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1 **Land grabbing on Brazil's**
2 **Highway BR-319 as a spearhead**
3 **for Amazonian deforestation**

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26 **Abstract:** Brazil faces its greatest period of environmental setback, where “ruralists”
27 (large landholders and their representatives) gain access to government land in the
28 Amazon. New roads are being paved, such as Highway BR-319 connecting Porto Velho
29 in Brazil’s notorious “arc of deforestation” to Manaus in relatively intact central
30 Amazônia. This highway acts as a spearhead penetrating one of the Amazon’s most
31 preserved forest blocks. Here we report how land grabbing (*grilagem*) is associated with
32 illegal logging in the Amazon on one of the new frontiers of illegal logging in
33 Amazonas via the BR-319 highway. Evidencing the illegality, lack transparency and
34 control of the territorial order that allows access to public lands through a consolidated
35 invasion with environmental infractions such as illegal logging and deforestation in a
36 lawless land This is not just a process linked to the highway, as it also involves the
37 actions of government agencies such as the National Institute for Colonization and
38 Agrarian Reform (INCRA). Illegal logging is rampant and areas of government land are
39 being marked out by land grabbers (*grileiros*) for illegal sale to arriving migrants. In
40 addition to poor control and inspection by the agencies, which do not receive funding to
41 perform their functions, the legal process despite environmental legislation requiring an
42 environmental impact assessment (EIA) for “Lot C.” which is one of stretches where
43 deforestation is advancing on public land, a judge has authorized paving this stretch
44 without an EIA while deforestation advances, against the proper environmental
45 legislation. Opening BR-319 and its associated side roads represents a path with no
46 return to a tipping point of self-degradation and loss of Amazonia’s vital biodiversity
47 and climate-stabilization functions under lack of assistance from scrapped territorial and
48 environmental control agencies

49

50 **Keywords:** Amazon rainforest; conservation units; Indigenous lands; land-use policy;
51 land invasion; land titling; environmental impact; environmental legislation; road
52 ecology; tropical forest

53

54

55 **Introduction**

56

57 **Amazonia threatened by Brazil’s president**

58

59 Brazil’s current presidential administration has weakened and dismantled
60 environmental and Indigenous agencies to favor “ruralists” (large landholders and their
61 representatives) (Ferrante & Fearnside, 2019). Pressures have increased on the Amazon,
62 where longstanding threats, such as cattle ranches (Fearnside, 2005), soy plantations
63 (Fearnside, 2001), mines (Sontter et al., 2017; Ferrante & Fearnside, 2020a) and
64 hydroelectric dams (Lees et al., 2016) are augmented by plans for new roads and
65 monoculture expansion for large-scale biofuel production (Ferrante & Fearnside, 2018,
66 2020b). President Jair Bolsonaro took office on 1 January 2019, and between January
67 2019 and January 2020 deforestation in Brazilian Amazonia increased 74% compared to
68 the same period in the previous year (Fonseca et al., 2020). Annual deforestation rates
69 during the Bolsonaro administration exceed the annual deforestation rates observed in
70 the biome over the last 12 years (INPE, 2021), reflecting the reversal in the public
71 policies for protection of the Amazon.

72

73 President Bolsonaro has claimed that foreigners, especially Chinese, are
74 planning to occupy the Amazon, and this argument has been central to justifying his
75 own plans to occupy the region by building roads and stimulating agribusiness (Dias,
76 2019). The president's discourse has stimulated illegal deforestation, burning, invasions
77 of conservation units (protected areas for biodiversity) and Indigenous lands, as well as
78 attacks on environmental inspection agents (Ferrante & Fearnside, 2019, 2020a;
79 Hanbury, 2019; HRW, 2019). COVID-19 and militarization of environmental control
80 now provide smokescreens for these events (Ferrante & Fearnside, 2020c). A boom in
81 the market for bulldozers indicates a scenario of more deforestation ahead due to the
82 expansion of agribusiness (ClimaInfo, 2020). Cumulative deforestation in Brazilian
83 Amazonia has already reached a level that is approximately at the limit that the forest
84 can tolerate without crossing a “tipping point” leading to environmental collapse
85 (Lovejoy & Nobre, 2018; Walker, 2021).

86 87 **Land grabbing**

88
89 A series of measures that facilitate land grabbing has been promoted by Brazil’s
90 president with support from the ruralist voting-block in the National Congress (See
91 Supplementary Material). “Land grabbing” (*grilagem*) in Brazil refers to illegal
92 appropriation of large areas of government land (almost always under Amazon
93 rainforest), after which these areas are often “regularized” (frequently by corrupt means)
94 and, with or without “regularization,” the areas are usually later subdivided and sold
95 (Brito et al., 2019). Note that this differs from the use of the term in Africa or Asia,
96 where “land grabbing” refers to buying up of local agricultural land by foreign interests
97 for export crops (Oliveira et al., 2021). In Brazil, land grabbers (*grileiros*) often hire
98 gunslingers (*pistoleiros*) to violently expel any small farmers or other claimants
99 (Fearnside, 2008).

100
101 On 10 December 2019 President Bolsonaro issued a provisional measure (MP-
102 910), which allowed legalizing land claims up to 15 fiscal modules (1500 ha in
103 Amazonia) through a mere “self-declaration” of ownership and, with the exception of
104 special cases where there are indications of infractions, without any form of on-site
105 inspection (PR, 2019). This has the effect of legalizing “land grabbing” in the Amazon
106 (Branford & Borges, 2019). MP-910 was in effect for 120 days, after which the
107 provisional measure was transformed into a proposed law (PL-2633/2020) (Câmara dos
108 Deputados, 2020). When passed, this will be the third “land grabbers’ law,” the first
109 two, in 2004 and 2017, having successively eased the restrictions on regularizing illegal
110 land claims (Fearnside, 2020). Rodrigo Maia, the president of the Chamber of Deputies
111 who allowed MP-910 to expire, did not allow either this bill or the bill (PL-191/2020)
112 submitted to the National Congress by President Bolsonaro that would open Indigenous
113 lands to mining, dams and agribusiness to be brought to the floor for a plenary vote.
114 This suddenly changed on 1 February 2021 when the presidencies of both houses of the
115 National Congress were won by the “Centrão” coalition of political parties that supports
116 Bolsonaro on issues related to the “ruralist” agenda, making rapid approval likely
117 (Ferrante & Fearnside, 2021). Similarly, a bill in the senate (PL-510) is moving forward
118 that would also legalize claims based on self-declaration and without inspection
119 (Senado Federal, 2021). The maximum area that can be legalized per claimant has
120 successively increased: from 100 ha to 1500 ha in 2009 and to 2500 ha in 2017
121 (Fearnside, 2021).

122 **Highway BR-319 a spearhead for Amazonian deforestation**

123

124 One of the ways to give access to land for expansion of agribusiness in the
125 Amazon is reconstruction of Highway BR-319 connecting Porto Velho in the state of
126 Rondônia, to Manaus in the state of Amazonas, thus linking the “arc of deforestation” to
127 vast areas of intact forest (Ferrante & Fearnside, 2019, 2020d; Mataveli et al., 2021;
128 Andrade et al., 2021; Ferrante et al., 2021). The highway was built in the early 1970s
129 and abandoned in 1988. A proposed reconstruction of the “middle section” of the
130 highway has yet to be approved – a first environmental impact assessment (EIA) was
131 submitted in 2009 and rejected as completely inadequate, and a second EIA was
132 submitted in 2020 and is rapidly progressing towards approval under strong political
133 pressure. In 2014 a means of circumventing the EIA requirement was found that would
134 allow a “maintenance” program for the road; the program has made the road passable,
135 although not paved, and has caused a substantial environmental impact (Fearnside,
136 2018). The “maintenance” program was announced in 2014 and began in practice in
137 2015 (Meirelles et al., 2018). In practice, this program is not restricted to
138 “maintenance,” having also replaced bridges with new ones compatible with the
139 planned reconstruction and upgraded the road in various ways that facilitate migration
140 of deforestation actors. Bus service between Manaus and Porto Velho was reestablished
141 in 2017, with the exception of the rainiest months.

142 It has been estimated that BR-319 and planned side roads will generate an
143 increase of the deforested area by more than 1200% by 2100 in the region between the
144 highway and Brazil’s border with Peru (dos Santos Júnior et al., 2018). The planned
145 AM-366 road would connect to BR-319, opening this “Trans-Purus” region to entry of
146 land-grabbers and other actors (Fearnside et al., 2020). AM-366 would traverse a vast
147 area of undesignated public land (*terras devolutas*), which is the category that is most
148 vulnerable to land grabbing (Azevedo-Ramos et al., 2020). The 15 December 2020
149 approval by the Brazilian Senate of a proposed law allowing foreign companies and
150 individuals to buy rural land (Senado Federal, 2020) could further increase pressure on
151 this critical area.

152 Reconstructing the highway was a campaign promise by then presidential
153 candidate Bolsonaro (Ferrante & Fearnside, 2019). BR-319 was abandoned due to lack
154 of economic viability, and it still lacks an economic-viability study (EVTEA). The
155 reconstruction project also lacks the consultation with Indigenous peoples required by
156 International Labour Organization (ILO) Convention 169 and by Brazilian Law No.
157 10,088/2019 (formerly No. 5051/2004), with at least 63 officially recognized
158 Indigenous lands impacted (Ferrante et al., 2020a). Two sections of the highway are to
159 be reconstructed: the “middle section” (km 250 to km 655) and “Lot C” (km 198 to km
160 250). On 5 August 2020 DNIT submitted the EIA for the “middle section” of Highway
161 BR-319 to IBAMA, and, after analyzing the report, IBAMA requested complementary
162 information in February 2021. DNIT announced that it would have this information by
163 the end of March, and, although delayed, the process will undoubtedly be completed
164 soon.

165 Unlike the “middle section,” the “Lot C” stretch never had an EIA prepared,
166 despite a unanimous court decision on 15 December 2014 that an EIA is constitutionally
167 required for this section (TRF-1, 2015). On 28 January 2019 a judicial decision rejected
168 a request by DNIT to remove the embargo on reconstructing “Lot C” without an EIA
169 (TRF-1, 2019). Nevertheless, on 24 June 2020 DNIT opened bidding for reconstructing
170 “Lot C” (DNIT, 2020), and on 20 August a judge rejected a request to suspend the
171 bidding made by the Federal Public Ministry (Campinas, 2020). The Federal Public
172 Ministry is a public prosecutor’s office created by Brazil’s 1988 constitution to defend

173 the rights of the people, including the right to an “ecologically balanced environment.”
174 DNIT’s simply ignoring the requirement for an EIA was characterized by the Federal
175 Public Ministry as being in “bad faith” (Ferrante & Fearnside, 2020d). On 30 June 2020
176 the Federal Public Ministry submitted a suit requesting the court to halt the bidding for
177 “Lot C” (JF, 2020), but the case languished in the hands of one of the judges, a contract
178 was signed with a construction firm in December 2020, and finally on 1 March 2021 a
179 decision was rendered upholding the original prohibition of reconstructing “Lot C”
180 without an EIA, thus suspending the construction contract (Campinas, 2021; TRF-1,
181 2021). Coincidentally the decision was rendered just 10 days after a publication by the
182 present authors (Ferrante et al., 2021) exposing this situation. Politicians in Manaus
183 were vociferous in criticizing the judge responsible (Elander, 2021), and on 7 April
184 2021 the head of Brazil’s Superior Court of Justice reversed the decision and allowed
185 reconstruction of “Lot C” to go forward (STJ, 2021).

186 The 7 April 2021 decision releasing the reconstruction of “Lot C” was given by
187 Judge Humberto Martins, who maintains a close relationship with the Bolsonaro family,
188 and on 23 April 2021 one of the president’s sons revealed in an interview that Martins is
189 one of the two top candidates to be Bolsonaro’s appointee to fill a seat on Federal
190 Supreme Court that will become available on 5 July 2021 (Carvalho & Giovanaz,
191 2021). Among his decisions favorable to the Bolsonaro family, Humberto Martins
192 requested, on his own initiative, an investigation into the “disciplinary conduct” of the
193 judge who is responsible for prosecuting the “Queiroz” case, which is one of the biggest
194 corruption scandals surrounding the Bolsonaro administration and the president’s family
195 (Onofre, 2020). As a prominent campaign promise, reconstructing Highway BR-319 is
196 a personal priority for president Bolsonaro (Ferrante & Fearnside, 2019).

197 The motivations for judicial support for circumventing environmental legislation
198 are unknown. Coincidentally, judge Martins justified his decision using the same
199 fallacious talking points that have been employed by politicians in Manaus, such as that
200 the highway is urgently needed to allow oxygen transport to Manaus in the COVID-19
201 pandemic (STJ, 2021). The political convenience of blaming the January 2021 oxygen
202 crisis in Manaus on the lack of BR-319 is clear, as this argument frees the local
203 authorities of responsibility for not having arranged in a timely manner for oxygen
204 shipments by the normal freight route (barges coming up the Amazon River from
205 Belém) despite having over two months’ notice that oxygen supplies would be
206 insufficient (Fearnside et al., 2021).

207 The judicial decision granting clearance for reconstructing and paving “Lot C”
208 without an EIA was based on the argument that lack of the road represents a serious
209 harm to public order, security, economy and health (STJ, 2021). The data from the
210 present study show that these justifications are fallacious, since the “maintenance”
211 program and the promise of paving have increased environmental crimes and the
212 insecurity of traditional peoples in the areas affected by Highway BR-319. Invasion of
213 the Apurinã do Igarapé São Jorge Indigenous Land and an illegal side road crossing the
214 Apurinã do Igarapé Tauamirim Indigenous Land are examples (Fearnside et al., 2020a),
215 as is an illegal side road from BR-319 entering an extractive reserve used by the Mura
216 Indigenous people (Fearnside et al., 2020b).

217 The economic justification is also fallacious, since economic and logistical
218 studies show that transporting freight to São Paulo by Highway BR-319 would be more
219 expensive than other modes (Teixeira, 2007; Fleck, 2009). The public-safety argument
220 is contradicted by the illegal deforestation that has increased along the highway as the
221 road has become more passable, as we show in this paper. Improvement of the highway
222 has also been accompanied by increasing illegal logging (Andrade et al., 2021). This is

223 also a factor that impacts industry according to the Federation of Industries of the State
224 of Amazonas (FIEAM) (MPF, 2020).

225 The justification for reconstructing the highway to guarantee public health is not
226 supported, since expenditure on the highway would be much higher than the cost of
227 improving the health systems in the municipalities (counties) along the highway. Paving
228 the highway does not ensure conditions for improvement of the health system. The
229 precarious state of public health systems in municipalities that are interconnected by
230 highways in the Amazon is well known (Sawyer, 2001).

231 The present study aims to show that the current lack of enforcement of
232 environmental and Indigenous legislation and the overturning of judicial decisions
233 requiring environmental studies for both sections of Highway BR-319 that are planned
234 for reconstruction make this highway a spearhead for deforestation in one of the most
235 preserved regions of the Amazon. Land grabbing, which is already underway, is central
236 to this deforestation process.

237

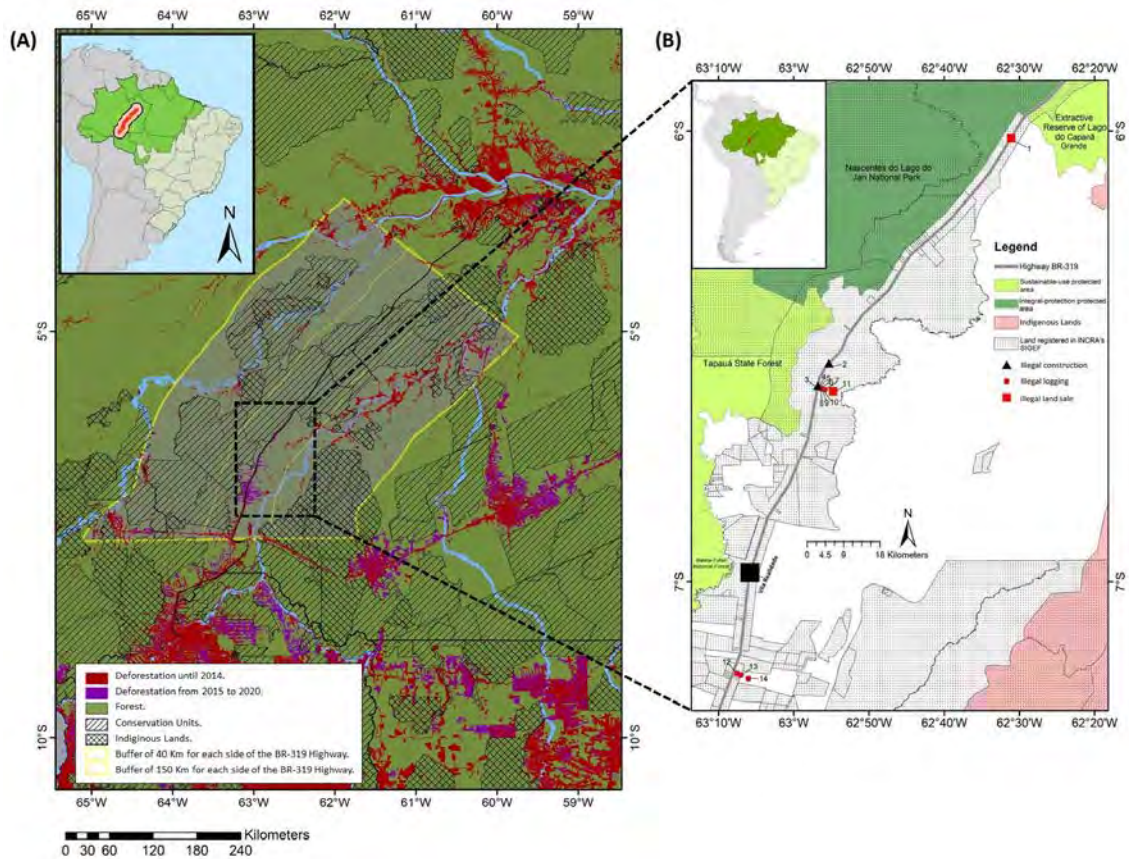
238 **Methods**

239

240 To assess deforestation along Highway BR-319 we used data from the
241 Deforestation Monitoring Project in the Brazilian Amazon (PRODES) of Brazil's
242 National Institute for Space Research (INPE, 2021) for buffers of 40 km and 150 km on
243 each side of the road for the "middle section and "Lot C" (Figure 1A). To test whether
244 Highway BR-319 influences deforestation we compared the annual deforestation rates
245 in the Brazilian Amazon as a whole with the rates in the two buffers. Comparison with
246 Brazilian Amazonia as a whole allows the effect of the highway to be differentiated
247 from the region-wide variations in deforestation rate stemming from economic and
248 other factors. We standardized the annual deforestation rate for each of the three
249 categories (Brazilian Amazon, 40-km buffer and 150-km buffer) in relation to the area
250 of each category, creating an index of deforestation proportional to the area. The trends
251 in deforestation rates for each area were quantified by linear regression and the slopes of
252 the regression lines were compared using the t-test. This allows determining whether the
253 change in deforestation rate with time in the three categories differed during the period
254 since the BR-319 "maintenance" program began in 2015. Deforestation in this period
255 would have influence from both the "maintenance" program itself and the promise of
256 reconstructing and paving the highway. Deforestation along BR-319 in this period
257 would reflect the land grabbing and migration that have been stimulated by improved
258 access and by the political promises of highway reconstruction.

259 We documented 14 sites of illegal deforestation on the "middle section" of
260 Highway BR-319 that we observed *in loco* in 2019 (Figure 1B), and we compared these
261 observations with public data from the Land-Tenure Network (*Malha Fundiária*)
262 database of the National Institute of Colonization and Agrarian Reform (INCRA) and
263 with and the agency's Land-Tenure Management System (SIGEF: *Sistema de Gestão*
264 *Fundiária*) and the Rural Environmental Registry (CAR). The INCRA land-tenure
265 database consists of information from the titling and regularization process
266 (georeferencing, registration in the SIGEF, an INCRA evaluation and a "descriptive
267 memorial" that includes data on applicants and supervisors). Our understanding of the
268 land-occupation process and possible land conflicts also comes from informal
269 conversations with actors active in deforestation and land grabbing, in addition to
270 community members of traditional and Indigenous populations in or near the affected
271 areas.

272

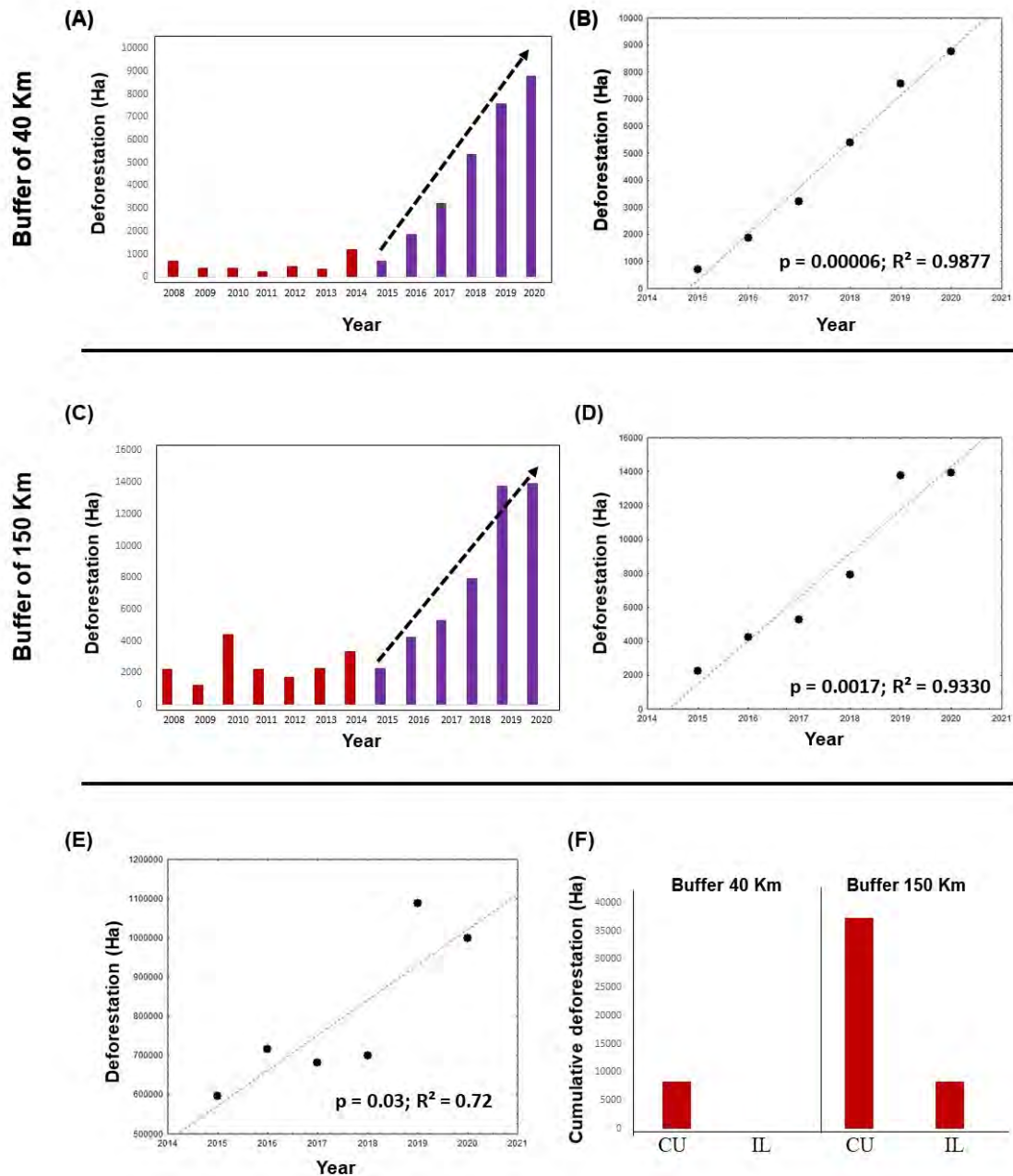


273
 274 Figure 1. (A) Cumulative deforestation along Highway BR-319 from 1988 to 2020
 275 (PRODES data). Deforestation in red represents cumulative deforestation from
 276 1988 to 2014 before the highway “maintenance” program began. Deforestation
 277 in purple represents cumulative deforestation from 2015 to 2020 (i.e., during the
 278 “maintenance” program). (B) Points with land grabbing, illegal logging, illegal
 279 mineral prospecting and illegal land sales observed on Highway BR-319.
 280 Numbers in the figure are described in Table 2. The inset map of South America
 281 shows Brazil’s “Amazon Biome” region in green, Highway BR319 as a black
 282 line, and the area of the larger map as a red rectangle.
 283

284 Results and Discussion

285
 286 For the entire BR-319 highway 89,328 ha was deforested between 1988 and
 287 2020 within the 40-km buffer, and 300,116 ha was deforested when considering the 150
 288 km buffer. After the highway “maintenance” program began in 2015, PRODES data
 289 show highly significant increases in deforestation for both the 40-km ($p = 0.00006$; $R^2 =$
 290 0.98) and 150-km ($p = 0.0017$; $R^2 = 0.93$) buffers (Figure 2A-D), indicating that the
 291 increase in deforestation is linked to the “maintenance” program and to the political
 292 promise of reconstructing and paving the highway. For the 150-km strip, deforestation
 293 had been falling over the 2010-2013 period that immediately preceded the
 294 “maintenance” program (Figure 2C). The increase in deforestation can be attributed to
 295 the “maintenance” program and to the promise of paving the highway because, when
 296 the deforestation trend within a given distance from the road (either 40 km or 150 km)
 297 is compared with the trend in the entire Brazilian Amazon, the areas of influence of the
 298 highway have higher rates of growth of deforestation as shown by the slopes of linear
 299 regressions, and deforestation in the BR-319 area increased steadily over the entire
 300 2015-2020 period, while for Brazilian Amazonia as a whole the deforestation rate

301 remained at a much lower level until it jumped in 2019 and 2020 under the influence of
 302 the Bolsonaro administration (Figure 2).



303
 304 Figure 2. (A) Annual deforestation within 40 km of Highway BR-319. (B) Annual
 305 deforestation in a 40-km buffer for each year of the highway's “maintenance”
 306 period. (C) Annual deforestation within 150 km of the highway. (D) Annual
 307 deforestation in the 150-km buffer for each year of the highway's “maintenance”
 308 period. (E) Annual deforestation in the entire Brazilian Amazon. (F) Cumulative
 309 deforestation in conservation units (CUs) and Indigenous lands (ILs).

310
 311 The comparison of the slopes of the linear regressions showed that the 40-km
 312 buffer had a deforestation rate 2.5 times higher than the rate in the Brazilian Amazon
 313 as a whole ($p = 0.02$). The deforestation rate in the 40-km buffer was also significantly
 314 greater than that in the 150-m buffer ($p = 0.00005$) (Table 1). This shows that the
 315 “maintenance” program and the promise of paving “Lot C” and the “middle section”

316 have influenced deforestation within 40 km of the highway, this increase in
 317 deforestation being much higher than both that observed for the interfluvium between the
 318 Purus and Madeira Rivers (the 150-km buffer) and the deforestation rate for the entire
 319 Brazilian Amazon.

320

321 **Table 1. Comparison of deforestation rates in the areas of influence of Highway**
 322 **BR-319 in relation to the Brazilian Amazon as a whole.**

	BRAZILIAN AMAZON	150-KM BUFFER	40-KM BUFFER
SLOPE:	0.0175	0.0178	0.0449
YEARS (N):	6	6	6
SE (REGRESSION):	0.0226	0.0100	0.0105
SE (SLOPE):	0.0054	0.0024	0.0025
Comparison between the areas			
	Amazon vs. 150-km buffer	Amazon vs. 40-km buffer	40-km buffer vs. 150-km buffer
DIFFERENCE:	0.0004	0.0274	0.0270
SE (DIFFERENCE):	0.0059	0.0059	0.0035
T-STATistic	0.0621	4.6037	7.8002
p:	0.952	0.002*	0.00005*

323 * Significant values.

324

325 Deforestation has been stimulated by the “maintenance” program beyond the 40-
 326 km distance that the environmental agency’s internal norms consider to be directly
 327 impacted for the purpose EIAs for Amazonian roads (MMA, 2011: Anexo II, 2015), and
 328 this “maintenance” program was not even considered sufficiently significant to be
 329 required to have an EIA. In the municipality (county) of Tapauá an illegal side road that
 330 begins beyond the 40-km range is currently progressing to connect to BR-319, cutting
 331 through an Apurinã Indigenous land and a national park (Figure 3A-C; Fearnside et al.,
 332 2020). Deforestation is also occurring in conservation units and Indigenous lands
 333 (Figures 1A and 2F). In Indigenous lands this deforestation has been caused by
 334 invaders, as in the case of the Tapauá side road (Fearnside et al., 2020).



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Figure 3. Sign demarcating the Apurinã do Igarapé São João Indigenous Land and forest cut by land grabbers in the municipality of Tapauá. (B) Opening of an illegal side road to connect Tapauá to Highway BR-319; here the side road follows the edge of the Apurinã do Igarapé São João Indigenous Land, after which it crosses the Apurinã do Igarapé Tauamirim Indigenous Land and the Nascentes do Lago Jari National Park. (C) Deforestation by land grabbers inside the Apurinã do Igarapé São João Indigenous Land. (D) Illegal deforestation at Point 8 on Highway BR-319. (E) Illegal deforestation at Point 9 on Highway BR-319. (F) Deforestation carried out for the occupation and sale of land at Point 11 on Highway BR-319. Photos A-C by Chief Waldomiro of the Apurinã People; D-F by Maryane Andrade.

No significant deforestation, including that in Indigenous lands, has been caused by Indigenous people themselves, contrary to President Bolsonaro’s claim that Indigenous people are to blame for the recent surge in deforestation and fire in Amazonia (see Ferrante et al., 2020b). In addition, when comparing deforestation within protected areas, Indigenous lands, conservation units (in both the “integral protection” and “sustainable-use” categories) and military areas along BR-319, there is less deforestation in Indigenous lands than in the other protected-area types (Figure 2F), demonstrating that the Indigenous people have better protected their territory than the federal government.

By comparing field observations with INCRA data we found a pattern of illegal deforestation and illegal appropriation and titling. We also saw land grabbing, subdivision of deforested areas, intimidation and illegal constructions (Table 2, Figure 3 and Supplementary Material, Figure S1). All 14 points analyzed showed some type of irregularity, and actors with strong influence on land grabbing in the region were identified. We also observed a discrepancy between INCRA’s Land-Tenure Network

363 database (“*Malha Fundiária*”) and the agency's Land-Tenure Management System
364 (SIGEF: *Sistema de Gestão Fundiária*), showing that INCRA's public databases conflict
365 with the internal database. This clouds the land-titling process in the Amazon and
366 illustrates a general lack of transparency. According to INCRA's SIGEF, all of the plots
367 of land (“*glebas*”) in which Points 1 through 13 are located were submitted for
368 certification and were certified by INCRA after 2015. This was the year of the new
369 promise to reconstruct and pave Highway BR-319 (Meirelles et al., 2018). According to
370 INCRA's Land-Tenure Network, Points 4 to 11 had been titled in 1984 with title
371 delivery in 1988. However, these areas were only occupied after 2015 as indicated both
372 by satellite imagery and by the observations of INPA researchers who studied these
373 PPBio plots from 2015 onwards. One of the titles was issued in 2000 in the name a
374 person other than the original holder, and according to INCRA's SIGEF, the lot is held
375 by yet another person.

376

Table 2. Status of points observed on Highway BR-319

378

Reference number on the map (Figure 1)	Distance from the edge of the highway (m)	Type of infraction observed	Type of occupation
1	10	Illegal land sale*	Irregular
2	45	Illegal construction	Irregular
3	48	Illegal construction	Irregular
4	519	Illegal logging	Irregular
5	620	Illegal logging	Irregular
6	755	Illegal logging	Irregular
7	1,010	Illegal logging	Irregular
8	1,150	Illegal logging	Irregular
9	1,215	Illegal logging	Irregular
10	1,892	Illegal logging	Irregular
11	3,950	Illegal land sale *	Irregular
12	1,010	Illegal logging, illegal mineral prospecting	Irregular
13	2,115	Illegal logging, illegal mineral prospecting	Irregular
14	3,990	Illegal logging, ilegal mineral prospecting	Irregular

379 *These lots were being sold despite being government land. Even after obtaining a title from INCRA, sale is not legally permitted until the land
 380 has been occupied for an additional 10 years (PR, 2017).

381

382 Through informal conversations we identified an illegal invasion process at
383 Point 1, where the land was resold to the current occupants by a land-grabber's agent
384 who was responsible for deforesting the area. This area does not have any land-titling
385 record or even a request for titling in the SIGEF, and there is also no CAR. The same
386 land-grabber responsible for the invasion of Point 1 built two other houses on the side of
387 the road (Figure 1: Points 2 and 3); Point 2 has no land title or registration record and is
388 for sale. At Point 3, in conversation with the land-grabber's agent, he admitted the
389 invasions and that he lives in the house at this point, but it belongs to his *patrão* or
390 "boss" (i.e., the land-grabber himself) who lives in the city of Humaitá, this being the
391 person to whom the most recent titles of lots were granted and where Points 3 to 11 are
392 located. The "descriptive memorial" in INCRA's Land-Tenure Network indicates that
393 the title to the lot in which Point 3 is located was awarded by INCRA in 2018, with the
394 delivery of the title in 2019. The title to the lot and the record of delivery of the title by
395 INCRA can be found in INCRA's Land-Tenure Network.

396 The land-grabber's agent accompanied our team at Points 4 to 11 and, according
397 to him, he is aware of the illegalities that have been committed and said that he has
398 already been arrested and that a new arrest would only be a matter of time. However,
399 according to the SIGEF's descriptive memorial, the area where Points 4 through 11 are
400 located is not certified and lacks the required inspection to be eligible for titling; the
401 requests for titling are in the same name that appears for the landholding where Point 3
402 is located -- the presumed "boss" of the land-grabber's agent. This process is worrying
403 because it shows the advance of land grabbing and subsequent sale and deforestation on
404 the edges of Highway BR-319, which has the potential to expand deforestation on a
405 large scale affecting the forest's ecosystem services and the global climate (Fearnside,
406 2020; Fearnside et al., 2020).

407 At Points 4 to 10 we observed illegal logging, with trails for dragging the logs
408 and log-storage decks in the forest (Figure 3C-E). What is observed in the area does not
409 follow any of the criteria required for legal forest management (MMA, 2006). In
410 addition, Brazil-nut trees (*Bertholletia excelsa*) were being cut, which is prohibited (PR,
411 2006). The logging is carried out under the command of the land-grabber's agent
412 mentioned for Points 1 through 11. These areas are the locations of permanent plots for
413 monitoring fauna and flora by the PPBio-INPA program. The land-grabber's agent even
414 showed curiosity about the presence of researchers in the area and tried to intimidate
415 one of the researchers, always carrying a gun in his hands when walking on the trail. At
416 Point 11 we observed an invasion process with the removal of vegetation and
417 subdivision of the land for sale.

418 We observed that, for this section of BR-319, the land-grabber's agent has
419 invaded areas both on the edge of the highway and in land more distant from the road,
420 removing vegetation, building houses and reselling land, and that this agent has a "boss"
421 who has been acting to obtain land titles but does not live in any of the areas, as is
422 required by Normative Instruction No. 100 of 30 December 2019 (INCRA, 2019). It is
423 worrying that two different INCRA databases (the Land Register in INCRA's SIGEF
424 and "land-tenure network" "*malha fundiária*") present discrepancies in the name of the
425 landholder, demonstrating flaws in the system that can assist the land-grabbing process.

426 At Points 12, 13 and 14 we observed illegal logging and mineral prospecting.
427 According to the SIGEF descriptive memorial, the areas where Points 12 and 13 are
428 located are not certified and have their titles pending. Point 14 is located in government
429 land (*terras da União*) according to the Land Register in INCRA's SIGEF and in the

430 SIGEF descriptive memorial, although the area has a CAR, which characterizes an
431 attempt to declare occupation in order to request title.

432 According to Normative Instruction No. 100 of 30 December 2019 on land
433 regularization in Brazil, an applicant must prove that he or she occupies the area and
434 that there has been “direct, gentle and peaceful” productive use of the area by the
435 applicant or by his or her predecessors since before 5 May 2014 (INCRA, 2019). The 5
436 May 2014 limit was established on 15 March 2018 (PR, 2018), prior to which the limit
437 was 22 July 2008 (PR, 2009). The term “direct” means that the claimant himself or
438 herself must be living on the land in question, which is not the case for most large land-
439 grabbers, as we observed here. The date requirement is also not met for areas we
440 observed *in loco*, where the first deforestation occurred after 2014. According to
441 INCRA’s land-tenure network database, many areas are larger than the 2500-ha limit
442 established in 2019 for land regularization (INCRA, 2019).

443 INCRA’s Normative instruction No. 100 specifies that a prior on-site inspection
444 (*vistoria prévia*) is mandatory prior to regularization if the land claim in question shows
445 signs of fraudulent “fractioning” (subdivision into smaller land claims to fit within the
446 legal limits on area) or if there are no signs of human occupation prior to 5 May 2014
447 (INCRA, 2019). All of these conditions barring land regularization were observed in the
448 area of the present study.

449 For Points 1 to 11 we identified actions by the same land-grabber’s agent, with 9
450 of these points being georeferenced. These sites were spread over a distance of 150 km.
451 This land-grabbing agent told one of us that he sells land on behalf of his “boss” in
452 Humaitá (the municipal seat) and offered to sell us land for R\$3000 (US\$729.92) per
453 hectare if located beside Highway BR-319 and for only R\$20 (US\$4.86) per hectare if
454 located at a distance from the highway, provided that the buyer cuts down the forest and
455 occupies the site. Such a low value per hectare exposes his probable real intentions:
456 establishing initial occupations and clearings in the area at a distance from the road so
457 that the remaining land can be sold to later arrivals at a much higher price, and also
458 increasing occupation of areas both near and far from the road as *faits accomplis* in
459 order to obtain political support for legalizing much larger areas. The land-grabber’s
460 agent stated that his goal is to deforest and populate the entire area along Highway BR-
461 319, presumably referring to the sparsely occupied “middle section” that extends for
462 406 km.

463 According to presidential decree of 2009 and Normative Instruction No. 100 on
464 land regularization in Brazil, it is required that there be a public consultation prior to
465 land regulation in “areas of social interest,” as is the case for BR-319. Social-interest
466 status was determined by the Federal Public Ministry. We observed an area for which
467 INCRA had issued titles dated 2 August 2018 that had not had a public consultation,
468 which indicates that the titles are illegal. In addition to the public hearing, all land
469 regularization in an “area of social interest” after 15 March 2018 is required to be
470 approved at a meeting of a group of agencies that includes the Ministry of the Economy,
471 the National Foundation of the Indian (FUNAI), the Brazilian Forest Service (SFB) and
472 the state environmental agencies (PR, 2018), but no such meeting has been held to date
473 and no regularization has been approved by the group.

474 The processes of occupation and land grabbing are intrinsically linked to the
475 beginning of highway “maintenance” program in 2015, since the locations of the
476 deforestation that we visited and georeferenced were in lots that had received approval
477 in INCRA’s SIGEF after 2015. Titles currently being granted by INCRA are in
478 violation of the agency’s own regulations because granting these titles violates the legal

479 parameters that INCRA established in 2009 and maintained in the subsequent versions
480 issued in 2018 and 2019 (PR, 2009, 2018; INCRA, 2019), making these titles illegal.

481 One of the political arguments for the paving of the BR-319 highway is that the
482 highway would improve access for inspections and thus restrain environmental
483 infractions, but we show that the opposite effect is more likely: greater traffic is
484 responsible for land invasion and deforestation. This is already apparent on the BR-319
485 where a highway “maintenance” program has spurred deforestation but not resulted in
486 governance to control environmental crimes (Santos, 2020).

487 The results described here show that the titling of illegal land claims on BR-319
488 intensified after the paving plans were announced. This suggests that paving will not
489 bring governance, but rather will increase deforestation and land grabbing in the region.
490 While titling of illegal land claims is often portrayed as a means of slowing
491 deforestation by removing the motivation to clear in order to justify titles, a recent study
492 using satellite data to document deforestation in 10,647 landholdings between 2011 and
493 2016 shows clearly that the opposite effect has resulted from Brazil’s “*Terra Legal*”
494 land-titling program, with titled small and medium landholders increasing their
495 deforestation and large landholders being unaffected (Probst et al., 2020). Reforms to
496 approve land regularization by the federal government reward those who have
497 committed environmental crimes and stimulate land grabbing by creating the
498 expectation of future pardons (Fearnside, 2020b; Maisonnave & Almeida, 2020).

499 On 2 December 2020 the Ministry of Agriculture (MAPA) and INCRA
500 published a joint ordinance that will outsource to the Brazilian municipalities the
501 process of land regularization of federal government land (MAPA & INCRA, 2020).
502 The ordinance is an incentive to land grabbing in the region, since municipal
503 governments in Brazilian Amazonia are often complicit in environmental crimes. For
504 example, the government of one of the municipalities along BR-319 (Tapauá) has been
505 using its bulldozers to open an illegal side road connecting to the highway, cutting
506 through an Indigenous land and a national park (Fearnside et al., 2020). In 2018 in the
507 municipality of Humaitá (which encompasses the southern portion of Highway BR-
508 319), the mayor and members of the municipal council were arrested for their
509 involvement in an attack that set fire to the local offices of IBAMA and of the Chico
510 Mendes Institute of Biodiversity (ICMbio) (Farias, 2018).

511 In addition to the illegal processes observed in the present study, Brazilian
512 legislation has been violated by government actions such as an official call for bids and
513 subsequent signing of a contract with a construction company for paving “Lot C”
514 without environmental studies being completed, putting the region's biodiversity and
515 ecosystem services at risk (Ferrante & Fearnside, 2020d; Ferrante et al., 2021). Such
516 actions need to be revoked and not repeated. Given that the lower court decision
517 requiring environmental studies for “Lot C” has now been overturned by the head of the
518 Superior Court of Justice, the option that remains is an appeal to the Federal Supreme
519 Court. This would be justified given the unprecedented environmental collapse that
520 reconstructing BR-319 could cause, especially in the absence of environmental studies
521 and consultation with Indigenous peoples (Ferrante et al., 2021).

522 The data from the present study show that “Lot C” and the “middle section” are
523 being targeted by specialized land-grabbing gangs and that illegal land claims have
524 often gained recognition by INCRA, which is the agency responsible for inspecting and
525 preventing illegal occupations. The bidding and construction contract for “Lot C”
526 without prior environmental studies and consultation with Indigenous peoples must be
527 questioned, and the involvement of federal deputies and judges merits investigation by
528 the appropriate authorities.

529 It is also necessary to immediately suspend the ordinance published on 2
530 December 2020 (MAPA & INCRA, 2020) that outsources to municipalities the
531 regularization of claims to federal government land because it can be expected to
532 greatly increase the legalization of land that is being illegally occupied in the Amazon,
533 such as the areas claimed through the land grabbing documented in the present study.
534 The involvement of public authorities in the process of legalizing irregularly occupied
535 areas adds to the need to suspend the paving and maintenance of Highway BR-319 until
536 environmental and economic-feasibility studies have been completed and approved for
537 both the “middle section” and “Lot C” and the consultation of all impacted Indigenous
538 peoples has been carried out.

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545 **References**

- 546 Andrade M, Ferrante L & Fearnside PM (2021) Brazil's Highway BR-319 demonstrates
547 a crucial lack of environmental governance in Amazonia. *Environmental*
548 *Conservation*. <https://doi.org/10.1017/S0376892921000084>
549
- 550 Azevedo-Ramos C, Moutinho P, Arruda VLS, Stabile MCC, Alencar A, Castro I &
551 Ribeiro JP (2020) Lawless land in no man’s land: The undesignated public
552 forests in the Brazilian Amazon. *Land Use Policy* 99: art. 104863.
553 <https://doi.org/10.1016/j.landusepol.2020.104863>
- 554 Branford S & Borges T (2019) Bolsonaro’s Brazil: 2019 brings death by 1,000 cuts to
555 Amazon — part one. *Mongabay*, 30 December 2019.
556 <https://news.mongabay.com/2019/12/bolsonaros-brazil-2019-brings-death-by-1000-cuts-to-amazon-part-one/>
557
- 558 Brito B, Barreto P, Brandão Jr A, Baima S & Gomes PH (2019) Stimulus for land
559 grabbing and deforestation in the Brazilian Amazon. *Environmental Research*
560 *Letters* 14: art. 064018. <https://doi.org/10.1088/1748-9326/ab1e24>
561
- 562 Câmara dos Deputados (2020) PL 2633/2020, Câmara dos Deputados, Brasília, DF,
563 Brazil. <https://bitly.co/6NJy>
- 564 Campinas F (2020) Juíza nega suspensão de edital para asfaltamento de trecho da BR-319.
565 *Amazonas Atual*, 20 August 2020. <https://amz.run/4TJ0>
566
- 567 Campinas F (2021) Justiça suspende licitação do governo Bolsonaro para pavimentação da BR-
568 319. *Amazonas Atual*, 2 March 2021. <https://amz.run/4U51>
569
570
571
572
573
574
575
576

577 Carvalho I & Giovanaz D (2021) Bolsonaro pode indicar ao STF ministro que pediu
578 investigação de juiz do caso Queiroz. *Brasil de Fato*, 23 April 2021.
579 <https://tinyurl.com/ewz97nm2>
580

581 ClimaInfo (2020) Mercado aquecido para tratores de esteira indica mais desmatamento
582 à frente. *ClimaInfo*, 1 June 2020. [www document]. URL: <https://bitly.co/4o83>
583

584 Dias T (2019) Movido a Paranoia: Documentos e áudios inéditos mostram planos de
585 Bolsonaro para povoar a Amazônia contra chineses, ONGs e igreja católica. *The*
586 *Intercept Brasil*, 20 September 2019. [www document]. URL:
587 <https://bitly.co/4o85>
588

589 DNIT (Departamento Nacional de Infraestrutura de Transportes) (2020) Aviso de
590 Licitação, RDC Eletrônico nº 216/2020. *Diário Oficial da União*
591 <https://bitly.co/5D0K>
592

593 dos Santos Júnior, M. et al. (2018) BR-319 como propulsora de desmatamento:
594 Simulando o impacto da rodovia Manaus-Porto Velho. Instituto do
595 Desenvolvimento Sustentável da Amazônia (IDESAM), Manaus, Amazonas,
596 Brazil. 54 pp. Available at: <https://bitly.co/4skH>
597

598 Elander, B. 2021. Juiz chamado de preconceituoso por senador do AM quanto à BR-319
599 responde: “é exigência”. *Rio Mar*, 8 March 2021. <https://bitly.co/6YB3>
600

601 Farias E (2018) Prefeito de Humaitá e vereadores são presos por envolvimento em
602 ataque a prédios do Ibama e ICMBio. *Amazônia Real*, 27 March 2018. [www
603 document]. URL: <https://amz.run/465k>
604

605 Fearnside PM (2001) Soybean cultivation as a threat to the environment in Brazil.
606 *Environmental Conservation* 28: 23-38.
607 <https://doi.org/10.1017/S0376892901000030>
608

609 Fearnside PM (2005) Deforestation in Brazilian Amazonia: History, rates and
610 consequences. *Conservation Biology* 19: 680-688.
611 <https://doi.org/10.1111/j.1523-1739.2005.00697.x>
612

613 Fearnside PM (2008) The roles and movements of actors in the deforestation
614 of Brazilian Amazonia. *Ecology and Society* 13: art. 23.
615 <http://www.ecologyandsociety.org/vol13/iss1/art23/>
616

617 Fearnside PM (2018) BR-319 e a destruição da floresta amazônica. *Amazônia Real* 19
618 October 2018. [www document]. URL: <https://amz.run/4SzB>

619
620 Fearnside PM (2020a) BR-319: The beginning of the end for Brazil's Amazon forest
621 (commentary). *Mongabay*, 3 November 2020. [www document]. URL:
622 <https://bitly.co/4skE>
623
624 Fearnside PM (2020b) Brazil's 'land-grabbers law' threatens Amazonia (commentary).
625 *Mongabay*, 25 May 2020. [www document]. URL: <https://bitly.co/4oUe>
626
627 Fearnside, P.M. (2021) Desmatamento ilegal zero, mais uma distorção do Bolsonaro.
628 *Amazônia Real*, 26 April 2021. [https://amazoniareal.com.br/desmatamento-](https://amazoniareal.com.br/desmatamento-ilegal-zero-mais-uma-distorcao-do-bolsonaro/)
629 [ilegal-zero-mais-uma-distorcao-do-bolsonaro/](https://amazoniareal.com.br/desmatamento-ilegal-zero-mais-uma-distorcao-do-bolsonaro/)
630
631 Fearnside PM, Andrade MBT & Ferrante L (2021) Brazil's BR-319: Politicians
632 capitalize on the Manaus oxygen crisis to promote a disastrous highway
633 (Commentary). *Mongabay*, 7 February 2021. [www document]. URL:
634 <https://bitly.co/6NOR>
635
636 Fearnside PM, Ferrante L & Andrade MBT (2020b) BR-319 illegal side road threatens
637 Amazon protected area, indigenous land (commentary). *Mongabay*, 27 March
638 2020. [www document]. URL: [https://news.mongabay.com/2020/03/br-319-](https://news.mongabay.com/2020/03/br-319-illegal-side-road-threatens-amazon-protected-area-indigenous-land-commentary/)
639 [illegal-side-road-threatens-amazon-protected-area-indigenous-land-commentary/](https://news.mongabay.com/2020/03/br-319-illegal-side-road-threatens-amazon-protected-area-indigenous-land-commentary/)
640
641 Fearnside PM, Ferrante L, Yanai AM & Isaac Júnior MA (2020a) Trans-Purus: Brazil's
642 last intact Amazon forest at immediate risk (commentary). *Mongabay*, 24
643 November 2020. [www document]. URL: <https://bitly.co/4o8J>
644
645 Ferrante L & Fearnside PM (2018) Amazon sugarcane: A threat to the forest. *Science*
646 359: 1476. <https://science.sciencemag.org/content/359/6383/1476>
647
648 Ferrante L & Fearnside PM (2019) Brazil's new president and "ruralists" threaten
649 Amazonia's environment, traditional peoples and the global climate.
650 *Environmental Conservation* 46: 261-263.
651 <https://doi.org/10.1017/S0376892919000213>
652
653 Ferrante L & Fearnside PM (2020a) Brazil threatens indigenous lands. *Science* 368:
654 481-482. <https://doi.org/10.1126/science.abb6327>
655
656 Ferrante L & Fearnside PM (2020b) The Amazon: Biofuels plan will drive
657 deforestation. *Nature* 577: 170. <https://doi.org/10.1038/d41586-020-00005-8>
658
659 Ferrante L & Fearnside PM (2020c) Military forces and COVID-19 as smokescreens for
660 Amazon destruction and violation of indigenous rights. *Die Erde* 151(4): 258-
661 263. <https://doi.org/10.12854/erde-2020-542>
662
663 Ferrante L & Fearnside PM (2020d) Amazon's road to deforestation. *Science* 369: 634.
664 <https://doi.org/10.1126/science.abd6977>
665
666 Ferrante L & Fearnside PM (2021) Brazil's political upset threatens Amazonia. *Science*
667 371: 898-899. <https://doi.org/10.1126/science.abg9786>
668

669 Ferrante L, Gomes M & Fearnside PM (2020a) Amazonian indigenous peoples are
670 threatened by Brazil's Highway BR-319. *Land Use Policy* 94: art. 104548.
671 <https://doi.org/10.1016/j.landusepol.2020.104548>
672

673 Ferrante L, Leite L, Silva Junior CA, Lima M, Coelho Junior MG, Fearnside PM
674 (2020b) Brazil's biomes threatened: President Bolsonaro lied to the world.
675 *Nature Ecology & Evolution Community*, 22 October 2020.
676 <https://tinyurl.com/yta3dcdk>
677

678 Ferrante L, Andrade MBT, Leite L, Silva Junior CA, Lima M, Coelho Junior MG, Silva
679 Neto EC, Campolina D, Carolino K, Diele-Viegas LM, Pereira EJAL, Fearnside
680 PM (2021) Brazil's Highway BR-319: The road to the collapse of the Amazon
681 and the violation of indigenous rights. *Die Erde*, 152(1): 65-70.
682 <https://doi.org/10.12854/erde-2020-552>
683

684 Fleck, L (2009) Eficiência Econômica, Riscos e Custos Ambientais da Reconstrução da
685 BR 319. Série Técnica, no. 17. Conservation Strategy Fund (CSF), Lagoa Santa,
686 Minas Gerais, Brazil. 53 pp. [https://www.conservation-](https://www.conservation-strategy.org/publications#.W1NKXvZFxMs)
687 [strategy.org/publications#.W1NKXvZFxMs](https://www.conservation-strategy.org/publications#.W1NKXvZFxMs).
688

689 Fonseca A, Cardoso D, Ribeiro J, Ferreira R, Kirchhoff F, Monteiro A, Santos B,
690 Ferreira B, Souza Jr C & Veríssimo A (2020) Boletim do desmatamento da
691 Amazônia Legal (janeiro 2020) SAD. Instituto do Homem e Meio Ambiente na
692 Amazônia (IMAZON), Belém, Pará, Brazil. [www document]. URL:
693 <https://bitly.co/4o8K>
694

695 Hanbury S (2019) Murders of indigenous leaders in Brazilian Amazon hits highest level
696 in two decades. *Mongabay*, 14 December 2019. [www document]. URL:
697 <https://bitly.co/4o8L>
698

699 HRW (Human Rights Watch) (2019) *Rainforest Mafias: How Violence and Impunity*
700 *Fuel Deforestation in Brazil's Amazon*. HRW, New York, USA. 163 pp.
701 Available at: <https://bitly.co/4o8O>
702

703 INCRA (Instituto Nacional de Colonização e Reforma Agrária) (2019) Instrução
704 Normativa N°100, de 30 de Dezembro de 2019, *Diário Oficial da União*, 31
705 December 2019, Edition 252, Section 1, p. 58 [www document]. URL
706 <https://bitly.co/4o8E>
707

708 INPE (Instituto Nacional de Pesquisas Espaciais) (2021) Projeto PRODES –
709 Monitoramento da Floresta Amazônica por Satélite. INPE, São José dos
710 Campos, SP, Brazil. Available at: <https://bitly.co/5JeS>
711

712 JF-1 (Justiça Federal da 1ª Região). 2020. Processo Judicial Eletrônico Número:
713 1016749-49.2019.4.01.3200. <https://amz.run/4DHd>" <https://amz.run/4DHdm>
714

715 Lees AC, Peres CA, Fearnside PM, Schneider M & Zuanon JA (2016) Hydropower and
716 the future of Amazonian biodiversity. *Biodiversity and Conservation* 25(3): 451-
717 466. <https://doi.org/10.1007/s10531-016-1072-3>.
718

719 Lopes W (2021) Justiça Federal libera obra em trecho da BR-319, que liga Manaus a
720 Porto Velho. *GI*. <https://tinyurl.com/a4n8wfpp>
721

722 Lovejoy TE & Nobre C (2018) Amazon tipping point. *Science Advances* 4: art.
723 eaat2340. <https://doi.org/10.1126/sciadv.aat2340>
724

725 Maisonnave F & Almeida L (2020) Esperança de regularização faz com que grileiros
726 transformem castanhais em pasto no AM. *Folha de São Paulo*, 26 July 2020,
727 Available at: <https://bitly.co/4o8Q>
728

729 MAPA & INCRA (Ministério da Agricultura & Instituto Nacional de Colonização e
730 Reforma Agrária). (2020) Portaria Conjunta N° 1, de 2 de dezembro de 2020.
731 [www document]. URL <https://bitly.co/4o8G>
732

733 Mataveli, G.A.V., Chaves, M.E.D., Brunzell, N.A., Aragão, L.E.O.C., 2021. The
734 emergence of a new deforestation hotspot in Amazonia. *Perspect. Ecol.*
735 *Conserv.* 19: 33–36. <https://doi.org/10.1016/j.pecon.2021.01.002>
736

737 Meirelles FA, Carrero GC, Neto JGF, Cenamo MC & Guarido PCP (2018) *Análise*
738 *Ambiental e Socioeconômica dos Municípios sob Influência da Rodovia BR-319*.
739 Instituto do Desenvolvimento Sustentável da Amazônia (IDESAM), Manaus,
740 Amazonas, Brazil. 113 pp. Available at: <https://bitly.co/4o8R>
741

742 MMA (Ministério do Meio Ambiente) (2006) Instrução Normativa n° 4, de 11 de
743 dezembro de 2006. MMA, Brasília, DF, Brazil. [www document]. URL
744 <https://bitly.co/4o8V>
745

746 MMA (Ministério do Meio Ambiente) (2011) Portaria Interministerial N° 419, de 26 de
747 outubro de 2011. 28 October 2011 (n° 208, Section 1, p. 81). *Diário Oficial da*
748 *União*. <https://bitly.co/6Ksi>
749

750 MMA (Ministério do Meio Ambiente) (2015) Portaria Interministerial N° 60, de 24 de
751 março de 2015. 25 March 2015 (n° 57, Section 1, p. 71). *Diário Oficial da*
752 *União*. <https://bitly.co/6Kso>
753

754 MPF (Ministério Público Federal) 2020. Gravação da XXII reunião do fórum
755 permanente de discussão sobre o processo de reabertura da rodovia BR-319.
756 Ministério Público Federal, 10 March 2020.
757

758 Oliveira GLT, McKay BM & Liu J (2021) Beyond land grabs: New insights on land
759 struggles and global agrarian change. *Globalizations* 18: 321-338,
760 <https://doi.org/10.1080/14747731.2020.1843842>
761

762 Onofre R (2020). Mudança no comando do STJ pode ajudar interesses de Flávio
763 Bolsonaro. *Folha de Pernambuco*, 28 August 2020. <https://tinyurl.com/rsxnv3c>
764

765 PR (Presidência da República) (2006) Decreto n° 5.975, de 30 de novembro de 2006.
766 PR, Brasília, DF, Brazil. [www document]. URL <https://bitly.co/4o8W>
767

768 PR (Presidência da República) (2009) Decreto nº 11.952, de 25 de junho de 2009. PR,
769 Brasília, DF, Brazil. [www document]. URL: <https://bityl.co/4skN>
770

771 PR (Presidência da República) (2017) Lei Nº 13.465, de 11 de julho de 2017. PR,
772 Brasília, DF, Brazil. [www document]. URL: <https://bityl.co/4spK>
773

774 PR (Presidência da República) (2018) Decreto nº 9.309, de 15 de Março de 2018. PR,
775 Brasília, DF, Brazil. [www document]. URL: <https://bityl.co/4sjr>
776

777 PR (Presidência da República) (2019) Medida Provisória Nº 910, de 10 de dezembro de
778 2019. PR, Brasília, DF, Brazil. <https://bityl.co/6NLA>
779

780 Probst B, BenYishay A, Kontoleon, A & dos Reis TP (2020) Impacts of a large-scale
781 titling initiative on deforestation in the Brazilian Amazon. *Nature Sustainability*
782 3: 1019–1026. <https://doi.org/10.1038/s41893-020-0537-2>
783

784 Santos I (2020) Grilagem faz floresta virar fumaça no maior estado brasileiro. *Deutsche*
785 *Welle*, 9 October 2020. [www document]. URL: <https://bityl.co/50Y2>
786

787 Sawyer D (2001) Evolução demográfica, qualidade de vida e desmatamento na
788 Amazônia. In: Fleischresser, V. (Ed.), *Causas e Dinâmicas do Desmatamento na*
789 *Amazônia*. Ministério do Meio Ambiente (MMA), Brasília, DF, Brazil, pp. 73–
790 90. 436 pp.
791

792 Senado Federal (2020) Projeto de Lei nº 2963, de 2019. Senado Federal, Brasília, DF,
793 Brazil. [www document]. URL: <https://bityl.co/4wDh>
794

795 Senado Federal (2021) Projeto de Lei nº 510, de 2021. Senado Federal. Brasília, DF,
796 Brazil. [www document]. URL: <https://bityl.co/6NKH>
797

798 Sonter LJ, Herrera D, Barrett DJ, Galford GL, Moran CJ & Soares-Filho BS (2017)
799 Mining drives extensive deforestation in the Brazilian Amazon. *Nature*
800 *Communications* 8: art. 1013. <https://doi.org/10.1038/s41467-017-00557-w>
801

802 STJ (2021) Suspensão de liminar e de sentença Nº 2897 - AM (2021/0078070-0).
803 Superior Tribunal da Justiça. <https://bityl.co/6Y9R>
804

805 Teixeira, K.M. (2007). *Investigação de Opções de Transporte de Carga Geral em*
806 *Conteineres nas Conexões com a Região Amazônica*. Doctoral thesis in transport
807 engineering. 235 pp. Universidade de São Paulo, Escola de Engenharia de São
808 Carlos, São Carlos, São Paulo, Brazil.
809 [https://teses.usp.br/teses/disponiveis/18/18137/tde-27112007-](https://teses.usp.br/teses/disponiveis/18/18137/tde-27112007-110022/publico/KARENINA_2007.pdf)
810 [110022/publico/KARENINA_2007.pdf](https://teses.usp.br/teses/disponiveis/18/18137/tde-27112007-110022/publico/KARENINA_2007.pdf).
811

812 TRF-1 (Tribunal Regional Federal da 1ª Região) (2015) Tribunal Regional da 1ª Região
813 TRF-1-Apelação Civil (AC) AC: 0005716-70.2005.4.01.3200. TRF-1, Manaus,
814 Amazonas, Brazil. <https://bityl.co/6NSN>
815

816 TRF-1 (Tribunal Regional Federal da 1ª Região) (2019) Numeração Única
817 005716.70.2005.4.01.3200. TRF-1, Manaus, Amazonas, Brazil.
818 <https://bitly.co/5D0R>
819
820 TRF-1 (Tribunal Regional Federal da 1ª Região) (2021) Tribunal Regional da 1ª
821 Região. Processo: 1029927-28.2020.4.01.0000 processo referência: 0005716-
822 70.2005.4.01.3200.TRF-1, Manaus, Amazonas, Brazil. <https://bitly.co/6YCE>
823
824 Walker RT (2021) Collision Course: Development Pushes Amazonia Toward Its
825 Tipping Point. *Environment: Science and Policy for Sustainable Development*
826 63(1): 15-25. <https://doi.org/10.1080/00139157.2021.1842711>

Supplementary Material

Land grabbing on Brazil's Highway BR-319 as a spearhead for Amazonian deforestation

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Attempts to “flexibilize” land titling to legalize land grabbing in the Amazon

On 5 February 2020, President Jair Bolsonaro submitted a proposed law (PL 191/2020) to the National Congress (Congresso Nacional, 2020). If passed (as is likely), it would open indigenous lands to mining activities and agribusiness for non-indigenous people, with disastrous consequences both for the indigenous people and for the Amazon forest (Ferrante & Fearnside, 2020). Brazil’s Indigenous Lands protect more Amazon forest than do federal conservation units (Nogueira et al., 2018).

A provisional measure (MP901) has been also presented by President Jair Bolsonaro, which would reduce the percentage of the areas of rural properties that Brazil’s Forest Code requires to be maintained as a “legal reserve” from 80% to 50% in the Amazonian states of Roraima and Amapá (Congresso Nacional, 2019). This would be likely to presage a similar change for other Amazonian states. Although this provisional measure has also expired, it is worrisome that a proposed law may be drafted to implement the same provisions, as in the case of MP910.

In addition to measures that facilitate land grabbing and encourage deforestation on public lands (Ferrante & Fearnside, 2019), the federal government has taken steps to open indigenous lands to agribusiness. Among these is Normative Instruction No. 9/2020 signed by the head of the National Foundation for the Indian (FUNAI) on 24 April 2020, which regulates the issuing of the “Declaration of Recognition of Limits” document, allowing occupation and even sale of areas in indigenous lands (Batista, 2020; FUNAI, 2020). Indigenous lands are under great pressure from agribusiness, loggers and mining (both by large enterprises and individual “wildcat” miners), and murders of indigenous leaders have increased substantially for this reason (Hanbury, 2019; HRW, 2019). Normative Instruction No. 9/2020 would regularize the invasion in indigenous lands and of the lands that are legally protected for other traditional peoples.

At a ministerial meeting on 22 April 2020, environment minister Ricardo Salles opined that the government should seize the “opportunity” presented by media’s attention being focused on the COVID-19 pandemic in order to approve “infra-legal” changes to regulations on the environment and on regularization of illegal land claims, calling for the government to “let the herd of cattle pass through,” the “cattle” referring to the changes to gut regulations (Youtube, 2020).

References

- Batista JP (2020) Funai edita medida que permite ocupação e até venda de áreas em Terras Indígenas. *Instituto Socioambiental*. Available at: <https://www.socioambiental.org/pt-br/blog/blog-do-ppds/funai-edita-medida-que-permite-ocupacao-e-ate-venda-de-areas-em-237-terras-indigenas>
- Congresso Nacional (2019) Medida Provisória nº 901, de 2019. Congresso Nacional, Brasília, DF, Brazil. Available at: <https://www.congressonacional.leg.br/materias/medidas-provisorias/-/mpv/139448>
- Congresso Nacional (2020) PL 191/2020. Câmara dos Deputados, Brasília, DF, Brazil. Available at:

<https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2236765>

Fearnside PM. (2020) Brazil's 'land-grabbers law' threatens Amazonia (commentary). *Mongabay*, 25 May 2020. [www document]. URL <https://bitly.co/4oUe>

Ferrante L & Fearnside PM (2019) Brazil's new president and "ruralists" threaten Amazonia's environment, traditional peoples and the global climate. *Environmental Conservation* 46: 261-263.
<https://doi.org/10.1017/S0376892919000213>

Ferrante L & Fearnside PM (2020) Brazil threatens indigenous lands. *Science* 368: 481-482. <https://doi.org/10.1126/science.abb6327>

FUNAI (Fundação Nacional do Índio). (2020) Instrução Normativa Nº 9, de 16 de abril de 2020. Diário Oficial da União, Edição 76, Seção 1, p. 32.
<https://bitly.co/50gH>

Hanbury S (2019) Murders of indigenous leaders in Brazilian Amazon hits highest level in two decades. *Mongabay*, 14 December 2019.
<https://news.mongabay.com/2019/12/murders-of-indigenous-leaders-in-brazil-amazon-hit-highest-level-in-two-decades>

HRW (Human Rights Watch) (2019) *Rainforest Mafias: How Violence and Impunity Fuel Deforestation in Brazil's Amazon*. HRW, New York, USA. 163 pp.
Available at:
https://www.hrw.org/sites/default/files/report_pdf/brazil0919_web.pdf

Nogueira EM, Yanai AM, Vasconcelos SS, Graça PMLA, Fearnside PM (2018) Brazil's Amazonian protected areas as a bulwark against regional climate change. *Regional Environmental Change* 18(2): 573-579.
<https://doi.org/10.1007/s10113-017-1209-2>

Youtube (2020). Reunião Ministerial em 22 de Abril, falas Ricardo Salles. Available at:
<https://www.youtube.com/watch?v=BWDemNNMbeU>

Map of land in the Rural Environmental Registry (CAR) in the study area

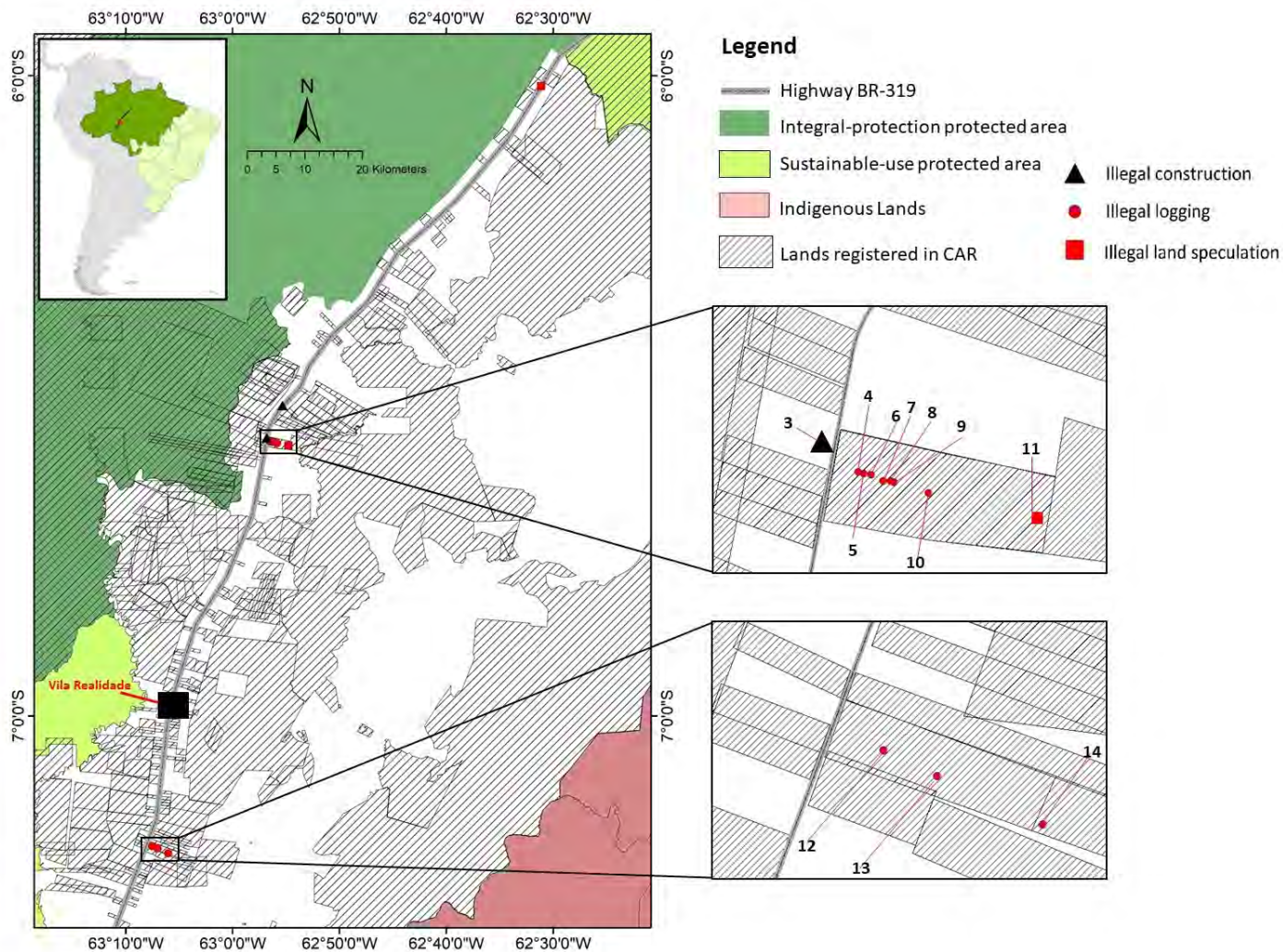


Figure S1 Land in the Rural Environmental Registry (CAR) in the study area. Numbers in the figure are described in Table 1 in the main text. The inset map of South America shows Brazil's "Amazon Biome" region in green, Highway BR319 as a black line, and the area of the larger map as a red rectangle.