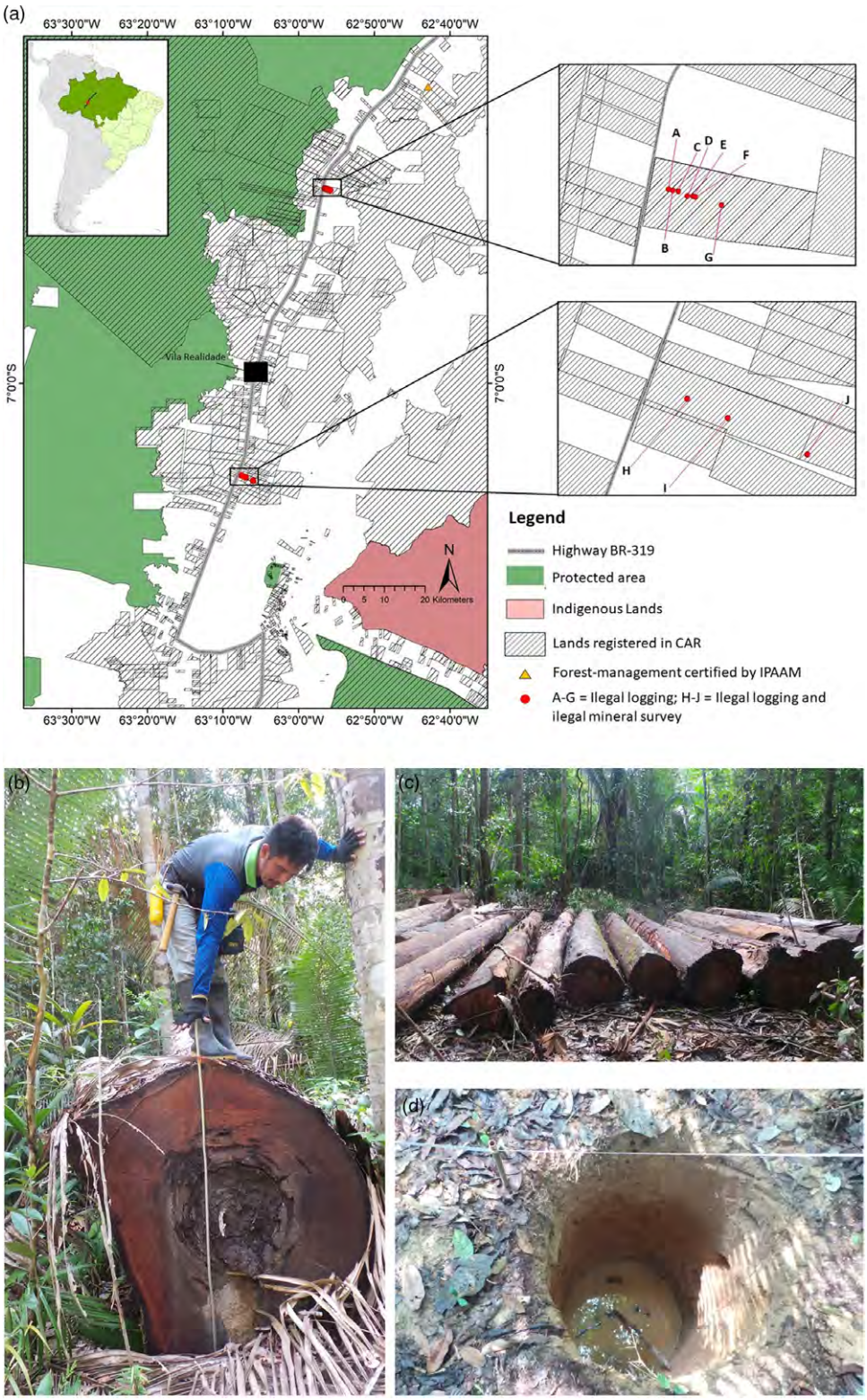

Fig. 1. (a) Map of Highway BR-319 and the location of illegal logging and mining documented here; (b) an illegally cut log; (c) a log-storage deck; and (d) a pit dug by gold prospectors.

Environment and Renewable Natural Resources (IBAMA) and the Chico Mendes Institute for Biodiversity (ICMbio) (Brazil, TCU 2020).

In 2018, migrants who settled along BR-319 in the Realidade district were interviewed by the *Folha de São Paulo* newspaper. One of the migrants indicated that, in addition to livestock, he had a forest-management project with a licence issued by the environmental agency of the state government of Amazonas (IPAAM) and that he did not have a land title (Appendix S1). This implies that IPAAM violated Brazilian regulations that require proof of land ownership as a precondition for approving forest-management plans (Brazil, MMA 2006). We also found areas with forest-management licences granted by IPAAM along BR-319 that did not have a Rural Environmental Registry

(CAR; *Cadastro Ambiental Rural*, the registry of rural properties in Brazil) entry, which is also mandatory for forest management (IPAAM 2011).

Forest management in the Brazilian Amazon often serves as a form of subterfuge that allows illegally harvested timber to appear legal through the practice known as 'heating up wood', where wood from illegal logging is camouflaged as volume credits from legal forest management (Brancalion et al. 2018). This is easier if the locations are in close proximity, and IPAAM's public data indicate forest-management plans approved by the agency less than 20 km from the points of illegal logging visited in the present study.

The fact that the areas of logging authorized by IPAAM do not have land titles and CARs and are close to the areas of illegal logging brings into question the legitimacy of the timber industry. In view of national and global concerns regarding climate mitigation, it is essential that the economic activities in the area that is being opened to exploitation by BR-319 comply with environmental laws that are intended to keep forest standing and healthy over the long term. For this to occur, it is necessary that government authorities certify that legal requirements are met. Otherwise, the approval of forest management will continue to function as an engine for degradation through predatory logging. Greater enforcement is needed if legal timber industries are to be financially sustainable, since illegal activity competes unfairly in the market with legal forest management.

Illegal mining

Mining poses significant risks to Brazil's Amazonian forests (Sonter et al. 2017). The current president of Brazil has encouraged both corporate mining projects and *garimpeiros* ('wildcat miners') in the Amazon region, including those invading indigenous lands, thereby increasing land conflicts and forest destruction (Ferrante & Fearnside 2019, 2020). At the president's request, the Ministry of the Environment has punished IBAMA officials and inspectors for carrying out repression measures on illegal mining in indigenous land (Appendix S1). In the present study, we observed exploratory ore pits at 3 of the 10 sampled points (Fig. 1(c)) – these are pits that are dug to evaluate the mineral potential of the site. The agency responsible for granting, storing and managing data and information on any mining and prospecting activity is the National Mining Agency (Brazil, PR 2017). However, no records of the points we observed are contained in the agency's Geographic Mining Information System (Brazil, ANM 2020). The presence of exploratory pits indicates a plan to intensify mining activity by illegal actors. Given the ongoing dismantling of the country's environmental inspection agencies by the federal government, mining activities have increasingly become a risk to the environment in Brazilian Amazonia and to the region's traditional peoples (Ferrante & Fearnside 2019). This is particularly worrisome along BR-319 because gold miners in Humaitá (with the help of local politicians) set fire to the offices of IBAMA and ICMbio in 2018 (Appendix S1), once again showing a total lack of governance in this part of Amazonia.

Conclusion

We present evidence that Highway BR-319 in its current state is already leading to forest degradation along its route and that governance in the area is essentially non-existent. Under these circumstances, the reconstruction of BR-319 and the building of planned connecting roads would act as spearheads for deforestation and forest degradation in the western portion of the Brazilian Amazon. The proposed reconstruction project should not be approved until governance is in fact established both in the area along the highway route and in the other areas to which migration would flow. This process will take years and will require fundamental changes in the control of activities such as logging and mining, as well as addressing the underlying issues that lead to deforestation and forest degradation when Amazonian highways are built.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/S0376892921000084

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Conflict of interest. None.

Ethical standards. None

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Appendix S1- Supplementary Material

Brazil's Highway BR-319 shows crucial lack of environmental governance in Amazonia

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LEGAL INCONSISTENCIES

Bidding has been opened for one segment of Highway BR-319 (Lot 'C': kms 177.8 to 250. Note: BR-319's km 0 is at the Manaus end of the Highway), even though it lacks the Environmental Impact Study and Report (EIA/RIMA) that is required by Brazilian legislation (Brazil, Justiça Federal da 1ª Região 2020, Ferrante & Fearnside 2020). In the case of another section (the 'middle section': kms 250.00 to 655.70) the bidding has not yet been opened, but preparations for the start of the construction are proceeding quickly despite the EIA/RIMA that has recently been prepared for this section still being under analysis by licensing agency, the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA). The EIA/RIMA must be approved before either the bidding or the construction work can legally be done, but in Brazil there is a long tradition of many laws being ignored or circumvented, especially when powerful interests are involved (e.g., Rosenn 1971).

Neither of these segments could legally be constructed without consulting affected indigenous peoples as required by ILO Convention 169 (ILO 1989) and the corresponding Brazilian law (Decree No. 10,088, of 5 November 2019; formerly Decree No. 5051, of 19 April 2004) (Brazil, PR 2004, 2019). These require the prior, free and informed consent of Indigenous and Traditional Peoples, and this consent must be obtained not only before the beginning the construction project itself but also before the decision on whether or not the project should be built (e.g., Brazil, DNIT 2020, p. 27; Fearnside 2020a, Ferrante et al. 2020). The project also lacks a Technical, Economic and Environmental Feasibility Study (EVTEA), which is also legally required (Law 5917/1973 art. 3, paragraph i): Brazil, PR 1973, Brazil, TCU 2016, 2018).

Despite this scenario of legal inconsistencies and environmental risks the deforestation and the building of illegal side roads are already occurring along the BR-319 route, even in areas of traditional indigenous use (Fearnside et al. 2020a,b). Political pressure to rebuild BR-319 is high, and interested parties argue (fallaciously) that territorial governance would be able to contain the migration of illegal actors, such as loggers, land grabbers (*grileiros*) and wildcat miners (*garimpeiros*).

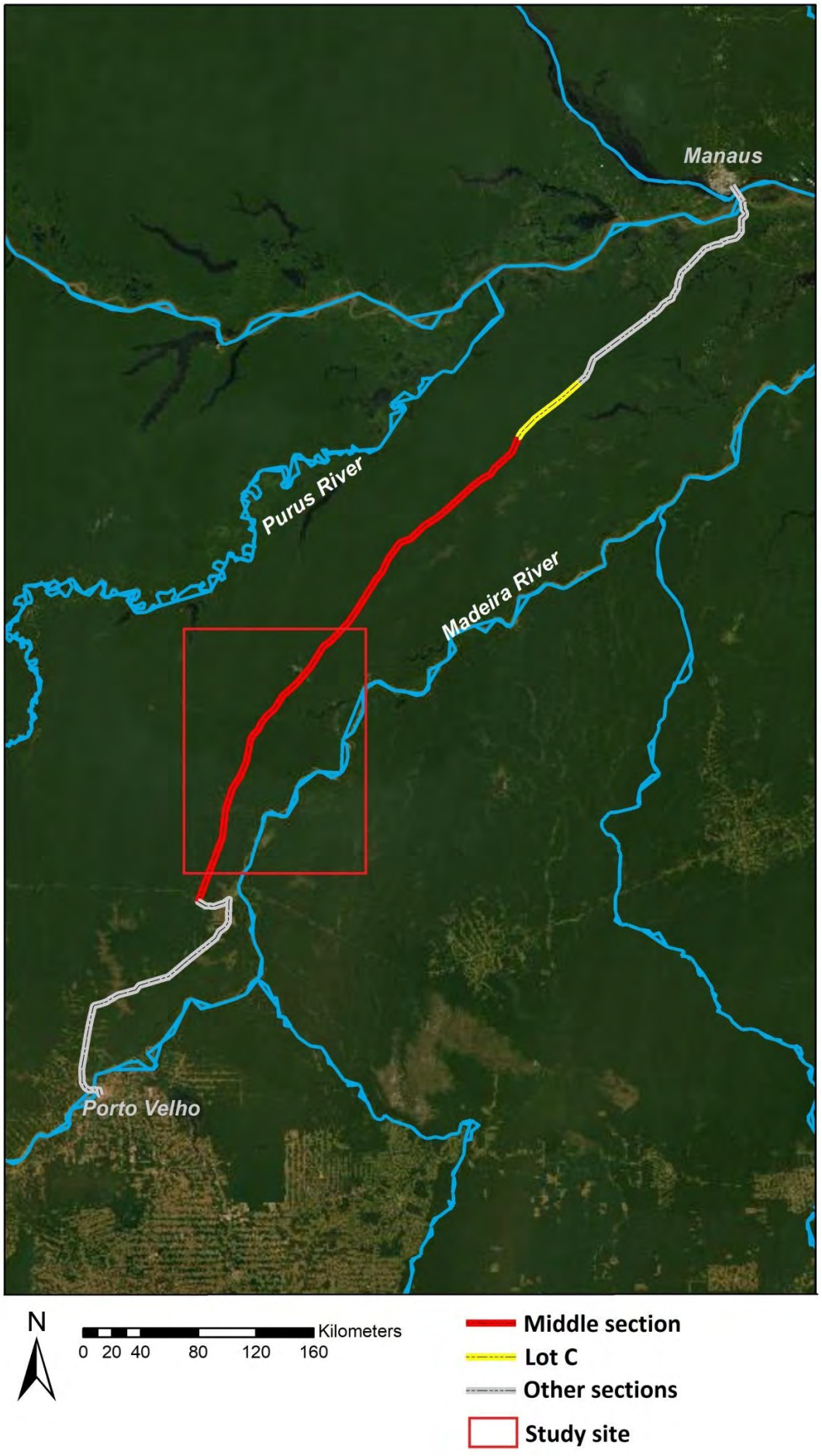
A LAWLESS LAND

Migration of deforestation actors to the BR-319 area is occurring in synergy with the lack of governance. This is particularly worrying along BR-319 because in 2018 gold miners in Humaitá (with the help of local politicians) set fire to the offices of IBAMA and ICMbio (Farias 2018), once again showing a total lack of governance in this part of Amazonia.

That same year and in the same municipality (county), migrants who settled along the BR-319 in Realidade district were interviewed by the *Folha de São Paulo* newspaper. One of the migrants indicated that, in addition to livestock, he had a forest-management project with a license issued by the environmental agency of the state government of Amazonas (IPAAM) and that he did not have a land title (Maisonnave & Almeida 2018).

Even with clear problems of inspection and punishment of illegal actors. Brazil is taking the opposite path, decreasing command-and-control in the Amazon. At the president's request, the Ministry of the Environment has punished IBAMA officials and inspectors for carrying out repression measures on illegal mining in indigenous land (Gonzales 2020).

Figure 1. Diagrammatic map of BR-319 with the administrative sections of the highway and study site.



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