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1 **Brazil's new president and "ruralists" threaten Amazonia's environment,**  
2 **traditional peoples and the global climate**

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13           Jair Bolsonaro, who took office on 1 January 2019 as Brazil's new  
14 president, has taken actions and made promises that threaten Brazil's Amazon  
15 forest and the traditional people who inhabit it. '*Ruralistas*' (hereafter 'ruralists'),  
16 namely the large landholders and their representatives who are a key part of the  
17 new president's political base (Sassine 2018), are advancing an agenda with  
18 environmental impacts that extend to the entire world. Our objective in this  
19 comment (including its supplementary material) is to summarize this agenda,  
20 recent events threatening Amazonia and its peoples, and some of the potential  
21 responses to these challenges.

22           Brazil's Atlantic Forest and *Cerrado* (central Brazilian savanna) biomes  
23 have now been almost completely taken over by agribusiness, with only 8 to  
24 11% remaining of the Atlantic Forest and 19 to 20% of the *Cerrado* (MapBiomias  
25 2019 and supplementary material). This makes ruralists turn their eyes towards  
26 the Amazon forest, threatening the region's biodiversity and traditional peoples,  
27 as well as regional and global climate (Fearnside 2017).

28           During his campaign, Jair Bolsonaro promised to abolish the  
29 Environment Ministry and pass its functions to the Agriculture Ministry (See  
30 supplementary material for sources for all statements and events mentioned in  
31 the text). Shortly after the election, influential ruralists convinced the new  
32 president not to extinguish the Environment Ministry because such a move  
33 might induce restrictions on Brazil's exports. Instead of abolishing the ministry  
34 outright, President Bolsonaro moved the deforestation-control sector of the  
35 Environment Ministry to the Agriculture Ministry, which is also headed by a  
36 ruralist. The sector dealing with climate change was abolished and its remaining  
37 functions were transferred to the Agriculture Ministry.

38           President Bolsonaro appointed as environment minister Ricardo Salles, a  
39 ruralist who had been the environment secretary for the state of São Paulo,  
40 where he essentially dismantled and neutered the agency (Guerra & Ribeiro  
41 2018, Rodrigues 2018). On 19 December 2018 he was condemned for  
42 "malicious" alteration of the zoning maps of an environmental protection area.  
43 Mr. Salles holds that observed climate change may be wholly natural and  
44 dismisses all discussion of global warming as "innocuous".

45           President Bolsonaro has repeatedly stated his desire to weaken  
46 environmental licensing (Fearnside 2018) and promised to remove licensing  
47 authority from IBAMA, the federal environmental agency that is part of the  
48 Environment Ministry (Soterroni *et al.* 2018). Weaker environmental controls are  
49 likely to lead to new disasters like the Mariana and Brumadinho mine-tailings  
50 dam ruptures (See supplementary material). The administration also removed  
51 from their posts the IBAMA superintendents in 21 of Brazil's 27 states. The  
52 Environment Ministry plans to establish a "nucleus" within the ministry to review  
53 and modify or annul fines issued by IBAMA. Under the current administration  
54 IBAMA has had the lowest performance in its history. IBAMA now often gives  
55 advanced warning of where it will carry out inspections for illegal deforestation,  
56 which has led to no punishment of the offenders despite 95% of the  
57 deforestation that occurred in the first three months of the presidential  
58 administration being illegal (MapBiomias 2019). Deforestation rates have  
59 surged, with the rate in June 2019 (the first dry-season month in the new  
60 presidency) up 88% over the 2018 rate in the same month (INPE 2019).

61           Ricardo Salles has been trying to pervert the Amazon Fund to indemnify  
62 deforestation for which Salles has granted amnesty. President Bolsonaro and

63 his Minister of Agriculture Tereza Cristina Dias propose “flexibilizing” the forest  
64 code, including extending deadlines for environmental recovery and changing  
65 the cutoff date for requiring landowners to restore natural vegetation in areas  
66 that they had illegally deforested in their “areas of permanent protection” and  
67 “legal reserves”. The result would be that many escape any consequence for  
68 past violations.

69 The new president has stated that not a single centimetre of land will be  
70 demarcated for indigenous peoples and that both “conservation units”  
71 (protected areas for natural ecosystems) and indigenous lands should be open  
72 to agriculture and mining. This is supported by ruralist legislators, who promote  
73 what is known as the “death agenda”. This includes suspending official listing of  
74 threatened species, rescinding restriction on hunting wild animals, “flexibilizing”  
75 environmental licensing, weakening environmental and regulatory agencies,  
76 promoting large infrastructure projects like highways and dams in Amazonia  
77 and allowing use of pesticides that are banned in many countries (See  
78 supplementary material).

79 President Bolsonaro denies the existence of anthropogenic climate  
80 change (Fearnside 2019) and chose a minister of foreign affairs who considers  
81 global warming to be an “invention of Marxist ideology”. One his first acts as  
82 minister was to abolish the ministry’s sectors dealing with climate change and  
83 with the environment. The actions of President Bolsonaro and his ministers  
84 favour expansion of monoculture plantations and cattle ranching in Amazonia.  
85 An expected consequence of such deforestation is to decrease rainfall in the  
86 South and Southeast regions of Brazil and in neighbouring countries, such as  
87 Argentina (e.g., Zemp *et al.* 2014). Domestic water supply in heavily populated  
88 states such as São Paulo and Minas Gerais would be affected, as would  
89 hydroelectric power generation and agriculture, including the production of  
90 biofuels (Ferrante & Fearnside 2018). Carbon released by Amazon  
91 deforestation contributes to climate change around the globe (IPCC  
92 2014). Considerable alteration of the composition of Amazonian vegetation has  
93 already occurred due to climatic change (Esquivel-Muelbert *et al.* 2018).  
94 Amazonia is close to the limit of deforestation that can be tolerated by the  
95 region’s ecosystems (Lovejoy & Nobre 2018). Various studies have shown the  
96 importance of Brazil’s conservation units and indigenous lands for maintaining  
97 Amazonian forest (e.g., Ferreira *et al.* 2005, Nepstad *et al.* 2006, Vitel *et al.*  
98 2009, Walker *et al.* 2009, Ricketts *et al.* 2010, Soares-Filho *et al.* 2010,  
99 Nogueira *et al.* 2018). These forests provide environmental services, such as  
100 supplying water vapour that falls as rain in other parts of Brazil (D’Almeida *et al.*  
101 2007, van der Ent *et al.* 2010, Arraut *et al.* 2012, Zemp *et al.* 2014).

102 Ruralists frequently (but falsely) claim that Brazil’s indigenous lands were  
103 created due to influence from international non-governmental organizations that  
104 are fronts for foreign governments that are allegedly conspiring to impede the  
105 growth of Brazilian agribusiness and thus avoid competition. Indigenous lands  
106 are key factors in conservation because of the large area they protect – roughly  
107 20% of Brazil’s Legal Amazon region. Bolsonaro has moved responsibility for  
108 demarcating indigenous lands (*terras indígenas*) from the National Indian  
109 Foundation (FUNAI) to the Agriculture Ministry, where this responsibility is  
110 assigned to a sector headed by a ruralist. The National Congress passed a  
111 measure reversing this action, but President Bolsonaro has countered this for  
112 now by issuing a “provisional measure”, the validity of which awaits a final

113 decision by the Supreme Court. What remains of FUNAI has been moved from  
 114 the Justice Ministry to a new Ministry of Women, Family and Human Rights,  
 115 which is headed by another controversial minister (See supplementary  
 116 material).

117 Acts of vandalism and attacks on environmental and indigenous  
 118 agencies by loggers, prospectors and ruralists have increased markedly across  
 119 the Amazon since Bolsonaro's election, and these incidents often show a  
 120 connection to the new president's discourse. In one case loggers carrying pro-  
 121 Bolsonaro placards forced IBAMA inspectors to flee a town in the state of  
 122 Amazonas. In another case land-grabbing "grileiros" invaded the Uru-Eu-Wau-  
 123 Wau indigenous land in the state of Rondônia. These "grileiros" threatened to  
 124 kill the Uru-Eu-Wau-Wau's children if the tribe tried to recover their lands, and  
 125 claimed that the natives would no longer be entitled to anything now that  
 126 Bolsonaro had won the elections.

127 The "death agenda" includes abolishing the legal reserves and opening  
 128 conservation units and indigenous lands to mining, agriculture and ranching.  
 129 Blocking demarcation of indigenous lands and labelling social movements as  
 130 "terrorists" tend to inflate land conflicts in the Amazon, threatening traditional  
 131 peoples. The actions currently proposed by the new president and his ruralist  
 132 supporters would impact forests, biodiversity and traditional peoples, including  
 133 indigenous peoples, members of 'quilombos' (communities of Afro-Brazilians  
 134 descended from escaped slaves) and 'ribeirinhos' (traditional riverside  
 135 dwellers). The presidential administration's release of dozens of new  
 136 agrochemicals already puts the environment, farm workers and national and  
 137 international consumers at risk.

138 Funding entities must begin to evaluate the risk of investment in projects  
 139 that cause deforestation and land conflicts, thus contributing to global warming  
 140 and to violation of human rights. The same concerns apply to companies and  
 141 countries that import Brazilian soy, meat and minerals. The responsibilities of  
 142 the various international actors will be a critical subject of debate as history  
 143 unfolds in Brazilian Amazonia over the next four years.

144 .

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156

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## Supplementary Material

**Brazil's new president and "ruralists" threaten** Amazonia's environment, traditional peoples and the global climate

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## New ministers and the “ruralist” agenda

Jair Bolsonaro, Brazil's new president, has appointed ministers who support the agenda of “ruralists” (large landholders and their representatives), a group that is a key part of President Bolsonaro's political base. No congressional approval is needed for ministerial appointments in Brazil. Ricardo Salles, the new environment minister, holds anti-environmentalist views that were recently epitomized by a television interview in which he was asked about the relevance of Chico Mendes, after whom one of the agencies under the Environment Ministry is named. He replied by denigrating this conservation leader and martyr, citing what he described as the views of people in agribusiness, and asked rhetorically “what difference does it make who Chico Mendes was?” The minister has also announced that he will review existing conservation units and allow railways (and apparently also highways) to pass through these areas. Ricardo Salles has replaced environmental specialists by military police within the agency, which facilitates subservience and reduces the agency's technical capacity for action, but has not helped combat illegal deforestation. In his capacity as Environment Secretary for the state of São Paulo (before his appointment as minister) he was convicted “malicious” alteration of zoning maps. His sentence bars him from holding political office for three years, which led the Public Ministry (a public prosecutor's office to defend the rights of the people) to request his immediate removal from the Environment Ministry, but the administration did not obey. On 7 June 2019, environment minister Salles was denounced once again to the Federal Public Ministry for his persecution of the ministry's staff, for transferring the Brazilian Forestry Service from the Ministry of Environment to the Ministry of Agriculture, and other misconduct.

The new agriculture minister (Tereza Cristina Corrêa da Costa Dias) is widely known as the “muse of the poison” due to her role as a congresswoman in 2018 leading a successful ruralist effort to enact legislation gutting restrictions on agrochemicals. The agrochemical industry was an important source of Ms. Dias's campaign funds. She chose as the new head of the Forest Service a former congressman (Valdir Colatto) who had introduced a bill that is now rapidly advancing in the congress to allow hunting wild animals throughout Brazil, even in conservation areas. A bill proposed by Ms. Dias would allow raising cattle in conservation units. Cattle ranching is the most damaging activity for neighbouring forests (whether with or without fencing to prevent livestock from entering the forest for water and shade), the damage to forest structure and fauna being especially dramatic when cattle are allowed to enter the protected areas themselves (Ferrante *et al.* 2017). As minister, Ms. Dias has argued that slaughterhouses should only be required to do “self-inspection”, which might result in contaminated meat for national and international trade. In addition to health concerns, these measures also directly affect trade with Islamic countries that import Brazilian meat on the condition of slaughterhouses following halal practices.

On 13 February 2019 the new ministers of agriculture and environment made clear their support for Bolsonaro's promises to open indigenous lands to agribusiness when they visited and praised a soy plantation in an indigenous area where tribal leaders had illegally rented out land to non-indigenous soy producers. Expanding soy plantation area is a high priority, and Bolsonaro has

announced his intention of forgiving R\$15 billion (US\$4 billion) in agribusiness debts. Bolsonaro has characterized indigenous peoples as “isolated in reserves” like “animals in zoos”.

In deference to the ruralists, President Bolsonaro intends to modify the Rural Environmental Register (CAR) by simplifying the georeferencing of properties and further extending the deadlines for meeting the requirements of the registry. The CAR has been shown to be efficient in reduced deforestation on registered lands (Gibbs *et al.* 2015; Alix-Garcia *et al.* 2018; Roitman *et al.* 2018). President Bolsonaro's actions also contribute directly to setbacks in environmental licensing and in the credit system. President Bolsonaro has issued a decree changing the structure of the National Environment Council (Conama), which establishes regulations on air quality, heavy metal levels in the water and other forms of pollution. The Bolsonaro administration intends to reduce 67 conservation units to remove impediments for infrastructure such as highways, railways, ports and airports. The administration has defended the end of the “legal reserve” of forest that rural properties are required to maintain. These measures can be expected to contribute to increasing rates of deforestation, species loss and collapse of environmental services.

The power of the ruralists suddenly became apparent in 2011-2012 when the National Congress gutted Brazil's forest code (a package of regulations governing deforestation) (Fearnside 2016). This included reducing the required preservation of riparian forests; formerly the strip of forest to be preserved along watercourses extended for a defined distance measured from the high-water flood level, but this was changed to the low-water level. Under Amazonian conditions the change eliminated much of the protected area. More than 40 years of illegal deforestation was pardoned, and a variety of new provisions assured that much of the future deforestation will be considered “legal” (Freitas *et al.* 2018). Loss of forest for soybeans totalled over 73,000 ha between 2013 and 2015 in just three of the nine Amazonian states (Pará, Mato Grosso and Rondônia) (TRASE 2018). In September 2018, the month before the election and with Bolsonaro leading in the polls, Brazil's Amazon deforestation increased by 84% as compared to the same months in 2017 (IMAZON 2018).

Ruralists are generally enthusiastic deniers of anthropogenic climate change (Fearnside 2019). Bolsonaro stated multiple times in his campaign that he would withdraw Brazil from the Paris agreement on climate change. His current position has changed only superficially: he now says Brazil will remain in the agreement “for now”, but subject to various demands requiring alterations of the accord that are unlikely to happen, given that this would need approval by the 184 other parties to the agreement (Fearnside 2019). Bolsonaro has repeatedly claimed that the Paris Agreement is a foreign plot to usurp Brazil's sovereignty over its Amazon region.

President Bolsonaro created a new Ministry of Women, Family and Human Rights, and appointed Damares Regina Alves to head the new ministry. She is co-founder of an evangelical organization that was denounced in 2009 to the Human Rights Commission of the Chamber of Deputies by indigenous leaders of the Yawalapiti nations in Mato Grosso and Kayapó in Pará for promoting illegal adoption of indigenous children. Damares Alves stated that more than 1500 children are buried alive by indigenous peoples in the Amazon every year. However, this was denied by the Brazilian Association of

Anthropology in an open letter stating that these are unsubstantiated statements and without any scientific basis.

Dameres Alves appointed general Franklimberg Ribeiro de Freitas as head of FUNAI. He had previously served as head of this agency from May 2017 to April 2018, when he resigned and was hired by the Canadian company Belo Sun Mining to act as an adviser on indigenous, community and environmental affairs at the company's planned mine on the "big bend" of the Xingu River between the two dams that make up the Belo Monte hydropower project in Pará state. At the time, the Public Ethics Committee of the Presidency of the Republic determined that he should wait six months before being contracted because, by law, those in senior public positions are prevented from initiating private activities that would result in a conflict of interest. However, this guidance was not followed. Belo Sun's mine would directly affect the Juruna and Arara indigenous tribes, as well as other traditional communities that have already been adversely impacted by the Belo Monte dams (*e.g.*, Tófoli *et al.* 2017). Belo Sun Mining has one of the largest proposed mining projects in the country, and the project depends on FUNAI's authorization to be executed. The new head of FUNAI has already stated that the project is feasible and beneficial to indigenous people. The Minister of Mines and Energy recently stated that companies could mine in indigenous lands without the consent of indigenous leaders. The administration has prepared an expedition to contact isolated peoples with the announced objectives of "integrating" them into Brazilian society as a whole and of "resolving conflicts over land".

### **Large infrastructure projects in the Brazilian Amazon**

During his campaign Bolsonaro promised to complete Highway BR-319 (Manaus-Porto Velho), linking Rondônia to the central Amazon and opening the way for deforestation activity that previously was concentrated in the "arc of deforestation" on the southern and eastern edges of the Amazon forest. The BR-319 would allow actors and processes in the arc of deforestation to invade forest throughout much of the northern and western portions of the Brazilian Amazon (Fearnside 2006, Fearnside & Graça 2006). Considering the secondary roads planned for Highway BR-319, more than 138,000 km<sup>2</sup> of deforestation are projected by 2100, an increase in the cumulative area deforested by 1291% as compared to the area cleared by 2011 (Santos Junior *et al.* 2019). Despite the economic unviability of Highway BR-319 (Teixeira 2007, Fleck 2009) and an extraordinarily high environmental impact, politicians in the Amazon region universally support the highway project, almost all of which would be paid for by taxpayers elsewhere in Brazil. To the surprise of these politicians, on 29 January 2019 Bolsonaro's administration announced a four-year spending plan that did not include the highway. These politicians are now mobilizing pressure to include the highway in the list of priority projects. Note that economic unviability cannot be counted upon to halt proposed megaprojects, as demonstrated by such cases as the Balbina and Belo Monte dams (Fearnside 1989, 2017c). The Amazonas state senate has requested that the environmental licensing of Highway BR-319 be made the exclusive responsibility of the Amazonas state government. Previous attempts to exclude the federal environmental agencies have been rejected, but this outcome cannot be guaranteed in the current political climate. State-level licensing

weakens protections both for the environment and for traditional forest-dependent peoples.

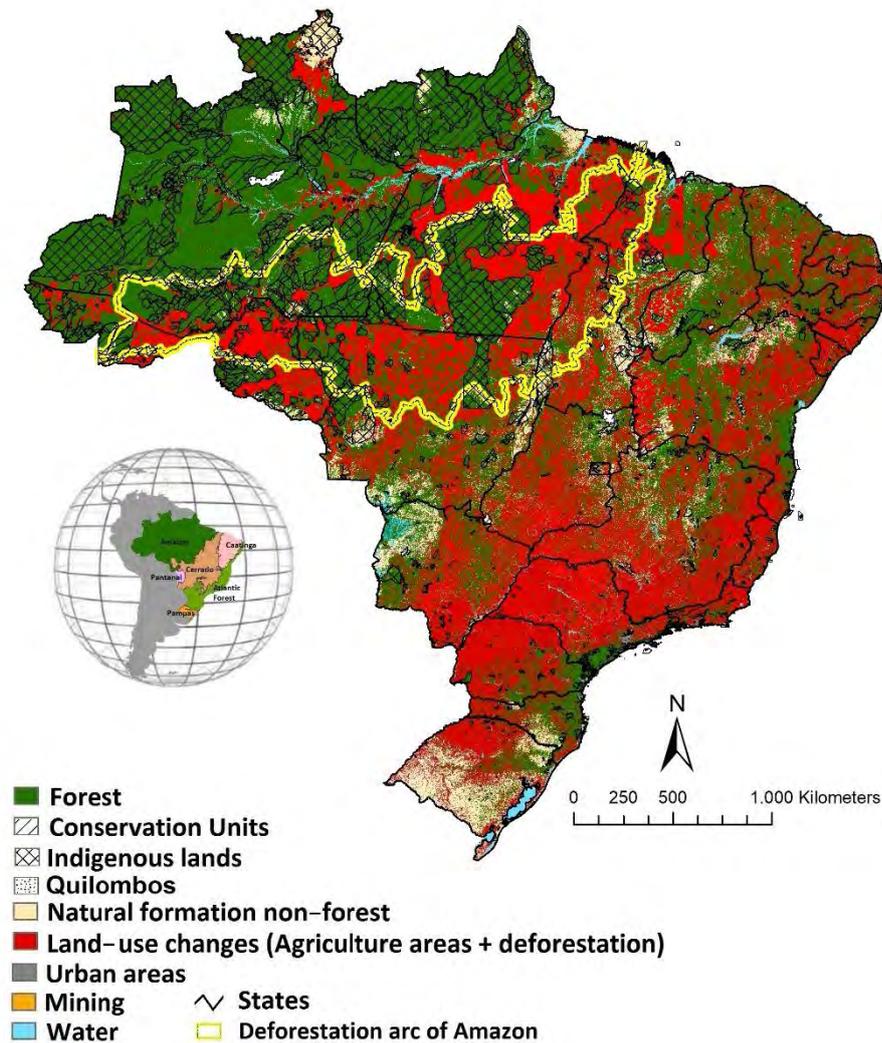
In January 2019 the head of strategic affairs in Bolsonaro's presidential office (General Maynard Santa Rosa) announced a series of new mega-infrastructure projects in the Amazon, including a 500-km extension of Highway BR-163 (Santarém-Cuiabá) from the Amazon River to the Surinam border. The new projects include a bridge over the Amazon River in Pará state and a new dam on the Trombetas River. Both projects would stimulate deforestation; they would impact four indigenous reserves, eight *quilombo* communities (traditional communities of Afro-Brazilians descended from escaped slaves) and five conservation units in the Trombetas River region. According to General Santa Rosa, the Amazon forest is an "unproductive *latifundio*" (i.e., like one of the vast semi-feudal landholdings of colonial times in northeastern Brazil) that must be integrated into the national productive system, along with the region's indigenous peoples and *quilombo* communities. He called the area surrounding the project an "unproductive, desert-like" region, making it clear that neither the forest and its ecosystem services nor the traditional peoples that inhabit the forest are considered to be valuable. Maynard also said that the proposed road and dam should benefit people who live below the poverty line in the state. However, the recent history of large infrastructure projects in the Amazon shows the opposite to be the result of such projects, as in the case of the Belo Monte Dam where the traditional peoples were not consulted and their rights were severely affected, in addition to the project area experiencing increases in indicators of poverty and crime (Magalhães & da Cunha 2017).

Indigenous and *quilombo* lands are particularly sensitive for the new presidential administration, which sees these as a reflection of foreign pressure to keep Brazil from developing. The secretary of national security in the presidential office (General Augusto Heleno), for example, claims that an event to be held by the Catholic Church in the Vatican in October 2019 to discuss the conservation of the Amazon is a danger to Brazil's sovereignty (Rocha 2019).

Scenarios based on the new presidential administration's plans suggest that deforestation rates could triple (Soterroni *et al.* 2018a, b). Despite readily available information, the environment minister has stated that "it is not known where deforestation is taking place, inside protected areas, inside indigenous lands, or in private areas" (Wenzel 2018). Such attempts to disqualify the role of protected areas and indigenous lands in reducing deforestation are ominous. Figure S-1 contrasts with the minister's statement and shows the need to maintain conservation units, indigenous lands and *quilombos*. Data on deforestation in all Amazonian conservation units, indigenous lands and official *quilombos* are available in Nogueira *et al.* (2018a,b). Conservation units and indigenous lands protect large areas of intact forests in Brazil and various studies have shown the importance of conserving these areas for their environmental services, such as regulation of the climate on which agriculture itself depends. Ruralists would better serve their own commercial interests by supporting the conservation of Brazil's Amazonian forests and traditional peoples and by investing in increasing production on the currently existing agricultural land and in abandoned areas. The role of the Amazon forest is so significant for the climate of South America and for maintenance of current agricultural production of Brazil that even the Brazilian biofuels industry

association has argued for not promoting new monocultures that could affect the Amazon (Mansur 2017; Ferrante & Fearnside 2018).

The advance of agricultural activity in Brazil from 1985 to 2017 is shown in Figure S1. The red area highlights the almost complete replacement of natural vegetation in the Atlantic forest and *Cerrado* (central Brazilian savanna) and shows the much smaller advance of agriculture and ranching in the Amazon forest. The map also shows the area known as the “arc of deforestation” (outlined in yellow) on the southern and eastern edges of the Amazon forest. Almost all deforestation is outside of conservation units and indigenous lands, which reflects the effectiveness of these areas.



**Fig.S-1.** Advance of agriculture and ranching in Brazil over natural vegetation and its relation to protected areas.

### Relaxing restrictions on agrochemicals

Ruralists oppose restrictive regulation at the state and municipality levels on the use of pesticides, and they want federal agencies to allow sale of new pesticides without consideration of environmental and health impacts. Agrochemicals, which would be euphemistically termed "phytosanitary defensives", could be purchased in unrestricted over-the-counter sales. As part of this agenda, the senate has passed a law eliminating the need to label transgenic foods. Compounds suspended by international conventions have already been detected in Brazilian pesticides, in addition to more than 80 compounds confirmed as affecting the environment and causing neurotoxic, reprotoxic, carcinogenic or endocrine-disrupting effects in humans (Schiesari *et al.* 2013). The new administration's Agriculture Ministry has published a list requesting 131 applications for release new agrochemicals in Brazil, among them more than 28 considered highly dangerous and banned in the United States and in the European Union. Brazil has released of up to 5000 times the amount of pesticide allowed in Europe. This pesticide policy (proposed by ruralists in the National Congress) is questioned by the National Agency of Sanitary Surveillance (Anvisa). Bolsonaro's team is "studying" ways to either replace the heads of independent regulatory agencies like Anvisa with individuals aligned with the president or transfer their powers to the ministers he has appointed. The "flexibilization" of pesticide regulations threatens food security and poses a risk to agricultural workers and to both domestic and international consumers.

### **Ruralist proposals and land conflicts**

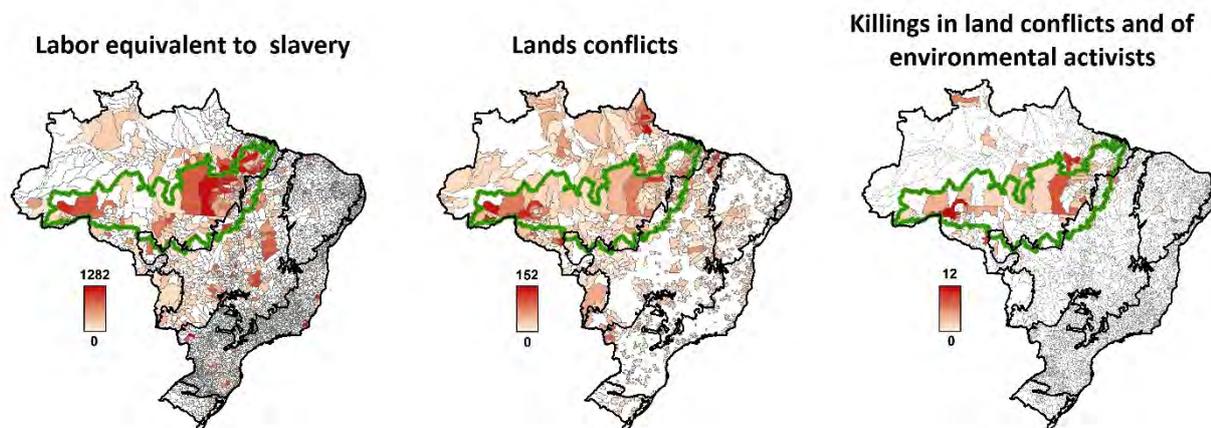
The greatest threats to the Amazon forest and its biodiversity and traditional peoples are cattle, soy, mineral extraction and large infrastructure projects such as hydroelectric dams (Fearnside 2017a). These activities are also responsible for the country's land conflicts, affecting traditional peoples and small farmers. In addition to their social and human-rights impacts, land conflicts are part of a process that leads to more deforestation. Several of the current presidential administration's proposals can be expected to stimulate conflicts.

Conflicts are mainly in or near the "arc of deforestation" (Figure S2). Amazonia already leads the world in deaths from land conflicts and in killing environmental activists (Global Witness 2017). The new president has promised to revoke gun-control laws and to allow weapons to be carried for "protection of rural properties". Ironically, when he was a congressman Bolsonaro was the author of a law prohibiting environmental agents from carrying weapons. He has labelled the landless farmers' movement (MST) as "terrorists", and a bill applying anti-terrorist laws to this and other groups is being fast-tracked by his supporters in the National Congress. He has announced that no "activism" of any type will be tolerated. Recently, Bolsonaro also said that "democracy ... only exists when the armed forces want it". On social media the current environment minister suggested "rifle bullets" to fight the MST. Bolsonaro has already signed a decree allowing citizens living in urban or rural areas to keep firearms at home, and redefined "home" for rural properties as referring to the entire area of the property. Greater fatalities in Amazonian conflicts may also result from the anticrime package launched by justice minister Sergio Moro,

which would exempt police from blame for shooting presumed criminals on sight if the police are in a (vaguely defined) stressful situation.

Upon taking office, Bolsonaro suspended Brazil's agrarian reform program indefinitely, but he later partially reopened the program. He has chosen the president of the Rural Democratic Union (UDR) (a lobbying group for large landholders) to head a special secretariat in the Ministry of Agriculture that has now been given responsibility for environmental licensing, settling landless farmers and demarcating the lands of indigenous peoples and *quilombos*. These tasks were formerly in three ministries: Environment, Justice and Agrarian Reform. Placing them under a representative of large landholders signals an end to effective public policies in these areas. In addition, the secretary announced a review of indigenous and *quilombo* lands and may annul previous acts.

Amazonian agribusiness and cattle-ranching operations are frequently found to have labour conditions "equivalent to slavery" (Suzuki *et al.* 2018). The numbers of cases of labour "equivalent to slavery" (from 2008 to 2016), land conflicts (from 2010 to 2016) and killings in land conflicts and of environmental activists (from 2008 to 2016) are shown in Figure S2. We produced these maps from publicly available data collected by the Pastoral Land Commission (CPT). The maps were made using Lapig open-use software (<http://maps.lapig.iesa.ufg.br/lapig.html>).



**Fig. S2.** Brazil's labour "equivalent to slavery" (2008-2016), land conflicts (2010-2016) and killings in land conflicts and of environmental activists (2008-2016). The area outlined in green is the "arc of deforestation".

The data strongly suggest that the greatest number of land conflicts in Brazil is in or near the "arc of deforestation". This reflects the great pressure of the soy and livestock sectors on conservation units, indigenous lands and small farms.

## Safety concerns from “flexibilization” of licensing and impacts in the Amazon

### *Mariana*

The rupture of the Fundão mine-tailings dam on 5 November 2015 affected the municipality (county) of Mariana in Brazil’s state of Minas Gerais, killing 19 people and impacting the aquatic and terrestrial ecosystems with damage extending into the Atlantic Ocean (Fernandes *et al.* 2016; Garcia *et al.* 2017). Weaker environmental controls are likely to lead to new disasters like the Mariana dam rupture. To date the victims have not been compensated, nor has any restoration been carried out in most of the devastated area. As of May 2018, only 3.4% of the fines levied since November 2015 on companies that caused environmental “disasters” in Brazil had been paid. Bolsonaro claimed repeatedly in his campaign that environmental agencies are a “mafia of fines” and that he intends to end the “environmental fines industry” and facilitate granting environmental licenses to companies proposing development projects. This was also a request made by ruralists to the new environment minister.

### *Brumadinho*

Only 25 days after Bolsonaro took office another mine-tailings dam broke, this time in the municipality (county) of Brumadinho, which, like the site of the Mariana disaster, is also in the state of Minas Gerais (Darlington *et al.* 2019). The new environmental disaster is estimated to have killed over 300 people who were buried in toxic mud.

Bolsonaro asserts that there is no relation of this dam rupture with the federal government. However, IBAMA, which has often been attacked in Bolsonaro’s discourse, was the only government agency that had warned about the danger of the dam rupturing. The dam’s environmental license was of a simplified type currently defended by Bolsonaro and that has gained strength in the state governments (the dam was licensed by the Minas Gerais state government). At least 45 other dams in Brazil are mentioned by inspection bodies as having similar safety concerns. Risks of dam failure also apply to Amazonian hydropower (Fearnside 2015). Among Bolsonaro’s development plans are eight nuclear power plants.

### *Effects of illegal mining in the Amazon*

The Mariana and Brumadinho iron-mining tailings disasters occurred despite the mines having legal status through state licensing in Minas Gerais. For gold mining in the Amazon the situation is even worse because much of the mining is completely illegal. It is estimated that every 20 months the volume of gold-mining tailings released into the Tapajós River is equivalent to the tailings that were released at Brumadinho. This impact affects both indigenous areas such as Sawré Muybu and conservation units such as Amazonia National Park and the Itaitubá II National Forest.

In Roraima, gold mining has also drastically affected the Yanomami people, both through aggressions from the miners and from environmental

contamination. This scenario underscores the need for intervention by the Public Ministry to halt mining in indigenous lands.

### **Recommendations to the Brazilian Public Ministry**

One of the means of containing damage of recent changes is through Brazil's Public Ministry, which is a public prosecutor's office created by Brazil's 1988 constitution to protect the interests of the people, including their constitutional right to an "ecologically balanced environment". Just as the Public Ministry represents a potential check on actions by the executive branches of the federal and state governments, it is also a potential check on the legislative branches when their actions infringe the people's social and environmental rights. An example is a state law proposed in Pará in June 2019 (PL 129/2019) that would greatly facilitate land grabbing by *grileiros*. An example at the federal level is a proposal to end the autonomy of states to prohibit aerial spraying of pesticides.

The Public Ministry is important for enforcing Brazil's laws and commitments under international conventions, such as the required consultation of traditional peoples prior to beginning construction of infrastructure projects that affect them. Unfortunately, illegality is not always sufficient to prevent such projects, as illustrated by the Belo Monte and São Manoel dams (e.g., Fearnside 2017a,b, 2018).

Large infrastructure projects in the Amazon, such as Highway BR-319, the extension of highway BR-163 and new hydroelectric dams, are projects that tend to affect the forest, traditional peoples and to increase land conflicts, giving the Public Ministry an important role in seeing that the necessary studies of economic feasibility and environmental licensing are done, and that environmental licensing requirements are met (which has often not been the case even before the current "flexibilization"). Highways BR-319 and BR-242 are among the projects that are being pushed forward without meeting legal requirements, such as consultation of affected indigenous peoples. The current presidential administration's weakening of IBAMA and FUNAI make it even less plausible that projects such as Highway BR-319 would be accompanied by sufficient governance to avoid disastrous impacts. In addition, the fact that government funds are hardly sufficient for building the infrastructure itself means that, regardless of whatever promises may be made, funds would not be available for environmental and social mitigation measures on the scale needed. Brazil's Public Ministry and the National Congress need to act in order to avoid the impacts described here, and to curb the dismantling of the country's policies for the environment and human rights. Ministerial appointments need to be based on technical knowledge rather than ideological or religious identity.

Ricardo Salles met on 29 June 2019 with the governor of the state of Amazonas to discuss the environmental licenses for reconstructing and paving Highway BR-319. We emphasize the importance of the Public Ministry assuring that licensing requirements are adequate and that they are met. Particularly important is the consultation with indigenous peoples required by International Labour Organization Convention 169 and by Brazilian law.

The Public Ministry could also intervene to reverse the "flexibilization" of pesticide authorizations and to enforce regulations that are designed to avoid conflicts of interest, especially among government officials making decisions

about “flexibilization”. More difficult but theoretically possible is holding members of congress accountable for legislating in their own self-interest when they own large landholdings or interests in mining companies.

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