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Environmental justice and Brazil's Amazonian dams

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ABSTRACT:

Brazil's Amazonian dam building has frequently caused social impacts that violate what most people would consider to be basic standards of environmental justice. Brazil's massive plans for future dams imply similar impacts on a wider scale. Dams flood land, displacing local residents, including indigenous peoples and traditional riverside dwellers (*ribeirinhos*). Impacts on fish, including blocking fish migrations, destroy the livelihoods of riverside populations whether or not their land and homes are flooded. Benefits of hydropower accrue mainly to distant urban centers, and part of the power is used for electro-intensive exports such as aluminum that create little employment in Brazil. Examples of existing dams with evident social injustices (among other impacts) include Tucuruí and Balbina (which displaced indigenous peoples as well as destroying fisheries), Santo Antônio and Jirau (which blocked fish migrations that had supported riverside populations in three countries), Teles Pires (which flooded the most sacred site of the Munduruku indigenous people), and Belo Monte (which displaced urban and rural populations, destroyed fisheries and removed 80% of the water flow from a 100-km stretch of the Xingu River that includes two indigenous areas). Planned dams with major social impacts include dams on the Tapajós River that would flood indigenous land and a series of dams on the Xingu River upstream of Belo Monte that would flood vast areas of indigenous land. Although the Brazilian government claims dams upstream of Belo Monte are no longer planned, strong indications suggest that some of these dams, including the largest of them -- Babaquara/Altamira -- are still planned. Many of the scores of other dams planned in Brazil's Amazon region would have dramatic social impacts, such as the Marabá Dam that would displace a population estimated to number between 10,000 and 40,000 people (mostly *ribeirinhos*). An array of proposed laws and constitutional amendments, including some that have already been passed by Brazil's National Congress, would weaken environmental licensing and facilitate construction of dams regardless of their consequences for environmental justice.

Introduction

“Environmental justice” refers mainly to unequal environmental impacts on human groups based on differences such as race, ethnicity and income. Definitions of both the “environmental” and the “justice” portions of the term are varied and continually evolving (Schlosberg 2007, 2013; Schlosberg and Carruthers 2010). Amazonian dams clearly fall within any definition of the concept. These dams particularly affect those who live along and depend upon Amazonian rivers, in other words, traditional residents such as indigenous peoples and “*ribeirinhos*” (traditional riverside dwellers). Benefits of the dams accrue to urban consumers and especially to industries. The export of electricity in the form of electro-intensive commodities such as aluminum illustrates inequality on an international scale, with Amazonia and its people paying the environmental price for consumption and industrial employment in countries that would themselves no longer accept the impacts of the kind unleashed by these dams.

Amazonian dams (Figure 1) have a history of impacts causing environmental injustice. Part of this is inherent in this energy option: concentrated impacts on riverside residents and indigenous peoples in the Amazonian interior versus diffuse benefits to distant beneficiaries. This aspect is often written off by dam builders with the shibboleth “you have to break a few eggs to make an omelet.” Of course, this logic is much easier to apply when the eggs to be broken refer to poor people spread along Amazonian rivers far from the centers of power and political influence.

[Figure 1 here]

Ironically, one frequently hears discourse from the electrical sector arguing that more dams are needed because millions of Brazilians live without electricity. However, this argument bears little relation to electricity distribution in Brazil. Rural electrification has not been a high priority in government budgets, and recent advance of the “Light for Everyone” (*Luz para Todos*) program represents a minuscule fraction of the country’s electricity use, and an even smaller fraction of the portion of the country’s electricity that is connected to the national grid and hence to hydroelectric dams. A poignant example of the traditional low priority for rural electrification is the Tucuruí Dam, completed in 1984, where 29 years later 12,000 families around the reservoir still had no access to electricity (*Folha de São Paulo* 2013). High-voltage transmission lines carry most of the dam’s power directly to aluminum smelters in Barcarena, Pará and São Luis, Maranhão (e.g., Fearnside 1999). Hydroelectric companies advertise dams by trumpeting astronomical figures for the number of homes that can be supplied with power from the dams. However, most electricity in Brazil is not for domestic use, which accounts for 22-29% of the total depending on the year (e.g., Bermann 2012; Fearnside 2016a). The fact that the largest share of electricity from dams goes to industry is not advertised.

This kind of injustice could be reduced somewhat by better measures to resettle and replace the livelihoods of the displaced people, but the fundamental structure of the injustice is not altered. In addition to this inherent type of injustice, Amazonian dam projects have shown a consistent pattern of human-rights violations and of actions without consideration of social and environmental concerns in general.

Brazil’s existing Amazonian dams can be divided into those that were completed or under construction during the country’s 1964-1985 military dictatorship and those implanted in more recent times under the current environmental-licensing system, which began on January 23, 1986. The impacts of the earlier dams are often dismissed

by Brazil's electrical sector as irrelevant – mistakes of the past that would not recur today under a democratic government with an environmental licensing system. Unfortunately, these cases are still highly relevant, and the basic structure of decision making has changed little. While decisions are no longer made by a small group of military officers, they are instead made by a small group of officials in the “Civil House” of the presidential office and in the Ministry of Mines and Energy. The real decision to build a dam is made long before the environmental studies are done, and the decision is therefore made with no input on social and environmental impacts even if these considerations were given the importance they deserve. The licensing procedures that follow, such as drafting the Environmental Impact Study (EIA) and holding public hearings, merely legalizes the dam project, with the maximum effect being suggestions for alteration of mitigation programs and minor adjustments in design rather than the existence of the project as such.

Amazon Dams and Decision Making

Brazil's Amazon dams have a notoriously poor record as examples both of rational decisions on building infrastructure and of governance before, during and after the dams are built. Dams initiated during Brazil's 1964-1985 military dictatorship, such as Tucuruí (Fearnside 1999, 2001; Magalhães et al. 1996), Balbina (Fearnside 1989; Rodrigues and Fearnside 2014) and Samuel (Fearnside 2005a) provide examples that are still highly relevant today. During the military dictatorship environmental studies were done, although not under the current system of federal licensing that began in 1986 (with works in progress such as Balbina and Samuel being exempted). These environmental studies were done while the dams were under construction, the decision to build them having been made years earlier.

The record has not improved much since implementation of the current licensing process and since the advent of guarantees for the environment and human rights included in Brazil's 1988 constitution (Brazil, PR 1988). The inadequacy of the initial decision-making, the environmental licensing and the subsequent mitigation measures are manifold in the cases of the Santo Antônio Dam (reservoir filled in 2011) and the Jirau Dam (filled in 2013), both on the Madeira River (Fearnside 2013, 2014a, 2014b, 2015a). Licensing was approved over the formal objections of the technical staff of the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) (Deberdt et al. 2007; see Fearnside 2014c). South America's richest inland fishery has been destroyed and conflicts with the thousands of displaced fishermen and women continue. The murder case of the outspoken leader of one of the fishing cooperatives remains unsolved: the body of Nilce de Souza Magalhães, known as “Ncinha,” was found weighted down with rocks at the bottom of the Jirau Reservoir (e.g., Aranda 2016; Toledo 2016).

In the case of the Belo Monte Dam, on the Xingu River, licensing was approved over the formal objections of IBAMA's technical staff (Brazil, IBAMA 2009, 2010) by replacing the head of the agency (see Fearnside 2012). Impacted indigenous people were not consulted, a violation of International Labor Organization Convention 169 (ILO 1989) and Brazilian Law No. 5051 of April 19, 2004 (Brazil, PR 2004). This resulted in over 20 legal suits still awaiting judgment despite the dam's having been allowed to continue to completion on the strength of a one-person decision by the then head of Brazil's Supreme Court (International Rivers 2012a). Post-construction mitigation has been disastrous by any measure (see Fearnside 2017a,b; Magalhães and da Cunha 2017; Villas-Bôas et al. 2015). Fishing populations lost their livelihoods in

the reservoir area and in a 100-km “reduced flow” stretch below the main dam, a stretch that includes two indigenous lands plus an area fished by a third indigenous group that resides in a tributary. The 2001 murder of dam-opposition leader Ademir Albeu Federicci, known as “Dema,” remains unsolved (e.g., Switkes 2001).

The Tapajós River Dams have followed a similar path (Fearnside 2015b,c; Alarcon et al. 2016; Nitta and Naka 2015; de Sousa Júnior 2014). The Teles Pires Dam, filled in 2015, flooded the Sete Quedas rapids, which was the most sacred site of the Munduruku indigenous people who live along the Tapajós (e.g., Branford and Torres 2017a). The São Manoel Dam, under construction since 2014, is only 700 m from the Kaiabi Indigenous Land and has provoked a series of conflicts (e.g., Branford and Torres 2017b). In 2012, Federal Police invaded a Kaiabí village and opened fire on the population, killing Adenilson Kirixi Munduruku (see Forest Comunicações 2016; Silva 2012; Sposati 2012). The proposed São Luiz do Tapajós Dam would flood part of the Sawré Mubyu area inhabited by Munduruku indigneous people (see Fearnside 2015b). The licensing process for the dam was “archived” by IBAMA in 2016 because of this, although the protection this affords is fragile given the frequent replacements of the head of IBAMA and the Minister of Environment (see Fearnside 2016b). São Luiz do Tapajós continues in ELETROBRÁS plans, although its public visibility has diminished because its expected time for construction has now extended beyond the 2026 limit for the current 10-year plan (Brazil, MME 2017, Chapter 3, 61). However, the President of ELETROBRÁS gave a speech on November 30, 2016 indicating that the agency's plans still include the São Luiz do Tapajós Dam despite the licensing having been archived by IBAMA (Nunes and Neder 2016). These plans suggest that those in power expect the environmental licensing system as a whole to be scrapped by the National Congress.

Planned Dams

Many of the officially planned dams in Brazilian Amazonia have evident impacts. For example, the Marabá Dam, which is considered to be “in execution” by Brazil’s Program for the Acceleration of Growth (Brazil, MP 2017), would displace tens of thousands of people (with estimates as high as 40,000), mostly traditional riverside dwellers known as “*ribeirinhos*” (see Rodrigues and Ribeiro Júnior 2010).

Some of the greatest impacts would result from “unofficially planned” dams, these being dams that have featured in past official plans but that currently have disappeared from publicly announced plans. One is the Babaquara Dam (renamed the “Altamira” Dam but best known by its original name), which is one of six dams in the Xingu River Basin that were long planned to store water upstream of Belo Monte in order to run the 11,000 MW of installed capacity in Belo Monte’s main powerhouse during the low-flow season (e.g., Sevá Filho 1990; Fearnside 2006). The natural river flow is insufficient to turn even one of the 20 turbines in the main powerhouse for three months of the year and is sufficient for only a few turbines for several other months (Fearnside 2017c). Climate change (Ângelo and Feitosa 2015; Margulis and Untersell 2017; Sorribas et al. 2016) and deforestation (Stickler et al. 2013) are projected to reduce Belo Monte’s power output substantially. Even without these impacts on the Xingu River’s future flow, this dam would be financially unviable without the massive subsidies it has received from Brazilian taxpayers through the National Bank for Social and Economic Development (BNDES). Only these subsidies, combined with political pressure, were sufficient to induce a consortium of companies to invest in the dam (Rojas and Millikan 2014). BNDES financed 80% of the construction cost with loans at 4% annual interest, while the federal government finances itself selling bonds at 10%

annual interest (Leitão 2010). Funds from taxpayers in Europe and North America have also contributed through World Bank “development policy loans” (DPLs) to BNDES (see BIC 2009; Fearnside 2017a).

The financial unviability of Belo Monte without the upstream dams is a strong indication that at least the Babaquara/Altamira Dam continues as part of the real plan (see Fearnside 2017c). The Belo Monte Dam by itself defies basic economic logic (e.g., de Sousa Júnior and Reid 2010; de Sousa Júnior et al. 2006; Fearnside 2006). Other indications include the history of plans for the number of turbines to be installed in Belo Monte, with installed capacities half of the current 11,233 MW total capacity having been considered in 2003 (Pinto 2003), which would be more compatible with operation assuming an unregulated river flow, but the plans later returned to having the main powerhouse with the 11,000-MW design that had originally been planned during the period when the intention to build the upstream dams was publicly admitted. Another indication that Babaquara/Altamira continues in undeclared plans was the 2013 announcement by then-President Dilma Rousseff of a switch in policy to favor dams with “big reservoirs” rather than run-of-river dams like Belo Monte, a policy change that was confirmed by the current presidential administration in 2016 (Borges 2013, 2016; Fearnside 2017d). The Xingu River is the obvious place that had been planned for development with large storage dams.

The Chacorão Dam on the Tapajós River is a case with strong similarity to Babaquara/Altamira as an “elephant in the room” that is absent from official discussions. Chacorão would flood 11,700 ha of the Munduruku Indigenous Land. This dam no longer appears in official plans for hydropower, but the Tapajós Waterway (*hidrovia*) that is planned to carry soybeans from northern Mato Grosso to ports with access to the Amazon River continues to be a government priority, and the barges would not pass the Chacorão rapids without the dam (Brazil, MT 2010; Fearnside 2015c).

Obstacles to Environmental Justice

The current decision-making system

The presumption that what is forbidden by Brazil’s laws or by the constitution will simply not happen in real life is very naïve. After all, the Belo Monte Dam was well described by the Federal Public Ministry (public prosecutors charged with defending the people’s interests) in Belém as “totally illegal” (Miotto 2011) but it now stands on the Xingu River as a concrete fact.

The current decision-making system in Brazil represents a major obstacle to incorporating concerns for environmental justice into government planning and policy. Decisions to build dams and other infrastructure that provoke obvious injustices are overridden by the influence of political donations and outright corruption from parties with financial interests in the projects. In 2013 Brazil’s Supreme Electoral Court (TSE) released data for the first time on political donations, indicating that in the previous ten years the top four donors were large construction companies that build dams in Amazonia (Gama 2013). The Belo Monte Dam provides a well-documented example, where those on both the paying and receiving end have made affidavits affirming both legal and illegal “donations” (*Amazonas em Tempo* 2015; do Amaral 2016). The Santo Antônio Dam on the Madeira River also yielded illegal campaign donations to the ruling political party according to confessions by the Odebrecht construction firm (Francis 2017).

The decision-making system also tends to ignore environmental justice concerns because the real decisions on infrastructure and other major projects are made by a handful of people before information on environmental and social impacts has been collected, and usually before any public discussion of the projects in question. The system needs to be reformed to have information collection and public discussion before the real decisions are made.

Brazil's environmental licensing system is another impediment. Licensing should not be confused with decision-making: in practice, the current licensing system essentially serves to ratify what has already been decided on political grounds. The licensing allows alterations in mitigation and compensation requirements and the addition of small changes in construction plans, but virtually never extends to questioning the wisdom of the project's existence.

Erosion of environmental licensing

Federal licenses are required for major infrastructure projects such as large dams. However, various trends are eroding the influence of this requirement. One is a trend to decentralization of licensing, transferring progressively more authority from the federal level to the state level. As compared to the federal government, the state governments are more directly influenced by local economic and political interests and are less subject to scrutiny by the press or by environmental non-governmental organizations. An example is the redefinition of a "large" dam in Brazil in 2004: prior to that year all dams with 10 MW or more of installed capacity were considered "large" and required to have a federal license, but this limit was raised to 30 MW, creating a class of dams between 10 and 30 MW called "PCHs," meaning "small hydroelectric centers," that require only a state license. Dams of this size have substantial impacts, and they are being built by the hundreds with little public visibility. Because state licenses are much cheaper and faster to obtain than federal ones, there is often a tendency for hydroelectric companies to invest in multiple PCHs rather than in a "large" dam when the choice exists.

Another tendency weakening licensing is to accelerate the approval process, often irrespective of the completeness of the information or of the compliance of the project proponent with demands that may have been made by the environmental agency. One example of a measure to accelerate approvals was a June 2017 change in IBAMA's procedure for granting pay bonuses to its technical staff. Previously bonuses were granted on the basis of the number of technical opinions (*pareceres*) produced, a policy that introduces a motive for staff to accelerate the approval process even if corners are cut. The 2017 change creates an even stronger bias, by only granting the bonus if the technical opinions are favorable, not if they recommend against approving a project (see Borges 2017a).

Political pressure on top environmental officials to approve high-priority hydroelectric projects has been common, as in the cases of the Santo Antônio, Jirau and Belo Monte dams (Fearnside 2014c, 2017a,b). In all of these cases government prosecutors threatened the individual technical staff members in the licensing department of IBAMA with prosecution for "bad faith" in recommending against approval of the licenses (AGU 2011, 2012). As a measure to minimize such threats, the signatures of the technical staff no longer appear on the technical opinions, such as the opinion recommending against approval of the São Manoel Dam (Brazil, IBAMA 2017; see Fearnside 2017e).

Strategies to evade control

One of the strategies of dam-building interests to obtain approval of dams with severe environmental-justice impacts is to deny the existence of plans for these dams until approval is obtained for other dams in a complex of projects on the same river. The Babaquara/Altamira Dam on the Xingu River and the Chacorão Dam on the Tapajós River are examples of this, where public denial of plans appears to be “disinformation,” or a deliberate spreading of false information (Fearnside 2017c). Another is the Cachoeira Riberão Dam on the Madeira River (also known as the “Guajará Mirim” or the “Binacional” Dam). In 2006 while preparations were underway for the Santo Antônio and Jirau Dams, the head of the Odebrecht construction firm in Porto Velho told this author that Odebrecht staff were forbidden to discuss Cachoeira Riberão until the other dams were approved.

Another strategy is to simply not divulge plans for controversial dams. In December 1987, ELETROBRÁS released its 2010 Plan (after the plan had leaked into the public domain). This document presented dams to be built by the year 2010, but also included a list of planned large dams irrespective of the expected year. A total of 79 large dams were listed for the Legal Amazonia region (Brazil, ELETROBRÁS 1987; see Fearnside 1995). This includes five dams in the Xingu basin upstream of Belo Monte (which was then known as “Kararaô”)(see Fearnside, 2006). A storm of criticism of the dam plans ensued, and ELETROBRÁS has never again released information on planned dams without being limited to a relatively short timeline, such as the ten-year plans and occasional reports for longer periods (20 or 30 years).

Dams that have vanished from the announced plans can resurge years later. An example is the Cachoeira Porteira Dam planned on the Trombetas River. Environmental were prepared (Brazil, ELETRONORTE 1988). *Quilombos* (communities of descendants of escaped African slaves) would be affected (e.g., Farias 2014), and this may explain why the dam vanished from official plans. *Quilombolas* (members of *quilombo* communities) have the same rights as indigenous peoples in accord with Brazil’s current Constitution (Brazil, PR 1988). The ease with which the Belo Monte Dam gained congressional approval appears to have encouraged dam plans that impact *quilombolas* and indigenous people (Fearnside 2017a,b). In addition to *quilombolas*, the Cachoeira Porteira Dam would other communities of traditional *ribeirinhos* and Brazilnut gatherers, among other impacts (Teixeira 1996, 253-317). Amazonia’s largest turtle breeding beach is located downstream of the dam (e.g., Eisemberg et al. 2016). The Cachoeira Porteira Dam has recently reappeared in official plans (e.g., CPISP 2014).

Projects such as these are known as “vampire projects” because, like a vampire asleep in his coffin, they can rise up later. Like vampires that can only be killed with a stake through the heart, these projects are very hard to cancel definitively. A major case that appears to have become a vampire project is the São Luiz do Tapajós Dam. The dam would flood part of the Sawre Muybu indigenous area (Fearnside 2015b). On April 19, 2016 the head of IBAMA “archived” the licensing process, with the approval of the Minister of Environment (de Araújo 2016). However, heads of IBAMA and ministers of environment change often, and it is quite probable that future occupants of these offices could “de-archive” the licensing process (Fearnside 2016b). ELETROBRÁS officials continued to plan for the dam after the licensing was archived Nunes and Neder 2016), and the ELETROBRÁS 2017-2026 ten-year plan states that “the process that involves this dam continues to be accompanied by EPE [Energy Research Enterprise, of the Ministry of Mines and Energy] and, once all environmental questions are resolved, it

can become part of the basket of candidates for expansion of energy supply” (Brazil, EPE 2017, Chapter 3, 61).

Legislative proposals to gut the licensing system

“Ruralists,” or representatives of large landholders, have quickly risen to control the Brazilian government. Although large landholders represent a minuscule percentage of Brazil’s population, of the 513 members of the Chamber of Deputies (the house of the National Congress where representation is proportional to population), an estimated 210 (41%) are ruralists (Carvalho et al. 2017).

This voting block has been the critical part of the coalition supporting the presidential administrations since the mid-2000s. In addition to obtaining support by means of laws and infrastructure projects that benefit agribusiness at the expense of environmental justice and other concerns, the ruralists have been able to place their choices in many of the key appointed positions in the government. The power of the ruralist block was dramatically demonstrated during the 2011-2012 passage of the reform that gutted Brazil’s 1965 “Forest Code” – a package of regulations governing deforestation. The initial vote in the Chamber of Deputies approved gutting the code by a ratio of seven to one (*Congresso em Foco* 2011). This is extraordinary, given that 85% of Brazil’s population is urban and therefore has no financial interest in being allowed to deforest steep hillsides, near rivers, etc. At the time of the vote, public opinion polls indicated that 80% of the population was opposed to any change in the Forest Code (Lopes 2011). The rise in influence of the ruralists is explained by the money from soybeans and other agricultural commodities. Government policy makers are responsive to the greatly increased percentage this represents in the country’s gross national product, and influence is especially enhanced by political campaign contributions, both legal and illegal (Fearnside and Figueiredo 2016; Zucco and Lauderdale 2011). On the day of the vote in the Chamber of Deputies, the environmentalists José Cláudio Ribeiro da Silva and Maria do Espírito Santo da Silva were murdered near Marabá, in southern Pará (see Milanez 2016). When a deputy from Green Party tried to speak of this during his address from the podium in the Chamber of Deputies, he was shouted down by the multitude of deputies favoring gutting the Code. The open hostility to any discussion of social issues related to the proposed changes was evident.

The ruralist block in the National Congress is pushing a series of bills for legislation and proposed constitutional amendments (“PECs”) that would cause serious environmental and social impacts. Constitutional amendments are much easier to pass in Brazil than in most other countries: the current constitution, which was enacted in October 1988, had been amended 97 times by December 2017. Since the ruralist block is sufficient to block a presidential impeachment, this, along with distraction from other congressional business, offered opportunities for the ruralist agenda to make great advances during the impeachment trial of President Dilma Rousseff in 2016 (Fearnside, 2016c) and in the weeks preceding two congressional votes on initiating investigations for impeachment of President Michel Temer in 2017 (Fearnside 2017f,g).

Proposals include measures to weaken or effectively abolish environmental licensing, such as the proposed constitutional amendment PEC-65 (Brazil, Senado Federal 2016), which would make the mere submission of an environmental impact study (EIA) an automatic approval of any development project, and proposed laws PLS-654/2015 (Brazil, Senado Federal 2015) and PL-3.729/2004 (Brazil, Câmara dos Deputados 2004), which would eliminate two of the current three required licenses and

would establish impossible deadlines for IBAMA to approve the projects, after which the license would be approved automatically.

One major blow to environmental licensing was approval of Law 13,334 of September 13, 2016 (formerly MPV 727), establishing a program of “public-private partnerships” with a governing board that is given the power to force IBAMA, FUNAI or any other agency to approve any project that the board considers to be “strategic” (Brazil, PR 2016). Yet another blow was approval in December 2016 with approval of constitutional amendment No. 95 (formerly PEC 55) (Brazil, Câmara dos Deputados and Senado Federal 2016). This freezes the federal budget for the next 20 years at the current level, which has already been reduced to the point where agencies such as IBAMA and FUNAI are in many aspects inoperable. Only the Ministries of Health and Education are allowed to have increases their shares of the budget pie, which means that as demands inevitably increase the Ministry of Environment and other agencies will shrink further, making proper enforcement of environmental laws unviable. In addition to inadequate allocations in the federal budget for less-powerful sectors such as the Ministry of Environment, Brazil has a unique system that results in the real amounts spent in these sectors being even less than the budget would suggest. One feature is “*contingenciamento*,” or placing the funds in contingency status when tax revenues are insufficient to pay the promised allocations. The budget amounts are not released at one time at the beginning of the year, but rather are released in installments as the year progresses. The ministries are therefore pitted against each other in a continual struggle to get their installments released, and not all are successful. Another feature of the system is that less-powerful ministries are likely to have much of their money released in the closing days of the fiscal year when it is bureaucratically inviable to complete the lengthy bidding process needed to make most expenditures, and the funds are therefore returned to the treasury unspent.

Other proposals that are moving forward include one to allow opening indigenous lands to mining (PL-1.610/1996) (Brazil, Câmara dos Deputado 1996). There is also the notorious PEC-215, which would remove the authority of ICMBio to create “conservation units” and of FUNAI to create “indigenous lands” (Brazil, Senado Federal 2016; ISA 2015). This authority would be transferred to the National Congress, which is controlled by ruralists and thus would effectively end the creation or expansion of protected areas. Various moves to reduce existing protected areas are progressing, such as removal of one million hectares from protected areas in the southern part of the state of Amazonas (Fearnside and Lovejoy 2017) and in 2017 the removal of protection from 346,000 ha along the BR-163 (Santarém-Cuiabá) Highway in Pará (Chagas 2017; Fearnside 2017f).

Removal of protected areas as barriers to dams

Protected areas, including indigenous lands, represent a barrier to hydroelectric development in many locations, but this barrier is progressively weakening. Parts of reserves can be removed to make way for dams, as was done, initially though presidential executive orders (“*medidas provisórias*,” or “MPs”), for the planned São Luiz do Tapajós Dam for five protected areas, including the Amazonia National Park (Sanson 2012). The degazetting and downgrading of reserves is an increasing threat throughout Brazilian Amazonia (Bernard et al. 2014).

Dam plans can also block creation of new protected areas, as has occurred for an extractive reserve for *ribeirinhos* in the area of the planned Jatobá Dam on the Tapajós River (Fearnside 2015b) and the Sawre Muybu indigenous area that would be partially

flooded by São Luiz do Tapajós, and where, despite the 2016 decree initiating the process of creating an official “indigenous land,” the area has yet be officially demarcated on the ground an “*homologado*” (confirmed by a higher authority).

In addition to gaining concessions through the legislature, ruralists also make gains by convincing the President to issue MPs. Ruralists are pressing for such a measure to allow “partnerships” between indigenous peoples and non-indigenous actors, thus allowing areas in indigenous lands to be rented out to agribusiness (Borges 2017b). This would be catastrophic both for the forest and for the indigenous people. Indigenous land protects more Amazon forest than do the “conservation units” that are administered by ICMBio in the Ministry of Environment (Nogueira et al. 2018a,b). Indigenous lands have so far been the most effective type of protected area in avoiding deforestation (Nepstad et al. 2006; Vitel et al. 2009), but this effectiveness cannot be taken for granted (Fearnside 2005b; Fearnside and Ferraz 1995; Vitel et al. 2013).

Security suspensions

An infallible means for dam proponents to circumvent restrictions on social and environmental impacts, including environmental-justice concerns, is the “security suspension.” This device stems from a law from Brazil’s military dictatorship (Law 4348 of June 26, 1964 that has been maintained and broadened in the intervening years (Law 8437 of June 30, 1992; Law 12,016 of August 7, 2009) (Brazil, PR 1964, 1992, 2009). This allows any judge to overturn any judicial decision blocking a project if stopping the project would cause “grave damage to the public economy.” Since hydroelectric dams are invariably important for the economy, decisions can be overruled regardless of how many laws, constitutional protections or international conventions have been violated. By 2014 security suspensions had been invoked 12 times in the case of the Belo Monte Dam and 14 times in the case of the Tapajós dams (Palmquist 2014). They have been used several times since in both cases. The Brazilian public is generally unaware of the existence of security suspensions, thus guaranteeing a complete lack of pressure on lawmakers to revoke the security-suspension laws (Fearnside 2015c).

Brazil’s court system has proved incapable of enforcing relevant laws such as 5051 of April 19, 2004, which implements ILO Convention 169 requiring consultation of indigenous peoples (Brazil, PR 2004). The legality of Belo Monte is contested in over 20 still-undecided suits from the “Public Ministry” (a public prosecutor’s office created by the 1988 Constitution to defend the interests of the people), and, in the meantime, the dam has been built. In the one case that reached a court decision, the ruling was in favor of the indigenous people (see Silva and Santos 2017). The presidential administration appealed the ruling to the Supreme Court, and, after receiving four government representatives and none from civil society, chief justice Ayres Britto ruled that the dam construction could continue pending a decision on the merits of the case (Britto 2012). The ruling was made without consulting the other members of the court; this occurred just 15 days before Britto’s retirement date and in the midst of trying the “Mensalão” corruption scandal (International Rivers 2012a; Peres 2012; Seva-Filho 2014). Since then the Belo Monte case has not even appeared on the radar for inclusion in the Supreme Court’s agenda, and the dam has been built in practice.

Alternatives to Dams

Energy alternatives abound in Brazil, making the government's plans for many more dams in Amazonia unnecessary. The plans themselves are based on flawed projections, as costs and construction times of dams are systematically underestimated (e.g., Ansar et al. 2014) and Brazil's assumed future energy demands are based on wildly unrealistic projections of economic growth (Prado et al, 2016). One obvious step is for Brazil to stop exporting electricity in the form of electro-intensive commodities like aluminum, which generate very little employment in Brazil while wreaking great damage through the dams built to supply these industries (Fearnside 2016a)

A highly visible efficiency option in Brazil is to stop using electric showerheads to heat bathwater. These are officially estimated to consume 5% of all of the electricity in Brazil (Brazil, CIMC 2008, 58). Since the 2008 National Program for Climate Change (PNMC), it has been a government objective to phase out electric showerheads, but essentially nothing has been done – instead, the priority continues to be building more hydroelectric dams. Brazil has great potential for heating bathwater with solar heaters without use of electricity (Costa 2007).

Brazil's inefficient electrical transmission system, which wastes 20% of the power transmitted, could be greatly improved without the impact of building more dams (Rey 2012). Brazil also has enormous undeveloped wind and solar resources, which clearly receive much lower priority than hydropower (Baitelo 2012; Baitelo et al. 2013). In January 2016 Brazil's president vetoed the inclusion of any funding for “non-hydraulic renewable energy” in the next five-year development plan (PPA) (ISA 2016).

Needed Reforms

Environmental-justice concerns need to be incorporated in to the decision-making and licensing systems such that the current pattern of building dams and other projects regardless of these impacts is ended. Subterfuges need to be eliminated that currently allow projects to go forward even when legal protections are violated, especially the security suspension laws.

A profound reform of the decision-making process is needed such that likely social and environmental impacts are studied, democratically debated and given real consideration before the critical decisions are made on dam construction (e.g., Fearnside 2018a). Note again that the real decisions on dam construction are not the same as the officially designated ones in the licensing process, which, in practice, only ratify prior decisions that have been made in the absence of information, public debate and consideration of social and environmental consequences.

These changes alone are insufficient. Brazil, and many other countries where similar situations apply, must also pursue alternatives to dams and other development modes that inherently provoke environmental injustices and other unacceptable impacts.

The concerns of environmental justice provoked by Amazonian dams are of a type that is qualitatively different from many of the other concerns over dams, such as their financial cost or their legality. Environmental-justice concerns have been shown to be important in bringing about change both at individual and societal levels (e.g., Reese and Jacob 2015). For these changes to take hold in Brazilian decision-making on Amazonian dams, it is essential that these concerns not only be formally documented, studied and explained by academics and others, but also that they be experienced and internalized by society at large.

Possible Policy Change on Amazon Dams

A development in January 2018 offers hope of change in policy on energy priorities, although only time will tell the extent to which Amazon dams are foregone. Two key officials -- the executive secretary of the Ministry of Mines and Energy and the head of EPE (Energy Research Enterprise, which is the agency under the Ministry of Mines and Energy responsible for energy planning) -- stated that the heavy environmental and social impacts of Amazon dams mean that priority should shift to other energy sources, such as wind and solar (Ventura 2018). However, there was no mention that any of the planned Amazonian dams that are listed for construction by 2026 (Brazil, EPE 2017) would be cancelled (e.g., Fearnside 2018b; IRN 2018).

The stated motive of heavy impacts may not be the key factor, as economic realities would logically lead to the same policy shift (Branford 2018). Contrary to frequent claims by dam proponents, hydropower is not “cheap energy”, even ignoring the non-financial cost of social and environmental impacts. The financial cost of dealing with social and environmental impacts has increased greatly in Brazil over the past 20 years, making it an important factor in the worsening economics of new Amazonian dams (Hirata 2018). A worldwide survey shows the normal pattern to be for dams to have much higher financial costs and to take much longer to begin generating power than is thought at the time construction decisions are made (Ansar et al. 2014). This is shown by recent cases in Brazil, such as the Madeira River dams and Belo Monte, which cost more than double the amount officially expected (e.g., Fearnside 2017a).

Uneconomic dams like Belo Monte have gone forward with massive government subsidies that are connected both to the role of construction companies in financing political campaigns (both legally and illegally) and to simple corruption at the level of individuals (e.g., Branford 2018; Fearnside 2017b). This influence is presumably decreasing due to the prohibition of campaign contributions from corporations beginning with the elections of 2016 (Falcão 2015), reaction to the ongoing “Lava Jato” corruption investigations (*Band Notícias* 2015), and the diminished cash reserves of BNDES (Lima and Vettorazzo 2018). The August 2017 announcement of the government’s intent to privatize ELETROBRÁS by the end of 2018 could also be a factor in the change (Ventura 2018). There is uncertainty concerning this privatization since 70% of Brazil’s population is opposed to it (Hirata 2017) and there are unresolved legal issues (Reuters 2018). As a government company, ELETROBRÁS is headed by political appointees and has been subject to political pressure to promote uneconomic dams that would never be considered by a private company (Branford 2018). An increase in economic rationality is desirable, but it is important to remember that the “invisible hand” of the economy is not always kind to issues of environmental and social impacts. Incorporation of environmental-justice concerns is also essential to prevent the problems so often seen in Brazil’s Amazonian dams. It will be a great advance if the recent statements are transformed into a change in the role of these impacts in decision making.

The chances of these statements being acted upon diminished further in April 2018, when both of the officials who had made the statements were removed from their posts when a new Minister of Mines and Energy was appointed. The new minister (Moreira Franco) is under investigation in the “*lava jato*” (“car wash) corruption probe, and his appointment is widely viewed as a means of giving him the protection of the “privileged forum” (Brandino 2018). This privilege means that ministers can only be tried by the eternally backlogged Supreme Court and are therefore, in practice, effectively immune from prosecution, along with any other individuals who might be named should the minister turn state’s evidence in exchange for a light sentence. When asked to explain why he removed the two technical experts who had questioned the

priority for dams, he limited his reply to saying “positions here are not permanent” (Dias and Wiziack 2018).

Conclusions

Brazil’s Amazonian dams provoke severe social and environmental impacts and have shown a pattern of violation of human rights. Environmental-justice concerns should motivate a rethinking of this development strategy, shifting energy development to alternatives such as reduced use of electricity, cessation of energy export in the form of aluminum and other electro-intensive commodities, elimination of waste and inefficiency, and generation from wind and solar resources.

Past injustices provoked by existing Amazonian dams need to be given priority in government programs to re-establish the livelihoods and quality of life of affected populations.

Safeguards need to be strengthened in Brazilian development and regulatory agencies and in Brazilian and international financial institutions in order to avoid the kinds of environmental injustices illustrated by Amazonian dams.

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Figure Legend

Figure 1: Brazil’s Legal Amazon region and locations mentioned in the text. Existing dams: (1) Balbina, (2) Santo Antônio, (3) Jirau, (4) Belo Monte, (5) São Manoel, (6) Teles Pires, (7) Samuel. Planned dams: (8) Cachoeira Ribeirão, (9) Cachoeira Porteira, (10) Babaquara/Altamira, (11) São Luiz do Tapajós, (12) Jatobá, (13) Chacorão, (14) Marabá.

