



Comment

Cite this article: Ferrante L and Fearnside PM (2019). Brazil's new president and 'ruralists' threaten Amazonia's environment, traditional peoples and the global climate. *Environmental Conservation* 46: 261–263. doi: [10.1017/S0376892919000213](https://doi.org/10.1017/S0376892919000213)

Received: 25 February 2019

Revised: 4 July 2019

Accepted: 5 July 2019

First published online: 24 July 2019

Author for correspondence:

Lucas Ferrante,

Email: lucasferrante@hotmail.com

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

Lucas Ferrante and Philip M Fearnside

National Institute for Research in Amazonia (INPA), Av. André Araújo, 2936, 69067-375, Manaus, Amazonas, Brazil

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

Brazil's Atlantic forest and *cerrado* (central Brazilian savanna) biomes have now been almost completely taken over by agribusiness, with only 8–11% remaining of the Atlantic forest and 19–20% of the *cerrado* (MapBiomas 2019; Supplementary Material). This makes ruralists turn their eyes towards the Amazon forest, threatening the region's biodiversity and traditional peoples, as well as the regional and global climate (Fearnside 2017).

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

President Bolsonaro appointed as environment minister Ricardo Salles, a ruralist who had been the environment secretary for the state of São Paulo, where he essentially dismantled and neutered the agency (Guerra & Ribeiro 2018, Rodrigues 2018, Rodrigues 2019). On 19 December 2018, he was condemned for 'malicious' alteration of the zoning maps of an environmental protection area. Mr Salles holds that observed climate change may be wholly natural and dismisses all discussion of global warming as 'innocuous.'

President Bolsonaro has repeatedly stated his desire to weaken environmental licensing (Fearnside 2018) and has promised to remove licensing authority from IBAMA, the federal environmental agency that is part of the Environment Ministry (Soterroni et al. 2018). Weaker environmental controls are likely to lead to new disasters like the Mariana and Brumadinho mine-tailings dam ruptures (see Supplementary Material). The administration also removed from their posts the IBAMA superintendents in 21 of Brazil's 27 states. The Environment Ministry plans to establish a 'nucleus' within the ministry to review and modify or annul fines issued by IBAMA. Under the current administration, IBAMA has had the lowest performance in its history. IBAMA now often gives advanced warning of where it will carry out inspections for illegal deforestation, which has led to no punishment of offenders despite 95% of the deforestation that occurred in the first 3 months of the presidential administration being illegal (MapBiomas 2019). Deforestation rates have surged, with the rate in June 2019 (the first dry-season month in the new presidency) up 88% over the 2018 rate in the same month (INPE 2019).

Ricardo Salles has been trying to pervert the Amazon Fund to indemnify the deforestation for which Salles has granted amnesty. President Bolsonaro and his Minister of Agriculture, Tereza Cristina Dias, propose 'flexibilizing' the forest code, including extending deadlines for environmental recovery and changing the cut-off date for requiring landowners to restore natural vegetation in areas that they had illegally deforested in their 'areas of permanent protection' and 'legal reserves.' The result would be that many escape any consequence for past violations.

The new president has stated that not a single centimetre of land will be demarcated for indigenous peoples and that both 'conservation units' (protected areas for natural ecosystems) and indigenous lands should be open to agriculture and mining. This is supported by ruralist legislators, who promote what is known as the 'death agenda.' This includes suspending official listing of threatened species, rescinding restriction on hunting wild animals, 'flexibilizing'

environmental licensing, weakening environmental and regulatory agencies, promoting large infrastructure projects such as highways and dams in Amazonia and allowing the use of pesticides that are banned in many countries (see Supplementary Material).

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

Ruralists frequently (but falsely) claim that Brazil's indigenous lands were created due to influence from international non-governmental organizations that are fronts for foreign governments that are allegedly conspiring to impede the growth of Brazilian agribusiness and thus limit competition. Indigenous lands are key factors in conservation because of the large area they protect – c.20% of Brazil's Legal Amazon region. Bolsonaro has moved responsibility for demarcating indigenous lands (*terras indígenas*) from the National Indian Foundation (FUNAI) to the Agriculture Ministry, where this responsibility is assigned to a sector headed by a ruralist. The National Congress passed a measure reversing this action, but President Bolsonaro has countered this for now by issuing a 'provisional measure,' the validity of which awaits a final decision by the Supreme Court. What remains of FUNAI has been moved from the Justice Ministry to a new Ministry of Women, Family and Human Rights, which is headed by another controversial minister (see Supplementary Material).

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

The 'death agenda' includes abolishing the legal reserves and opening conservation units and indigenous lands to mining, agriculture and ranching. Blocking demarcation of indigenous lands

and labelling social movements as 'terrorists' tend to inflate land conflicts in the Amazon, threatening traditional peoples. The actions currently proposed by the new president and his ruralist supporters would impact forests, biodiversity and traditional peoples, including indigenous peoples, members of '*quilombos*' (communities of Afro-Brazilians descended from escaped slaves) and '*ribeirinhos*' (traditional riverside dwellers). The presidential administration's release of dozens of new agrochemicals has already put the environment, farm workers and national and international consumers at risk.

Funding entities must begin to evaluate the risk of investment in projects that cause deforestation and land conflicts, thus contributing to global warming and to violations of human rights. The same concerns apply to companies and countries that import Brazilian soy, meat and minerals. The responsibilities of the various international actors will be a critical subject of debate as history unfolds in Brazilian Amazonia over the next 4 years.

Supplementary material. For supplementary material accompanying this paper, visit www.cambridge.org/core/journals/environmental-conservation.

Financial support. The authors' research is financed solely by academic sources. LF thanks the National Council of Scientific and Technological Development (CNPq). PMF thanks CNPq (429795/2016-5, 610042/2009-2, 575853/2008-5, 311103/2015-4), the Foundation for the Support of Research of the State of Amazonas (FAPEAM) (708565) and the National Institute for Research in Amazonia (INPA) (PRJ13.03).

Conflict of interest. None.

Ethical standards. None.

References

- Arraut JM, Nobre CA, Barbosa HM, Obregon G, Marengo JA (2012) Aerial rivers and lakes: looking at large-scale moisture transport and its relation to Amazonia and to subtropical rainfall in South America. *Journal of Climate* 25: 543–556.
- D'Almeida C, Vorosmarty CJ, Hurrut GC, Marengo JA, Dingman SL, Keim BD (2007) The effects of deforestation on the hydrological cycle in Amazonia: a review on scale and resolution. *International Journal of Climatology* 27: 633–647.
- Esquivel-Muelbert A, Baker TR, Dexter KG, Lewis SL, Brienen RJW, Feldpausch TR, Lloyd J et al. (2018) Compositional response of Amazon forests to climate change. *Global Change Biology* 25: 39–56.
- Fearnside PM (2017) Deforestation of the Brazilian Amazon. In: Oxford Research Encyclopedia of Environmental Science. ed. H Shugart. New York, NY, USA: Oxford University Press [www document]. URL <https://oxfordre.com/environmentalscience/view/10.1093/acrefore/9780199389414.001.0001/acrefore-9780199389414-e-102?print=pdf>
- Fearnside PM (2018) Why Brazil's new president poses an unprecedented threat to the Amazon. *Yale Environment* 360, 8 November 2018 [www document]. URL <https://e360.yale.edu/features/why-brazils-new-president-poses-an-unprecedented-threat-to-the-amazon>
- Fearnside PM (2019) Will President Bolsonaro withdraw Brazil from the Paris Agreement? *Mongabay*, 31 January 2019 [www document]. URL <https://news.mongabay.com/2019/01/commentary-will-president-bolsonaro-withdraw-brazil-from-the-paris-agreement/>
- Ferrante L, Fearnside PM (2018) Amazon sugarcane: a threat to the forest. *Science* 359: 1472.
- Ferreira LV, Venticinque E, de Almeida SS (2005) O desmatamento na Amazônia e a importância das áreas protegidas. *Estudos Avançados* 19(53): 157–166 [www document]. URL <http://www.scielo.br/pdf/ea/v19n53/24086.pdf>
- Guerra R, Ribeiro A (2018) Indicado para Meio Ambiente foi denunciado pelo MP por improbidade administrativa. *O Globo*, 9 December 2018 [www document]. URL <https://oglobo.globo.com/brasil/indicado-para-meio-ambiente-foi-denunciado-pelo-mp-por-improbidade-administrativa-23292920>

- INPE (Instituto Nacional de Pesquisas Espaciais) (2019) Alertas do DETER na Amazônia em junho somam 2.072,03 km². INPE, São José dos Campos, SP, Brazil [www document]. URL http://www.inpe.br/noticias/noticia.php?Cod_Noticia=5147
- IPCC (Intergovernmental Panel on Climate Change) (2014) *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. VR Barros, CB Field, DJ Dokken, MD Mastrandrea, KJ Mach, TE Bilir, M Chatterjee et al. Cambridge, UK: Cambridge University Press.
- Lovejoy TE, Nobre C (2018) Amazon tipping point. *Science Advances* 4: eaat2340.
- MapBiomass (2019) Map Biomass Alerta [www document]. URL <http://plataforma.alerta.mapbiomas.org/>
- Nepstad DC, Schwartzman S, Bamberger B, Santilli M, Ray D, Schlesinger P, Lefebvre P et al. (2006) Inhibition of Amazon deforestation and fire by parks and indigenous lands. *Conservation Biology* 20: 65–73.
- 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: 573–579.
- Ricketts TH, Soares-Filho B, da Fonseca GAB, Nepstad D, Peterson A, Anderson A, Boucher D et al. (2010) Indigenous lands, protected areas, and slowing climate change. *PLoS Biology* 8: e1000331.
- Rodrigues S (2018) Ricardo Salles foi condenado por fraude em plano de manejo. *O Eco*, 20 December 2018 [www document]. URL <https://www.oeco.org.br/noticias/ricardo-salles-foi-condenado-por-fraude-em-plano-de-manejo/>
- Rodrigues S (2019) 'Esse governo é de vocês', diz Bolsonaro a Ruralistas. *O Eco*, 4 July 2019 [www document]. URL https://www.oeco.org.br/noticias/esse-governo-e-de-voce-diz-bolsonaro-a-ruralistas/?fbclid=IwAR3_ZLfZvZnagiQi8Fg_12IJoVIunEaSWHZuVCg9QTd-bA6xz-q1efG4qZ0
- Sassine V (2018) Ruralista vai cuidar de demarcação de terras indígenas e licença ambiental no governo Bolsonaro. *O Globo*, 18 December 2018 [www document]. URL <https://oglobo.globo.com/brasil/ruralista-vai-cuidar-de-demarcacao-de-terras-indigenas-licenca-ambiental-no-governo-bolsonaro-23313524>
- Soares-Filho BS, Moutinho P, Nepstad D, Anderson A, Rodrigues H, Garcia R, Dietzsch L et al. (2010) Role of Brazilian Amazon protected areas in climate change mitigation. *Proceedings of the National Academy of Sciences of the United States of America* 107: 10821–10826.
- Soterroni AC, Mosnier A, Carvalho AXY, Câmara G, Obersteiner M, Andrade PR, Souza RC et al. (2018) Future environmental and agricultural impacts of Brazil's Forest Code. *Environmental Research Letters* 13: 074021.
- van der Ent RJ, Savenije HHG, Schaeffli B, Steele-Dunne SC (2010) Origin and fate of atmospheric moisture over continents. *Water Resources Research* 46: W09525.
- Vitel CSMN, Fearnside PM, Graça PMLA (2009) Análise da inibição do desmatamento pelas áreas protegidas na parte Sudoeste do Arco de desmatamento. In: *Anais XIV Simpósio Brasileiro de Sensoriamento Remoto, Natal, Brasil 2009*, eds. JCN Epiphany, LS Galvão, pp. 6377–6384. São José dos Campos, SP, Brazil: Instituto Nacional de Pesquisas Espaciais (INPE) [www document]. URL <http://marte.sid.inpe.br/col/dpi.inpe.br/sbsr%4080/2008/11.13.14.42/doc/6377-6384.pdf>
- Walker R, Moore NJ, Arima E, Perz S, Simmons C, Caldas M, Vergara D, Böhrer C (2009) Protecting the Amazon with protected areas. *Proceedings of the National Academy of Sciences of the United States of America* 106: 10582–10586.
- Zemp DC, Schleussner CF, Barbosa HMJ, van der Ent RJ, Donges JF, Heinke J, Sampaio G et al. (2014) On the importance of cascading moisture recycling in South America. *Atmospheric Chemistry and Physics* 14: 13337–13359.

Supplementary Material

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

L. FERRANTE^{1*}, P. M. FEARNside¹

¹National Institute for Research in Amazonia (INPA) Av. André Araújo, 2936, 69067-375, Manaus, Amazonas, Brazil.

*To whom correspondence should be addressed. Email: lucasferrante@hotmail.com

New ministers and the "ruralist" agenda	2
Large infrastructure projects in the Brazilian Amazon	4
Relaxing restrictions on agrochemicals	6
Ruralist proposals and land conflicts.....	7
Safety concerns from "flexibilization" of licensing	9
Recommendations to Brazilian Public Ministry	10
Literature cited	11
References for statements by President Jair Bolsonaro	14
References for statements by and facts about ministers	15
References for proposed laws on threatened species, hunting and agrochemicals	18
References for attacks on environmental agencies, the National Indian Foundation (FUNAI) and illegal deforestation.....	19
References for Large infrastructure projects in the Brazilian Amazon.....	22
References for the Mariana and Brumadinho disasters	23
Shapefile data.....	24

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.

Damare 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 km² 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.

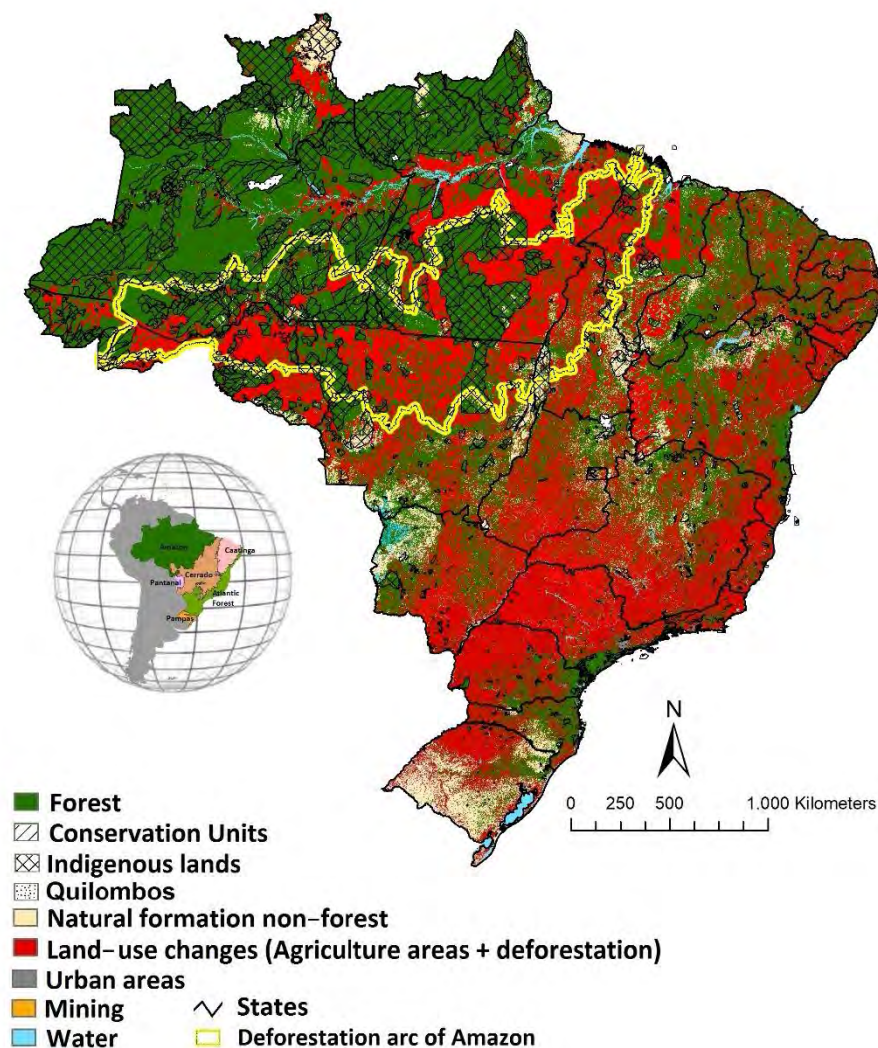


Fig.S-1. Advance of agriculture and ranching in Brazil over natural vegetation and its relation to protected areas.

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>).

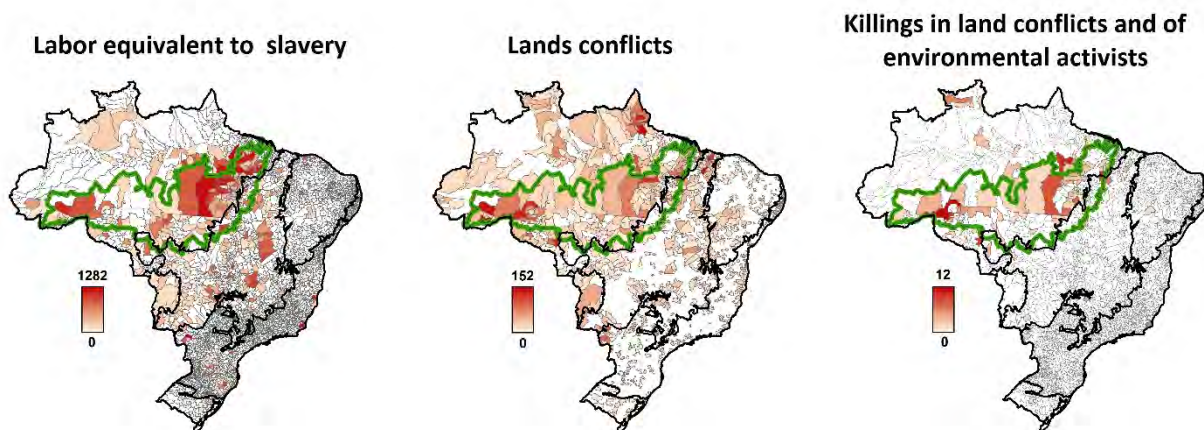


Fig. S2. Brazil's labour “equivalent to slavery” (2008-2016), land conflicts (2010-2016) and killings in land conflicts and of environmental activists (2008-2016). The area outlined in green is the “arc of deforestation”.

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.

Literature cited

- Darlington S, Glanz J, Andreoni M, Bloch M, Peçanha S, Singhvi A & Grigg, T. (2019) A Tidal wave of mud. *The New York Times*, 9 February 2019. <https://www.nytimes.com/interactive/2019/02/09/world/americas/brazil-dam-collapse.html>
- Fearnside PM (1989) Brazil's Balbina Dam: Environment versus the legacy of the pharaohs in Amazonia. *Environmental Management* 13(4): 401-423. <https://doi.org/10.1007/BF01867675>
- Fearnside PM (2006) Containing destruction from Brazil's Amazon highways: Now is the time to give weight to the environment in decision-making. *Environmental Conservation* 33(3): 181-183. <https://doi.org/10.1017/S0376892906003109>
- Fearnside PM & Graça PMLA (2006) BR-319: Brazil's Manaus-Porto Velho Highway and the potential impact of linking the arc of deforestation to central Amazonia. *Environmental Management* 38(5): 705-716. <https://doi.org/10.1007/s00267-005-0295-y>
- Fearnside PM (2015) As barragens do rio Madeira como espada de Dâmocles – 1: Mudanças nas enchentes. *Amazônia Real* 14 December 2015. <http://amazoniareal.com.br/as-barragens-do-rio-madeira-como-espada-de-damocles-1-mudancas-nas-enchentes/>
- Fearnside PM (2016) Brazilian politics threaten environmental policies. *Science* 353: 746-748. <https://doi.org/10.1126/science.aag0254>
- Fearnside PM (2017a) Belo Monte: Actors and arguments in the struggle over Brazil's most controversial Amazonian dam. *Die Erde* 148 (1): 14-26. <https://doi.org/10.12854/erde-148-27>
- Fearnside PM (2017b) Brazil's Belo Monte Dam: Lessons of an Amazonian resource struggle. *Die Erde* 148 (2-3): 167-184. <https://doi.org/10.12854/erde-148-46>
- Fearnside PM (2018) Challenges for sustainable development in Brazilian Amazonia. *Sustainable Development* 26(2): 141-149. <https://doi.org/10.1002/sd.1725>
- Fernandes GW, Goulard FF, Ranieri BD, Coelho MS, Dales K, Boesche N, Bustamante M, Carvalho FA, Carvalho DC, Dirzo R, Fernandes S, Galetti Jr PM, Millian VEG, Mielke C, Ramirez JL, Neves A, Rogass C, Ribeiro SP, Scariot A & Soares-Filho B (2016) Deep into the mud: ecological and

- socio-economic impacts of the dam breach in Mariana, Brazil *Natureza & Conservação* 14: 35-45. <https://doi.org/10.1016/j.ncon.2016.10.003>
- Ferrante L, Baccaro FB, Ferreira EB, Sampaio MFO, Santos T, Justino RC & Angulo A (2017) The matrix effect: how agricultural matrices shape forest fragment structure and amphibian composition. *Journal of Biogeography* 44: 1911-1922. <https://doi.org/10.1111/jbi.12951>
- Ferrante L & Fearnside PM (2018) Amazon sugarcane: A threat to the forest. *Science* 359: 1472. <https://doi.org/10.1126/science.aat4208>
- Fleck L (2009) *Eficiência econômica, riscos e custos ambientais da reconstrução da BR 319*. Série Técnica, no. 17. Conservation Strategy Fund (CSF), Lagoa Santa, MG, Brazil. 53 pp. <https://www.conservation-strategy.org/pt/publication/eficiencia-economica-riscos-e-custos-ambientais-da-reconstrucao-da-rodovia-br-319#.W1NKXvZFxMs>
- Freitas FLM, Sparovek G, Berndes G, Persson UM, Englund O, Barretto A & Mörtberg U (2018) Potential increase of legal deforestation in Brazilian Amazon after Forest Act revision. *Nature Sustainability* 1: 665–670. <https://doi.org/10.1038/s41893-018-0171-4>
- Garcia, LC, Ribeiro DB, Oliveira Roque F, Ochoa-Quintero, JM & Laurance WF (2017) Brazil's worst mining disaster: Corporations must be compelled to pay the actual environmental costs. *Ecological Applications* 27(1): 5–9. <https://doi.org/10.1002/eap.1461>
- Global Witness (2017) A que Preço? Negócios irresponsáveis e o assassinato de defensores da terra e do meio ambiente em 2017. Available at: <https://www.globalwitness.org/pt/campaigns/environmental-activists/a-que-pre%C3%A7o/>
- IMAZON (Instituto do Homem e Meio Ambiente na Amazônia) (2018) Boletim do Desmatamento da Amazônia Legal (Setembro de 2018) SAD. <https://imazon.org.br/publicacoes/boletim-do-desmatamento-da-amazonia-legal-setembro-2018-sad/>
- Magalhães SB & da Cunha MC (2017) *A Expulsão de Ribeirinhos em Belo Monte: Relatório da SBPC*. Sociedade Brasileira para o Progresso da Ciência-SBPC, São Paulo, SP, Brazil. 448 pp. <http://portal.sbpcnet.org.br/livro/belomonte.pdf>
- Mansur A (2017) União da indústria de cana-de-açúcar diz que é contra plantio na Amazônia. *Época*, 13 September 2017. Available at: <http://epoca.globo.com/ciencia-e-meio-ambiente/blog-do-planeta/noticia/2017/09/uniao-das-industrias-de-cana-de-acucar-diz-que-e-contra-plantio-na-amazonia.html> (accessed 16 February 2018).
- Mittermeier R A, Robles Gil P, Hoffmann M, Pilgrim J, Brooks T, Mittermeier C G, Lamoreux J & Da Fonseca G A B (2004) Hotspots revisited: Earth's

biologically richest and most endangered terrestrial ecoregions.
CEMEX/Agrupación Sierra Madre, Mexico City. 392 pp.

Nogueira EM, Yanai AM, Vasconcelos SS, Graça PMLA & Fearnside PM (2018a) Carbon stocks and losses to deforestation in protected areas in Brazilian Amazonia. *Regional Environmental Change* 18(1): 261-270. <https://doi.org/10.1007/s10113-017-1198-1>

Nogueira EM, Yanai AM, Vasconcelos SS, Graça PMLA, Fearnside PM (2018b). 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>

Rocha J (2019) Bolsonaro government takes aim at Vatican over Amazon meeting. *Mongabay*, 20 February 2019. <https://news.mongabay.com/2019/02/bolsonaro-government-takes-aim-at-vatican-over-amazon-meeting/>

Schiesari L, Waichman A, Brock T, Adams C, Grillitsch B (2013) Pesticide use and biodiversity conservation in the Amazonian agricultural frontier. *Philosophical Transactions of the Royal Society B* 368: 20120378. <https://doi.org/10.1098/rstb.2012.0378>

Soterroni AC, Mosnier A, Carvalho AXY, Câmara G, Obersteiner M, Andrade PR, Souza RC, Brock R, Pirker J & Kraxner F (2018a) Future environmental and agricultural impacts of Brazil's Forest Code. *Environmental Research Letters* 13, art. 074021. <https://doi.org/10.1088/1748-9326/aaccbb>

Soterroni AC, Ramos FM, Obersteiner M & Polasky S (2018b) Fate of the Amazon is on the ballot in Brazil's presidential-election. *Mongabay*. 17 October 2018. <https://news.mongabay.com/2018/10/fate-of-the-amazon-is-on-the-ballot-in-brazils-presidential-election-commentary>

Suzuki N et al. (2018) Escravo, nem pensar! Pará 2016/2017. Equipe 'escravo, nem pensar', São Paulo. http://escravonempensar.org.br/wp-content/uploads/2018/10/caderno_enp-para_final_baixa.pdf

Teixeira KM (2007) *Investigação de Opções de Transporte de Carga Geral em Contêineres nas Conexões com a Região Amazônica*. Doctoral thesis in transport engineering. Universidade de São Paulo, Escola de Engenharia de São Carlos: São Carlos, SP, Brazil. 235 pp. Available at: http://philip.inpa.gov.br/publ_livres/Dossie/BR-319/Outros%20documentos/TEIXEIRA_KARENINA_Investigação_de_opções_de_transporte_de_carga_geral_em_contêineres_nas_conexões_com_a_região_amazônica.pdf

Tófoli RM, Dias RM, Alves GHZ, Hoeinghaus DJ, Gomes LC, Baumgartner MT & Agostinho AA (2017) Gold at what cost? Another megaproject

threatens biodiversity in the Amazon. *Perspectives in Ecology and Conservation* 15, 129–131. <https://doi.org/10.1016/j.pecon.2017.06.003>

TRASE (2018) Desmatamento territorial causado pela soja 2013-2015. Available at: <https://trase.earth/flows>

Wenzel F 2018. Futuro ministro do Meio Ambiente diz que faltam informações sobre desmatamento. *OEco*, 10 December 2018. <https://www.oeco.org.br/noticias/futuro-ministro-do-meio-ambiente-diz-que-faltam-informacoes-sobre-desmatamento/?fbclid=IwAR2K9n1emAsEXRon6dKsA6GY7A8M42ZrDKY7eXowGhzULACbHeE7r5XzH3A>

References for statements by President Jair Bolsonaro

1. Brasil Urgente (2018) Datena entrevista o presidente eleito Jair Bolsonaro. *Youtube*, 5 November 2018. Available at: <https://www.youtube.com/watch?v=GaZkVYEXyJ8>
2. Marques J, Fernandes T (2018) Bolsonaro diz ter pedido para não haver Conferência do Clima da ONU no Brasil. *Folha de São Paulo*, 29 November 2018. Available at: <https://www1.folha.uol.com.br/ambiente/2018/11/bolsonaro-diz-que-pediu-para-nao-haver-conferencia-do-clima-no-brasil-em-2019.shtml>
3. Soares J, Grandelle R (2018) Bolsonaro afirma que vai sugerir mudanças no Acordo de Paris. *O Globo*, 13 December 2018. Available at: https://oglobo.globo.com/sociedade/bolsonaro-afirma-que-vai-sugerir-mudancas-no-acordo-de-paris-23301645?fbclid=IwAR3wNTtj2ZGDL_mBb5-usoAB05z1_Q1QSTLdVQjBKCqdalUGtE-7KDIFueo
4. Sassine V (2018) Ruralista vai cuidar de demarcação de terras indígenas e licença ambiental no governo Bolsonaro. *O Globo*, 18 December 2018. Available at: <https://oglobo.globo.com/brasil/ruralista-vai-cuidar-de-demarcacao-de-terras-indigenas-licenca-ambiental-no-governo-bolsonaro-23313524?fbclid=IwAR14lldw4puNg5SeX1Z0f6Sgw6fZyQbcBinKvTq9PPEJJVhv7JrfuQkIFgE>
5. Phillips D (2018) Brazil's biggest tribal reserve faces uncertain future under Bolsonaro: Far-right government vows to legalise mining and commercial farming on indigenous Yanomami land. *The Guardian*, 18 December 2018. Available at: <https://www.theguardian.com/world/2018/dec/18/brazil-biggest-tribal-reserve-faces-uncertain-future-under-jair-bolsonaro>
6. Fearnside PM (2019) Will President Bolsonaro withdraw Brazil from the Paris Agreement? *Mongabay*, 31 January 2019. Available at: <https://news.mongabay.com/2019/01/commentary-will-president-bolsonaro-withdraw-brazil-from-the-paris-agreement/>

7. Carta Campinas (2019) Atacado por Bolsonaro, Ibama foi o único órgão que alertou sobre o rompimento da barragem. 26 January 2019. Available at: https://cartacampinas.com.br/2019/01/atacado-por-bolsonaro-ibama-foi-o-unico-orgao-que-alertou-sobre-o-rompimento-da-barragem/?fbclid=IwAR3fkMPE1vCZVncqr-zuDwHwq-1Z90R8dbbMaH4UwQAwHc454q_Ur9GpAAw
8. Woodward A (2019) Brazil's new president has started taking steps towards damaging the 'lungs of the planet'. *Business Insider*, 5 February 2019. Available at: <https://www.businessinsider.com/bolsonaro-plan-to-develop-amazon-rainforest-2019-1>
9. Redação revista Veja (2019) Democracia só existe quando Forças Armadas querem, diz Bolsonaro. *Veja*, 7 March 2019. Available at: https://veja.abril.com.br/politica/democracia-so-existe-se-as-forcas-armadas-quiserem-diz-bolsonaro/?fbclid=IwAR3iJCtN1onQtKgP_Jv33wugBLWlbRtlrhNXilXRDNvGj7o1WNvAsTUq3FE
10. Trigueiro A (2019) 15 pontos para entender os rumos da desastrosa política ambiental no governo Bolsonaro. *G1*, 3 June 2019. Available at: https://g1.globo.com/natureza/blog/andre-trigueiro/post/2019/06/03/15-pontos-para-entender-os-rumos-da-desastrosa-politica-ambiental-no-governo-bolsonaro.ghtml?fbclid=IwAR1D0uSOE7qE_SfBi0Sp0SScpZ43YDdf_w1O3XDxlSTTc2zqqzAPx1t_roA
11. Arbex T (2019) Governo deve reeditar medida provisória que flexibiliza Código Florestal. *Folha de São Paulo*, 4 June 2019. Available at: <https://www1.folha.uol.com.br/ambiente/2019/06/governo-deve-reeditar-medida-provisoria-que-flexibiliza-codigo-florestal.shtml>
12. Bresciani E (2019) Bolsonaro vai editar nova MP para flexibilizar Código Florestal. *O Globo*, 4 June 2019. Available at: <https://oglobo.globo.com/sociedade/bolsonaro-vai-editar-nova-mp-para-flexibilizar-codigo-florestal-23716820>

References for statements by and facts about ministers

1. Rocha L (2009) Indígenas denunciam organizações missionárias evangélicas por sequestro de crianças. *Correio Braziliense*, 18 April 2009. Available at: <https://www.correiobraziliense.com.br/app/noticia/brasil/2009/04/18/inter-na-brasil,99946/indigenas-denunciam-organizacoes-missionarias-evangelicas-por-sequestro-de-criancas.shtml>
2. Guerra R, Ribeiro A (2018) Indicado para Meio Ambiente foi denunciado pelo MP por improbidade administrativa. *O Globo*, 9 December 2018.. Available at: <https://oglobo.globo.com/brasil/indicado-para-meio-ambiente-foi-denunciado-pelo-mp-por-improbidade-administrativa-23292920>
3. Rodrigues S (2018) Ricardo Salles foi condenado por fraude em plano de manejo. *Oeco*, 20 December 2018. Available at: <https://www.oeco.org.br/noticias/ricardo-salles-foi-condenado-por-fraude-em-plano-de-manejo/>

4. Bilenky T, Fernandes T, Watanabe P (2018) Aquecimento global é tema secundário, diz futuro ministro. *Folha de São Paulo*, 10 December 2018, p. B9. <https://www1.folha.uol.com.br/ambiente/2018/12/vamos-preservar-o-ambiente-sem-ideologia-diz-futuro-ministro-de-bolsonaro.shtml>
5. Guerra R, Ribeiro A (2018) Indicado para Meio Ambiente foi denunciado pelo MP por improbidade administrativa. *O Globo*, 9 December 2018. Available at: <https://oglobo.globo.com/brasil/indicado-para-meio-ambiente-foi-denunciado-pelo-mp-por-improbidade-administrativa-23292920>
6. Wiziack J (2018) Equipe de Bolsonaro estuda como desaparecer agências. *Folha de São Paulo*, 2 December 2018, p. A21. Available at: <https://www1.folha.uol.com.br/mercado/2018/12/equipe-de-bolsonaro-estuda-como-desaparecer-agencias.shtml>
7. Beck M, Ventura M (2018) Ministério da Fazenda defende fim de subsídios para energia eólica e solar. *O Globo*, 13 December 2018. Available at: https://oglobo.globo.com/economia/ministerio-da-fazenda-defende-fim-de-subsidios-para-energia-eolica-solar-23303374?fbclid=IwAR3jiOR7VLnUES3OP4S5y29k0FGNRXVT05IFwWqWEJMu0UDCmYsaH7_x6U
8. Wenzel F (2018) Futuro ministro do Meio Ambiente diz que faltam informações sobre desmatamento. *O Eco*, 10 December 2018. Available at: <https://www.oeco.org.br/noticias/futuro-ministro-do-meio-ambiente-diz-que-faltam-informacoes-sobre-desmatamento/?fbclid=IwAR2K9n1emAsEXRon6dKsA6GY7A8M42ZrDKY7eXowGhzULACbHeE7r5XzH3A>
9. Di Cunto R, Araújo C, Freitas C (2018) Novo chanceler diz que esquerda criou 'ideologia da mudança climática'. *Valor Econômico*, 15 November 2018. Available at: <https://www.valor.com.br/politica/5985233/novo-chanceler-diz-que-esquerda-criou-%3Fideologia-da-mudanca-climatica>
10. Sampaio C (2018) "Musa do veneno": saiba quem é a ministra da Agricultura de Bolsonaro. *Brasil de Fato*, 9 November 2018. Available at: <https://www.brasildefato.com.br/2018/11/09/musa-do-veneno-saiba-quem-e-a-ministra-da-agricultura-de-bolsonaro/>
11. Boldrini A (2018) Ruralistas festejam 'musa do veneno' em festa após aprovação de relatório sobre agrotóxicos. *Folha de São Paulo*, 26 June 2018. Available at: <https://www1.folha.uol.com.br/mercado/2018/06/ruralistas-festejam-musa-do-veneno-em-festa-apos-aprovacao-de-relatorio-sobre-agrotoxicos.shtml>
12. Lopes RJ (2018) Ministro não pode se dar ao luxo de fingir que não há mudanças climáticas. *Folha de São Paulo*, 16 December 2018. Available at: <https://www1.folha.uol.com.br/columnas/reinaldojoselopes/2018/12/ministro-nao-pode-se-dar-ao-luxo-de-fingir-que-nao-ha-mudancas-climaticas.shtml>
13. Girardi G (2019) Bolsonaro continua no Acordo de Paris, mas mudanças no ministério geram preocupação com desmatamento. *Estado de São Paulo*, 16 January 2019. Available at: <https://sustentabilidade.estadao.com.br/noticias/geral,bolsonaro->

- [continua-no-acordo-de-paris-mas-mudancas-no-ministerio-geram-preocupacao-com-desmatamento,70002680300](#)
14. Albuquerque L, Parreira M (2019) Ministra da Agricultura anuncia deputado Valdir Colatto como novo chefe do Serviço Florestal. *O Globo*, 16 January 2019. Available at: <https://g1.globo.com/politica/noticia/2019/01/16/ministra-da-agricultura-anuncia-deputado-valdir-colatto-como-novo-chefe-do-servico-florestal.ghtml>
 15. Zocchio G (2018) Ministra de Bolsonaro quer gado de 'brigada de incêndio' em reservas ambientais. *Outras Palavras*, 9 November 2018. Available at: <https://outraspalavras.net/ojoioeotrigo/2018/11/ministra-de-bolsonaro-quer-gado-de-brigada-de-incendio-em-reservas-ambientais/>
 16. Camargos D (2018) 'Musa do veneno', deputada Tereza Cristina recebe doações de empresários ligados a agrotóxicos. *Reporter Brasil*, 26 November 2018. Available at: <https://reporterbrasil.org.br/2018/09/musa-do-veneno-deputada-tereza-cristina-recebe-doacoes-de-empresarios-ligados-a-agrotoxicos/>
 17. Borges A (2018) Futura ministra quer acabar com inspeção diária em frigoríficos do País. *Estado de São Paulo*, 22 December 2018. Available at: <https://economia.estadao.com.br/noticias/geral,futura-ministra-quer-acabar-com-inspecao-diaria-em-frigorificos-do-pais,70002655119>
 18. Grigori P (2019) Governo liberou registros de agrotóxicos altamente tóxicos. *Reporter Brasil*, 18 January 2019. Available at: <https://reporterbrasil.org.br/2019/01/governo-liberou-registros-de-agrotoxicos-altamente-toxicos/?fbclid=IwAR0AFn2oXU4qOafjks-s5rZByQaHLGy4fj8XV-0HybrO3KEkXNJYOIL964>
 19. Redação Catraca Livre (2019). Ministério libera uso de substâncias banidas nos EUA e na UE. *Catraca Livre*, 22 January 2019. Available at: <https://catracalivre.com.br/cidadania/ministerio-libera-uso-de-substancias-banidas-nos-eua-e-na-ue/?fbclid=IwAR2QJUYqDr4hugOhghwqQ0VOzmAsKH8kTBvhnZ4pwwOglbJJ3tsWspbl2ml>
 20. Góes F (2019) Salles ordena 'pente fino' no Fundo Amazônia. *Valor Econômico*, 7 March 2019. Available at: <https://www.valor.com.br/politica/6148311/salles-ordena-pente-fino-no-fundo-amazonia>
 21. Silva CV (2019) O que é o Sínodo da Amazônia e porque o evento preocupa o governo Bolsonaro? *O Eco*, 14 February 2019. Available at: <https://www.oeco.org.br/noticias/o-que-e-o-sinodo-da-amazonia-e-porque-preocupa-o-governo-bolsonaro/>
 22. Oliveira ALM (2019) Governo vê encontro da Igreja Católica na Amazônia como ameaça. *Fpabramo*, 12 February 2019. Available at: <https://fpabramo.org.br/2019/02/12/governo-ve-encontro-da-igreja-catolica-na-amazonia-como-ameaca/>
 23. Tajra A, Montesanti B (2018) Futuro ministro, Ricardo Salles é condenado em ação de improbidade. *UOL*, 19 December 2018. <https://noticias.uol.com.br/meio-ambiente/ultimas-noticias/redacao/2018/12/19/futuro-ministro-ricardo-salles-e-condenado-em-acao-de-improbidade.htm>

24. Audi A, Martins R M (2019) Fiscais batem ponto e recebem salários no meio ambiente de Ricardo Salles – Só não podem trabalhar. *The Intercept Brasil*, 8 May 2019. <https://theintercept.com/2019/05/08/salles-paralisa-meio-ambiente/?fbclid=IwAR1dIO-ABxSE7Yqp16RpeWJ7uAi-7qdYUPxHKPb5q1KEhHSSqgfdiyP6FN0>
25. Associação Brasileira de Antropologia - ABA & Comissão de Assuntos Indígenas - CAI (2019). De onde a ministra Damares tirou este número? Sobre a declaração da Ministra no dia 31/05/2019, em Buenos Aires. Available at: <http://www.portal.abant.org.br/2019/06/11/de-onde-a-ministra-damares-tirou-este-numero/?fbclid=IwAR29ldIk1xpdCZHYiialBU-SA67Dx3XfGFpKc3Lr5oYL-znUbQgOgEFtEIU>
26. Do Camaro S (2019) Servidores denunciam Ricardo Salles à Comissão de Ética Pública e ao MPF. *Congresso em Foco*, 14 June 2019. Available at: https://congressoemfoco.uol.com.br/meio-ambiente/servidores-denunciam-ricardo-salles-a-comissao-de-etica-publica-e-ao-mpf/?fbclid=IwAR0awv_gUxRVmrQxeIGQUxbb7eN0MFjyzBwx6o6N-Zrrh8-Ksu2u6b-fa8A
27. Ricardo Salles se reúne com governador do Amazonas para discutir licenças da BR-319: <https://amazonasatual.com.br/ministro-do-meio-ambiente-se-reune-com-wilson-lima-e-alfredo-menezes-em-parintins/?fbclid=IwAR3FCnCT0QdV4Lk6-dFaVOgmvQ8wZ5xsVQoo3YwsvaScmHe4KGCFbX5FGUc>
28. AGU e agrotóxicos: https://oglobo.globo.com/sociedade/agu-discorda-de-ruralistas-diz-que-estados-podem-proibir-pulverizacao-de-agrotoxicos-por-avioes-23747663?utm_campaign=agricultura&utm_content=94989642&utm_medium=social&utm_source=facebook&hss_channel=fbp-159103797542&fbclid=IwAR3I5AFjIz3HI4qaP3ACdZ6Xr3dDCAj62aG9X-UgLkOZ0kNneqI3TfGNKWQ
29. PL da grilagem no Pará: <http://www.ihu.unisinos.br/78-noticias/590391-brasileiros-pagaram-118-bilhoes-para-legalizar-grileiros-na-amazoniaO?fbclid=IwAR2auHzbGerwnzy59o-fMxHArAdNYKZMbZ4OFomTejVo1fyZTVsF6K2c-MU>

Proposed laws on endangered species, hunting and agrochemicals

1. Brazil, Câmara dos Deputados, PL 6268/2016 (2016). Available at: <https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2113552>
2. Brazil, Câmara dos Deputados, PDC 427/2016 (2016). Available at: <https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2091481>
3. Brazil, Câmara dos Deputados, PL 6299/2002 (2002). Available at: <https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=46249&ord=1>

4. Brazil, Câmara dos Deputados, PL 34/2015 (2015). Available at: <https://www25.senado.leg.br/web/atividade/materias/-/materia/120996>
5. Lazzeri T (2017) Brasil libera quantidade até 5.000 vezes maior de agrotóxicos do que Europa. *UOL*, 27 November 2017. Available at: https://noticias.uol.com.br/meio-ambiente/ultimas-noticias/redacao/2017/11/27/brasil-libera-quantidade-ate-5000-vezes-maior-de-agrotoxicos-do-que-europa.htm?fbclid=IwAR06JEkbS-VobTyhuCTAx4TQ-cXDbIc5nv_IKKomvr92zqbO4JvIBLO_s1E&cmpid=copiaecola
6. Spautz D (2019) O Brasil não pode ser quintal de agrotóxicos banidos, diz médica que trata câncer infantil. *G1*, 26 March 2019. Available at: <https://www.nsctotal.com.br/colunistas/dagmara-spautz/o-brasil-nao-pode-ser-quintal-de-agrotoxicos-banidos-diz-medica-que-trata>

References from actions and attacks on environmental agencies, the National Indian Foundation (FUNAI) and illegal deforestation

1. Instituto Humanitas Unisinos (2019) Organização criminosa invade Terras Indígenas em Rondônia. 17 January 2019. Available at: <http://www.ihu.unisinos.br/78-noticias/586134-organizacao-criminosa-invade-terras-indigenas-em-rondonia>
2. Masionnave F (2018) Com cartazes pró-Bolsonaro, protesto de madeireiros obriga Ibama a fugir de cidade do AM. *Folha de São Paulo*, 18 December 2018. Available at: <https://www1.folha.uol.com.br/ambiente/2018/12/com-cartazes-pro-bolsonaro-protesto-de-madeireiros-obriga-ibama-a-fugir-de-cidade-do-am.shtml>
3. Amazonas Atual (2019) Funai faz maior expedição para contato com índios isolados no Amazonas. 7 March 2019. Available at: https://amazonasatual.com.br/funai-faz-maior-expedicao-para-contato-com-indios-isolados-no-amazonas/?fbclid=IwAR3GFWPtG_20OzBAKDdtgm0ZtuoqHHab3CGA1IxcxOloEyYidz00Cc9I7mM
4. Fellet J (2019) Governo inicia megaexpedição para se aproximar de índios isolados no Amazonas. 7 March 2019. Available at: https://www.bbc.com/portuguese/brasil-47351472?ocid=socialflow_facebook&fbclid=IwAR3i2ANm4VfmzTShr7ca6QikDSXAoW3ybRZLF4XhoT7oR16qfTc0wmPdli8
5. Souza MM (2019) Índios não poderão decidir sobre atuação de mineradoras em suas terras. 5 March 2019. Available at: <https://www.valor.com.br/brasil/6146253/indios-nao-poderao-decidir-sobre-atuacao-de-mineradoras-em-suas-terras>

6. Mendes K (2019) Brazil's Congress reverses Bolsonaro, restores Funai's land demarcation powers. *Mongabay Series: Amazon Illegal Deforestation*, 5 June 2019. Available at: https://news.mongabay.com/2019/06/brazils-congress-reverses-bolsonaro-restores-funais-land-demarcation-powers/?fbclid=IwAR31jrFcWftGANEi1VXp8TaxB4YeSZzDIPs2ymdgfMHDxxEYUu0_hCsFZOA
7. Rodrigues S (2019) Câmara aprova MP que alterou novo Código Florestal. *O Eco*, 29 May 2019. Available at: https://www.oeco.org.br/noticias/camara-aprova-mp-que-alterou-novo-codigo-florestal/?fbclid=IwAR0XMnVnM9mCjD2w9L4Y4CIDJ4z_74RWW7VdpTNNEHxcRanXV5BkqVFWsdo
8. Calgaro F, Garcia G, Resende S (2019) Câmara aprova MP que muda Código Florestal, mas presidente do Senado diz que não vai pautar. *G1*, 25 May 2019. Available at: https://g1.globo.com/politica/noticia/2019/05/29/camara-aprova-texto-base-de-mp-que-altera-o-codigo-florestal.ghtml?fbclid=IwAR0F7WAp_vb1sHZVytEwjC8bFbQU0gBT1zBDWXjTDXeifrQy6SzM8F-jjiA
9. Por Observatório do Clima (2019) Sob Bolsonaro, autuações do Ibama são as menores em uma década. *OEco*, 23 May 2019. Available at: https://www.oeco.org.br/noticias/sob-bolsonaro-autuacoes-do-ibama-sao-as-menores-em-uma-decada/?utm_campaign=shareaholic&utm_medium=facebook&utm_source=socialnetwork&fbclid=IwAR3fPx85yYb9Kom1_jdLpT5NpEByvH3gfRAfx1ILhiqvq8fesr5v51DnDw
10. Camporez P (2019) Fundo Amazônia pode perder recursos doados pela Alemanha. *O Globo*, 27 May 2019. Available at: https://oglobo.globo.com/sociedade/fundo-amazonia-pode-perder-recursos-doados-pela-alemanha-23697439?utm_source=Facebook&utm_medium=Social&utm_campaign=O%20Globo
11. Jornal GGN (2019) Governo quer cortar seis das 11 bases do ICMBio. *Jornal GGN*, 7 June 2019. Available at: https://jornalggn.com.br/meio-ambiente/governo-quer-cortar-seis-das-11-bases-do-icmbio/?fbclid=IwAR00mAiiK3JO-3GVQ9zYoWOyLjkgenBovzp5C63aYgK8Y_Au1cqi7fHJ_ow
12. Barifouse R (2019) Dia Mundial do Meio Ambiente: 68% das áreas de proteção e indígenas da Amazônia estão ameaçadas, diz estudo. *BBC News*, 5 June 2019. Available at: https://www.bbc.com/portuguese/brasil-48504317?fbclid=IwAR21bx98MyFI23AJ2Ctv2xew3sX2DylvuqargpEolYbFOg_Lx03wisliVA
13. Rodrigues S (2019) Senador entra na Justiça contra alteração no Conama. *OEco*, 5 June 2019. Available at: <https://www.oeco.org.br/blogs/salada-verde/senador-entra-na-justica->

- [contra-alteracao-no-conama/?fbclid=IwAR11VLgKIS-NyCLHlj8S49ltPZsEVQFgUBO1n1qYs47UyeYfYmGbskUNhWI](https://www.facebook.com/Correio-da-Amazônia-Brasil/posts/10158491623549162)
14. Correio da Amazônia (2019) Extração criminosa e venda ilegal do Ipê no Pará e Amazonas é registrada em vídeo. *Correio da Amazônia*, 8 June 2019. Available at: <https://correiodaamazonia.com/extração-criminosa-e-venda-ilegal-do-ipe-no-para-e-amazonas-e-registrada-em-video/?fbclid=IwAR1o2tGjTe0cBxyXbqiZl7-P33gjdKHJCeQ2rGMxlw0HFYl-PqWfvfhm34>
 15. Branford S, Borges T (2019) Dismantling of Brazilian environmental protections gains pace. *Mongabay*, 8 May 2019. Available at: https://news.mongabay.com/2019/05/dismantling-of-brazilian-environmental-protections-gains-pace/?n3wsletter&utm_source=Mongabay+Newsletter&utm_campaign=386f2ccc65-newsletter_2019_05_09&utm_medium=email&utm_term=0_940652e1f4-386f2ccc65-77145941
 16. ClimaInfo (2019) 95% do desmatamento do primeiro trimestre foi ilegal, informa o novo sistema MapBiomas Alerta. *ClimaInfo*, 7 June 2019. Available at: <http://climainfo.org.br/2019/06/07/95-do-desmatamento-do-primeiro-trimestre-foi-ilegal-informa-o-novo-sistema-mapbiomas-alerta/?fbclid=IwAR0ke45ANZiAkj9Hy7bXCX7g1I7ERYKHLnYFnku5CnPsh1HpezW9jBlkCio>
 17. Bresciani E (2019) Bolsonaro vai editar nova MP para flexibilizar Código Florestal. *O Globo*, 4 June 2019. Available at: https://oglobo.globo.com/sociedade/bolsonaro-vai-editar-nova-mp-para-flexibilizar-codigo-florestal-23716820?fbclid=IwAR2EXAd8ABe3i9zhI7HQfepZycRzqB_iRXP1vPXyu3R7d1lvBeo9QwFKT8k
 18. Moura G (2019) Índice de desmatamento na Amazônia Legal cresce e leis ambientais são alteradas. *BandNews* 93.7, 5 June 2019. Available at: http://www.bandnewsdifusora.com.br/2019/06/05/indice-de-desmatamento-na-amazonia-legal-cresce-e-leis-ambientais-sao-alteradas/?fbclid=IwAR0_OdXhDH1jp-saKFE9K8A6qyybrMp024Y_O0syS8JCJ3QEc1rMKDOPuFQ
 19. Borges A (2019) Confira a lista das 67 unidades de conservação que o governo federal quer reduzir. *Estadão*, 12 June 2019. Available at: https://sustentabilidade.estadao.com.br/noticias/geral,confira-a-lista-das-unidades-de-conservacao-que-o-governo-quer-reduzir,70002868340?fbclid=IwAR0I5uVpsF1FewDVG22iq7cv-kpuzf8eTYn_tZm1aDaL7zwszUwSYeySwzA
 20. Boadle A, Paraguassu L (2019) Satellite data shows Amazon deforestation rising under Brazil's Bolsonaro. *Reuters*, 4 June 2019. Available at: https://www.reuters.com/article/us-brazil-environment-deforestation-idUSKCN1T52OQ?fbclid=IwAR3nVrVTUA0pF_CDWoqaYv6UAIrImgwIMUdj8EWj_fFANoiUozYKE4YzJo

21. Redação Globo Rural (2019) Indígenas do Xingu entregam plano de consulta sobre a BR-242 à Câmara dos Deputados. *Globo Rural*, 13 June 2019. Available at:
https://revistagloborural.globo.com/Noticias/Infraestrutura-e-Logistica/noticia/2019/06/indigenas-do-xingu-entregam-plano-de-consulta-sobre-br-242-camara-dos-deputados.html?utm_source=facebook&utm_medium=social&utm_campaign=post&fbclid=IwAR1eHM3RZ2MH3sfGRXXM_HFWDFi513uyx1VbQLW2ozm91YDmGOD4PNAonig

References from Large infrastructure projects in the Brazilian Amazon

1. *A Crítica* (2019). BR-319 fica de fora de pacote de obras do governo Bolsonaro para rodovias federais. *A Crítica*, 30 January 2019.
<https://www.acritica.com/channels/manaus/news/br-319-fica-fora-de-pacote-de-obras-do-governo-bolsonaro-para-rodovias-federais?fbclid=IwAR2J6Tp7vtyehyLvwW46pOYAk8AKKh1E5-yVaqS5v9imovpjVOPBSAYUMc4>
2. Mello PC, Prado A (2018). Agronegócio banca palestras de cético sobre mudança climática para ruralistas no Matopiba. *Folha de São Paulo*, 22 May 2018. <https://arte.folha.uol.com.br/ciencia/2018/crise-do-clima/cerrado/agronegocio-banca-palestras-de-cetico-sobre-mudanca-climatica-para-ruralistas-no-matopiba/>
3. Picado A (2018) La minería ilegal está destruyendo a los Yanomami. *El país*, 19 July 2018. Available at:
https://elpais.com/elpais/2018/07/19/3500_millones/1531993839_746461.html?id_externo_rsoc=FB_CC&fbclid=IwAR3R9roS9ZuLv96nlCBYMCU_hTf9jhjRvaxikaFrEsNcOLw9u178xCv2dUlg
4. Rocha J (2019). Bolsonaro government reveals plan to develop the 'Unproductive Amazon'. *Mongabay*, 28 January 2019.
<https://news.mongabay.com/2019/01/bolsonaro-government-reveals-plan-to-develop-the-unproductive-amazon/>
5. Mendonca G (2019) Entrevista General Santa Rosa - Rede Nacional de Rádio. Projeto Barão do Rio Branco vai desenvolver obras na região amazônica. *Rede Nacional de Radio*, 21 January 2019. Available at:
<http://redenacionalderadio.com.br/programas/materias-da-voz/21-01-19-graziella-mendonca-entrevista-general-santa-rosa.mp3/view>
6. Campinas F (2019) Jantar com Maia e Alcolumbre na casa de Silas terá BR-319 e ZFM no 'cardápio'. *Amazonas Atual*, 4 February 2019. Available at:
<https://amazonasatual.com.br/omar-negocia-encontro-entre-wilson-lima-maia-e-alcolumbre-na-casa-de->

silas/?fbclid=IwAR2LAdDLVbEmDGBVIVE-It8jBhclNXydO25JVAL7WAcJZMWYacqA8i-xvBQ

7. Lima V (2019) Bancada quer que governo delegue ao AM licenciamento e recuperação da BR-319. *Amazonas Atual*, 4 February 2019. Available at: <https://amazonasatual.com.br/bancada-quer-que-governo-delegue-ao-am-licenciamento-e-recuperacao-da-br-319/?fbclid=IwAR1Gxy6MqowNtdxIG4vTrQmOjvUkWbJfFWmhiPTDxta3KjMyhBdke6dngA8>
8. Borges A (2019) Confira a lista das 67 unidades de conservação que o governo federal quer reduzir. *O Estado de São Paulo*, 12 June 2019. Available at: <https://sustentabilidade.estadao.com.br/noticias/geral,confira-a-lista-das-unidades-de-conservacao-que-o-governo-quer-reduzir,70002868340>

References related to the Mariana and Brumadinho disasters

1. G1 (2015) Barragem se rompe, e enxurrada de lama destrói distrito de Mariana. *O Globo*, 5 November 2015. Available at: <http://g1.globo.com/minas-gerais/noticia/2015/11/barragem-de-rejeitos-se-rompe-em-distrito-de-mariana.html>
2. Jornal Nacional (2018) Tragédia de Mariana completa três anos e maioria dos atingidos ainda não foi indenizada. *O Globo*, 5 November 2018. Available at: <https://g1.globo.com/jornal-nacional/noticia/2018/11/05/tragedia-de-mariana-completa-tres-anos-e-maioria-dos-atingidos-ainda-nao-foi-indenizada.ghtml>
3. IBAMA (2018) Rompimento da Barragem de Fundão: Documentos relacionados ao desastre da Samarco em Mariana/MG. Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), 23 October 2018. Available at: <http://www.ibama.gov.br/cites-e-comercio-exterior/cites?id=117>
4. Guimarães J (2019) Em 3 anos, Samarco cumpriu 1 dos 42 programas de reparação após crime ambiental. *Brasil de Fato*, 5 January 2019. (2019). Available at: https://www.brasildefato.com.br/2019/01/05/em-3-anos-samarco-cumpriu-1-dos-42-programas-de-reparacao-apos-crime-ambiental/index.html?fbclid=IwAR1ISfZtFjb7-HnrX8ei1-EFzBNj6LOI_wiCu0RrzRKuQmpvfpUYESTRuiU
5. Nogueira D (2018) Empresas envolvidas em desastres ambientais quitaram só 3,4% de R\$ 785 milhões em multas. *O Globo*, 8 May 2018. Available at: <https://oglobo.globo.com/economia/empresas-envolvidas-em-desastres-ambientais-quitaram-so-34-de-785-milhoes-em-multas-22657874>
6. Paes CF (2018) mineradoras e ruralistas se unem para afrouxar regras de licenciamento ambiental. 14 December 2018. *The Intercept*, Available at: <https://theintercept.com/2018/12/14/mineradoras->

- [licenciamento/?fbclid=IwAR3shFfgHB3ubvUg8unxbiGazf4SuPUoVNDHDAbidn7mdhw-W9pirkok6-w](#)
7. Agência Nacional de Águas (ANA) (2018) 45 barragens preocupam órgãos fiscalizadores, aponta Relatório de Segurança de Barragens elaborado pela ANA. ANA, 19 November 2018. Available at: http://www3.ana.gov.br/portal/ANA/noticias/45-barragens-preocupam-orgaos-fiscalizadores-aponta-relatorio-de-seguranca-de-barragens-elaborado-pela-ana?fbclid=IwAR2yLL-RtplxQUfyi_hw6uvz4OIO0QF9gCI95B9CR1p6eW8WOkvUggix4fU
 8. Lisboa C (2019) Expansão de mineração em Brumadinho foi aprovada com licença simplificada. *OEco*, 26 January 2019. Available at: <https://www.oeco.org.br/noticias/expansao-de-mineracao-em-brumadinho-foi-aprovada-com-licenca-simplificada/?fbclid=IwAR3DJ8zd-44KBnfz0jSgS4cuNJJ0BKTsb5BnkfZPY8SA3XPW7N5h0jLNiAo>
 9. Carta Campinas (2019) Atacado por Bolsonaro, Ibama foi o único órgão que alertou sobre o rompimento da barragem. *Carta Campinas*, 26 January 2019. Available at: https://cartacampinas.com.br/2019/01/atacado-por-bolsonaro-ibama-foi-o-unico-orgao-que-alertou-sobre-o-rompimento-da-barragem/?fbclid=IwAR3fkMPE1vCZVncqr-zuDwHwq-1Z90R8dbbMaH4UwQAwhc454q_Ur9GpAAw
 10. Scannavino C (2019) Amazônia: garimpos jogam 'uma Brumadinho' a cada 20 meses no Tapajós. *Carta Capital*, 5 June 2019. Available at: <https://www.cartacapital.com.br/?p=79389&fbclid=IwAR0ZS84He2U3NzBb3QWXAaoLCrj97FY6XVDZoSnp4HwsPYYdz8USUJkqPEM>

Shapefile data

- Land-use change base map and landscape components (MAPBIOMAS). Available at http://mapbiomas.org/pages/database/mapbiomas_collection_download
- Thematic Map and Geostatistical Data of Federal Conservation Units (ICMbio and MMA). Available at <http://www.icmbio.gov.br/portal/geoprocessamentos/51-menu-servicos/4004-downloads-mapa-tematico-e-dados-geoestatisticos-das-UC-S>
- PRODES Amazônia. Data for deforestation in the Brazilian Amazon (2005-2017). Available at: <http://maps.lapiq.iesa.ufg.br/lapiq.html>
- Data for clearing of the Brazilian *Caatinga* (2009). Available at: <http://maps.lapiq.iesa.ufg.br/lapiq.html>
- Data for clearing of *Cerrado* in the Matopiba region (2003-2017). Available at: <http://maps.lapiq.iesa.ufg.br/lapiq.html>