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IS THERE A FUTURE AFTER THE BELO MONTE DAM?

**Building Futures Scenarios for the Volta Grande do Xingu in
Amazonia, Brazil.**

Master's Thesis
in Futures Studies

Author/Laatiija:
Marianna Birmoser Ferreira-Aulu

Supervisors/Ohjaajat:
Ph.D. Jarmo Vehmas
Ph.D. Matti Salo

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Turun kauppakorkeakoulu • Turku School of Economics

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Table 1 List Of Abbreviations

Abbreviation	In Portuguese	In English
Aimyx	Associação Indígena Miratu Yudjá Xingu	Indigenous Association Miratu Yudjá Xingu
ANEEL	Agência Nacional de Energia Elétrica	Brazilian Electricity Regulatory Agency
CAV	Centro do Apoio ao Visitante (da Norte Energia)	Visitor Support Centre (Norte Energia's)
CEA	Centro de Estudos Ambientais (da Norte Energia)	Centre for Environmental Studies (Norte Energia's)
CONAMA	Conselho Nacional do Meio Ambiente	Brazilian National Council of Environment
EIA	Estudo de Impacto Ambiental	Environmental Impact Assessment
FPIC	Consentimento Livre e Esclarecido	Free Prior Informed Consent
Funai	Fundação Nacional do Índio	National Indian Foundation
GDP	Produto Interno Bruto	Gross Domestic Product
GHG	Gases de Efeito Estufa	Greenhouse Gases
Ibama	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis	Brazilian Institute of Environment and Renewable Natural Resources
ILO	Organização Internacional do Trabalho	International Labour Organization
ISA	Instituto Socioambiental	Socio-environment Institute
MAB	Movimento dos Atingidos por Barragens	Movement of People Affected by Dams
MW	Megawatts	Megawatts
NGO	Organização não-governamental	Non-governmental organisation
PAC	Programa de Aceleração do Crescimento	Acceleration of Growth Programme
PBA	Projeto Básico Ambiental	Basic Environmental Project
SIA	Estudo de impacto Social	Social Impact Assessment
SIMP	Gestão de impacto social	Social Impact Management Plan
PESTEC	Aspectos Políticos, Ecológicos, Social, Tecnológicos, Econômicos e Culturais	Futures tables: Political, Ecologic, Social, Technologic, Economic, Cultural - aspects
UFRJ	Universidade Federal do Rio de Janeiro	Federal University of Rio de Janeiro
UFSCAR	Universidade Federal de São Carlos	Federal University of Sao Carlos
UN	Nações Unidas	United Nations
UNDRIP	Declaração dos direitos dos povos indígenas das Nações Unidas	United Nations Declaration on the Rights of Indigenous Peoples
USP	Universidade de São Paulo	University of Sao Paulo

ABSTRACT

The Belo Monte Dam is being built in Amazonia, Northern Brazil, and once completed, it will be one of the four largest hydroelectric power plants in the world. The power plant is a major infrastructure project in Brazil that should contribute to the country's energy security and benefit the economy. As any large construction, it also has potential drawbacks. Due to its location, Belo Monte already have and will continue to disrupt ecosystems and human lives. The negative impacts of the dam have created polemic discussions among different interest groups. This controversy is investigated in this paper in its various aspects: political, ecological, cultural, social, and economic. The findings of this research are presented in the form of scenarios of alternative future possibilities for the region. This Master's Thesis aims at helping different interest groups to envision alternative futures with these scenarios, and to provide tools to create change towards their preferred futures.

RESUMO

Complexo Belo Monte é o nome que se dá para a usina hidrelétrica que está sendo construída na Volta Grande do Xingu, no estado do Pará, Norte do Brasil. Ao ser concluída, será uma das quatro maiores usinas hidrelétricas do mundo. Belo Monte é o atual principal projeto de infraestrutura do Brasil, e propõe contribuir para segurança energética do país, e para o crescimento de sua economia. Como qualquer grande obra, ela carregada de desvantagens. Os impactos socioambientais de Belo Monte são amplamente discutidos na sociedade brasileira, e geraram uma grande controvérsia no país. Esta tese de mestrado investiga a controvérsia que é Belo Monte em seus diversos aspectos: político, ecológico, social, econômico e cultural. Como resultado, quatro cenários de possíveis futuros para a região são apresentados. A partir desses cenários, essa pesquisa tem como objetivo ajudar os diferentes grupos envolvidos com Belo Monte a visualizar alternativas de futuros possíveis, fornecendo-lhes ferramentas que viabilizem mudanças em direção aos futuros que prefiram que venham a acontecer.

ABSTRAKTI

Belo Monte -patokompleksia rakennetaan parhaillaan Amazonin sademetsäalueella, Pohjois-Brasiliassa. Valmistuessaan siitä tulee yksi maailman neljästä suurimmasta vesivoimalaitoksesta. Belo Monte on laajamittainen ja -alainen hanke, jonka tarkoitus on vahvistaa Brasilian energiavarmuutta ja valtion taloutta. Kuten kaikkiin suuriin rakennushankkeisiin, Belo Monteeseen liittyy etujen lisäksi lukuisia mahdollisia haittoja. Pato vaikuttaa jo eläinten, kasvien ja ihmisten elämään ja nämä vaikutukset ovat herättäneet keskustelua ja käynnistäneet kiistoja eri osapuolten välille.

Tässä tutkielmassa käsitellään Belo Monteen vaikutuksia ja siihen liittyvää keskustelua politiikan, kulttuurin, talouden, ympäristön ja yhteiskunnan näkökulmista. Tutkimuksen perusteella hahmotellaan alueelle mahdollisia tulevaisuuksia, jotka esitetään skenaarioiden muodossa. Skenaarioiden tarkoitus on auttaa Belo Monteen eri sidosryhmiä ja etujärjestöjä hahmottamaan erilaisia haluttuja tulevaisuuksia ja tarjota työkaluja niiden saavuttamiseen.

1. INTRODUCTION

Energy security is a global challenge. It is defined as “the uninterrupted availability of energy sources at an affordable price” (IEA 2017). Energy security is closely linked to population growth, to the rise of living standards (Partainen and Korhonen, 2016:15), and to the advancement of societal structures. As societies reach a higher level of organization, the demand for energy also grows. (Heinonen 2017: 8).

Historically, energy security is associated with oil supply (IEA 2017) as the global energy system is founded primarily on fossil fuels and other non-renewable energy sources (see for example Floyd 2012:24, Roser 2016, IEA 2016:6). The process of burning fossil fuels, however, emits GHG (greenhouse gases), which affect global climate change and the environment.

To prevent the negative effects of climate change, there is a growing demand to expand the production of clean and renewable energy systems (United Nations 2015:3). In 2005, the Kyoto Protocol established emissions reduction targets for industrialised countries (Whittington 2007:54) and more recently in 2016, the Paris Agreement called signatory parties to undertake rapid GHG emission reductions “in accordance with best available science” and to provide support to developing countries (United Nations 2015:6).

Brazil occupies a unique position among the major GHG emitting countries . Its emissions per capita are at around 2.4 tons CO₂, which according to Lèbre La Rovere et al. (2017:242), is considerably low. It is argued that the reason for the Brazilian low per capita energy-related GHG emissions is the country’s abundant 'clean energy resources' (Lèbre La Rovere et al. 2017:242). About 80% of Brazil's total energy comes from hydropower plants, and hydroelectricity is the main electric power source in the country (Norte Energia 2011b). Hydroelectric power is thought to be low on GHG emissions. Hydro power plants are perceived as means to cheap and reliable energy supply, and are promoted as important contributors for the societal wellbeing. (Ministry of Mines and Energy 2011, Norte Energia 2011b:1, Ministry of Planning 2014). The expansion of hydropower is part of the Brazilian strategy for acceleration of growth (Ministry of Planning 2014). The decision for this specific source of energy is guided by the country's commitment to reduce GHG emissions, and by the idea that the technology is environmentally feasible. However, this might prove to be a misconception.

Recent findings suggest that hydroelectricity should not be considered a source of 'clean energy' as it does in fact produce GHG emissions, mainly on the reservoirs and spillways (Fearnside 2002, 2015b and 2017). Moreover, scholars have shown strong indications that negative impacts on ecosystems surpass economic benefits, especially when considering power plants being built on rivers in tropical forests, as is the case of several hydroelectric power plants in Brazil. (see for example Magalhães and Hernandez,

2009:2, Sousa Júnior and Reid 2010, Fearnside 2016). This paper investigates one hydroelectric power project in particular, the Belo Monte Dam Complex¹.

Belo Monte is currently the largest hydroelectricity project in Brazil. It is being built in a region called Volta Grande do Xingu, in Amazonia, in the state of Pará, Northern Brazil. Belo Monte is to become the third largest hydroelectric power plant in the world (ANEEL 2011:57-59). Its 11 turbines combined will have an installed capacity of 11,233.1 MW (Norte Energia 2013:8).

Social and environmental impacts caused by the implementation of Belo Monte stirred polemic discussions among different interest groups. Proponents of Belo Monte perceive the dam as fundamental to the economic growth of Brazil. Expanding hydroelectric power is part of the national strategy, as it is a renewable source of energy that arguably produces low GHG emission. Hydroelectricity is seen by government officials as a path to sustainability. (Brazilian Ministry of Planning, Budget and Management 2013, Lobão in Planalto 2011, Rousseff 2014). Opponents, on the other hand, claim that the project should be considered unfeasible because the negative impacts surpass economic benefits. The region where Belo Monte is being built is home to a paradoxical ecosystem, both superabundant and fragile at the same time (Loureiro 2017:62). Moreover, the region is populated by diverse traditional peoples, including indigenous tribes of various ethnic and language groups. The construction and operation of the dam has already caused negative impacts to the ecosystem and to the traditional communities living in the region. These impacts include rise on illegal logging (Socioambiental 2014a), disappearance of animal species (Magalhães and Hernandez 2009:7-8, Prang 2007:13), rise on criminality (Costa 2011), and even indigenous ethnocide (Thais Santi 2014). Taking into consideration the low resilience of the Amazonian ecosystem, some of these impacts may be irreversible.

In this paper, this controversy² is investigated in its various aspects: political, ecological, cultural, social, and economic. The findings are presented in the form of scenarios of alternative future possibilities for the region. This Master's Thesis aims at helping different interest groups to envision alternative futures with these scenarios, and to provide tools to create change towards their preferred futures.

¹ From now on, referred to "Belo Monte Dam" or simply "Belo Monte", interchangeably.

² Further referred to "the Belo Monte controversy"

The main question this research attempts to answer is:

- *What will become of the Belo Monte region after the construction of the dam complex?*

In order to explore futures with Belo Monte, other issues should be understood first:

- How did Belo Monte come to be? What are the justifications for building the dam, and why are these justifications being questioned?
- What are the most important issues that proponents and opponents of the dam argue about?
- What are the most significant impacts (positive or negative) that Belo Monte has already brought to the region?

Naturally, the main research question is not answered in this paper. Reasoning behind that is that the future (definitive and singular) is not graspable or knowable. The answer to “what will become of the Belo Monte region after the construction of the dam complex” can only be answered retrospectively in the future. Instead, this thesis explores alternative future possibilities, which are presented in the form of four scenarios, describing how futures in the region could look like.

The structure of this paper is as follows: First, the study area in question is described. Then, the theoretical and methodological frameworks are provided, where the main concepts and methods used, as well as ethical considerations and a personal motivation to the study are presented. The frameworks are followed by a description of the research material. Next, the Belo Monte controversy is presented. Several aspects are taken into consideration and explained. The political, ecological, cultural, social, and economic aspects are presented in depth. Once the controversy is covered, the scenario-building process is explained, and long tables sketching each scenario are presented. Finally, the scenarios are written out in the form of a narrative. The paper ends with a small discussion on how these scenarios can be useful, and dialogues with what other authors have said about the topic. A list of works cited and appendices are available at the end of this document.

Understanding the Belo Monte controversy is the core objective of this research. It explores the Belo Monte polemic investigating the political processes leading up to the construction and operation of the dam, the economic considerations of the project, socio and environmental impacts, as well as the cultural implications that the dam’s implementation has caused to the local population. I hope to inspire decision makers of Belo Monte as well as of other large infrastructure projects to use futures thinking in their development plans.

2. THEORETICAL AND METHODOLOGICAL FRAMEWORK

2.1 Futures Studies

Futures Studies is an interdisciplinary field that aims at forecasting alternative futures for study and evaluation (Dator 2011:32). Scholars of this field, known as Futurists, use the verb *to forecast* when presenting their work. The verb *to predict* is avoided, because it is impossible to predict what will happen for sure because there is no one single future ahead of us. For that reason, although the word “future” is commonly used in the single form, the word “futures” in plural form is commonly used among futurists.

When studying alternative future possibilities, we can assess possible, probable and preferable futures. By identifying the components of these alternative futures, individuals and organisations can set actions for the present that may guide them towards their preferred futures (Dator 2011:32). Understanding that there are several paths to preferred futures, and that the actions taken today can guide us towards these futures can be a powerful tool for social change.

The Brazilian futurist Rosa Alegria (2011) says that understanding the future is purposeful, because the future is the remaining time we have ahead of us. According to her, futures research is a tool to impulse change, and in order to understand the future, researchers should infuse scientific methods with passion, curiosity, and intuition.

Although Futures Studies are offered as major subjects for masters and doctoral studies in some universities (for example the University of Turku, for which this master’s thesis is being written, the University of Houston, and the University of Hawaii), it is not yet universally recognized as an academically established field. There is no consensus on the definition of the activity of a futurist, or even if Futures Studies belong to the sciences. (See for example Niiniluoto 2001:371, Dator 2011:32, Glenn 2009a:4, Bell 1997:188). Some Futures Studies terminology are here distinguished.

The term *Futures Studies* refers to the field of studies that assess possible, probable and preferable futures through systematic futures research (Bell 1997:73). I refer to *Futures Research* as the product of Futures Studies within academia. Futures Research are presented in the form of theses and dissertations, academic journal articles conference presentations, books, and other academic publishing. Futures Research is subject to academic rigor and the methodology can be qualitative or quantitative. There are several peer-reviewed academic journals that publish futures research. Some of these journals are: European Journal of Futures Research (under SpringerOpen); Foresight: The Journal of Future Studies, Strategic Thinking and Policy (Published by Emerald); Futures: The Journal of Policy, Planning and Futures Studies (Published by Elsevier); Futuribles (Published by the Futuribles Centre), International Journal of Foresight and Innovation Policy (Published by Inderscience); Journal of Futures Studies: Epistemology, Methods, Applied

and Alternative Futures (Published by Tamkang University, Taiwan), The International Journal of Forecasting (Published by Elsevier).

In the University of Turku, some of the methods used in Futures Studies are Backcasting, Causal Layered Analysis (CLA), Cross-impact Analysis, Delphi, Environmental Scanning and Trend Analysis, Futures Wheel, Futures Workshops, Scenarios, Simulation and Games, among others.

Despite the wide variety of methods, it is argued that Futures Studies cannot be recognized as a science, because the results of this kind of research lack reproducibility, and that “the outcome of studies depends on the methods used and the skills of the practitioners.” (Glenn 2009a:2). The Finnish futurist Pentti Malaska (in Glenn 2009a:5) claimed that the empirical base of Futures Studies is as wide as “all sciences, whereas the empirical base of anyone science is only that science's domain”. He adds that the value of this field of studies is “not discovering new factual knowledge as in the sciences, but producing perceptions and insights to that body of knowledge”. (Malaska in Glenn 2009a:5)

"The purpose of futures methodology is to systematically explore, create, and test both possible and desirable futures to improve decisions. It includes analysis of how those conditions might change as a result of the implementation of policies and actions, and the consequences of these policies and actions" (Glenn 2009a:1)

The term *futuring* appears in this paper as a reference to the process of thinking about the future and producing materials related to that process. By adding the -ing suffix in the end of the word future, it is transformed into a verb in gerund, which gives the idea of a progressive aspect to the word. Futuring is a process for exercising the future (for example through scenarios or simulations). Futuring aims at producing statements about different classes of futures, and at figuring out ways to improve possible futures towards preferable ones (See for example Edward Cornish 2004).

Different types of futures can be found in Futures Studies literature and some authors have distinguished five classes: potential, possible, plausible, probable, preferable futures (for example Masini 1993, Hancock Bezold 1994, Voros 2003, Jentl 2015), as illustrated in Figure 1.

Jentl (2015:18) illustrates with the Futures Cone (Figure 1) that different futures “are not mutually exclusive but closely related and even partially overlapping”. Jentl’s Futures Cone is an adaptation from Hancock & Bezold (1994) and Voros (2003). The cone is three-dimensional, and varies in probability and size. The three-dimensionality feature of the cone arises because a longer time frame presents more opportunity for divergence from the present, so the set of possible futures for ten years from now is larger than the set of possible futures for tomorrow (Jentl 2015:18).

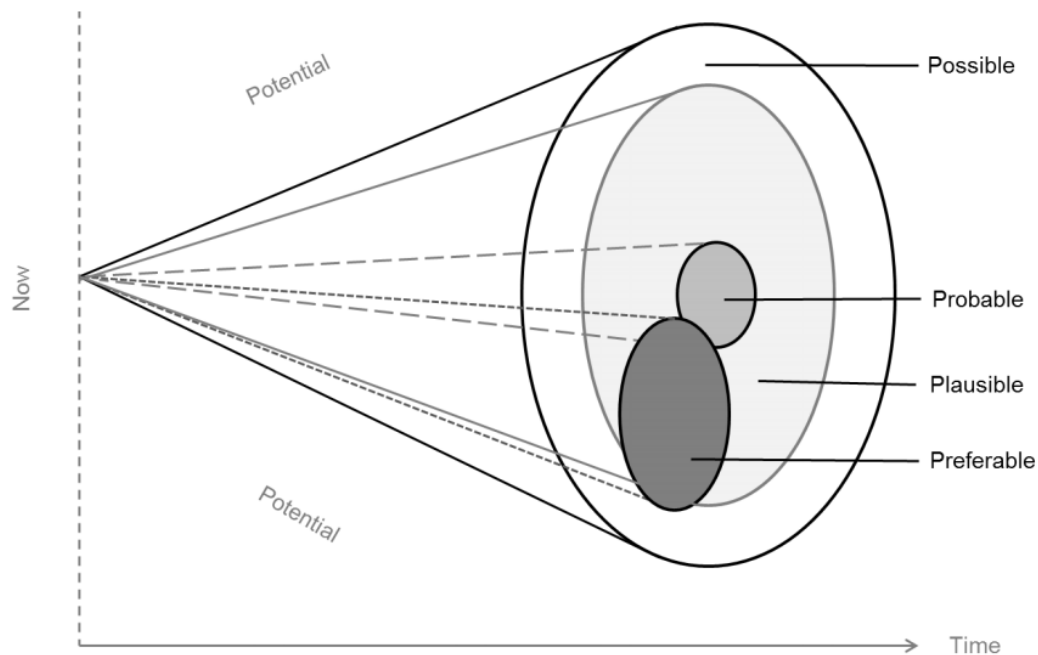


Figure 1 The Futures Cone (Jentl 2015)

Potential Futures is the largest concept which includes everything that has the capacity to develop into being, including those which we cannot imagine (Voros 2003:16). Potential futures are inside and outside the cone represented in Figure 1. The boundary of the Futures Cone is our ability to imagine possible futures, thus events that are unknown, and unknowable to us today, are also included in the potential futures. It is important to recognize that there are possibilities of futures beyond our current knowledge and capacity of imagination.

The outermost layer of the cone, *possible futures*, is a class of all kinds of futures that we can imagine (Voros 2003:16). This class of futures also includes science-fiction-like futures “that transgress presently accepted laws of science” (Hancock and Bezold 1994:24). The concept contemplates the known systems we now have, and takes into consideration that new discoveries can be made in days or years to come. Possible futures embrace the knowledge which we do not yet possess, and the idea that with the advancement of science we ought to gain knowledge and have answers for questions we now have.

Plausible futures are possible futures that ‘could happen’ according to our current knowledge of how things work (Voros 2003:17). This class of futures excludes knowledge that we do not yet possess. Plausible futures are based on the knowledge we have today. Its foundations are the current scientific work, methodologies and processes (Voros 2003:17).

Probable futures are possible futures that are considered likely to happen (Voros 2003:17). Naturally, even among probable futures some are more likely than others. In general terms probable futures are based on the idea that the future is a linear extension

of the present, a continuation of what we have today (Voros 2003:17). The so-called “*business-as-usual*” futures are commonly seen as “the most probable futures” (Hancock and Bezold 1994:24), as in general they are not too different from the past. The *drivers of change* are known trends that can be studied and calculations of probabilities may sometimes be made. Although the business-as-usual might just as well be the future that lies ahead for us, present trends may change, and discontinuities may occur.

Preferable futures (also known as *desirable futures*) is arguably the most subjective of all classes of alternative futures (Voros 2003:17). This class of futures can also be referred to ‘*prescriptive futurism*’ or ‘*normative forecasting*’ (Hancock and Bezold 1994:25). According to Jentl (2015:19) preferable futures is distinguished from other classes of futures for being always normative and thus, originating from value judgement. Thus, may vary from one individual to another. Additionally, Jentl (2015:19) explains that preferable futures are not always probable or even plausible futures. The issue on values and the understanding of preference are topics discussed further in chapter 2.5. Preferable futures permeate all imaginable (possible) futures. It may include probable and improbable events, as well as current and future knowledge about the universe. Thinking of preferable futures is perhaps the most empowering tool Futures Studies can offer.

Finally, as an addition to the futures cone presented above, a sixth class of futures found in the literature: *wildcards*. Wildcards are possible-but-improbable events. Among wildcards, *extreme events*, or *X-events*, are unlikely but potentially significant events that might trigger a sequence of linked events creating conditions for a completely different set of futures. (Casti et.al. 2011:9-11). These events are conditional to the surrounding context, and if they do come to be, they may create possibilities for drastic changes. Extreme events that have happened in the past are for example the tsunami that hit Thailand in 2004, the terrorist attacks in New York in 2001, or, perhaps the most extreme of all, the asteroid that hit Earth about 66 million years ago (evidenced by the Chicxulub crater in Mexico) that have caused a mass extinction of numerous animal and plant groups, including dinosaurs.

In the Futures Studies’ literature, wildcards are also referred to *Black Swans* (see for example Goodwin 2008 and Taleb 2007). Nicholas Taleb (2007: xviii) introduced Black Swans as events that rare, of extreme impact, and that have a retrospective predictability, meaning that they cannot be predicted beforehand, but signs that could have led to its prediction can be explained afterwards.

Thinking of wildcards may be a complicated task, exactly because they are unexpected in its essence, even unpredictable. When thinking about futures, we have to take into consideration that there are things we do not know, and now now, and at the moment we do not have means to know about them. Speculating how wildcards could affect the future, however, is an important part of futures thinking.

Since 1996, a think tank composed of futurists called *The Millennium Project* has been annually updating what is perceived as the *15 Global Challenges Facing Humanity*.

These challenges serve as a framework for this Master's thesis. The Millennium Project's publication *2013-14 State of the Future* (Glenn et.al. 2014:19) presents the following challenges:

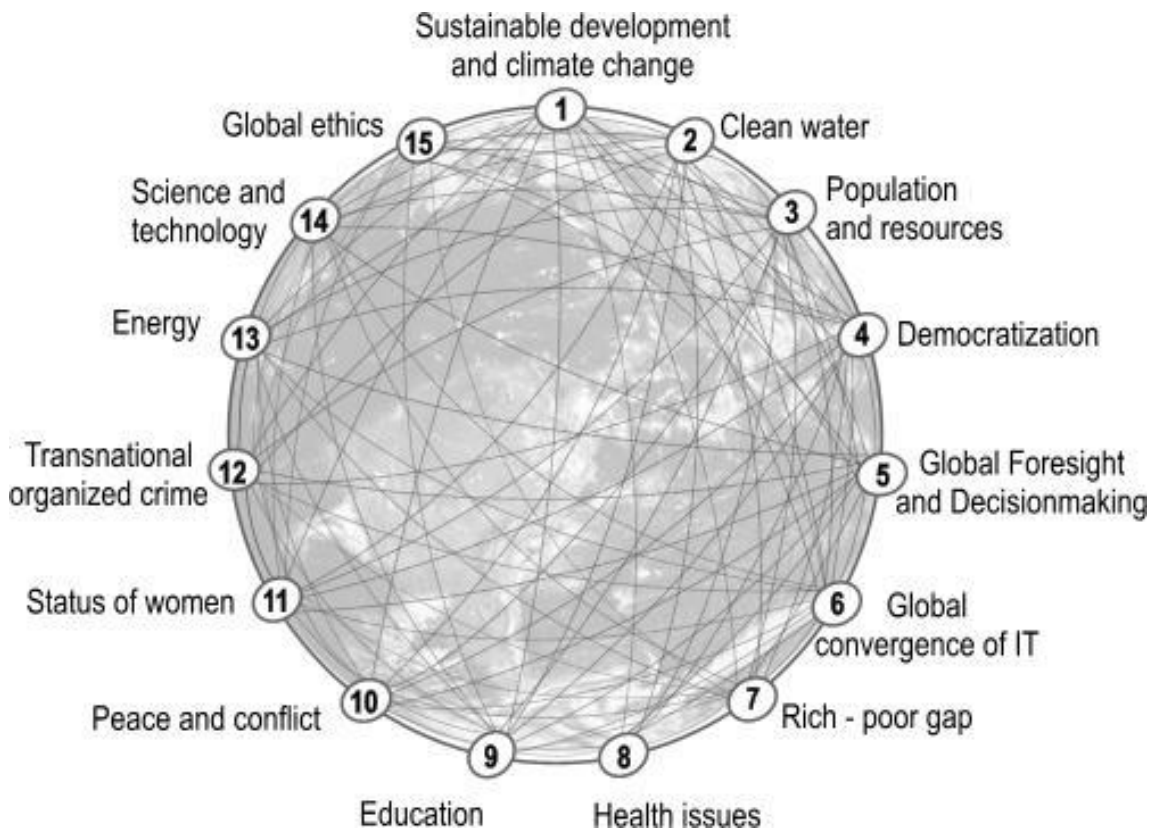


Figure 2 Fifteen Global Challenges Facing Humanity (Millennium Project 2014)

Figure 2 shows that all 15 Global Challenges Facing Humanity are interconnected. The image clarifies the understanding of holistic thinking, which is well present in Futures Studies. Holistic thinking aims at understanding systems as whole entities, interconnected and interdependent of its components. In order to gain full understanding of a system it has to be considered from a macro and micro perspectives.

While holistic thinking is a strength of Futures Studies, it is also a weakness; especially in publications written by a single researcher like this master's thesis. It is unfeasible, if not impossible to truly take all the components of reality affecting an issue into consideration. The Belo Monte case is uniquely complex and controversial. In an attempt to cover as many aspects to the Belo Monte controversy without compromising depth, this master's thesis is exceptionally large.

Nine of the 15 global challenges presented in Figure 2 are discussed in this thesis. As it is depicted in the image, all issues are interconnected. The Belo Monte controversy presented in the following chapters includes the government's goals to reduce CO₂ emissions and mitigate climate change (challenge #1), while guaranteeing energy resources for future generations (challenge #13). Opponents argue that the construction of the dam

is polluting the rivers (challenge #2) which in effect hampers the aquatic life: the local population's food and economic resources (challenge #3). Locals demonstrate, fighting for their rights to be heard and acknowledged (challenge #4). The issue of health (challenge #8) of the local population is also discussed, as well as conflicts between mining companies, urban population and the indigenous peoples (challenge #10). When considering problems created by speeding up "development" in the city of Altamira, issues like corruption, organized crime and violence (challenge #12) are also present. Additionally, the meaning of global ethics (challenge #15) is also discussed.

2.2 Scenarios Development

In this master's thesis, scenario thinking is used as a method to look into futures possibilities. The term *scenario* has its origin in dramaturgy (Glenn 2009b:1). Like the script of a play, scenarios are stories of what a future could look like. They "can be used as subject of analysis (e.g., analysis of personal futures images), as a tool for strategic planning (e.g., for companies or organisations), or as a way to organize and present findings (e.g., alternative futures for a certain topic)" (Jentl 2015:51). The scenarios presented at the end of this thesis fall in the latter category.

The last chapters of this thesis convey stories of plausible futures for the Belo Monte Dam and the peoples affected by it. Written in the form of narratives, scenarios illustrate key decisions, events, and consequences, connecting a future state with the present (Glenn 2009b:1). Building scenarios involves thinking of multiple, equally plausible futures (Van Der Heijden 2009:1), yet not all scenarios are equally probable. Also, it is possible that none of these alternative futures resented come to be, and that the future that unfolds is quite different from the ones presented. Actions taken today affect the days to come, scenarios can help envision how different actions may affect alternative futures. By identifying plausible futures, different scenario elements, and how each of these futures may come to be, we open an umbrella of opportunities.

Several methods can be found in the Futures Studies literature for creating scenarios (Glenn 2009b:5). Although methods range from simplistic to complex, from individual to group work, the need to understand the system under study permeates most methods, as well as the identification of trends, issues, driving forces, and potential events that are critical to this system (Glenn 2009b:5). The scenarios written for this particular research are based on the futurist Peter Schwartz's guide for developing scenarios. According to Schwartz (1991:241–248) there are eight steps that should be followed to develop scenarios:

- Step 1. Identify focal issue or a decision
- Step 2. List key factors in the local environment
- Step 3. Identify driving forces
- Step 4. Rank them by degree of importance and uncertainty
- Step 5. Select scenario logics
- Step 6. Flesh out the scenarios
- Step 7. Define implications of each scenario for the focal issue or decision
- Step 8. Select of leading indicators and signposts

The scenarios in this master's thesis are built following these steps. The focal issue identified for the Futures of Belo Monte is how the dam is coming to be. The focal decision is the choice for building Belo Monte the way it is being built. This is related to political decisions, to issuing licences and how the preconditions for these licenses are being handled. The Environmental Impact Assessment (EIA) is the first precondition for any licence, as will be described later, and it is considered an important concept in this paper. How the EIA is carried out can be considered a focal issue (or decision) for the development of scenarios, it has long-term impacts for the populations in question.

Steps 2 and 3 of the development of scenarios are presented in chapter 3. The key factors in the local environment, and driving forces of the scenarios are presented chapter are presented as the Belo Monte controversy, divided in its several aspects, political, ecological, cultural, social and economic. I look at the impacts that Belo Monte is causing to the region, and rather the impact mitigation measures carried out by the company building the dam are successful or not.

PESTEC is used as a systematic way of organising chapter 3 in order to guarantee a holistic approach to the research. Originally PESTEC is a technique used in the form of a matrix to tackle different dimensions and multiple variants of a certain issue (Heinonen and Ruotsalainen 2013:22). Professor Sirkka Heinonen from the Finland Futures Research Centre has often used the PESTEC table in her work, analysing issues from the following dimensions: (P) political, (E) economic, (S) social, (T) technological (E) ecological, and (C) cultural, citizen and customer dimensions (Heinonen and Ruotsalainen 2013). The model used by Heinonen has been modified for this research. I have altered the order of the PESTEC dimensions to "PECSE" (P) political, (E) ecological, (C) cultural, (S) social and (E) economic. PECSE outlines the first part of the research results where the Belo Monte controversy is explained in depth in each of these dimensions. The dimensions are easily identified in the second level headings of chapter 3, and the key factors in the local environment are found in the third level headings of that chapter.

The *political aspect* of the Belo Monte controversy deals the government rationale for choosing to build the Belo Monte dam. Chapter 3.4 explains the politically driven motivations behind this choice, and the legal procedures and implications to begin the construction of the dam. Moreover, the legitimacy of the dam's licenses is questioned, and links to a large corruption scandal involving high-rank politicians is revealed.

The *ecological aspect* deals with the impacts to the environment caused by the Belo Monte Dam. Chapter 0 presents some of the environmental projects being conducted to mitigate the negative impacts, and questions the core premise for the choice of building the plant in the first place: Brazil's commitment to reduce GHG emissions.

The *cultural aspect* is focused on the traditional peoples that live in the region where Belo Monte is being built, and how their cultures and indigenous way-of-life are being affected by the dam's construction. In chapter 3.6 I denounce an indigenous ethnocide (an intentional and systematic destruction of indigenous cultures). The chapter explains why and how this ethnocide has happened, and presents a description of one of these communities, the Muratu, whose leader kindly welcomed me to visit and enter his home.

The *social aspect* deals mainly with the urban population being impacted by Belo Monte. Chapter 3.7 presents the services being offered to this population, the urban development in the region, and how the process of resettlement and formalisation of land tenure was conducted.

Finally, the *economical aspect* deals with the budget for Belo Monte. Chapter 3.8 describes how the budget for Belo Monte has grown over the years, and makes considerations of costs unaccounted-for.

The *technological aspect* was purposely removed from the analysis for two reasons, firstly, the technical characteristics of the dam have been specified and the technology used or building plans themselves are not the issue under discussion here, but instead, how these constructions affect its surroundings. Secondly, my field of expertise is within socio-environmental issues, and I thought that the engineering discussions should be left out of this paper. However, some technical characteristics of the dam have been presented in chapter 3.2.

Steps 4 and 5 for developing scenarios are found in chapter 4, represented with long tables based on Heinonen's PESTEC. The tables presented acknowledge the key factors studied, and identify the driving forces in the macro environment that influence the key factors in the local environment. These driving forces were transferred into a PECSE matrix where the results were analysed as a part of the development of scenarios.

It is important to understand which driving forces are predetermined elements (that do not depend on any particular chain of events) and are therefore present in all four scenarios, and which are the uncertain key drivers that make the scenarios differ from each other. The fourth step is exactly to rank the driving forces by uncertainty as well as by importance (Schwartz 1991:243). Examples of predetermined events in the Belo Monte case are slowly changing phenomena like the already consummated population growth; constrained situations like a region far from urban centres; situations already in the pipeline, like the increased pressure on the natural environment and inevitable collisions like the disappearance of certain fish species in the region. Although these are inevitable (and the inevitability is further described in chapter 3) it is uncertain how the government and the local population will deal with these elements.

By questioning the predetermined events, and the assumptions upon them, it is possible to find critical uncertainties. According to Schwartz (1991:116) the relationship between predetermined elements and critical uncertainties is “like a choreography with a certain sequence of steps to take place, but each dancer may interpret them differently”.

Once the driving forces have been identified, and ranked by importance and uncertainty, the most important and more uncertain elements are used to compose the plot of the scenarios. For this step, a scenario table was developed. This table is exceptionally long and is a personal input (I have never seen a scenario table that detailed being used in Futures Research). Each line represents one uncertain element or driving force, and each column represented one future state for it. By filling in the table, the logics of the scenarios were created, and with that, the scenarios could be fleshed out, and the narratives for each started to emerge. Step 6, 7 and 8 for developing scenarios are presented in chapter 5. The scenarios at the end of this paper are narratives unfolding how the driving forces identified through the research might plausibly behave in the futures described. By using the documentary analysis to identify the driving forces and the building blocks of the scenarios, and by using the knowledge learned during the research, the scenarios are based on the empirical world and how issues have proceeded in the past. Once the narratives had been written and developed in some detail, the focal was reviewed. Also indicators to monitor whether one of the scenarios could become more probable than others were identified, and are further discussed in the final chapters of this master’s thesis.

There is no consensus on what a good number of scenarios is, although traditionally futurists tended to think of three alternative scenarios. This tendency was evident, for example, in the scenario classification used by Herman Kahn (in Glenn 2009b:1), as well as in Schwartz (1991:19) as follows:

- a. Surprise-free (or) business-as-usual (or) more of the same scenario
- b. Worst-case (or) worse scenario
- c. Best-case (or) different but better scenario

Later this three-scenarios-approach was criticized by futurists (Glenn 2009b:1), especially for the inclusion of a business-as-usual scenario (see for example Dator 2009:7, and Van Der Heijden 2009:1). The contemporary Jim Dator (2009:8) has introduced four generic futures:

1. Continued Growth (or the official future of all modern governments)
2. Collapse (social or environmental)
3. Discipline (or disciplined society, with deep changes in the values of a society)
4. Transformation (or dream society)

All of Dator’s futures include positive and negative aspects, and none of them are “best-case scenario” or “worst-case scenario”. Dator (2009:7) claims that even if people write about six or nine alternative futures, the scenarios usually fall within these four classifications. Based on the ideas of Dator’s four generic futures and on the traditional

classifications by Kahn and Schwartz, this master's thesis brings the following: *Continuation & Amplification*, *Perfect Storm*, *Lucidity* and *Black Swan*.

The first, the Continuation & Amplification Scenario is based on Dator's "continued growth", which somewhat resonates with Schwartz's "more of the same" scenario. It is based on the present-day official goals of the Brazilian government and the experiences from the past as explored in the documentary analysis.

The second, the Perfect Storm Scenario, is based on the idea that a combination of events intensifies the problems that are visible today. This scenario presents a disastrous situation aroused from a set of failed circumstances (for more information on the concept of a perfect storm, see Killeen 2007). What if all the individual circumstances that potentially could go wrong actually do go wrong? This scenario could be related to Kahn's worst-case scenario, but not on Dator's "collapse scenario". No basic structures break on the perfect storm, and there are no extreme events that lead systems to collapse. This scenario is based on the results of the interviews conducted, and the fears that the interviewees have presented. Although the perfect storm could be taken as a dystopia, this scenario could be used as a tool to understand how bad decisions taken today could affect the future. When taking into consideration the issues that could go wrong, decision makers can take action in the present in order to avoid these to happen.

The third scenario, called Lucidity Scenario, is based on the idea that the decision making process is more inclusive, and that socioenvironmental issues are dealt with experts of various fields. Chapter 3 presents how socioenvironmental issues has deliberately and systematically been neglected by decision makers. As will be discussed, the licences for building the dam were issued without a proper consent from traditional peoples and communities living in the region, with an inconclusive EIA, and with warnings from the scientific community on several overlooked negative impacts of the Belo Monte Dam. This Lucidity Scenario is based on the idea that scientific evidence and social participation are key elements in the decision making processes. This scenario is an antonym of the Perfect Storm, because here, the impacts of Belo Monte are managed responsibly. This scenario can be related to Dator's "transformation or dream society", created based on the preferred future images collected during the interviews conducted.

The fourth and last scenario is tailor-made for some of my interviewees. This question, from interviewee to interviewer was asked in multiple occasions. Interviewees asked me to write a scenario that would take into consideration the unlikely possibility that Belo Monte operations would be interrupted. This Black Swan Scenario presents an unlikely yet significant event that could change everything in the discussion of the Belo Monte controversy.

2.3 Description Of The Geographical Area

Belo Monte is being built in Eastern Amazonia, on the Xingu River, in the state of Pará, in Northern Brazil. The white star in Figure 3 shows the location of the dam complex. The Xingu River has a total length of 1,979 km (International Rivers 2016). Its source is in the State of Mato Grosso in Brazil and from there it runs northward through the State of Pará, towards the Amazon River. The two rivers meet near the Atlantic coast.

Besides the Amazon River, there are two other larger rivers near the Xingu, Tocantins (in the East) and Tapajós (in the West), both of which also have ongoing dam building projects. In the map below it is possible to locate the Tucuruí Dam water reservoir, which is the larger dark area in the Tocantins River, about 300 km Southeast from Belo Monte. Another dam complex has been proposed and is under study for the Tapajós River, and it is possible it will be implemented in the near future (see for example Guimarães 2015, Fonseca 2015, and Fearnside 2015a).

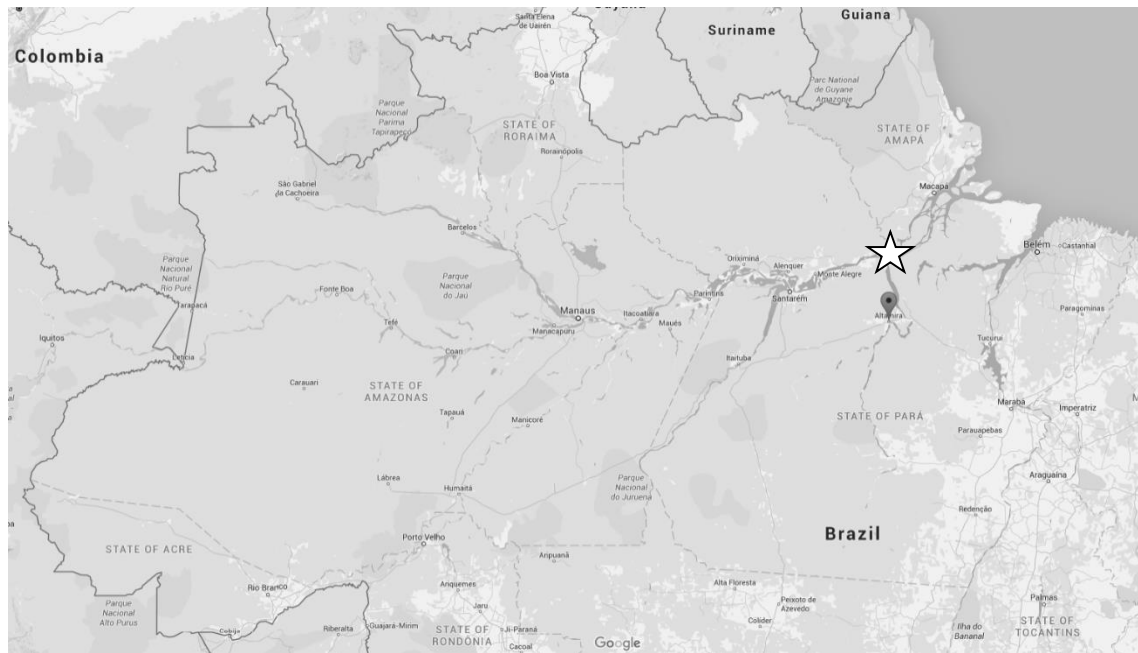


Figure 3 Location Of The Belo Monte Dam (From Google Maps)

Where the Xingu River reaches the city of Altamira, in Pará, it encounters a formation of hard soil, which forces the river to naturally divert its path forming a U-shaped diversion known as Volta Grande do Xingu: The Big Bend of Xingu. It is in this U-shaped diversion that the Belo Monte Dam Complex is currently being built.

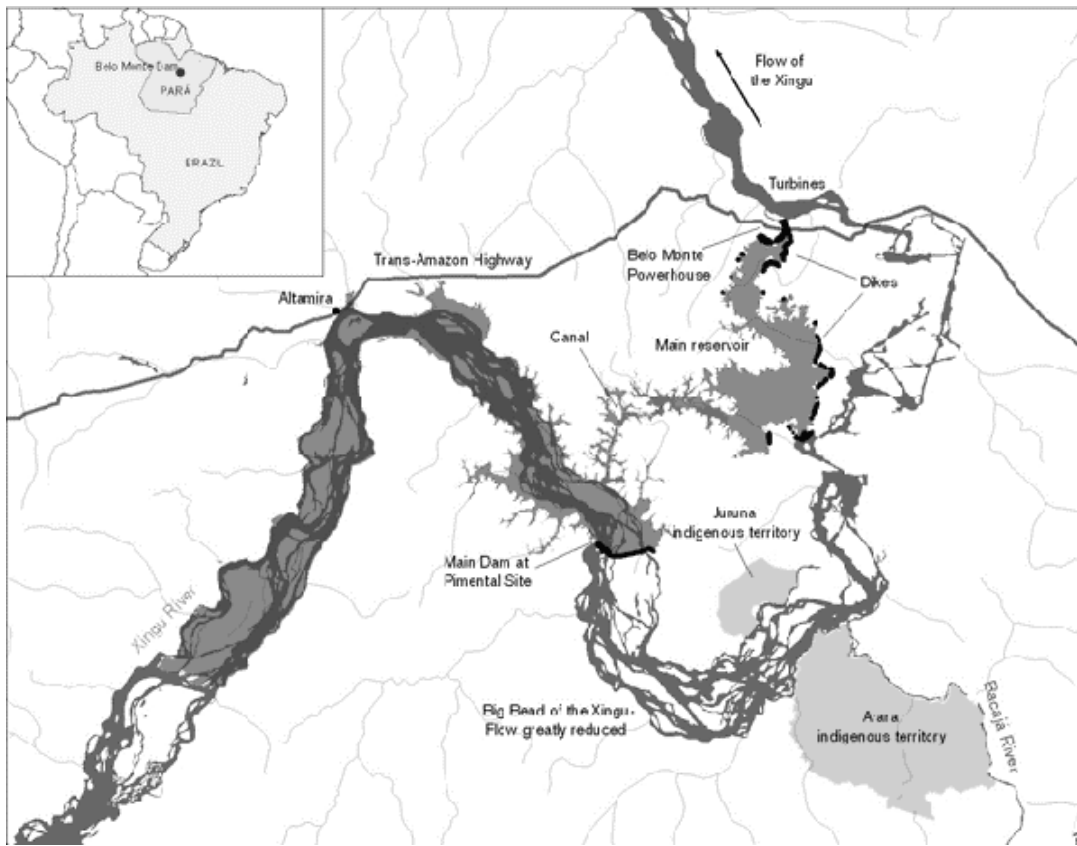


Figure 4 Belo Monte In Volta Grande Do Xingu (International Rivers 2012)

The construction plans for Belo Monte in Volta Grande do Xingu is illustrated in Figure 4. The indigenous territories directly affected by Belo Monte are shown in light grey (the Juruna and the Arara indigenous territories). The Trans-Amazon Highway³ is highlighted, and crosses the Belo Monte Site. Figure 4 also indicates the two dams that are being built for Belo Monte: the main dam is being built in the Pimental Site, in the Southeast of the City of Altamira, and the second dam, the Main Powerhouse is being built in the Belo Monte Site. One canal is being built to derive the water flow from the Volta Grande do Xingu towards the main powerhouse in the Belo Monte Site. As a consequence, parts of the City of Altamira and several small islands will be flooded once the dams are completed, while the Volta Grande do Xingu is expected to have a reduced outflow of water. The Juruna and the Arara indigenous territories highlighted are lands that will be directly affected by Belo Monte due to the proximity of the constructions. As shown in the map, these communities live in the area of the river that will experience a reduced water flow.

³ Rodovia Transamazônica (BR230)

2.4 Environmental Impact Assessment (EIA)

One of the key concepts of this paper is the *Environmental Impact Assessment*⁴ (EIA), because it has been identified as a focal issue that scenarios of alternative futures derive from. EIAs are documents that “provide information on changes that may occur in the environment and on the likely effects that may arise from specific projects (or other proposed activities) significantly affecting the environment” (Jay et al. 2007:287; Cardenas and Halman 2016:24). Because EIAs deal with possible and probable changes that may occur in the environment, for all intents and purposes it is an exercise in futuring (Duinker and Greig 2007:207).

EIAs are conducted prior to the start of a project and provide information to decision-makers whether to approve the project or to reject it. EIAs have been institutionally embedded by many countries as a mechanism of technical evaluation to prevent environmental problems (Jay et al. 2007:288).

According to Jay et al. (2007:294) EIAs raise environmental awareness amongst communities and other stakeholders and contribute to sustainable patterns of development. Duinker and Greig (2007:207) suggest that EIA processes are dedicated to exploring options for more sustainable futures by forecasting environmental impacts, EIAs provide decision-makers with tools for environmental protection. Conversely, Cashmore et al. claim that the potential for EIAs to contribute to sustainable development is widely underestimated. They conducted research on the effectiveness of EIAs, and their conclusions are that although EIAs “typically exert a moderate influence on both consent and design decisions”, these influences are decision-oriented and many aspects of sustainable development are oversimplified to operational principals, making the outcomes of EIAs appear considerably more limited (Cashmore et al. 2004:308). Furthermore, literature on environmental impact assessments suggests that EIAs in general suffer from a gap between environmental procedures and an idealized, ‘state of the art’, EIA system (see for example Jay et al 2007:295; Cardenas and Halman 2016:24).

In Brazil the EIA is a tool used by Ibama – the Brazilian Environmental Agency, branch of the Ministry of Environment – to determine impact mitigation measures and conditions for the implementation of an enterprise (Hanna et al. 2014: 61). The document describes the area where a given enterprise is to be implemented, and assesses possible positive and negative impacts to the local environment and to the local population (Funai 2011:10). Each enterprise that applies for an environmental licence has its own EIA. Customarily, the document is prepared by the proponents of the given project, and approved by a governing body. In the case of Belo Monte, this governing body is Ibama.

Ibama determines the terms of reference for EIAs depending on the context of the project under consideration. Each project has its unique terms of reference. As Belo

⁴ Equivalent to the Brazilian *Estudo de Impacto Ambiental* (EIA)

Monte is being built near indigenous areas, its EIA must include an indigenous component. Funai – Brazil’s National Indian Foundation– is consulted by Ibama on all pertinent matters related to indigenous populations (Hanna et al. 2014:61). In addition to Ibama, in the case of hydroelectric power plants, Conama –Brazilian National Council of Environment– also set requirements for EIAs. According to Conama (1986), studies required for the EIA are divided into three categories:

- Physical environment (air, soil, water, etc.),
- Biological environment and natural ecosystems (fauna & flora),
- Socioeconomic environment (population dynamics; use and occupation of land; socioeconomic characteristics of affected communities; structure of the local economy; infrastructure and public services; historical, cultural, archaeological and palaeontological heritage; leisure; tourism and culture; and indigenous or traditional communities),

Because studies on the socioeconomic environment are part of the Brazilian EIA requirements, it is safe to assume that in this context, the EIA can be interpreted as an environmental impact assessment as well as a social impact assessment (SIA).

In the case of Belo Monte, the company responsible for the dam (Norte Energia), prepared a document called *Projeto Básico Ambiental (PBA) – Basic Environmental Project*, which was based on the EIA approved. The PBA is a detailed document that guides actions for Norte Energia, and also for the contractors hired by the company to provide services regarding the impact mitigation measures. The PBA for Belo Monte could be compared to ESMPs – *Environmental and Social Impact Management Plans*. ESMPs are internationally known because they are one of the required conditions to obtain funding from the International Finance Corporation (IFC), a private lending arm of the World Bank. (Franks and Vanclay 2013:41) ESMPs are documents that summarize the findings of EIAs and outline the proposed measures for mitigation and community development (Franks and Vanclay 2013:42). Both ESMPs and the Belo Monte’s PBA include a planned timetable for the completion of the projects, an estimate of costs of management measures. They also guide monitoring and reporting procedures. Some of the topics included in the PBA are constructions works, relocations of population, vocational trainings, support projects to farmers and fishermen, socio-geographical studies, etc.

2.5 Ethical Considerations

First, I would like to position myself as a Brazilian researcher based in Finland, or in other words, a researcher of the so-called Global South, in Europe. Undoubtedly, being a Brazilian researcher doing research about Brazil gave me the benefit (in comparison to my colleagues in Finland) of not only being able to communicate with my interviewees in their native tongue, but also in understanding the society from within. On the other hand, as a researcher from Finland, I had difficulties into gaining access to the indigenous population. Leonardo Custódio, a researcher in the same position, has described in his doctor's dissertation (2016: 41) that using our position of a Brazilian researcher in Europe is a way to challenge different forms of Western-centrism in academia.

I would also like to contextualize my values as a researcher, and a futurist. The human rights declared by UNESCO are the basis of the values that this research is based on. The UNESCO's Universal Declaration of Human Rights (1948) recognizes all persons as equal members of the "human family", which is founded by freedom, justice and peace. Freedom, in the declaration, includes freedom from slavery or servitude; freedom of speech and thought; freedom of movement, etc. Moreover, the declaration promotes rebellion against tyranny and oppression. As a futurist, my research "aims at helping individuals, corporations, governments and other groups to envision, and to move towards, their preferred futures" (Jim Dator 2011:32).

But how can we assess what is a preferred future? Wendell Bell (1997:69) proposes that evaluating preferred futures should surpass opinions, expertise, or authority, but that objective methods should be used to justify an assentation of what ought to be and what we ought to do. Moreover, Bell suggests that values of propositions can be tested by using the critical realist theory of knowledge, together with human values and goals. However, what are the human values that Bell talks about? Can we define some values that all humans respect and take into consideration in their every action? Values are linked with the understanding of "good and bad". They can be objective or subjective, they are determined by societies, cultures, and by individuals. Values can vary among different groups, and are aligned to belief systems. Therefore, Bell can be questioned on the very existence of "universal" human values.

The search for human values leads to Jeffrey Sachs from The Earth Institute. According to Sachs (2013:93) there are certain values that could be considered universal. On his research on virtue ethics in the quest for happiness, Sachs concluded that although human society is plural, some basic ethical principles are shared by all major religions, which could be considered the principles of humanity. These principles presented are:

"Non-violence and respect for life (including respect for human life and respect for the natural environment), justice and solidarity (including rule of law, fair competition, distributive justice, and solidarity), honesty and

tolerance (including truthfulness, honesty, reliability, toleration of diversity, and rejection of discrimination because of sex, race, nationality, or beliefs), mutual esteem and partnership (including fairness and sincerity in relation to stakeholders and the rights to pursue personal and group interests through collective action)". (Sachs 2013:93)

Sachs adds in his conclusions that it is not possible to force ethical consensus, even if some studies can identify (potential) ethical consensus across society. "Universal" human values are therefore not easily identified.

The principles presented by Sachs, and the rights presented by UNESCO are important values to look for, and a guideline for action. In this paper, preferred futures are futures where people enjoy human rights, in a more just and peaceful world.

2.6 Motivation

The motivation for researching this topic rouse in my first year as a student in the master's degree programme of Futures Studies at the University of Turku, after watching the documentary film "Belo Monte: An Announcement of War", directed by André D'Elia (2012). The documentary presents how Brazil's main infrastructure project had been conducted until that moment, from the point of view of the civil society. The documentary includes interviews with local communities and government workers, it presents issues such as human rights violations and ecological destruction, and calls for more discussion and awareness of the situation. In the same year of the publication of this documentary film, the International Energy Agency (IEA) released –in cooperation with the Brazilian Ministry of Mines and Energy– a publication called "Technology Roadmap: Hydropower", where hydropower is praised as cost-competitive, clean, and a contributor for decarbonising the energy mix. (International Energy Agency 2013:9). At this point, I didn't know that the cards had already been dealt and the Belo Monte controversy had already begun long before.

In a radio interview with the Ministry of Mines and Energy of the time, the minister (Lobão in Planalto 2011a) claimed that the dam was *essential* for the development of the nation, and that this was the cheapest and cleanest source of energy Brazil could have. Furthermore, it was advocated that Norte Energia has several environmental projects in their agenda, including projects in cooperation with local indigenous communities (Norte Energia 2011a). While the Brazilian Government and Norte Energia had the support of the International Energy Agency, the civil society was taking action against the dam and several movements to stop its construction began. Brazilian celebrities raged against Belo Monte and called citizens to sign a petition against the dam through a social movement called "Movimento Gota d'Água" (Drop of Water 2011). International celebrities like

James Cameron, director of the movie *Avatar*, visited the region and campaigned alongside with indigenous leaders (Phillips 2010a). These campaigns were supported by several international organisations like Amazon Watch (2010a), International Rivers (2016), and Greenpeace (2009).

The discourses used by proponents and opponents of the dam held so many conflicting issues, that I became more and more interested in comprehending the controversy as a whole. It was these strong differences of opinion and discourse that got me motivated to begin an academic research about the topic and to explore alternative futures for the Belo Monte region. The material used for this research includes publications from proponents and opponents of the dam, as well as academic articles and material collected during fieldwork.

2.7 Research Materials

The data collected for this research includes official documents and academic articles, as well as articles from the news and from non-government organisations, documentary films, and other media. Furthermore, the research data also includes material from field work.

The documentary film “Belo Monte: An Announcement of War” directed by André D’Elia was the starting point of the research and provided inspiration to find out more about the topic. The main news carriers consulted for this research were the Brazilian *Folha de São Paulo*, and *Estadão*, as well as the foreign *El País*, Amazonia Newsletter, and BBC. Articles written by non-governmental organisations and institutions were analysed. One significant source of that sort was the database of *Instituto Socioambiental*, a non-profit association that intends integrated solutions to social and environmental issues in Brazil. The organization acts on different projects, which include indigenous people's rights, monitoration of protected areas, monitoration of public policies and legislation decisions, as well as location-specific projects. (Socioambiental 2015). The organisation is financed by several institutions, including Rainforest Foundation Norway, Ford Foundation, Horizont 3000/Climate Alliance, Petrobrás, and others. (Socioambiental 2015). Socioambiental conducts a solid work in Amazonia, cooperating with the academic community as well as with governmental bodies, and partnering with traditional peoples in the region and local activists.

The books and academic articles used as sources for this paper are mainly from the fields of Futures Studies, Environmental Sciences, and Social Sciences. Among the scholarly articles, one author that was particularly influential for this research was Dr Philip Fearnside, an active scholar who advocates the preservation of Amazonia and writes critical articles about the impacts of dams to the environment.

The official documents used were all found in electronic format and are available for public access. They include documents published by the Brazilian Government such as licence documentations, public reports, action plans, federal decrees, public defenders' actions and decisions given by the State, etc. Documentation issued by the company responsible for the construction of the dam has also been used as official documents, these include environmental and technical studies that were presented to the licencing bodies, and detailed descriptions of the impact mitigation measures to be completed (PBA). Moreover, official documents also include international treaties and conventions.

Field work was conducted in two stages. The first stage was while sketching the documentary analysis between January 2014 and March 2014, in Sao Paulo, Brazil. At this stage, five semi-structured interviews were conducted. The second stage of the empirical research was a field trip to Amazonia conducted in September 2014, accompanied by a research assistant, Sergio Andrade, and financed by the Finnish Cultural Foundation⁵. During this second stage, another 10 semi-structured interviews were made. Also six Skype interviews were conducted throughout the research process.

A semi-structured interview is a method commonly used in qualitative research, in which the main goal is to get to hear the interviewees' opinions, experiences or expertise. (Bryman 2004:319-335) Unlike structured quantitative research, where identical questionnaires are given to a large sample, semi-structured interviews are partly tailor made for each interviewee. The semi-structured interview method was chosen due to its flexibility. The interviewer is allowed to change the order of questions asked, can skip questions that might not be relevant after certain questions have been answered, and can even add additional unscripted questions as follow-up questions depending on the interviewee's answers. In sum, "interviewers can depart significantly from the original script, schedule or guide being used" (Bryman 2004:320). The aim of qualitative interviewing is to get rich detailed answers, and semi-structured interviews allow, open ended answers. Sometimes as the interview progresses, the interviewees themselves raise complementary issues not prior considered by the interviewer.

Each interview lasted between 40 minutes and two hours. The interview guides were tailor-made for each interviewee, and each interview had its own theme to be discussed according to the expertise of the interviewee. One question however was included in all. At the end of the interviews, I asked interviewees to describe their image of the future for Altamira in 2020, when the constructions of the dam are due to be finalized. I asked them to think about the city, the local economy, the urban, rural and indigenous population, and think about how they would contribute to that future coming true. Responses were

⁵ Suomen Kulttuurirahasto

usually restricted to the interviewee's own area of expertise. While some saw future possibilities optimistically, others seemed distressed by the lack of opportunities and hope for the local population; at least for such a close-by future, 2020⁶.

I decided to take a neutral and sometimes a sympathetic role with the intention to get the interviewees comfortable to say what they found was important in their opinion. The sympathetic role was used as a method to give voice to the interviewees' concerns. I acknowledge that if I had taken an argumentative role, some topics could have been discussed differently, and even more in depth. Nevertheless, due to the sensitivity of the issues discussed, I preferred not to take an argumentative role to avoid tension or even violence. Interviewees gave informed, prior consent for disclosing their information in this document. They were given options on level of disclosure, from complete anonymity to full disclosure of names, organisation and occupation. In general, experts and activists chose to have their names published, so that the publication of this thesis gives credit for their work. The local population however, preferred anonymity in order to preserve their privacy. A complete list of the interviewees, as well as the consent form is available (in Portuguese) in Appendix 1 at the end of this document.

Gaining access to my subjects presented a challenge in itself. Every person interested in entering indigenous territory for the purpose of scientific research must apply for a permit. As part of the process of obtaining this permit, the researcher should present oneself on site (Funai 1995: art.7). It was unfeasible to obtain the permit before leaving Finland, and for that reason the field work had to be modified to entering indigenous land as part of an expedition organized by third parties.

Between 7 and 11 September 2014, my research assistant and I participated in an expedition organized by the NGO Instituto Socioambiental (ISA) in cooperation with the Indigenous Association Miratu Yudjá Xingu⁷ (Aimyx). The expedition can be considered a 5-day ethnographic study. It consisted of a 112 km canoe trip of in four days, and one day for trainings and preparation. Twenty-one traditional canoes and three motorboats carried a group of 120 people who gathered to discuss the impacts of Belo Monte for the traditional peoples of the Volta Grande do Xingu. The group consisted of indigenous and riverine people, researchers from various institutes, activists, reporters, lawyers, doctors, social workers, and other people interested in the topic.

Figure 5 is a snapshot depicting a scenery of the expedition: traditional indigenous canoes, participants, and the Xingu River in the background. This expedition gave me the opportunity to see Belo Monte from the eyes of the local population, from their perspective, from their boats on the river. During the trip, I met indigenous and riverine peoples, visited their homes and shared cultural experiences. We travelled together, ate together,

⁶ Fieldwork was conducted in 2014 and this paper was originally supposed to be published by the end of 2015, but due to health issues combined with a maternity leave, the publication was postponed to mid-2017.

⁷ Associação Indígena Miratu Yudjá Xingu

and camped by the river side at night. The expedition was an opportunity to get closer to the local population, gain their trust, and above all, comprehend issue at hand with a depth no documentary analysis could ever fulfil.



Figure 5 Expedition Organized By ISA And Aimyx (Photo By Author)

In addition to the expedition, on 12 September 2014, my research assistant and I participated in a guided tour offered by Norte Energia to the Belo Monte construction sites. The guided bus tour, called “Conheça Belo Monte” (Get to Know Belo Monte), lasted for 9 hours (7:00-16:00) and included seven stops: Belo Monte Visitor Support Centre⁸; Belo Monte Observation Point⁹; the workers’ cafeteria in the Pimental site, the Centre for Environmental Studies¹⁰; and the three construction sites: the canal & levees site, the Belo Monte site, and the Pimental site. In each of the stops, visitors have access to construction plans and other information relevant to each the site, and the atmosphere is of a bus-tour in a famous touristic city. The guided tour is one of the actions taken by Norte Energia to promote Belo Monte to the local population, and it is intended to teachers, students above 13 years-old, as well as other members of the civil society. In the tour that I participated in September 2014, visitors travelled in an air-conditioned bus equipped with multimedia devices, we watched promotional videos about Belo Monte and were quizzed about what we learnt in a playful manner. The tour was free of charge, and included lunch, snacks, and refreshments. The tour was operated by a tourism company hired by Norte Energia. Tourist guides were trained by Norte Energia to present the construction sites, but the company does not hold themselves accountable for the content of the information given by the guides.

⁸ Centro de Apoio ao Visitante - CAV

⁹ Mirante Belo Monte

¹⁰ Centro de Estudos Ambientais - CEA

3. THE BELO MONTE CONTROVERSY IN DEPTH

3.1 The timeline Of The Administrative Processes

According to Norte Energia (2011a:3) hydroelectricity in the Xingu basin was first thought of in the 1970s, but due to problems with studies on the viability of the construction, as well as strong opposition from local indigenous communities, the project was constantly pushed aside. A number of feasibility studies were made after that, and the plans for damming the Xingu were adapted accordingly (Norte Energia 2013:9).

Analyses were first carried out by the power utility company Eletronorte, and later transferred to Eletrobrás, Brazil's major electric utility company. These studies were conducted in partnership with the construction companies Camargo Corrêa S/A, Andrade Gutierrez and Norberto Odebrecht. The first studies to assess the hydroelectric power possibilities in the Xingu River were conducted in 1975. In 1980 the inventory was concluded and a proposal for the power plant was published. Nine years later, in 1989, studies on the viability of construction were concluded. At that time, the power plant was called Kararaô which is the name of one of the indigenous groups in the region. In 1994 a revision of the studies previously made was published. In the reviewed study, the flooding area was diminished, allowing the conservation of indigenous areas.

In 2002 further studies on technical, economic and environmental feasibility were presented to ANEEL, the Brazilian Electricity Regulatory Agency, and were rejected by the supreme federal court. The reasons for this rejection was that the project was to be located inside indigenous areas and would directly affect indigenous populations, and that the institution conducting the studies, Fadesp, was not chosen according to procedures regulated by law. (Socioambiental 2002, Xingu Vivo 2016).

In 2005 the national congress authorized Eletrobrás to continue further studies for the feasibility of Belo Monte constructions. The same group of construction companies that conducted the first studies in the 1970s was again responsible for the feasibility studies in 2005. (Norte Energia 2014a).

In 2006, Ibama – the Brazilian Institute of Environment and Renewable Natural Resources – started to prepare their Environmental Impact Assessment (EIA). The document was concluded in 2007. Also in 2007 the first public hearings were conducted in the two most affected cities: Altamira and Vitória do Xingu. Finally, in 2010 Ibama granted Belo Monte a prior licence¹¹, and ANEEL approved the feasibility studies. Following that, public auction was organized to decide which company would be responsible for the construction of the dam. The consortium Norte Energia S.A. was constituted, won the auction and contracts were signed. The constructions started in 2011. (Norte Energia 2014a).

¹¹ The licensing procedure will be discussed in more detail in chapter 3.4.2

3.2 Technical Characteristics Of The Hydroelectric Power Plant

According to the Brazilian Electricity Regulatory Agency – ANEEL (2011:57-59), Belo Monte is to become the third largest hydroelectric power plant in the world: With an installed capacity of 11,233.1 MW, the power plant is only behind the Chinese Three Gorges Dam (of 22,500 MW installed capacity), and the Brazilian-Paraguayan Itaipú Dam (of 14,000 MW installed capacity).

Belo Monte is to be connected to the Brazilian National Grid of Electricity¹² through a transmission line of 2,092 km operated by the Chinese State Grid Brazil Holding. The transmission line allows the energy produced to flow from the State of Pará in the North of Brazil directly to the State of Rio de Janeiro in the South East (State Grid 2014).

According to Norte Energia (2011a:5) Belo Monte is expected to produce 4,571 MW on average, which is about 40% of its capacity. The main powerhouse, the Belo Monte Site has an installed capacity of 11,000 MW and 4,418.9 MW of expected average, while the secondary powerhouse, the Pimental Site has an installed capacity of 233,1 MW and 152,1 MW of expected average. (Norte Energia 2011a:5, MME 2011:3) Belo Monte is a run-of-the-river hydroelectric power plant, which means little water storage is provided in its reservoir and therefore the production of energy is subject to seasonal river flow variation.

The efficiency of the power plant is questioned by the academic community (for example Sevá 2005, Fearnside 2006 and 2011, BBC 2008, Sousa Júnior. et.al. 2010 and 2006). Eletrobrás, a major State-owned electricity utility company, has been collecting data on the water flux of the Xingu River since 1931. Based on the data by Eletrobrás, the University of Campinas (Unicamp) conducted a simulation study on how much energy would have been produced between the years 1931 and 1996 if Belo Monte had already been constructed then. The conclusion of that study was that Belo Monte would have produced an average of little more than 1,356 MW not 4,571 MW as Norte Energia states. (Switkes and Sevá in Sevá 2005: 17-19, 69). Sousa Júnior. et.al. (2006:76) presented a study where 10,000 simulations were done with the Monte Carlo method, and their result shows that Belo Monte's average capacity will not be 40% as Norte Energia states, but instead, less than 20%.

Belo Monte would only be running at full capacity for about three months a year, and during the dry season, which lasts another three to four months a year, some of the turbines would be shut down (Sevá 2005: 17-19). The inefficiency of Belo Monte is understood due to a naturally extremely variable water flow that fluctuates between 450 and 30,000 cubic meters of water per second (Sevá 2005). The river may have abundant water in the wet season, but it also has a long lasting dry season every year.

¹² Sistema Interligado Nacional (SIN)

On that study conducted in Unicamp (in Seva 2005), other simulations were conducted for Belo Monte’s productivity considering additional smaller dams used to regulate the flow of the river. The study showed a rise in the average of production from 1,356 MW to 7,950 MW by adding one additional dam. The authors suggest that only then Belo Monte could be considered economically viable. Nonetheless, the additional dam would have to be built where today is the centre of the City of Altamira, and that would have obvious additional implications. (Switkes and Seva in Seva 2005, 17-19).

According to Raul Silva Telles do Valle (in Seva 2005: 67) with an optimization of the water flow of the Xingu River, Belo Monte could reach optimum efficiency. This optimization could be possible if six dams would be built along the Xingu River. Indeed, this was the original plan for the dam complex elaborated in the 1970s, but the plan was rejected due to its substantial environmental impact (over 18,000km² would have been flooded, including 12 indigenous reserves) as well as to strong indigenous opposition at the time. The project was adapted and only two, instead of six dams are being built.

3.3 Consortium Norte Energia S.A.

The company responsible for building and operating Belo Monte Hydroelectric Dam Complex is Norte Energia S.A. and it has the concession for Belo Monte for 35 years (Norte Energia 2016). Table 2 Shareholders Of Norte Energia S.A. Table 2 presents the shareholders of Norte Energia S.A. The company is a consortium that includes state and private companies. As shown in Table 2, of the shareholders, 49.98% are public corporations, 9.77% have mixed ownership, 20% are public workers’ pension funds, and 20.25% are private companies. (Norte Energia 2016a).

Table 2 Shareholders Of Norte Energia S.A.

Name of the company	Ownership	Shares in Norte Energia
Chesf S.A.	Public	15.00%
Eletronorte S.A.	Public	19.98%
Petros	Pension Fund	10.00%
Funcef	Pension Fund	10.00%
Belo Monte Participaoes S.A. (Neoenergia S.A.)	Private	10.00%
Amazonia (Cemig S.A. and Light S.A.)	Mixed	09.77%
Vale S.A.	Private	09.00%
Sinobras S.A.	Private	01.00%
J. Malucelli Energia S.A.	Private	00.25%
		Total: 100%

3.4 Political Aspect: How The Dam Came To Be

The political aspect of the Belo Monte controversy is perhaps the most complicated part of this thesis, as it discusses complex and disrupted legal issues that are difficult to summarize. This is an important chapter that depicts the complexity of the controversy, and the other aspects discussed in the following chapters (Ecological, Social, Economic, Cultural) are based on decisions exposed here; this is the reason the political aspect was chosen to be the first aspect to be presented.

3.4.1 *The Brazilian Government's Rationale For building Belo Monte*

The decision to expand hydroelectric power was guided by Brazil's commitment to reduce CO₂ emissions (Ministry of Mines and Energy 2011). Norte Energia (2011b:1) claims that hydroelectricity is the most favourable energy source for Brazil due to its environmental feasibility, low greenhouse gas emissions and reliable energy supply. The company labels its energy clean and efficient for the nation. Edison Lobão, the former minister of Mines and Energy¹³, explains why hydroelectric power is so important for Brazil. In a radio interview given in 2011 for the president's office's media channel, Lobão stated that hydroelectricity is "the cleanest, cheapest and most renewable energy in the world". The minister added that "the whole world admires the Brazilian hydroelectric power" (Lobão in Planalto 2011a).¹⁴

In 2007 the Brazilian Ministry of Planning, Budget and Management implemented a major infrastructure programme called *Programa de Aceleração do Crescimento* – PAC – or "acceleration of growth programme". PAC promotes the construction of large infrastructure projects in several sectors, including urbanisation, logistics, and energy. By expanding the infrastructure, the programme does not only contribute to the societal well-being in Brazil but also to the economy. PAC contributed to the generation of jobs; over 8.3 million jobs were created between 2007 and 2011. (Ministry of Planning 2014) Among of the largest projects promoted by PAC is Belo Monte. Belo Monte is promoted by state officials as a project that has generated thousands of jobs. Also, the state claims that the energy produced by the power plant will help the Brazilian economy grow, and it will further the nation's competitiveness among developing countries. Furthermore, the energy produced will prevent energy blackouts, which are commonplace today. (Rousseff

¹³ Edison Lobão started his career as a journalist during Brazil's dictatorship regime, he worked with the counterintelligence and has supported the prosecution on opponents to the dictatorship (Sevá 2011), and currently he is being investigated by the Brazilian Federal Police for his involvement in the Lava Jato money laundering scheme (Folha 2016).

¹⁴ The radio interview mentioned was given in Portuguese. Free translation by the author.

2014) Hydroelectricity is the main electric power source in Brazil, producing about 80% of the total energy in the country (Norte Energia 2011b). The Brazilian Ministry of Planning, Budget and Management (2013), estimates that in 2021 about 86% of the Brazilian energy will come from renewable resources. Priority will be given to hydroelectricity, biomass and wind power, as these sources of energy are polluting less than other energy sources. The Ministry adds that their scenario for 2021 is only positive, as Brazil will be almost self-sufficient, producing 90% of the total energy use of the country. This self-sufficiency, according to the government, can only be achieved by expanding the hydro-power of the country. Lobão (in Planalto 2011b) claims that Belo Monte is *absolutely essential* for the development of the nation, and his justification is that with an installed capacity of 11,233.1 MW, Belo Monte has the capacity to supply 40% of the country's residential consumption (Lobão in in Planalto 2011b, Norte Energia 2011b).

This main justification given by Lobão, used by Norte Energia and the State's official publications and campaigns is, however, questionable. Firstly, *having the capacity* to produce a certain amount of energy does now mean actually producing it. Secondly, neither Edison Lobão nor Norte Energia or the Ministry of Mines and Energy published how this number was estimated. Norte Energia's annual report (2013:5) showed that this 40% refers to the consumption of 2013, and they estimate that the energy produced by Belo Monte has the potential to reach the demands of 60 million people.

From a futurist's perspective, I would argue that this affirmation of number of people and percentage of the residences in the country is misleading, as the energy needs of the future, when Belo Monte is concluded, is likely to be different from the energy consumed in 2013. Consumption patterns might have changed, and decision makers seem to have overlooked the futures perspectives of the issue. Furthermore, the Ministry of Planning published only one scenario for 2021, and as mentioned above, it is a positive one, where all investments put in today are either in progress or complete. The scenario by the Ministry of Planning does not take into account possible disruptions on today's projects, major changes in the society, or the new needs that these changes might lead to. Also new technologies under development today, which could lead to important breakthroughs, are not taken into consideration.

3.4.2 *Licencing Procedures*

In Brazil, the regular environmental licencing procedure consists of three stages: a *prior licence*, a *construction licence*, and finally an *operation licence*¹⁵. Environmental licencing has been established in Brazil in 1981 through the law 6.938 art.9. (Vulcanis 2013) The Brazilian law states that an environmental licence is:

“Administrative act by which the competent environmental authority establishes the conditions, restrictions, and environmental control measures that must be met by the proponent, physical or juridical person, to locate, install, operate or expand enterprises or activities which use environmental resources, are considered to be actual or potential polluters, or which in any way may cause environmental degradation.”

(Brasil 1997:Art.1, in Hanna et al. 2014:61)

The authority responsible for licencing Belo Monte is Ibama, a branch of the Ministry of the Environment. As mentioned in chapter 3.1, Ibama issued the prior licence in 2010, in the same year Norte Energia was consolidated and won the public auction to build and maintain Belo Monte. One of the preconditions for the prior licence is that the Environmental Impact Assessment (EIA) is presented and accepted both by the governmental authority and the entrepreneur, in the Belo Monte case, Ibama and Norte Energia. The document determines conditions for the implementation of the project, as well as the impact mitigation measures that need to be addressed before starting the actual construction process. According to the common licence procedure, the implementation of the dam should only start once all the conditions and impact mitigation measures imposed in the prior licence and EIA are completed. (Hanna et al. 2014:61)

As shown in Figure 6, Belo Monte did not follow regular licencing procedures. On the left, the dashed boxes illustrate the Brazilian regular licencing procedure as described by Hanna et al. (2014). On the right, the solid balloons illustrate what has actually happened with Belo Monte’s licences. The diagram is based on the literature analysis in combination with results from a personal interview with lawyer Leonardo Amorim, from Instituto Socioambiental. The dark-grey filled balloons indicate the questionable processes that are explained further.

¹⁵ Licença prévia, licença de instalação e licença de operação.

Licensing Procedure

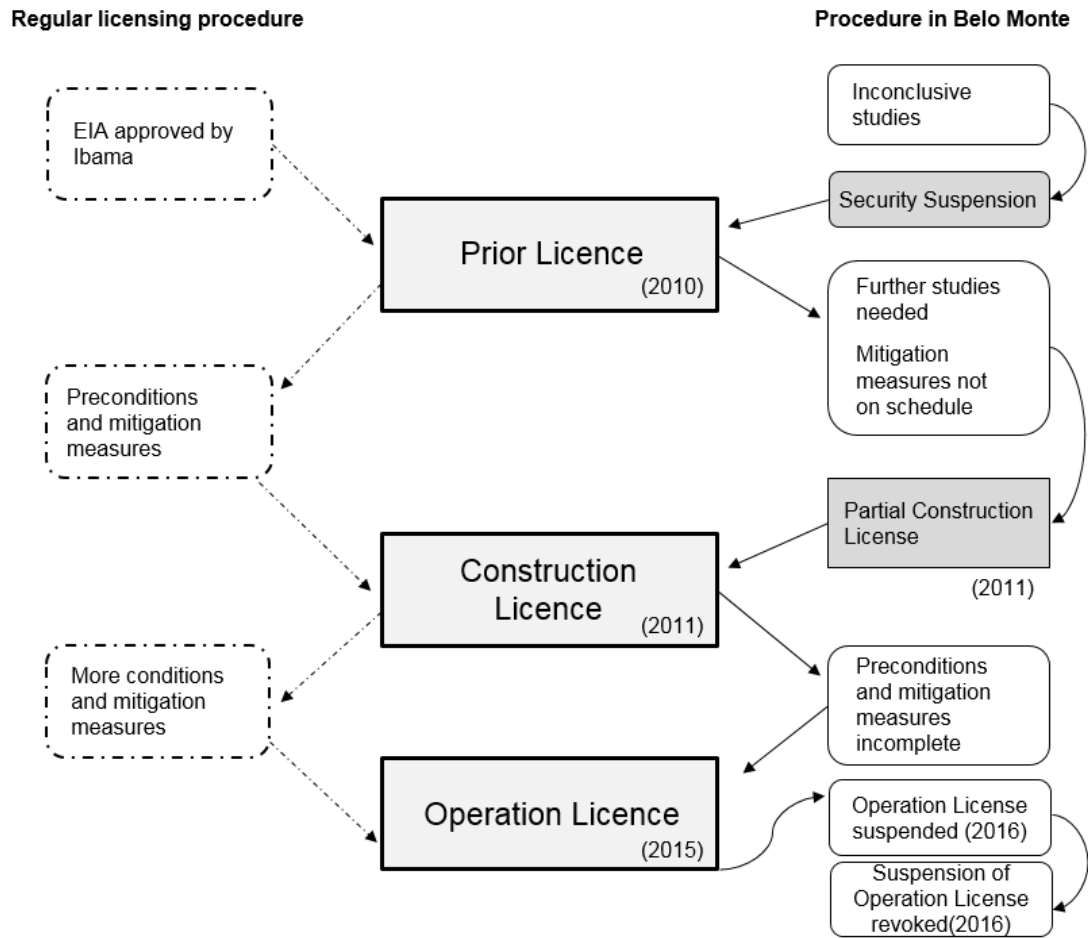


Figure 6 Summary Of The Licensing Procedure (Diagram By Author)

Amorim (interview) explained what the problems related to the licence procedures for Belo Monte were. Before the prior licence was given, Ibama had determined that the construction of Belo Monte was not environmentally feasible, as studies previously conducted had been inconclusive about the possible impacts of the construction on the local environment. In other words, there was no scientific proof that the environment would be sufficiently resilient to the changes caused by the construction of the dam. The Ministry of Planning and the Ministry of Mines and Energy pressured Ibama to issue the prior licence, as Belo Monte was a key project of PAC. Due to PAC being created during president Luiz Inácio Lula da Silva's second term and being essential for his mandate, the licence for Belo Monte was forced into being issued. The first licence was issued due to political pressure, despite the known environmental-related uncertainties.

Amorim (interview) explained that instead of denying the licence due to inconclusive studies, Ibama issued the prior licence and added further studies as a precondition for the operation licence. The prior licence was given in 2010 accompanied with a series of preconditions and actions to be taken before the construction licence could be given, including a new version of the EIA. However, the government had already stipulated that the

construction licence would be issued by January 2011, and up until that date, few of the conditions given by the previous licence would have been met. Similarly to the issuing process of the prior licence, the construction licence was also forced into being issued through tough political and economic pressure.

The pressure was so intense that a number of Ibama presidents resigned over the Belo Monte licencing process. One of the former presidents of Ibama, Abelardo Bayma Azevedo resigned on 13 January 2011 after having faced pressure to grant the construction licence for Belo Monte. (Hurwitz 2011) Azevedo's predecessor was Roberto Messias, who resigned due to pressure to issue several environmental licences, including the one for Belo Monte. (Alves 2011) On 26 January 2011, Américo Ribeiro Tunes, Azevedo's substitute, signed a *Partial Construction Licence*¹⁶. The final construction licence was signed by the subsequent Ibama president, Curt Trennepohl, who also resigned the following year (Bragança 2012). It is worth pointing out that in Brazil, the president appoints the Ministers, and the Minister of Environment appoints Ibama's presidency. Abelardo Bayma Azevedo and Roberto Messias were not the only people to resign due to environmental licences pressure. In 2008, the former Minister of Environment, Marina Silva, also resigned from office, and she claimed to have resigned because she had not agreed with Brazil's weakening environmental licencing framework. (Hurwitz 2011)

The high number of resignations prior to the licence being given, and clear instability of the licencing body leads to questionable legitimacy of the documents signed. If Ibama had followed the national licensing procedure to the letter, the construction licence could not have been issued in January 2011 due to the deficiency on preconditions and impact mitigation actions met.

Moreover, the partial construction licence, signed by Américo Ribeiro Tunes is not a standard licence in the licencing procedure and poses a threat to the process as a whole.

“That is when the fundamental problems began: Ibama issued the so-called Partial Construction Licence, which is a stage in the licencing procedure that does not exist. The constructions of Belo Monte began with an invalid licence that is not recognized by law.”

(Amorim 2014: personal interview)

The Federal Public Prosecution Office brought an action against Norte Energia and Ibama regarding the illegal licence, but the action was stopped by a juridical spin called 'Security Suspension'¹⁷. The term is explained in the Brazilian law:

“Security suspension is a juridical spin that can be made by any high-level judge to overrule any injunction (or stop order) on the basis of potential

¹⁶ Licença de instalação parcial: will be discussed below.

¹⁷ Suspensão de segurança

‘serious harm to public order, health, safety or the national economy’.”
(Brasil 1992:Art.15 in Hanna et al. 2014:63).

Amorim (interview) adds that the security suspension can only be given upon request of an organ of state. He reveals that the action brought by the Public Prosecution Office is high in complexity, and the case will most likely only be judged in 10 or 15 years. By then, the construction of the dam will be completed and the power plant will already be operating. That means that the issues from the EIA that were supposed to be solved before giving the prior licence will only begin its legal negotiations after the construction of the dam is completed. Undoubtedly, it will be too late to discuss some of the issues included in the action.

“One of the conditions that were supposed to be met before the licence was given was the construction of a new hospital in Altamira, so that the incoming population would not pressure the already pressured health system of the region. The constructions of the dam have been going on for four years, but the hospital is still not ready. When this issue gets to be discussed in court, patients have already suffered from lack of service, people have already died.” (Amorim 2014: personal interview)

Most of the conditions proposed in the prior licence were not completed by the time the construction licence was issued. In July 2015 Instituto Socioambiental published a dossier listing which conditions were met, and which were not. The dossier also exposed additional impacts that Belo Monte is causing to the local population that were not thought of or included in the EIA. The conclusions of the dossier were that the operation licence for Belo Monte is unviable and Instituto Socioambiental (2015) strongly recommended for Ibama not to sign the operation licence.

On 10 September 2015 Ibama indeed denied the operation licence, and published a technical report listing unresolved issues that not being solved would hinder the operation licence to be signed (Ibama 2015). Less than two months later, however, on 24 November 2015, Ibama signed the operation licence even though the conditions listed in their report were not met. Two days later, a proposal to halt the licence was discussed in Brazilian National Congress, using the dossier by Instituto Socioambiental as a source for their decision-making (Chamber of Deputies 2015). On 14 January 2016 the Federal Court suspended the operation licence, after the publication of a document by the federal prosecutor Thais Santi. (G1 2016) Nevertheless a few days later the suspension of the operation licence was revoked on the premises that too many jobs were at stake (MME 2016a) and in April 2016 Belo Monte began its commercial operations (MME 2016b).

In sum, Belo Monte is now operational without proper studies regarding possible impacts on the environment; Norte Energia continues its operations under inappropriate licences and the situation is sustained by the State on the grounds that Brazil needs the energy produced by Belo Monte in order to grow economically. It can be argued that the

current administration deliberately disregards environmental issues, possibly due to being oblivious to them. The approvals of the licences were only possible due to the strong political and economic pressure. The reasons behind this questionable licencing process cannot be answered in this publication, but I believe that some of the answers ought to be revealed with the development of the Lava Jato money laundering investigations currently being conducted by the Federal Police. The investigations have already targeted President Dilma Rouseff, Minister of Mines and Energy Edison Lobão, and some of the contractors involved in the Belo Monte constructions. (See for example Folha 2016, Amora 2015, Barrucho 2015, Brum 2015, Carvalho 2015)

3.4.3 *Current Licencing Procedure At Risk*

President Dilma Rouseff was impeached¹⁸ early in 2016, and since then, the acting government has pulled proposals of bills and law amendments from the archives back into the senate's table. The PEC 65/2012, the PLS 654/2015 and the PL 3.729/2004 are some of these bills, and these involve environmental law issues. The three proposals are currently under discussion and if passed, will alter the licencing procedure deeply and their consequences are unprecedented.

The constitutional amendment PEC 65/2012 establishes that once the EIA is presented to the licencing bodies, no construction can be suspended or cancelled. In the amendment proposal, its writer Senator Acir Gurgacz claims that the reasoning behind it is to speed up a *slow and inefficient process* and to give *city mayors the opportunity to conclude their projects before their mandates are over*. (Senado Federal 2012). As seen in the previous chapter, the EIA is a precondition to the prior licence, so in effect, the bill PEC 65/2012 puts an end on the environmental licencing as is, as constructions cannot be suspended once the EIA is presented, that is, before the EIA is approved or even before issuing the prior licence¹⁹. Taking into consideration that the EIA is a document produced by the proponents of a given project, and that the public sector may suffer from lack of resources for inspection and control, the PEC 65/2012 in effect increases the vulnerability of the environment, as it implies that constructions cannot be suspended even if problems arise.

The PLS 654/2015 bill suggests that “strategic projects” such as large dams and roads should be subject to “speed licences” (up to eight months, without the three phases as described in the previous chapter), and if government agencies involved in the procedure

¹⁸ The reasoning Rouseff being taken out of office is somewhat linked to the Lava Jato money laundry investigations, but the premises of the impeachment (or coup?) are purposely not discussed in this paper.

¹⁹ Note from author: Think of it as operating on a patient after applying to medical school, before studying medicine, and even before being admitted to the university.

do not act according to the timetable, it is automatically considered that they are in accordance with the licencing. In effect, if for some reason the regulatory agency cannot meet their deadlines due to lack of resources, for example, licences would be considered to be issued without proper considerations.

Finally, the bill PL 3.729/2004 proposes that the licencing procedure should be self-declaratory, done in electronic format. The bill restricts the power of government agencies, and limits the opportunities of the civil society to participate in the licencing procedure. (Brazilian Chamber of Deputies 2004).

I contacted Telma Bartholomeu, an environmental lawyer specialist in this topic to explain what these bills mean to Brazilian environmental legislation. Bartholomeu explained to me in a Skype interview (2016) that despite an international effort to strengthen environmental laws to move forward with sustainable development, with these bills under discussion, Brazil seems to be moving in the opposite direction. The three proposals presented look at licencing from the perspective of the proponents of projects to cause an environmental impact, and seem not to consider the affected population. Bartholomeu argues that the bill PEC 65/2012 is dangerous because it wants to simplify a process that is complex for a reason. She says:

“The EIA is just a study; it is not a decision. Once the EIA is presented, then the licencing process may begin. It is called a process, because there are phases to be followed and completed; there are conditions and impact mitigation measures for each of the three licences, and there should be supervision from the State that these are met.”

(Bartholomeu 2016, Skype interview)

Bartholomeu (2016, Skype interview) argues that in practice the environmental licencing suffers from a dichotomy: when the proponent of a given project is the private sector, licencing is commonly done according to the regular procedure, but when the proponent of the project is the State, the process is generally more indulgent, and there is a deliberate omission of inspections. Moreover, Bartholomeu complements that large constructions such as Belo Monte that demand infrastructure constructions like roads and resettlement of populations, should not be simplified as proposed by the bills presented. On the contrary, the process, in her opinion, should be longer and more complex, should involve an interdisciplinary committee composed of different interest groups that affect and are affected by the project. While it is understandable that emergency infrastructure constructions need to be done within a shorter period of time, they should not, nevertheless, the EIA should not lack rigor and decisions should be made based on evidence.

The bill proposals are criticized by the civil society for being a throwback to the fundamental rights of the Brazilian society, ripping the current environmental laws and threatening Brazil to environmental disasters (Wons 2016, Borges 2016, Socioambiental 2016, and Saraiva 2016). Instituto Socioambiental (2016) reinforces that environmental

licencing should be strengthened by improving social participation, reinforcing the conditions and resources of the environmental institutions, and improving the quality of the EIA by including the participation of the scientific community and the civil society.

3.4.4 *Environmental Impact Assessment (EIA) For Belo Monte*

As discussed in chapter 0, Ibama – the Brazilian Environmental Agency – is the governmental agency which determines the conditions for the implementation of an enterprise, as well as the impact mitigation measures to be implemented. Each project has its unique terms of reference, and decisions are made based on the project’s EIA. (Hanna et al. 2014:61, Funai 2011:10).

The first version of an EIA for Belo Monte was prepared by CNEC – National Consortium of Consulting Engineers – and presented in 1980, but was rejected by Ibama as deficient, and was under judicial embargo because of fraud. (Federal Court of Justice 2002) A second version of an EIA for Belo Monte was prepared by FADESP – Foundation for the Support and Development Research – completed in 2002, and rejected due to inconsistent results. (Fearnside 2006:20-22). The version that was approved was prepared by Ibama themselves and concluded in 2007. (Norte Energia 2013, Rojas and Telles 2013).

The first EIA was problematic because it involved conflicts of interest of the consulting firm, who had clear interests in pushing the project forward, while the second one was problematic because FADESP was hired for the studies without the normal bidding²⁰ under the claim of “technical excellence”. (Philip Fearnside 2006:21). The third EIA, which was produced and approved by Ibama, was subject to heavy criticism from the academic community.

In 2009, a group of 42 independent researchers from Brazilian universities and abroad, formed an expert panel to analyse the EIA produced, and the result was an Experts Panel Report, which was sent to the Federal Attorney’s office in Altamira (Magalhães and Hernandez, 2009:2). The report presents a critical analysis of the EIA’s estimations of economic viability and socioenvironmental impacts, it exposed mistakes, critical omission of data, and human rights violations. Despite the warnings given by the group of scholars through the Experts Panel Report, the concession of Belo Monte was given to Norte Energia in 2010.

Once Norte Energia gained the concession for Belo Monte, the company became responsible for frequently updating the existing EIA, as well as to complement the previous document with supplementary studies, and for adapting the EIA according to the construction plans of the company. These actions have not been done according to timetable,

²⁰ Licitação

and the Brazilian Federal Court²¹ has issued warnings and resolutions that caused the paralysation of the construction work as well as substantial fines to be paid by Norte Energia (Poder Judiciário 2014, Amazonia 2014).

To sum up, the conditions for the implementation of an enterprise, as well as the impact mitigation measures to be conducted are determined by the government based on a document prepared by the enterprise itself.

It would be naïve to think that any EIA would be prepared free from conflict of interests. The document is prepared by those who are causing the impacts. Given that impact mitigation measures may be costly time consuming, it is in their interest that risks are ignored or underestimated.

I have raised some questions while analysing the licencing procedure of Belo Monte and the creation and maintenance of the EIA that are were left unanswered during the process of this research: Is there a chance that some impacts have been purposely ignored so that licences would be approved? Is there a chance that individuals preparing the document would be pressured or incentivised by the enterprise to alter their results to mask risks? Do government officials responsible for evaluating the EIAs have the resources to find errors or omissions of data from these documents? In the case of Belo Monte, why the expert's report was not taken into consideration when issuing the licences? How could this issue be solved?

These questions go beyond the scope of this thesis, but my intuition is that many of these are probably going to be answered in the future with findings by the Lava Jato money laundering investigations mentioned in the previous chapter, or some other police investigation. The Lava Jato investigations conducted by the Brazilian Federal Police in cooperation with the Brazilian Public Prosecution Office have proven that large contractors and consulting firms are strong lobbyists who have made substantial contributions to individual members of the Brazilian parliament, as well as to the latest presidential election campaigns. (Ministério Público Federal 2016)

²¹ Tribunal Regional Federal da Primeira Região

3.5 Ecological Aspect: Impact Mitigation Measures To The Environment

In the introduction of this master's thesis, I presented an overview on energy security as a global challenge, and how the idea of hydropower being a clean and cheap energy supply stirred governments to promote hydropower as a substitute for non-renewables. As previously discussed, in Brazil, hydropower is said be low on GHG emissions, and to promote economic growth and societal wellbeing. This agenda has been pushed so far, that it has become an accepted paradigm.

The preceding chapter discussed how this paradigm was and still is used to promote large hydroelectric projects, including the Belo Monte dam. On the face of it, the decision to invest in hydroelectricity is done based on ecologic and economic reasoning. However, as was explained, in the case of Belo Monte, it is evident that other incentives are in play as well; including individual aspirations for political power, and possibly corruption, which have overshadowed the ecological objectives. The licencing procedure, for example, was not done conforming to legislation.

In this chapter, I argue that the impacts to the ecosystem were purposely underestimated. Although the Environmental Impact Assessment was done as required by law, and approved by the governing authorities, the measures to mitigate the impacts on ecosystems proposed in the Basic Environmental Project (PBA) for Belo Monte are insufficient. I go on to claim that Norte Energia uses their environmental projects as a means of greenwashing and disinformation.²²

3.5.1 Greenhouse Gas Emissions

As discussed, the Brazilian Government claims to invest on hydro power due to its low greenhouse gas (GHG) emissions. Although hydropower is a renewable source of energy, there is no consensus on whether hydroelectric dams are emitters or net sinks of GHG (IPCC 2012 in Arvizu et al. 2012:84). According to Fearnside (2015b:226) emissions from tropical dams are largely underestimated. Fearnside argues that in the case of Brazilian dams, official numbers of GHG estimates not only have mathematical errors, but also omit emissions, for example, from turbines.

Hydroelectric power plants can emit GHG through several processes: decaying plants under water, emissions from turbines, emissions from spillway, and from deforestation (Fearnside 2002:77-88). In order to build hydroelectric dams in tropical forests, a large

²² The term greenwashing is used to describe an activity by corporate groups that gives a positive public image to practices that are environmentally unsound, and the term disinformation is used to describe false information which is given deliberately to mislead.

area is deforested and it is common that these areas are flooded without properly being cleaned. The flooded reservoir contains trees and small plants that decompose in the water, creating CH₄ (methane) emissions (Fearnside 2002:83). Methane is a gas with high global warming potential, much higher than CO₂. One of the indicators for methane flux is the presence of floating weeds in the water, which in 1986 covered 39% of the Tucuruí Dam's water reservoir (Fearnside 2002:75)²³. When the water from the reservoir passes through the turbines of the power plant, some of the CH₄ dissolved in the water is released to the air. Spillways also release methane into the atmosphere, even more efficiently than turbines. Spillways are channel-like structures built to control water flow. The combination of a reservoir with decomposing trees and spillways is an efficient mechanism to emit GHG to the atmosphere.

There are indications that the GHG emissions of the Tucuruí Dam are very high. According to Fearnside, in 1990 the dam's emission was 7.0–10.1×10⁶ tons of CO₂-equivalent carbon, an annual emission significantly higher than the fossil fuel based GHG emissions of São Paulo, Brazil's largest city and biggest contributor to greenhouse gas emissions (Fearnside 2002:69). Another example is of a hydroelectric powerplant emitting high GHG is the Balbina Dam, also built in Amazonia. The forest near Balbina was also not cleared properly for the reservoir, and like Tucuruí, the power plant emitted a large amount of GHG, particularly carbon dioxide (CO₂), hydrogen sulphide (H₂S) and methane (CH₄). (Fearnside 1989:409) Study shows that the GHG emissions by Balbina are significantly higher than that of coal-fired power plants (Tagore 2007). Furthermore, the Balbina dam is criticized for wasting valuable timber (Fearnside 1989:412).

Similar problems may occur in Altamira when the Belo Monte Dam begins its operations. As submerged vegetation decomposes, the Xingu River will also be subject to the production of greenhouse gases. Although vegetation and residue has thoroughly been cleared for the construction of the canal, the main reservoir will be only partially cleared. Norte Energia (2014b:25) claims that Belo Monte will emit "almost no greenhouse gases whatsoever". The company explains that the main reservoir will have 50% of its vegetation cleaned, and the area not planned to be cleared is an area that naturally floods every year. According to the company, the vegetation in the area is adapted to seasonal flooding, therefore methane gas should not be a product of the Belo Monte reservoir.

The Ministry of Mines and Energy (2011) states that the potential harm to the environment is minimal, because the "*flooded reservoir is estimated to be only 515 km²*". The size of the water reservoir is a fundamental element in the Brazilian Government's rationale for building Belo Monte, because it uses a much smaller area in comparison with

²³ The Tucuruí Dam is also located in Pará, see Figure 3 in page 24. Although the two dams have very different engineering, their surrounding environment is quite similar. Learn more about the Tucuruí Dam in chapter 3.9.

the water reservoirs of other dams built in Brazil. However, it is arguable that this rationale is invalid. For once, less area affected does not necessarily mean less impact. Secondly, this rationale disregards the problems faced in other regions of Brazil, as well as the environmental disasters that some of these dams have caused. More about lessons learned from other dams in Brazil will be discussed in chapter 3.9.

3.5.2 Environmental Projects for Belo Monte

The PBA (Projeto Básico Ambiental) was prepared by Norte Energia in cooperation with the contractors CNEC, Worley Parsons, and Leme. The document is based on Belo Monte's EIA; it summarises the findings of the EIA and outlines the proposed measures for impact mitigation and community development. The PBA describes the work to be conducted, a timetable to be followed, and lists possible partners for each project. As mentioned in chapter 2.4, the PBA is perhaps the Brazilian equivalent to ESMPs – Environmental and Social Impact Management Plans. The topics addressed in the PBA (Norte Energia 2011d) are:

- Action plans for environmental management,
- Geological and mineral resource management,
- Water management, conservation and use of the water reservoir,
- Terrestrial ecosystem conservation,
- Aquatic ecosystem conservation,
- Care for the affected population,
- Urban requalification,
- Public health,
- Interaction with different institutions, and
- Cultural heritage assessment.

Because the PBA is so large, and covers so many issues, analysing the document point by point would be both unfeasible and a completely different work than what is proposed in this Master's thesis. Instead of analysing all the projects included in the PBA, I hereby present an analysis of the projects that I was able to witness with my own eyes while in fieldwork. The projects were witnessed in two moments of the fieldwork: during a guided tour organized by Norte Energia, and during a canoe expedition organized by Instituto Socioambiental in partnership with indigenous communities (the two are described in chapter 2.7 Research Materials).

Reforestation

Belo Monte has been blamed for provoking deforestation in the region. Leite et.al (2013:ch.2) argues that although the government puts pressure on Norte Energia to use the wood that they cut for the constructions, there are not enough sawmills with the capacity to process all this wood. Instead, Norte Energia buys processed wood from other companies. These large purchases of legal processed wood put pressure on the local timber market, encouraging however indirectly, the illegal market of timber in the region.

“A report from Imazon, a research NGO, showed that from 2011 to 2012, the non-authorized cutting of wood increased by 151% in the state of Pará. Pará accounted for most of the Amazon’s deforestation during the 2012-2013, with 2,379 km² cut-clear: 41% of the total amount of deforestation in Brazil.” (Leite et.al 2013:ch2).



Figure 7 Deforestation On Belo Monte’s Construction Site. (Photo By Lalo De Almeida/Folhapress In Leite et.al 2013)

Figure 7 shows some timber from an area cut down to make space for Belo Monte’s construction. Leite et.al (2013) claim that in Belo Monte, timber is being wasted similarly to what was done when the Tucuruí Dam was built, as reported by Fearnside (2002). It is estimated that about 3 million trees are being cut.

During a personal visit to Belo Monte’s construction site, while on tour with the “Conheça Belo Monte” I witnessed fallen timber on the sides of the roads surrounding the dam. I asked my guides about the fallen timber, and they said these were protected

species, and Norte Energia was not able to use them for the constructions without authorisation from authorities. The response was given with a shrug, followed by “you know how slow the public sector can be”. This phenomena was also described by Leite et.al:

“There are two types of piles: discarded waste, both large and small (branches and trunks of no value to sawmills) and stockpiles of logs, some of them blackened from one or two years of being outdoors. Norte Energia claims that most of the timber is ‘white wood’ (not dense enough for use in civil construction) or from species, like Brazil Nut trees²⁴, whose processing requires Ibama authorisation.” (Leite et.al 2013:ch.2)

According to the expert panel report (presented in chapter 3.4.4), one of the problems related to deforestation is that the environmental impact assessment (EIA) conducted for Belo Monte presented models of deforestation in the past, without taking into consideration the estimations of deforestation for the future. Panelists claim that today there are tools for simulating deforestation, and analysing its impacts to the environment. The experts’ panel report suggests that future scenarios of deforestation should be analysed in order to plan impact mitigation actions in the present. (Magalhães and Hernandez, 2009:2). The critique against Belo Monte presented leads to conclude that the deforestation caused by the dam constructions cannot be restricted only to the area to be flooded by the water reservoir. Non-authorized logging has risen in the region since the beginning of Belo Monte constructions and from an environmental point of view the situation is alarming.

In the Centre of Environmental Studies, visitors on Norte Energia’s guided tour get to learn about the reforestation programme conducted there. It was explained to our group that before doing any work on deforestation, Norte Energia rescued plants and seedlings. According to them 88,000 plants and seedlings have been rescued, from which 96% were re-planted in the surrounding areas. (Norte Energia 2014c:5). Tour guides also said that Norte Energia has a reforestation project of 26,000 ha and that they have donated seeds for local communities and for universities for research.

²⁴ *Bertholletia excelsa*



Figure 8 Norte Energia's Centre Of Environmental Studies: Seedling Nursery
(Photo By Regina Santos, Norte Energia 2014c)

Figure 8 provided by Norte Energia, illustrate the seedling nursery of the company's Centre of Environmental Studies. The centre has collected 370 species of plants and has produced 48,452 seedlings for scientific use (Norte Energia 2014c).

Rescue And Release Programme

While visiting Belo Monte's construction sites with Norte Energia's guided tour in September 2014, I got to know the company's Rescue and Release programme, which is included in Belo Monte's PBA (in Norte Energia 2011d, Vol.5:194-211). During our group's visit, we got to see caged animals who were said to be rescued and were to be released back to the wild after being examined by biologists, who would identify their species and log them. We saw frogs, snails, monkeys and capybara pups. It was explained that the least common animals to be found on the construction site are fast and large animals (such as adult mammals), who naturally run away from the area due to noise pollution and high movement of construction workers. Slower and smaller animals, in the other hand, need to be rescued and returned to the wild. On a booklet provided during the tour, Norte Energia (2014b:5) said to have rescued over 117,000 animals between 2011 and 2014, and to have returned about 94.5% of these animals to the wild. Tour guides also said that in some cases, samples are collected for scientific analysis, and when animals are injured or diagnosed with diseases, they are treated before being reintroduced to

the environment. Rare or threatened species found are reported to Ibama and, when suitable, are sent to research institutes.

To the less informed, this projects can be impressive. The rescue and release programme is presented in the guided tour as meaningful and important for the preservation of the ecosystems in the region. Exotic species are displayed and visitors are excited to take pictures with the animals, some of which, they are seeing for the very first time. Although wildlife rehabilitation programmes have their merits, I would argue that it is common sense that if the habitat where these animals lived are drastically being changed, or do not exist anymore, simply releasing the animals to the wild does not help the population to survive. Depending on the degree of changes in that specie's habitat, releasing these animals back to the wild can be a cruel act to that individual, which has no chance of survival. Moreover, releasing animals to different areas without proper management of the natural environment may cause stress or over population of certain species, may change the balance of ecosystems, and finally, cause a chain reaction of environmental impacts.

Fish And Other Aquatic Animals

The PBA for Belo Monte includes projects to investigate the taxonomy of fish species, monitor the fish fauna, capturing and releasing fish, running a project of ornamental fish aquiculture, and incentive programmes for sustainable fishery. Additionally, there are two projects specifically for research and management of river turtles. (Norte Energia 2011c Vol.6:14-503). When presenting the work being conducted for aquatic animals in Norte Energia's tour, our guides maintain a discourse that the impact mitigation measures taken by Norte Energia are vast, and the work conducted in the area is very important for the preservation of the remaining ecosystems in the region.

Despite Norte Energia's positive views on their impact mitigation actions, scholars have strong arguments against the importance of Norte Energia's actions towards the environment. The experts' panel report (Magalhães and Hernandez, 2009, 7-8.) for example, argue that the degree of environment destruction is so large, no mitigation measures could possibly compensate the impacts caused by the construction of the dam. The foundation of this argument is that the studies upon which the PBA actions are based (the EIA) are incorrect and underestimates the ecosystem losses of the future. According to the panelists, from the point of view of the ichthyofauna (fish fauna), Belo Monte is technically unviable, and that the changes in the aquatic environment could cause the extinction of hundreds of fish species.

According to Eduardo Pegurier (2013), from the non-governmental organisation *O Eco*, the survival of migratory fish is improbable after the construction of Belo Monte. Pegurier argues that the dam prevents fish to go upstream and downstream freely, which

disturbs the animal's breeding possibilities. With no chances for breeding, migratory species are likely to disappear from the Xingu River. Some examples of such species are the tambaqui (*Colossoma macropomum*), the surubim (*Steindachneridion doceanum*), and the piraiba (*Brachyplatystoma*). Along with the species mentioned in Pegurier's study, D'Elia (2012), mentions two other endangered fish species: the plant-eating parana and zebra pleco fish (*Hypancistrus zebra*), also known as acari-zebra (Roman, 2011). Moreover, small animals living in the river basin are likely to become endangered with the power plant construction. One example of such species is the Xingu-poison-dart-frog (*Dendrobates*). (D'Elia, 2012)

As explained in chapter 3.2, the water flow of the Xingu River varies extremely between wet and dry seasons. The changes in the river flux through wet and dry seasons occur naturally in the Xingu River, and animals living in the region are adapted to those changes. While animals living in the Xingu River basin are adapted to survive in the natural wet and dry seasons; some species depend on these variations to survive. As the Belo Monte Dam directly affects the river flow, it consequently affects the lives of these animals. While wet and dry seasons will still exist to some extent, damming the river will allow a certain degree of control of the water flux around the year. This controlled river flow throughout the year will have an impact on the natural habitat of several species.



Figure 9 Gelson Juruna Displays Two Hypancistrus Zebra. (Photo By Lalo De Almeida/Folhapress In Leite et.al 2013)

Figure 9 shows Gelson Juruna, a man from the Paquiçamba indigenous reserve. Juruna displays two acari zebra fish (*Hypancistrus zebra*) in the Xingu River. The acari zebra is considered one of the most valuable aquarium species. It is illegal to capture this species,

but the fish can fetch up to 40 BRL²⁵ per unit in the black market. (Folhapress, 2013) According biologist Ana Paula Roman (2011:20-23), the species is endangered because its only natural habitat is the Xingu River. The fish species has not only been suffering from illegal catch, but now its natural habitat is changing due to the constructions of the dam. Ornamental fishery for aquariums is an important economic activity for riverine communities, as the average value of Brazilian amazonian ornamental fish exports is about U\$ 11.5 million/year (Prang 2007:13)

A four-day canoe trip with indigenous and riverine people was part of the field work for this thesis. While canoeing and discussing about possible futures for their communities, our hosts hunted several adult individuals and eggs of a river turtle named *tracajá* (*Podocnemis unifilis*). Figure 10 shows the tracajá eggs captured by one of our hosts during the fieldwork. The riverine man (identity preserved) explained that *tracajá* is a protected species, but they have the right to hunt them because it is part of their traditions for generations. He showed me his hunt with glowing eyes and it soon become clear this is something he is very proud of. The man wanted to show me and my research assistant a token of his traditional customs.



Figure 10 Riverine Man Shows Captured Tracajá Eggs (Photo By Author)

²⁵ 12.5 EUR and 16.8 USD according to the conversion of the date of the publication, and 11.6 EUR and 12.9 USD as per 17 May 2017.

While showing us the hunt of the day (Figure 10), our host explained:

“The tracajá will disappear from the Xingu after Belo Monte. They need wet and dry seasons for their reproduction, but that will not happen the way it does now. Their survival is unfeasible. Before, we would only hunt a few tracajás, and leave most of the eggs on the ground for reproduction. But now that we know they will disappear anyways, there is no reason to spare them. We eat all that we find, they are delicious.”

(Riverine man 2014: during fieldwork)

Later that day, I sat with the chief of the Muratu indigenous community (one of the organizers of the field trip) and we talked about tracajá eggs. I asked him what he thought about hunting turtles and eggs. The chief answered that he was apprehensive towards this kind of attitude from the riverine men, though some indigenous people had a similar way of thinking. The chief argued that the local population did not comprehend sustainability or basics of species preservation, and that a serious environmental awareness programme should be conducted with members of traditional communities.

“Both the river turtles and the fish in the Xingu River are disappearing by over-exploitation. People have to understand that Belo Monte is already pressuring the environment, and it is our job to preserve the few individuals that do survive.”

(Giliarde Pixan Juruna 2014: personal interview)

The issue of species preservation is both complex and manifold. There is indeed scientific evidence that the Belo Monte dam poses a threat to some species, and pressures the ecosystem as a whole (see for example Fearnside 2011, Leite 2013, Magalhães & Hernandez 2009, Sevá & Glenn 2005, Sousa Júnior et. al 2010). However, also the local population's attitude towards the issue seems to be increasing the threat by limiting the chances of these fragile animal species to survive.

3.6 Cultural Aspect: The Traditional Peoples Of *Volta Grande Do Xingu*

The previous chapter exposed the many impacts that the dam has is causing to the natural environment. The water flow of the Xingu River will change dramatically, the aquatic fauna has already suffered intensely, deforestation in the region has risen, roads have facilitated access to and from indigenous lands, the population growth in the region has put a pressure in the natural resources, and so on and so forth.

This chapter discuss some of the cultural implications of these impacts towards the local population, particularly the traditional peoples. First, I will define who the traditional peoples of Volta Grande do Xingu are, and will describe some of their characteristics. Then, I discuss legal issues related to the indigenous populations, particularly the right for free, prior and informed consent (FPIC) and how these rights are ensured to be respected by the national government. I go on to present some of the impact mitigation measures conducted by Norte Energia, and how these have affected the daily lives of indigenous peoples. Finally, I will describe what I have seen when visiting one of these communities in person, during fieldwork.

3.6.1 *Defining The Traditional Peoples Of The Volta Grande do Xingu*

In the Brazilian context, traditional peoples²⁶ refers to communities which use natural resources as a condition to preserve their cultural, social, religious traditions. The use of the natural resources is done based on practices and knowledge transmitted by tradition, and these peoples have been protected by the Brazilian government under the Federal Decree 6040 since February 2007 (Brazil 2007).

Instituto Socioambiental (2014b) defines traditional peoples as:

“Groups or communities who, living in areas that are peripheral to our society, in a situation of relative isolation from the western capitalist world, have formed their own ways of relating to one another and to other beings or things: ways that are very different from what is considered mainstream in our society . . . each of these peoples we term traditional has its own identity, shared history, memory and territory”.

(Instituto Socioambiental 2014b)

In the context of this research, when writing about *traditional peoples of the Volta Grande do Xingu*, I refer to communities and individuals part of cultural minorities, such as indigenous and riverine people, both from rural and urban areas. They are people from

²⁶ *População Tradicional*

different ethnic and cultural groups, each of which has their own identity, history, shared memory and territory, as the definition by Socioambiental proposes. The umbrella term refers not only to the indigenous communities present in the region, but also refers to small-scale farming communities that plant cocoa trees and other plants typical to the region; to riverine communities who fish with traditional fishing nets; to agricultural workers and extractivists; to small-scale-miners; and to an urban minority that lives from natural resources (e.g. ornamental fish).

During fieldwork it became clear that some of the riverine peoples have two homes, one in a rural area, and another in an urban area. They are constantly moving from one to the other in order to take care of their crops, sell their products, and run their errands. The fact that traditional peoples constantly move from rural to urban areas, makes it difficult to define them. In some cases, individuals may have a traditional farm, but also a job in the city to complement the family's income. This phenomenon has been defined by Padoch et. al (2008:1) as multi-sited households, where members participate in rural–urban networks as well as in rural land-use decisions. Multi-sited rural–urban populations are common in Brazilian and Peruvian Amazonia, but official classifications restrict households to either rural or urban (Padoch et. al 2008:4). And then there is also the urban-indigenous families.

The indigenous component of Belo Monte's Environmental Impact Assessment (EIA) is severely criticized by NGOs and environmental activists. The websites of Greenpeace, Socioambiental, Amazon Watch, and International Rivers for example have published several articles criticising Norte Energia for its wrongdoings towards the local indigenous groups. (See for example Amazon Watch 2010, Borges 2012, Guimarães 2015, Socioambiental 2014) Despite the accusations by these groups, Norte Energia affirms in their press release (Nidecker 2011:1) that “Belo Monte will not impact the lands of any indigenous group” and that indigenous lands “will be left untouched by the dam and by other engineering structures of the Belo Monte power plant,” furthermore “no indigenous community will be relocated as a result of the project”.

Even if there are no dam structures or machines operating in indigenous lands, the changes on the environment next to indigenous lands affect these areas intensely. It would be naïve to think that indigenous lands have a protecting seal against any impacts coming from outside its borders.

Figure 11, from Norte Energia's PBA – Basic Environmental Project, illustrates the indigenous lands recognized by the enterprise in the region. While only two are recognized as areas of direct influence (Paquiçamba and AVGX, as shown in the zoomed square on the top left of the image), all these other areas are perceived by Norte Energia as indigenous areas of indirect influence by the Belo Monte Dam Complex. The indigenous groups from the Xingu basin, among them the groups Apyterewa, Arara, Araweté,

Bacajá, Baú, Iriri, Jarina (or Juruna), Kararaô, Kayapó, Koatinemo, Kuruáya, Menkrag-noti, Panará, Xikrin do Cateté, Xipaya, belong to different language groups and have distinct cultures, values, and traditions. (Fearnside 2006:16 & Sevá 2005)

Terras Indígenas do Médio Xingu

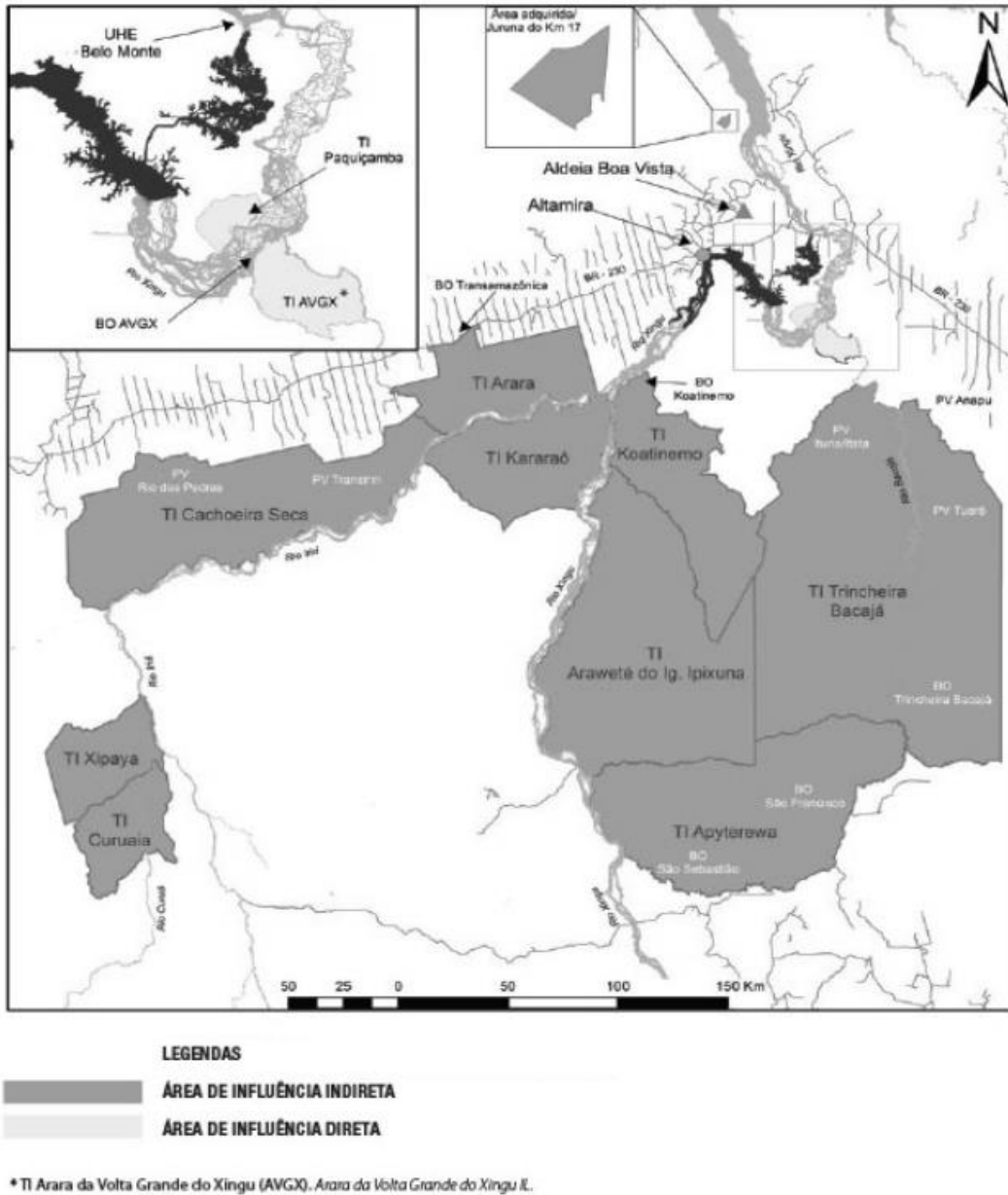


Figure 11 Indigenous Lands Of The Region (Norte Energia 2016b:7)

Several documents from Norte Energia from 2011 to 2016 were analysed and are listed at the end of this thesis. It can be argued that indigenous communities are in general treated as nuisance. Their protests cause the paralysation of construction work, and the

completion of the impact mitigation measures are an obstacle to obtain the dam's operation licence. One of the basic conditions for Belo Monte's licences to be issued is consent from the indigenous peoples affected by the dam.

3.6.2 Free, Prior And Informed Consent (FPIC)

In 2007, Brazil signed the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and ratified the International Labour Organization Convention 169 (ILO C169). Consequently, the country committed to apply 'Free, Prior and Informed Consent' (FPIC) procedures. (Hanna et al. 2014:58) ILO promotes the participation of the population in the decision-making processes, and proposes that consultations should be carried out with the "objective of achieving agreement or consent to the proposed measures". (ILO 1989:art.16)

Although FPIC is understood as an indigenous right within international law (Ward 2011:54), the concept of FPIC is a complex one, as the UNDRIP does not offer clear guidelines of action, leaving room for interpretation by different states and governmental organs. UNDRIP refers to FPIC in 4 articles: 10, 19, 29, and 32 (UN General Assembly 2007). The four articles are available as Appendix 2 at the end of this document. Based on the documents by the United Nations, Tara Ward (2011:54) defined FPIC as:

"The right of indigenous peoples to make free and informed choices about the development of their lands and resources. The basic principles of FPIC are to ensure that indigenous peoples are not coerced or intimidated, that their consent is sought and freely given prior to the authorisation or start of any activities, that they have full information about the scope and impacts of any proposed developments, and that ultimately their choices to give or withhold consent are respected". (Tara Ward 2011:54)

The definition from Tara Ward is, nevertheless, subject to contestation. The ILO C169 only mentions the term consent in two articles: 6 and 16. The full text of the articles are available in the end of this paper as Appendix 2. Article 16 (ILO 1989) proposes that free and informed consent shall be given "whenever the relocation of peoples is considered necessary".²⁷ Article 6 (ILO 1989) suggests that indigenous peoples should be consulted "whenever consideration is being given to legislative or administrative measures which may affect them directly".

Both UNDRIP and ILO C169 give room for interpretation, and there appears to be some confusion towards the meanings of "right of participation", "right to be consulted" and the "right to give or withhold consent". The licensing process in Brazil seem to embed

²⁷ This is not considered the case in Belo Monte, as no indigenous lands are planned to be flooded.

the rational that consultation and consent are the same thing. No official document by Ibama, Funai, or Norte Energia appears to address the term informed consent. The only official document that somewhat refers to the subject is the Federal Decree 6040 – *National Policy for the Sustainable Development of Traditional Populations and Communities* (Brazil 2007). The Federal Decree (article 1.10) states that there should be a promotion for the inclusion of traditional populations and communities into the decision-making process that involves these peoples' rights and interests. Moreover, the document states (in article 3.4) that the traditional populations and communities who are affected by projects, constructions and enterprises must have their rights guaranteed.

Belo Monte's Environmental Impact Report (RIMA)²⁸ published by Norte Energia (2009:10) explain that one of the preconditions for the prior licence is to listen to the local population in *public hearings*²⁹. By analysing the text written in the RIMA, I conclude that Ibama and Norte Energia interpret that running public hearings is a manner to obtain consent from the local population. However, in a document published by Funai (2011:12), the organ described the public hearings as mere informative meetings where environmental impacts listed in EIA are presented, and the local population has the opportunity to ask questions about these impacts. As much as *informative* public events have their merits, having the opportunity to ask questions about the impacts is not the same as giving consent. Neither Norte Energia nor Funai mention anything about intentions of *granting consent* from the local population in these meetings.

Photographs taken during a public hearing organized in Altamira in 2009, indicate that FPIC rights were not respected: In Figure 12, for example, we can see an elder indigenous man sitting on the floor, while armed men dressed in police and army uniforms stand behind him. We cannot talk about free consent, if the armed forces are there to insure the consent is given.

Figure 13 is a snapshot of the public who turned up to the public hearing. The room is clearly over-crowded, and people resort to seating in the floor in order to listen to Norte Energia's presentation. On the left, banners say "no to Belo Monte's constructions"³⁰

²⁸ Relatório de Impacto Ambiental

²⁹ Audiência Pública.

³⁰ For better visualisation, see these and more pictures in colour and full screen in the following address:
<http://arte.folha.uol.com.br/especiais/2013/12/16/belo-monte/m/capitulo-2-ambiente.html>



Figure 12 Indigenous Man In A Public Hearing In Altamira In 2009
(Photo By Lalo De Almeida/Folhapress In Leite et.al 2013)



Figure 13 Public Hearing In Altamira In 2009
(Photo By Lalo de Almeida/Folhapress in Leite et.al 2013)

Amazon Watch (2010b) criticized the Brazilian government for not providing the indigenous peoples their right for FPIC, although Ibama claimed that these communities were appropriately consulted. The NGO states that:

“Only four public hearings were held in the cities of Altamira and Vitória do Xingu, where security forces obstructed the entrance of civil society representatives. The few public queries that were made were dismissed, ridiculed, and answered evasively. For the Brazilian government, consultation was never about obtaining consent from indigenous peoples through public hearings; it was only about the clarification of impacts”.

(Amazon Watch 2010b)

In support of the indigenous peoples, Amazon Watch (2010a), International Rivers (2016), BBC (2008), D’Elia (2012), Greenpeace (2009), and several others accuse the Brazilian Government of abandoning their commitment to Environmental and Human Rights legislature by supporting the dam's creation.

“At the public hearings security forces impeded the entrance of civil society representatives, and the few public queries that were asked were dismissed, ridiculed, and answered evasively by Eletrobrás representatives”.

(Amazon Watch 2010a)

D’Elia’s documentary “Belo Monte: An Announcement of War” (2012) shows the indigenous dissatisfaction towards Belo Monte. To the cameras, they threaten to go to war, if necessary. Indigenous groups and other traditional peoples of the *Volta Grande do Xingu* constantly remind the State that they have not given FPIC to Belo Monte’s constructions. In 2013 for example, when the constructions were already ongoing, indigenous peoples became more active in demanding to be asked for their consent. (Cimat 2013) In April 2013 the Munduruku people published an open letter inviting government officials to their land for a public hearing, with the condition that the lawyer representing the tribe would be present, and with the condition of not bringing the armed forces to the public hearing in order to avoid intimidation. In the letter the Munduruku explained:

“We are available for a dialogue with members of the Public Prosecutor’s Office³¹ without the pressure from the organs of national security (Army, Federal Police, Federal Highway Police, and National Public Security Force). It is impossible to have a negotiation with the presence of these organs. They cause intimidation and humiliation. The presence of these organs is not necessary for the negotiations between the government and the Munduruku people”. (Cimat 2013)³²

³¹ Ministério Público Federal

³² Letter written originally in Portuguese. Translation by the author.

It is clear from the Munduruku letter that they feel unheard, and coerced into giving consent by having the organs of national security present on their lands. Desperate to get their voices heard, and eager to participate in public hearings, the local population protested by invading Belo Monte's construction site. The protest was a reminder that their rights have not been taken into consideration. An open letter explaining the actions of the protesters was written:

“We are the people that live by the rivers where you want to build dams. We are the Munduruku, Juruna, Kayapó, Xipaya, Kuruaya, Asurini, Parakanã, and Arara peoples, fishermen and riverine communities. We are from Amazonia, and we want it to live. We are Brazilians. The river is our supermarket. Our ancestors are older than Jesus Christ.

You are pointing guns at our heads. You travel our lands with war tanks. You make the fish disappear. You steal the bones and remains of our ancestors from the ground.

You do that, because you are afraid of listening to us. You are afraid of hearing that we do not want the dam to be built. You do not want to understand why we do not want the dam.

You create this image that we are violent and that we want war. But who kills our relatives? How many white³³ people have died and how many indigenous people have died in this conflict? You are the ones who kill, little by little or even at once³⁴. We are dying and with every dam you build, more people are dying. When we try to communicate with you, you bring tanks, helicopters, soldiers, machine guns, and tasers.

What we want is very simple: The law that regulates our rights for free, informed consent needs to be adjusted. Meanwhile, you must stop all constructions and studies³⁵ on the Xingu, Tapajós and Teles Pires rivers. And you have to come talk to us, ask for our consent.

³³ Note from the author: during my empirical research, I concluded that the indigenous peoples of the *Volta Grande* consider all non-indigenous as “white people”. The term “white” is given to anyone not pertaining to the indigenous community independently on that person's skin colour.

³⁴ Note from the author: I believe they refer to a massacre of indigenous peoples that supposedly happened between 1940s and 1980s during the Brazilian military dictatorship. The government is investigating the case up to the date of writing this text, but evidence leads to believe that a population of 300,000 indigenous people dropped to 20,000 during that period (see for example Milena 2012, Harari and Wroblewski 2016).

³⁵ Note from the author: I believe they refer to EIA

We would like to open a dialogue, but you are not allowing us to talk. This is the reason we have invaded your construction site. You simply have to stop everything and listen to us first.”

Vitória do Xingu (PA) 2 May 2013³⁶ (in Sposati 2013)

The protests and construction site invasion persisted for several months, and the National Public Security Force intervened in order to assure the continuity of the construction. According to the Government Gazette³⁷(DOU 2013), the Ministry of Justice provided the security force services upon request from the former Minister of Mines and Energy Edison Lobão. The services were requested by Lobão on the premises of “maintaining public order, ensuring the safety of people and giving continuity of the services pertaining to the Ministry of Mines and Energy” (DOU 2013). Overpowered by the National Public Security Force, the local population retreated and the constructions of Belo Monte continued normally.

Concluding, issues related to the indigenous peoples’ rights are seen as obstacles to the development of Brazil and to the country’s economic growth. Indigenous communities are in general treated as a costly nuisance: issues related to the indigenous peoples’ rights lead to a temporary suspension of Belo Monte’s operation licence, their protests caused the paralysation of construction work in several instances, consequently delaying the conclusion of the construction of the power plant.

3.6.3 Disruptive Impact Mitigation Measures

According to Norte Energia (2013:38) the company has invested 260 million BRL³⁸ in impact mitigation measures for indigenous communities, including benefits in healthcare, infrastructure, mobility, and cultural heritage preservation. The document adds that 756 houses were built in 12 indigenous communities, 21 airstrips were built, schools, as well as 42 radio stations and an “indigenous house” in the city of Altamira, where indigenous people can stay when visiting the city. Additionally, 34 healthcare centres are planned to be built in indigenous communities, although only one was completed up to the date of my empirical research (September 2014). As much as Norte Energia has invested on impact mitigation measures for indigenous communities, after analysing the PBA I conclude that these measures are aggressive towards the indigenous cultures. Instead of helping the indigenous communities to preserve their cultural heritage, the actions taken manipulates the culture of these groups, offering material goods to replace immaterial losses.

³⁶ Translation by the author

³⁷ Diário Oficial da União

³⁸ About 75.4 million EUR (exchange rate 17 May 2017)

The federal prosecutor Thais Santi (2014) argues that even before the conclusion of the constructions, Belo Monte has already caused an *indigenous ethnocide*. Through Belo Monte's defaulting measures taken thus far, the Brazilian government caused an intentional and systematic destruction of indigenous cultures as a means to silence the indigenous groups, who were historically the only agents who still had a voice and visibility in the scope of resistance towards the development of hydroelectric power in Amazonia. This ethnocide, according to Santi, was done mainly through the impact mitigation measure called *Emergency Plan*.³⁹

Established by FUNAI and operated by Norte Energia, the Emergency Plan was taken into action in order to start urgent mitigation processes in favour of the indigenous peoples affected directly or indirectly by the Belo Monte constructions even before the PBA would be completed. An informational bulletin written for indigenous groups (Norte Energia 2011:2) described the main actions of the Emergency Plan: to protect indigenous lands, to develop the local FUNAI infrastructure in Altamira, to guarantee food security of the tribes, and to promote cultural awareness.

Thais Santi (2014) explains that the Emergency Plan had at first the objective to create specific projects for each of the affected ethnicities, with the intention of empowering the indigenous peoples and decreasing their vulnerability. Although in theory the Emergency Plan could assist the indigenous groups in a positive way, in practice the measures taken caused impacts with unprecedented results. In effect, the Emergency Plan consisted basically of "an allowance" of material goods given from Norte Energia to indigenous groups. Between 2010 and 2012, each of 12 indigenous communities received a total of 30 thousand BRL⁴⁰ in goods such as food, clothing, boats, trucks, fuel, machinery, etc. The goods were provided based on a list given monthly by the communities to the company. (Borges and Chiaretti 2012) Santi (2014) reveals that there is clear evidence of diversion of resources from the Emergency Plan, and that the project was not conducted as originally planned.

One of my interviewees, an anthropologist conducting research in the region, confirmed that a diversion of resources has happened. When I asked how the allowances were provided, the interviewee reported that there was no proper documentation.

In the community where I am conducting my research, the chief would dictate to the assistant-nurse a list of goods that they wanted. After a couple of weeks, they would receive the goods. As simple as that. Most of the community members are illiterate. Once I accompanied the chief to the city and we double-checked the list of goods. They showed us an Excel file with the goods asked for and the estimated prices of each good. Among the

³⁹ Plano Emergencial

⁴⁰ 12,000 EUR and 17,100 USD according to the currency conversion of 2010, and 8,700 EUR and 9,600 USD as per 17 May 2017

items there was 1,000 lunch vouchers in the city of Altamira à 10 BRL⁴¹. That community does not have 1,000 members. Even if the entire community and their relatives would go to the city at the same time, this expense could not be justified. I ask myself how many of these ghost lunches were added to the lists of the communities... How many more ghost items were added (identity preserved 2014: Skype interview)⁴²

The Emergency Plan has been heavily criticized in the media for being a form of bribe that silenced indigenous communities and opposition movements. (See for example Borges and Chiaretti 2012, Thuswohl 2012, Rojas 2014, Castilho 2014, Santi 2014, Pereira 2015). FUNAI and Norte Energia were accused of creating an environment of domination of the company over the indigenous people. Indigenous communities are described as people becoming dependent on the company's allowances, as communities stopped producing food, quit working, and became inactive in their own societies (Rojas 2014, Castilho 2014, Santi 2014).

As discussed previously (chapter 3.4.2), when Belo Monte's viability was under study, the dam was declared unfeasible by Ibama. The expert panels report (Magalhães and Hernandez, 2009:2) warned policy makers about the high risks for the indigenous populations in the region, and suggestions of possible impact mitigation measures were made. Environmental impact studies (EIA) included the work of several anthropologists. But despite all of these, the Emergency Plan was a policy that encouraged consumerism and contempt for tradition.

But how do the indigenous people themselves feel about all of this? How do they live today? The answer is plural and complex, as many of the issues presented in this thesis are. While some communities, or some individuals within a community, may benefit from the impact mitigation measures, others may not, but suffer deeply from the changes being brought directly and indirectly by the enterprise. For the purpose of this thesis, it would be unfeasible to describe each community and the reality they live in. Nonetheless, one community can be described, as during fieldwork, I had the opportunity to get to know some of its members in person.

⁴¹ 3.3 EUR and 4.3 USD according to the currency conversion of the date of the interview, and 2.9 EUR and 3.2 USD as per 17 May 2017

⁴² Interview given in Portuguese. Translation by author.

3.6.4 *The Muratu Indigenous Community*

During the canoe expedition organized by *Instituto Socio Ambiental* in September 2014, which was part of my empirical research, I was invited by Giliarde Pixan Juruna, chief of the Muratu community, to visit his village. Juruna also granted me a personal interview. The Muratu are part of the Juruna Yudjá peoples and live on the Paquiçamba indigenous land area, an area recognized as directly affected by the dam, as illustrated in the introductory chapters of this thesis.



Figure 14 Giliarde Pixan Juruna, Chief Of The Muratu Community, And His Son
(Photo By Zé Gabriel 2014)

In a personal interview in 2014, Giliarde (photographed with his son in Figure 14) explained that their community is very young and have separated from the Paquiçamba community three years back due to conflict of interests between community members. Giliarde wanted the community to accept Norte Energia's schools, healthcare centre and other material goods. He saw the situation as an opportunity for the community to develop and receive assistance. He understood that there are several projects being offered to indigenous communities both by Norte Energia and by the Brazilian Government. He states that his community is interested in incorporating outside projects in their own.

The Muratu community consists of 60 members, of which 30 are children⁴³. They speak Portuguese as a first language and only a few understand Yudjá, their relative's tongue. The Muratu village consists of several wooden houses built in a semi-circle facing the river. In the centre of the semi-circle there are two round structures, the "community meeting place" and the "party place", and in between the two round structures, at the epicentre of the village, there is a football field. When Giliarde, my research assistant and I were standing in the middle of the football field, the community chief began to point at each of the houses:

"This first house is my brother's house, the second is my sister's, that one is my cousin's, that one is my other cousin's, that one is my brother's mother-in-law's, that one is for the construction-boy who moved here a year ago and does not want to go back to the city, that one is my house, and the last one is the healthcare centre."

(Giliarde Pixan Juruna 2014: personal interview)⁴⁴

Giliarde told us how Norte Energia came to their community, demolished all the existing houses they had and built new ones nearly identical to the ones they had before. The community chose to have wooden houses built by Norte Energia because the community members are used to dealing with wood and in case the houses need maintenance, they can fix them by themselves. My research assistant and I were invited to enter two of the houses. They were both equipped with a large plasma TV on the entrance, rooms had beds as well as hammocks, the kitchen had a gas stove, and the living room had toys for the kids and some artisanal indigenous goods.

Up the hill, further from the semi-circle of houses, the community also has a water tank, a school, a flourmill, and a field where they grow food. All these structures were recently built by Norte Energia. The school is used not only by their own community members, but also by members of other communities, including that one that they have detached from. The school has two classrooms, one for the children and another one for adult education. It also has a computer room fully equipped, except that the community does not have internet connection. The flourmill was still under construction at the time of our visit, and it contained equipment that no one in the community knew how to use. There is a discussion whether they should throw the equipment away, or sell to someone who would use it. I ask if they are not receiving any training on how to use the flourmill equipment. He answers that they should, but either way, they have their own traditional way to make flour different from that one. The field for food growing is large but seems

⁴³ The population demographics of the Muratu community are consistent with the general pattern within Brazilian indigenous groups. According to the population census 1991-2000 (Pereira et al. 2002:8) among those living in indigenous areas, about 20% are under four years old and about 70% are under 24 years old.

⁴⁴ Interview given in Portuguese. Translation by author.

abandoned and overgrown with weed. Giliarde explains that they were promised that they [Norte Energia] would come with tractors to work on the soil, and therefore they [community members] did not remove the weed or work on the soil. But the tractors did not come at the right time of the year; they missed the seeding season and therefore lost an entire year's worth of crop. By the time they [community members] realized no one was coming to work on the soil with tractors, it was too late to start removing weed and planting with their artisanal tools.

The scenery encountered in the Muratu village was surprising. My first impression was that this was not an indigenous community at all. After all, there were wooden houses, electricity, and a football field in the core of the community. "Could not get more Brazilian than that"- I thought. But as we go deep in the little village we see that although there is a strong influence of the Brazilian cultural hegemony, the community also has strong influences of the indigenous values and traditions, for example the round patterns, the meeting room, etc. I ask Giliarde how he sees all these influences of the Brazilian society on his community, he answers:

"I am an indigenous man, but I am also Brazilian. Our community also wants to advance; we also want to live comfortably. We can be Brazilian and indigenous at the same time, the same way as you⁴⁵ are Brazilian but you live abroad. We want to be able to continue living according to our traditions, but we also want to learn, to go to school and develop ourselves just like anybody else." (Giliarde Pixan Juruna 2014: personal interview)⁴⁶

Giliarde has a clear understanding of education being key to empowering the community and therefore decreasing their vulnerability. Although his community lives on indigenous land, which in theory is an area protected by the State, the constant contact with the Brazilian civil society has had an evident influence on the community's culture, their needs and interests.

⁴⁵ Referring to me, the author.

⁴⁶ Interview given in Portuguese. Translation by author.

3.7 Social Aspect: Development Based On The PBA

The social aspect of the Belo Monte is perhaps the most complex and controversial of all. As explained in the introductory chapters of the thesis, *Volta Grande* is not only a rich area when it comes to the natural environment, but it is also a rich area in socio-cultural diversity. As earlier presented, the population of the *Volta Grande* includes a rural population from large cattle farmers to small-scale farmers as well as riverine fishing communities, traditional extractivist communities; small- and large-scale miners, indigenous groups of various ethnicities, etc. Furthermore, the *Volta Grande* also incorporates an urban population as well as a considerable number of migrant workers from various regions of Brazil and from abroad. The Belo Monte dam affects all these different social groups, directly or indirectly. Some are positively affected, as the dam construction has brought new work opportunities and social services are more easily accessible. Other groups on the other hand, are affected negatively.

As discussed in earlier (chapter 3.4.4), Norte Energia and their contractors have prepared a document called *Projeto Básico Ambiental* (PBA) published in 2011 that serves as a guide for the companies' action plans. The PBA includes several social impact mitigation actions, divided into six parts, or six plans of action:

- services for the affected population,
- urban development,
- cooperation with local public institutions,
- relations with the local population,
- public health, and revitalisation of local heritage⁴⁷.

Each of these plans includes several programmes to be followed by Norte Energia and contracted companies. The following subchapters analyse some of the actions proposed in the PBA, and how they are being conducted de facto, many of which were witnessed during field work for this research.

3.7.1 Services For The Affected Population

According to the PBA the affected population includes “all social groups, families and individuals that are negatively affected by the enterprise”. (Norte Energia 2011 Vol. 2:14). It is explained that by “all”, the document refers to people who are reliant on (or closely tied) to the affected territories or resources affected by the enterprise due to the following reasons:

⁴⁷ Plano de atendimento à população atingida, plano de requalificação urbana, plano de articulação institucional, plano de relacionamento com a população, plano de saúde pública, plano de valorização do patrimônio. (translation by author)

- Involuntary displacement
- Economic loss through disruption of economic activities
- Disruptions of social ties (community, family, neighbourhood, crony)
- Losses of facilities or infrastructure available before Belo Monte

According to this definition of affected population, there is a wide variety of reasons for a person or a group to be considered a part of this group. The PBA does not specify the precise groups to receive compensation for the impacts of the dam, which may lead to differences of interpretation from the various parties. The “disruption of social ties” is especially vague, as these ties may be subjective. Norte Energia proposed to monitor the affected population in order to identify persons in need of social assistance and psychological support. This monitoring by Norte Energia is mainly aimed at risk groups (women, children, adolescents). According to the PBA, the aim is “to meet the needs of 100% of the socio-psychological needs of the affected population” (Norte Energia 2011 Vol 2:392) by monitoring risk groups and referring people in need to public social services. Although the PBA claims to give support to the local government and communities, they also claim that services will be performed by local institutions (Norte Energia 2011 Vol 2:391). Norte Energia’s aim of meeting 100% of the socio-psychological needs of the affected population is unrealistic. Taking into consideration the population growth and lack of resources in the public sector, the quality of the services provided to the population is questionable. Moreover, the PBA is unclear on how the support will actually be given to the local community, and it seems that not only the services, but the responsibility upon the social work users is forwarded to the public administration.

The compensation programme for economic losses began with a study of the economic activities conducted up until then. Once the study had been completed, vocational courses, workshops and other training aimed at developing various economic activities were organized in order to support the local commerce and production. The programme has had partnerships with various educational institutions and local associations. (Norte Energia 2011 Vol 2, 311-315) In Altamira, the extraction of sand, gravel and clay has traditionally been an important economic activity for the city. Therefore, these economic sectors received a special programme in the PBA in order to guarantee the production of these raw materials. (Norte Energia 2011 Vol.2:321-330) The PBA also guaranteed a programme in favour of Vitória do Xingu, neighbour-city of Altamira, where a boatyard is planned to be built in order to satisfy the needs of production and maintenance of boats in the region.

3.7.2 Urban Development

The constructions of the Belo Monte dam will mainly affect four municipalities: Altamira, Brasil Novo, Senador José Porfirio and Vitória do Xingu. (Defensoria Pública

2014:15) Altamira is the city most affected by the dam, as parts of the city will be flooded for Belo Monte's reservoir. Official statistics from IBGE, the Brazilian Institute of Geography and Statistics shows that the number of inhabitants in Altamira is 99,000. (IBGE 2015) The Secretary of planning of the city of Altamira, Dr. Rainério Meireles da Silva (2014, personal interview) points out that this number is outdated, and the last population census was carried out in 2010 and the population has grown since then. The city does not have official statistics on the current population size. Leite et.al (2013:3) published a special report on Altamira, where according to her, the urban population of Altamira jumped from 100,000 to 140,000 between 2011 and 2013. While the exact number of people is unknown, the outcomes of the inflow in population clearly bring problems to the local environment. Although the city of Altamira is not large in terms of population, it is immense in area. Its territorial area is 159,533 km² (IBGE 2015)⁴⁸.

The PBA prepared by Norte Energia and its partners imply that the urban development plan cannot be done solely by the private sector; cooperation between public and private sectors should happen as the urban development plan also affects the local government's plans of action. (Norte Energia 2011 Vol.3:10-12) The document includes a detailed list of improvements to be done in Altamira and in the neighbouring cities alongside with the construction of the dam. The improvements listed include:

- As Belo Monte's reservoir is being built very close to the core of the city, some areas are at risk to flooding. Residents living next to the river should be allocated to safer zones, and river banks should endure environmental recovery.
- Improve the housing and sanitation conditions of the resettled population
- Build new residential areas in the city capable of accommodating the migrant workers and the resettled urban population
- Build a residential area for the incoming workers, to be integrated to the urban area of the city of Vitória do Xingu
- Facilitate the interaction between local and incoming population
- Provide adequate urban infrastructure to accommodate the population influx into the urban centres of Altamira, Vitória do Xingu, Belo Monte, and Belo Monte do Pontal
- Restructure the existing road system in urban areas and road connections to the construction sites.

A personal interview was conducted with an urban architect⁴⁹ working for one of the contractors hired by Norte Energia. The interviewee is responsible for many of the construction projects undergoing in Altamira, Vitória do Xingu, and to some extent also the

⁴⁸ Note from author: for a comparison to my readers, this is equivalent to about half the area of Finland.

⁴⁹ The interviewee preferred not to be identified. For this reason, he is referred to "the urban architect interviewed".

neighbouring city Anapú. Projects include the implementation of a sewage system, construction of a new neighbourhood allowing the relocation of the population, construction of bridges, harbour, public transportation system, and a promenade replacing the palafitte houses that are currently being removed. The interviewee acknowledges that Belo Monte brings some negative impacts to the surrounding areas, and that there is a great debate whether the presence of the power plant is good or bad for the region. Nonetheless, as an urban architect, s/he sees the development of the city as a great opportunity for the local population because without the dam, the city would not have such heavy investment in infrastructure, and these betterments would not happen at the pace they are happening now. S/he describes the entire city going through renovations, as plumbing work is being done to all houses that had been registered by 2008 when the PBA was being prepared.

“The construction of the sewage system is very important for the city. So far the residues of the entire town have been going directly to the river. The sewage system will greatly affect the quality of life of the population; will provide positive effects to the health of the people, and the quality of the water...” (urban architect 2014: personal interview)⁵⁰

From an urban development point of view, the undergoing infrastructure developments in the city of Altamira have a positive effect indeed. Roads and bridges are being built, as well as schools, hospitals, houses, squares, promenades, etc. There is heavy investment in civil engineering in the cities directly affected by Belo Monte.

Since the Belo Monte constructions started, several thousand people moved to the city in search for jobs and new opportunities. “There are newcomers from all different social classes, from construction workers with no education to high class engineers”, says the urban architect interviewed.

Leite et.al (2013:3) describes Altamira as a city turned into “a chaos of traffic, violence and rising prices”. Several interviewees commented on the local traffic. The urban architect interviewed (2014)⁵¹ compared the local traffic with that of the city s/he grew-up, and said that un-written traffic rules in Altamira are very different from those of larger metropolitan cities. Although metropolitan cities have more vehicles on the streets, Altamira’s signs are insufficient. The interviewee claimed that pedestrians are highly vulnerable in the city, and warned me to be double-careful when walking on the streets of Altamira. Dr. Rainério Meireles da Silva, secretary of planning of the city of Altamira, claimed in a personal interview (2014) that street signs and traffic planning are the city’s

⁵⁰ Interview given in Portuguese. Free translation by author.

⁵¹ Identity preserved

top priorities⁵². Also in a personal interview (2014), Luciane Madruga one of the directors of the Regional Hospital, said that a large portion of the patients in that hospital are there due to traffic accidents. Madruga adds that, in her opinion, the main problem generated by the population inflow is the chaotic traffic.

“Although Altamira is the largest municipality in the country, an immense area of 159.533,730 km² (IBGE 2015), the city never had public transport before. Nowadays there are buses to and from Belo Monte construction sites and the city centre. There are also boat transportation systems, as well as taxis, moto-taxis, and carts pulled by donkeys. Bus lines between the city centre and the newly built urban areas are also part of the city planning.” (Urban architect 2014)⁵³

⁵² Note from author: During my empirical research, I also witnessed problems in traffic in the city of Altamira. Cars and motorcycles often did not respect the indicated speed limits of the streets, many streets lacked traffic signs and adequate lighting. One incident was particularly curious: the empirical research was conducted one month before the local elections. The hotel I stayed was in the same street at the Regional Hospital and had a low speed limit. While walking to get some dinner, I was surprised (and nearly ran over) by several pickup trucks with about nine women on the back screaming and waving flags with the picture of the mayor in it. I don't know what was more surprising: the high speed that the trucks were going, or the sexist and unsafe electoral campaign. This incident got me thinking that if traffic accidents are a major problem in the city, and traffic planning is one of the city's top priorities, why did the local administration choose to use unsafe over-speeding in their electoral campaign?

⁵³ Interview given in Portuguese. Translation by the author

3.7.3 *Formalisation Of Land Tenure*

Arguably the costliest, most time consuming, and problematic service for the affected population is the formalisation of land tenure. The PBA plans include resettlement of a large number of urban and rural residents, a reorganisation of remnant land areas, and the formalisation of land tenure for informal settlements, including public, private, and communal land areas. In paper, both land owners and land users have the right to receive compensation. The EIA prepared by Ibama in 2007 served as a preliminary population census that would define the number of land owners, and the number of properties to be compensated for. Additionally, the PBA from 2011 included new socio-demographical studies of the affected population (Norte Energia 2011 Vol.2:311).

Around 52% of the real estate properties on the land area directly affected by Belo Monte constructions are not formalised (Norte Energia 2011 Vol.2:19). In a personal interview, the secretary of planning of the city of Altamira, Rainério Meireles da Silva (2014), warned that the number of informal land and real estate properties might be even higher than the reported numbers by Norte Energia. Meireles da Silva explained that the land tenure situation in the region is very complicated, as a large portion of the population live on lots with no documentation. The process of formalisation of land tenure, both in rural and urban areas is slow and difficult, as it involves conflicts of interest. Meireles da Silva argued that this is one of Altamira's immediate needs, but due to its complexity, it is a long-term process that is being pursued jointly with land-use planning of the city.

The pace of the dam constructions and the company's immediate need of land does not coincide with the slow public process of formalisation of land tenure. Norte Energia cannot afford to wait for slow bureaucratic processes. As a result, people are being displaced by force before formal resolutions.

I was told about one such irregular displacement. An interviewee of mine was an agricultural worker who had two homes: one in the city, and another one in a small island in the Xingu River, none of which are their primary or secondary homes. Her case is a prime example of that multi-sited household phenomena described by Padoch et. al (2008:1) as mentioned earlier in chapter 3.6.

My interviewee's family's income relied on fishing and agricultural goods produced in the island, which would be sold in the city. Recently one of her sons started working for the dam construction, and he now lives permanently in the city. When the preliminary population census was conducted by Ibama in 2007, the family happened to be on the island working on their land and their house in the city was closed. According to my interviewee, the company regarded her house an abandoned shack, and therefore the family was not included in the original list of affected urban population. Her family has no documentation for the lot of lands they live and work in. They are illiterate. They don't know if they will ever receive any compensation from Norte Energia, or to where they will be displaced to. The family was forcedly removed from the island a couple of months

before our interview, and now they are being removed from the house in the city as well. The interviewee explained that traditionally, the riverine people like her usually have two homes: one in the city and one in the rural area. She considers both places are her family's home, and she wishes to be compensated for both. She looked at the ground and said: "They said I can only live in one place, but I have two homes, how could I choose? Now soon I have none."

My interviewee is not the only one with problems in the land tenure formalisation process. In September 2015, *El País* published the story of Raimunda, a riverine woman that had her rights brutally violated. According to the article, Raimunda's rural land area was properly accounted for, and when she was about to be displaced, the woman received a call from Norte Energia asking when she could remove 'her family's residues from the island', as they needed to start the construction works in that region. The woman agreed upon a date with Norte Energia, and the day before that, she went from the city to the island to pack her things. Her house was on fire. The article by *El País* states that the incident has been reported to the police, and that Raimunda was informed that Ibama had forbidden Norte Energia to remove any riverine peoples from their lands.

3.7.4. Resettlement

Norte Energia emphasises that the residents in Altamira are only to gain from their relocation, as they will move to a more developed area, with improved social services.

“Construction plans include moving hundreds of people from rural areas and around two thousand Altamira families who nowadays live under precarious conditions.” (Norte Energia 2011)

Figure 15 is an example of a palafitte house (also known as stilt house) from Rua da Peixaria. The notice board with the logo of Norte Energia on the left reads “Do not occupy or build. Protected area for public use. Authorized resolution by Aneel number 3,293”⁵⁴.



Figure 15 Example Of A Palafitte House In Altamira. (Photograph By Author)

During my fieldwork in 2014, I visited a neighbourhood of palafitte houses, and had the opportunity to interview some of the residents. The palafitte houses that I got to know during my visit to Altamira, on Rua da Peixaria, were mainly built with wood. As the houses were built on the Xingu river bank, in an area of the city that floods annually, the houses were raised on pylons over the surface of the soil. Most houses were connected to their neighbour’s houses, although there were some empty areas as well, with what remained from the homes of people who had already been resettled. One of my interviewees allowed me to enter her home. “As you can see, my house breathes air” she explained, showing me the holes between one and another piece of wood on the wall and on the floor.

⁵⁴ Translation by the author

“They say my house is precarious. You can see it is not. It is a beautiful house. My family has built it with our own hands. These holes here are on purpose: we don’t need air conditioning. The breeze comes in and we have fresh air day and night. The houses that they are offering are all closed and hot.” (Resident of a palafitte house 2014: personal interview)⁵⁵

I asked her about the rain and also about the water of the river. “Well if it rains too much we need to leave the house. Our neighbour lost everything last year, because her house flooded”- She responded. By the end of this interview, I had understood that the conception of precarious and unsafe, or decent and secure, can be very different according to context.

I also visited Jatobá, one of the resettlement areas. I was taken there by the urban architect interviewed, who showed me the facade of the houses. As seen in Figure 16, the streets on the resettlement are paved. The streets have all been levelled, and trees are being planted next to the sidewalks. The sidewalks are level, are adapted for the visually impaired, and are wheelchair accessible. All the houses have the same size and shape.



Figure 16 Jatobá Settlement Area, Altamira. (Photograph By Author)

“The relocation of the people is also very important, although it is a really complex issue. It involves so many things... But the conditions these people lived in were unacceptable. The palafitte houses were poorly built; the relocation settlement has proper houses, sewage system, streets, legal documentation, etc.” (urban architect 2014: personal interview)

According to Norte Energia (2012), after conducting a preliminary population study, the company has made a decision to resettle 7,637 families, around 20,000 people. The study revealed that 54% of the houses catalogued were equal or smaller than 60 m², 23% of the houses were between 60 m² to 100 m² and the remaining 27% of the houses catalogued were larger than 100 m². Based on that information Norte Energia announced that

⁵⁵ Interview given in Portuguese. Translation by the author

they would build houses of three sizes: 60 m², 69 m² and 78 m², each in a land area of 300 m², independently of the size of the house. The houses are all one storey high and have two to three bedrooms. Although Norte Energia had promised houses of three different sizes, the Public Defender's Office of Altamira (2013) published a note that only 62 m² houses were built, the material used for the construction were not the same as promised, and the changes were not communicated to the population affected.

Even though the houses delivered by Norte Energia to the population are newly built, they have already presented problems. In practice the resettlement areas are already falling apart. In September 2013 the Public Defensor's office of the state of Pará fined Norte Energia for building inappropriate houses that have not received prior approval from the city. The housing plans do not follow the municipality construction codes: internal walls are too thin, kitchen coating height is too low, toilets are only accessible from kitchens, bathrooms are too small, bathrooms for the disabled are too small and do not follow norms, electrical installations are done inadequately and are potentially unsafe. (Defensoria Pública do Estado do Pará 2013).



Figure 17 Water Damage In The Toilet Of A House In The Resettlement
(Photo By MAB 2014)

There have been reports from MAB – Movement of People Affected by Dams (2014) that residents of these new houses already suffer from broken pipes, mould, cracking walls and lack of water. Figure 17, from MAB, shows a toilet in one of the houses of the resettlement. The case of water damage is evident. According to MAB, in 2014, when only 200 families had moved to the urban settlement, Norte Energia received at least 10 complaints per day for problems related to the houses received.

As everything in the Belo Monte controversy, there are several sides to the same story. While palafitte houses are seen as beautiful and functional homes for many of the people

living there, they are seen as precarious and unacceptable to the government, architects and engineers. The resettlement is, as many other aspects discussed, complex and delicate. It is essential that the palafitte houses are removed because that area is to be flooded. Moreover, the houses shouldn't have been built there in the first place because this is supposed to be a protected area. However, even if the local population built their homes in an illegal land area, they still have the right for proper housing and shelter, free from infiltration, and with the an architecture that follows accepted norms.

3.8 Economic Aspect: Costs Unaccounted For

3.8.1 Growing Budget

When Norte Energia won the public auction in 2010 for the concession of the Belo Monte Dam Complex, the company offered that the price of the energy produced by the dam would be 77,97 BRL⁵⁶ per MWh (Megawatt-hour), which was 6% lower than the initial bid (Aneel 2010). Eletrobrás, the State-owned electricity utility company signed a contract with Norte Energia that they would buy all excess energy produced for 130 BRL⁵⁷ per MWh (Leite et. al 2013).

According to Norte Energia's website, the company "will sign a contract for commercialising the electrical energy within a regulated environment, with the distribution concessionaires, at the sum of 62 billion BRL⁵⁸, relating to the supply of 795 million MWh." Additionally, the company is to pay 16.6 million BRL⁵⁹ annually to the Federal Government of Brazil for the use of public property and is also to pay a sum of 200 million annually for the Federal Government of Brazil, for the State of Pará and for the municipalities in the areas affected by the plant as a compensation for the use of hydro resources. (Norte Energia 2016a)

⁵⁶ 31.18 EUR and 44.44 USD according to the currency conversion on the date of the public auction, and 22.51 EUR and 25 USD as per 17 May 2017

⁵⁷ 52 EUR and 74 USD according to the currency conversion on the date of the public auction, and 37 EUR and 41 USD as per 17 May 2017

⁵⁸ 18 billion EUR and 19,84 billion USD according to the currency conversion on the date of the public auction, and 24.8 billion EUR and 35.34 billion USD as per 17 May 2017

⁵⁹ 6.64 million EUR and 9,45 million USD according to the currency conversion on the date of the public auction, and 4.8 million EUR and 5.3 million USD as per 17 May 2017

When Aneel, the Brazilian Electricity Regulatory Agency announced a public auction for the concession over Belo Monte in 2010, the dam's budget laid on the ball park figure of 16 to 19 billion BRL⁶⁰ (Aneel 2010).

The company won an auction in 2010 by offering an initial budget of 16 billion BRL. In 2011 the budget jumped to 23 billion BRL, and in 2013 was corrected to 28.9 BRL billion, due to inflation restatement of contracts signed back in 2010. (Norte Energia 2016a) The sum was revised again and has grown to over 30 billion BRL⁶¹ (see for example Pereira 2013, Veja 2013, Monteiro 2015). Belo Monte's constructions are financed by BNDS, the Brazilian Development Bank. According to the bank's charts (BNDS 2016) Norte Energia S/A has received thus far a total of 28,740,665,307 BRL⁶² for the constructions of the Belo Monte dam.

When reviewing Brazil's historic inflation rates to compare nominal prices with real prices (inflation.eu), it is possible to note that since 2010 Brazil's annual inflation has been of about 6%, and 10% in 2005. Taking the inflation into consideration, the corrected budget to Belo Monte should have been around BRL 23.5 billion in 2016, but it is over BRL 30 billion. How can such large difference be explained?

According to Pereira (2013), one significant factor for Belo Monte's budget increase is the work delay due to worker's strikes and indigenous protests. It is estimated that the dam's constructions are one year late due to such paralysations. Furthermore, costs related to the worker's accommodation, logistics, and environmental impact mitigation projects were underestimated. (Monteiro 2015). It is suggested that there is more to it than work paralysations and underestimation of costs. Monteiro (2015) recommends that a thorough revision of Belo Monte's budget should be investigated by Lava Jato. The contractors working on Belo Monte are the same companies involved in the Lava Jato corruption scandals in Brazil (see for example Amora 2015, Barrucho 2015, Brum 2015, Carvalho 2015).

Despite possible links to corruption scandals, Belo Monte's ever growing budget is not an exception among dam constructions. Fearnside (2016:48-49) argues that there are hundreds of unprofitable dams worldwide, that in general terms dams cost more and take longer to build than originally assumed. Ansar et al. (2014: 43-56) made multi-level regression analysis of costs and cost overrun, as well as implementation schedule and schedule slippage of 245 large dams. The aim of this analysis was to discover inaccuracies between actual outcomes versus planned forecasts. The study concluded that 75% of large dams worldwide have suffered a cost overrun, and that costs are on average 96% higher than estimated costs. Also, 80% of large dams have suffered a schedule overrun, on average 44% (or 2.3 years) higher than the estimate. (Ansar et al. 2014: 48). According

⁶⁰ 6.4 to 7.6 billion EUR according to the currency conversion on the date of the public auction

⁶¹ 8.7 billion EUR and 9.6 billion USD according to the currency conversion in 17 May 2017

⁶² 8,334,792,939 EUR and 9,197,012,898 USD according to the currency conversion in 17 May 2017.

to that study, this poses an overwhelming evidence that budgets of dams are systematically biased below actual costs, and the authors suggest that there are two explanations for this: the first is a psychological delusion, or a “planning fallacy” of too optimistic plans, and the second a political deception from proponents of the dam, possibly due to misplaced political incentives (Ansar et al. 2014:44).

3.8.2 External Costs

One of the reasons for dams’ budgets to grow are that initial environmental impact assessments are not capable to take all non-dam infrastructure costs into account. Fearnside (2016:49) claims that the non-monetary socio-environmental costs of hydropower are not weighed critically enough when making decisions on energy options. Sousa Júnior and Reid (2010:250-258) conducted analysis on risk scenarios for Belo Monte taking into account those external costs. Their conclusion is that the costs of Belo Monte are likely to be greater than its benefits. The scholars identified non-dam infrastructure required for the construction of the plant (transmission lines, sub-stations, maintenance areas, roads, etc.), as well as social, economic and environmental feasibility costs.

The external costs that could be quantified, according to the authors, are losses in fishing, losses in ornamental fish collection, losses in water quality, loss of agricultural and livestock activities, losses in water through evaporation, losses for tourism, and costs related to GHG emissions. External costs that could not be quantified are for example the value of non-commercial fauna and flora, the value of recreation, loss of commercial and aquatic species, archaeological and cultural sites associated with the traditional communities, direct economic losses for these communities, access to clean water, farmable land, etc. (Sousa Júnior and Reid 2010:250-258).

The authors argue that when taking external costs into consideration, the cost benefit ratio of Belo Monte is not viable. According to them, the risks and uncertainties related to these externalities make the construction of the dam economically unfeasible, but the key elements for decision making of Belo Monte were not the true costs of the dam, but the government’s strong emphasis on energy-economic production correlation, as energy availability is commonly associated with gross domestic product (GDP). (Sousa Júnior and Reid 2010:250-258).

3.8.3 *Lobbying From The Private Sector*

There are suggestions that the mining sector and construction companies have lobbied in favour of the dam. (Barbosa 2015:136) Both sectors have a lot to gain from Belo Monte. The interests of construction companies are obvious: as seen in previous chapters, the construction companies are directly involved with producing the EIA and PBA, and are co-responsible for the urbanisation projects of the region.

The mining industry is interested in Belo Monte because the Xingu River is rich in gold and other rare natural resources as diamonds, niobium and copper (Poirier 2012). Prior to the construction of the dam, these resources are difficult to extract due to the intensive river flow. The construction of Belo Monte Dam can potentially facilitate the extraction of the resources as the river levels are maintained at the "low-level" point consistently throughout the year (Belo Sun 2012).

The Canadian company Belo Sun Mining Corporation is currently in the process of obtaining licences to operate a goldmine in the region (Barbosa 2015:135) and the process has already shown irregularities (Poirier 2012). Belo Sun's EIA was published in 2009, before Belo Monte's constructions begun (Leite 2016) and the cumulative environmental impacts were not taken into consideration. As Belo Monte's impacts on the river flow makes mining easier in the region, it is plausible that the mining industry may gain boost in the region, and the resulting social and environmental impacts of the mining industry cumulated with the dam's impacts are unprecedented and unknown.

3.9 **Lessons Learned From Other Dams In Brazil**

The issues presented until now about Belo Monte's social and environmental impacts are not issues particular to this specific location. Traditional peoples of other regions of Brazil struggle with similar issues as the ones described previously, and the disregard for the environment, as well as for the warnings from academics are not unique to the Belo Monte case. Before moving to the analysis of the Belo Monte controversy and creating scenarios for the future, this last subchapter presents examples of experiences from the past lived in other regions of Brazil. Three Brazilian dams currently in operation were chosen to be used as a comparison and an inspiration for thinking about the future of Belo Monte. Two of them are also tropical dams located in Amazonia, and one of them is located in the South of Brazil in the border with Paraguay.

The *Tucuruí Dam* completed in 1984, was built in a tributary river of the Amazon River, and also in Amazonia, in the state of Pará, the same state where Belo Monte is being built⁶³. Although Tucuruí's engineering is considerably different from Belo Monte,

⁶³ Shown in the map in Figure 3, page 24 of this paper.

the surrounding ecosystems of the two dams are very similar. The region also has a culturally diverse society like Altamira. The impacts caused by the construction of Tucuruí are still object of studies and debates (See for example Curtarelli 2016, Chen 2015). The construction plans of the Tucuruí Dam were imprecise and significant changes were made during the implementation phase. The location of the dam, for example, was moved 7 km away from its original plans due to geological conditions of the region, and the reservoir had a projected submerged area of 1,630 km², but ended up with 2,850 km² (La Rovere et.al. 2000:20).

The *Balbina Dam* completed in 1989, is a classic example of how things can go wrong. Balbina is described by the Brazilian Ministry of Mines and Energy (MME 2016c) as “the worst environmental crime committed in the history of Brazilian engineering”. In order to redeem for the proven environmental crimes committed by the construction of the dam, and to improve the cost-benefit of the plant, floating solar panels are currently being installed on Balbina’s reservoir. The panels are to be connected to the power plant and this hybrid solar-hydropower is a pilot project described as an innovative solution to improve the efficiency of the plant. (Logiuratto 2016, Cooke 2016)

The *Itaipú Dam*, completed in 1984, is located in the South of Brazil, on the border with Paraguay. It is currently the largest working hydroelectric power plant in the world (Itaipu Binational 2010). According to the federal prosecutor Andrea Vulcanis (2013:3), Itaipu’s constructions would never have been accepted had it gone through an environmental licensing process, which was only established in Brazil in 1981.

Table 3 Comparison Between Dams

	Belo Monte	Tucuruí	Balbina	Itaipú
Installed Capacity	11,233.1 MW	4,125 MW	250 MW	14,000 MW
Size of Reservoir	503 km ²	2,850 km ²	2,360 km ²	>1,400 km ² .
Population displaced	~20,000	~23,000	~1,400	~30,000

Table 3 above compares Belo Monte with the other dams described above. The table is based on Norte Energia (2016), La Rovere et.al. (2000:20), Fearnside (1989:401), Itaipu Binacional (2010), and Terminski (2013:53). The table illustrates the generator capacity of each dam, the size of their reservoirs, and the estimated number of people displaced due to the dam constructions.

Similarly to what is happening in Altamira with the construction of Belo Monte, the construction of Tucuruí also drew a large inflow of migrants. According to a report prepared for the World Commission on Dams (La Rovere et.al. 2000:82), the local population increased six fold. The region continues to experience population growth and up to the publication of that report the city of Jacundá, one of the affected municipalities, has had around 20.9% annual growth. The rapid population growth in Tucuruí also resulted in higher complexity of social problems alike these of Belo Monte, peasants and small

farmers were also removed from their lands, and resettlement homes were also insufficient for the families displaced. (La Rovere et.al. 2000:83) The majority of the population in the region is composed by migrants, spread throughout the lower social strata: workers in the informal sector, poorly-paid wage-earners, unemployed people, and house maids (La Rovere et.al. 2000:83). The report suggests that the relocation process in Tucuruí was inadequate and a number of cases referred to the courts are still open (La Rovere et.al. 2000:xiv). 23,000 people were displaced by Tucuruí's reservoir and the settlement areas are reported to experience "dramatic problems related to agriculture, health, and lack of infrastructure". (Fearnside 2016:57)

The problems that the indigenous peoples of the Xingu are facing now can be associated to past experiences by indigenous peoples in other regions of Brazil and the impacts they have had with constructions of hydroelectric power plants. The issues discussed earlier, like the disrespect for indigenous rights of informed consent, disruptive impact mitigation measures and problematic compensations are not singular to Belo Monte.

In Tucuruí, the Parakanã people suffered from an inadequate resettlement process. The indigenous group was split up and relocated several times. However, on the bright side, long-term medical care programmes and border surveillance of the indigenous reserve contributed to the expansion the Parakanã people, and with that expansion they have even established new villages. (La Rovere et.al. 2000:xvi)

In Balbina, the Waimiri-Atroari people, who lived in the region, had 10 villages flooded by the reservoir. In November 1980 the Fourth Bertrand Russel Tribunal in Rotterdam accused the Brazilian government for genocide of the Waimiri-Atroari peoples. (Fearnside 1989:411) According to recent publications, the Waimiri-Atroari were killed by the Brazilian military, both in land combat and through air force. (Reis 2014) These indigenous peoples were known to be particularly violent when defending their territory and the federal administration of that time believed that they could pacify the indigenous people with missiles. (Albuquerque Rodrigues and Fearnside 2014:56) The Waimiri-Atroari had an estimated population of 6,000 in the beginning of the 1900's (Fearnside 1989:411), in 1972 the population had declined to 3,000 and in 1982 the population dropped further to 571, later in 2014 the Waimiri-Atroari population had grown to around 1,670. (Reis 2014)

The Itaipú Dam also affected indigenous peoples, particularly the Guarani, the Ocoy, and the Tekohá Añetete. (Itaipú Binacional 2010). It is estimated that 100 indigenous communities have been impacted by the dam, and some have not yet received appropriate compensation (Pyl 2010).

The companies behind the dams described all have projects aimed at providing support to the indigenous populations affected by the dam (Norte Energia 2016b, Itaipu Binacional 2010, Eletronorte 2016). The projects include healthcare services, education, demarcations and surveillance of lands.

4. CREATING THE SCENARIOS

The process of building the scenarios for this master's thesis was based on the eight steps to develop scenarios by Schwartz (1991:241–248), as described in chapter 2.2. In this chapter I present scenario logics and how I fleshed out each future state through a very large table originally based on the PESTEC table (Heinonen and Ruotsalainen 2013:22).

4.1 PESTEC Table

Table 4, the Table 4 PESTEC Table is as a systematic way of summarizing the Belo Monte controversy and organising issues in different aspects. The table can be perceived as a summary of the findings broken down into six aspects: political, economic, social, technological, ecological and cultural. The issues presented in this table are the *driving forces* identified for the scenario building process.

The numbers in parenthesis are the page numbers of the headers of chapters or sub-chapters where the issue has been discussed earlier in this thesis. The cells with a white background indicate *predetermined elements* that are already consummated events. The cells with a dark-grey background are *uncertain elements* that may change in different scenarios and are examined further in The, the Scenario Table.

See for example, on the first line (P) and fourth column (Technological Aspect), I have the text “Efficiency of the power plant (34)” on a white background. This means that the issue on the efficiency of the Belo Monte Dam is a technological issue with political implications, and that this topic has been discussed in a chapter starting from page 34, which is the subchapter “3.2 Technical Characteristics Of The Hydroelectric Power Plant” where I present the installed capacity and average energy production of the dam.

Some predetermined elements deserve further explanation, because depending on the context, they can also be considered uncertain elements:

- *Brazil's growing needs for electricity.* The reason this is a predetermined aspect is that this is a slow-changing phenomena that is already in the pipeline, and also because it goes in agreement with the Brazilian Ministry of Planning, Budget and Management (2013) scenarios for 2021.
- *Technical capacity of the Dam.* The technical capacity to generate energy from the stream is considered a predetermined element because the construction of the plant was done based on certain engineering specifications and these are not questioned for the purpose of this thesis. Nevertheless, if new dams are built in the future in order to regulate the water flow of the river, the efficiency of the power plant may increase. (See more in chapter 3.2.)

- *Population growth, ecological stress and high prices in the City of Altamira.* These are predetermined issues because they are already consummated events and inevitable, also because Altamira is a city that is geographically isolated and constrained.
- *Income inequality.* Although this issue was not deeply discussed, it permeates both economic considerations and social development chapters. Additionally, the Gini Index (2012) suggests that this is a slow-changing phenomena in the Brazilian context.
- *Biodiversity loss.* It is a predetermined issue for being an already consummated fact. The level of loss, however, is uncertain.
- *Complex definition of the traditional peoples in the region and the conflicting values of different interest groups.* The conflict of interest is an inevitable collision that permeates the daily lives of the traditional peoples as discussed in the introductory chapters of this thesis, as well as in the political aspect chapters and also on the chapter on indigenous peoples.
- *Ethnocide.* This is a predetermined issue because it is also an already consummated event. This issue was discussed in chapter 3.6.3. this is a term used by the Federal Prosecutor Thais Santi (2014) when describing the disruptive impact mitigation measures conducted to the indigenous populations, particularly the Emergency Plan.
- *Corruption.* Although there is no single chapter dealing with the topic in depth, issues related to corruption are present throughout the documentary analysis. The Lava Jato corruption investigations were briefly mentioned in the chapter on economic considerations. Although the level of corruption and how corruption will be dealt with is uncertain, the presence of corruption is certain. Therefore, it can be argued that the presence of corruption is a predetermined element which carries critical uncertainties.

Table 4 PESTEC Table

	Political	Economic	Social	Technological	Ecological	Cultural
P	Acceleration of Growth Programme PAC (36)	Interests of the private sector (e.g. mining industry) (83)	Brazil's growing needs for electricity (36)	Efficiency of the power plant (34)	Damming more rivers in Amazonia (34)	Questionable FPIC (56)
E	Creation of jobs (36)	Return over investment (80)	Rise of prices in Altamira (71)	78 or 130 BRL/ MWh? (80)	Losses for fishing and other traditional living (48)	Conflicting values between interest groups (44, 56, 64)
S	Electricity to supply 40% of Brazil's residential consumption (36)	Income inequality (88)	Urbanisation (70)	Housing conditions (75,77)	formalisation of land tenure (75)	Ethnocide (64)
T	Investment in Renewable energy (36)	Risks and external costs (82)	IT and vocational training to population (70)	Technical capacity of the dam (33)	Run-of-the-river hydroelectricity (33)	Decisions taken only by cultural hegemony (56)
E	Licencing procedure (38)	Deforestation (48)	Population growth: ecological stress (56)	GHG Emmissions(46)	Biodiversity loss (46)	Over-exploitation of natural resources (48)
C	Priorities of the national government to cultural hegemony (36)	Emergency Plan (64)	complex definition for "traditional peoples" (56)	Traditional peoples also want hi-tech devices (67)	Indigenous reserves are "green islands"	Cultural preservation or destruction? (64)

The cells with a light background indicate *predetermined elements* that are already consummated events. The cells with a dark background are *uncertain elements* that may change in different scenarios. Numbers in bracket refer to the pages where these issues have been previously discussed in this paper.

4.2 Fleshing Out The Scenarios

The Scenario Table was constructed to flesh out the scenarios that will be presented in the next chapter. This very long table is based on the uncertain elements or driving forces identified in Table 4 PESTEC Table.

4.2.1 *Some Considerations About The Scenario Table*

As mentioned in the introductory chapters, this thesis is an exercise of holistic thinking, but there are so many issues that can be included in the research. Although the The Scenario Table is mainly based on the issues presented in chapter 3, the table also includes some aspects that have were not selected as main topics of discussion earlier, but should be mentioned before constructing the scenarios. These are significant issues and could be further investigated for example in a doctor's dissertation. The topics not previously examined that are included in the scenario table are:

- *Demarcation of indigenous lands*: this is a very complex issue and several changes related to it are currently occurring in Brazilian politics. This issue would deserve an entire chapter, if not a completely new thesis.
- *Corruption*: As already said before, this is a predetermined element, which carries critical uncertainties. The Lava Jato investigations are ongoing and new findings are constantly being published. These findings by the federal police may play an important role on the futures of Belo Monte and the affected population.
- *Global climate change*: some common knowledge of the subject was taken into consideration for the construction of the tables and scenarios.
- *Livestock*: The issue was raised during a personal interview with the secretary of planning of the city of Altamira. The and the scenarios take into consideration a growing trend of livestock production in Amazonia (for more about this issue, see for example Aguiar et.al 2015 and Latawiec et. al. 2014)
- *Tourism*: although the topic was discussed in personal interviews, the results were not explicitly written down in the final version of this thesis. It could have made part of the economic considerations chapter, for example.
- *Drugs and prostitution*: These are growing elements in the subculture in urban Altamira, and deserve to be researched in depth. Due to lack of expertize in this field, to the sensitivity of the topic, and to strive for personal security, I have made the decision of not researching this aspect further. Even though I have not included any questions related to drugs and prostitution on my interview scripts, interviewees often brought the subject up with concern. "*Looking at the future of Altamira*

without considering the future of drugs and prostitution here, is like studying immigration in USA and not considering illegals.” - one of my interviewees warned.

- *Social movements:* Although some social movements were briefly mentioned thorough the research, this aspect was not closely examined.

Dengue, Zika and Malaria: Norte Energia has conducted a programme in Altamira and the region affected by Belo Monte to fight malaria, and the results of this project has been successful. This is an important positive contribution to the health of the local population (Norte Energia 2015). However, when the water flow of the Volta Grande do Xingu becomes lower, the region may be more prominent to mosquitoes, flies, and other insects, as stagnant pools of water ought to become more common. With the rise of number of such insects, the region may also suffer from a rise on arthropod-borne diseases like as dengue, zika and malaria. The fight against malaria was an important contribution of Norte Energia to the health of the local population.

4.2.2 How To Read The Scenario Table

Each line represents one uncertain element, and each column represents one future state for it. By reading the table top to bottom, it is possible to understand the scenario logics and see how each of these elements come to be in that particular alternative future. By reading the table from left to right, it is possible to see how each scenario differs from one another in each of the aspects. The numbers in parenthesis refer to the page number of the beginning of the chapter where a certain topic was discussed in this paper. The cells with a white background refer to results originated from the literature, the cells in light grey refer to results from interviews, and the cells with a darker background highlight personal creative input to the scenarios. The table also includes the following symbols that are indications of how issues change in the different futures states compared to the present. The arrows are a visual representation of the text written in each cell:

- = For issues that might remain very similar
- ↓ For issues that might decline (less of something)
- ↓↓ For issues that might decline strongly (much less of something)
- ↑ For issues that might increase (more of something)
- ↑↑ For issues that might increase strongly (much more of something)
- ≠ For issues that might be very different to today, and therefore cannot exactly be compared to the present with an increase or decline.

Driving Forces		Continuation		Perfect Storm		Lucidity		Black Swan	
Ecological Aspect	<i>Process of damming Amazonia (36)</i>	↑	Endures: Rise on the number of dams under construction.	↑↑	Intensify: Several new are built and more dams are under study.	↓↓	Decelerate: Stricter environmental laws pose a barrier on construction licences of large proportions, decelerating the pace of these constructions.	↓	Some new dams are ongoing, but it is harder to obtain licences due to improved FPIC procedures.
	<i>Damming the Xingu River (36)</i>	↑	Small dams in the Xingu River and its affluent have been proposed to control the water flux of the Belo Monte Dam.	↑↑	Old project that planned to dam the Xingu in several parts is reconsidered.	=	No new dams are planned for the Xingu River.	↓	Restoration of the river, dam is on the process of being removed
	<i>Severity of biodiversity loss (48)</i>	↑	High: Several species disappear from the region.	↑↑	Very high: Several species disappear from the region. Some species are completely extinct.	↑	Medium: Few species disappear from the region	↑	Low: Several projects to revitalise local biodiversity
	<i>Forest preservation (50)</i>	=	Pressure on legal logging in the region instigates illegal deforestation.	↓↓	Uncontrolled illegal deforestation instigates acts of violence. Environment protection lacks funding.	↑	Investment on environmental preservation, especially inside new indigenous lands.	↓	Illegal logging is overlooked by officials

Figure 18 Screenshot Of A Piece Of Table 5 As An Illustration How To Read The Table

Figure 18 is a screenshot of a piece of the Scenario Table, and is used here as a visual representation to better explain how the table can be read. When reading the table from left to right, we can observe how the driving force “Damming the Xingu River” differs in each future state represented by each scenario. This driving force is a topic within the Ecological Aspect of the Belo Monte controversy. Number 34 suggests that this topic has been discussed in page 36, which is chapter 3.2 “Technical Characteristics Of The Hydroelectric Power Plant”. In the Continuation scenario, we expect that a few small dams are built (or at least are being proposed to be built) to control the water flux of the Xingu. This is based on results from the literature (note that the background of the cell is white). On the Perfect Storm scenario, the Xingu River is massively dammed, as the old project for damming the Xingu is taken back to the table of decision makers. Note that the background is dark, so it means this is my own idea of a stormy future and nowhere in the literature there is a suggestion that this could happen. The cell that belongs to the Lucidity scenario is based on the results of interviews (light grey background) and suggests that the damming of the Xingu River remains the same, that is, no new dams are built, while in the Black Swan (my own input, dark background) the river is undergoing a process of restauration, and the dams are being removed.

If we read the table from top to bottom, we can notice cells in the Continuation scenario are mostly white (based on the literature), cells in the Perfect Storm are mostly dark (my own input), the Lucidity scenario is mainly light grey (resulted from interviews) and the Black Swan is a good mix of dark and light grey (my own input and results from interviews).

4.2.3 The Scenario Table

Driving Forces		Continuation		Perfect Storm		Lucidity		Black Swan	
Political Aspect	<i>Complexity of the Environmental Licencing Procedure (38,42)</i>	↓	Procedure is simplified. Three-stage licencing is no longer in effect.	↓↓	Failure of procedure due to approval of PEC 65/2012, PLS 654/2015 and PL 3.729/2004.	≠	Procedure is revised to become more democratic, including participation of civil society and the scientific community.	↑	Procedure is revised, becomes more complex and full of loopholes
	<i>Focus of licencing in political discussions (38)</i>	=	Economic potential of projects for the region and for the nation state	↓	Economic benefits for the proponents of projects	≠	Focus on the impacts themselves and the imposed risks to the affected population	=	Same as "Continuation"
	<i>Development of EIA (23,44)</i>	↓	Written by the proponents of the project in accordance to a common set of requirements	↓↓	Written by the proponents of the project using an electronic template	↑↑	Requirements for EIA are revised, well defined and publicly assessable. Public participation is required and guaranteed.	=	Revised, but in effect, no fundamental changes done
	<i>Impact Mitigation Measures (64, 70)</i>	=	Projects defined hitherto continue with no significant changes or adaptations	↓↓	Unfinished projects are abandoned after Operation Licence is granted	↑↑	Revised: projects are expanded in quality and quantity.	≠	New EIA and new PBA under study. New impact mitigation measures are put into practice
	<i>Security Suspension (38)</i>	=	Endures despite investigations because Belo Monte is a question of "energy security".	↑	Endures regardless of the confirmation to involvement with corruption cartel(s).	↓↓	Annulled due to maturity of corruption scandal investigations.	↓	Annulled due to public pressure.
	<i>FPIC (56)</i>	=	Public Hearings are mere informative meetings with no intention of consent.	↓	The local population is not consulted for changes in the project, including new dams.	↑↑	The model of consultations with traditional peoples is revised and new legislation is done on the matter	↑	FPIC is done in the form of a citizen's initiative / petition
	<i>Indigenous territories (88)</i>	=	Lines of demarcation for indigenous lands do not expand.	↓↓	Further constriction of indigenous lands.	↑↑	Indigenous lands are well demarcated and further expanded.	↑	Indigenous lands and demarcated, but poorly maintained.

		Driving Forces	Continuation	Perfect Storm	Lucidity	Black Swan				
Ecological Aspect		<i>Process of damming Amazonia (34)</i>	↑	Endures: Rise on the number of dams under construction.	↑↑	Intensify: Several new are built and more dams are under study.	↓↓	Decelerate: Stricter environmental laws pose a barrier on construction licences of large proportions, decelerating the pace of these constructions.	↓	Some new dams are ongoing, but it is harder to obtain licences due to improved FPIC procedures.
		<i>Damming the Xingu River (34)</i>	↑	Small dams in the Xingu River and its affluent have been proposed to control the water flux of the Belo Monte Dam.	↑↑	Old project that planned to dam the Xingu in several parts is reconsidered.	=	No new dams are planned for the Xingu River.	↓	Restoration of the river: dam is on the process of being removed
		<i>Severity of biodiversity loss (46)</i>	↑	High: Several species disappear from the region.	↑↑	Very high: Several species disappear from the region. Some species are completely extinct.	↑	Medium: Few species disappear from the region	↑	Low: Several projects to revitalise local biodiversity
		<i>Forest preservation (48)</i>	=	Pressure on legal logging in the region instigates illegal deforestation.	↓↓	Uncontrolled illegal deforestation instigates acts of violence. Environment protection lacks funding.	↑	Investment on environmental preservation, especially inside new indigenous lands.	↓	Illegal logging is overlooked by officials
		<i>Water reservoir (46)</i>	=	Same as planned (503 km ²).	↑	Larger than predicted. Floods in the plant occur in the wet season causing operation malfunction	=	Same as planned (503 km ²).	↓	Xingu waters not deviated to the reservoir as plant is abandoned. Some spillage is present on wet season.
		<i>Global climate change (10,89)</i>	↑	More intensive dry & wet seasons cause droughts and floods. Desertification of soil of deforested areas.	↑↑	Amazon biome is close to reaching its tipping point with unlikely return: extreme forest lost allows desertification of large areas	↑	Despite international cooperation on environment preservation of Amazonia, the region is anyway affected by climate change	↑	Prolonged droughts increase forest fires, Amazonia close to an ecological collapse.

Driving Forces		Continuation		Perfect Storm		Lucidity		Black Swan	
Economic Aspect	<i>Mining industry (86)</i>	↑	Large national and international companies get installed in the region. Large amount of workers employed by mining industry	↑	One international company gets installed and controls the entire region. Only a fraction of the revenue benefit locals.	↓	Mining is highly controlled and therefore only done small-scaled.	↑	Growth on illegal mines, as confiscation is uncommon
	<i>Work</i>	↑	Slight movement towards formalization of work, although informal work is still commonplace.	↓↓	Work is mostly irregular: significant raise on "Gold rush" migrant-workers; illegal logging, drug cartels, black market; prostitution	↑	Mainly formal, regulated work. Trained professionals do high quality work, are efficient and happy. Irregular work still present.	↓	Slight growth of informal work
	<i>Employment rate</i>	=	High number of unemployed and homeless people in the region.	↑	Low unemployment, but workers suffer from lack on conditions and from human rights violation.	↑	Although a high number of the working age population is out of employment, there is heavy investment in adult education and vocational training which includes paid internships	↓	High unemployment.
	<i>Local businesses</i>	=	New businesses open due to new needs: cars, motorcycles, better housing, IT goods, etc.	↓	Big chains get installed in the region. Small local business cannot compete with prices. Rise of black market goods	↑	Heavy governmental support for the promotion of small-scale farming. New businesses are small.	↓	Recession: Lack of consumers induce many local businesses to close down
	<i>Tourism (88)</i>	=	Small commercial flights open opportunities for tourists to visit Altamira. The Belo Monte Dam site is the favourite attraction	≠	Growth on sex tourism.	↑↑	Rise on ecotourism: national and international tourists come to get to know the infamous Xingu River and its small islands and rapids. The river bank offers a beautiful waterfront	↑	As the Belo Monte region became known worldwide due to the dam, tourism has slightly grown. But lack on investment on this area does not attract too many tourists.
	<i>Technology</i>	=	Due to miss-usage, lack of training and to the tropical weather, electronic appliances have low endurance in the region.	↓	Belo Monte is forced to buy new equipment due to low endurance and improper implementation.	↑	Trained professionals know how to fix and maintain electronic appliances. New technology from subsidized research makes energy production more effective	≠	Expensive machinery from Belo Monte being sold to other dam projects

		Driving Forces	Continuation	Perfect Storm	Lucidity	Black Swan			
Social Aspect									
	<i>Migration (71)</i>	=	Slight population growth: Constant influx and outflow of national migrants. Lower-class-migrant-workers settling permanently, higher-class migrant workers moved away.	↓	High population growth: Most workers that arrived in Altamira in 2010 stay in the region, and influx is constant.	↑	Slight population decline: As development project are more organized in a national level, migrant workers leave Altamira with secured contracts in other regions	↑↑	High Population decline: Qualified workforce migrate away from the region.
	<i>Urban development (71)</i>	=	Development of the region's urbanisation continue according to PBA	↓↓	Irregular urbanisation. New palafitte houses resurge on the river bank.	↑	New neighbourhoods, bus lines, healthcare centres, promenades, leisure areas, etc.	↓	Irregular urbanisation is somewhat present as local government remain indulgent.
	<i>Health (38, 71)</i>	↑	More hospitals and healthcare centres are slowly being opened in the region. Even though they still lack from personnel, the situation is better than before. Equipment break and they are not repaired frequently enough. Decline on malaria cases, constant control on dengue and zika cases	↓↓	Hospital still not ready by 2020. Overcrowded healthcare centres force patients to travel to other cities to get treatment. But for some, it is too late. More cases of dengue, zika and malaria. Increasing number of diabetes patients; increasing obesity in children, especially from indigenous origin.	↑↑	As the hospital gets ready, Altamira becomes a central city in the region for healthcare treatment. Tribe members and citizens from small towns travel to Altamira to get treated. More hospitals and healthcare centres are being built in the region.	=	As funding for the construction of hospitals and healthcare centres are cut, constructions are paralyzed. Existing facilities continue to function, but the conditions are the same as in the past.

		Driving Forces	Continuation		Storm		Transformation		Black Swan
Cultural Aspect	<i>Organized social movements (88)</i>	=	Minority groups organize themselves to fight for their rights, but little result is achieved	↓	Strong censorship. Strikes and protests are violently terminated. Activists produce creative solutions.	↑ ≠	Protests are uncommon due to the growing dialogue between civil society and the State. Unions of all kinds are strengthened.	=	Rise on strikes and protests but little results achieved (same-but-worse from "Continuation").
	<i>Presence of NGOs</i>	↑	As the media coverage for Belo Monte grows, NGOs of various kinds get installed in the region in support of the local population.	↓	NGOs suffer from lack of funding as well as censorship. Recess on number of volunteers due to fear. Nevertheless, NGOs are still present and fight for people's rights	↑ ≠	Unions, NGOs, and educational institutes work hand-in-hand with the State providing independent expertize work, support, and creative solutions.	=	Some NGOs that have been working in the region for decades are still present and do important investigative journalism with meaningful publications. Bus as region is abandoned from public interest, no new NGOs.
	<i>Indigenous Culture (56)</i>	↓	Indigenous peoples continue to strive for their rights, social activism ends up bringing them closer to urban population. Tribal languages and traditions dying with the older population	↓↓	Indigenous groups are dissolved almost completely. Indigenous goods are considered artefacts for museums. Researchers are discouraged to publish findings with to violent threats from an authoritarian state	↑	Indigenous children go to bilingual school; are educated, self-aware and know their rights. While some choose to leave the tribes to universities and city life, others stay and maintain a rustic lifestyle.	=	Considered "lower culture" indigenous peoples continue to fight for their rights. While some groups become "more conservative", others "forget" traditions and live lives closer to the Brazilian cultural hegemony
	<i>Appreciation of local food goods</i>	↓	Main local production is livestock, although few traditional small scale farmers still produce other agricultural goods.	↓↓	Local agriculture produce is almost inexistent due to droughts, forest fires and water pollution. Opportunity to expand livestock	↑↑	Appreciation for locally grown products promotes small-scale farming. Only special goods are imported.	=	Overexploited local produce. Most food goods imported from other regions.

5. SCENARIOS

5.1 Continuation & Amplification Scenario

A future not much different from today. Governmental actions are driven by economic growth heedless of its socio-environmental impacts.

It is 2020 and the Belo Monte has been operational since 2016, although the constructions were only finished in 2019. The dam complex has been generating energy and feeding the national grid of electricity. Hydroelectricity is the main source of renewable energy in Brazil, and the construction of the Jatobá Dam and São Luiz do Tapajós Dam in the Tapajós River are just about to be completed. Between 2016 and now, 43 other dams have been built around Brazil. The Brazilian governmental plan to expand hydroelectric set at the beginning of the century has been successful.

The expansion of hydroelectricity in Brazil is successful due to a simplification of the licencing procedure for PAC projects, where new dams are no longer subject to three-phase licencing as Belo Monte was. The implementation of hydropower is a priority in the Brazilian acceleration of growth project, as it is considered a clean, cheap and sustainable source of energy with great economic potential for local and national levels. Having said that, it is enough that the licencing body approves the project's EIA and PBA. "Public hearings" to inform the local population on what is being done are conducted.

Although it was promised that Belo Monte's yearly efficiency would be about 40% of its total capacity, this has not been the case in practice. The Xingu River water flow is not as abundant in 2020 as it was when the studies to assess the hydroelectric power possibilities were made in 1970s and 1980s. In the past, low flow levels of water remained for about four months per year, but recent studies have registered that the low flow has a longer period, and it is also dryer than before.

One of the conditions for Belo Monte licences was that the river is guaranteed a minimum monthly water flow of 700 m³ per second. (MME 2011:4) Norte Energia's reports say that these are being complied, but NGOs and local activists have reported levels of water flow lower than that minimum promised in the least favourable months. The *Volta Grande do Xingu* is dry. The water flow has stagnated to about a monthly 700m³/s (or less) during most of the year, except for the most favourable months of the wet season. As the water flow of *Volta Grande* is low during most of the year, the river and the surrounding nature have adapted to this new condition: some streams dried, while others became larger. Some small islands became part of the main land, and the geography of the *Volta Grande* has modified. The water and sand temperature have risen. Fish, frogs, turtles, and other water-dependent animals suffer from the rise on water temperature, and from the lack of a proper wet season.

While several species have completely disappeared from the region, other better-adapted species are thriving. Norte Energia continues operating environmental programmes in order to protect the local fauna. The company provides, for example, fish seeds for the region at regular intervals. One of the most popular eco-programmes offered is ornamental fish aquaculture, as well as the incentive programmes for sustainable fishery. According to the latest newsletter by Norte Energia, these programmes are a success and the local riverine population is satisfied.

Norte Energia's sustainable fishery programme also involves some indigenous communities. The indigenous communities have also been provided with basic infrastructure, including schools, healthcare centres, access to electricity, roads, runways (for aircrafts), as dictated by the PBA. The communication between Norte Energia and the indigenous communities is direct, without intervention of Funai, the National Indian Foundation.

Juçara⁶⁴ is an indigenous woman in her 20s. She is the person in charge of communications between Norte Energia and her community. She was chosen for the job due to her outspoken character, and because she is used to visiting the City of Altamira. Juçara's community is small and young.

The community leader, Moacir⁶⁵, is Juçara's brother-in-law. Moacir is a defender of the forest. Although his community is located inside an indigenous land territory recognized by the state, the land has been invaded several times by illegal loggers. The area has several sign posts indicating where the indigenous lands start and end, but illegal loggers ignore the demarcation of land, because they know that within the indigenous areas they can find larger trees which are more valuable than the ones found in the over-exploited non-indigenous territory.

Moacir's community is small, and they are struggling to maintain their indigenous identity. The community has, in general, more infrastructure than the communities of their more conservative relatives. They are equipped with a school, a healthcare centre, toilets, etc. Every week they receive visitors of various kinds in the community: teachers for the local school, social workers, nurses, doctors, construction men that come to fix something every now and then, researchers, documentarists, etc. These people often need a place to stay for the night when they visit, so the community also has a 'white-men's-house', where people can stay on temporary basis. Having outsiders in the indigenous territory on regular basis have evident disruptions on the daily lives of the community. In many ways, the indigenous community is undistinguished from other riverine communities in the region. They share the same language, the same clothing, the same architecture. Their economic activities are very similar, and as inter-ethnic relations become more common, they look very similar to non-indigenous people.

⁶⁴ Fictitious character

⁶⁵ Also a fictional character

This indigenous group has recently separated from another bigger community because of differences of opinions, mainly related to how much influence white people (non-indigenous) can have over the community. More conservative indigenous communities argue that if they want the benefits of city life, they should leave the forest and become “white persons”. Moacir and his community members reason that partial integration to the Brazilian society is unavoidable, and he defends that indigenous people have the right to visit cities for health treatments and studies. *“Healthcare helps us live longer, and studies help us not to be taken as fools, give us possibilities to defend our rights”* he says.

A new member is about to be born in the community. Juçara is with child. The latest ultrasound showed that Juçara’s baby is sideways and it was recommended to her to go to the hospital in Altamira for a caesarean. The need for a caesarean created an extra tension between Juçara’s community, and other more conservative indigenous communities. Giving birth in the hospital and staying there overnight is not the natural way a child should be born, and Juçara should may longer be considered indigenous. Moacir, the young community leader, argues with his more conservative relatives that survival is more important than traditions. They come to an understanding that Juçara should go to the hospital and make sure the baby is born safe, even if that contradicts their common practice among indigenous peoples.

But how safe is it in the hospitals in Altamira? Juçara’s only experience with the hospital of Altamira is that it is always full and it is known for the lack of resources. On the other hand, it is one of the few hospitals in the country that has specialisation on indigenous care. She contemplates that she and her child have better chances in the hospital. If there are any complications on the birth at home, it would take several hours before she can get to the hospital and that might be too late. Juçara’s mother tells her she was born in the river, and so were all her siblings, as well as their parents and grandparents. Juçara has heard from her relatives about the benefits of water-birth. Although she finds the idea of giving birth in the river romantic, she does not want to take the risk. Even though a modern sewage system was built by Norte Energia as part of the impact mitigation measures of Belo Monte, the majority of the houses in Altamira are not linked to the system and the Xingu River is contaminated by the city’s waste. Today, Juçara cannot conceive the idea of giving birth in the waters of the Xingu. They opt to book the caesarean. This was not an easy decision. She knows that giving birth in the hospital and later going back home will affect the relationship between her community and their relatives who live in more conservative indigenous communities.

There are two ways to travel from the indigenous community to Altamira: by land, or by water. If she decides to go by water, she would have to use her brother-in-law’s motor boat. Moacir got a motor boat from Norte Energia when their community separated from the larger community. Although the motor boat is fast she would have to pass through Belo Monte and that means passing by the marine travel-lift, which depending on the day, may take several hours. If she decides to go to the city by land, she will use her brother’s

pickup truck. Her brother got this pickup truck from Norte Energia even before the road to their community was ready; it is a ten-year-old-car and has its flaws. Workers from a company contracted by Norte Energia opened the forest for this road when they started to build the school for the community about ten years ago. Road lights, pavement, and traffic signs were part of the plan too, but none of these things were implemented. There has not been any work on the road for over several years and due to weather conditions the road is constantly collecting holes and indentions. Accidents have already happened on that road, and their community has already lost members due to traffic accidents. Whatever route Juçara opts for, they have to leave early in advance to ensure the safety of both mother and child.

5.2 Perfect Storm Scenario

A future where many potential hazards come to be.

It is 2020 and the constructions of Belo Monte are still incomplete. Belo Monte is only partially operational and is considered the most expensive hydroelectric power-plant ever built. The current administration shut down the Lava Jato money laundering investigations, and so the federal police no longer explores corruption frauds linked to the power plant. Despite the lack of resources from the federal police, the civil society -mainly NGOs and the academic community- have reported numerous irregularities related to Belo Monte. Allied with the environmental lawyers and prosecutors, opponents of the dam have filed several actions against Belo Monte, but the actions were all archived. None of the actions against the dam are taken forward to the Supreme Court, because Belo Monte is still protected by the Security Suspension.

Belo Monte is a priority within PAC, the acceleration of growth programme by the Brazilian government. The discourse among government officials is that the dam is intrinsic for the country's energy security. As the government is the main proponent of the dam, there is a deliberate omission of inspections, and irregularities are overlooked.

While state officials omit themselves from regular inspections, the civil society produce creative solutions to make the inspections themselves. Reports prepared by the civil society are frequently published.

Organized strikes and protests forced Belo Monte to stop its operations several times. However, the armed forces violently terminate protests, Norte Energia terminates work contracts with those workers that participate in the strikes, and social movements suffer from censorship and violent crimes.

The Xingu River is a lot drier than in the 1970s and 80s when studies were made to assess the possibilities of hydroelectricity in the Xingu. As Belo Monte's efficiency is not

as high as expected, new dams are being built to control the water flux of the river downstream. Opponents of the project claim that these new dams are unfeasible, because Belo Monte and Belo Sun mining cumulated impacts have already been too destructive. The region has suffered from deforestation at an unprecedented rate, illegal logging has instigated acts of violence and several plant species have completely disappeared. Soil desertification has intensified and the Amazon biome is close to reaching its tipping point with unlikely return. Fishery is almost exclusively a result from fish seeding, and several aquatic species are locally extinct from the natural environment.

Despite the opposition, water-flux regulatory dams have received their construction licenses, and proponents argue that the new dams are much smaller than Belo Monte, and the impacts they will cause to the region are very small compared to the potential economic benefits they may bring. Besides, the damage to the Xingu River has already been done. Water shortages in the South of Brazil are tough and proponents argue that damming Amazonia is especially beneficial for the country's strategy for economic growth because the wet season in the North of Brazil coincides with the dry season in the South.

New dams are being built not only in the Xingu River, but also in other rivers in Amazonia. The expansion of hydropower is a priority strategy in the current administration, and therefore subject to "speed licences". With the approval of the bills PEC 65/2012, PLS 654/2015 and PL 3.729/2004, obtaining licences for hydroelectric power plants are not as complicated as it was before. Once the EIAs produced by proponents of the project are presented, government agencies have eight months to evaluate the EIA, and in that timeframe, licencing bodies have the opportunity to reject the project. If government agencies involved in the procedure do not act within these eight months, it is considered that they are in accordance with the licencing, and the constructions of these projects may begin. Proponents of infrastructure projects use an electronic template to produce EIAs, and this new system allowed EIAs to be completed more efficiently and abundantly. Government agencies, on the other hand, lack resources to act according to timetable, and therefore licences are given to projects without proper evaluation. No construction can be suspended or cancelled after the project's EIA is presented, so in practice some projects already start their constructions even before the construction licence is issued.

As the power of proponents of dams and infrastructure projects grows with this new licencing procedure, the affected population loses their rights for intervening and the natural environment is being put at risk. The focus of the environmental licence procedure is not on the environment itself, but the economic benefits that the proponents of the project gain. Public hearings are organized, but as has been done in the past, they are actually only meetings where the local populations are informed about the projects. The affected population, in effect, is not consulted, and have no opportunity to give, or to deny consent. Public hearings are organized in strategic locations with difficult access for indigenous populations, and security is reinforced by the military.

While 70% of Belo Monte's energy produced is sold to public consumption, the other 30% is sold directly to local industries in Pará. The State of Pará is now the most active mining state in Brazil, bringing a positive contribution to the country's GDP. Belo Sun, the Canadian gold mining company is a prosperous company that have created many jobs in the region. Other important companies installed in Pará are aluminium smelters, and other electro-intensive industries. These industries are powered by Belo Monte's energy and price deals are made directly from one company to another.

A new group in the social strata of the region has experienced fast growth, as the mining industry is now fully operational. Belo Sun acquired their Operation License, and the Volta Grande do Xingu experiences a "gold rush". The population of Altamira and region has grown once again. As competition for unskilled work is high in the region, the average salary of a workingman is low. In order to be able to pay all the bills, many have opted to working two jobs. As a means to support income, irregular jobs are commonplace. Although the city does not experience high unemployment due to various job opportunities, informal work has risen, and workers suffer from lack of conditions and from human rights violations.

The infrastructure of the city is not adequate for its population size, but due to impact mitigation measures, Altamira and region continue to receive investment on infrastructure, and the city is constantly being renovated.

Schools and hospitals are constantly overcrowded; violent crimes have escaped out of control.

The use of narcotics has grown in Altamira, and the local government is unable to control the fast-growing illegal drug trade, nor the rise on violence associated with it. Drug cartels gain strength in the region, prostitution has risen and the violence against women is especially alarming.

The traffic in Altamira continues to be chaotic, although the city centre now has more traffic signs. Belo Monte brought some public transportation to the city, as it was part of the impact mitigation measures. Some bus lines connect settlements to the city centre and the centre to some industries, but they do not bring significant relief to the city traffic. Public transportation is insufficient for the rapid growing population and the various areas of the city are not interconnected. Driving schools have flourished in the city, and the main means of transportation is the motorbike. Small budget cars are also becoming more common.

The local business in Altamira is very different than it was before Belo Monte's establishment in the region. Large chains were installed in the region and public appreciation of these retailers affect small local businesses drastically, as they cannot compete with the prices of large chains. Chains set the prices of goods. As a counterpoint, the black market brings uncontrolled counterfeit cheap goods, offering basic-needs goods at a lower price. Consumers strive for low prices, and pay for low quality products, from clothing to children's toys, imported food and even medication. Black-market goods pose a threat

to the health of its consumers, as they do not meet quality standards. Nevertheless, access to Altamira continues to be limited due to its remote geographic location, retailers often run out of products. As supply and demand is unbalanced, the prices of goods vary constantly. The prices of food, clothing, medication and other basic-needs goods are significantly higher than those in other parts of Brazil.

Creative and agile small businesses still survive in the region regardless of the presence of large chain stores.

Perhaps the social groups most affected in Volta Grande do Xingu are the riverine people and small-scale agriculture workers. These two groups are less resilient to the socio-environmental changes that Belo Monte has caused, as they are highly vulnerable and are not sufficiently adaptive. As the course of the Xingu River changed, so did the natural environment. As a large amount of water is deviated to the dam's canal, the Volta Grande do Xingu becomes drier, and the region suffers from desertification of soil. While large-scale farmers own appropriate irrigation infrastructure, small-scale farmers suffer from drought, forest fires and water pollution. As a result, small-scale traditional farming undergoes a reduction of produce compared to two decades before, which leads agriculture workers to abandon this 'way of life' and the rural areas experience an exodus. Moreover, as large chains of supermarkets bring food from elsewhere at a cheaper price; small-scale farmers have difficulties to sell their produce in the market at a competitive price.

Moacir is the leader of the last recognised indigenous community in the region. He has travelled to the city to file yet another incident report at the police station. The complaint is once again about invasions on the indigenous reserve. Moacir has to be very careful when he visits the city, because drug lords are hunting for his head. He has recently called the authorities when members of the cartel used the indigenous reserve as a hiding place. The road from the indigenous community to the city is dark at night, and often used for illegal transport. Indigenous women wandering alone are target of violence, even within the indigenous territory. The road was constructed at first to facilitate transportation of indigenous men and women to the city. The waterways transportation became non-navigable. The river is very dry and only small vessels are able to navigate. Moreover, the marine travel-lift provided by Norte Energia is often out of order.

The interchanges between indigenous and the urban population are routine. While Belo Monte brought a range of positive services to the indigenous communities such as healthcare and education, it also brought negative influences, such as the introduction of sugar in their diets, alcohol and drugs. As part of the impact mitigation measures, Norte Energia built new houses for the indigenous communities, provided them with motor boats, cars, trucks and machinery for agricultural work. These machines are now 10 year old, many of them are broken or need repairing. As the indigenous communities cannot afford to buy spare parts, machines run in unsafe condition. Because of the influences of industrialised technology, the indigenous community has lost many of its traditional cus-

toms and, on the surface, they seem no different from other rural communities. The indigenous men and women of Moacir's community go to school, have jobs, pay taxes. The clothes they wear are exactly the same as clothes worn by the urban population, they speak Portuguese as a first language.

As younger generations were uninterested in learning the indigenous languages, these languages died out. The younger generation's disinterest in the indigenous traditions is understandable. The indigenous cultures are seen by the majority of the Brazilian population as inferior. Indigenous children learn that their ancestors were illiterate and ignorant, and traditional customs are devalued. The communities' traditions of agriculture and fishery are indeed unfeasible in the current conditions. The Xingu River is polluted and the few fish species that survive are contaminated and improper for human consumption.

One of the reasons that the Xingu River is so polluted is that the sewage of Altamira continues to be spilled into the river. Although Altamira has a modern sewage system which was built by Norte Energia, most houses are not connected to the system. The system has been shut down for several years as it is economically inviable to keep it operational when houses are not connected to the system. Moreover, several houses have done irregular connections to the system causing technical problems and leakage. The other reason for the pollution of the river is the improper waste dump from the mining industry. Due to inadequate management, the mining industry has spilled mercury into the Xingu waters contaminating the fish and all life in the riverbank.

The few indigenous and riverine peoples that remain in the Xingu suffer from lack of clean water and food, and endure severe health problems due to the contamination of the river. As the impacts have become larger, the communities' resilience deteriorated. As a result, many communities have dissolved completely. The indigenous culture of the Volta Grande do Xingu today is history, and the indigenous goods are now artefacts on the indigenous museum downtown.

5.3 Lucidity Scenario

A future where decision-making is evidence-based, and facts prevail over political power. The scientific community is more present on the decision-making process, by giving guidance and consultancy, and FPIC procedures are conducted de facto.

It is 2020 and the fight against corruption has intensified in Brazil as it has never been before. Corruption investigations commenced little over a decade ago culminated in a political and economic crisis. The heads of a corrupt representative democracy were exposed, convicted corrupt politicians could not run for office due to the *Ficha Limpa*⁶⁶ law, and innovative tools to help voters find a suitable candidate to represent them were introduced. The current administration is strongly engaged to sustainable development and democratic participation. As corruption is more difficult to occur, so is deviation of public expenditure. A large budget was allocated to transparency policies and training for public institutions personnel.

The State invested on strengthening environmental organs, allowing these institutions to hire specialised professionals, and to improve their equipment and processes. Several projects and measures to develop the country towards a sustainable economy are now being promoted. One of these measures is to heavily fight corruption at all levels of society. As part of the fight against corruption, all ongoing major infrastructure projects implicated in the Lava Jato money laundering scheme -among them Belo Monte- were carefully revised. Belo Monte's security suspension was cancelled, and the actions opened were re-opened and taken to court. Norte Energia was fined for the existing irregularities and new impact mitigation measures were established.

The legislator agencies have updated the environmental licencing laws, and EIA requirements were made into a law to meet the new agenda of sustainability. The new law was produced democratically, as it involved representatives of various interest groups in the writing process of the law itself. Initially the State promoted interdisciplinary projects at universities, where law scholars would cooperate with specialists of other disciplines such as economy, business, social sciences, history, biology, etc. to produce proposals for the new code of law. These proposals produced by the universities were then analysed and combined, and government officials produced a law proposal published in an online platform where the civil society had the opportunity to write opinions and suggestions. Public hearings were also conducted and traditional peoples were consulted. The process

⁶⁶ Ficha Limpa, or 'clean state' is the name given to the supplementary law 135/2010 that prevents candidates convicted of crimes, or who have been impeached, to run for office

of renewing the legislation is a time-consuming process, especially when public participation in the law-making process is so heavily promoted. The process has received both heavy criticisms by the opposition, as well as praise from human rights organisations.

The focus of the environmental licensing shifted to a balance between economic gain and the resilience of the environment and society affected by a given project. EIAs must present analysis of risk scenarios, and publish not only the results, but also the data and methodology used. The data collected is published, it is also verifiable, and results are therefore contestable by actors. The new licensing procedure conspire with the new government agenda, which is focused on evidence and transparency. The civil society has access to the data produced by proponents of projects, they are able to denounce evidence-based irregularities (even anonymously, when needed), and these irregularities may be inspected and confirmed by government agencies.

The current administration struggles to explain why in their administration Brazil has not significantly grown economically. Economist experts differ on opinions whether the current administration is responsible for the recent economic depression or not, and experts offer various solutions to the problems. The current administration reminds that they have been elected for a four year term, but that the administration has started several long-term projects that are not necessarily economically profitable in their early stages. The Brazilian conservative parties argue that the private sector has weakened and international investment has suffered a depression due to an unstable economy. The administration's counterargument is that sustainable development has a long-term approach, and that electorates should take into consideration the long-term benefits that the current administration is providing not only for this trimester, but for a lifetime, and for future generations.

The involvement of the scientific community on political decision making has become more common since the 2015 United Nations Climate Change Conference in Paris. Since then, cooperation between states has advanced, as there is a common understanding that cooperation is intrinsic for the development of the human species. World leaders now understand that scientists can be important assets to this development. Since the conference, countries around the globe have been pushing one another to comply with the United Nations Framework Convention on Climate Change treaty. Stricter environmental laws are being enforced globally and countries cooperate to preserve various natural environments. The preservation of Amazonia, as well as other delicate natural environments around the world became crucial in international politics. The Mercosur⁶⁷ countries now

⁶⁷ Mercado Comum do Sul (Mercosul, or Mercosur) is a sub-regional bloc combined of Argentina, Brazil, Paraguay, Uruguay and Venezuela that promotes free trade, political cooperation, fluid movement of goods, people and currency (Mercosur 2015)

have a strong cooperation with the European Union and the ASEAN⁶⁸, and together they have created innovative methods of forest preservation and management.

Brazil has turned its focus to the North of the country. The development of the region has created many jobs, and there is a heavy investment in infrastructure. The creation of jobs affects the local economy positively, and taxable income is reverted as resource to cities, which become better equipped to invest in different areas.

Thanks to international cooperation in science, technology, and education, Amazonia is a pole of innovative sustainable infrastructure technology. Universities cooperate with traditional peoples, who have a unique knowledge and perception of the forest and forest goods. Traditional peoples in Amazonia have managed the environment sustainably for centuries, and the use of their ecological knowledge is crucial to being able to comply with the UN treaty. The global society is slowly understanding the importance of indigenous knowledge. By consulting traditional peoples around the globe, societies are becoming more resilient to disasters, and infrastructure technologies are more sustainable.

There is a growing interest in the indigenous populations. Indigenous communities from different parts of Latin America have been organising exchanges between each other, so they can learn the customs of their relatives. Communities that historically have competed for land areas and resources, now cooperate and exchange traditional knowledge. There is a growing interest for learning dying indigenous languages. The University of São Paulo –USP has had a centre of indigenous studies since 1990. (USP 2015) This centre of studies has grown and expanded to several other universities in Brazil. The centre has publications in the areas of history, anthropology and language studies. They have recently started research projects also in the areas of law, engineering, biology, biochemistry, medicine, and futures studies.

In 2020, USP has a strong cooperation with UFPA – the University of Pará. UFPA is the Brazilian university with most indigenous professors and students, and they act in various areas and faculties. Indigenous professors are scarce, and are often away from their home universities for participating in conferences or going back to their communities of origin for retreats.

Moacir⁶⁹, from *Volta Grande do Xingu*, is a law professor at UFPA. He got interested in law as a young adult when Belo Monte started to be implemented in the Xingu River. Moacir was driven to attend law school to gain knowledge of the Brazilian laws, so he

⁶⁸ Association of Southeast Asian Nations (ASEAN) is a regional organisation combined of Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar (Burma), Singapore, Thailand, the Philippines, and Vietnam. The bloc's purpose is to promote cooperation among governments, as well as economic integration. The bloc aims at regional acceleration of economic growth, social progress and cultural development (ASEAN 2012)

⁶⁹ Fictional character

could have the means to fight for the rights of his community. Moacir's passion for indigenous rights, combined with his background and life experiences, provided the university with research publications from a unique perspective. The lectures that Moacir gives are a combination of environmental and human rights. His research team provides consulting services for the Ministry of Justice, for the Ministry of Environment, and for Ibama.

Belo Monte's revised PBA has recently been published. Services for the affected population expand in quality and quantity. The city of Altamira is constantly developing and urbanisation projects are ongoing. The resettled population are provided with opportunities to renovate their houses, new neighbourhoods are being built, and they receive bus lines, improved healthcare centres, schools, leisure areas, etc.

The new impact mitigation measures require Norte Energia to cooperate with the local administrations of the affected cities *de facto*. This public-private collaboration is complex and time-consuming due to its high levels of conflicts of interest. Professional mediators facilitate negotiations to promote productivity and to prevent delayed timetables. The scientific community is also included in the process acting as expert consultants and proposing resolutions for the various problems that emerge. Public participation is endorsed.

As Belo Monte's constructions have concluded, a large amount of its workers have been reassigned to other regions. This reassignment of work has caused a slight outflow migration of the population, which in effect caused an alleviation of the pressures imposed by Belo Monte during its construction phase. As urbanisation projects continue, roads, schools, and other basic infrastructure are constantly being renovated, hospitals and healthcare centres are improving their conditions, and the unemployed have opportunities to pursue adult education and vocational training according to their needs and interests.

Volta Grande do Xingu promotes the growth of small business and sustainable small-scale farming. Citizens value goods that are produced locally, and prefer consuming them over imported goods. Along with the valorisation of local production, there is a growing trend of valorisation of workers too. Vocational training on various fields is offered to the local population, allowing formalisation of work and a significant improvement on the quality of services provided. Formal, regulated work has grown in the region. In general terms, work conditions have improved from the point of view of safety, working hours, remuneration, etc. Nevertheless, informal work is still present in the society, mainly in the form of freelance work to complement families' income.

Ecotourism is rapidly growing in the region. National and international tourists travel to Altamira to get to know the infamous Belo Monte Dam, the Xingu River, its rapids, its beautiful islands and beaches. As tourism generates income to the region, there are more reasons to guarantee the preservation of the river and its ecosystem.

The traditional populations of Volta Grande do Xingu have suffered from drastic changes to their local environments. While some received aid to develop their family farms, others had to find creative solutions to adapt to the new environment. Riverine communities that had an income exclusively dependent on fishing for example, had to adapt their forms of living. Many of these families are now involved with ecotourism: they present to tourists their cultural heritage, traditions, promote water and energy preservation. When ecotourists visit the Volta Grande do Xingu, they have the opportunity to stay overnight in riverine people's homes, they eat fresh produce from their family farms, and they see the Belo Monte Dam from the impacted population's perspectives. Promoting this kind of tourism is an effective way to promote sustainable development and raise awareness of the socio-ecological impacts of mega dams and large infrastructure projects like Belo Monte.

Altamira does not receive only visitors interested in ecotourism. Visitors also travel to the region to enjoy the sweet-water beaches of the Xingu bay, religious festivities, and the region's eccentric nightlife. Moreover, the City of Altamira and Norte Energia also promote guided tours to the dam sites, where tourists may appreciate the impressive engineering. Naturally, guided tours to Belo Monte are better organized and have a better infrastructure than the rustic ecotourism organized by the local population. The dichotomy of the local tourism reflects the Belo Monte's controversy.

5.4 Black Swan Scenario

An unlikely future where Belo Monte is stopped.

In the past decade, cases of money laundering by high-level politicians. Between 2016 and 2017 two consecutive impeachments, of the same administration culminated in a political and economic crisis and instability in Brazil. It is now 2020 and the current administration's main goals are to fight corruption at all levels, working towards a more transparent and just society. Major infrastructure projects implicated in the money laundering scheme have been revised, and some had their security suspension annulled. The issues about Belo Monte gained momentum when a documentary exposing its absurdities won an international prize, and the Brazilian Government received pressure from various international organisations to annul Belo Monte's security suspension and proceed with the cases that were filed against the mega dam. Belo Monte's cases were taken to court, and due to the numerous irregularities (and public pressure), the judicial system decided to terminate Belo Monte's operation licence and to begin a project to revitalise the Xingu River and its biodiversity. Dam removal is also being discussed, and now proponents of this idea are conducting studies on alternative solutions how the Belo Monte Dam should be removed.

The urban population of Altamira and surrounding cities are, in general, discontent with the termination of work in Belo Monte. A large proportion of the population was employed either directly (by Norte Energia) or indirectly (by contracting companies). All of these jobs are now history. As a result, the region experiences an exodus. Specialised workers who had moved to Altamira due to the Belo Monte constructions move in search for better opportunities elsewhere. Construction workers migrate to other parts of the country. Nonetheless, some of Belo Monte's workforce have stayed in Altamira, as the city has become home to their families.

When the operation licence of Belo Monte was terminated, Norte Energia declared bankruptcy and all the ongoing programmes being conducted by the company were interrupted abruptly. Many of these programmes were being carried out by contracted companies specialised in different areas: construction work, healthcare services, mental health services, vocational training, environment preservation, wild species preservation and research, etc. The lack of funding from Norte Energia, culminated into the paralysation of these activities.

The interruption of Belo Monte's operation caused a significant change to Altamira and the surrounding municipalities. The region suffers from high unemployment, and a large portion of the population depend on social benefits. As the number of taxpayers diminishes, the budget of the city is suppressed. Municipalities plead to the Brazilian higher court to review their decision to terminate Belo Monte's operation licence. The situation is complex and uncertain.

The local population is increasingly under stress due to this uncertainty. The workers who lived in the construction sites of Belo Monte and did not migrate elsewhere, have now moved to city centres. The processes of formalisation of land tenure continue to be a problem in the region, and the region faces a new wave of unplanned urbanisation. Palafitte houses are once again emerging by the river banks.

Indigenous communities also suffer from the abrupt interruption of services from Norte Energia. Despite the inconveniences that the company have caused, indigenous communities received goods and services that became part of their routine, and the abrupt termination of these services cause stress and uncertainty also to the indigenous communities.

NGOs, organized social movements, and independent institutions that have been present in the region since the beginning of the Belo Monte constructions, report invasions in indigenous lands. Illegal logging and mining is growing in the region, and reports denounce that the local government is increasingly indulgent. There is a deliberate omission of inspections for illegal deforestation and mining in the region. These activities grow, and so does informal work.

It is 2020, and Belo Monte's political momentum is over. Once the operation licence was terminated, the issue lost public interest, and once again, the region suffers from abandonment. Although the local government is lenient to the growing illegal mining,

logging, and emerging informal jobs, they also try to find solutions to unemployment and their new situation of a much lower budget. The local government suffers from lack of resources and trained personnel; they have to deal with an abrupt end of funding in many outsourced social projects previously ran by Norte Energia. Many of these services are necessary for the population, and the local government has to stretch their budget in order to provide the continuation to at least some of these projects.

However, all is not lost for the population of Volta Grande do Xingu. Another hearing regarding Belo Monte's future is due a few months from now. It is being decided if the dam will be removed from the Xingu River or not. If the decision is negative, there is still a chance that the Operation Licence will be reinstated. Will the Brazilian government cover the costs in the name of economic growth? Is there any private company interested in investing, considering the risks?

If the court makes a decision against the dam, and for the river restoration, the region may once again be focus of public interest and media, as it would be the first time in history of Brazil that such a large construction would be dismantled. Dam removal EIA is being produced, and this EIA base some of its predictions on lessons learned from dam removals in USA, for example the Glines Canyon Dam dismantled on the Elwha River in Washington, and the Glen Canyon Dam in the Colorado River, in Arizona. The river restoration project consists of a multi-staged scheme to dismantle the dam in a way that turbines and other expensive components of the structure are removed so that they can be sold and reused in other locations. Aquatic species which are now living in controlled, constrained environments will gradually be reintroduced to the wild, and the local riverine population will receive training to safeguard the survival of these species. The process is to take several years and impact mitigation measures for the affected population are under ongoing discussion.

As part of the EIA requirements, proponents of the river restoration project also have to present a budget and a list of responsible funders for these expenses. Proponents of the project search for investors, but the budget needed for the activities proposed is massive.

Representatives of the traditional communities of the region have been part of the production of the dam removal EIA. FPIC has been done in the form of a citizens-initiative where registered voters sign petitions in favour or against different issues. Informative public hearings are organized, and petitions are circulated in these meetings.

Although public hearings have the support of NGOs, scholars, and the federal prosecutor, the military police is often present to reassure order. Indigenous men and women feel pressured to sign in favour of issues they sometimes are against, or do not fully understand.

5.5 Scenario Probability Assessment

When looking at the four scenarios, it is possible to argue that the first two are more probable than the other two. This argument comes from the fact that no fundamental changes are considered in the first two scenarios, while the other two require major changes in the political decision making processes, especially when regarding social and environmental policies.

The first scenario, the “Continuation Amplification Scenario” has positive and negative issues to consider. While the local population still struggles from inadequate social services, overall, the city has improved with new infrastructure such as roads, harbour, schools, new hospitals and healthcare centres. Although the environment has suffered drastic changes, the region is not abandoned, and environmental projects to mitigate the impacts remain ongoing. I personally believe this is the most probable future, but I must admit that I am certain that some aspects of the other three scenarios ought to be incorporated to the first in the future that will truly come to be. This remains to be seen. Also, of course, issues that have not been taken into consideration in this research, the “known unknowns” might play an important role.

The second scenario describes a future where additional dams are built upstream the Xingu River. This is a popular future depicted by scholars who argue that additional dams will regulate the water flow and increase the average energy production of the power plant. (see my arguments in chapter 3.2). Sousa Júnior. et.al. (2006:76) go so far as to say that the low capacity of Belo Monte on the current format represents a “planned crisis”, and the temptation to build additional dams are inevitable. The second scenario depicts a social and environmental disaster, but as bad as it may seem, this scenario is not all that improbable. The current circumstances in Brazil are susceptible to this future, as the country faces a political and economic crisis. These issues are very fresh in Brazilian politics and important events happened during the course of this research, after the field work and after most of the data was collected. The current economic and political crisis relates to the Lava Jato money laundering investigations as well as the questionable impeachment of president Dilma Rousseff. During the past year, the interim government ruled by Michel Temer have passed harsh new social policies that have direct effect on the rights of traditional populations. As I write this paragraph, Temer faces the electoral court facing charges of abuse of power. These are pressing issues that are not been dealt in detail in this master’s thesis. Perhaps in the future I could do further research on the topic and deal with these issues more deeply. Legal manoeuvres are under ongoing discussion in the senate. I emphasize that the law amendments PEC 65/2012, the PLS 654/2015 and the PL 3.729/2004, discussed in chapter 3.4.3 have unprecedented consequences, and if passed, will leave the entire country vulnerable to ecological catastrophes. Furthermore, even though environmental licencing is project-specific, environmental damage usually affects a much larger region than the project itself. In the worst of cases, environmental

disasters have no geopolitical borders, and negative impacts may cover surprisingly large areas. Moreover, it is possible that Belo Sun will eventually gain their operation licence. I argue that unless adequate impact mitigation measures are conducted more responsibly, the combined impacts of Belo Monte and Belo Sun will be catastrophic to the local environment.

The third scenario was created based on my interpretation of the preferred futures of the interviewees. It was a challenge to combine preferred futures of different actors and interest groups. The solution was to think of the impacts that Belo Monte has already caused, and how to move from there. Although this particular scenario may seem like very improbable and even utopian, the scenario is based on the idea of cooperation and understanding. In a figurative way, most of the seeds for this future have already been sowed. Brazil has already signed several international treaties that, if followed with good will, could culminate in a more lucid future as I suggest. There is a lot of research being conducted on impacts of hydroelectric power plants around the globe, and never before have we had so much information available on Amazonia and its ecosystems. The scientific community has produced valuable information that could be used in decision making processes. What we lack now, is political will for a de facto cooperation. I strongly believe that if decision-making would be more evidence-based, taking suggestions made by the scientific community more seriously, and if governments would be more transparent and participatory, the future could really move towards this third scenario.

The last scenario takes into the consideration the unlikely event that Belo Monte's operation licence is terminated. Although the premises for this decision seem unrealistic, taking into consideration the current state of instability in Brazilian politics, it is not impossible that decisions that today seem final are reconsidered. This scenario was tailor-made to some of my interviewees, who asked me what I thought could happen if Belo Monte would actually stop. This question, from interviewee to interviewer was asked often enough that the Black Swan scenario had to be considered. The issue on dam removal and river restoration was a topic of discussion of the participants of the expedition through the Xingu River I have participated as part of my field work, and while I was there, I could contribute to the discussion with information I had collected about the dam removals in USA, more specifically the cases of the Glines Canyon Dam the Glen Canyon Dam, also mentioned in the fourth scenario. The idea of dam removal in this case is very improbable, at least in a near future like 2020, but nevertheless not impossible. Although the dam removal seems unrealistic, the idea of the local government becoming increasingly indulgent as public interest moves their eyes to other issues, as described in that scenario, is not that farfetched. Even if there is a deliberate omission of inspections from local governments, the civil society may publish findings that expose these omissions. If the region suffers from omissions from the administration as well as lack of public interest, some of the issues discussed in the Black Swan scenario may come to be.

6. DISCUSSION

The scenarios presented above are the result of an extensive qualitative analysis on the Belo Monte controversy. These alternative futures suggest that the environmental licencing process, as well as the development of the Environmental Impact Assessment (EIA), are key drivers of change. EIAs are prepared in the initial phase of the decision-making process of infrastructure projects. At that point, decision makers are still able to reject the commencement of unviable projects.

As presented, the current licencing procedure is at risk due to bills and law amendments currently under discussion in the Senate. These aim at speeding the licensing procedure, consequently diminishing the importance of EIAs and ripping the current environmental laws. The perfect storm scenario shows how these rapid licenses enhance the danger of environmental disasters. How can we move forward to evident-based decision making, as suggested in the lucidity scenario? Is this the common preferred future of our society?

My suggestion is that instead of weakening EIAs, we should instead strengthen them, and develop a model how to prepare EIAs in a way that could give decision-makers tools for making informed decisions that are empirically based. I restate that EIAs should not be prepared only by proponents of a given project. They should involve an interdisciplinary committee composed of different interest groups that affect and are affected by the project. This committee should include members of the scientific community as well as the civil society. EIAs should be rigorous in methodology, and the inclusion of futures thinking can only develop EIAs positively. I believe that enhancing futures literacy in decision making is already overdue. This “model” to prepare EIAs, as I suggest, could include futures research methods in a way to present possible, probable, and desirable futures.

Other scholars have also proposed alternatives to improve decision-making for hydroelectric power plant projects. Ansar et al. (2014: 43-56), for example, propose a quantitative method called *outside view*, or *reference class forecasting (RCF)*. This methodology has been used in the areas of psychology, economics and development of infrastructure projects to improve decision-making under uncertainty (Ansar et al. 2014: 44). The developer of RCF is Daniel Kahneman, he won a Nobel Prize in Economics linked to this methodology. RCF is based on the idea that we can look at similar past projects and make statistical analysis comparing initial forecasts and actual outcomes in order to compare them. The reference class may include cost and cost overrun, schedules and schedule overrun (as Ansar et al. included in their analysis). Other variables can also be included, such as deforestation, geological risk, GHG emissions, number of people to be resettled, etc. Ansar et al. (2014:55) suggest that by using RCF, risk profiles could be more transparent, and various energy alternatives could be compared, making decision-making less biased. However, in order to have a reliable reference class, it is necessary to create a

comprehensive global dataset that would include data of similar, previously completed cases. Moreover, the sample size have to be large to be statistically significant, but narrow enough to be comparable. Thus far, such dataset do not yet exist.

Assuming we could have a well-developed and broad dataset that includes data from hydropower projects, as well as solar energy, wind, wave, nuclear, etc, from projects world-wide, we could be able to compare different energy sources more effectively. This technique would allow us to weigh risks, costs, environmental impacts, and other issues. In this case, the statistical analysis done in RCF could be an important risk management technique. Reference class forecasting exposes evidence of systematic inaccuracies between actual outcomes versus planned forecasts. Using RCF in early decision-making can be a powerful tool to opt for more viable projects.

However, even if the dataset is rich in data and variables, statistical analysis can only account for quantifiable and comparable data, excluding the so-called “externalities”, as discussed earlier in my research (see chapter 3.8.2). The externalities previously mentioned (as described by Sousa Júnior and Reid 2010:250-258) are the value of non-commercial fauna and flora, the value of recreation, loss of commercial and aquatic species, archaeological and cultural sites associated with the traditional communities, etc. In order to bring these “externalities” into the table of decision-makers, we need to achieve a higher socio-ecological consciousness.

Futures thinking is deeply connected with socio-ecological consciousness. Heinonen et al. (2005), for example, deal with finding new sustainable solutions for Finland's well-being in the future. Although that research does not deal with hydropower in particular, it does discuss alternative energy futures. Heinonen et al. (2005:24) propose a scenario called “New Consciousness” where the concepts of “growth” and “progress” have been redefined, where society is more altruistic and sustainable, and energy production is decentralized. This “New Consciousness” scenario was later analysed by Breyer et al., whose study concluded that taking into account the limited resources on Planet Earth, it is urgent that we “overcome current political barriers to reach a long-term sustainable energy system for rebalancing the energetic requirements of future humankind.” (Breyer et al. 2017: 7-15). Although the new consciousness scenario proposed by Heinonen et al. (2005:24) is far-fetched and utopian, it somehow dialogues with the lucidity scenario presented in this research. Both scenarios deal with revolutionary futures based on an environmentally conscious society who base their decisions on evidence. The new consciousness scenario does not mention fight on corruption as I so strongly emphasize, but it does mention a more altruistic society where people have “loosened their individual egos”. These two can easily be linked to one another.

7. SOME THOUGHTS ABOUT THE RESEARCH PROCESS

When this thesis was first thought of, it was planned to include futures workshops with various members of the urban and rural communities in Altamira. I was interested in learning how the local population saw Belo Monte, and what kind of images they had for their own futures. My plan was to collaborate with NGOs to help individuals to take action for their own futures. As much as running these futures workshop would have been interesting, gaining access to the local population beforehand to organize the meetings was a challenge, both due to the lack of permits to conduct research as explained earlier, and because of the lack of contacts in the research area prior to the field work.

As the literature review gained substance and expanded further, I got to understand the macro processes on national level, and so my focus of interest shifted from personal futures images to environmental licencing procedures and social policies. When I refined the topic of research, I understood that as for the traditional populations living in the Volta Grande, individuals have very little power over their own futures: in this context, the government and the private sector strained the population to accept alternatives that are not much different from one another.

The Belo Monte Dam is a case of systematic bending of (if not breaking) the rules. In the beginning of the research process I thought the chapter about political processes leading to the operation licence would have been a minor section that would present basic issues concerning bureaucracy. At the end of the research process, I now realise that the political aspect chapter should have been the largest, and most thought of, as it has so significant influence on all the other aspects. I had no idea how much a broken environmental licencing procedure could influence the society, the economy, the environment. Everything in the Belo Monte controversy has a link to the licences. After learning all this, I believe that had the licencing process, including the development of the EIA and the PBA, been done more robustly, a very different story would have been told in the previous chapters.

As it was discussed, the licencing procedure itself is being challenged by current decision-makers. It was intriguing to read legal documents and to notice that conditions that are set in one file can be changed substantially after a few months. Official decisions are never final, and the actions taken do not always coincide with these decisions.

I was especially surprised to learn that the environmental impact assesement, as well as the reports on impact mitigation measures are done by the same parties that are installing and operating the construction works, and therefore the ones who are creating these impacts. Surprisingly, this is a practice not only in Brazil, but also in other countries. It is arguable that the validity of these studies and reports are jeopardized due to conflicts of interest. High-level decision-makers base their judgements on these reports presented to them.

I was disappointed to recognise how small the influence of the scientific community is towards high-level-decision making in the Brazilian political process. So many scholars have presented evidence-based material against the dam. Specialists of various fields gathered to write the Experts Panel Report. The report (Magalhães and Hernandez, 2009) was sent to the authorities, but resulted in no impact on the decision making. Thirst for power and economic growth seems to lead decision makers to overlook the evidence presented to them.

While in fieldwork, during the canoe expedition on the Xingu River organized by Instituto Socioambiental, when we passed by the Belo Monte Dam construction site, some of the members of the expedition laid a banner on the shore that said “Development, yes. But not in any which way”.⁷⁰ The phrase in that banner summarizes very well the overall feeling I got in the field. In general, people that I talked to who were opponents of the dam, are not really opponents of the dam itself, but of the way things were being conducted. These people were distressed due to the inadequate impact mitigation measures. It is not enough to simply build hospitals, schools and houses, if the quality standard of these buildings are poor and not long lasting. Organized social movements like MAB exposed the poor conditions of the houses built in the resettlement area, which a few months after their inauguration already presented mould and water damage. Indigenous people marched against the dam, they made very clear that they did not give consent to the construction. As it has been presented within the cultural aspect, the indigenous people were bribed and silenced. The Emergency Plan, monthly allowances that provided indigenous peoples with material goods that, according to federal prosecutor Thais Santi, lead to an indigenous ethnocide. When discussing impact mitigation measures, it is important to remember that not everything is the responsibility of the private enterprise. The local and national governments also have responsibility towards their citizens, and as it has been shown, residents of Altamira have historically been neglected of their rights for social services and basic infrastructure. This is partially due to corruption of various levels.

In several instances, I have made comments on evidence of diversion of resources. From ghost lunch vouchers to high-level money laundering, these are serious allegations that must be investigated by the authorities.

Furthermore, I was provoked by the fact that most texts on the Belo Monte Dam were so opinionated. As this is a highly controversial topic, it is hard to write about it without taking a stance. As I went through the material, I learned to triple check my sources. When dealing with newspaper articles that would report a new decision taken by Funai, for example, before writing about it, I would also check Funai’s website, the original source, and look for the original document that the newspaper article would be mentioning. Depending on the complexity of the issue, I would also investigate further searching for

⁷⁰ “Desenvolvimento sim, de qualquer jeito não.”

academic articles written on similar issues, I would go through Instituto Socioambiental article database, read about the same topic on the Norte Energia's website, search for news media articles in different sources, in all the languages I can read, and sometimes I would go further to having a Skype meeting with some of my informants to understand the issue further. While often considered unreliable sources for academic work, bloggers and independent media are very critical towards the situation in the Xingu region. In order to test the reliability of these media sources, every time a blogger would quote a scholar, an NGO, a document, I would try to find the original text where this phrase came from. This was a challenging task, as most blog posts quote only the person, without giving clear references as done in academic citation and documentation. When searching for the blogger's original source, I found that on occasion the information was misinterpreted. However, most of the time finding the original source enabled me to deepen my knowledge about the subject. This investigative work of reading and listening to different sides of the same story in order to understand the complexity of issues at hand was time-consuming. Nevertheless, the most time-consuming process was to digest all this information and to put it into academic writing.

As the Belo Monte controversy unfolded, it was difficult to limit which issues to discuss, and which to omit for the sake of submitting a final version of the thesis. My original goals of providing a holistic understanding of the Belo Monte controversy within the page limits of a master's thesis proved to be unrealistic. Keeping the PESTEC dimensions used by Sirkka Heinonen always in mind was especially helpful for building ideas and developing concepts.

8. CONCLUSIONS

This master's thesis addressed the Belo Monte Dam as a controversial construction which although was chosen to be built as a way to promote sustainability, provoked enormous socio-environmental impacts to the region. This paper analysed the Belo Monte controversy in various aspects: political, economic, social, ecological, and cultural. Also legal implications have been discussed within the political aspect. It was found that even though Belo Monte is now operational, many (but not all) of the impact mitigation measures proposed during the licencing procedure have not been completed yet, and several were completed, but inadequately. It has become evident that the problems faced in Belo Monte are not unique to this project, but more of a norm within hydropower projects: other hydropower projects were also negligent towards the ecosystems and societies affected by the implementation of power plants, other regions have also suffered from significant negative impacts, the budget and the schedule of several other dams were also underestimated, or miscalculated.

This paper aimed at answering the following research questions:

- *What will become of the Belo Monte region after the construction of the dam complex?*
 - How did Belo Monte come to be? What are the justifications for building the dam, and why are these justifications being questioned?
 - What are the most important issues that proponents and opponents of the dam argue about?
 - What are the most significant impacts (positive or negative) that Belo Monte has already brought to the region?

The second question, "*how did Belo Monte come to be*" and its justifications, are answered mainly in chapters 3.1, in 3.4. and in 3.6. The rationale behind the decision to build Belo Monte is presented, as well as a problematic licensing procedure. The legitimacy of Belo Monte's licences is questioned: this paper presents legal manoeuvres associated to issuing the licences, lack of informed consent from the local populations, and a complex environmental impact assessment, allegedly inaccurate in some instances, incorrect in others, and possibly also fraudulent.

The last two research questions, related to the most important issues that proponents and opponents of the dam argue about, and most significant impacts that Belo Monte has already brought to the region are answered throughout chapter 3.

Opponents of the dam criticize Belo Monte for being destructive towards the environment. As discussed, impacts of the construction work are permanent in most cases. Long-term impacts include illegal logging, disappearance of animal species, greenhouse gas emissions, resettlement of populations, an indigenous ethnocide, etc. The swelling of the urban population, the crowded hospitals and rise on criminality may be considered temporary impacts for the society, although these influenced the lives of some individuals

permanently. Due to the sensitivity of the region, both in social and ecological terms, the region suffers from a low resilience. Endangered species, as well as human populations living traditional cultures, are especially sensitive to the changes caused by the dam. I emphasize that environmental impacts go beyond geopolitical borders, and it is possible that the area of influence of Belo Monte may be much larger than expected beforehand.

Proponents of the dam argue that Belo Monte is to cause minimal harm, that the impact over the vegetation is not significant, and that Norte Energia, the company building the dam, not only protects, but also develops the environment further. Norte Energia has invested in reforestation programmes, they monitor forest areas, and have established several programmes to study and to preserve animal and plant species, all of which are described in Belo Monte's basic environmental project (PBA). The same document also includes positive developments for the city of Altamira and region. The formalisation of land tenure, which historically have been problematic in the region, is now an undergoing process. The city has also gained in infrastructure such as new hospitals, schools, roads, bridges, ports, sewage system, landfill, etc. As it was discussed, all this investment in the city's infrastructure probably would not have happened if Belo Monte would not have been built, at least not in the pace it is going now.

Although the impact mitigation measures are numerous, this paper shows that they are not only insufficient but also inadequate. I suggest that the environmental programmes ran are a means of greenwashing, giving Norte Energia a positive public image to practices that are environmentally unsound. I argue that the current Brazilian administration deliberately disregards environmental issues. However, is this because the administration is oblivious to them, or is there a delusion that things are done adequately? Or is there a deliberate deception due to misplaced political incentives? The close links between Belo Monte and the Lava Jato corruption scandal currently being revealed by the Brazilian Federal Police, suggest the latter.

The main research question made in the introduction chapter of this paper "*What will become of the Belo Monte region after the construction of the dam complex?*" was answered in chapter 5, where four scenarios of alternative futures were distinguished. Although this main research question is formulated in singular form, as it was explained already in the introduction and further clarified in chapter 2.1, there is no single future ahead of us. "The future" is plural and uncertain, and recognizing that, the scenarios presented in the previous chapter are an attempt to envision some of the many possibilities for futures of the region. The scenarios suggest that the environmental licensing procedure is a key driver of change, and its first precondition, the EIA, should be more futures oriented, in a way to improve the decision-making process. As EIAs are presented in the initial phase of the licensing procedure, at this point decision makers are still able to reject the commencement of unviable projects.

Despite the growing international efforts to strengthen environmental laws in order to move forward with sustainable development, it seems that in Brazil, this effort is being

driven on the reverse gear. Law amendments are being proposed to simplify the environmental licencing, which may prove to be risky for the environment and the society. This master's thesis suggest that instead of simplifying the licencing procedure, it should be an even more rigorous process than it is today. Environmental licencing should be strengthened by improving social participation, reinforcing the conditions and resources of the environmental institutions, and improving the quality of the EIA.

EIAs have been here introduced as documents that provide information on the changes that may occur on the environment and on the society affected by specific projects. It has been discussed that for all intents and purposes, EIAs are an exercise in futuring. But do authors of these EIAs have appropriate understanding of Futures Studies methodologies, or have suitable directives to produce such material? Can the environmental impact assessments be a true evaluation of possible futures conditions, when it does not consider alternative futures? I propose that a model for preparing EIAs should be further developed, that EIAs should be more inclusive, should be prepared by an interdisciplinary committee composed of different interest groups. I argue that EIAs should be prepared in a way that could give decision-makers tools making informed decisions that are evidence based. I restate that EIAs should be rigorous in methodology, and the inclusion of futures thinking can only develop EIAs positively. I strongly recommend that EIA directives should include Futures Studies methodologies in order to access alternative futures, and that EIAs should present scenarios that illustrate key decisions, events, and consequences. These scenarios ought to benefit the decision-making process, and moreover, as the future unfolds, decision makers know what to do next.

Futures Studies methodologies should be included in the decision making process, not only in environmental licencing, but in other decision making processes too. I believe it is important to raise awareness of the methodologies available and to promote futures thinking to achieve sustainability.

As a futurist, I intend to contribute to raising awareness of the importance of futuring in decision making by publishing this study not only at the University of Turku, but also through other channels of communication. I intend to distribute electronic and printed copies of this thesis to my interviewees as a form of feedback and as a symbol of gratitude for their valuable time. I also intend to send copies of this research to several of Belo Monte's stakeholders, from the Ministry of Mines and Energy and Norte Energia's headquarters to NGOs, indigenous leaders and riverine peoples. It is also possible that a shorter version of this paper will be sent to Futures Studies academic journals, and applications for conference presentations have already been sent. Moreover, I have received proposals to publish this material in Brazil as well, given that the material would be translated into Portuguese. I hope that by pursuing these projects and by promoting futures thinking, I inspire actions for a more just and sustainable future.

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APPENDICES

1. Interviews

Amorim, Leonardo (11 September 2014) Personal Interview. Lawyer at the Instituto Socioambiental.

Bartholomeu, Telma (30 June 2016) Skype Interview. Environmental lawyer at Conjur.

Estronioli, Elisa (27 January 2014) Personal Interview. Activist at MAB.

Ferreira, Afrânio de Matos (11 November 2015) Skype Interview. Psychologist at Instituto Sedes Sapientiae.

Irigaray, Maíra (23 January 2014) Skype Interview. Lawyer and activist at Amazon Watch.

Juruna, Giliarde Pixan (10 September 2014) Personal Interview. Chief of the Muratu community, Indigenous Association Miratu Yudjá Xingu (Aimyx).

Leite, Letícia (17 February 2014) Skype Interview. Reporter at Instituto Socioambiental.

Madrugá, Luciane (12 September 2014) Personal Interview. Director of Regional Hospital of Altamira.

Mantovanelli, Thais Regina (31 July 2014) Skype Interview. Anthropologist at the Federal Univ. of São Carlos (UFSCAR)

Meireles da Silva, Rainério (12 September 2014) Personal Interview. Altamira's local government Secretary of Planning.

Villas-Boas, André (4 February 2014) Personal Interview. Xingu project coordinator at Instituto Socioambiental.

Undisclosed (10 September 2014) Personal Interview. Indigenous woman.

Undisclosed (13 September 2014) Personal Interview. Resident of a palafitte house #1.

Undisclosed (13 September 2014) Personal Interview. Resident of a palafitte house #2.

Undisclosed (9 September 2014) Personal Interview. Riverine man, Agriculture worker.

Undisclosed (7 September 2014) Personal Interview. Unemployed man, previously working for Belo Sun.

Undisclosed (2014) Personal Interview on 6 September 2014, and Skype interview on May 2014. Urban architect.

2. UNDRIP Articles Referring To FPIC Procedures

United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) articles 10, 19, 29, and 32 (UN General Assembly 2007). These articles refer to the 'Free, Prior and Informed Consent' (FPIC) procedures.

Article 10

Indigenous peoples shall not be forcibly removed from their lands or territories. No relocation shall take place without the free, prior and informed consent of the indigenous peoples concerned and after agreement on just and fair compensation and, where possible, with the option of return.

Article 19

States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them.

Article 29

1. Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement assistance programmes for indigenous peoples for such conservation and protection, without discrimination.

2. States shall take effective measures to ensure that no storage or disposal of hazardous materials shall take place in the lands or territories of indigenous peoples without their free, prior and informed consent.

3. States shall also take effective measures to ensure, as needed, that programmes for monitoring, maintaining and restoring the health of indigenous peoples, as developed and implemented by the peoples affected by such materials, are duly implemented.

Article 32

1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources.

2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilisation or exploitation of mineral, water or other resources.

3. States shall provide effective mechanisms for just and fair redress for any such activities, and appropriate measures shall be taken to mitigate adverse environmental, economic, social, cultural or spiritual impact.

3. ILO C169 Articles Referring To FPIC Procedures

Article 6

1. In applying the provisions of this Convention, governments shall:
 - (a) Consult the peoples concerned, through appropriate procedures and in particular through their representative institutions, whenever consideration is being given to legislative or administrative measures which may affect them directly;
 - (b) Establish means by which these peoples can freely participate, to at least the same extent as other sectors of the population, at all levels of decision-making in elective institutions and administrative and other bodies responsible for policies and programmes which concern them;
 - (c) Establish means for the full development of these peoples' own institutions and initiatives, and in appropriate cases provide the resources necessary for this purpose.
2. The consultations carried out in application of this Convention shall be undertaken, in good faith and in a form appropriate to the circumstances, with the objective of achieving agreement or consent to the proposed measures.

Article 16

1. Subject to the following paragraphs of this Article, the peoples concerned shall not be removed from the lands which they occupy.
2. Where the relocation of these peoples is considered necessary as an exceptional measure, such relocation shall take place only with their free and informed consent. Where their consent cannot be obtained, such relocation shall take place only following appropriate procedures established by national laws and regulations, including public inquiries where appropriate, which provide the opportunity for effective representation of the peoples concerned.
3. Whenever possible, these peoples shall have the right to return to their traditional lands, as soon as the grounds for relocation cease to exist.
4. When such return is not possible, as determined by agreement or, in the absence of such agreement, through appropriate procedures, these peoples shall be provided in all possible cases with lands of quality and legal status at least equal to that of the lands previously occupied by them, suitable to provide for their present needs and future development. Where the peoples concerned express a preference for compensation in money or in kind, they shall be so compensated under appropriate guarantees.
5. Persons thus relocated shall be fully compensated for any resulting loss or injury.

4. Informed Consent Form Used In Field Work

Termo de consentimento livre e esclarecido

Declaro, por meio desse termo, que concordei em ser entrevistado(a) e/ou participar na pesquisa de campo referente a pesquisa intitulada “*Possible Futures for the Peoples of the Xingu*” desenvolvida por **Marianna Birmoser Ferreira-Aulu**, orientada por **Jarmo Vehmas** e **Matti Salo**, da Universidade de Turku, Finlândia, com assistência de **Sergio Andrade**. Poderei contatar a pesquisadora a qualquer momento que julgar necessário através do e-mail mbfeau@utu.fi.

Afirmo que aceitei participar da pesquisa por minha própria vontade, sem receber qualquer incentivo financeiro, com a finalidade exclusiva de colaborar para o sucesso da pesquisa.

Fui informado(a) que os objetivos desse estudo são estritamente acadêmicos e que, em linhas gerais, trata-se dos impactos socioambientais de Belo Monte sobre a população de Altamira e região.

Nível de exposição por entrevista semi-estruturada:

- A minha participação será anônima (sem nome ou instituição)
- A minha participação será semi-anônima (instituição pode ser publicada, mas não o meu nome)
- Meu nome e instituição podem ser publicados.

Apenas a pesquisadora, seus orientadores, e o assistente de pesquisa terão acesso aos dados e correspondente análise.

Fui informado(a) que posso me retirar dessa pesquisa a qualquer momento antes de sua publicação, sem sofrer quaisquer sanções ou constrangimentos. Recebi uma cópia deste termo de consentimento livre e esclarecido.

Data e local

Assinatura do(s) participante (s)

Assinatura da pesquisadora

5. Translation Of The Informed Consent Form Used

Free, informed consent

I declare, by this term, that I have agreed to be interviewed to the research entitled "Possible Futures for the Peoples of the Xingu" developed by **Marianna Birmoser Ferreira-Aulu**, supervised by **Jarmo Vehmas** and **Matti Salo**, University of Turku, Finland, with **Sergio Andrade** as a research assistant. I have the right to contact the researcher at any time it deems necessary through email mbfeau@utu.fi.

I declare that I have taken part in the research on my own will, without receiving any financial incentive, and with the sole purpose of working for the success of the research.

I was informed that the objectives of this study are strictly academic and that the research topic deals with the social and environmental impacts of the Belo Monte Dam.

In the publication of the research I would hope to be treated as:

- Completely anonymous (no name or occupation may be revealed)
- Semi-anonymous (my occupation can be published, but not my name)
- Public (my name, occupation and work institution can be published)

Only the researcher, the supervisors, and the research assistant may have access to data related to my identity.

I was informed that at any time before the publication of this research, I can ask that my input may be removed, no questions asked.

I received a copy of the free and informed consent.

Date and place

Signature (s) of interviewee (s)

Signature of the researcher