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Planned disinformation: The example of the Belo Monte Dam as a source of greenhouse gases

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Introduction

”Disinformation” (mendacious, deliberately incomplete or misleading information) is a hypothesis that haunts discussions of Amazonian development, particularly the Brazilian government’s massive plans for building hydroelectric dams such as Belo Monte.Plans for hydroelectric dam construction in Brazilian Amazonia call for dozens of large dams and over a hundred smaller ones. Decision making in Brazil is critical to these developments, not only because of the large number of dams in Brazilian Amazonia but also because Brazil is financing and building many of the dams in neighboring countries (e.g., Fearnside 2014a). Impacts of dams include effects on indigenous peoples, such as loss of fish and other resources from the natural rivers. Resettlement impacts on both urban and rural people represent a concentration of the human cost of this form of development (e.g., Fearnside 1999). This is also true of impacts on the downstream residents who lose livelihoods based on fisheries and floodplain agriculture. Health impacts of reservoirs include proliferation of insects and methylation of mercury (transforming this metal into its poisonous form) (e.g., Leino and Lodenius 1995). Forest loss occurs not only from direct flooding but also from clearing by displaced residents, from road construction, from migrants and investments attracted to the area, and from agribusiness made viable by waterways associated with many of the dams (e.g, Alencar 2016; Alencar et al. 2015; Barreto et al. 2011; Fearnside 2001). Greenhouse-gas emissions from dams include carbon dioxide from decay of trees killed by flooding and emission of nitrous oxide and especially methane from the water in the reservoirs and from water passing through the turbines and spillways. Carbon credit for dams under the Kyoto Protocol’s Clean Development Mechanism now represents a major additional source of impact on global warming because virtually all of the dams awarded credit would be built anyway even without this subsidy, meaning that the countries buying the credit can emit gases without there being a genuine offset to neutralize the impact of the emissions (Fearnside 2013a,b, 2015a).

Greenhouse-gas emissions by dams is an area where the hypothesis of disinformation arises as an explanation for official discourse. Hydropower continues to be portrayed as “clean” energy with zero or negligible emissions long after this has been known to be false. Although Belo Monte’s Environmental Impact Study (EIA) claims emissions would be negligible, this dam, along with at least one other that would be needed upstream to supply water for Belo Monte’s turbines in the dry season, would have a negative impact on global warming for at least 41 years, with the magnitude of the impact exceeding that of greater São Paulo during the first ten years (Fearnside

2009a,b). This negative impact is based on comparison with the same energy generation with fossil fuels. Of course, the relative impact of the dams would be worse if compared with measures to increase the efficiency of electricity use or to generate with sources like wind and solar power. The option of simply not generating this electricity, part of which would be exported to other countries in the form of aluminum ingots, would give the best result (Fearnside 2016a). The idea that hydroelectric dams produce "clean energy," which is constantly repeated by the Brazilian government and by the hydroelectric and aluminum industries, is what dominates the view of the public.

Dams as the “only option”

“Disinformation,” a euphemism for mendacious, deliberately incomplete or misleading information, is a term adopted by the US Central Intelligence Agency (CIA) (Agee 1975). This definition is essentially identical to that of the less-palatable term “lie,” that is, a false statement presented as being true and intended to deceive.

One of the areas that best illustrates this is the promotion of hydroelectric dams in Brazilian Amazonia. The subject is almost always presented with the justification adopted by proponents of the construction projects, i.e. a choice between a dam and the development of the country, the only alternative being presented as blackouts and sacrificing the hopes of those who still live without electric lights. This is a case of disinformation that has gained widespread acceptance through constant repetition. Not mentioned is the underlying assumption that Brazil will continue exporting vast amounts of electricity in the form of aluminum and other electro-intensive metals. The first question has to be "what will be done with the electricity?" Only after addressing this question come the comparisons of impacts of each potential project, such as a hydroelectric dam. In the case of the Belo Monte Dam (Figure 1), proponents were successful in avoiding any discussion of the impacts of other dams planned upstream of Belo Monte. In all cases, the issue of greenhouse-gas emissions by dams has been absent, virtually always simply repeating the assertion that this is "clean" energy.

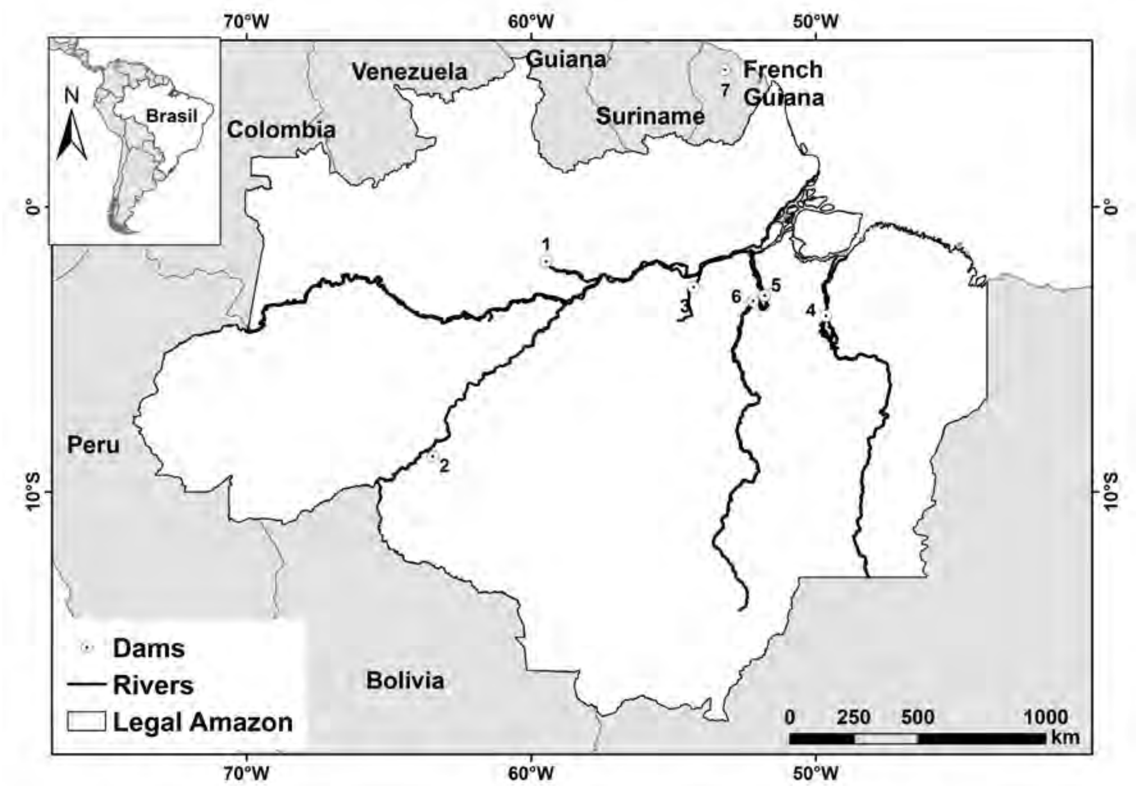

Figure 1 – Dams mentioned in the text: 1.) Balbina, 2) Samuel, 3.) Curuá-Una, 4.) Tucuruí, 5.) Belo Monte, 6.) Babaquara (Altamira), 7.) Petit Saut.

Almost every time the subject of dams arises, including the issue of greenhouse-gas emissions, the presumption is that we "need" more power, and therefore the decision is always a choice between the dam or another electricity source, generally fossil fuel. What is done with the energy is rarely questioned. However, this is the most basic question, and has to be answered before we can say what the net impact of the hydroelectric plant is. In the case of the Belo Monte Dam, for example, part of the energy is to make alumina and aluminum for export. Aluminum processing generates only 1.46 jobs per gigawatt-hour of electricity consumed (Fearnside 2016a), the only worse option in terms of creating employment in Brazil being iron alloys, which are also being exported (Bermann and Martins 2000, 90). Stopping export of aluminum and other electro-intensive commodities would be the first measure (Fearnside 2016a). Then there are many ways in which energy use could be more efficient (Baitelo et al. 2011; Bermann 2003; Moreira 2012). The most obvious item is the electric shower, which is an extremely inefficient way to obtain hot water for bathing. According to Brazil's National Climate Change Plan, 5% of all electricity consumption in Brazil is to heat water (Brazil, CIMC 2008). This is more than Belo Monte will generate. Much of Brazil's bath water could be heated with solar collectors, and what cannot be heated this way could more effectively heated directly with gas rather than with electricity. The Brazil is one of the only countries in the world that uses the electric shower. The lack of logic from the standpoint of the country is evident from the fact that a shower that costs approximately US$15 to the individual to install costs the country US$1000 – 1500 to build the generating capacity to supply electricity to the shower (Cidades Solares 2006). Only after advance in efficiency should we turn to other sources of power generation (solar, wind, etc.) and, finally, dams – with priority always given to options with the lowest impact.

Dams as “clean energy”

One of the areas where disinformation is evident is the portrayal of hydropower as emission-free “clean” energy. Unfortunately, this is not the case, especially for tropical dams. Dams emit gases that can be understood from the spillway design, for example, in the Tucuruí Dam in Brazil’s state of Pará (Fearnside 2004a). The water was taken at a depth of 20 m in Tucuruí-I (the original 4000-MW configuration inaugurated in 1984), which increased to 24 m since 2002 with Tucuruí-II (with 8000 MW of installed capacity). When a steel sluicegate is lifted, a slit opens at the bottom and water descends a "ski jump" and is thrown upwards to be sprayed as billions of droplets. This is part of the design of the dam, intended to oxygenate the water to decrease fish mortality in the river downstream. However, the other side of this coin is that all of the methane dissolved in the water is released into the air immediately. Methane (CH_4) is a much more powerful greenhouse gas than carbon dioxide (CO_2). Methane is formed when organic matter decomposes in oxygen-free environments, as is the case at the bottom of an Amazonian reservoir. The water in the reservoir separates into two layers: a surface layer 2-8 m thick where the water is warm and is in contact with the air, and a deeper layer with colder water. The water in the two layers only rarely mixes, and the methane that forms remains trapped in the bottom layer. The intake for the spillways is below the thermocline (the division that separates the two layers), and the intake for the turbines is even deeper than the intake for the spillways. The concentration of methane measured in Tucuruí increases with depth, and reaches very high levels at the depths where water is drawn from the reservoir (Fearnside 2002, 2004b). This water emerges under high pressure, which is immediately reduced to one atmosphere at the outlet of the turbines. Solubility of gases in water is proportional to the pressure, and therefore most of the methane dissolved in water will come out in bubbles at the outlet of the turbines. This is what happens when one opens a bottle of Coca Cola and CO_2 bubbles begin to emerge as soon as the pressure is released.

The organic matter that is converted into methane comes from sources in two groups. The first is the initial stocks, such as the leaves of the trees in the flooded area and the easily oxidized (labile) portion of the soil carbon. The second group is the renewable stocks, such as macrophytes (water weeds) growing in the water and terrestrial herbaceous vegetation that grows in the drawdown zone (the area exposed each year when the water level in the reservoir is lowered). The vegetation that grows in this area is soft, mainly composed of grasses, and quickly rots underwater (unlike wood, which decomposes very slowly). The vegetation in the drawdown zone is rooted in the bottom, where, when the water level rises, it decomposes in the anoxic zone and generates methane. When plants grow, photosynthesis removes carbon from the air in the form of CO_2, and when the plants later die when flooded this carbon is returned to the atmosphere in the form of CH_4. Because this is an emission that is repeated every year in a sustainable way, the dam acts as a "methane factory" (Fearnside 2008).

ELETRONORTE (the government company that owns the Tucuruí Dam) reacted to my use of the phrase "methane factory" as follows in a text entitled "ELETRONORTE responds to the *New York Times”*:

> *Finally, ELETRONORTE no longer accepts, after 20 years of exhaustive and repeated explanations like this, that "scientists" continue claiming without any*

> *proof that "Tucuruí is virtually a methane factory." What is virtual has been these catastrophic predictions that only corroborate the opinion of those who, whether well informed or not, want nothing more than to speak ill of Brazil.* (Brazil, ELETRONORTE 2004).

Another contribution of dams to global warming comes from the wood in the forest that is flooded when the reservoir is initially filled. This represents a substantial stock of carbon that leads to an emission of CO_2 by the decomposition of dead trees that are left projecting out of the water (Abril et al. 2013). This emission of CO_2 is added to the large pulse of methane production by underwater decomposition of the leaves that fall off the trees. The Balbina Dam is the worst example, with a large shallow reservoir that generates little energy. The reservoir has approximately 3300 islands (Feitosa et al. 2007), increasing the dam's impact on the forest and also forming thousands of bays with standing water. Balbina has more global-warming impact than generating the same energy from fossil fuels (Fearnside 1995). Although a group in Canada had already identified hydropower plants in that country as sources of greenhouse gases two years earlier (Rudd et al. 1993), it was my 1995 publication that sparked a heated reaction from the hydroelectric industry worldwide, including in Brazil. The US Hydropower Association called the idea that dams have emissions "baloney" (see: IRN 2002). Other Amazonian dams also remain worse than fossil fuels for many years, as in the cases of Tucuruí, Samuel and Curuá-Una (Fearnside 2002, 2005a,b). The then "president" of ELETROBRÁS attacked me as subject to the "temptations" of the nuclear and thermal power lobbies (Rosa et al. 2004), and asserted that my estimates of emissions from dams were only "political claims" (Rosa et al. 2006; see replies: Fearnside 2004a, 2006a). Rosa et al. (2006) gave the following explanation of the phenomenon:

> *Although he* [Fearnside] *selected Coca-Cola as an example, which is highly symbolic of his way of thinking, he could just as well have selected guaraná – a carbonated soft drink that is very popular in Brazil, flavored with Amazon berries. It is easier to see the bubbles as guaraná is transparent while Coca-Cola is dark. People in Brazil often sit around a table to chat as they drink it, with the bottles open and the glasses full for half an hour or more, without losing completely the bubbles. Instead of fast food, the Brazilian custom is a leisurely drink.* (Rosa et al. 2006).

This is the origin of the term "fizzy science," with reference to the noise that the bubbles make when they emerge from a soft drink. "*Fizzy Science*" is the title of the publication by International Rivers (an environmental NGO) on the hydropower industry's conflict of interest in its research on emissions from dams (McCully 2006).

The head of the climate sector of Brazil's Ministry of Science and Technology (MCT), who was also responsible for the country's national inventory of greenhouse gases that was submitted the Climate Convention in 2004, convened a meeting on emissions from dams, and subsequently put the transcript of the event on the MCT website. He stated explicitly that he had invited ELETROBRÁS to draw up this part of the report in order to avoid undesirable political consequences if large emissions from hydropower were accepted:

> *We* [the MCT climate sector] *talked with Prof. Pinguelli* [Rosa] *and I asked the help of ELETROBRÁS* [on the subject of greenhouse gas emissions from dams]*;*

actually, it was ELETROBRÁS that coordinated this work [i.e., the work reported in the hydroelectric portion of Brazil, MCT 2004] *exactly because of this, because this subject was becoming political. It has a very great impact at the World level; we are going to suffer pressure from the developed countries because of this subject. And, this subject was little known. It is mistreated. It is mistreated and continues to be mistreated by Philip Fearnside himself, and we have to be very careful. The debate that is taking place now in the press shows this clearly; that is to say, you can take any one-sided statement to show that Brazil is not clean, that Brazil is very remiss, that Brazil, implicitly, will have to take on a commitment* [to reduce emissions] *in the future. This is a great political debate and we are preparing ourselves for it.* (Brazil, MCT 2002).

In fact, the very small calculated emissions of dams in the national inventory completely omitted emissions from water that passes through the turbines and spillways (Brazil, MCT 2004, 152). The emission for the Tucurui Dam in the National Inventory was only 0.56 million tons of carbon equivalent of CO_2 per year (for 1998-1999), a discrepancy of 1437% compared with my value of 8.55 ± 1.55 million tons of carbon equivalent of CO_2 per year for 1990 (Fearnside 2002). For the Samuel Dam, the national inventory calculated 0.12 million tons of carbon equivalent of CO_2 per year (for 1998-1999), a discrepancy of 1150% compared with my value of 1.5 million tons for 1990 or 146% compared with my value of 0.29 million tons for 2000 (Fearnside 2005a,b).

The same group persists in claiming that:

Much controversy has come about recently from studies conducted in Amazonian reservoirs, especially from theoretical studies based on extrapolations devoid of established scientific criteria. These studies have a strong bias against any type of hydroelectric development in the Amazon and put the viability of these enterprises in doubt with regard to greenhouse-gas emissions and were done for the Tucurui, Samuel and Balbina hydroelectric dams (Fearnside, 1995; Fearnside, 1996; Kemenes et al., 2007). (dos Santos et al. 2008).

Unfortunately, those who read the papers cited in the foregoing passage will find a different world. Kemenes et al. (2007) measured a large emission at Balbina and made calculations for other Amazonian dams indicating all of the other dams as being worse than fossil fuels (Kemenes et al. 2008). Additional errors in the calculations of the ELETROBRÁS group further worsen the conclusion for dams, approximately tripling the emission by bubbling and diffusion through reservoir surfaces (Fearnside and Pueyo 2012; Pueyo and Fearnside 2011). Projected emissions for planned storage dams show higher emissions than fossil fuels (de Faria et al. 2015; Fearnside 2016b). Brazil's president has announced a shift in priority from run-of-river to storage dams in Amazonia (Borges 2013).

Belo Monte and global warming

Belo Monte is a 11,233-MW hydroelectric dam that is under construction since 2011 on the Xingu River, in Brazil's state of Pará. The dam is expected to have severe environmental and social impacts, including impacts on indigenous peoples, and its licensing and implementation have involved multiple violations of international agreements and Brazilian constitutional protections and legislation (see: Fearnside 2012a; Magalhães and Hernandez 2009; Vilas-Boas et al. 2015).

Among the impacts of Belo Monte is emission of greenhouse gases (see: Fearnside 2011). The same group that prepared the hydroelectric dam portion of Brazil's 2004 national inventory was responsible for the section of Belo Monte's EIA on greenhouse-gas emissions. The estimation of methane emission from the future Belo Monte reservoir is described as follows:

> *.....If the methane emission is similar to that of the Xingó reservoir, the projected area of the Belo Monte reservoir (400 km^2) will emit around 29 mg CH_4 m^{-2} d^{-1}. But, if it is similar to the Tucuruí reservoir it will emit 112 mg CH_4 m^{-2} d^{-1}. In the face of uncertainty we take the emission* [of Belo Monte] *to be the average of these two values, i.e. 70.7 mg CH_4 m^{-2}d^{-1}. Before flooding … we arrive at a value of 48 mg CH_4 m^{-2} d^{-1} for the emission of the area to be transformed into the Belo Monte reservoir*. (Brazil, ELETROBRÁS 2009, Vol. 8, p. 72).

Again, the imagined emission is minimal due to the omission of the main emission sources -- turbines and spillways, in addition to dead trees rotting above the water (Fearnside 2009a). In the case of the Belo Monte Dam there is another major factor that raises real emissions to even higher levels. This is the effect of massive dams upriver to regulate the flow of the Xingu River at the site of the Belo Monte Dam. The EIA was all done under the assumption that these dams will not exist. The EIA document of nearly 20 thousand pages would essentially become a work of fiction if other dams are later built. The impact is apparent from the technical data. The first would be the Babaquara Dam (now with its name changed to "Altamira"). The original plan calls for this dam to have a 6140-km^2 reservoir, or more than double the area of the notorious Balbina Dam. The vertical variation of water level in the reservoir would be 23 m, thus opening a 3580-km^2 mudflat every year as a drawdown zone. This would be a "methane factory" without parallel.

My calculations indicate a huge peak in concentrations of methane in the water of the Babaquara (Altamira) reservoir in the early years due to decay of the soft parts of the original vegetation and of the easily oxidized (labile) soil-carbon stock (Fearnside 2009b). These sources later decrease, but emissions at a lower level continue in subsequent years; the concentration of CH_4 oscillates, with a peak every year when the drawdown zone is flooded. This represents an emission that would be sustained throughout the life of the dam. A form of validation of this result comes from measurements of methane in water in the Petit Saut reservoir in French Guiana, where a sustained oscillation of this type has been found since the reservoir was filled in 1994 (Abril et al. 2005).

The large initial emission, combined with a reasonable level of baseline emissions over the years, result in a time of 41 years for the Belo Monte hydroelectric complex with Babaquara (Altamira) beginning to have a net benefit in terms of emissions. Given climate threats in Amazonia and elsewhere, this is much too long a period to wait to begin mitigating global warming. Furthermore, the period of 41 years refers to a calculation without any value being given to time. If any discount rate greater than 1.5% per year is applied, the power plant remains worse than fossil fuel for more than a century. The time period considered is an essential factor. If only the first 10 years are considered, the average net emission totals 11.2 million tons of carbon equivalent to carbon CO_2 per year, or more than the emission of greater São Paulo (Fearnside 2009b). This assumes no discounting for the value of time, which would worsen the picture even more. This calculation considers the impact of each ton of methane as being only 21 times the impact of a ton of CO_2 (the conversion used by the 1997 Kyoto Protocol). The 2013 Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) raises this conversion factor to a value of 34, or a 62% greater impact of methane from dams, if the same 100-year time horizon is used, or a value of 86 if a time horizon of 20 years is considered (Myhre et al. 2013, 714). The 20-year time horizon is what is relevant to maintaining global temperatures below the 2˚C warming limit agreed in Copenhagen in 2009 as defining "dangerous" climate change or the 1.5 °C aspiration endorsed in Paris in 2015 (e.g., Fearnside 2015b). The conversion value of 86 effectively quadruples the impact of methane from dams.

A key issue is the credibility of the official scenario of having Belo Monte as the only dam on the Xingu River. Disinformation is the most logical explanation for this scenario, which opponents of Belo Monte refer to as the "institutionalized lie" (e.g., Salm 2009). This scenario is based on the decision of the National Council on Energy Policy (CNPE) in July 2008 that only the Belo Monte Dam would be built on the Xingu River. However, there are strong indications that this official scenario does not correspond to the sequence of events that would be initiated with the construction of Belo Monte (de Souza et al. 2006; Fearnside 2006b, 2012a). The CNPE is mainly composed of ministers, and these change with each presidential administration; this council is free to change its mind on previous decisions at any time. High authorities in the electrical sector have never accepted the CNPE resolution: the head of the National Electrical Energy Agency (ANEEL) called the decision "a typical case of giving up your rings to keep your fingers" (Pamplona 2008). At the highest levels of power there appears to be no intention of following the official scenario: when the then minister of environment Marina Silva proposed an extractive reserve in part of the area that would be flooded by dams upstream of Belo Monte, the then head of presidential staff (and current president of Brazil) Dilma Rousseff vetoed the proposal "because it could hinder the construction of dams additional to Belo Monte" (Angelo 2010). As president, Dilma Rousseff emphasized in a speech that Brazil "needs dams with large reservoirs" (Borges 2013), which appears to be an allusion to the Babaquara (Altamira) Dam.

Unfortunately, there is also a history of parallel cases of disinformation associated with dams that have already been built in the Amazon, where electrical authorities announced that they were not going to do something and instead did exactly what they had promised not to do. In the case of Balbina, a "public clarification" was released days before closing the dam, promising to fill the reservoir only to the level of 46 m above sea level, creating a 1580-km^2 impoundment (Brazil, ELETRONORTE 1987a). Filling to the 50-m level would be only done after years of study of the water quality. But what really ensued was filling the reservoir directly to the 50-m mark, and even a small amount (10 cm) above this mark. During the filling process itself this author obtained the plan being followed by ELETRONORTE engineers at the dam site, indicating the intention of raising the water level directly to the 50-m level (Brazil, ELETRONORTE 1987b). Today Balbina's reservoir covers 2995.5 km^2 according to our measurements from satellite images (Feitosa et al. 2007). The reservoir has been operated consistently above the 50-m level and in two years above the 51-m level (Feitosa et al. 2007).

The other case of documented disinformation providing a parallel for the Belo Monte/Babaquara complex is the Tucuruí-II project, which added 4000 MW of capacity to the Tucuruí power plant in the state of Pará. Under the law, any hydroelectric project with more than 10 MW needed an EIA (a limit subsequently raised to 30 MW), and ELETRONORTE was preparing to contract this report when Brazil's president simply flew to Pará and released the money. The rationalization was that the water level in the reservoir would not increase above the 70-m elevation of Tucuruí-I, and therefore would have no impact and did not need the study (Indriunas 1998). After the Tucuruí-II construction project was completed, the water level was simply raised, and Tucuruí has been operating at a 74-m water level since 2002 (Fearnside 2006b,c). Similarly, after the construction of Belo Monte it is likely that the construction of Babaquara (Altamira) would simply go ahead when the time for it arrives in the schedule. The timeline before launching the current official scenario foresaw this huge dam beginning operation seven years after Belo Monte (Brazil, ELETROBRÁS 1998, 145). The famous phrase of George Santayana (1905) that "Those who cannot remember the past are doomed to repeat it" has never been so relevant.

The logic of dams upstream of Belo Monte is apparent from the Xingu River hydrograph, i.e. the fact that during 3-4 months there would not be enough water to run a single turbine in the 11,000-MW main power house. An economic analysis, carried out by the Conservation Strategy Fund, in Minas Gerais, demonstrates the complete unviability of the Belo Monte Dam without water storage in major dams upstream (de Sousa Júnior et al. 2006). The financial temptation would be great to build Babaquara (Altamira) after a "planned crisis" when it is discovered that there is not enough water for the main power house at Belo Monte; adding Babaquara (Altamira) would increase the value of the energy generated per year at Belo Monte by approximately US$2.8-4.6 million (de Sousa Júnior et al. 2006, 76).

The Tapajós River provides a parallel case of disinformation concerning plans for building a particularly high-impact dam as part of a larger scheme that is apparently not to be publically revealed until after completion of a current project. In this case the São Luiz do Tapajós Dam plays the role of Belo Monte, and the Chacorão Dam the role of Babaquara (Altamira). Just as Babaquara (Altamira) would flood already-demarcated indigenous land, Chacorão would flood 11,700 ha of the Munduruku Indigenous Land. This dam is not included in the current ten-year plan for energy expansion (Brazil, MME 2015), nor in the "energy axis" of the Program for the Acceleration of Growth (PAC) (Brazil, PR 2011), but its locks are included in the PAC's "transportation" axis and represent a high priority to make the Tapajós River navigable as a waterway for transporting soybeans from Mato Grosso to ports on the Amazon River (Brazil, MT 2010). A sequence of events is currently playing out in the Tapajós River basin that repeats many of the worst features of the history of Belo Monte (Fearnside 2015c,d). Similarly, the multiple illegalities and injustices in the licensing and construction of Belo Monte repeat events that took place only a few years earlier in case of the Madeira River dams (Fearnside 2013c, 2014b,c).

The backlash against criticism of Belo Monte has been unrelenting. Rogério César Cerqueira Leite (an influential member of the editorial board of the *Folha de São Paulo* newspaper) labled those who criticize the dam as "pseudointellectuals," "jugglers," "windbags," an "extemporaneous Brancaleone army" and by some new terms he contributed to the Portuguese language for the occasion: "*ecopalermas*," "*ignocentes*" and "*verdolengos*" (Leite 2010; see responses: Fearnside 2010; Medeiros 2010). Among other statements, Leite claims that the indigenous people should have no objection to the dams because they are “semi-nomadic” and can simply pick up and move to another part of the forest.

A dossier of pro-dam material was compiled by Bittencourt (2012), which culminates by implying that critics of Belo Monte are Marxists. Edification is provided by a long quotation from Lenin to the effect that the key to achieving true communism is to bring electric power to all of Russia in order to transform rural peasants into urban proletarians.

An example of the way information on Belo Monte was distorted is provided by a highly visible response to criticisms of the project that had been put forward in a video made by soap-opera stars from Brazil’s Globo television network (Movimento Gota d’Água 2011). The TV stars had, indeed, made some factual errors in describing the Belo Monte project, but their basic criticisms of social and environmental impacts were correct. The video was responded to in a counter-video (Tempestade em Copo d’Água 2011) made by engineering students at Campinas State University (UNICAMP); the students each replied to a different statement in the TV stars’ video. The counter-video culminates with the students’ teacher (a former consultant to the Belo Monte consortium) declaring that Belo Monte is a great project for Brazil “in all aspects: economic, environmental and social.” I recommend my debate with the teacher on the Terra internet television channel (Terra TV 2011). In response to a statement that indigenous peoples will be impacted, a student replied that he had done “research” and found that no indigenous areas will be flooded by the Belo Monte reservoir; clearly his research did not include impacts on the two downstream indigenous areas in the 100-km “reduced flow” stretch, let alone the implications of upstream complements to Belo Monte like the Babaquara (Altamira) Dam. Other students reply to a questioning of Belo Monte as producing “clean energy” by stating that the “very same water” that enters the reservoir will be released below the dam “just as clean as when it came in;” evidently, the students had missed out on studies showing high concentrations of methane and low concentrations of oxygen in water released by dams. The counter-video was then turned into a feature article and cover page of *Veja*, Brazil’s largest news magazine (Eler and Diniz 2011). An image of each TV star and each student replying is shown with the statements in balloons in comic-book style, and each is accompanied by a drawing of a giant boxing glove “knocking out” the TV star. The article and cover-page were reprinted by the Belo Monte consortium and widely distributed in Altamira.

Unfortunately, the basic fact that the Belo Monte Dam would have a huge impact, far beyond what is officially admitted, still stands regardless of the discourse employed. Among these impacts is the emission of greenhouse gases. The best illustration of how these impacts have not yet managed to penetrate the curtain of discourse emerged at the 15th Conference of the Parties (COP) of the Climate Convention held in Copenhagen at the end of 2009. A reporter from Amazonia.org.br (an environmental website run by Friends of the Earth-Brazilian Amazonia) interviewed Brazil’s special ambassador for climate change, who was responsible for negotiating on the Brazilian side. The reporter asked: "But, isn’t Belo Monte one of the hydroelectric projects that the government considers to be sources of renewable and clean energy?". The answer was: "Yes it is. But, what I'm saying is that I think it [Belo Monte] is not in

Amazonia, right? So it is a different scheme" (Munhoz 2009). If key people in decisions regarding dams and climate change (such as negotiations on carbon credit for hydropower) do not even know that Belo Monte is located in the Amazon region, it is very difficult to imagine that they know the details of its impacts, including emissions of greenhouse gases.

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