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Please cite as:

Favor citar como:

Fearnside, P.M. 2024. **Lula and**

Amazonia pp. 131-143 In: R.

Bourne (ed.) *Brazil after Bolsonaro:*

The Comeback of Lula da Silva.

Routledge, New York. 229 pp.:

<https://doi.org/10.4324/9781003407546-1>

[released 28 Aug. 2023]

DOI:

<https://doi.org/10.4324/9781003407546-13>

[whole book]: <https://doi.org/10.4324/9781003407546>

ISBN: 978-1-032-52331-6 (hbk)

ISBN: 978-1-032-52330-9 (pbk)

ISBN: 978-1-003-40754-6 (ebk)

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The publication is available at:

A publicação está disponível em:

<https://doi.org/10.4324/9781003407546-13>

<https://www.routledge.com>

21 January 2023

Lula and Amazonia

Philip M. Fearnside

The outlook for the environment in Brazilian Amazonia is clearly much better under Luiz Inácio Lula da Silva's presidency than what could be expected under a second term of Jair Bolsonaro. In the months before the October 2022 election, Lula made multiple statements indicating the intent to fight deforestation and climate change and to protect indigenous peoples, and he has appointed people with good credentials to head the federal government agencies that deal with environmental and indigenous matters. However, both the history of his past administrations and some of his current discourse indicate areas of concern. It will be important to see that damaging policies are avoided in these areas.

Hydroelectric dams

The Belo Monte Dam on the Xingu River, the Santo Antônio and Jirau Dams on the Madeira River, and the Teles Pires and São Manoel Dams in the Tapajós basin were all initiated during Lula's administrations. All of these dams have tremendous environmental and social impacts. Lula recently stated that he would build Belo Monte all over again (Lima, 2022), and, when asked in an interview if he had any regrets over the disaster at Belo Monte, he defended the project stating that the millions of reais spent on social programs meant that the local people had been benefited (TV5 Monde, 2022). Lula had especially strong personal involvement in promoting Belo Monte and in denigrating the local people who opposed the project (Bratmann, 2014; Fearnside, 2017a,b). The impacts on indigenous peoples and traditional riverside dwellers (*ribeirinhos*) have been devastating, as have the impacts on natural ecosystems. The “*Volta Grande*” (Big Bend), a 130-km river stretch between the two dams that make up the Belo Monte complex, had 80% of its water flow diverted away through canals to the main powerhouse. Two indigenous peoples live along the “*Volta Grande*” and a third Indigenous land on a tributary that flows into the Volta Grande also depended on the fish and turtles in this river stretch. None of the impacted indigenous peoples were consulted, as required by International Labour Organization Convention 169 (ILO, 1989) and by the Brazilian law that enacts it (Law 10,088/2019, formerly 5051/2004). At least 20 suits against the dam were initiated by Brazil's Federal Public Ministry and are still pending in Brazilian courts, and one was decided in favor of the indigenous people. The Federal Public Ministry is a public prosecutor's office created by Brazil's 1988 Constitution to defend the rights of the people. However, the Lula administration appealed this decision to the Federal Supreme Court, and the head of the court, after receiving four representatives of the administration and none from civil society, decided to allow the dam to go forward until such time as the full court decided on the merits or the case. This occurred when the head of the court was racing to complete the trial of the “*mensalão*” scandal and was only 15 days before he would be forced to retire by his reaching the age limit for supreme court justices. In the meantime, the dam has been completed and the Belo Monte case has not appeared on the court's radar for a decision.

Belo Monte is on the Xingu River, which has a water flow that is insufficient to justify the 11,000 MW of turbines that were installed in the main powerhouse (Fearnside, 2017c). The greatest fear is that this could provide an excuse for building at least one of the five large dams that were originally planned upstream of Belo Monte, thus flooding vast areas of indigenous land (Fearnside, 2006, 2017c). An upstream dam might well be a consequence if the bill opening indigenous lands to hydroelectric dams (PL 191/2020) is passed, as is on the agenda for the “ruralist” voting-block in the National Congress (which has a strong interest in the bill’s provisions to allow non-indigenous agribusiness operations in these lands). Many other dams in Amazonian indigenous land are planned if the bill is passed (Fearnside, 2020a).

The Madeira River dams have also caused massive impacts, and, like Belo Monte, the approval of the environmental licenses for these dams was forced through the licensing agency under intense pressure from the presidential palace (Fearnside, 2013, 2014a,b). One of the most dramatic impacts was blocking the annual spawning migration of the “giant catfish” of the Madeira River. Although Lula famously complained in 2007 that his environment minister Marina Silva had “thrown a catfish in his lap” by questioning the dams, these catfish were providing the livelihoods for a large population: just in Brazil there were 2400 members of fisheries cooperatives (each of whom represented a family), and there were also large fisher populations in Bolivia and Peru that depended on this resource. The assassination of fisheries cooperative leader Nilce de Souza Magalhães, known as “Nicinha,” illustrates the tension: her body was found five months later at the bottom of the Jirau reservoir, weighted down with rocks (Toledo, 2016). Her husband told me the police have made no progress on finding the assassins, let alone identifying the actor that presumably hired them. The Jirau Dam is controlled by the French multinational Energie (the former GDF Suez), and the dam has resulted in multiple environmental and human-rights impacts. In a radio interview in June 2022 Lula defended the Madeira River dam projects and stated that the fishers could produce fish in aquaculture ponds (Rádio Difusora Manaus, 2022).

The Teles Pires Dam represents the worst shock the Munduruku people have suffered, which is saying something. The Sete Quedas rapids were first dynamited and then flooded by the reservoir. This is the place where the spirits of tribal elders go after they die – the equivalent of heaven for Christians (Branford & Torres, 2017). The loss of sacred sites is not even considered to be an impact in the Environmental Impact Assessments done for licensing purposes (Fearnside, 2015a). A total of 30 dams with at least 30 MW of installed capacity are planned in the Tapajós basin, including the Chacorão Dam that would flood 11,700 ha of the Munduruku Indigenous Land (Fearnside, 2015b).

The São Manoel Dam was built only 700 m from the Kayabi Indigenous Land, and no indigenous people were consulted. The Federal Public Ministry submitted multiple public suits to the courts to halt the project for its violation of the consultation requirements of ILO Convention 169 and corresponding Brazilian legislation (Fearnside, 2017d). These were summarily overruled by invoking “security suspensions,” a vestige of Brazil’s 1964-1985 military dictatorship (Law 4348 of 26 June 1964) that has been confirmed and expanded in current laws (Law 8437 of 30 June 1992; Law 12,016 of 7 August 2009) and allows any decision to be overruled if a project would cause “grave damage to the public

economy.” The repeated use of this provision under Lula’s administrations to allow the Belo Monte, Teles Pires and São Manoel dams to go forward despite clear violations bodes poorly both for future infrastructure and for the possibility of his championing the repeal of the security-suspension laws.

Highway BR-319

A major question is whether Lula will go forward with the project to “reconstruct” Highway BR-319 (Manaus-Porto Velho). He stated in an interview in June 2022 that the highway is important for the economies of Amazonas and Rondônia and that it should be built if the federal, state and municipal governments have a “commitment” (*compromisso*) to defending the environment (Rádio Difusora Manaus, 2022). Unfortunately, even if such a commitment could actually prevent the impact, elected governments change every few years, and there can be no guarantee of the uninterrupted presence of the political courage and astronomical financial resources that would be needed.

Highway BR-319 was built in 1972-1973, inaugurated in 1976 and abandoned in 1988; it has been made minimally passable by a so-called “maintenance” program since 2015. BR-319 and its planned side roads would open the largest remaining block of Amazon forest to the entry of deforesters from the notorious “arc of deforestation” along the southern and eastern edges of the region (Fearnside, 2022a). The project is backed by all politicians in Manaus, including those who support Lula, provided, of course, that the project is paid for by the federal government with funds from taxpayers throughout Brazil. The project is unusual in not having an economic rationale, and it is the only major infrastructure project in Brazil that does not have an economic viability study (EVTEA). Transporting products to markets in São Paulo from the factories in the Manaus Free Trade Zone (SUFRAMA) is much cheaper by the present system of barge and road transport than it would be via BR-319, and it would be even cheaper if transported in containers in ocean-going ships (Teixeira, 2007). The preliminary license for the reconstruction project was approved in July 2022 despite the required consultation with impacted indigenous peoples not having been carried out (See: Ferrante et al., 2020).

Alternative arguments for BR-319 are also fallacious. If the objective were to improve access to schools and health centers for people in the interior of the state of Amazonas, the funds would be spent on building and staffing these facilities throughout the state’s interior and not on reconstructing an expensive road for the lucky few who have settled along the highway route. The road is not a priority for “national security” because it is far from Brazil’s borders and BR-319, as stated in 2012 by the Brazilian Army’s commander for Amazonia, and it is not mentioned anywhere in the Brazilian military’s 2008 National Strategy for Defense. Brazilians are free to “come and go,” but they do not have any inherent “right” for the government to build a road to their doorsteps. Lastly, the argument that the rest of Brazil should pay for the road because it owes a “historical debt” to Amazonia for having exploited the region for centuries for the benefit of the country’s wealthy southeastern states is unlikely to be convincing in São Paulo, especially if the population there were to realize that 70% of the water that supports the city of São Paulo comes via the winds known as “flying rivers” from precisely the block of forest that is

threatened by BR-319 and its side roads (e.g., Fearnside, 2015c; van der Ent et al., 2010; Zemp et al., 2014).

Rhetoric surrounding Highway BR-319 invariably claims that deforestation in the area will be prevented by governance. The first of the two Environmental Impact Assessments even presented Yellowstone National Park as the example of the governance expected to prevail, showing a map of the park with the roads over which millions of tourists drive without cutting a single tree (See Fearnside & Graça, 2009). In 2010, Dilma Rousseff, then Lula's head of the presidential "Civil House," announced that BR-319 would be a "parkway" (*estrada parque*) where tourists would drive to admire the forest (Paraguassu, 2010). Politicians in Manaus claim the highway will be "an example of sustainability for the world" (*Amazonas em Tempo*, 2020). Unfortunately, this scenario is pure fiction, and the highway route today is basically a lawless area where illegal logging and landgrabbing are in full view (Andrade et al., 2021; Ferrante et al., 2021a). The rapid multiplication of illegal "endogenous" roads (*ramais*) is giving access to invasion of protected areas and undesignated public land (Fearnside et al., 2020). As to the frequently heard argument that paving the road will result in better access for inspectors and less violations of environmental regulations, this is belied by the history so far: with the gradual improvement of the road by "maintenance" since 2015, environmental violations have been constantly increasing, rather than decreasing.

Gas and Oil

Plans for gas and oil exploitation in Amazonia are another area of concern. The massive "Solimões Sedimentary Area" project would cover 740,000 km², the area of the UK and Spain together. The project is in a particularly important area for Brazil's environment: the Trans-Purus region between the Purus River and the Peruvian border (Fearnside, 2020b; Fearnside et al., 2020). Drilling rights in the first 16 blocks of the project have already been sold to Rosneft, the Russian government oil and gas company. Three of these blocks are directly on the route of the planned AM-366 highway that would connect to BR-319 (Brazil, DNIT, 2020). The financial and political influence of Rosneft could induce the federal and Amazonas state governments to prioritize building the potentially disastrous AB-366 highway (Fearnside, 2022b), and the oil companies themselves could build, or convince the government to build, branch roads connecting to AM-366, since access by road is much cheaper than the official scenario of oil fields being like platforms in the ocean, accessible by helicopter (Fearnside, 2020b).

Greenpeace-Russia accuses Rosneft of causing over 10,000 oil spills around the world. Oil spills in Amazonia are especially damaging to aquatic biodiversity. Lula's previous administrations were not exactly careful in promoting gas and oil exploitation, having launched the Pre-Salt project in the Atlantic Ocean off the coast of Brazil. Virtually all discussion was on what to do with the money that would be generated, rather than the project's environmental risks. In 2010, the last year of Lula's second term, the Deep-Water Horizon well spilled oil into the Gulf of Mexico unchecked for months, demonstrating that no one in the world had the capacity to contain a spill at a depth of 1.5 km. The Pre-Salt project off the coast of Northeast Brazil includes wells at double that depth (Fearnside,

2018). Petrobras plans to begin extracting oil in a “new Pre-Salt” the Amazon estuary off the coast of Amapá by 2026 at a depth of 2.8 km (ClimaInfo, 2022).

Biofuels

The question of biofuels could be an important factor in future deforestation. Crops such as sugarcane for alcohol and oil palm and soy for biodiesel could occupy vast areas in Amazonia (Ferrante & Fearnside, 2020). During Lula’s first administration there was a long battle between his ministers of agriculture (Reinaldo Stephanes) and environment (Marina Silva) over whether Amazonia and the Pantanal would be opened for sugarcane. In the end, Marina Silva was able to prevail. Note, however, that Lula has been making overtures to “ruralist” (agribusiness) leaders and supported a ruralist Senate candidate in Mato Grosso (Oliveira et al., 2022). Political battles over opening the Amazon to sugarcane have continued to the present. Although efforts to remove the restriction were blocked by a judicial decision, biofuel companies are investing in projects that temporarily use maize while waiting for this policy to change (Ferrante et al., 2021b).

The National Plan for Climate Change, released during Lula’s presidency in 2008, calls for hydroelectric dams, tree planting and biofuels as major efforts to mitigate global warming (Brazil, CIMC, 2008). Castor bean (*mamona: Ricinus communis*), and jatophra (*pinhão manso: Jatropha curcas*) were emphasized by Lula for promotion in semiarid northeastern Brazil as sources of biodiesel, with social benefits in providing livelihoods to small farmers. The plan called for tripling both alcohol and biodiesel production in a decade. However, meeting the government’s targets for biodiesel production this way proved challenging, and the result was reliance on biodiesel from soy, which is grown by wealthy landholders in mechanized plantations in other regions of the country. Jatophra planting by small farmers can potentially reduce production of food crops by competing for both land and labor, as has been documented in Mexico and Africa. Small farmers have an essential role in supplying staple food crops in Brazil, as large landholders usually produce commodities for export.

Tree planting & “net zero deforestation”

Lula’s 2022 campaign platform included a goal of “net zero deforestation,” which means no further decline in the total area of “forest”, including the original forest, secondary forests and planted forests (Coligação Brasil da Esperança, 2022). While this goal can have environmental benefits compared to the current trend, these benefits depend entirely on how the goal is achieved. The key issue for the environment is halting further loss of the original forest – what is needed is a goal of “zero deforestation,” not “net zero deforestation.” Aside from reducing “illegal” deforestation by rebuilding Brazil’s environmental agencies, Lula’s platform emphasizes the importance of “recuperating degraded land” in achieving the net zero deforestation goal. This has much less benefit than preventing further loss of original forest: a hectare of “recuperated” land has much less carbon and biodiversity than a hectare of original forest, and it also costs more than to prevent a hectare of deforestation. In terms of carbon kept out of the atmosphere, the difference in the cost per ton is obviously even greater than the difference in cost per hectare. In addition, the benefit of avoiding deforestation can be immediate, whereas either

planted or naturally regenerated trees take years to grow, and the value of time is very great in matters of climate change.

Costs of forest restoration in the state of Mato Grosso were calculated by Hissa (2019). The cheapest scenario per ton of carbon in land that was originally forest relied on protecting secondary forest for natural regeneration rather than active planting (which is substantially more expensive), and with equal weights for the criteria considered. The total cost, in 2019 dollars, was US\$47.30/tC (US\$12.9/t CO₂e), of which US\$14.94/tC represented opportunity costs and US\$ 32.36/tC represented direct costs. This calculation was for both private land (restricted to landholdings in the Rural Environmental Register, or CAR), where total cost averaged US\$59.77/tC, and public land, where total cost averaged US\$37.77/tC. The estimate covered an 11-year time period with an annual discount rate of 10%.

The cost of avoided deforestation in Mato Grosso was calculated by Börner and Wunder (2008), indicating a total (opportunity + direct) cost, in 2006 dollars of US\$3 per ton carbon, excluding 50% of the land with the highest agricultural value and considering only private land, a 10-year period and a 10% annual discount rate. Nepstad et al. (2007, 2009) calculated a total (opportunity + direct) cost in 2007 dollars of US\$2.75/tC in the whole of Brazilian Amazonia considering both public and private land, excluding 6% of the land with the highest opportunity cost, a 30-year period and a 5% annual discount rate. These values are not directly comparable, but they both indicate low costs for large areas where deforestation could be avoided.

It should be remembered that, although not insurmountable, both restoration and avoided deforestation programs face significant challenges in delivering the expected carbon benefits. Regenerating forest in restoration projects may be cut down before the areas have time to accumulate the hoped-for carbon stocks: in the Atlantic Forest the average age of secondary forests is only 7.9 years, raising doubts about proposed restoration programs (Piffer et al., 2022). The continuing destruction of original Atlantic Forest is “hidden” by presenting forest data in terms of changes in total forest area, including secondary forests (Rosa et al., 2021), and this deception is likely to be increasingly important in Amazonia as the clearing of original forest progresses. In the case of avoided deforestation projects, a major challenge is a tendency to exaggerate benefits. In voluntary market REDD+ projects in Brazil almost all have greatly exaggerated baselines, meaning that much of the calculated carbon benefit is not real (West et al., 2020). Various other challenges also need to be addressed (Fearnside, 2012b,c). Despite these challenges, avoiding deforestation clearly is more cost-effective as a global-warming mitigation option than forest regeneration and has large additional environmental and social benefits.

Because the amount of money available for environmental programs is always limited, every dollar of “green” money spent on recuperating degraded lands means there is one less dollar available for stopping deforestation. The problem is that political forces all push in the direction of recuperating degraded lands rather than stopping deforestation. There are powerful interests that want to be free to deforest more, whereas offers of money for landholders to plant trees are welcomed by all. Large ranchers in Mato Grosso are avid to receive subsidies from carbon credit to plant trees in the illegally cleared Areas of

Permanent Preservation (APPs) in their properties. There is also much more money to be made by companies providing services for tree planting than there is in avoiding deforestation. To the extent that the goal of “net zero deforestation” is achieved by planting trees while original forest continues to be cleared, the environment in Amazonia will continue suffer a net loss.

Land tenure

Land-tenure policy is surely the most delicate of the various areas of concern for Lula’s presidency. His support from organized landless farmers (*sem-terras*) and his need for support from the “ruralists” (large landholders and their representatives) who dominate the National Congress (Pochmann, 2022) represent forces in the direction of further loosening restrictions in this key area.

Brazil has yet to make a basic transition that has taken place in the rest of the world hundreds, if not thousands, of years ago. This is the government asserting control over private actors to prevent them from simply entering areas of government land and claiming the land for themselves. This applies both to landless family farmers (*sem terras*) and to large “land grabbers” (Fearnside, 2008). The term “land grabbers” (*grileiros*) in Brazil refers to large operators who claim areas of government land and, often through corrupt means, obtain legal title to the area; the areas are usually subdivided and sold to ranchers, either with or without legal documentation (Note that the use of the English-language term “land grabbers” in the literature on Amazonia differs from that in Africa and Asia, where the term refers to foreign interests buying land from local people and converting it to export crops). For the past 500 years since Europeans arrived in Brazil, occupation and later legalization of land claims has been the way that much of the land has passed from the public to the private domain. In other countries, including the tropical forest countries, the thought would not even cross someone’s mind that they could invade a government area, clear some of the forest, and later gain legal title to the land. The practice of legalizing illegal land claims is euphemistically termed land-tenure “regularization” in Brazil, which implies that the claimants have a legal right to the land and that their lack of a title is merely a reflection of the government’s bureaucratic inefficiency -- conjuring up the image of traditional riverside dwellers (*ribeirinhos*) who have been living in the Amazonian interior for generations without legal title to their land. However, the vast majority of the area being titled refers to legalizing illegal claims to recently invaded area (e.g., Fearnside, 2001). A series of “land grabbers’ laws” has progressively increased the area that each claimant can legalize and has moved the timeline forward for the cutoff before which the claim had to be occupied to be eligible for legalization. This sends the clear message to would-be invaders that they can invade land now and eventually be granted “amnesty” by a future policy change. The implications of this for deforestation on the Amazonian frontier are tremendous.

During Lula’s second term in office, the first “land-grabbers law” (Law 11,952/2009) was passed, establishing the “Terra Legal” program and increasing the area that could be legalized per claimant in Amazonia from 100 ha to 400 ha. Even 100 ha would not be considered a “small” property in most of the world, but even in Amazonia a 400-ha property represents a medium-sized cattle ranch rather than an area intended to

elevate a family farmer from poverty. This and other legalization programs have been defended as reducing deforestation by removing the motivation to clear forest in order to justify the claims for titling, but studies of the actual deforestation in these legalized properties have shown that the titling increases rather than decreases the rate of deforestation (Probst et al., 2020). The effect of tenure security allowing larger investments in deforestation apparently outweighs the effect of clearing to bolster land claims. Titling also increases the sale value of the land and speeds the land “concentration” process, where smallholders are bought out by wealthier actors who manage a group of small holdings as a medium or large ranch. This is rapidly transforming settlements from their intended function of providing livelihoods to small farmers to areas with much larger holdings (Carrero & Fearnside, 2011; Yanai et al., 2020). The result is not only increased deforestation in the settlement area, but also the deforestation by those who have sold their land once they move to a new frontier elsewhere in Amazonia.

A second “land-grabbers’ law” (Law 13,465/2017) was enacted in 2017 under President Michel Temer, and a third such law (PL 2633/2020 and PLS 510/2020) is nearing approval in the National Congress (Carrero et al., 2022; Ferrante et al., 2021a). Despite rhetoric claiming these laws are to benefit small farmers, ample provisions for small farmers are already present in existing legislation, and the portions of the laws that are new are solely for much larger actors, namely landgrabbers and the ranchers who have bought illegal land claims from them (Fearnside, 2020c). Areas up to 2500 ha per claimant will be legalized. Of course, several members of a single family can make claims, thus legalizing enormous areas. The Rural Environmental Register (CAR), created by Brazil’s current “Forest Code” (Law 12,651/2012), allows self-declared claims with no onsite inspection. This greatly facilitates land grabbing in practice, despite the CAR having been created for environmental purposes and specifically not conferring land tenure (Azevedo-Ramos et al., 2020; Brito et al., 2019). The history of land tenure in Brazilian Amazonia has so far been one of continual government retreat, repeatedly legalizing illegal land claims and virtually never taking effective action to remove illegal occupiers, with the exception of some invasions of private property and a small percentage of the invasions in indigenous lands or conservation units—but essentially never in undesignated public land. The future posture of the Lula presidency in this area is a major unknown.

References

- Amazonas em Tempo*. 2020. BR-319 será exemplo sustentável para o mundo, dizem deputados. *Amazonas em Tempo*, 22 September 2020. <https://bit.ly/3QOaAbo>
- Andrade, M.B.T., L. Ferrante & P.M. Fearnside. 2021. Brazil’s Highway BR-319 demonstrates a crucial lack of environmental governance in Amazonia. *Environmental Conservation* 48(3): 161-164. <https://doi.org/10.1017/S0376892921000084>
- Azevedo-Ramos, C., P. Moutinho, V.L.S. Arruda, M.C.C. Stabile, A. Alencar, I. Castro & J.P. Ribeiro. 2020. Lawless land in no man's land: The undesignated public forests in the Brazilian Amazon. *Land Use Policy* 99: art. 104863. <https://doi.org/10.1016/j.landusepol.2020.104863>

- Börner, J. & S. Wunder. 2008. Paying for avoided deforestation in the Brazilian Amazon: from cost assessment to scheme design. *International Forestry Review* 10(3): 496-511. <https://www.jstor.org/stable/43739785>
- Branford, S. & M. Torres., 2017. The end of a people: Amazon dam destroys sacred Munduruku ‘Heaven’. *Mongabay*, 5 January 2017. <https://bit.ly/3w592Bw>
- Bratman, E.Z. 2014. Contradictions of green development: Human rights and environmental norms in light of Belo Monte dam activism. *Journal of Latin American Studies* 46(2): 261–289. <https://doi.org/10.1017/S0022216X14000042>
- Brazil, CIMC (Comitê Interministerial sobre Mudança do Clima). 2008. Plano Nacional sobre Mudança do Clima – PNMC –Brasil. CIMC, Brasília, DF. 129 pp. <https://bit.ly/3pxbEVb>
- Brazil, DNIT (Departamento Nacional de Infraestrutura de Transportes). 2020. Estudo do Componente Indígena CI Preliminar da Etnia 3 – Apurinã – Rev C. DNIT, Brasília, DF. <https://bit.ly/3mMpWAr>.
- Brito, B., P. Barreto. A. Brandão, S. Baima & P.H. Gomes. 2019. Stimulus for land grabbing and deforestation in the Brazilian Amazon. *Environmental Research Letters* 14: art 064018. <https://doi.org/10.1088/1748-9326/ab1e24>
- Carrero, G.C. & P.M. Fearnside. 2011. Forest clearing dynamics and the expansion of land holdings in Apuí, a deforestation hotspot on Brazil’s Transamazon Highway. *Ecology and Society* 16(2): art. 26. <https://doi.org/10.5751/ES-04105-160226>
- Carrero, G.C., R.T. Walker, C.S. Simmons & P.M. Fearnside. 2022. Land grabbing in the Brazilian Amazon: Stealing public land with government approval. *Land Use Policy* art. 106133. <https://doi.org/10.1016/j.landusepol.2022.106133>
- ClimaInfo*, Petrobras quer explorar “novo pré-sal” na costa do Amapá. *ClimaInfo*, 22 August 2022. <https://bit.ly/3wnqHVf>
- Coligação Brasil da Esperança. 2022. Diretrizes para o programa de reconstrução e transformação do Brasil Lula Alckmin 2023-2026 Coligação Brasil da Esperança. Tribunal Superior Eleitoral, August 2022. <https://bit.ly/3Ck2NOn>
- Fearnside, P.M. 2001. Land-tenure issues as factors in environmental destruction in Brazilian Amazonia: The case of southern Pará. *World Development* 29(8): 1361-1372. [https://doi.org/10.1016/S0305-750X\(01\)00039-0](https://doi.org/10.1016/S0305-750X(01)00039-0)
- Fearnside, P.M. 2006. Dams in the Amazon: Belo Monte and Brazil’s Hydroelectric Development of the Xingu River Basin. *Environmental Management* 38(1): 16-27. <https://doi.org/10.1007/s00267-005-00113-6>

- Fearnside, P.M. 2008. The roles and movements of actors in the deforestation of Brazilian Amazonia. *Ecology and Society* 13(1): art. 23. <https://www.jstor.org/stable/26267941>
- Fearnside, P.M. 2012a. Segurança nacional na Amazônia. pp. 177 & 191. In: A.L. Val & G.M. dos Santos (eds.) *GEEA: Grupo de Estudos Estratégicos Amazônicos*. Tomo V, Editora do Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, AM. 191 pp. <https://bit.ly/3CcNp6x>
- Fearnside, P.M. 2012b. The theoretical battlefield: Accounting for the climate benefits of maintaining Brazil's Amazon forest. *Carbon Management* 3(2): 145-148. <https://doi.org/10.4155/CMT.12.9>
- Fearnside, P.M. 2012c. Brazil's Amazon Forest in mitigating global warming: Unresolved controversies. *Climate Policy* 12(1): 70-81. <https://doi.org/10.1080/14693062.2011.581571>
- Fearnside, P.M. 2013. Decision-making on Amazon dams: Politics trumps uncertainty in the Madeira River sediments controversy. *Water Alternatives* 6(2): 313-325. <http://www.water-alternatives.org/index.php/alldoc/articles/vol6/v6issue2/218-a6-2-15/file>
- Fearnside, P.M. 2014a. Brazil's Madeira River dams: A setback for environmental policy in Amazonian development. *Water Alternatives* 7(1): 156-169. <https://bit.ly/3PoThwq>
- Fearnside, P.M. 2014b. Impacts of Brazil's Madeira River dams: Unlearned lessons for hydroelectric development in Amazonia. *Environmental Science & Policy* 38: 164-172. <https://doi.org/10.1016/j.envsci.2013.11.004>.
- Fearnside, P.M. 2015a. Brazil's São Luiz do Tapajós Dam: The art of cosmetic environmental impact assessments. *Water Alternatives* 8(3): 373-396. <https://bit.ly/3CcNNlv>
- Fearnside, P.M. 2015b. Amazon dams and waterways: Brazil's Tapajós Basin plans. *Ambio* 44: 426-439. <https://doi.org/10.1007/s13280-015-0642-z>
- Fearnside, P.M. 2015c. Rios voadores e a água de São Paulo. *Amazônia Real*. <https://bit.ly/3qykIsY>
- Fearnside, P.M. 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, P.M. 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, P.M. 2017c. Planned disinformation: The example of the Belo Monte Dam as a source of greenhouse gases. pp. 125-142. In: L.-R. Issberner & P. Lena (eds.) *Brazil in the Anthropocene: Conflicts between Predatory Development and Environmental Policies*. Routledge, Taylor & Francis Group, New York, U.S.A. 364 pp. <https://bit.ly/3AlrDfq>
- Fearnside, P.M. 2017d. Amazon dam defeats Brazil's environment agency. *Mongabay*, 20 September 2017. <https://bit.ly/3JYuzl6>
- Fearnside, P.M. 2018. Brazil's offshore oil risks. *Science* [Online comment] <https://science.sciencemag.org/content/re-brazil's-offshore-oil-risks>
- Fearnside, P.M. 2020a. Brazil's Amazon dam plans: Ominous warnings of future destruction (commentary). *Mongabay*, 22 October 2020. <https://bit.ly/3QuF42c>
- Fearnside, P.M. 2020b. Oil and gas project threatens Brazil's last great block of Amazon forest (commentary). *Mongabay*, 9 March 2020. <https://bit.ly/3ELLZxt>
- Fearnside, P.M. 2020c. Brazil's 'land-grabbers law' threatens Amazonia (commentary). *Mongabay*, 25 May 2020. <https://bit.ly/3PoUL9Y>
- Fearnside, P.M. 2022a. Amazon environmental services: Why Brazil's Highway BR-319 is so damaging. *Ambio* 51: 1367–1370. <https://doi.org/10.1007/s13280-022-01718-y>
- Fearnside, P.M. 2022b. Putin's financial interest in Brazil's Amazon highways (commentary). *Mongabay*, 4 May 2022. <https://bit.ly/3JY45QJ>
- Fearnside, P.M. & P.M.L.A. Graça. 2009. BR-319: A rodovia Manaus-Porto Velho e o impacto potencial de conectar o arco de desmatamento à Amazônia central. *Novos Cadernos NAEA* 12(1): 19-50. <https://doi.org/10.5801/ncn.v12i1.241>
- Fearnside, P.M., L. Ferrante, A.M. Yanai & M.A. Isaac Júnior. 2020. Trans-Purus: Brazil's last intact Amazon forest at immediate risk (commentary). *Mongabay*, 24 November 2020. <https://bit.ly/3IrTJH5>
- Ferrante, L. & P.M. Fearnside. 2020. The Amazon: Biofuel plans will drive deforestation. *Nature* 577: 170. <https://doi.org/10.1038/d41586-020-00005-8>
- Ferrante, L., M. Gomes & P.M. Fearnside. 2020. Amazonian indigenous peoples are threatened by Brazil's Highway BR-319. *Land Use Policy* 94: art. 104548. <https://doi.org/10.1016/j.landusepol.2020.104548>
- Ferrante, L., M.B.T. Andrade & P.M. Fearnside. 2021a. Land grabbing on Brazil's Highway BR-319 as a spearhead for Amazonian deforestation. *Land Use Policy* 108: art. 105559. <https://doi.org/10.1016/j.landusepol.2021.105559>

- Ferrante, L., R.I. Barbosa, L. Duczmal & P.M. Fearnside. 2021b. Brazil's planned exploitation of Amazonian indigenous lands for commercial agriculture increases risk of new pandemics. *Regional Environmental Change* 21, Art. 81. <https://doi.org/10.1007/s10113-021-01819-6>
- Hissa, L.B.V. 2019. *From Deforestation to Forest Recovery: Perspectives for the Amazon under the Rule of the Brazilian Forest Code*. PhD dissertation in geography, Humboldt-Universität zu Berlin, Berlin, Germany. 207 pp. <https://bit.ly/3QUkOqG>
- ILO (International Labour Organization). 1989. C169 – Indigenous and Tribal Peoples Convention, 1989 (No. 169). ILO, Geneva, Switzerland. <https://bit.ly/3piKMbt>
- Lima, L. 2022. Lula diz que faria Belo Monte de novo e expõe diferenças com Marina. *Metropoles*, 23 June 2022. <https://bit.ly/3dq8rE5>
- Nepstad, D., B. Soares-Filho, F. Merry, P. Moutinho, A. Rodrigues, S. Schwartzman, O. Almeida & S. Rivero. 2007. Reducing Emissions from Deforestation and Forest Degradation (REDD): The costs and benefits of reducing carbon emissions from deforestation and forest degradation in the Brazilian Amazon. Woods Hole Research Center, Falmouth, MA, U.S.A. <https://bit.ly/3RdwGEr>
- Nepstad, D., B.S. Soares-Filho, F. Merry, A. Lima, P. Moutinho, J. Carter, M. Bowman, A. Cattaneo, H. Rodrigues, S. Schwartzman, D.G. McGrath, C.M. Stickler, R. Lubowski, P. Piris-Cabezas, S. Rivero, A. Alencar, O. Almeida & O. Stella. 2009. The end of deforestation in the Brazilian Amazon. *Science* 326: 1350-1351. <https://doi.org/10.1126/science.1182108>
- Oliveira, T., J. Gabriel & V. Azevedo. 2022. Equipe de Lula se reúne com agro por aliança em setor dominado por Bolsonaro. *Folha de São Paulo*, 22 July 2022. <https://bit.ly/3dzz5Cw>
- Paraguassu, M. 2010. BR-319 será uma estrada parque, diz ministra Dilma em Humaitá. *Tudo Rondônia*, 24 March 2010. <https://bit.ly/3KeQxkg>
- Piffer, P.R., M.R. Rosa, L.R. Tambosi, J.P. Metzger & M. Uriarte 2022. Turnover rates of regenerated forests challenge restoration efforts in the Brazilian Atlantic Forest. *Environmental Research Letters* 17(4): art. 045009. <https://doi.org/10.1088/1748-9326/ac5ae1>
- Probst, B., A. BenYishay, A. Kontoleon & T.N.P. dos Reis. 2020. Impacts of a large-scale titling initiative on deforestation in the Brazilian Amazon. *Nature Sustainability* 3: 1019–1026. <https://doi.org/10.1038/s41893-020-0537-2>
- Rádio Difusora Manaus. 2022. Lula fala para o Amazonas na Rádio Difusora. *Youtube*, 23 June 2022. <https://www.youtube.com/watch?v=bc5vXgK7Wjw>

- Rosa, M.R., P.H.S. Brancalion, R. Crouzeilles, L.R. Tambosi, P.R. Piffer, F.E.B. Lenti, M. Hirota, E. Santiami & J.P. Metzger. 2021. Hidden destruction of older forests threatens Brazil's Atlantic Forest and challenges restoration programs. *Science Advances* 7(4): art. eabc4547. <https://doi.org/10.1126/sciadv.abc4547>
- Teixeira, K.M. 2007. *Investigação de Opções de Transporte de Carga Geral em Contêineres nas Conexões com a Região Amazônica*. PhD dissertation, Universidade de São Paulo, São Carlos, SP. <https://bit.ly/3FNeuMv>
- Toledo, M. 2016. Após 5 meses, corpo de ativista é achado em lago de usina em RO. *Folha de São Paulo*, 23 June 2016. <https://bit.ly/3wtDJkr>
- TV5 Monde. 2022. Brésil: Les vérités du candidat Lula sur la crise climatique, l'Amazonie et les peuples autochtones. *TV5 Monde*, 30 May 2022. <https://bit.ly/3Qt8j5p>
- van der Ent, R.J., H.H.G. Savenije, B. Schaefli & S.C. Steele-Dunne. 2010. Origin and fate of atmospheric moisture over continents. *Water Resources Research* 46: art. W09525. <https://doi.org/10.1029/2010WR009127>
- West, T.A.P., J. Börner, E.O. Sills & A. Kontoleon. 2020. Overstated carbon emission reductions from voluntary REDD+ projects in the Brazilian Amazon. *Proceedings of the National Academy of Sciences USA* 117(39): 24188–24194. <https://doi.org/10.1073/pnas.2004334117>
- Yanai, A.M., P.M.L.A. Graça, M.I.S. Escada, L.G. Ziccardi & P.M. Fearnside. 2020. Deforestation dynamics in Brazil's Amazonian settlements: Effects of land-tenure concentration. *Journal of Environmental Management* 268: art. 110555. <https://doi.org/10.1016/j.jenvman.2020.110555>
- Zemp, D.C., C.F. Schleussner, H.M.J. Barbosa, R.J. van der Ent, J.F. Donges, J. Heinke, G. Sampaio & A. Rammig. 2014. On the importance of cascading moisture recycling in South America. *Atmospheric Chemistry and Physics* 14: 13337–13359. <https://doi.org/10.5194/acp-14-13337-2014>.