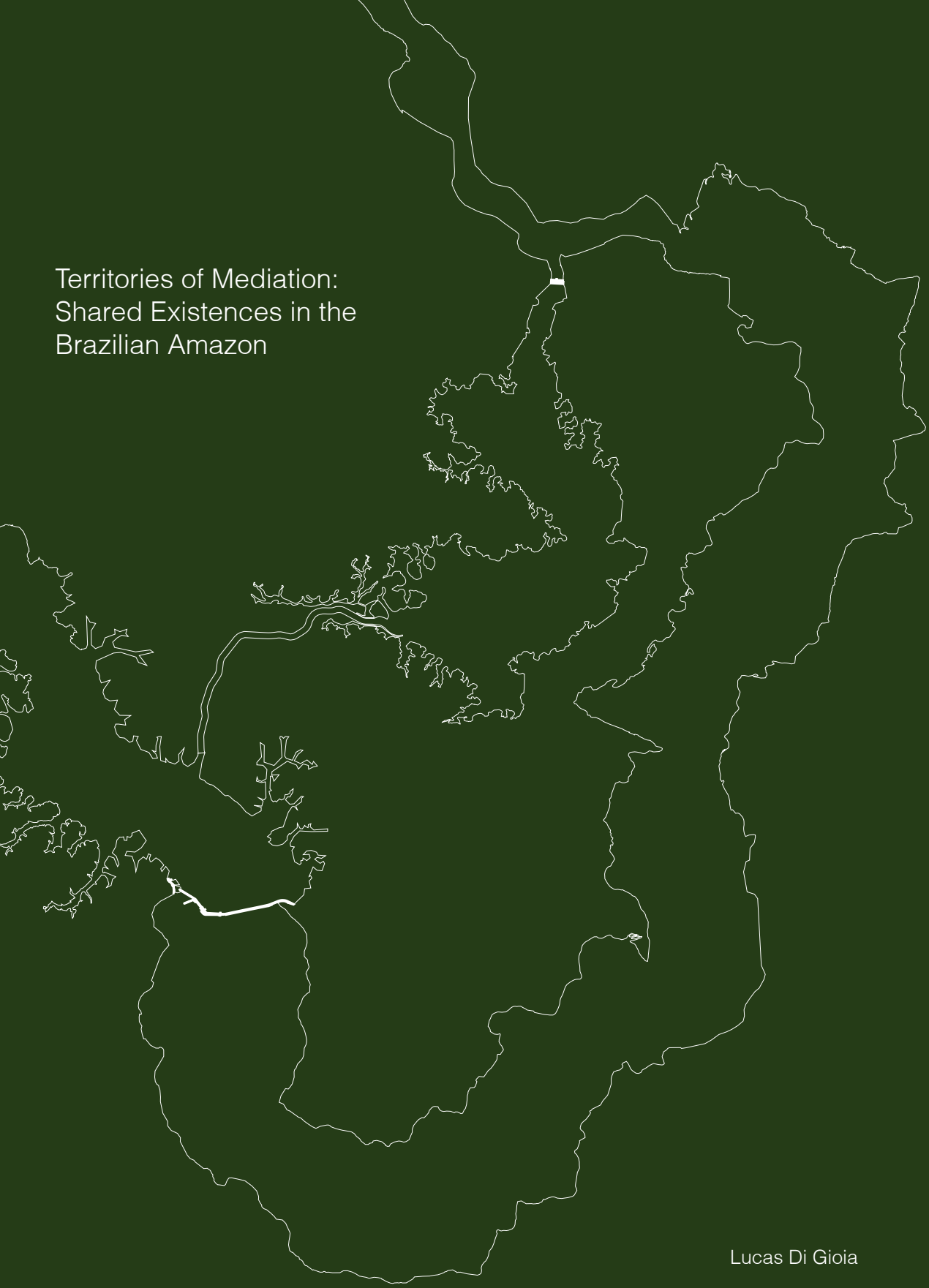
Territories of Mediation: Shared Existences in the Brazilian Amazon



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DELTA URBANISM

Territories of Mediation:
Shared Existences in the Brazilian Amazon
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Lucicleide Kurap of the Munduruku village of Dace Watpu
has a moment with a pet parakeet after washing dishes in the
Tapajos River in Para State, Brazil.
Aaron Vincent Elkaim, 2016.

Acknowledgements

Of all that you will read here, this was by far the hardest text I wrote. I have come to realise just how hard it is to put in words my gratitude to all those who supported me to get here and to carry through it.

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Crianças e o Rio Xingu.
Lado de Alemeida,
2016.

This thesis
is dedicated to all of those who have resisted and
still resist
the destruction of their worlds, caused by us.

They are who hold our sky in place.

Contents

8 Abstract
10 Introduction
12 Planetary Urbanization
14 Cosmopolitics
18 The End of the World
22 Context
24 The site
26 Climate Crisis
30 Sovereignty
32 Geopolitics
34 Economy
36 Ownership
38 Development
42 Amerindian Perspective
44 The Juruna
46 Problem
48 Boundary Conditions
50 Focus
50 Statement
50 Proposition
52 Directives: Methodology
54 Theoretical Framework
56 Theoretical Foundations
58 Research Framework
60 Question & Aims
62 Methods & Outcomes
64 Conceptual Framework
68 Analytical & Design Framework
70 Relevance
72 Approach: Analysis
72 Lines of Inquiry:
74 Matter
80 Topos
86 Habitat
102 GeoPolitics
108 Towards Synchronization:
108 Existing Rights
148 Stakeholder Analysis
150 Values
152 Synchronization Field & Framework
160 Systemic Mappings
172 Procedural Alignment
174 Descent: Projection
176 Manifesto
178 Alignment Strategy
180 Proposed Rights
182 Design Actions & Mediation Principles
184 Landing: Interfaces for Mediation
186 Territorial Directives & Strategic
188 Interfaces:
188 Dam Interface
210 Pathway Interface
224 Conclusion
226 Limits and Ramifications
228 Critical Review
234 Reflection
248 Bibliography
252 Appendix
Interview
Graduation Plan
Article
Theory Paper
Other Drawings

Crianças do rio.
Lado de Alemeida,
2016.

Abstract

The Xingu River Basin sits within the Amazon Biome and integrates its deforestation belt. It is home to a multitude of endemic species and indigenous nations which are now threatened by the disruption of the river's water pulse caused by the construction and operation of the Belo Monte Hydroelectric Dam. As we face our planet's ecological collapse due to resource based developmentalism, life on a planetary scale is increasingly threatened. Under the Anthropocene, urbanization networks have expanded beyond the traditional concept of hinterland. Planetary urbanization theory (Brenner & Schmid, 2012) unravels how untouched regions are now operationalized and incorporated into global resource networks.

The project explores the possibilities for mediation between natural and local-social systems with the demands of development brought by modernity to the river's basin, specifically to the areas directly affected by reduced water flow caused by the dam. Traditionally, Amazon rivers are spaces that allow for shared occupation. By considering water as the meditative space, forms of shared occupation are proposed which can enable a reconfiguration for coexistence and forms of life in the Xingu River according to varied worldviews. This sensitive approach towards local existences looks for a type of urbanization different from that of the modern project. In order to identify potential synchronicities between worldviews, a framework for reading worldview alignments regarding the systems in question was developed.

This thesis questions the limits of urban practice in such territories, posing a question that possibly cannot be answered with the tools we have at our disposal. If our field intends to position itself within such territories, we must begin to propose an alternative paradigm which can adequately territorialize cosmopolitics. Would Cosmourbanism be achievable?

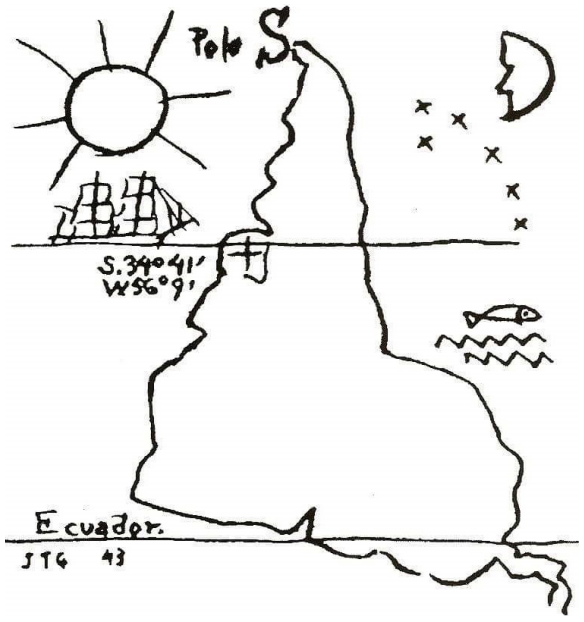
Earth.
Bill Anders, NASA,
24 December 1968.

Introduction

"I have said School of the South; because in reality, our North is the South. There should be no north, for us, but only in opposition to our South. That is why now we put the map upside down, and then we already have a fair idea of our position. Not as they want in the rest of the world. The tip of America, from now on, extending, insistently, points to the South, our North."

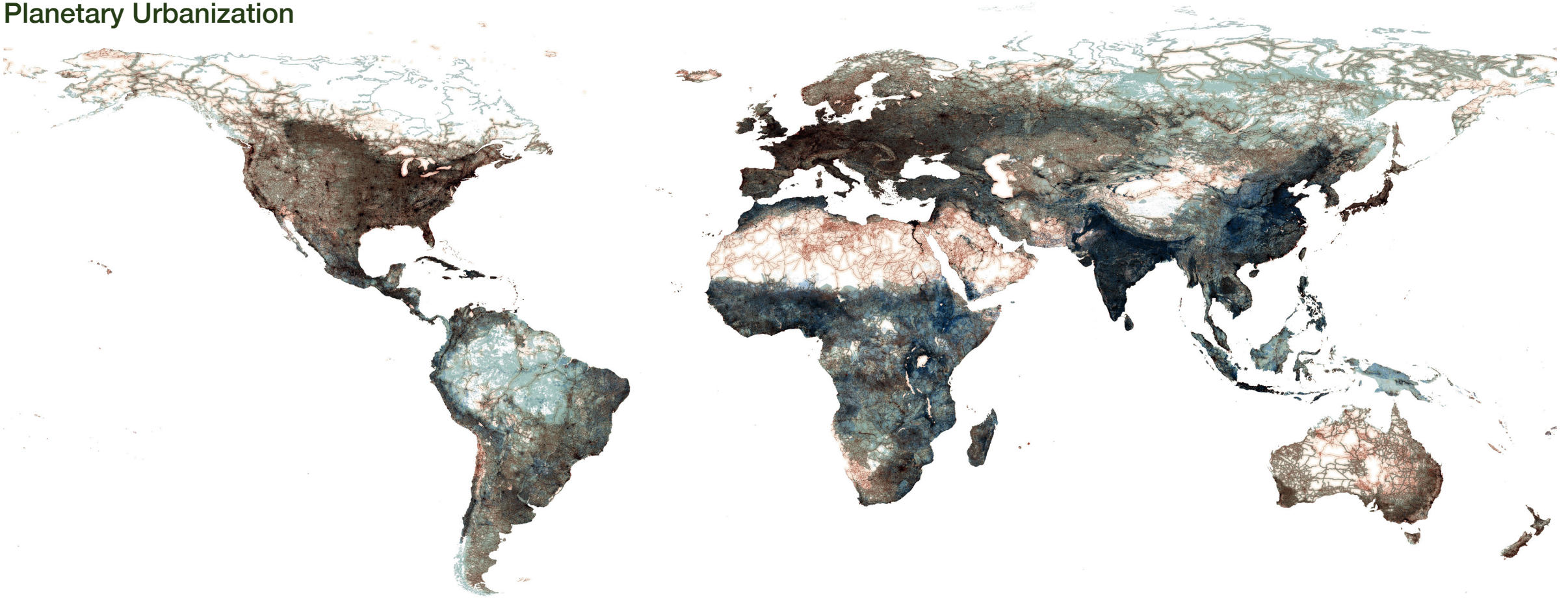
- Joaquín Torres-García

This thesis proposes to observe the Amazon region, sensitive to narratives other than those of the Global North, attempting not to tell the story of South Americans, but to serve as a conduit of those voices. As Joaquín Torres-Garcia illustrates, the power of mapping and how we decide to represent it is embedded in the narratives we elect to compose our stories. Mapping has always been the representation of intent to exert one's desire over a territory. In the case of South America, through the ontology of colonialism, the continent was drawn to frame the potential of its exploitation. If we (and here I say "we" as western civilization: descendants of colonial exploit) fail to question the origin of its mapping and do not propose a new conception, also fail to address the structural injustices that to this day continue to perpetuate the same exploitative systems that perpetuates narratives over the land and their people.



Nuestro Norte es el Sur
Joaquín Torres-García
1943.

Introduction:
Planetary Urbanization



Map of Operational Landscapes where red is infrastructure, blue urban and green agriculture and forrestry. Nikos Katsikis, 2019.

Planetary Urbanization (Brenner & Schmid, 2012) has framed the process of urbanization in the Anthropocene as a planetary interconnected network of material and financial accumulation that favours urban regions over hinterlands and landscapes that are yet to become operationalized. Within this context, we focus onto the spaces that compose what has been traditionally labelled as hinterlands, but within this contemporary model of capital agglomeration at a planetary scale, the concept of Operational Landscapes (Brenner & Katsikis, 2020) model describes with more precision the “implosion-explosion of hinterland zones which has been animated by capital’s drive to increase labour productivity and extend interspatial connectivity, both of which entail the construction of large-scale infrastructural configurations” (Brenner & Katsikis, 2020).

This productive configuration has exacerbated the pressure on local biomes such as the Amazon, since these ecological reserves sit on the fringes of operational hinterlands which are fuelled not by productivity but profit. In this sense, on a global production chain many zones of primary commodity production are not directly articulated to major cities or metropolitan regions, “but to other productive landscapes of cultivation, extraction, processing and distribution, which are in turn embedded and intermeshed within an intercontinental logistics space” (Brenner & Katsikis, 2020).

This positions the roll of large infrastructural investments centrally to condition the capacity of operationalizing landscapes under planetary urbanization. Within the context of the Amazon region, the operationalization to service this global chain is increasing deforestation in the biome, not only directly related to the expansion of soy fields from agribusiness but also with the expansion of new infrastructural chains within the amazon biome, facilitating the commodity flow through the vast river networks in the amazon region.

Introduction: Cosmopolitics

Within this hegemonic planetary framework, sit forms of existence that pre-existed the modernity. In these constructs, the Amazon biome sits not as a resource for mercantile exchange and exploitation but rather a system of life where humans and their activities are a part of the biome, not above it (Krenak, 2019). Cosmpolitics, first theorized by Isabelle Stengers (2010) brings a critical understanding of the existence of more than ethnographic perspectives on a “single world (the common “thing”), where we actually inhabit a pluriverse.” and as such, with regards to how Amerindian native peoples regard their relation to the amazon compared to western society, do not “refer to different cultural perspectives on the same “thing,” but to altogether different (albeit not unrelated) things.” (Latour, 2004).

The same land, horizon, rain, trees or fishes are constructed with meanings and reasons that cannot necessarily be translated through one’s worldview ontology. The urgency here lies in developing a conversation on equal terms. A conversation fueled by shared intentions. A form of “politics” which can allow accords that enables these universes to relate and realize the agencies from every life involved, human to non-human.

Through cosmopolitics we can envision a model for human occupation that is sensitive not only to the existing but to their ‘existences’ altogether. Understanding the multiple beings, human and non-human, that reside and construct the reality of the amazon in process beyond the juxtaposition of worldviews.

Meal preparations of Ribeirinhos in the Xingu River.
Photo by Aaron Vincent Elkaim , 2015.

Introduction:
The End of The World

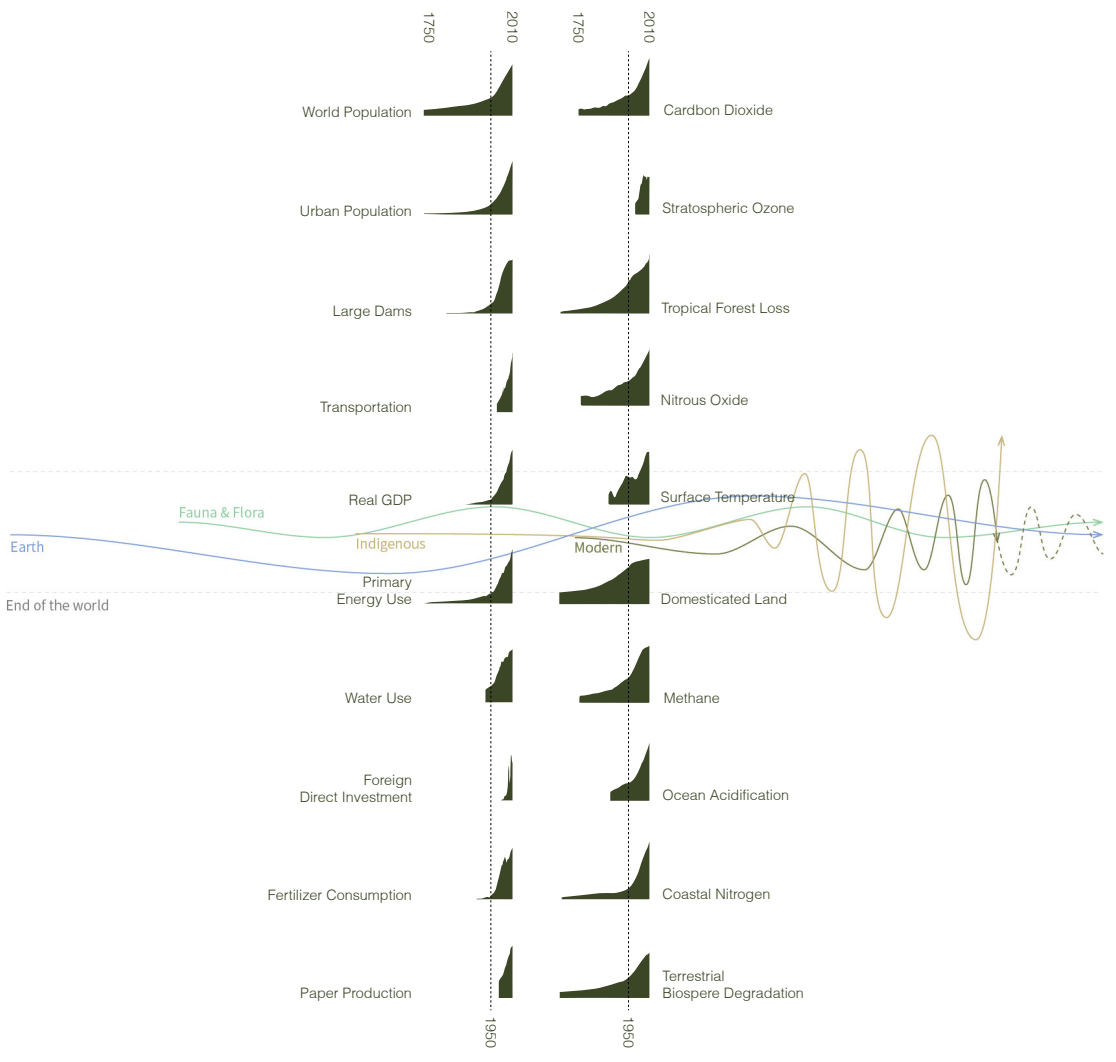
The era of the Anthropocene is marked by the end of the Holocene, where Earth has entered a new geological epoch, driven by the impact of human activities on the Earth System (Steffen et al., 2015). The impact of this epoch has greatly affected or climate and ecologies, threatening the biodiversity life on earth. We have reached this point by failing to realize the importance of biophysical processes in sustaining and regulating life processes on earth and are living with the conditions that will cause mass extinction of millions of species. The trends that have led to this are known as the great acceleration, which is defined by an accelerated process of usage of natural resources, leading to depletion of various natural processes in equal pace. Consequentially, this desynchronization (Recubenis Sanchis, 2020) has led to the destabilization of natural, social and economic systems.

Although all life on earth will face the consequences of this desynchronization, we must consider that, in a varying cosmological universe, each existence will witness varying amplitudes and frequencies of such consequences. In the case of human cosmologies, The Amerindian populations in the Amazon are already living through their extinct world. We are misled to believe that its urgency is common. As Ailton Krenak (2019) explains, this is the urgency of “a humanity”, and was brought upon every existence on the planet by that same humanity. That same humanity, or civilization, which continues to destroy and has destroyed other existences throughout history. In this, the understanding that we share the same urgency to deal with the climate crisis reveals itself. We, as the modern hegemonic society, are battling to save our own existence, not of every existence.

This is known very well by those which have found themselves in the path of our historical process of development. Dealing with the climate crisis or delaying the end of the world has only caught up to us now, whereas other universes that inhabit the same earth, have already crossed (in many cases involuntarily) and are existing in a post end of the world condition. For the indigenous populations of South America, the end of the world began in the 15-16th centuries and since then, they can only resist complete annihilation.

Diagram to show the dissonant existances that share Earth.
The author. 2020

The trajectory of the Anthropocene:
The Great Acceleration.
Will Steffen et al. (2015).



Context

Protesters dig a ditch to alow water through in a symbolic act.
Photograph by Xingu Vivo, 2012.

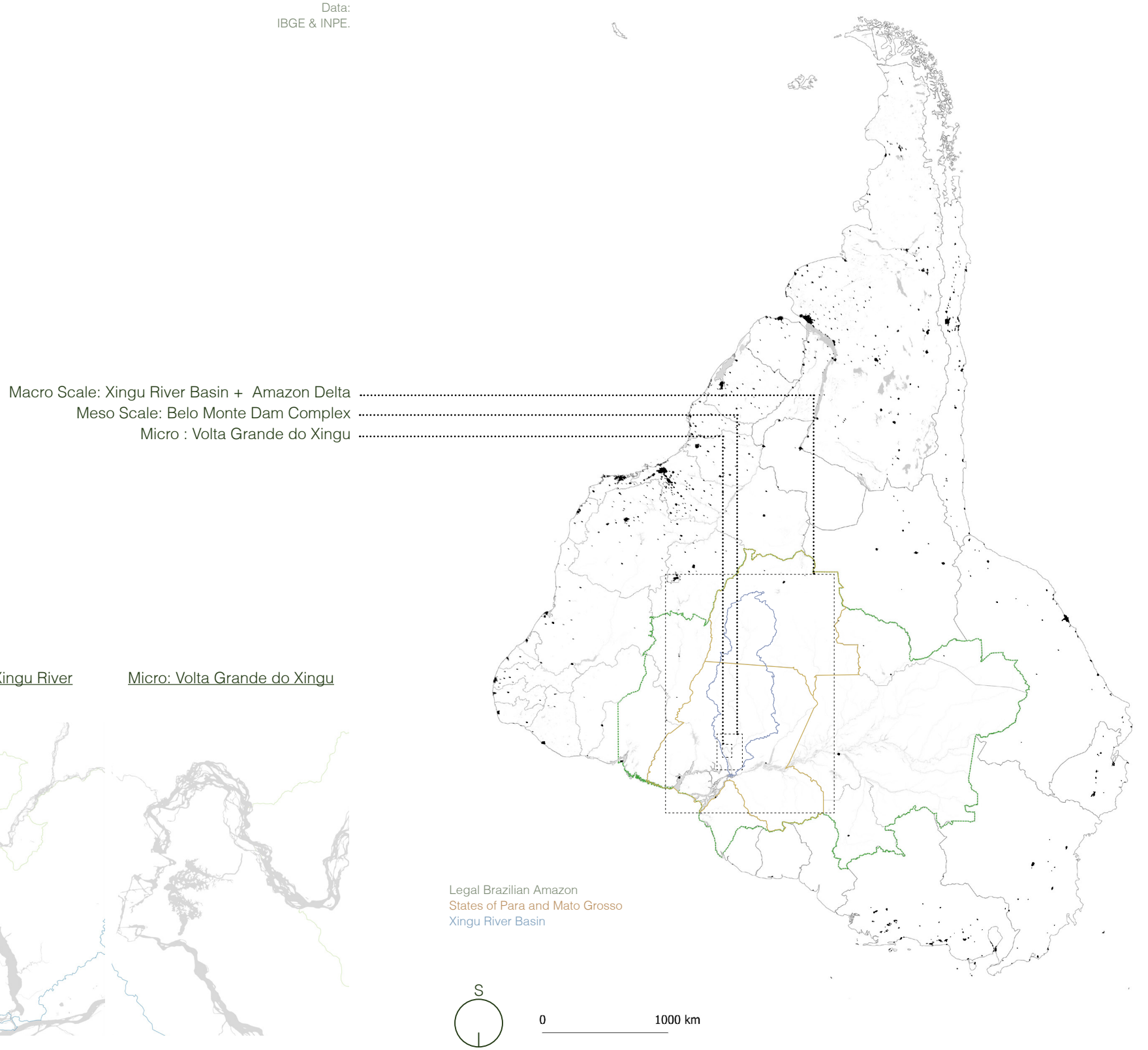
Site
Climate Crisis
Sovereignty
Geopolitics
Economy
Ownership
Development
Amerindian Condition

Context:
Site

The site chosen in the Amazon sits on the lower Amazon River Basin. The Xingu River Basin is an affluent to the Amazon River and provides most of the clear water to the Amazon river. This region sits on the deforestation belt of the amazon and is under immense pressure of agribusiness, mining activities and urban occupation. The region was one of the first urban occupations in the now Brazilian amazon where European colonizers confronted vast indigenous populations and complex urban systems that coexisted and enhanced the forests biodiversity.

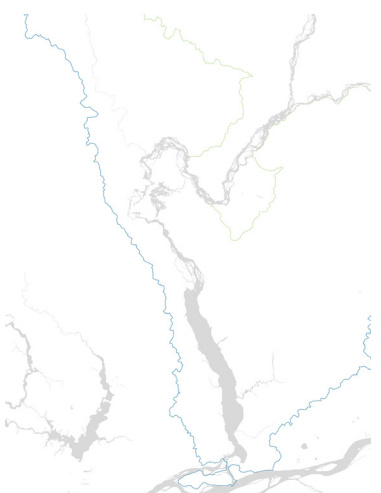
Now, this region is under pressure once more by the global chains of production, fuelling occupation further within the forest and culminating in deforestation and loss of biodiversity.

Map of South America
Data:
IBGE & INPE.



Macro: Xingu Basin

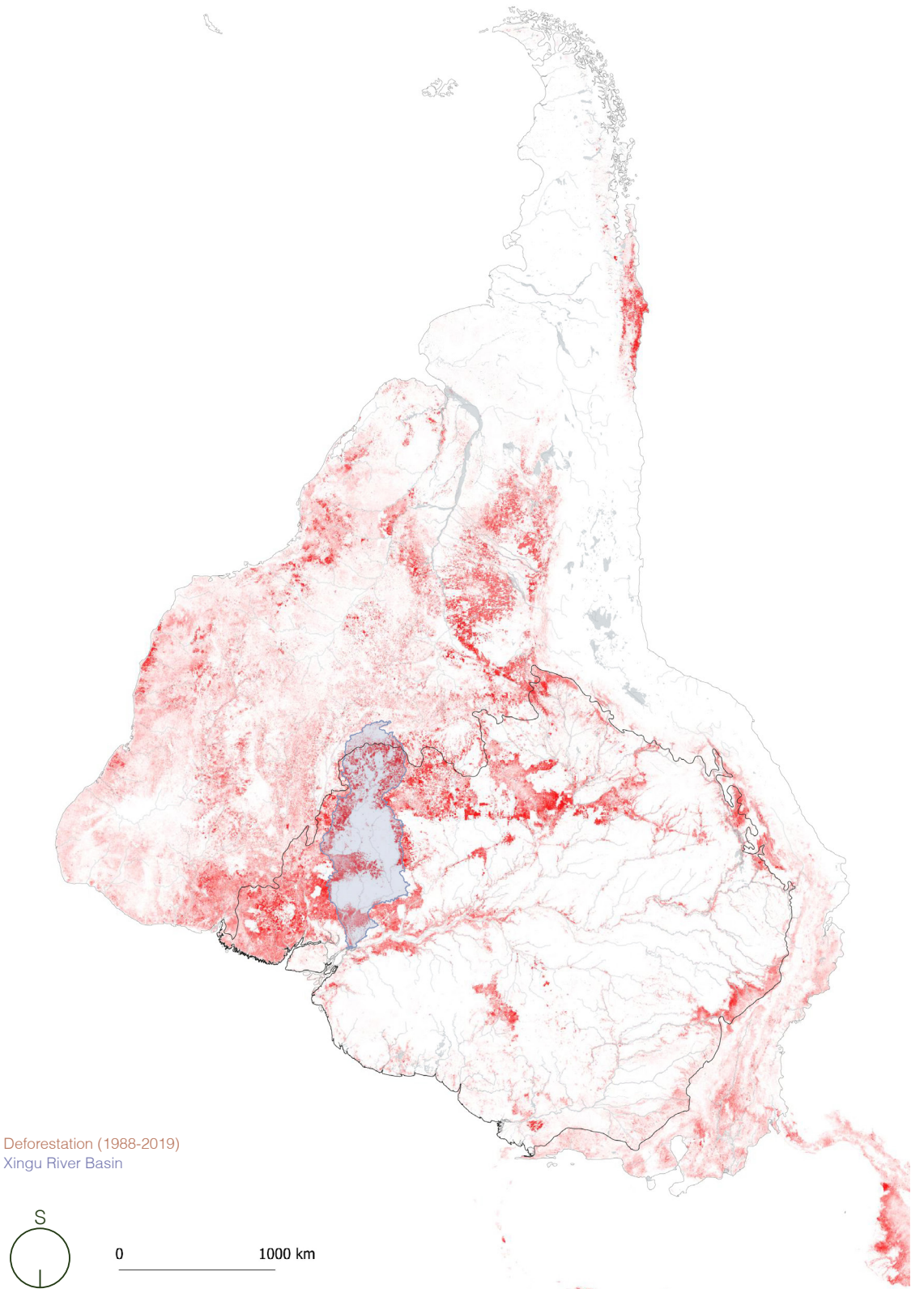
Meso: Lower Xingu River



Micro: Volta Grande do Xingu

Context:
Climate Crisis

Accumulated Deforestation in the
Brazilian Legal Amazon since 1988.
The author, 2020.
Data: INPE & IBGE.



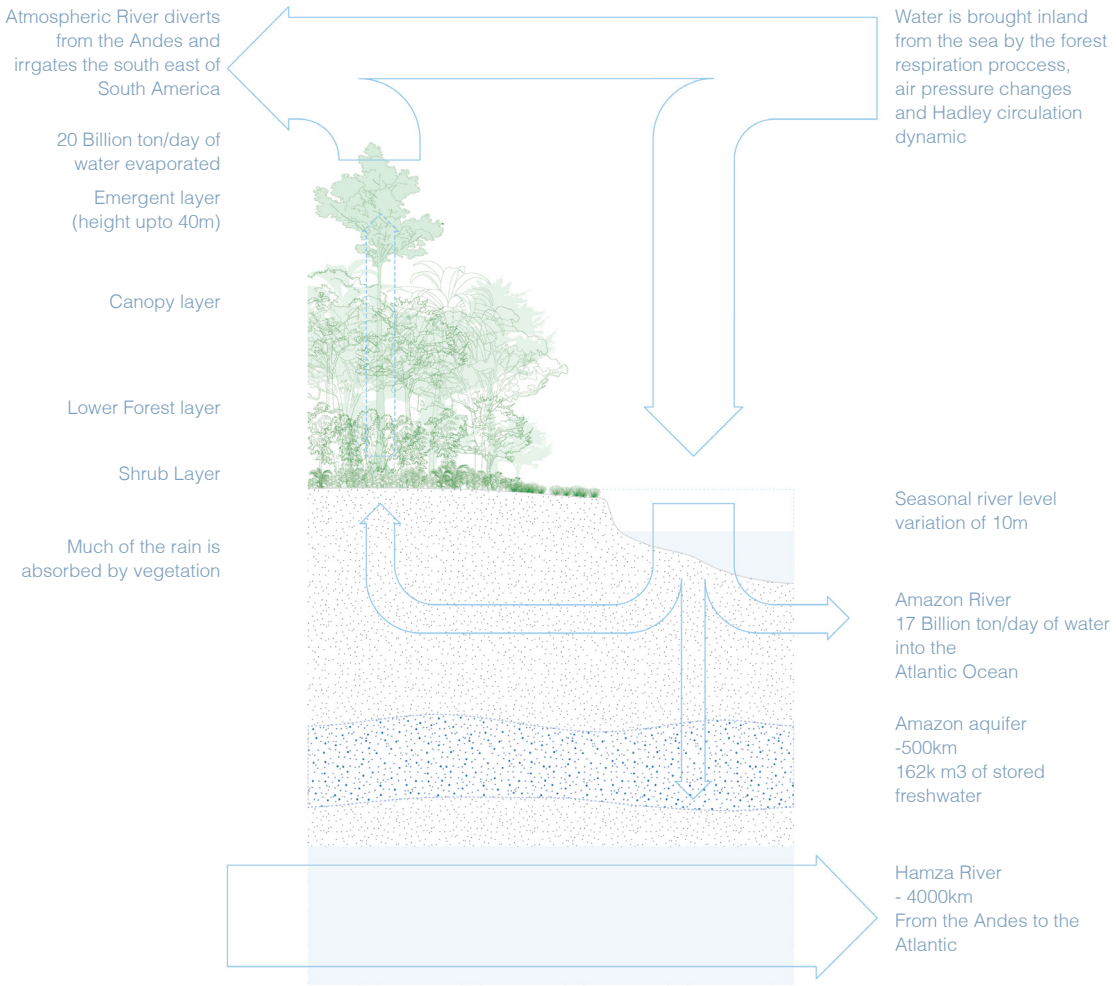
The capitalist model for development focused mainly on the extraction and exploitation of finite natural resources has disrupted natural climate systems and has endangered life on earth. The Amazon, the biggest tropical forest on earth with approximately 40% of South America. (Mongabay, 2020) and the largest CO2 storage, with approximately 200-400 million tons of stored CO2 (Lovejoy & Nobre, 2015). Deforestation, mineral extraction and consequent urbanization have posed a threat not only to the local biodiversity and ecosystem processes, but also have impacted climate and ecologic dynamics on a continental scale. The accelerating reduction of vegetation cover since 1980 by (total of 19%) (Lovejoy & Nobre, 2015) has impacted on rain patterns over several other dependent biomes and affected water provision in cities such as São Paulo, about 2000km away from the rain forest (Lovejoy & Nobre, 2015). Biomes such as the Pantanal (Biggest inland wetlands in the world) and the Pampas begin to face critical drought periods, resulting in devastating fires themselves (Lovejoy & Nobre, 2015).

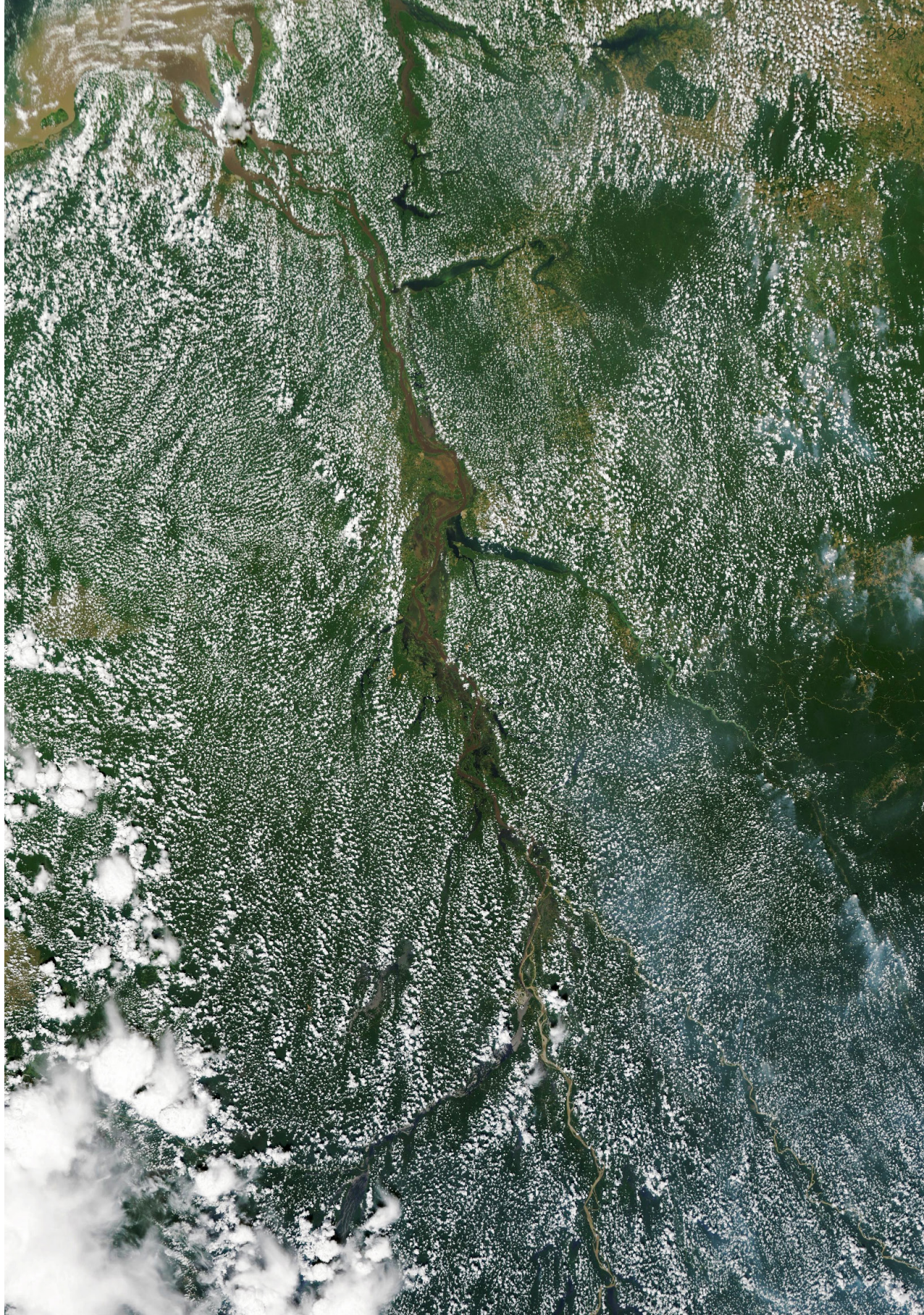
The Amazon plays a fundamental role in the provision of water for the continent, acting as a water pump of moisture, raised from the Atlantic Ocean by the Hadley equator cycle, this moisture is then pulled far inland because of the natural process of respiration of the vast vegetation cover. At the same time evapotranspiration occurs which pumps into the air heavy water particles at such a quantity that a literal air river is formed, larger in water than the Amazon river. Because of the arrangement of the forest and the Andes mountain range, this air river is diverted south, irrigating the southeast region of the continent, avoiding its desertification, as seen in in other continents at the same longitude.

Context:
Climate Crisis

Below:
Diagram of the Amazon's ecosystem cycles and services.
The author, 2020.

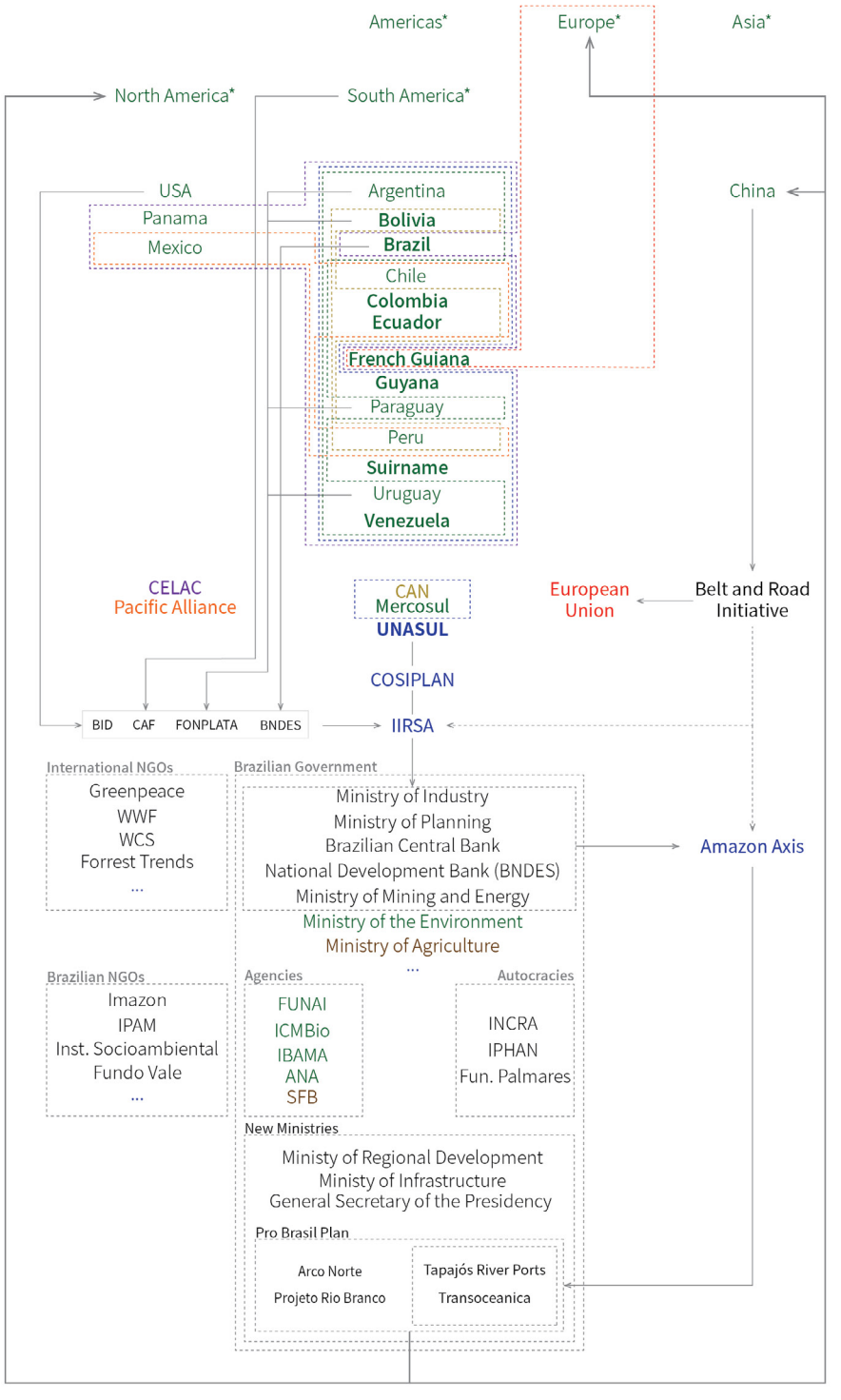
Right:
Satelite Image of the lower Amazon River Basin.
INPE, 2019





Context: Sovereignty

The political ecology of South America related to the Amazon.
The author, 2019



In more recent decades, after re-democratization in the late 80s, Brazil continued to facilitate the exploitation of the amazon. The privatization process of state-run companies facilitated the entry of international capital and investment which rapidly transformed the urban and industrial arrangements in Brazil (Maricato, 2009) and in the case of the Amazon, resource extraction. In the early 2000s, regional and continental planning and investment of strategic infrastructure was favoured. As the continent asserted itself as a major resource and commodities exporter, in turn greatly due to international demand, projects that facilitated logistic integration and enhanced production gained traction. These investments were largely funded and supported by the international bodies such as the BID and World Bank, since the facilitation of commodity supply fuelled industrialization in China. The MERCOSUL (economic union block of South America) consolidated a shared purpose for the region through the IIRSA integration initiative, coordinated by CONASUR. This program sought to integrate the region by aligning national projects under a common continental vision. The initiative focused mainly on large infrastructural projects that facilitated the flow of production, mainly of raw resources and commodities.

This continental project was implemented during a period of stable national political landscapes and shared development visions in the continent from centre-left to left governments. After the shift towards right and conservative ideologies following the global wave of resentment to the period of progressive establishment, IIRSA and transnational organizations, such as MERCOSUL, lost traction and common ground. Yet, the scramble for high demand commodities and resources continues and the investments to consolidate their continual and incremental flow have only shifted towards different actors and institutional arrangements (Duran, 2019).

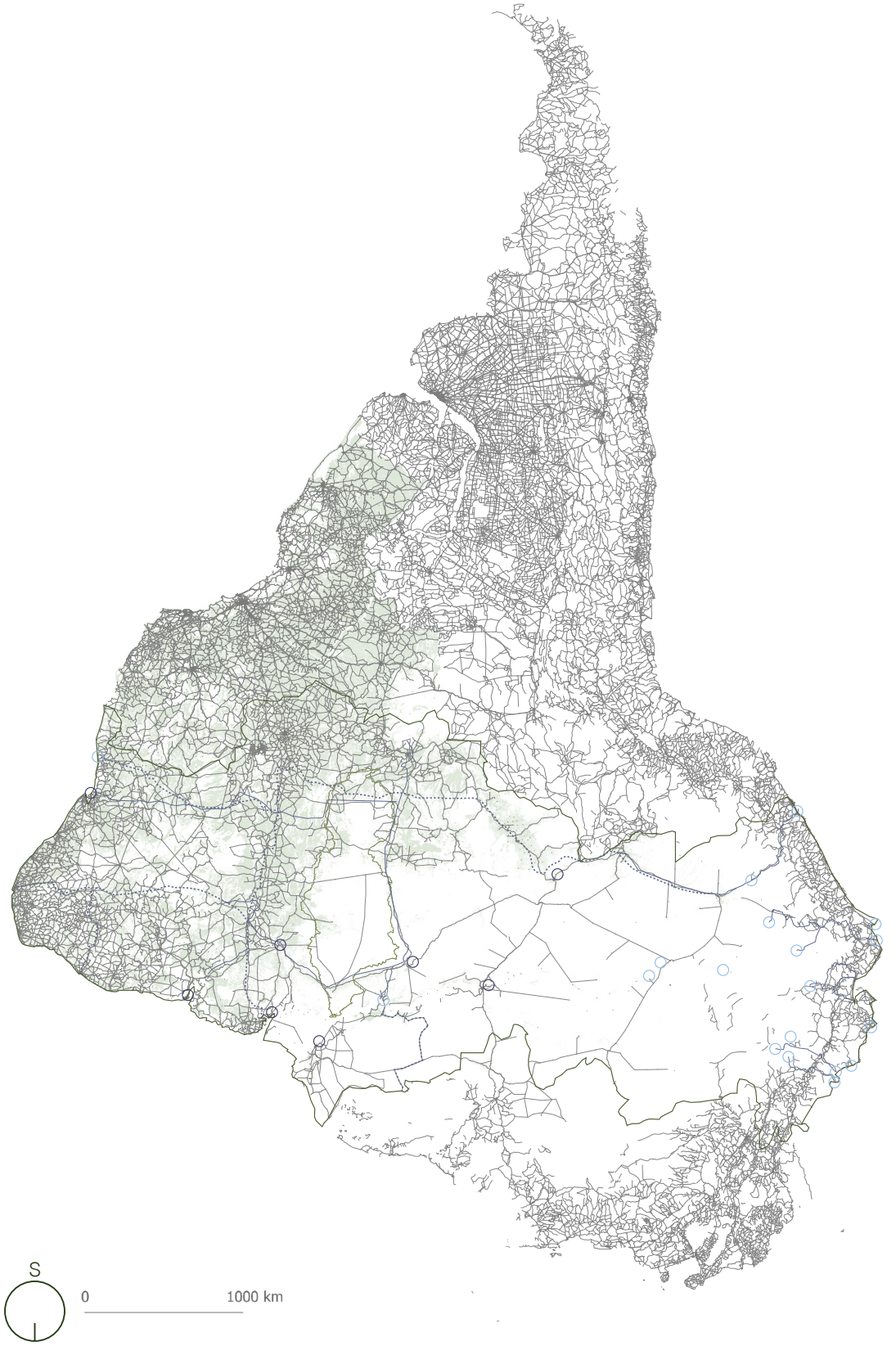
The Amazon, rich in resources and biological material, continues to be disputed, and this institutional dismantling has happened not only at the continental level, but is an active intent of the Brazilian and other national governments on the national and state levels (Becker, 2001). Under Brazil's president Jair Bolsonaro, the government has actively dismantled and undermined regulatory and legislative agencies and institutions of the Brazilian State in order to favour the exploitation interests of the Amazon. These actions have faced less resistance than before because of the current cultural understanding that, how Brazil handles its territory and resources is directly related to its sovereignty and freedom as a nation.

Context: Geopolitics

Amazon Hub
IIRSA, 2014.

he preservation of the Amazon biome is fundamental to guarantee conditions for life on earth, and as such, the world watches attentively over the Amazon. The vast biome shared by 9 countries has always been managed strategically by these countries, since its complete colonization and connectivity has always proven challenging. Since the arrival of Portuguese colonists in the Brazilian Amazon, geopolitical strategies to assert control over the territory against local indigenous civilizations and competing colonial powers have proven successful with the construction and implementation of key strongholds in strategic nodes along major rivers. The military regimes of the 40s and 60s sought to assert territorial presence my populating the region. Critical infrastructure and urbanization deep into the rainforest were stimulated, enabled by state led investments and companies created to mine resources. This strategy was employed to fundament the Brazilian presence in the region, in a time where neighbouring countries were experiencing uprisings and pre-Colombian populations were demanding recognition of their rights and lands.

In more recent decades, continental projects such as the IIRSA has facilitated the integration planning of the amazon beyond national or bilateral national agreements, articulating infrastructural projects to facilitate the flow of production and resources to access the global market demands. The IIRSA Integration corridor for the Amazon, or simply Amazon Axis, has aligned continental and international investments and funds to implement a series of infrastructural projects and networks around the amazon. These projects were not necessarily envisioned to address the local conditions and demands but to service the global economies demand for resources. As such, they continue to perpetuate the discourses of previous moments in Brazilian history which sought to integrate the region to favour the Brazilian economy, in detriment of the local population and development of the Amazon region.



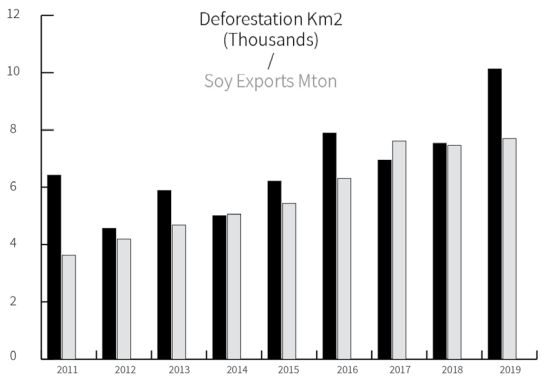
Context:
Economy

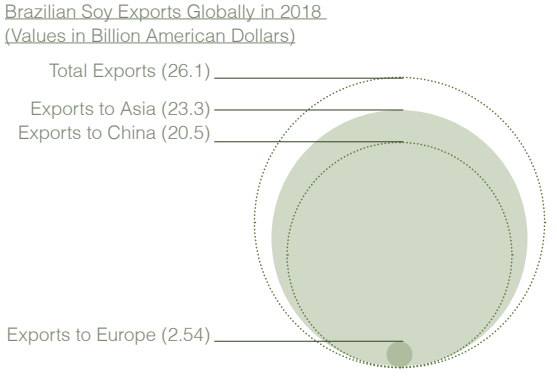
Right:
Global Soy Import and Export on
Dymaxion World Projection

Below:
Table of total annual soy exports
and total annual Amazon biome
deforestation
Data:
INPE
Ministry of Agriculture
Minstry of Commerce
(Accessed 2020).

The reigning process of economic development depends on a steady supply chain of raw materials at low stable prices in order to turn lucrative profit margins for shareholders. This is sustained by guaranteeing a stable and predictable flow along every step of the supply chain. The ultimate end to these products are cities, which occupy around 3% of the earth's surface and yet concentrate 70% of global GDP (Brenner & Katsikis, 2020). The operationalization of territories to service urbanization is unprecedented. These hinterlands continue to expand hyperspecialize and in order to guarantee ever record high yields. These landscapes are organized based on their capacity to generate profits and service global demands, often denying the local realities in which they are inserted. Considering the concentration of GDP in urban agglomerations, it is even more significant to analyse the explosion of primary commodity trade, which has grown two to three times faster than global population, symptoms of our current model of development. Agricultural specialization landscapes cannibalize their environment and accelerate the transformation of "unproductive" land into spaces for profit.

This dynamic is what poses the biggest threat to the amazon region today, where the expansion of soy and corn plantations pressure and force deforestation of the forest to make space for pasture which then clears the land to receive grain plantations. Most of the grain is not utilized in the Brazilian internal market or the neighbouring continent countries, but instead is in majority shipped abroad, mainly to China, in order sustain local livestock and fuel processes of urbanization elsewhere. The neoliberal economic discourse that positions South America as a raw resource and agriculture commodity exporter reaffirms the regions development path dependency (Castells, 1973).





Data Source:
Observatory of Economic Complexity

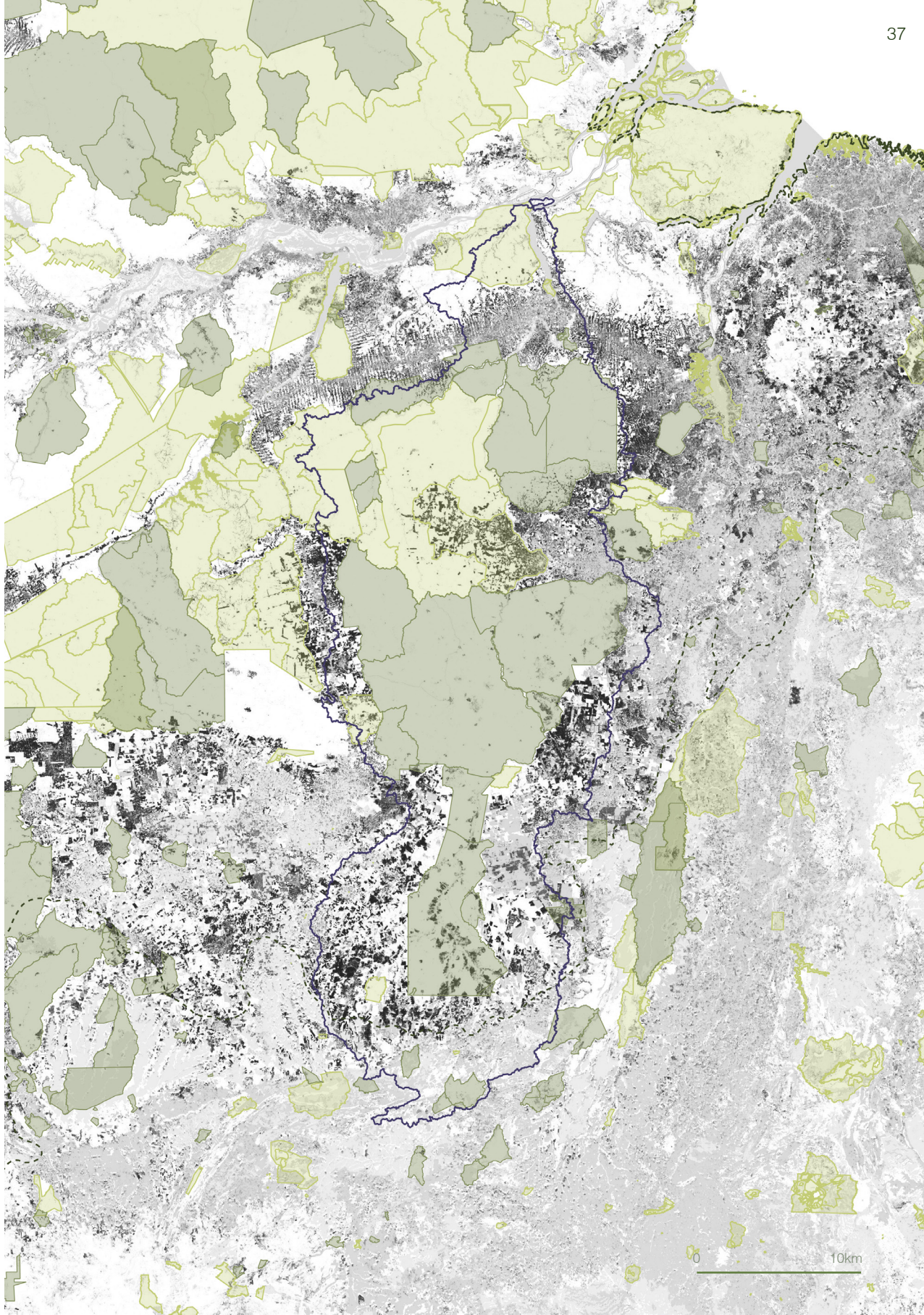
Context: Ownership

Nature and Indigenous Reservations

Data:
Ministry of Mining and Eenergy, Ministry of the Environment, INCRA, ICMBio, FUNAI and IBGE. (Accessed 2020).

In recent decades, the institutional ecology of Brazilian agencies that regulate and monitor activities in the Amazon region has been strengthened and enhanced. Organizations such as ICMbio and IBAMA, as well as FUNAI, under the guise of the Ministry of the Environment have acted to inform, regulate and impede activities that threaten the biome. Nevertheless, in recent years, the Brazilian government has acted to erode the capacity of action and autonomy of these institutions, attempting to deregulate and review demarcations that enforce and aid the preservation of the Brazilian biomes. This advance against these institutions and agencies comes hand in hand with a global phenomenon of distrust in political institutions and climate change denial from elected governments.

The land question in the amazon is central to understand the narratives from various people that fuel disputes over this land. Through processes of demarcation by different agencies and overlapping of boundary area and jurisdiction, the land in the assumes different conditions and performances. These boundaries are not always considering the limits of other agencies which adds to the fragmented nature of occupation and development in the Amazon.

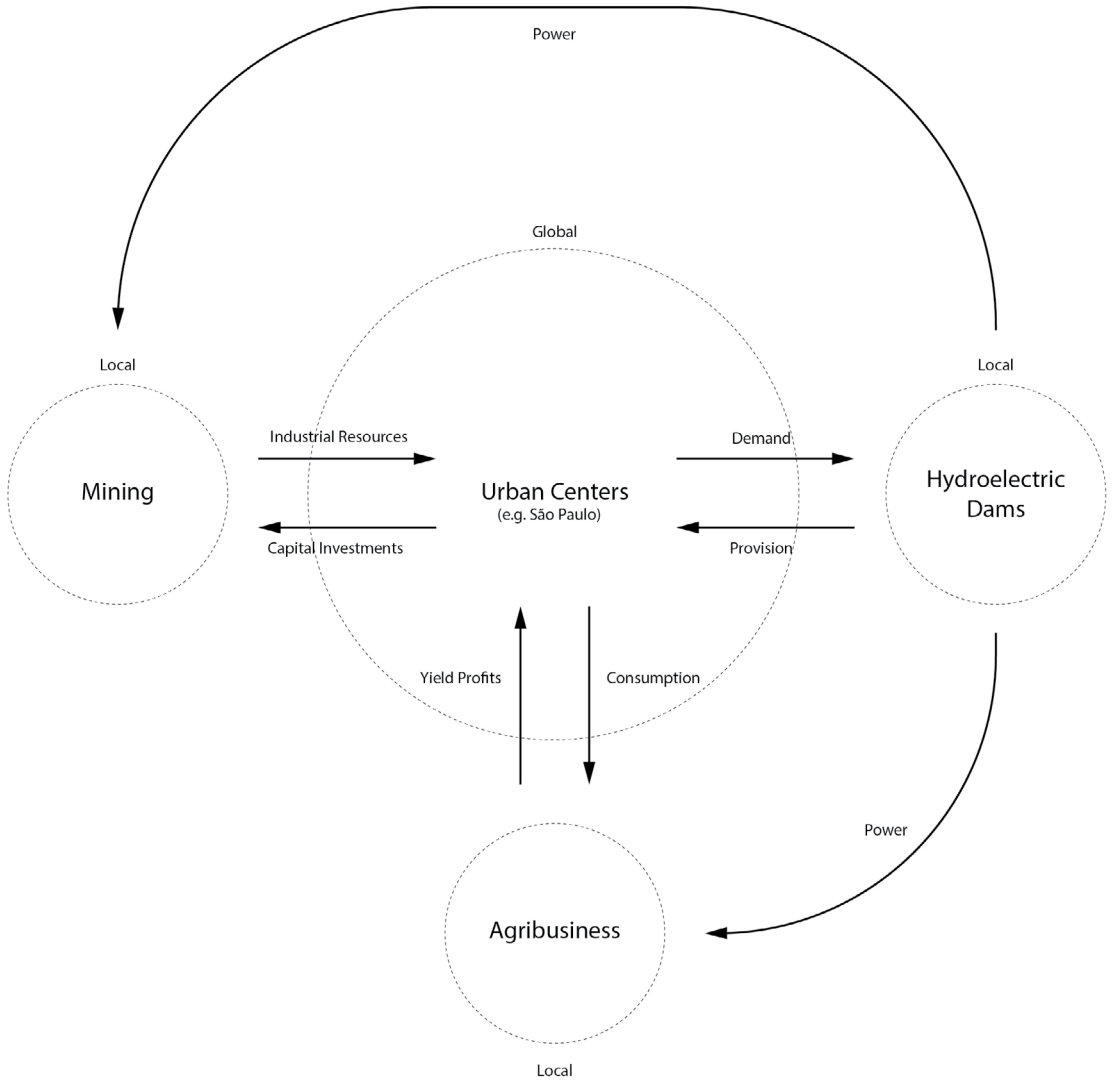


Context: Development

The concept of development in South America is directly related to the exploitation of raw and natural resources and commodities. This condition can be observed around the continents Urbanization historical process and is defined as a dependent condition of urbanization on the international economic market frameworks (Castells, 1989)

In the Amazon, this becomes evident due to the existing process of urban occupation and existing networks of production. Generally, the infrastructural projects being implemented attend to the needs of natural resource exploitation and mining activities, which in turn require cheap and dependable labour. In this way urbanization in the region has followed the demands of primary production which can be highly volatile long-term investments since these are traded internationally. The model of development being implemented on the amazon does not favour the local demands, but rather those of the larger urban centres of Brazil which depend on international market demands to perform economically.

Diagram of the dynamics of Local and Global development model.
The Author, 2020.



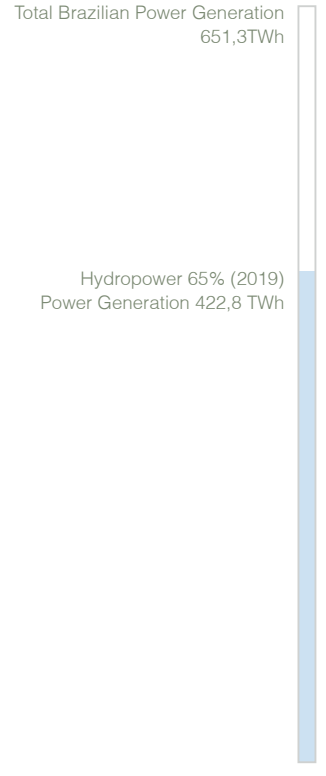
Context: Development

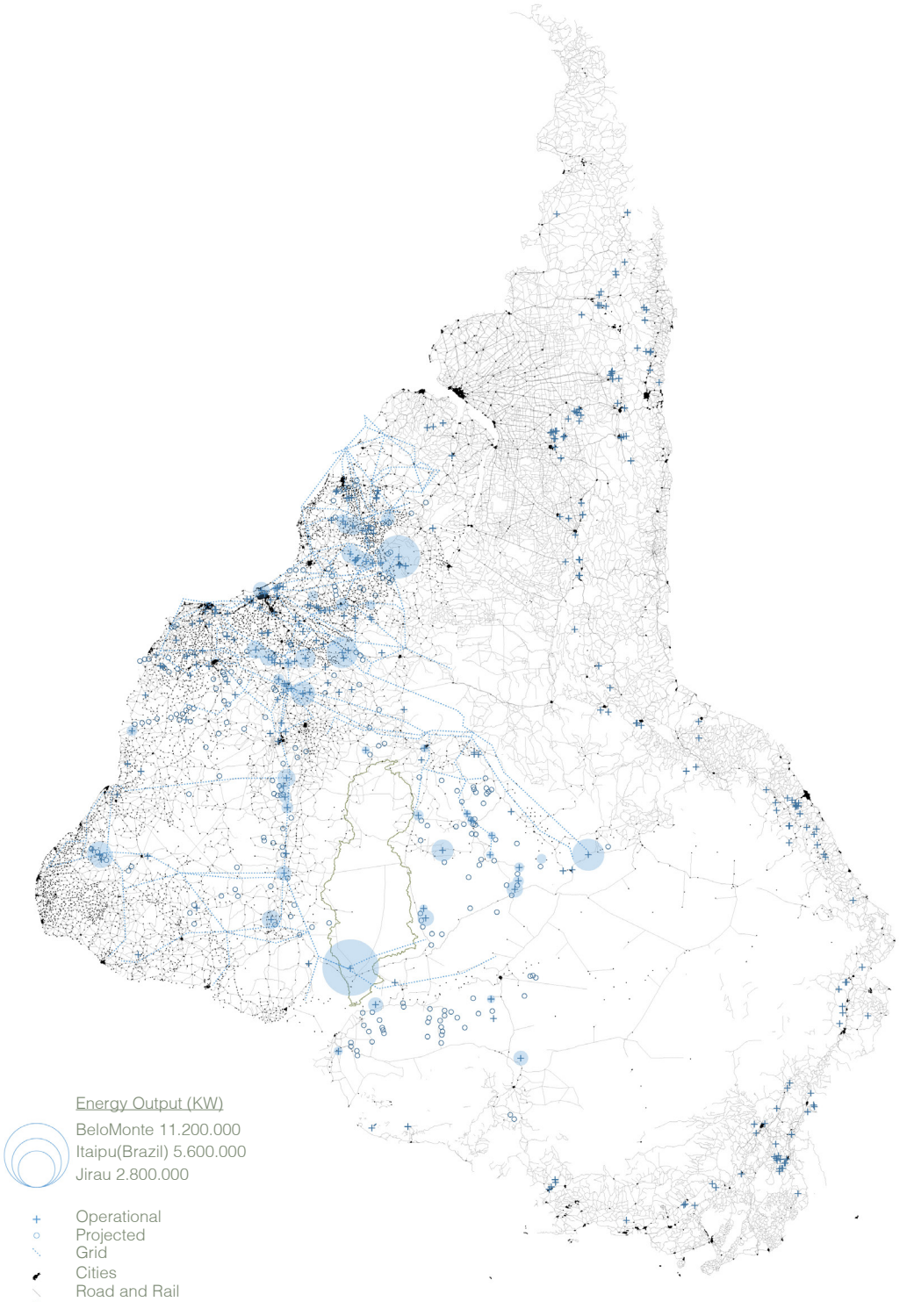
Right:
Map of the Brazilian Hydropower Enegery grid.

Left:
Share of Energy Production in Brazilian Energy Generation Matrix.

Ministry of Mining and Energy, 2020.

The energy production system in Brazil has always been highly dependant on hydropower generation. Given the countries abundance of rivers capable of power generation, with a relatively dependable output historically, the energy generation sector has favoured the construction of dams across the country, and this is no different to the amazon, region with the greater potential for hydropower production. Independent of the governing regime or political party, national developmentism has always counted with the construction of hydroelectric dams in the amazon as a steady and reliable source of energy production to fuel industrialization and urbanization, which happened mostly in the south-east region of the country. which is to say, that the energy produced in the amazon was not directed for the region's development, but rather to satisfy the needs of industrializing and urbanizing coastal cities of the south east such as Rio de Janeiro and Sao Paulo. In the end, the region would produce the energy for the country but keep its negative externalities of such endeavours like deforestation and ecosystem degradation, as well as informal and illegal occupation of highways and informal urbanization.





Context:
Amerindian Perspective

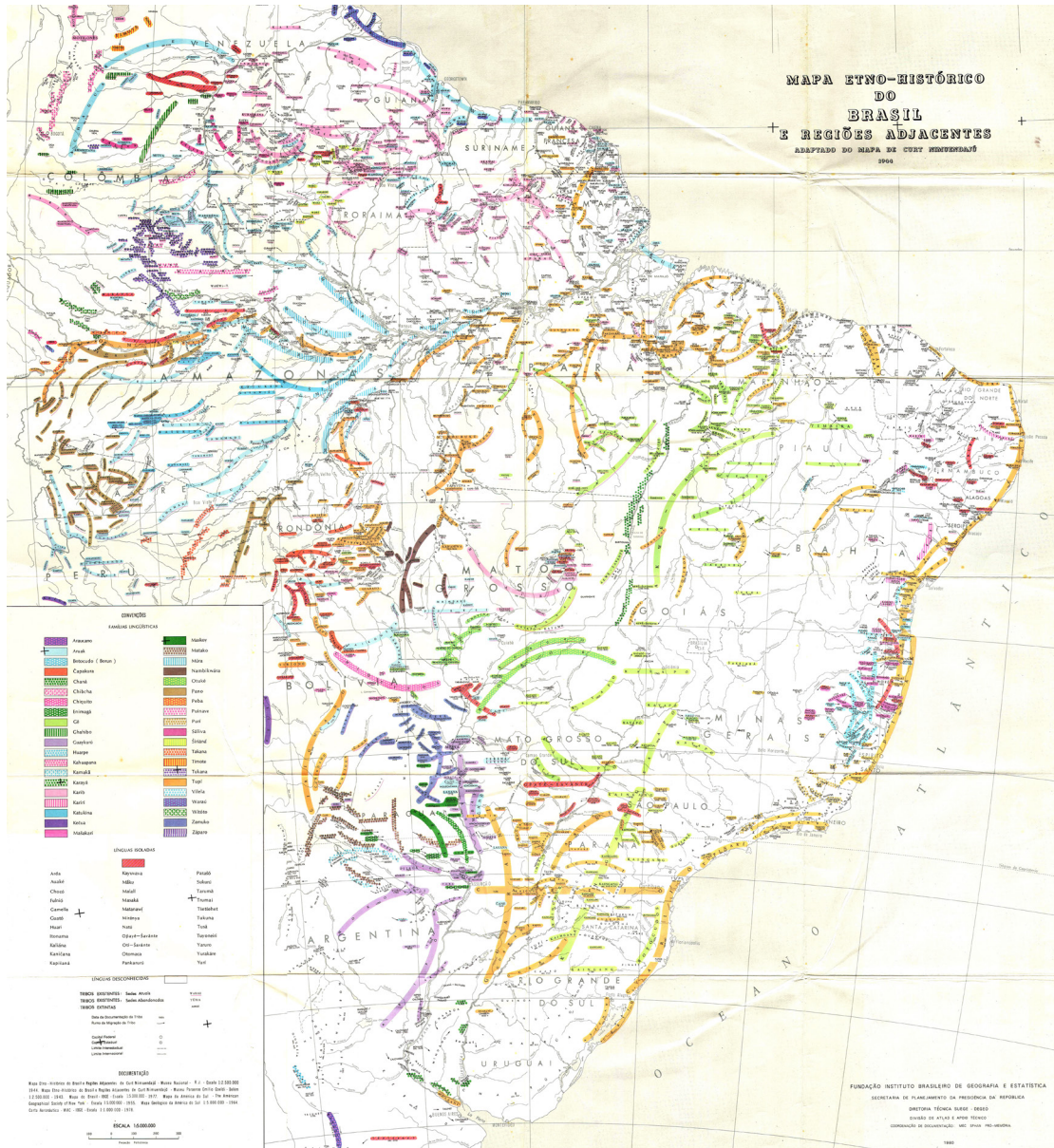
Amerindian perspectivism concerns the conceptual synthesis operated by Eduardo Viveiros de Castro (1996) to address an important Amazonian philosophical matrix regarding the relational nature of beings and the composition of the world. The concept synthesizes a series of phenomena and elaborations found in previous ethnographies about Amerindian peoples.
In general, the notion refers to indigenous conceptions that establish that beings with a soul recognize themselves and those to whom they are related as humans but are perceived by other beings in the form of animals, spirits or non-human modalities. The construction of this shared humanity is effective through the construction of bodies. That is to say: humanity only becomes visible to those who share the same type of body or to shamans, who can assume the perspective of others and see them as humans.

The human is thus the form of perception of himself, while the animal and the spirit are forms of perception of others. The idea of point of view, central to the concept, implies that there is only a world for someone. Everything that exists emerges for someone: there is no reality that does not depend on the subject.

The Amerindian conceptions that support the concept of perspectivism point, then, to the irreducibility of their contexts to an ontological distinction between nature and culture. Among Amerindians, nature does not exist in itself as an “objective” sphere, but as an effect of a point of view. The way in which the Amerindian worlds are governed leads to assumptions that are irreducible to the modern-western notion of cultural relativism. The unity of the soul and the multiplicity of bodies to which these ontologies point would lead not to modern-western multiculturalism, but to an Amerindian multinaturalism, in which culture is the common fund of a multiplicity of natures that unfold from bodies. Thus, the condition shared by humans and animals is not animality (as for modern science, according to which humans belong to the animal kingdom), but humanity.

Left:
“Aquela Gente que se transforma em Capitu”
Painting by Denilson Baniwa, 2018.

Below:
Historic-Ethnic map of
Brazil and adjacent regions.
By Curt Nimuendajú, 1944.



Context:
The Juruna

Top:
Tuíra,
indigenous woman,
at the moment she challenges the
ELETRONORTE
Director, Muniz Lopes.
Nascimento, 2017.

Bottom:
Cacique Raoni and Sônia Guajajara
protest against the construction of
Belo Monte Dam.
Ueslei Marcelino for Reuters, 2014.

The Juruna Nation (Yudjá) are a traditional inhabitants of the low Xingu River, occupying its islands and peninsulas. Culturally, they are known as a canoeing and river nation, having lived along the shores of the Xingu River since as long as their stories go back. They were the most important nation of the Xingu River and with the invasion of colonizers into their territories, they fled far from the coast and into the Xingu Basin, bringing other fleeing nations along with them. In 1842, their population was about 2,000 and a century later only 52. This was due to the conflict and genocide that "seringalistas" (rubber workers) imposed on the river nations as they sought to control the territory to guarantee rubber tree patches within the forest. It was in 1914 according to Nimuendajú that the remaining population decided to flee upstream to the High Xingu River region. Despite their imminent extinction, 12 members decided to stand ground in the region known as Volta Grande do Xingu, while the remaining tribe set upstream never to contact again those which were left behind. Those that set course upstream, settled within territories controlled by other nations and were in constant conflict with them. The Yudjá which remained married and exchanged culturally with settlers and colonizers in the region in order to maintain a growing population. Because of this, much of their traditional ways of life were lost, although they kept faithful to their riverine identity.

With the menace of the Hydropower dam construction in the 70-80ies, The Juruna mobilized and were supported by all nations which inhabited the basin, organizing large rallies and protests. Because of this, the Yudjá people which had migrated upstream 100 years ago were again in contact with the descendants of those who stayed, and this allowed for a reconnection and rediscovery of their nation's traditions and identity. The mobilization against the dam also formed a strong communal mobilization between all 26 Amerindians and indigenous nations in the basin, which today have many nationally renowned leaders such as Raoni Metuktire, Mário Juruna and Sônia Guajajara. They have united to mobilized against the destruction of their land and the Xingu Basin, rallying support from politicians and guaranteeing indigenous representatives in municipal, state and national congress.

Problem

Belo Monte Hydropower Dam.
Photo by Aaron Vincent Elkaim , 2015.

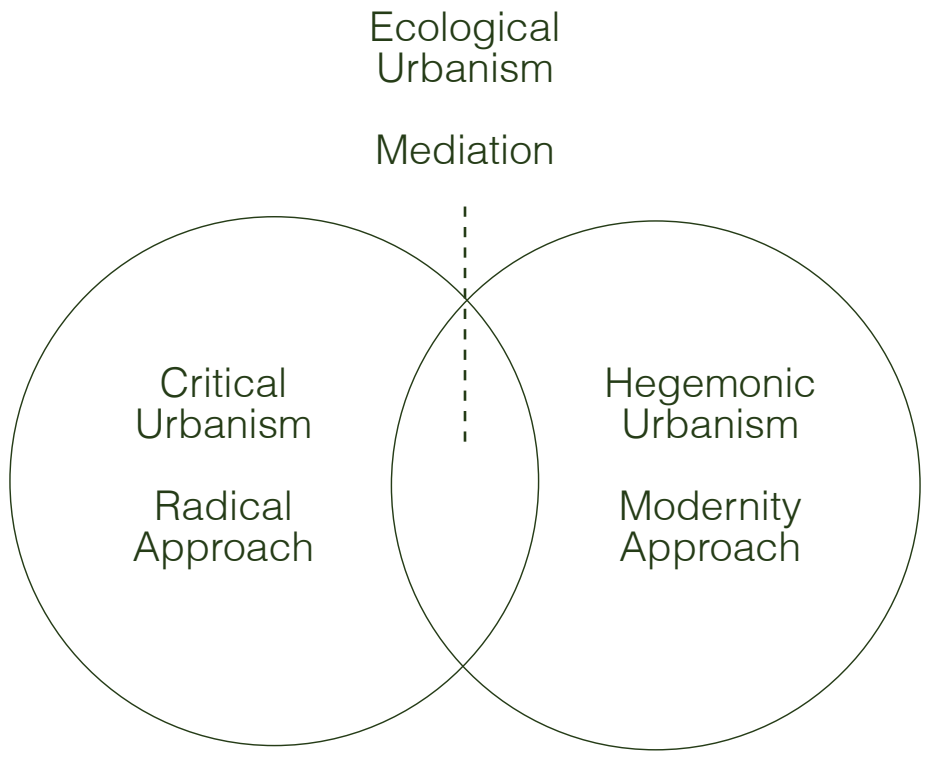
Boundary Conditions
Focus
Statement
Proposition

Defining the Boundary Conditions

The field of Urbanism and its practice differs from other spatial design fields given that it deals essentially with the design of relations and systems across scales, from the multiple to the singular. Urbanism provides solutions with various programmes which can offer quality of life in an egalitarian manner. This thesis positions itself within this field of understanding, which produces space to sustain ecological and social systems in place and propose enhancements to these systems in order to regulate desynchronized relationships. We can assume that this position sits within what is known as Ecological Urbanism, providing sensitive design solutions for social-ecological issues. This position differs from the most practiced hegemonic production of urban space which sits within modernity and classic urbanism. Modernity produces and replicates space with a cynical view of nature and ecology, arguing in favour of its capacity to control, quantify and commodify nature and ecology, vis-à-vis ecology as an ecosystem “service”.

On the other hand, critical urbanism identifies as the same material practice and existing systems but positions itself as the resistance towards hegemonic urbanism. Its radical counter designs exist in opposition, and so, existing only through opposition to something else, and never as a separate autonomous model.

This project attempts to position itself in between both practices, and specifically to the site conditions of this project, with a mediative approach between status quo and countering conducts seeking to explore the possibilities and limitations of our field when acting in such territories. The project works with what exists today and will propose designs within that sphere of possibilities rather than propose an alternative approach from what could be done if the conditions were given differently, e.g., a political scenario for dismantling the dam.



Problem: Focus, Statement & Proposition

Problem Focus

The current conditions of development in the Amazon are sustained by path dependencies and cultural models that have been present since the region's colonization and span through local to global scales.

In order to prevent climactic catastrophe not only in the region but on a planetary scale this development paradigm must shift to address and be sensitive to the local conditions and existences in the region.

Historically, hydroelectric dam projects throughout the water basins in the amazon region have served as catalysts for this development paradigm that exploits the region for its natural resources. The conditions that facilitate such projects systematically neglect the local conditions and social and ecological pre-existences. The de-synchronization between the built environment, ecology and societies caused by Dams are extremely damaging to the systems of life which depend on the natural cycles of rivers.

This dynamic is confirmed in the case of the Xingu Basin, tributary to the amazon river in the heart of the State of Pará. Known by the Amerindian as the year of the End of the World, Belo Monte Dam has been operational since 2016 and has quickly pushed the region into catastrophe. This dam has been contested by national and international agencies and resisted by local Indigenous peoples. The Dam greatly reduced water flow and natural river pulse dynamics, of which millions of life forms depend on to continue existing. The dam also sits on the "deforestation arch" of the Amazon, regional known as the advancing deforestation belt, and encloses areas of the forest that are primordial to maintain the biomes ecologic and climactic balance.

The importance of reviewing the influence of the dam's operation is critical for the survival of the basin and those who depend on it. Therefore, an approach that understands the varying forms of existances (human and non-human) that are related to the river and its natural systems is a necessary point of departure for any intervention in this territory. Considering this, the interfacing between local and infrastructure relationships must be understood in order to stabilize the effects and externalities that modern occupation has imposed.

Problem Statement

The increasing model of development dependent on commodity export is rapidly operationalizing the Amazon and causing the biomes ecological destruction with deforestation and pollution. The planning and implementation of hydropower dam infrastructure in the region are one of many systems that help catalyse the biomes destruction and have posed the biggest threat to Indigenous ways of life. Such projects fail to acknowledge the importance of local knowledge, societal relationships of these populations with forest and the intrinsic cycles of the biomes processes. overriding local systems of life and displacing populations, subjugated by the modern project into conformity.

Proposition

The current paradigm for development in the Amazon, structured within modernity's concept which views nature as resource, jeopardizes the sustainability of the biome. Dam Infrastructures planned over territories where a multitude of human and non-human entities pre-exist, do not take into consideration the systems and relationships in situ and generate catastrophic effects for these local universes. By considering local conditions and existances, the planning, implementation and operation of such structures could function better aligned and synced to existing ecological, social and built environment conditions of rivers. Rather than assuming a conflicting position when implementing such projects, a viable alternative is one that attempts to interface values over the territory.

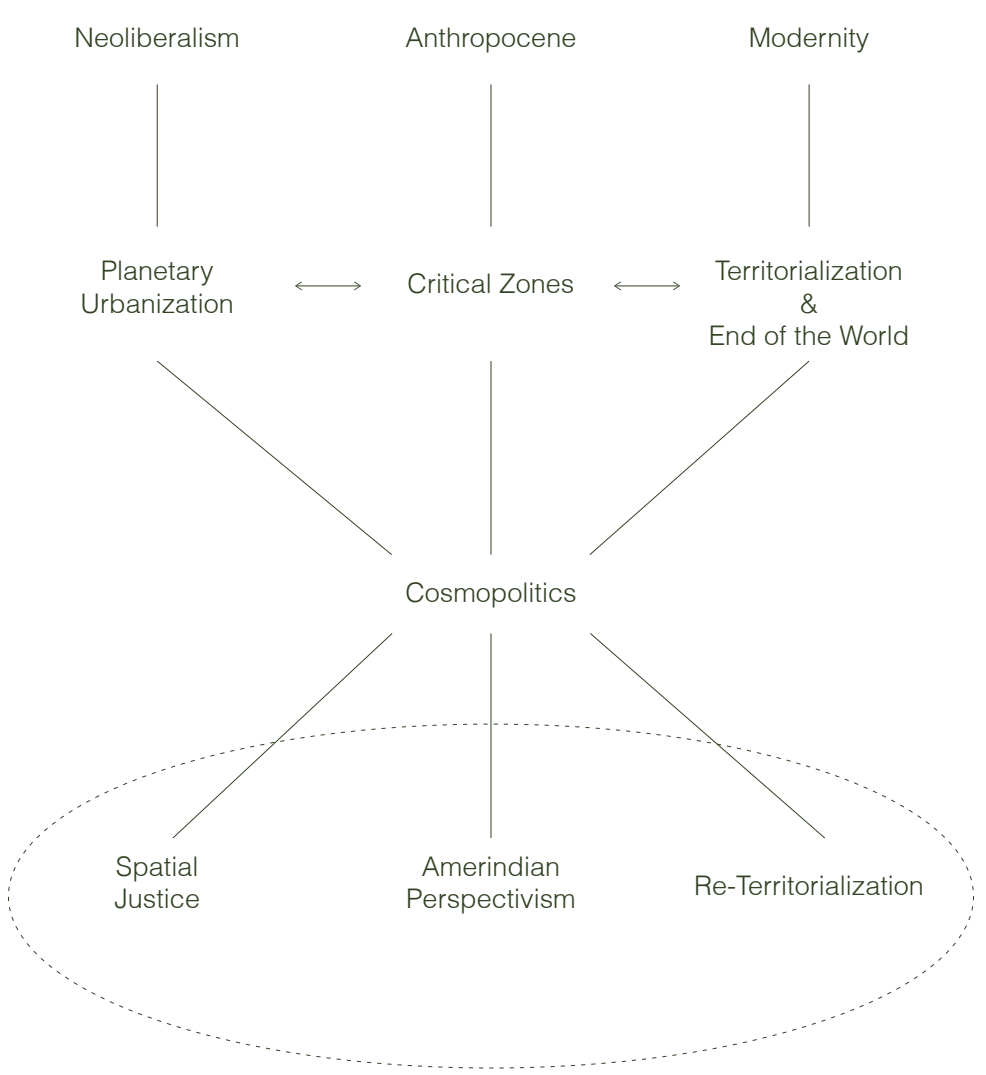
Directives: Methodology

Indigenous child jumps into the Xingu River waters.
Photo by Aaron Vincent Elkaim , 2015.

Theoretical Framework
Theoretical Foundations
Research Framework
Question and Aims
Methods
Intended Outcomes
Conceptual Framework
Analytical and Design Framework
Relevance

Theoretical Framework

Theoretical Framework Diagram
The author , 2020.



This theoretical framework illustrates the relationships between theories studied for the project and explain and define key concepts applied for the context. These theories arise from various fields of knowledge and are viewed considering their applicability to inform design and planning.

The three starting theories inform the hegemonic conditions that generally shape global dynamics and can also be seen influencing the Amazon region. These are related to theories that explain in more detail crucial dynamics which are informing processes acting on the Xingu Basin, and that, in one way or another, are disrupting the natural conditions. These also interrelate with one another and can overlap in various situations to potentialize there influence.

This desynchronised panorama is mediated by addressing the relevant aspects of all dynamics for life that have been disrupted. Cosmopolitics directs the need of accords that consider all existances and can be applied to align the core conditions for disruptions identified previously. Through cosmopolitics the problematized conditions are countered with theories which attempt to guide solutions. Spatial justice criteria can be used to address the disparities of neoliberalization and the spatial conformations of planetary urbanization. Highly institutionalized measures for forest conservation and an erroneous vision of Indigenous populations and ways of life are informed by the concept of Amerindian perspectivism, which can indicate unaddressed aspects of indigenous society and culture. These, help construct a review of the territorial arrangement, and re territorialize it according to these new guiding principles. Under the new territorial, social and environmental arrangement proposed by these theories, the environment is reviewed within its systemic condition, here described by critical zones theory.

Planetary Urbanization

Planetary Urbanization (Brenner & Schmid, 2012) has framed the process of urbanization in the Anthropocene as a planetary interconnected network of material and financial accumulation that favours urban regions over hinterlands and landscapes that are yet to become operationalized. Within this context, we focus onto the spaces that compose what has been traditionally labelled as hinterlands, but within this contemporary model of capital agglomeration at a planetary scale, the concept of Operational Landscapes (Brenner & Katsikis, 2020) model describes with more precision the "implosion-explosion of hinterland zones which has been animated by capital's drive to increase labour productivity and extend interspatial connectivity, both of which entail the construction of large-scale infrastructural configurations" (Brenner & Katsikis, 2020).

This productive configuration has exacerbated the pressure on local biomes such as the Amazon, since these ecological reserves sit on the fringes of operational hinterlands which are fuelled not by productivity but profit. In this sense, on a global production chain many zones of primary commodity production are not directly articulated to major cities or metropolitan regions, "but to other productive landscapes of cultivation, extraction, processing and distribution, which are in turn embedded and intermeshed within an intercontinental logistics space" (Brenner & Katsikis, 2020).

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Territorialization & Re-Territorialization

Defined by Raffstein (2012) as the act of human control and manipulation of space and its environment in order to produce either energy or resources. This control not only includes natural elements but also those who inhabit such space. Control over such areas can utilize a set of different strategies in order to control people and resources. This variability is necessary in order to achieve territorial influence efficiently depending on scale and type. Re-territorialization would then be the act to re-occupy or re-distribute control over such territory to achieve a varying intent over a given territory.

Cosmopolitics

Cosmopolitics, first theorized by Isabelle Stengers (2010) brings a critical understanding of the existence of more than ethnographic perspectives on a "single world (the common "thing"), when we actually inhabit a pluriverse." and as such, with regards to how Amerindian native peoples regard their relation to the amazon compared to western society, these do not "refer to different cultural perspectives on the same "thing," but to altogether different (albeit not unrelated) things." (Latour, 2004).

The lack of dialogue has led to the current state of things regarding our approaching climatic collapse and the only form to arrive at a common point would be to embrace dialogue in equal terms to these other existances, human and non-human alike. In this, we can achieve common visions to move forward. In the specific case of the amazon, the universe of Amerindian universe knowledge can show modernity how to reposition itself in balance with the biome's cycles, which redefine concepts of space and time (Krenak, 2019; Posey, 1982).

Spatial Justice

According to Soja (2009), spatial justice or injustice involves the fair and equitable 'distribution of public and social resources over the territory. In this sense, spatial justice involves not only the fair distribution of public and social resources but the right and opportunities for equal access to them. Usually, spatial injustice can be associated with biases and discrimination based on race, ethnicity, class or gender, producing intended disadvantages. Spatial Justice according to Soja, is the way in which justice can be achieved regarding the spatial effects of neoliberal globalization and the new economy.

Amerindian Perspectivism

Amerindian perspectivism (Castro, 1996) is rooted in the concept of perspectivism which argues that there is only one reality (in the metaphysical) where each one has a different perspective on reality, where each individual can perceive differently reality.

Amerindian perspectivism then, is related to the indigenous societies of the Amazon and can be characterized as in two main concepts: firstly, that the world is inhabited by a multitude of species and beings (including non-human) with consciousness and culture and secondly, each one of these species see themselves and others in a particular manner: as human, seeing every other one as non-human (as animals or spirits). The Amerindians also establish reciprocal relationships of respect with elements such as water, hunting animals and cultivated plants.

This in light of modernity, which constructs society in a dichotomic nature/culture manner, proposes a shift in western and modern worldview. Perspectivism also questions the strict and privileged scientific position as the only source of knowledge in western worldview. For Amerindian perspectivism, science is only yet another form of organization and systematization of reality.

Critical Zones

The theory of critical zones (Latour, 2010) shows us the trans-scalar influences of the climatic and ecological systems at work throughout earth. This reading allows us to expand the notion of territory, and as such, the extension of bioclimatic systems, beyond their immediate territorial spaces. Such a concept requires a different model to read and evaluate the sensitivity and the impact to their performance. Critical zones designate the fine layer inhabitable and possible for life on earth, where life has modified the cycles of matter by activating or catalysing physical and chemical reactions (Latour, 2018). This fine biofilm which covers the earth, is the central space of dispute and study in the age of the Anthropocene.

Research Framework

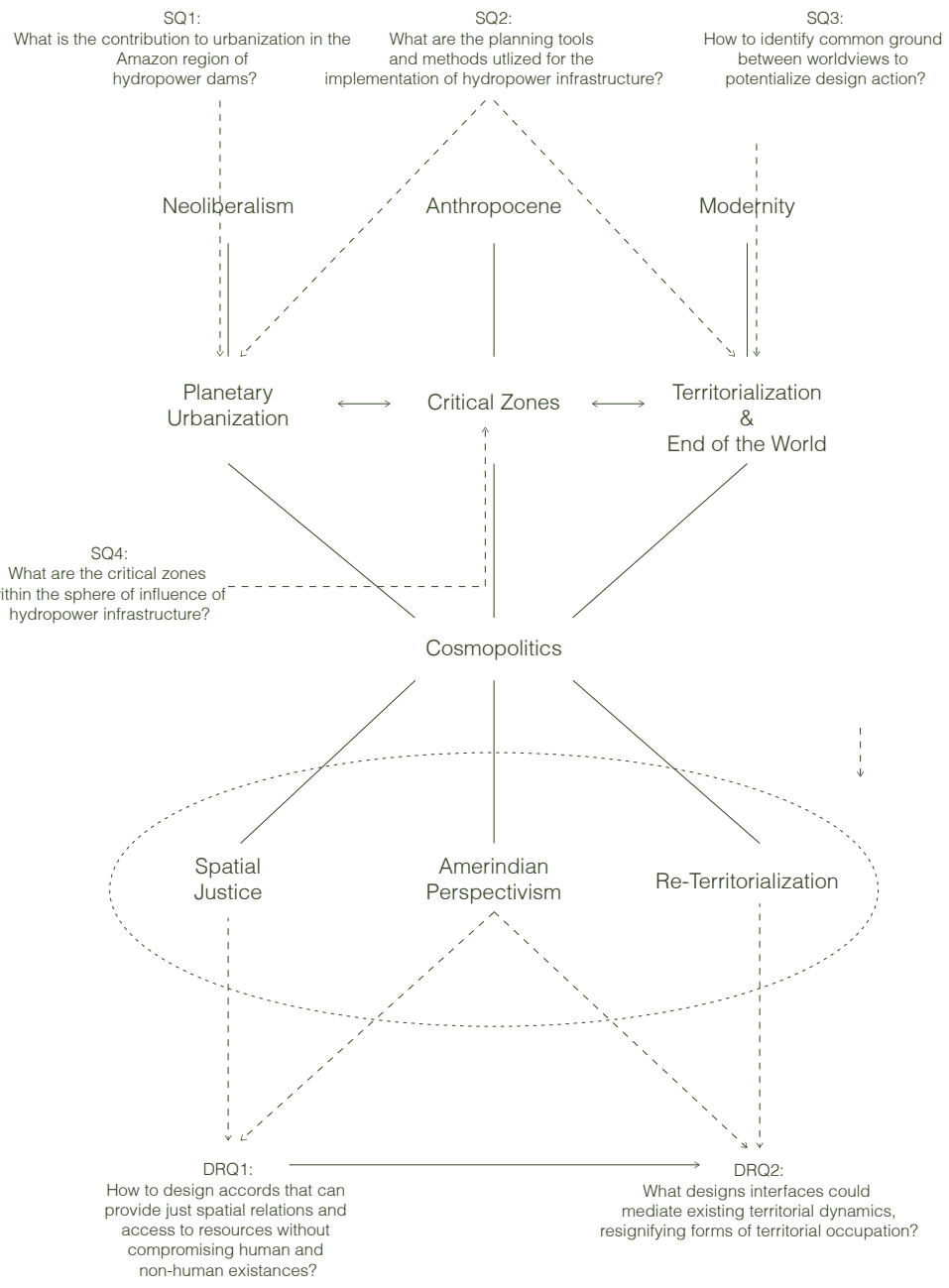
The conflicting juxtapositions of territorial occupations and universes are most evident in the vicinity of areas dedicated to support or function in favour of dam infrastructure. In the site where Belo Monte dam was constructed on the Xingu River, known as Volta Grande do Xingu (Large turn of the Xingu), a series of operations were conducted to conform the territory as an efficient resource for energy production. Given the specific site conditions of this, dams implementation and the challenges that arose from it, it is important to draw a specific set of theories, concepts and methods that can address the specificities of this locality.

The following research framework attempts to disentangle the complexities of this problem field and the characteristics and dynamics of the site. The frameworks drawn act as guides that structure the understanding of the issues towards the research, and through specific methods, understand how to capture and (re)interpret assumptions of such infrastructures and their potential impacts. The Outcomes proposed seek to enable tools that can aid in meditative projects, not only in the specific case of Belo Monte but for other dams in construction throughout tropical regions. In this sense, the research and design proposals can help envision other forms of interfaces with dams and local conditions.

Research Framework Diagram.
The author , 2020.

Research Question, Sub-questions & Theoretical Underpinning

Theoretical Framework with Research Question underpinnings. The author , 2020.



How to mediate the territorial occupation and impact of hydropower infrastructure on Critical Zones and Indigenous existances?

Analysis Sub-Questions:

ARQ1: What is the contribution to urbanization in the Amazon region of hydropower dams?

ARQ2: What are the planning tools and conditions involved in hydropower infrastructure projects?

ARQ3: What are the existing planning and design tools related to the implementation of dam infrastructure in the Amazon?

ARQ4: How to identify common ground between worldviews to potentialize design action?

ARQ5: What are the critical zones within the sphere of influence of hydropower infrastructure?

Design Sub-Questions:

DRQ1: How to design accords that can provide just spatial relations and access to resources without compromising human and non-human existances?

DRQ2: How to translate Amerindian Knowledge of nature and the environment to be incorporated into planning and design fields and strategies?

DRQ3: What strategies could reinterpret existing territorial dynamics and provide new models of occupation?

Aims, Methods & Outcomes

Articulation of Aims, Methods and expected Outcomes.
The author , 2020.

Research Questions

How to mediate the territorial occupation and impact of hydropower infrastructure on Critical Zones and Amerindian existances?

Analysis Sub-Research Questions:

ARQ1:
What is the contribution to urbanization in the Amazon region of hydropower dams?

ARQ2:
What are the conditions for hydropower infrastructure implementation?

ARQ3:
What are the existing planning and design tools utilized for implementation of dam infrastructure in the Amazon?

ARQ4:
How to identify common ground between worldviews to potentialize design action?

ARQ5:
What are the critical zones within the sphere of influence of hydropower infrastructure?

Design Sub-Research Questions:

DRQ1:
How to design accords that can provide just spatial relations and access to resources without compromising human and non-human existances?

DRQ2:
How to translate Amerindian Knowledge of nature and the environment to be incorporated into planning and design fields and strategies?

DRQ3:
What strategies could reinterpret existing territorial dynamics and provide new models of occupation?

Aims

To shed light on the social and ecological impacts of Dam Infrastructure in the Brazilian Amazon region, attempting to ilustrate the various universes impacted and propose interventions throughout the implicated systems that interface the desires of the involved universes, mediating potential conflicts.

(a). Develop an understanding of the process of urbanization in the Amazon related to and influenced by infrastructure implementation.

(b). Advance on the processes to incorporate local knowledge and production methods in order to facilitate and guarantee more sustainable approaches for infrastructure interface with the context.

(c). Critique the gaps in the various practices of regional integration for the amazon utilizing large infrastructural projects.

(d). Propose research-by-design scenarios that can envision other forms of inhabitation within tropical regions that are climate appropriate.

Methods

(1). Literature Review:
A comprehensive approach on the discussed theories and concepts from international authors and, especially, authors from the South American and Amerindian perspective.

(2). Visual documentation:
The collection and production of photography, cinematography and drawings that represent the local conditions and society.

(3). Analytic mapping:
The construction of maps that inform the territorial procedures analytically.

(4). Counter mapping:
Based on existing practices that overide the traditonal forms of territorial mapping and representation.

(5). Projective mapping:
The envisioning of realities based on the current occupation trends.

(6). Other forms of representation:
Modelmaking and exploration of other media.

(7). Surveys and interviews:
Collecting the data on ground from various actors and discussions with a selection of representative people/stakeholders.

(8). Scenario Exploration:
Mapping out the sites that are sensible to conflict between infrastructre and local conditions and accessing the variables for mediation.

(9). Case Study:
Selection of specific sites that can ilustrate the ground condtions studied and proposed interventions.

Method Limitations

(1). Literature Review:
- Limited access to english published aritcles and journals that develop on Brazilian Amerindian topics.
- The deliniation of theories must be applicable to the South American context.

(2). Visual Documentation:
- Difficulties regarding translation from Portuguese, Spanish and Indigenous languages.
- Access to sources might prove difficult given that many of these are concentrated in other regions of Brazil other than the Amazon.

(3). Analytic mapping:
- Difficulties finding data sets and merging sets from various sources to compose maps.

(4). Counter mapping:
- Access to spatial and cartographic local knowledge can prove difficult given the limited distribution of such information and accessibility difficulties.

(5). Projective mapping:
- Limited by the perspecitve being considered and omitted.

(6). Other forms of representation:
- Physical incapability to access workshops for modelmaking given the 2020/21 Covid-19 Pandemic restrictions in TU Delft.
- Inaccessible content due to copyright restrictions.

(7). Surveys and interviews:
- Due to 2020/21 Covid-19 Pandemic, Access to local sites and people is restricted or limited.
- Availability to conduct interviews of local actors is restricted to internet or technology access.

(8). Scenario Exploration:
- Access to data and information on different sites might vary considerably, compromising the effectiveness of choices for comparision.

(9). Case Study:
- Availability of data for constructing an accurate representation of ground conditions.

Prospect Outcomes

(i). Documentation and representation of the pre-existing networks and knowledge of locals and indigenous peoples.

(ii). Expand on the knowledge regarding the impact of large infrastructure implementation in tropical regions.

(iii). Documentation on the possible counter processes for management and implementation incorporating stakeholder engagement on ground.

(iv). A set of grounded intervention proposals relating to the impact of the dam on systemic dynamics of the Xingu River.

(v). A new design of accords and policies that allow the pre-existence of local conditions.

(vi). A revision of the of limits of our profession to engage through design according to varied worldviews.

(vii). A discussion on the prospects of cosmopolitics and design in publishing format.

Approach

(i)
=
A.RQ(1, 4) x
(a (1+2+3+4+6+7))

(ii)
=
A.RQ(1, 2, 3, 5) x
(a+b+c (1+2+3+5+6+7+8))

(iii)
=
(A.RQ(3, 4, 5) x D.RQ(1, 2)) x
(b+c (1+2+4+5+7+8))

(iv)
=
(D.RQ(1, 2, 3) x
(i, ii, iii) x
(b+d (5+6+8+9))

(v)
=
(D.RQ (1, 2) x
(i, ii, iii, iv) x
(b+d (1+6+8)

(vi)
=
(A.RQ(1, 3, 4) x D.RQ(2)) x
(i, ii, iii, iv, v) x
(a+b+c)

(vii)
=
(A.RQ(4) x D.RQ(1, 2, 3)) x
(i, ii, iii, iv, v, vi) x
(c+d)

Conceptual Framework & Project Framing

Conceptual Framework Diagram
The author, 2020.

Mediation Principles

The alignment and organization of concepts from the theoretical framework structure the constellation space that surround this projects study object: Dam infrastructure. Three main approach points are organized, where key concepts are arranged and gravitate towards according to similarities in definitions or explanations.

Starting from the Societal/Cultural entry point, the project identifies key aspects of the hegemonic worldview – modernity - which dictates the conditions for production under the maximum dichotomic separation of culture/nature. This paradigm has aggravated our planet's capacity to withstand life, jeopardizing its ecological systems. This is true in the case of the amazon. Cosmopolitics, theorized by philosopher Isabelle Stengers, argues for a new scientific rationalization that can counter modernity. She argues for a cosmopolitical accord between all living things, human and non-human, where a common discourse and project for earth can provide and respect the knowledge. cosmologies and worldviews of all those on our planet. It is essential to align theories within the notion of cosmopolitics in the case of the amazon and the Xingu basin. For this, we look to the concept of Amerindian perspectivism, the "end of the world" concept and the Kayapó people's time concept to situate the cosmological conditions of the indigenous in the Xingu basin. Amerindian perspectivism explains the Amerindian concept of oneself and the "others", where everyone, human and non-human, are first human in nature and then "dressed" as another being. This is true, not only for animals, but plants, crops, spirits and rivers. In this way, we can see the need to be sensitive to the relationships between all entities in the Amerindian view. The concept of time is also important since it dictates the cultural and religious moments in Amerindian societies. Time is relative to context. It can change depending on the pulse of river flow or crop and animal migration cycles. According to these moments, it can be experienced differently according to where you are in the river basin. According to Ailton Krenak, the severe disruption of these cycles caused by modernity have caused the end of the world for many Amerindian communities, where there natural and cultural ways of life have been absolutely altered without the possibility of return. They can only re-signify and resist to exist.

The second entry point, Ecological/Natural builds on the concept of the Anthropocene, the present geological age that is defined by human activity as the affecting variable in the planets current and future geological condition. The Critical Zone theory by Bruno Latour helps bring the urgency of realizing the impact of the Anthropocene on the fine biofilm that covers the planet where life is possible. The need for understanding the systemic relationships and sensitivity of their inter-scalar dependency Is crucial to any approach that wishes to stabilize cosmologies.

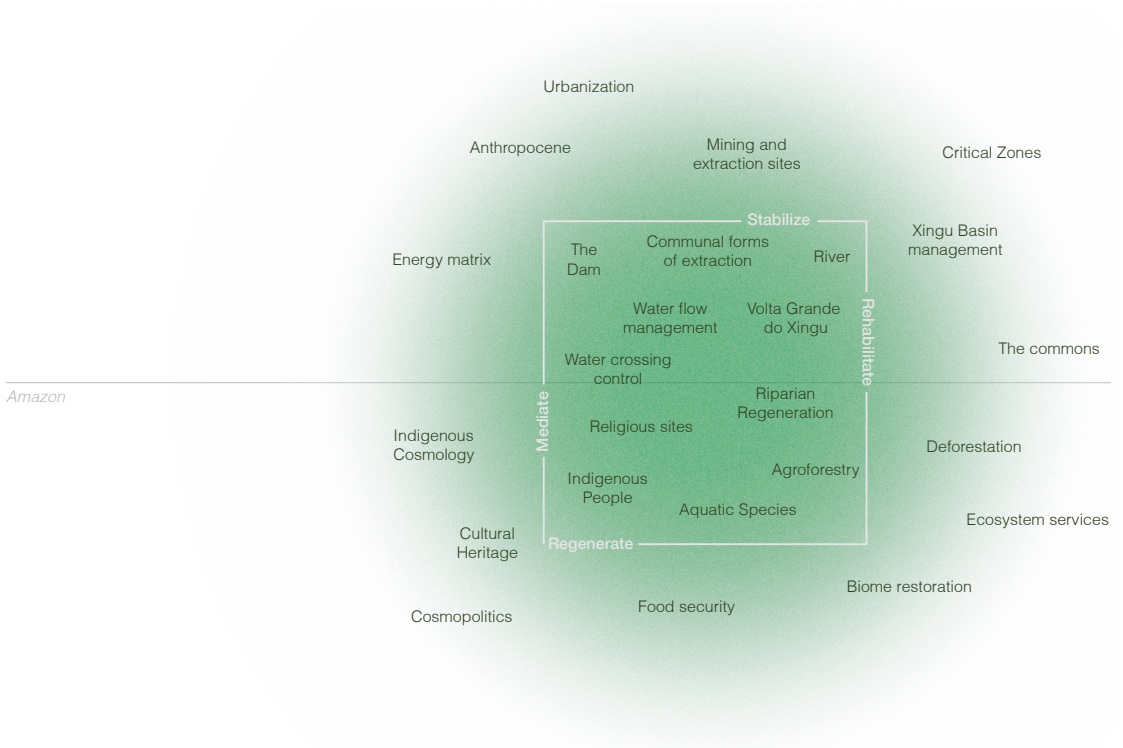
The third and final entry point, Procedural/ Operational organizes the set of productive conditions that have organized our planets inhabitation from the starting point of capitalism and neoliberalism. These are the hegemonic structures that govern societies development systems and that put pressure onto regions such as the amazon, rich in raw resources. The theory of planetary urbanization spatializes these productive and societal systems on a planetary scale and points out to the processes that are operationalizing the

Project Boundary Diagram.
The author , 2020.

amazon region to service these systems of capital accumulation by capturing fertile land or deforesting wild regions in order to transform these areas in to profitable and capital accumulative territories. These specialized landscapes are extreme context specific yet are transformed to serve global productive systems in detriment of local needs and conditions. For this chain to operate smoothly, 'glocal' infrastructure is implement and secured in order to guarantee the smooth flow of exploits, and again, in detriment of local necessities.

All three entry points are sustained by the concepts of each other entry point, bridging interrelationships between concepts. These concepts inform on the need to interface such dynamics with the context specific conditions in order to resynchronize the occupation dynamics in order to sustain balance for critical zone ecology.

Given the complexity and scale of the problematic and forces acting on the project's location, it is important to frame a set of targeted elements/conditions/dynamics which the project can address, as a scope limitation of a master thesis. For this, a set of fundamental elements are chosen, where larger problematics are left aside, yet kept in orbit as a reminder of their influence as key conditions that frame the selected objects which the project will address in more depth. The framing is made with the project's intent, or agency ("partido" in Portuguese), which act as the initial drive to approach the project's intervention solutioning.



Analytical & Design Framework

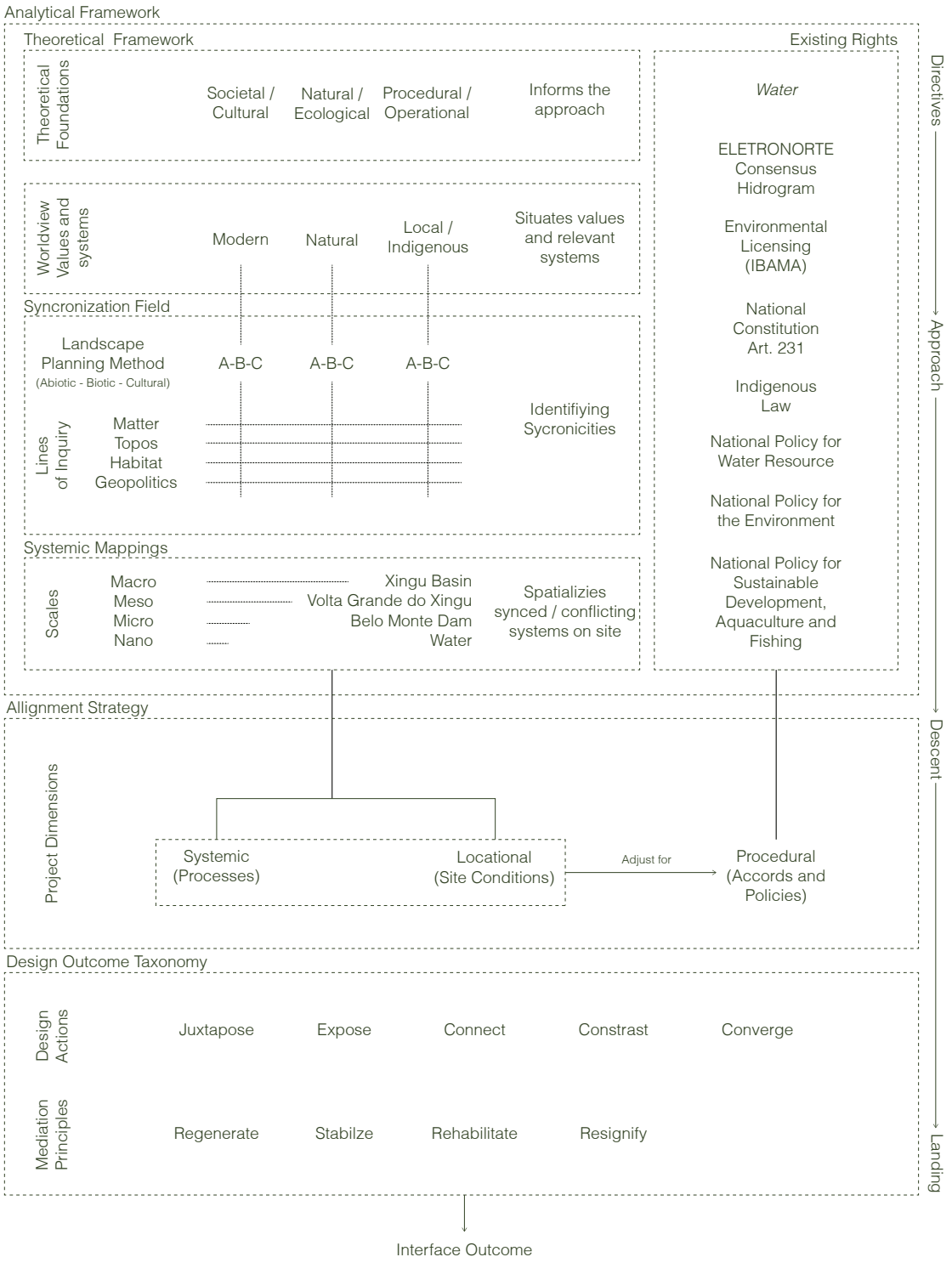
The analytical and design framework is organized to guide the required analysis of ground conditions, supported by the conceptual framework and built upon the methodological framework.

Informed by the Conceptual Framework, the Synchronization Field serves to visualize the Lines of Inquiry systems by first placing the values for each Line across worlds. By utilizing the Abiotic-Biotic-Cultural Landscape Planning Reading Model (ABC Model) within each worldview, these values could be broken down to their physical systemic elements informing the parts that compose a system which requires mediation.

Tran scalar systems will identify the key units of performance of each element identified with potential for interface in the synchronization field, and help identify the scalar limits for each system, indicating performance capacity.

The identified systems in need of mediation and their elements are transcribed into mappings which illustrate spatial and territorial implications. Utilizing the Alignment Strategy, selected systems are decrypted in three phases: Procedural, Systemic and Locational alignments. The Procedural alignment adjusts for the Systemic and Locational alignments, handling policy and accord gaps. This method allows for complex systems to be properly considered on all dimensions, delivering design directives which are in tune with systemic performances across worldviews.

Finally, the outcome is a set of interface examples that deal site conditions, worldview alignments and procedural accords for a given site. These outcomes do not attempt to resolve systems that govern the nature of occupation in the amazon, but rather provide immediate solutions for context specific situations and indicate the necessary changes in implementation and arrangements of such occupation which can then be replicated across other sites in the region.



Societal

As growing concerns mount and turn heads towards the actions of governments in the Amazon as the looming climate crisis aggravates, it is equally important to view such concern through the eyes of those who have inhabited the amazon and have contributed insignificantly to the planet's catastrophic future. This is to say, even the intentions to preserve and conserve the amazon may conceal subconsciously colonial and imperialistic mindsets, which ignore local peoples fundamental right to self-determination and production with the forest. In this way, the project looks to inform on the local conditions and relations in such regions, and as such, approximate their realities and worlds to ours with the intent to facilitate cultural exchange and dialogue.

The destructive model of occupation being implemented in the forest fails to comprehend the irreversible damage that it has been causing not only to the region but to the continent and planet. This is mostly because there are a series of scientific, social and cultural path dependencies that resist change in regarding the occupation model for the amazon. These visions marginalize local populations, and when governments and entities attempt to solve and aid by mitigating negative externalities, they do so with the modern worldview and within the capacities of the state. These hegemonic perspectives look to indigenous populations as economically poor or even sub-citizens, failing to realize that their values are others which cannot be measurable by the hegemonic development model. These hegemonic perspectives must be viewed under a critical lens to understand the source of such assumptions, in order to revert the marginalization of such populations.

Scientific

The urgency of the global climate crisis poses the need for more investigation on the processes related to the amazon's existing and urbanization as well as the possibilities of future models for the built environment that are sustainable and ecologically sensitive to tropical regions. To understand the multiculturality and worldview diversity in urbanizing regions of the amazon is key to propose and expose dynamics that may help guarantee the preservation of the region's biome. The mapping and research produced can also shed light on the possibilities for more precise actions needed to preserve the regions ecology and biodiversity in order to reduce deforestation as well as understand the extension of certain destructive chains and dynamics that extend to planetary scales.

Moreover, it is important to consider the extent of possibilities under the current global pandemic scenario for academic research and production. Especially regarding research methods which typically relied on site visiting. This research will provide the chance to explore the possibilities of new methods to conduct local approaches with site and people.

Ethical

In a fiercely disputed territory, often made invisible by authorities and media to most of the population and the world in order to favour exploitative narratives, the material produced in this project must work with dependable data from reliable sources, in most cases, compared to more than one source for cross referencing comparison. Given the risk of local actors and groups acting in the region, it is essential to preserve their integrity by not unnecessarily exposing individuals or groups, especially without consent.

The place of urban design and planning is fundamentally within the hegemonic worldview, and all our processes rely on our scientific knowledge. Considering the ambitions of this project, working with ethnicities, diverse cultures and worldviews, it is fundamental to not incorporate knowledge or speak for cultures from a place of certainty regarding their cultures and worlds. In this sense, given the limit of the profession, bound to our worldview, the project can only work with our "world" limit.

Approach

Child in the river.
Photo by Aaron Vincent Elkaim , 2015.

Lines of Inquiry:
Matter
Topos
Habitat
GeoPolitics

Towards Synchronization:
Existing Rights
Values
Syncronization Field
Systemic Mappings

Lines of Inquiry: Matter

Composition:
Continental Biotic Humidity Pump

The respiration process of the Amazon rainforest is responsible for pulling in a great volume moisture from the Atlantic ocean, deep into the continent. Due to the immense altitude of the Andes, this wall of moisture is accumulated and diverted down towards the Southeast of the continent, causing precipitation along the way and irrigating the river sources that then feed the amazon river with water.

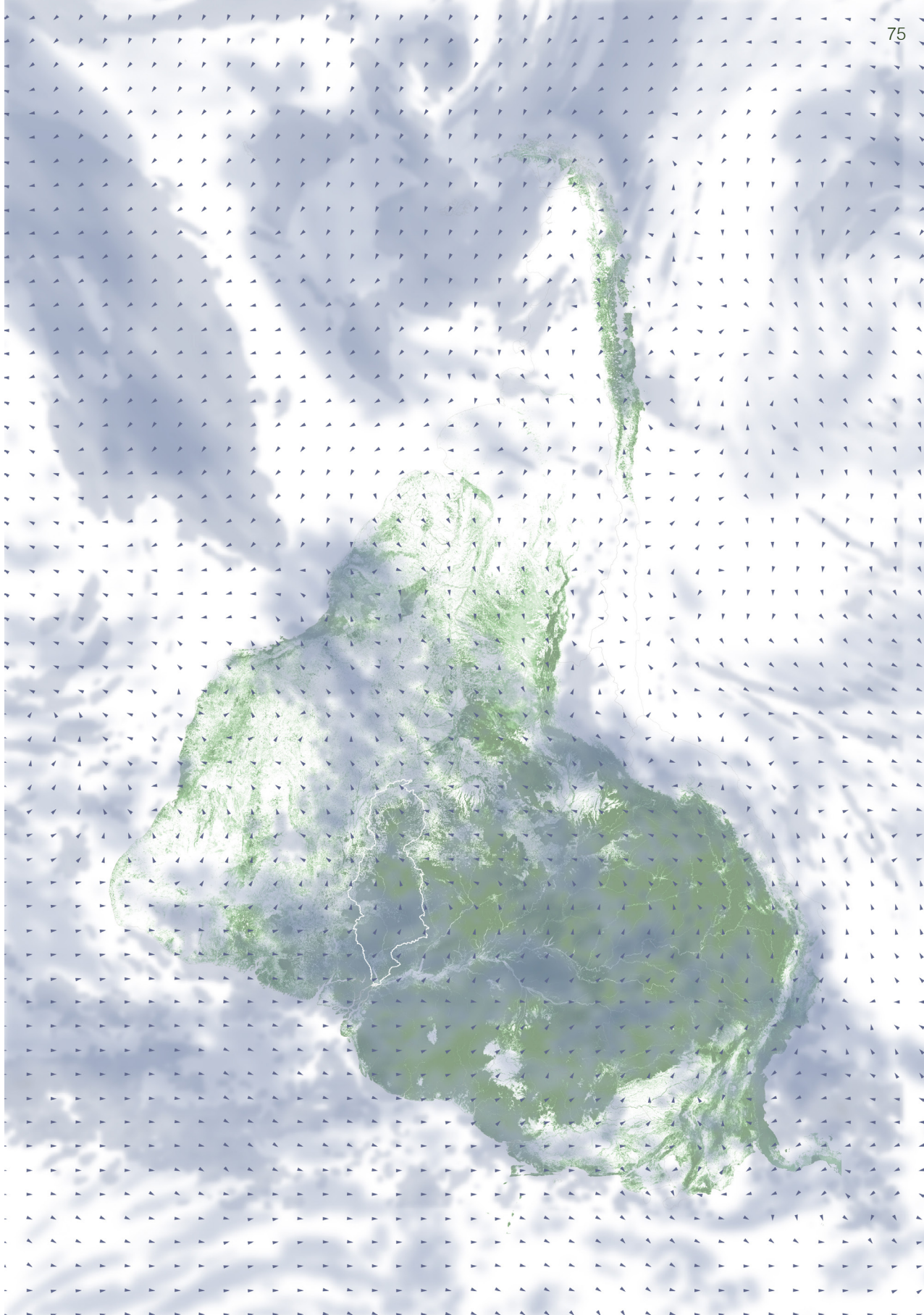
According to Nobre (2019) This dynamic is directly related to the Hadley climate cycle of on the tropics, but due to the specific geological and biotic conformation of South America, the Centre and South East of the continent are not arid plains as in other regions of the same latitude around the world.

The Xingu River Basin, one of the largest of Brazil and responsible for most clear water feeding into the Amazon river, sits between this continental cycle, where its source is directly dependent on the precipitation brought by what is called as the “Biotic Pump” (Lovejoy and Nobre, 2019).

Map of the South American continent under the influence of the Biotic Pump cycle. Cloud formation registered on the 12th to the 14th December, 2020.

Dense Forest
Air Moisture
Xingu River Basin
Wind Direction

S



Lines of Inquiry: Matter

Alteration:
Xingu River Basin Transformation

Right:
Map of the South American continent
under the influence of the Biotic Pump cycle.
Cloud formation registered on
the 12th to the 14th December, 2020.

Below:
Transect of Xingu River Basin
with constructed and proposed
Hydroelectric Dams
ELETRONORTE, 2009.

The Xingu Basin sits between two states of Brazil: Pará (to the North) and Mato Grosso (to the South). The basin has been under threat from encroaching land use activities such as deforestation followed by cattle and extensive agriculture activities and finally mining.

These operations are fracturing the basin and affecting its capacity to capture water and sustain natural ecological cycles. The Xingu River source is particularly threatened since extensive agriculture and deforestation is reducing the intake of water from the natural cycles of forest respiration and precipitation.

For decades, the Brazilian State has planned the extensive potential of the Basin to generate power through the implementation of large Hydroelectric dams along its rivers (Rolla, 2012). These projects have been widely contested due to their ecological and social impacts on the local conditions, nevertheless, one of them has managed to be constructed regardless of the proven detrimental effects it would inflict on the region. This is the Belo Monte Dam project, now the largest hydroelectric dam in Brazil.

Xing River Basin
Accumulated Deforestation
Agricultural Land
River course
Hydropower Dam

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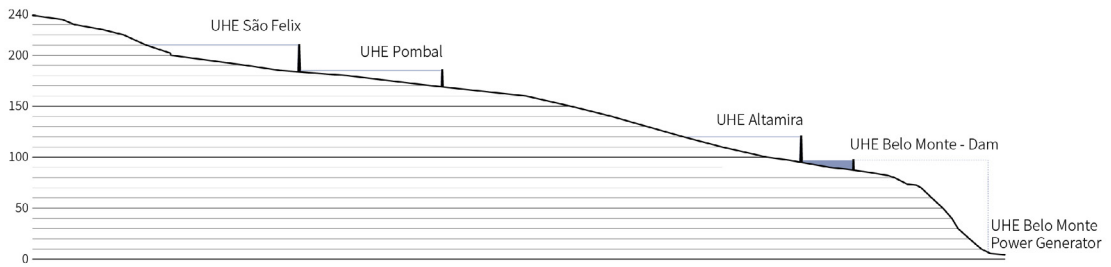
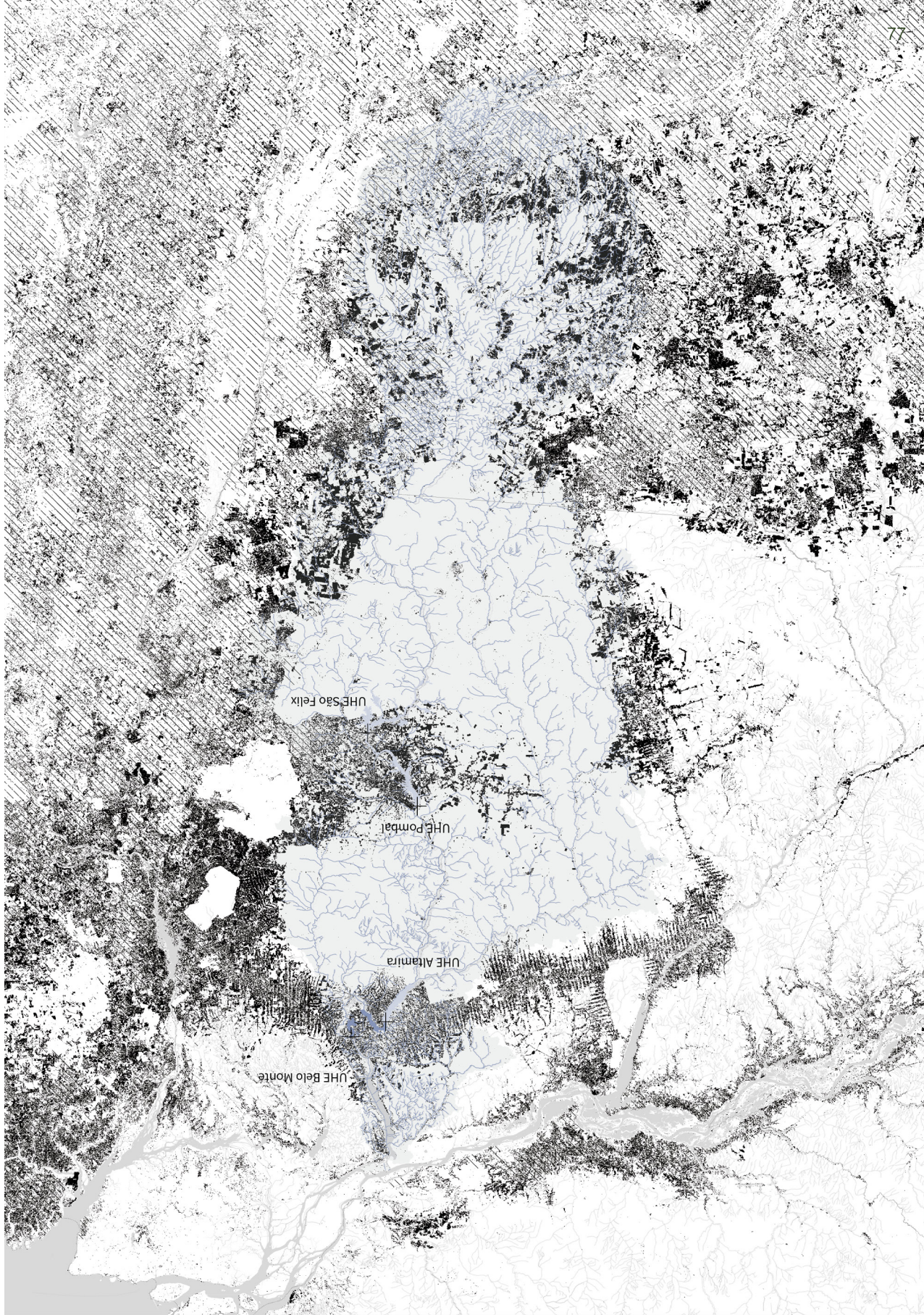
0km 250





Lines of Inquiry: Matter

Limits:
Operationalized Water

The Xingu Basin has been operationalized to feed a regular and dependable amount of water for power production by the Belo Monte Dam.

The river has a median flow of 22.000m3/second according to the readings of the hydrometric reading gauge in Atlamira, Pará (ELETRONORTE, 2009).

The damming and diversion of the rivers natural course has impacted severely the population that once depended on the ecological dynamics provided by the river at its natural flows, as well as the rivers cultural and religious importance (Ascselrad, 2009).

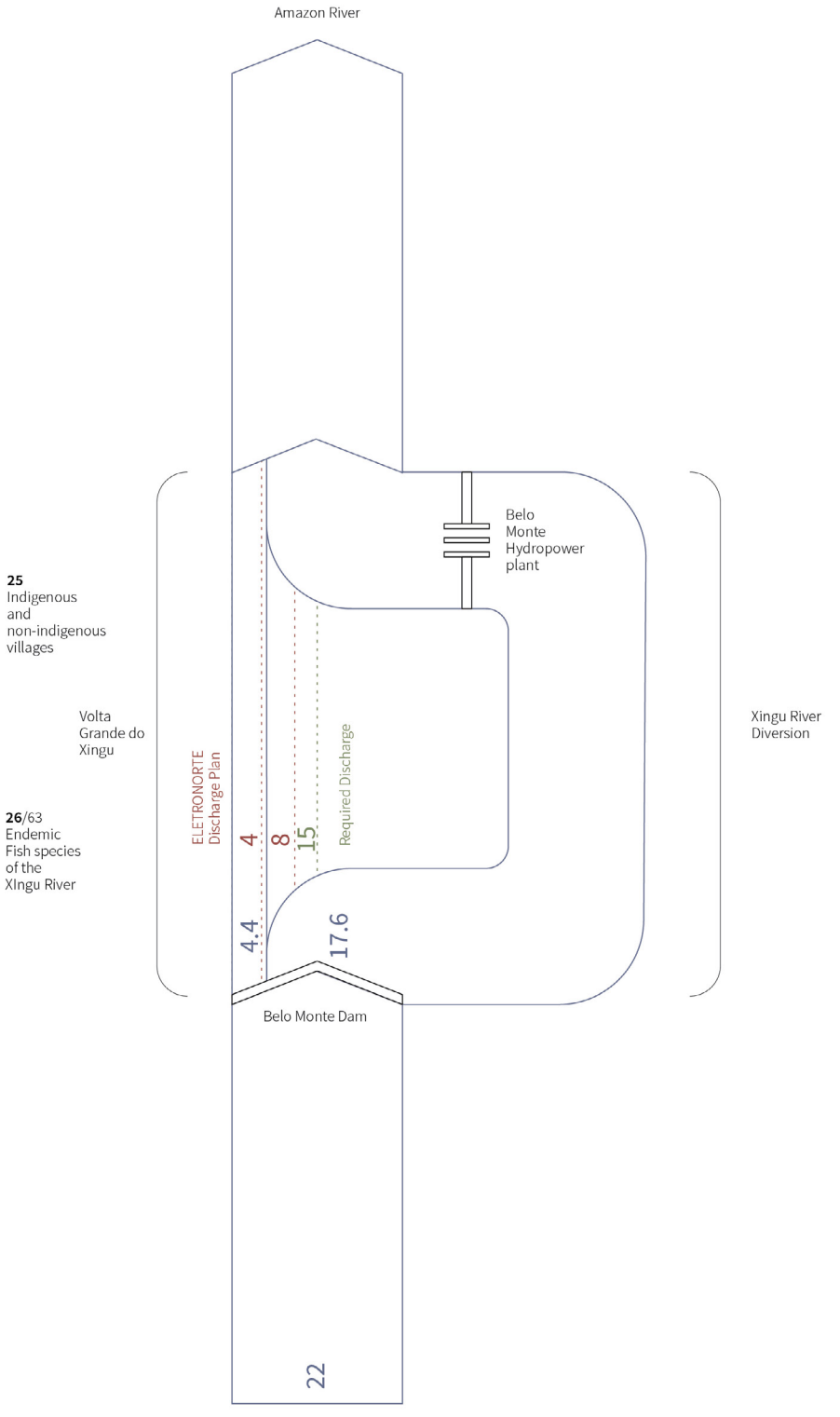
Certain fish species have been endangered due to the loss of the natural flooding and drought season yearly, which regulate the procreation cycles of many species.

The low water outlet from the dam to the Volta Grande do Xingu are has also impacted on the circulation of people along the river, which now are confined to certain branches of the river, given they have the adequate level of water to navigate and has restricted crossing upstream due to the system of vessel transshipment.

The conflict for the right amount of river flow to sustain the natural dynamic of the Volta Grande do Xingu is disputed by multiple entities and agencies on various levels.

The added stress on this already critical condition is one that has not been taken in consideration by these local actors, one in which starts at the river source and is of continental scale.

The accelerated deforestation of the amazon rainforest will launch the region into catastrophe since, given the biotic pump effect, the reduction of the forest means a direct reduction of water discharge upstream, and especially at the river source. This in turn will reduce the water downstream which is currently under contest between the dam local inhabitants, further aggravating the conflict and pushing local ecology to the brink of annihilation.



Right:
Water Flow Management Diagram of the Xingu River at Volta Grande do Xingu. ELETRONORTE, 2009.

Lines of Inquiry:
Topos

Composition:
Additions and Subtractions

Since the first plan for the Hydropower dam on the Xingu river in the 1970s, which would divert the natural flow of water from the area known as Volta Grande do Xingu, there have been continuous revisions to the project in order to reduce the impact that its reservoir would inflict (Ascselrad, 2009, Nascimento, 2017).

The technology known as “continuous water flow dam” was decided as the least impacting on the territory since it reduced in 80% reservoir surface area from the previous projects. This technology works by utilizing the natural flow of the river to generate power rather than the potential energy enhanded by a large resevoir of conventional dams.

This was seen as a technological advancement by government bodies and major communication outlets, but the impacts of such a massive enterprise still affect thousands of people directly and indirectly around the construction and flooding areas. Around 20.0000 people were displaced (Ascselrad, 2009, Pezzuti, 2018) and resettled in urban peripheries, completely disassociated from cultural natural processes by the river. This has led to a rise in unemployment, crime and depression in many of these resettled locations.

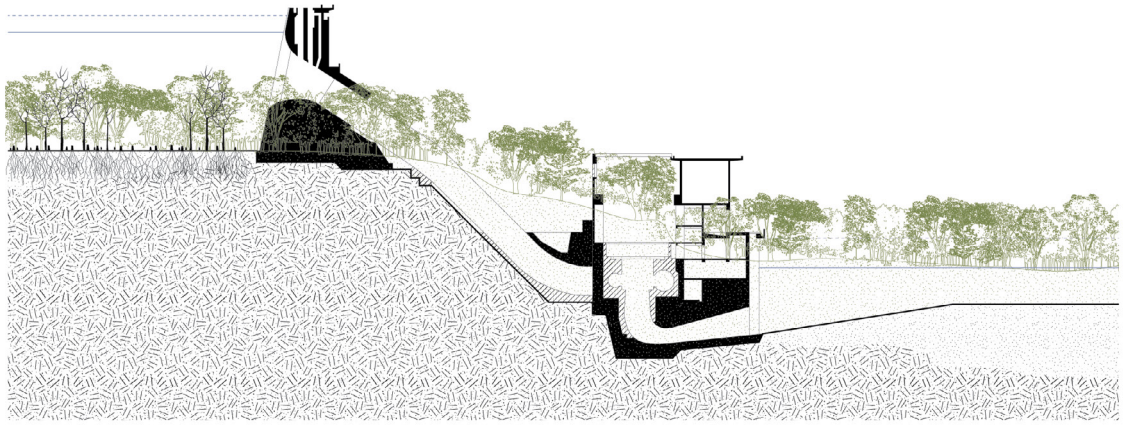
Land displacement is also widespread around the construction area due to a series of dams, dikes and canals which were constructed in order to divert and retain water from the Xingu river and potentialize energy production.

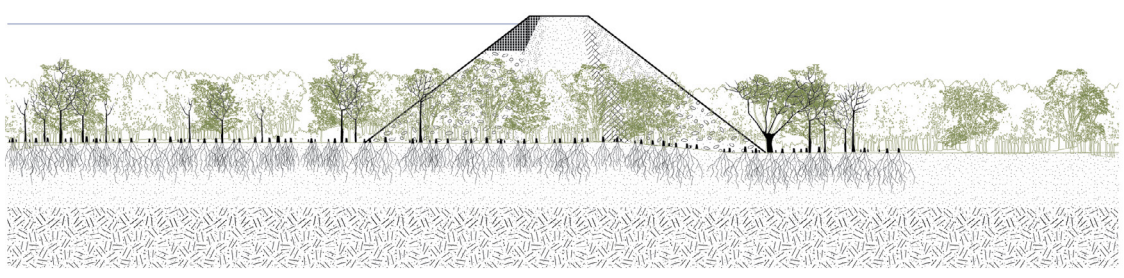
Map of soil and water transpostion
in the region around
Volta Grande do Xingu.
(ELETRONORTE, 2009)

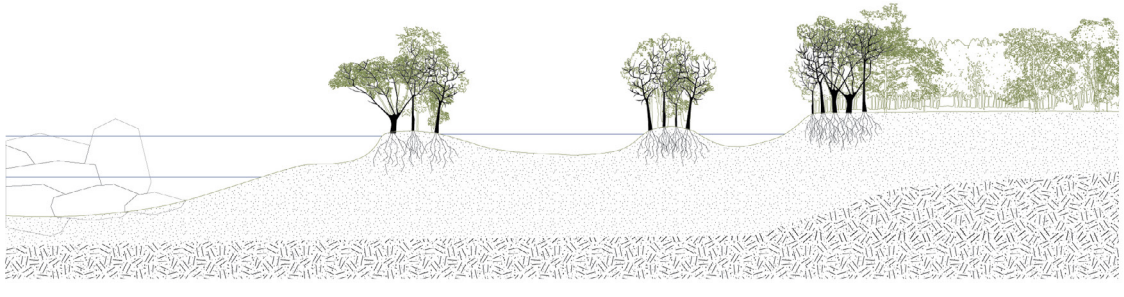
Lines of Inquiry:
Topos

Alteration:
Interfaces of Land and Water

During the planning and construction of the dam complex. little or no attention was given to the implications of these constructed barriers would have on natural processes of fauna displacement as well as the movement and territorial range of indigenous practices (Pezzuti, 2018). The “stabilization of nature” for operationalization purposes have affected the landscape in a variety of ways. With the dam itself, the terrain topography was altered in order to adjust and maximize the potential power generation of them dam. This has generated a physical barrier for natural dynamics from “lower” to “upper” levels. The reservoir flooded large forest zones, and in much of this area, trees were left to drown. This process is responsible for large Greenhouse gas emissions due to the decomposition of biomass. On the river, the control of the natural river pulse has compromised ecology, where aquatic species depend on the river pulse cues for migration, feeding and nesting periods. The constant flooding or drought of certain parts of the river have covered sites that held cultural or religious values, such as mythical waterfalls and rock formations and specific fish nesting sites related to cultural rituals (Pezzuti, 2018).







Map of the South American continent
under the influence of the Biotic Pump cycle.
Cloud formation registered on
the 12th to the 14th December, 2020.

Lines of Inquiry:
Topos

Limit:
Damming Lives

These landscape manipulations have imposed physical barriers to the territory and the social and natural systems, directly affecting its ecology. In the specific case of the region affected by the Dam complex, the Volta Grande do Xingu has been completely affected by the change in course of the river, destabilizing its natural processes caused by prolonged periods of intentional drought. The two formal indigenous territories of the Juruna people; Arara and Paquiçamba, have been closed off from the rest of the Xingu basin indigenous populations as well as the rest of the amazon region itself by engineered systems of river transposition that dictate and control passage from lower to upper Xingu River. The dam has not only impacted the physical landscape, but has dammed ecological flow, people and minds.

Diagram of physical barrier created by
the Belo Monte Dam complex
in the Xingu River.
The author, 2020.

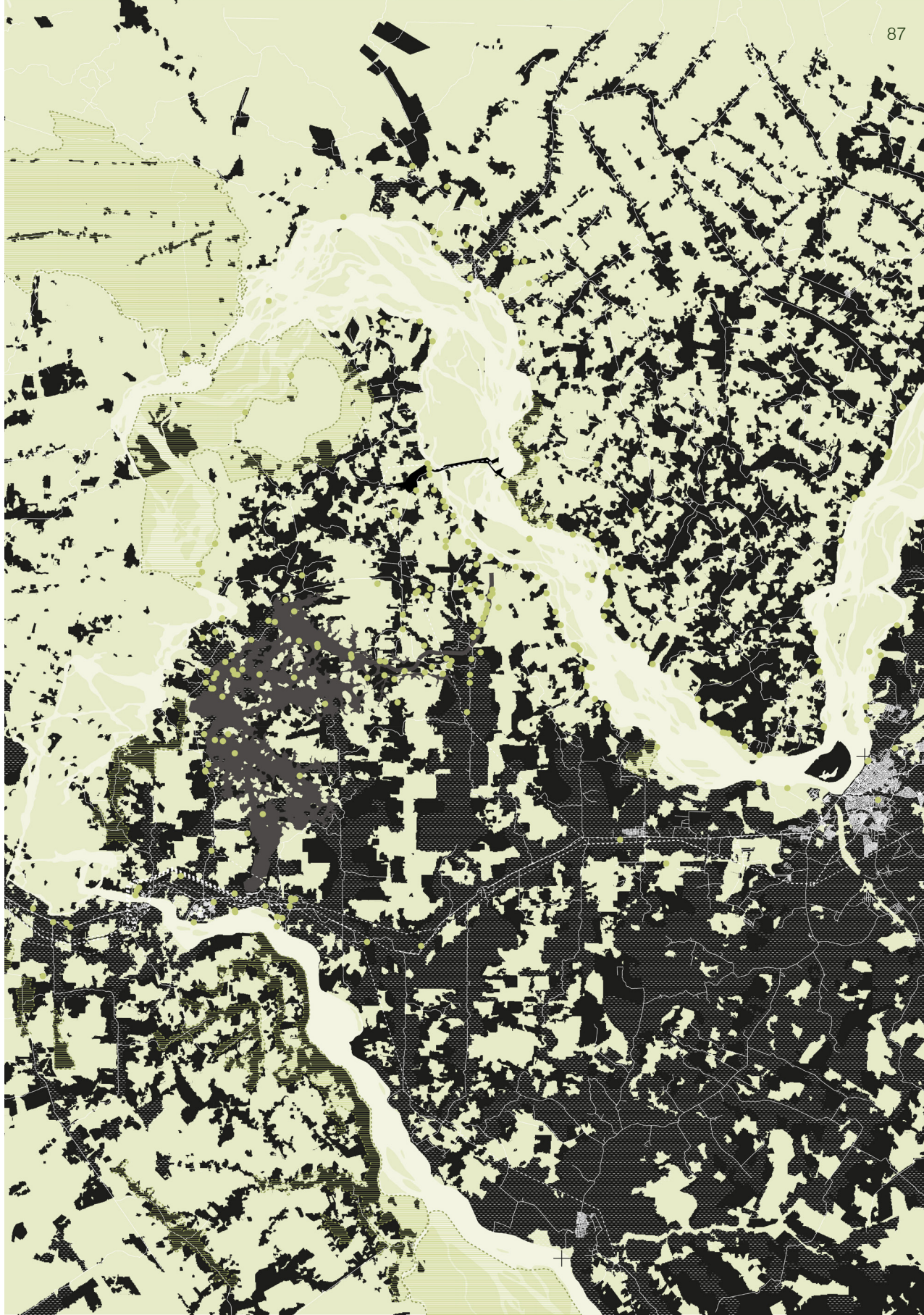
0km 20

S

Lines of Inquiry: Habitat

Composition:
The Conflict of Worlds

Western epistemologies have corroborated with the myth that the amazon biome is one of untouched wilderness or little human presence (Duran, 2019). This is not the case as many studies have shown that human presence from pre-Colombian eras have actively influenced and managed the forest, and where there is anthropogenic proven activity, biodiversity is greater (Duran, 2019). However, modern systems which have implemented a model of development through exploitation and depletion of natural resources, ignores the close ties between anthropogenic forest management techniques and forest biodiversity. The overlapping of these different worldviews is causing irreversible damage for millions of habitats that depend on a stable ecologic dynamic. The modern occupation model is exogenous to these endogenous systems of the amazon, and its ontology is imported from temperate regions of the world where the richness of tropical biodiversity and interconnectivity of ecologies has been set aside by a dichotomic notion of culture and nature being absolute separate entities. The endogenous model of occupation inhabits the region as another part of the system, contributing to its maintenance, allowing for regeneration and not over exploiting its resources.



Modern vs. Indigenous
The author, 2020.

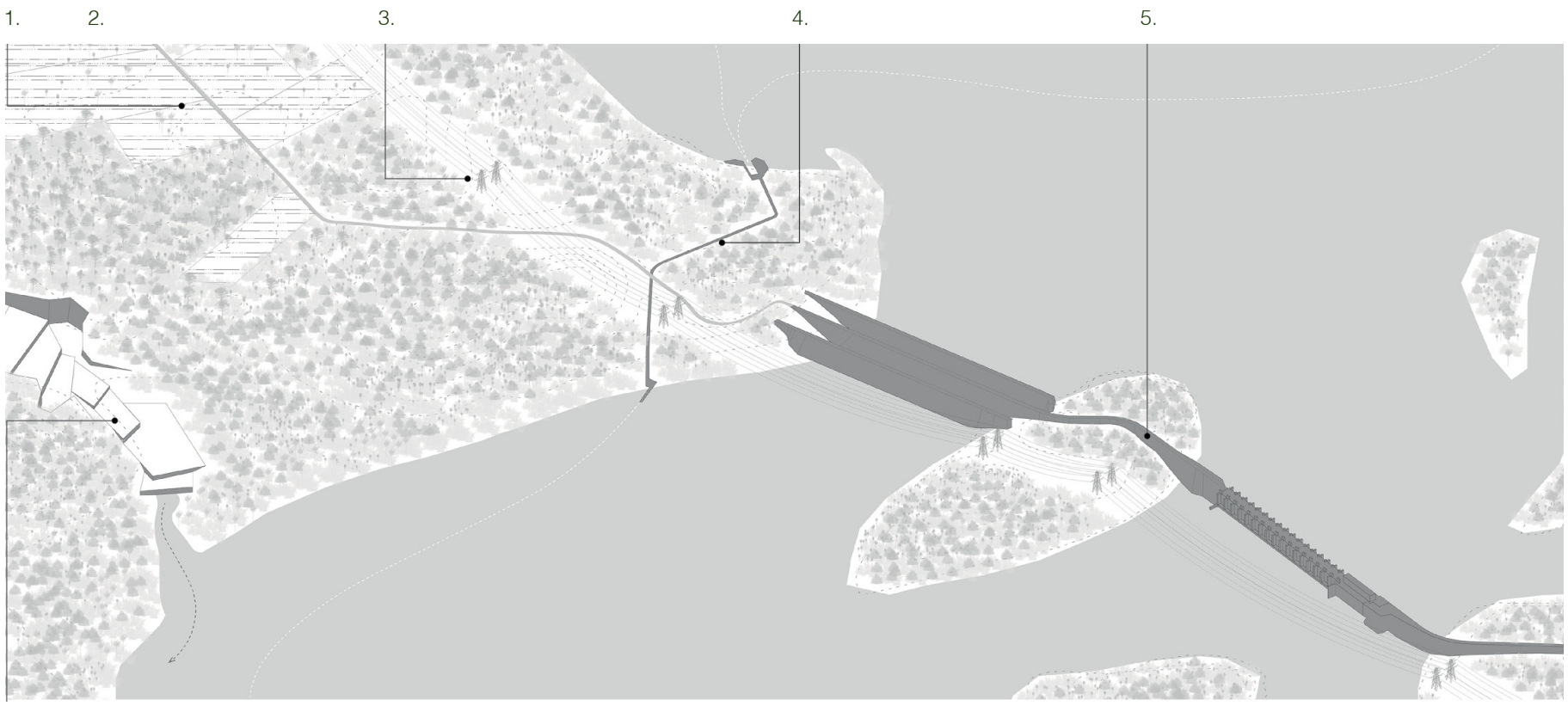
Lines of Inquiry:
Habitat

Alteration:
Territorial Configurations

Models of inhabitation and occupation
The author, 2020.

The amazon holds a multitude of cultures that vary in their forms of occupation. In the case of the Volta Grande do Xingu, three models of occupation are distinctive: Modern, Local/ Indigenous and Amerindian. These three distinct systems have existed superimposed onto one another and influence and co-depend.

The modern occupation of the Xingu Basin was first done in the 18th Century when explores navigated up the river. Anthropophagic Amerindian nations at the time quickly repelled the invading colonialists. In the 19th century, the rubber rush in the Amazon caused a swarm of settlers from the coast into the region which sought to occupy the riverbanks in order to extract, plant and cultivate latex from seringueira trees (rubber trees). This consequently caused a genocide of many riverine Indigenous nations where many were extinct. In the mid-20th century, another occupation rush took place when the Transamazonica highway project (which looked to cut through the Amazon forest from east to west) reached the region and connected to Altamira. With this, settlers occupied the margins of the roadway stimulated by colonization policies form the national government. In the second half of the 20th century, the desire to construct one of the largest dam networks in a single basin was intended to the Xingu River but was fiercely resisted by the basins indigenous nations, which managed to deny the construction of all but one of these projects. The intent of hydropower generation in the amazon was more than the discourse of powering large urban centres of the country, but most importantly to guarantee power for mining operations that would take place in the Xingu Basin, perpetuating the approach of extractive development pursued by the modern approach.



1.
The opening of roads deep within the rainforest facilitates legal and ileagal convertion of land into agricultural and cattle ranching causing deforestation.

2.
Industrial Mining utilizes water and chemicals to separate minerals from soil. Polluted water is not always fully filtered and can contaminate water bodies when dicharged back into the natural systems.

3.
Supporting infrastructure for power provision such as high voltage powerlines and transformer stations require fire and tresspassing bufferzones.

4.
River transposition of small water vessels is done by tow trucks and can take upto 20 minutes to transfer a boat from one side to the other.

5.
The Pimental Dam retains water upstream in order to supply the Belo Monte reservoir. Water flow is reduced downstream, compromising the livelihood of species and people.

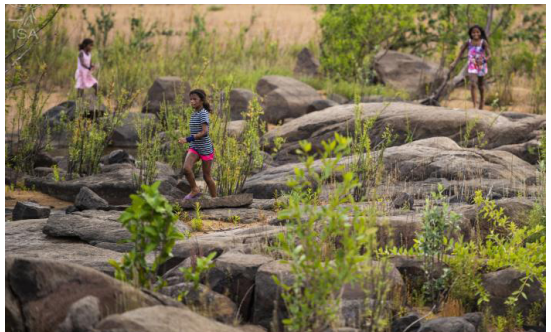
Alteration:
The Modern Territorial Configuration

Top:
Belo Monte Dam.
Lilo Clareto.

Bottom:
Belo Monte Reservoir.
Elaine Brum.

Top:
Vessel Transposition.
Aaron Vincent Elkaim , 2015.

Bottom:
Dry Riverbed.
Marcelo Soubhia - ISA.



Top:
Ressettling Neighbourhoods.
Lalo de Almeida.

Bottom:
Dry River bed.
NGO Xinguvivo.

Top:
Ressettled Couple.
Lilo Clareto.

Bottom:
Altamira shore.
Lalo de Almeida.

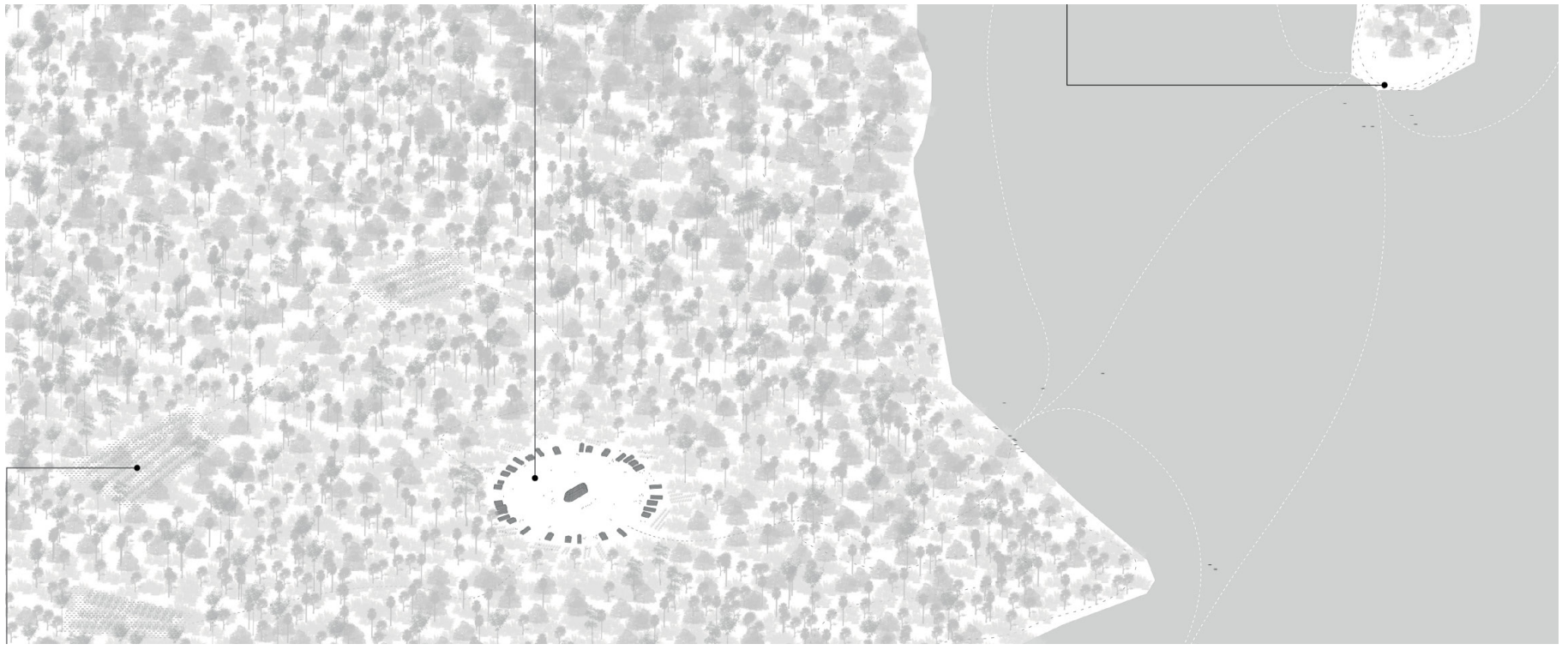
Alteration:
Amerindian Territorial Configurations

Models of inhabitation and occupation
The author, 2020.

1.

2.

3.



1.
Traditional systems of cyclic agroforestry where patches of forest are cleared from time to time with controlled fires which also helps fertilize the soil.

2.
Indigneopus villages are traditionally conformed in a circular fashion where a “Maloca” sits at the center and holds religious and communal symbolism as the most important building of a community.

3.
Water holds great importance for local Indigenous people. River cascades, rock formations and tributary systems are nesting grounds for fish as well as abundant fishing spots and religious and culturally significant sites.

Alteration:
Amerindian Territorial Configurations

Top:
Brasil Nut pickers in Extractive Reserve (ResEx).
- ISA.

Bottom:
Indigenous Agroforest plantation in
Terra Preta do Indio soil.
Bruno Kelly.

Munduruku child.
Lado de Almeida.

Top:
Juruna man by the Jericoá Waterfall.
Lilo Clareto.

Bottom:
Men drag canoe on dry riverbed.
Marcelo Soubhia - ISA.

Top:
Arapó Tigre Fish and Juruna man.
Lado de Almeida.

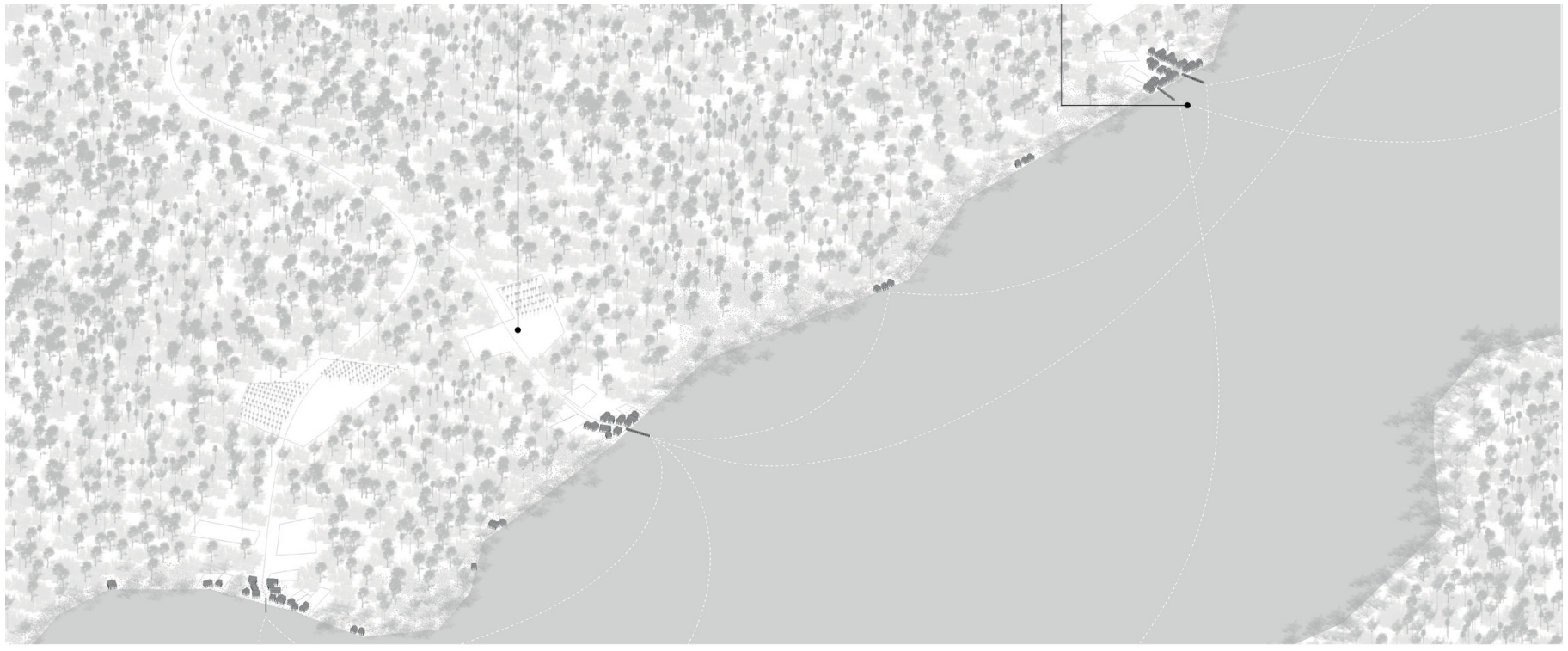
Bottom:
Ribeirinho women clean fish.
Marcelo Soubhia - ISA.

Alteration:
Local / Indigenous Territorial Configuration

Models of inhabitation and occupation
The author, 2020.

1.

2.



1.
Agriculture is separated between family patches closer to dwellings with a variety of species that are susceptible to flooded enviornments and communal patches that sustain more than one family on dryer land.

2.
Ribeirinho dwellings sit on the margins of rivers and are designed on wooded stilts to cope with high water level variability. Many of these dwellings can only be accessed from the water, having no inland connections.

Alteration:
Amerindian Territorial Configurations

Top:
Palaphitas houses by the shores of Altamira.
Lado de Almeida.

Bottom:
Ribeirinho plot.
Bruno Kelly.

Top:
Palaphitas home.
Eduardo Oliveira Soares, 2019.

Bottom:
Fishing of the Pirarucu by ribeirinhos.
Instituto Mamirauá.

Top:
Ribeirinho woman bathing and cleaning.
Aaron Vincent Elkaim , 2015.

Bottom:
Ribeirinho families cleaning food.
Aaron Vincent Elkaim , 2015.

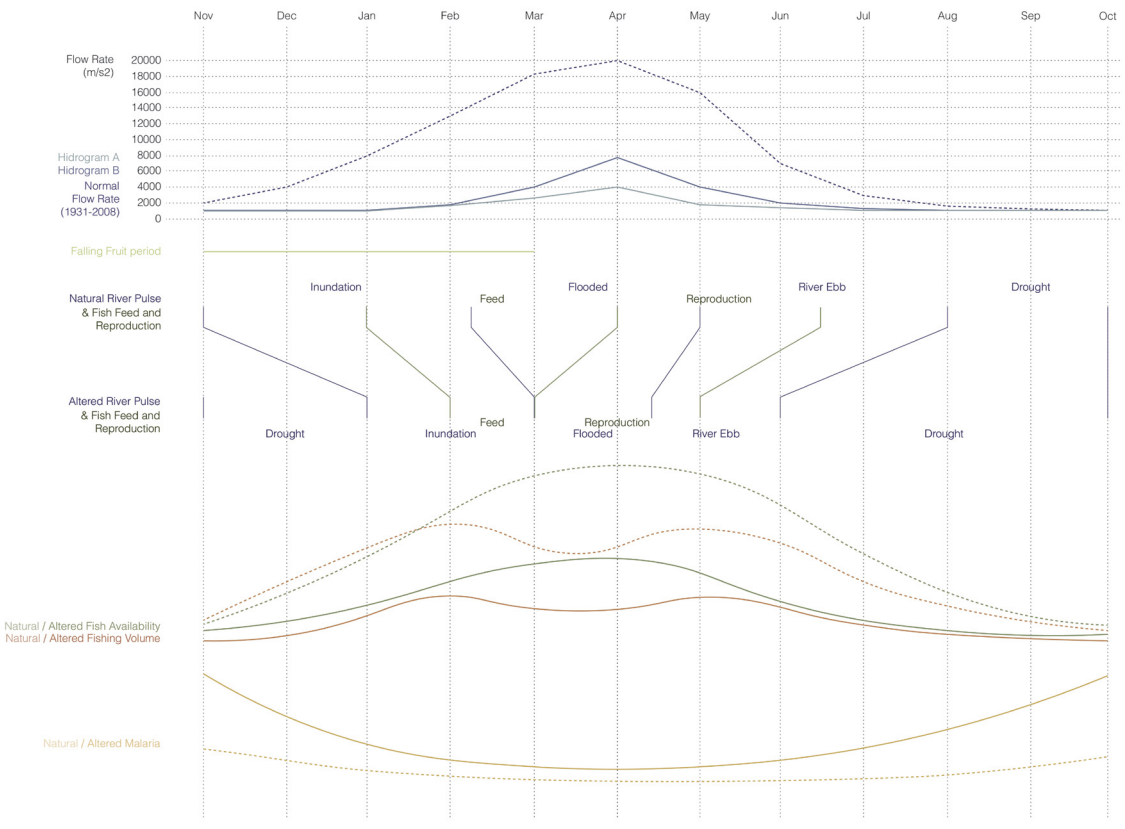
Top:
Palaphitas home.
Eduardo Oliveira Soares, 2019.

Bottom:
Ribeirinhos work oh agroforest “Roça” patch.
Flavio Forner, 2020.

Lines of Inquiry: Habitat

Limit:
Pulse Variability

In the Volta Grande do Xingu, the water and all life systems that depend on it have now been restricted by the dam and the plan known as “consensus hydrogram” (of which there is no “consent” about it) now directly controls all life on this section of the Xingu Basin. Crucially, when the natural river course was blocked in 2016 and diverted into the constructed reservoir, the Juruna people immediately noticed the destructive alterations on river life and named the year “Ano do Fim do Mundo” or Year of the End of the World. The world they knew, with their ancestral culture and traditions tied exclusively to the river and the Volta Grande do Xingu river bend, had dried up permanently. River pulses are extremely important to the biodiversity of tropical rivers. Tens of hundreds of species have adapted over millennia to natural cycles of water flow in high and low seasons related to rain and drought seasons typical to tropical climates. These relationships have been affected to the extent that fish cannot swim downstream from the basin easily into the river bend flood plains and creeks which are nesting grounds for these species. Also, the cues for these movements have been altered because they depended on the river water levels to do so. The reduction of fish populations has damaged fishing and communities which depended on this to strive.

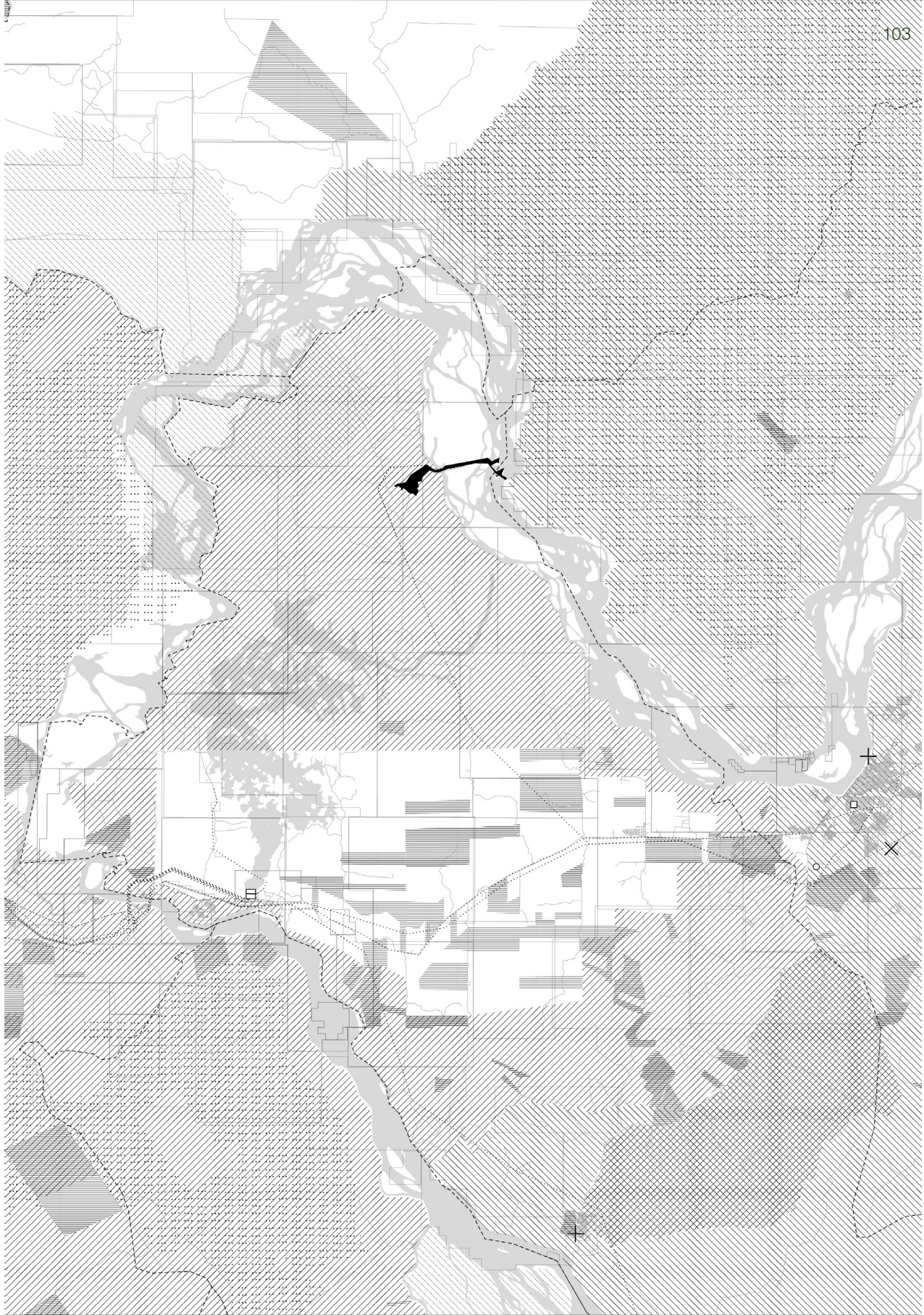


Graph showing the effects of the Consensus Hydrogram on various relationships in the XIngu River. The author, 2020.

Lines of Inquiry: GeoPolitics

Composition:
Patchwork of Territorial Claims

The amazon has a complex land use arrangement given the various institutional entities and agencies which coordinate the development and demarcation of the region. In many instances, these zones overlap not only in space but in intent. This institutional patchwork can facilitate land transformation and even exacerbate conflicts on the local level. The complexity of managing this region is enhanced because of this lack of clarity of land claims which favours illegal activities and complicates surveillance and auditing from regulation agencies. The lack of coordination between agencies and ministries can vary depending on political arrangements and who are the interested parties. Historically the state has also implemented policies and programs which incentivized individuals to occupy land which would them be legalized with colonization programs form the 60ies and 70ies. This model of occupation, now illegal, is still practiced since monitoring has proven difficult and agencies eventually give in to pressures of interested agricultural companies looking to legalize their land. On the other hand, protected land with an overlap of Indigenous territories and Amerindian populations fair the best in conservation of the forest because these cultures understand the importance of a health ecology to support their models of living.

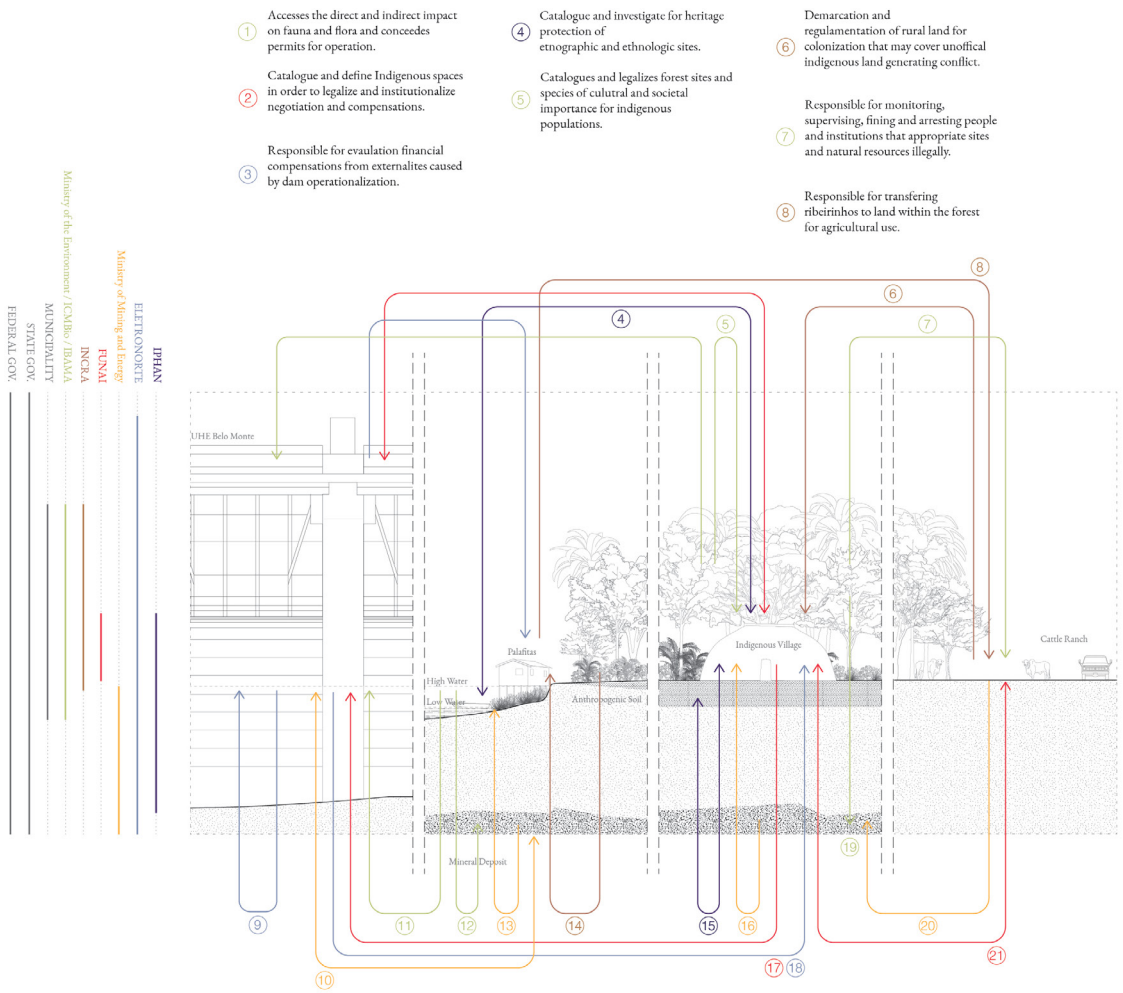


Map of land use
The author, 2020.

Lines of Inquiry: GeoPolitics

Alterations:
Institutional Influence

Each institution has a claim on the various surfaces of the amazon depending on what their intent and jurisdiction lies. In this way, it is important to read these institutions according to the depth of their reach and how this can mean conflict of interests between them. This also indicates what are the states priorities over the territory which informs the process of territorialization by the state and other sectors of society. This inevitably is a determining variable to the legal and jurisdiction power dispute of certain entities which can exert direct pressure on institutions and agencies within the state and government. This poses difficulties for people and organizations which have been historically excluded from the decision table, and which must now engage in political action to assert their desires and voices to propose their interests. Throughout the amazon, indigenous people have mobilized and demanded from institutions their legal rights in relation to their ways of life and territories.



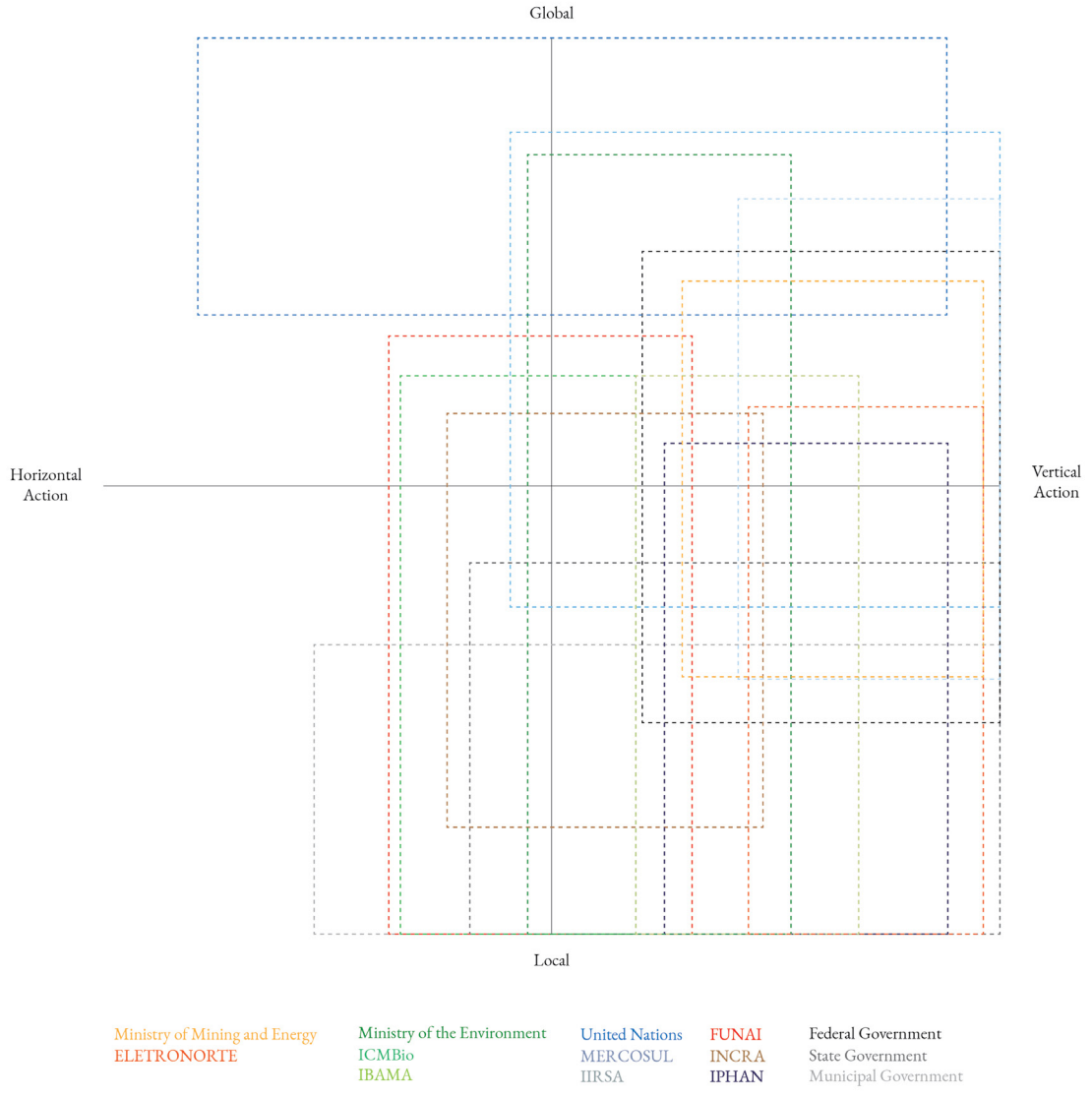
Sections of various land uses related to Institutional influence.
The author, 2020.

1. Accesses the direct and indirect impact on fauna and flora and conceedes permits for operation.
2. Catalogue and define Indigenous spaces in order to legalize and institutionalize negotiation and compensations.
3. Responsible for evaulation financial compensations from externalites caused by dam operationalization.
4. Catalogue and investigate for heritage protection of etnographic and ethnologic sites.
5. Catalogues and legalizes forest sites and species of culutral and societal importance for indigenous populations.
6. Demarcation and regulamentation of rural land for colonization that may cover unoffical indigenous land generating conflict.
7. Responsible for monitoring, supervising, fining and arresting people and institutions that appropriate sites and natural resources illegally.
8. Responsible for transfering ribeirinhos to land within the forest for agricultural use.
9. Controls river water flow and level in order to sustain required energy production and operation.
10. Responsible for evaulation financial compensations from externalites caused by dam operationalization.
11. Accesses and regulates the necessary water flow and levels to guarantee traditional and natural processes.
12. Regulates and monitors mining operations and impacts on environment.
13. Regulates and legalizes ribeirinho land into productive extractivist communities and agroforestry.
14. Regulates and legalizes ribeirinho land into productive extractivist communities and agroforestry.
15. Identifies and protects areas of Indigenous dynamics with fertile anthropogenic soil known as Terra Preta do Índio.
16. Responsible for accessing the impact on local indigenous communities of mining operations and facilitates deregulation of preserved zones for mining.
17. Protects Indigenous rights related to Dam operation externalities and supervises impacts on Indigenous society.
18. Responsible for evaulation financial compensations from externalites caused by dam operationalization.
19. Demarcates Natural Reserves in areas with mineral resources in order to lock exploitation and preserve local environment.
20. Aproves and regulates mining titles from land owners.
21. Demarcates, protects and supervises Indigenous land and rights from monoculture and cattle ranching activities and pressure.

Lines of Inquiry:
GeoPolitics

Limits:
Institutional Reaches and Influence

Most institutional entities from governmental spheres overlap in their range from local to global and vertical accessibility for decision from local actors. It is apparent that there is a lack of articulation that functions horizontally and at a local scale. Although these community organizations exist, they have little or no jurisdiction and institutional underpinning. This space in decision and planning has been occupied my many NGOs active in the region, from national or international backgrounds and attempt to bridge local decisions and pleads to the institutions capable of action.



Graph of Inistitutional area of action and scale of action. The author, 2020.

Existing Rights

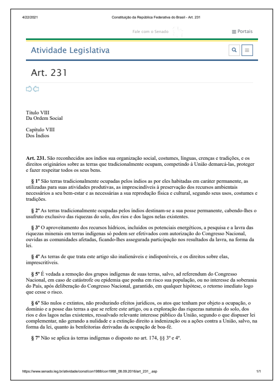
The Brazilian legislative landscape has continuously devised legislation and appointed appropriate agencies which clearly works to preserve nature as well as the contexts needed for its sustainability. There is also specific legislation responsible for upholding the civil rights of indigenous populations according to the specificities of their existances. Although some of the hereby selected laws have been in effect prior to Brazil's re-democratization and federal constitution of 1988, amendments and revisions have updated these prior legislations in order to fit and respect the fundamental rights brought by the constitution, one which repositions the role of the Union as a constellation of federative powers, where State and Municipal governments have greater autonomy and power within their boundaries and constituents.

This change in power organization has, in theory, allowed for decision making to be closer to those who exist and know their own territories, and reduced power from decisions at the higher instances. Essentially, decisions can be taken at lower levels of power without needing approval form the federal government, although these must still respect the rights within the constitution and other constitution bonded laws.

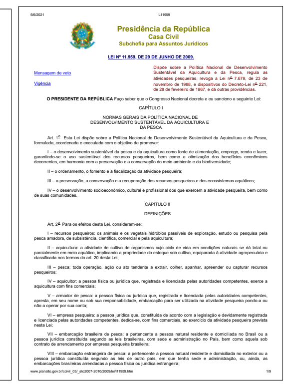
The following 7 documents are either Laws, Articles of the constitution or legally binding reports and licences which function within this legal organization and intertwine with each other. They have a direct relationship with the spatial configuration found in the territory where the Belo Monte Dam complex has been implemented and the Volta Grande do Xingu region.

The study of these existing laws allows for the mapping of the legislation landscape and which of the existing elements can be utilized for the proposal of a new legislation which can grant rights and facilitate the creating of new entities and accords to govern the Xingu Basin, especially in the region affected by the dam. This new law would be set up from the concept of giving Rights to the River, equalising ecological rights with human rights.

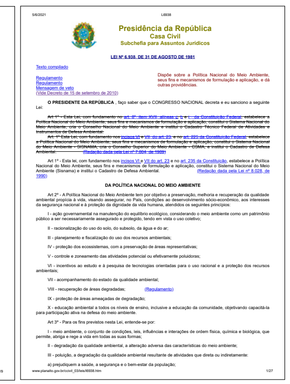
Brazilian Constitution Section on Indigenous Rights


Atividade Legislativa
Art. 231
Título VIII
Da Ordem Social
Capítulo VIII
Dos Índios

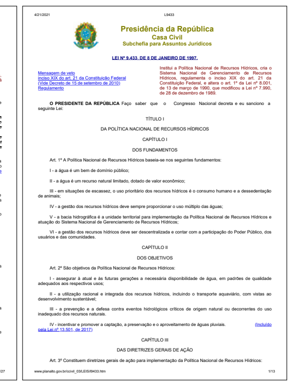
National Policy for Sustainable Development of Fishing


Presidência da República
Casa Civil
Subchefia para Assuntos Jurídicos
LEI Nº 11.959, DE 29 DE JUNHO DE 2009.

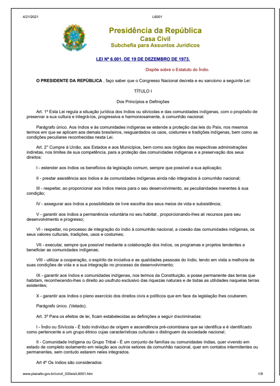
National Policy for the Environment


Presidência da República
Casa Civil
Subchefia para Assuntos Jurídicos
LEI Nº 6.938, DE 31 DE AGOSTO DE 1981

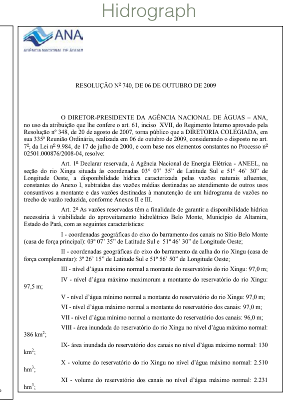
National Policy for Water Resources


Presidência da República
Casa Civil
Subchefia para Assuntos Jurídicos
LEI Nº 9.433, DE 8 DE JANEIRO DE 1997.

Indigenous Statute


Presidência da República
Casa Civil
Subchefia para Assuntos Jurídicos
LEI Nº 6.001, DE 19 DE DEZEMBRO DE 1973.
Dispõe sobre o Estatuto do Índio.

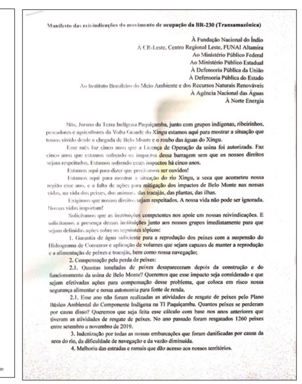
Approval of the Consensus Hidrograph


RESOLUÇÃO Nº 740, DE 06 DE OUTUBRO DE 2009

IBAMA Operation License


INSTITUTO BRASILEIRO DO MEIO AMBIENTE E DOS RECURSOS NATURAIS RENOVÁVEIS
Parecer Técnico nº 17/2021-COHID/CGTEF/DILIC

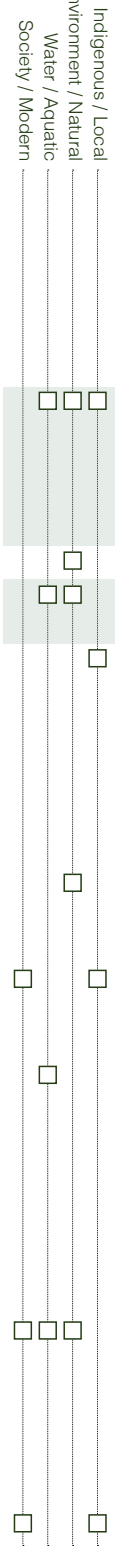
Local Protest Manifesto


Manifesto das reivindicações do movimento de ocupação da BR-230 (Transamazônica)

National Policy for Sustainable Development of Aquaculture and Fishery

This law was the first unified and dedicated policy law for fishing activities in Brazil, enforced from 2009 in conjunction with the now extinct Ministry of Fishing. This law regulates fishing activity both inland and seaward and defines a series of activities and stakeholder legal attributions and interactions with fauna as well as the territory.

This law brings an important contribution since it defines the activities of self-sustaining fishing by communities and families which are bound economically and culturally to fishing activities. In areas of fishing prohibition and / overfishing or threat of species extinction, this opens a positive precedence for those who rely on fishing of certain species to maintain their ways of life.



Chapter 1 General Rules of The National Policy For The Sustainable Development of Aquaculture and Fishery.

Art 1° This law establishes the National Policy for Sustainable Development of Aquaculture and Fishery, formulated, coordinated and implemented in order to promote:

I The sustainable development of fishing and aquaculture as a source of food, employment, income and leisure, ensuring the sustainable use of fisheries resources, as wellas the optimization of the resulting economic benefits, in harmony with the preservation and conservation of the environment environment and biodiversity;

II The planning, promotion and inspection of fishing activities;

III The preservation, conservation and recovery of fishery resources and aquatic ecosystems;

IV The socioeconomic, cultural and professional development of those engaged in fishing activities, as well as their communities.

Chapter 2 Definitions.

Art 2° For the purposes of this Act, be considered as:

I Fishery resources: hydrobic animals and plants subject to exploitation, study or research by recreational, subsistence, scientific, commercial and aquaculture fisheries;

V Fishing owner: the individual or legal entity that, registered and licensed by the competent authorities, prepares, in its name or under its responsibility, a vessel to beused in the fishing activity, whether or not it operates on its own account;

XIV Continental waters: rivers, basins, streams, lakes, lakes, dams or any non-marine water deposits, natural or artificial, and channels that have no connection with the sea;

Chapter 3 Sustainability of the use of Fishing Resources and Fishing Activity

Section I On the Sustainability of the Use of Fishery Resources.

Art. 3° Responsibility to the government regulation of the National Sustainable Development of Fishing Activity Policy, reconciling the balance between the principle of sustainability of fishing resources and the achievement of better economic and social outcomes, calculating, authorizing or establishing in each case:

I Access regimes;

Indigenous / Local
Environment / Natural
Water / Aquatic
Society / Modern

II The total permissible capture;
III The sustainable fishing effort;
IV Closed periods;
V The fishing seasons;
IX The Support Capacity of environments;
X The necessary activities to monitor, control and inspect the activity;
XI The protection of individuals in the process of reproduction or restocking.

Paragraph 1 The fisheries management should consider the peculiarities and needs of artisanal fishermen, subsistence and family farming, in order to ensure its permanence.

Paragraph 2 Responsibility to the states and the Federal District the management of fisheries in inland waters of their respective jurisdictions, subject to applicable law, and may exercise the activity is restricted to a particular watershed.

Section II Fishing Activity

Art. 4° The fishery comprises all fishing methods, and exploitation, farming, conservation, processing, transportation, marketing and research of fishery resources.

Single Paragraph For the purposes of this Law, artisanal fishing activities are considered to be the work of making and repairing fishing gear and gear, repairs carried out on small vessels and the processing of artisanal fishing products.

Art 5° Exercise of fishing activities by prior may be carried out only by autorization act issued by the competent authority, provided:

I The protection of ecosystems and the maintenance of ecological balance, observing the principles of biodiversity preservation and the sustainable use
II of natural resources;
The search for mechanisms to guarantee the protection and security of
III workers and populations with traditional knowledge;
The search for food safety and the health of the food produced.

Art 6° Exercise of fishing activities may be prohibited transient, intermittently or permanently, in accordance with specific standards for protection:

I Of threatened species, areas or ecosystems;
II The reproductive process of species and other vital processes for the maintenance and recovery of fish stocks;

Art 7° Sustainable development of fishing activities to be effected upon:

I The management of access to and use of fisheries resources;
II The determination of specially protected areas;
III Social participation;
IV The training of labor in the fishing sector;
V Environmental education;
VII The research of resources, techniques and methods relevant to the fishing activity;
IX Control and inspection of fishing activities;
X Credit to promote the fisheries sector.

Chapter 4 Of Fishing

Section I The Nature of Fishing

Art. 8° Fishing for the purposes of this Act, is classified as:

I Commercial:
a) Artisanal: when practiced directly by professional fisherman, autonomously or in a family economy regime, with its own means of production or under a partnership contract, landed, being able to use small vessels;
II Non-commercial:
c) Subsistence: when practiced for purposes of domestic consumption or non-profit barter and using gear provided for in specific legislation.

Section II Fishing Vessels

Art. 10° Fishing vessel, for the purposes of this Law, is one that, authorized and registered with the competent authorities, in the form of specific legislation, operates, exclusively, in one or more of the following activities:

I In fishing

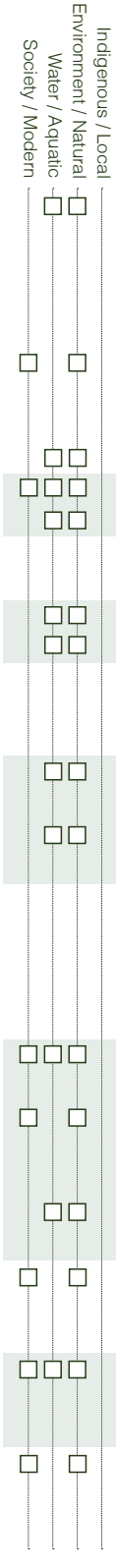
Paragraph 2 For credit purposes, are considered the production of goods boats, nets and other fitting equipment used in fishing or in the commercial aquaculture.

Chapter 7 From Stimulus to Fishing Activity

Art. 28° Fishing colonies may organize the marketing of their members' fishing products, directly or through cooperatives or other entities constituted specifically for this purpose.

National Environmental Policy

The national Environmental policy looks to rationalize the different natural areas and resources throughout Brazil. The Policy also sets the space for legislation which seeks to preserve ecosystems and natural representative landscapes. This law defines the environment and ecosystems as national public property and heritage and assumes a conservationist position rather than a position of sustainable coexistence with nature. In this way, activities which utilize natural areas in a sustainable way have some difficulty in maintaining their legality. This condition has been adjusted with complementary laws and addressed in other national policies specifying which, where and how these activities can be performed. The National Environmental Policy was also responsible for creating the managing agency ICMBio and supervision agency IBAMA which integrate the Ministry of the Environment but have a considerable amount of autonomy to act and regulate within their jurisdictions.



Art 2° The National Environmental Policy aims to preserve, improve and restore the environmental quality conducive to life, aiming to ensure, in the country, conditions forsocio-economic development, national security interests and the protection of the dignity of life human, meeting the following principles:

I Government action to maintain the ecological balance, considering the environment as a public asset to be necessarily ensured and protected, with a view to collectiveuse;

II Rationalization of the use of soil, subsoil, water and air;

III Planning and inspection of the use of environmental resources;

IV Protection of ecosystems, with the preservation of representative areas;

VI Incentives for the study and research of technologies aimed at the rational use and protection of environmental resources;

VIII Recovery of degraded areas;

IX Protection of areas threatened with degradation;

Art 3° For the purposes provided for in this Law, it is understood as follows:

I Environment, the set of conditions, laws, influences and interactions of a physical, chemical and biological order, which allows, shelters and governs life in all its forms;

V Environmental resources: the atmosphere, inland, surface and underground waters, estuaries, territorial sea, soil, subsoil, elements of the biosphere, fauna and flora.

Objectives of the National Environment Policy

Art 4° The National Environmental Policy will aim to:

I The Compatibility of economic and social development with the preservation, quality of the environment and ecological balance;

II The definition of priority areas for government action related to quality and ecological balance, meeting the interests of the Union, States, Federal District, Territories and Municipalities;

III The establishment of criteria and standards of environmental quality and norms related to the use and management of environmental resources;

V The dissemination of environmental management technologies, the dissemination of environmental data and information, and the formation of public awareness of the need to preserve environmental quality and ecological balance;

VI The preservation and restoration of environmental resources with a view to their rational use and permanent availability, contributing to the maintenance of the ecological balance conducive to life;

VII The imposition, on the polluter and predator, of the obligation to recover and/or indemnify the damage caused and, on the user, of the contribution for the use of environmental resources for economic purposes.

Society / Modern · Water / Aquatic · Environment / Natural · Indigenous / Local

The National Environment System

Art. 6° The bodies and entities of the Union, States, Federal District, Territories and Municipalities, as well as the foundations instituted by the Public Power, responsible for the protection and improvement of environmental quality, will constitute the National Environment System - SISNAMA , structured like this:

II Advisory and deliberative body: the National Council for the Environment (CONAMA), with the purpose of advising, studying and proposing to the Council of Government, guidelines for government policies for the environment and natural resources and to deliberate, within the scope of its competence, on norms and standards compatible with anecologically balanced environment and essential to a healthy quality of life;

IV Executing agencies: the Brazilian Institute for the Environment and Renewable Natural Resources - IBAMA and the Chico Mendes Institute for Biodiversity Conservation-Chico Mendes Institute, with the purpose of executing and enforcing the government policy and guidelines established for the environment environment, according to theirrespective competences;

V Sectional Bodies: the state bodies or entities responsible for the execution of programs, projects and for the control and inspection of activities capable of causing environmental degradation;

VI Local Bodies: municipal bodies or entities, responsible for the control and inspection of these activities, in their respective jurisdictions;

Paragraph 1 The States, in the sphere of their competences and in the areas of their jurisdiction, will elaborate supplementary and complementary norms and standards related tothe environment, observing those established by CONAMA.

Paragraph 2 The Municipalities, in compliance with federal and state norms and standards, may also prepare the norms mentioned in the previous paragraph.

Of the National Environment Council

Art. 8° It is incumbent upon CONAMA:

V Determine, through representation from IBAMA, the loss or restriction of tax benefits granted by the Government, in general or conditional nature, and the loss orsuspension of participation in credit lines in official credit establishments;

Society / Modern · Water / Aquatic · Environment / Natural · Indigenous / Local

National Environment Policy Instruments

Art. 9° The instruments of the National Environmental Policy are:

I The establishment of environmental quality standards;

II Environmental zoning;

III The assessment of environmental impacts;

IV The licensing and review of actually or potentially polluting activities;

VI The creation of territorial spaces specially protected by the federal, state and municipal authorities, such as areas of environmental protection, of relevant ecologicalinterest and extractive reserves;

XIII Economic instruments, such as forest concessions, environmental easements, environmental insurance and others.

Art. 9° The owner or owner of property, natural or legal person, may, by public or private instrument or by administrative term signed before Sisnama's member body,limit the use of all or part of their property to preserve, conserve or recover the resources existing environmental conditions, instituting environmental easements.

Paragraph 1 The instrument or environmental easement of the institution of term shall include at least the following items:

I Descriptive memorial of the environmental easement area, containing at least one georeferenced mooring point;

II Object of environmental easement;

III Rights and duties of the founding owner or possessor;

IV Period during which the area will remain as an environmental easement.

Paragraoh 2 Environmental servitude does not apply to permanent preservation areas and legal reserve minimum required.

Art. 10° The construction, installation, expansion and operation of establishments and activities that use environmental resources, effectively or potentially polluting orcapable, in any form, of causing environmental degradation, will depend on prior environmental licensing.

Art. 14° Without prejudice to the penalties defined by federal, state and municipal legislation, failure to comply with the measures necessary to preserve or correct theinconveniences and damages caused by the degradation of environmental quality will subject the transgressors to:

I The simple or daily fine, in amounts corresponding to at least 10 (ten) and at most to 1,000 (one thousand) Adjustable National Treasury Obligations - ORTNs, aggravatedin cases of specific recurrence, as provided for in the regulation, collection by the Union is prohibited if it has already been applied by the State, Federal District, Territories or Municipalities.

II The loss or restriction of tax incentives and benefits granted by the Government;

III The loss or suspension of participation in credit lines in official credit establishments;

IV Suspension of its activity.

Paragraph 1 Without preventing the application of the penalties provided for in this article, the polluter is obliged, regardless of the existence of fault, to indemnify or repair thedamage caused to the environment and to third parties affected by its activity. The Federal and State Public Prosecutor's Office will have the legitimacy to file civil and criminalliability actions for damages caused to the environment.

Art. 15° The polluter who exposes human, animal or plant safety to danger, or who is making the existing danger situation more serious, is subject to the penalty ofimprisonment of 1 (one) to 3 (three) years and a fine of 100 (one hundred) to 1,000 (one thousand) MVR.

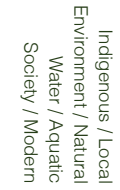
Paragraph 1 The penalty is increased up to double if:

I Result in:
a) Irreversible damage to fauna, flora and the environment;
b) Serious bodily injury;

II Pollution is due to industrial activity or transport;

National Water Resources Policy

The National Water Resources Policy is the law which regulates the management framework and uses of all inland water bodies and basins of Brazil. This law changes the way management of surface water occurs in comparison to previous laws since it acknowledges its systemic conditions and aspects required to guarantee sustainable water bodies. By recognize the importance of management at the basin level, commissions and specific basin regulations for basin management were set with the participation of representatives from all spheres of administration as well as members of environmental and indigenous representatives. Although there are advances in recognizing and guaranteeing the systemic conditions of river basins, these are still viewed as public domain resources, which fails to recognize rivers are fundamental agents for upkeeping life dynamics. In this way, the law only looks at its management and protection to guarantee and sustain the supply of resources made possible by rivers.



Chapter 1 Fundaments

Art. 1° The National Water Resources Policy is based on the following foundations:

I Water is a public domain good;

II Water is a limited natural resource, endowed with economic value;

III In situations of scarcity, the priority use of water resources is human consumption and animal watering;

V The hydrographic basin is the territorial unit for implementing the National Water Resources Policy and the performance of the National Water ResourcesManagement System;

VI The management of water resources must be decentralized and have the participation of the Government, users and communities.

Chapter 2 Objectives

Art. 2° The objectives of the National Water Resources Policy are:

I Assuring current and future generations the necessary availability of water, in quality standards suitable for their respective uses;

II The rational and integrated use of water resources, including waterway transport, with a view to sustainable development;

III The prevention and defense against critical hydrological events of natural origin or resulting from the inappropriate use of natural resources.

Chapter 3 General Guidelines for Action

II The adequacy of water resources management to the physical, biotic, demographic, economic, social and cultural diversities of the different regions of the country;

III The integration of water resources management with environmental management;

IV The articulation of water resources planning with that of the user sectors and with regional, state and national planning;

V The articulation of water resources management with land use;

VI The integration of the management of hydrographic basins with that of estuarine systems and coastal zones.

Art. 4° The Union will liaise with the States with a view to managing water resources of common interest.

Chapter IV Instruments

Art. 5° The instruments of the National Water Resources Policy are:

I Water Resources Plans;
II The classification of water bodies into classes, according to the preponderant uses of water;
III The granting of rights to use water resources;
V Compensation to municipalities;

Section I Water Resource Plans

Art. 6° The Water Resources Plans are master plans that aim to support and guide the implementation of the National Water Resources Policy and the management ofwater resources.

Art. 7 The Water Resources Plans are long-term plans, with a planning horizon compatible with the period of implementation of their programs and projects.

Art. 8° The Water Resources Plans will be elaborated by hydrographic basin, by State and for the Country.

Section III Granting Rights to Use Water Resources

Art. 11° The system for granting rights to use water resources aims to ensure the quantitative and qualitative control of water uses and the effective exercise of rights ofaccess to water.

Art. 12° The rights of the following uses of water resources are subject to granting by the Public Authorities:

IV Use of hydroelectric potentials;

Paragraph 2 The granting and use of water resources for electricity generation purposes shall be subject to the National Water Resources Plan, approved in accordance with the provisions of item VIII of art. 35 of this Law, subject to specific sectorial legislation.

Art. 13° Every grant will be subject to the priorities of use established in the Water Resources Plans and must respect the class in which the water body is framed and the maintenance of adequate conditions for waterway transport, when applicable.

Single Paragraph The concession for the use of water resources must preserve their multiple use.

Art. 14° The granting will be carried out by an act of the competent authority of the Federal Executive Power, of the States or of the Federal District.

Paragraph 1 The Federal Executive Power may delegate to the States and the Federal District the power to grant the right to use a water resource in the domain of the Union.

Art. 15° The granting of the right to use water resources may be partially or totally suspended, definitively or for a specified period, in the following circumstances:

III Urgent need for water to meet calamity situations, including those arising from adverse weather conditions;
IV Need to prevent or reverse serious environmental degradation;
VI Need to maintain the navigability characteristics of the water body.

Art. 18° The grant does not imply the partial alienation of the waters, which are inalienable, but the simple right to use them.

Chapter 6 Public Authority Action

Art. 29° In implementing the National Water Resources Policy, the Federal Executive Power is responsible for:

II Grant the rights to use water resources, and regulate and supervise the uses, within its sphere of competence;

IV Promote the integration of water resources management with environmental management.

Art. 30° In the implementation of the National Water Resources Policy, it is incumbent upon the State and Federal District Executive Powers, in their sphere of competence:

I Grant the rights to use water resources and regulate and supervise their uses;

Of National Water Resources Management System

Chapter 1 Objectives and Compostion

Art. 32° The National Water Resources Management System is created, with the following objectives:

II Administratively arbitrate disputes related to water resources;
III Implement the National Water Resources Policy;

Art. 33° Part of the National Water Resources Management System: (Wording given by Law 9,984 of 2000).

I The National Water Resources Council; (Wording given by Law 9,984 of 2000).
I-A The National Water Agency; (Included by Law 9,984 of 2000).
II The State and Federal District Water Resources Councils; (Wording given by Law 9,984 of 2000).
III The Hydrographic Basin Committees; (Wording given by Law 9,984 of 2000).
IV The federal, state, Federal District and municipal public authorities whose powers are related to the management of water resources; (Wording given by Law 9,984 of 2000).
V The Water Agencies. (Wording given by Law 9,984 of 2000)

Art. 34° The National Water Resources Council is composed of:

I Representatives of the Ministries and Secretariats of the Presidency of the Republic acting in the management or use of water resources;
II Representatives appointed by the State Water Resources Councils;
III Representatives of users of water resources;

Indigenous / Local
Environment / Natural
Water / Aquatic
Society / Modern

IV Representatives of civil organizations for water resources.

Art. 36° The National Water Resources Council will be managed by:

I 1 (one) President, who will be the Minister of State for Regional Development; (Wording given by Law No. 13.844 of 2019).

Art. 37° The Hydrographic Basin Committees will have as their area of action:

Single Paragraph The establishment of Hydrographic Basin Committees in rivers under the Union's domain will be carried out by an act of the President of the Republic.

Art. 39° The Hydrographic Basin Committees are composed of representatives:

I Of the Union;
II States and the Federal District whose territories are located, even partially, in their respective areas of action;
III Of the Municipalities located, in whole or in part, in its area of operation;
IV Users of water in their area of operation;
V Civil entities for water resources with proven performance in the basin.

Paragraph 1 The number of representatives of each sector mentioned in this article, as well as the criteria for their appointment, will be established in the committees' regulations, limiting the representation of the executive powers of the Union, States, Federal District and Municipalities to half of the total members.

Paragraph 3 In the Hydrographic Basin Committees of basins whose territories cover indigenous lands, representatives must be included:

I Of the National Indian Foundation - FUNAI, as part of the representation of the Union;

Chapter 6 Of Civil Water Resources Organizations

Art. 47° The following are considered, for the purposes of this Law, civil organizations of water resources:

Offenses and Penalties

Art. 49° It is a violation of the rules for the use of surface or underground water resources:

II Initiate the implementation or implantation of a project related to the derivation or use of water resources, surface or underground, which implies changes in the regime, quantity or quality thereof, without authorization from the competent bodies or entities;

VI Defrauding the measurements of the volumes of water used or declaring values different from those measured;

Below:
Munduruku indigenous people
set up a sign to demarcate their land.
Lado de Almeida, 2019.

The Indigenous State is the Law which regulates the states actions towards the indigenous peoples, their territories and ways of life. This law was approved in 1973, therefore during the Brazilian Military dictatorship, one of the most aggressive moments in history for Indigenous existence. Since, then, the law has been significantly altered to conform to the new constitution and the democratic conformation of the Brazilian state. The law develops the states interaction with indigenous people and lands and assign roles and conduct for government bodies and particular institutions which can interact with indigenous rights.

It is in this law that Indigenous peoples and lands are distinguished according to the type of occupation and productive activity within them, as well as the level of connectivity with Brazilian society. This has facilitated the states interaction and conduct with such populations as well as the regulation of society with indigenous territories.

The attributions and levels of interaction allowed by subsoil and natural resources present within indigenous territories are also regulated by this law. It is important to mention that it does grant indigenous people's exclusivity to exploration of natural resources within their own territories, although with the exception if these have national interest by the state for development reasons. In such cases, consultations must be conducted, and approval of exploitation would be granted by both houses of congress and regulation bodies. Economic exploits must be shared with indigenous peoples accordingly according to law and the constitution.

Society / Modern
Water / Aquatic
Environment / Natural
Indigenous / Local

Principles and Definitions

Art. 2° It is incumbent upon the Union, States and Municipalities, as well as the bodies of their respective indirect administrations, within the limits of their competence, to protect indigenous communities and preserve their rights:

II Provide assistance to Indians and indigenous communities not yet integrated into the national community;

III Respect, by providing the Indians with the means for their development, the peculiarities inherent to their condition;

IV Ensure the Indians the possibility of free choice of their livelihood and subsistence;

V Guarantee the Indians a voluntary stay in their habitat, providing them there with resources for their development and progress;

VI Respect, in the process of integrating the Indian into the national community, the cohesion of the indigenous communities, their cultural values, traditions, uses and customs;

VII Execute, whenever possible through the collaboration of the Indians, the programs and projects aimed at benefiting the indigenous communities;

VIII Use the cooperation, the spirit of initiative and the personal qualities of the Indian, with a view to improving their living conditions and their integration in the development process;

IX To guarantee to the Indians and indigenous communities, under the terms of the Constitution, permanent possession of the lands they inhabit, recognizing the right to the exclusive use of natural wealth and all the utilities on those existing lands;

Art. 3° For the purposes of law, the following definitions are established:

I Indigenous or Forestry - Any individual of pre-Columbian origin and descent who identifies and is identified as belonging to an ethnic group whose cultural characteristics distinguish him from the national society;

II Indigenous Community or Tribal Group - It is a group of Indian families or communities, whether living in a state of complete isolation from other sectors of the national community, or in intermittent or permanent contacts, without however being integrated into them.

Civil Rights and Political Rights

Indigenous / Local
Environment / Natural
Water / Aquatic
Society / Modern

Chapter 1 Principles

Art. 6° The uses, customs and traditions of indigenous communities and their effects on family relations, order of succession, property regime and acts or business carried out between Indians will be respected, unless they choose to apply common law.

Chapter 2 Assitance and Guardianship

Art. 7° Indigenous peoples and indigenous communities not yet integrated into the national community are subject to the tutelary regime established in this Law.

Paragraph 2 It is the responsibility of the Union, which will exercise it through the competent federal agency for assistance to the indigenous.

Art. 8° Acts performed between the non-integrated Indian and any person outside the indigenous community are null and void when there has been no assistance from the competent tutelary body.

From the Land of the Indigenous

Chapter 1 General Provisions

Art. 17 Indigenous lands are considered:

I Lands occupied or inhabited by indigeous, referred to in articles 4, IV , and 198 of the Constitution ; (Regulation) (See Decree No. 22, of 1991) (See Decree No. 1775, of 1996)

II The reserved areas referred to in Chapter III of this Title;

III Lands under the domain of indigenous or forestry communities.

Art. 18° Indigenous lands may not be the object of lease or any legal act or transaction that restricts the full exercise of direct possession by the indigenous community or by the foresters.

Paragraph 1 In these areas, any person outside tribal groups or indigenous communities is prohibited from hunting, fishing or gathering fruits, as well as from agricultural or extractive activities.

Art. 19° Indigenous lands, by initiative and under the guidance of the federal agency for assistance to the Indian, will be administratively demarcated, in accordance with the process established in a decree of the Executive Power.

Paragraph 1 The demarcation carried out pursuant to this article, approved by the President of the Republic, shall be registered in a proper book of the Union Patrimony Service (SPU) and in the real estate registry of the district of the land situation.

Art. 20° Exceptionally and for any of the reasons listed below, the Union may intervene, if there is no alternative solution, in an indigenous area, determined by decree of the President of the Republic.

1° Intervention may be decreed:
d) For carrying out public works that are of interest to national development;
f) For the exploitation of subsoil riches of relevant interest for national security and development.

2° The intervention will be carried out under the conditions stipulated in the decree and always by means of its own, which may result, depending on the seriousness of the fact, one or some of the following measures:
c) Rremoval of tribal groups from one area to another.

3° It will only be possible to remove a tribal group when it is impossible or inadvisable for its permanence in the area under intervention, with the indigenous community being destined for an area equivalent to the previous one, including in terms of ecological conditions.

Chapter 2 Of the occupied lands

Art. 22° It is incumbent on Indians or foresters to permanently possess the land they inhabit and the right to exclusive use of natural wealth and all the utilities on those existing lands.

Single Paragraph The lands occupied by the Indians, under the terms of this article, will be inalienable assets of the Union (Article 4, IV , and 198, of the Federal Constitution).

Art. 23° The possession of the Indian or forestry is considered to be the effective occupation of the land which, according to tribal uses, customs and traditions, he holds and where he lives or carries out an activity that is essential to his subsistence or is economically useful.

Art 24° The usufruct guaranteed to Indians or foresters comprises the right to possession, use and perception of natural wealth and all the utilities existing in the occupied lands, as well as the product of the economic exploitation of such natural wealth and utilities.

Paragraph 1 The usufruct, which extends to accessories and their additions, includes the use of springs and waters in the stretches of waterways included in the occupied lands.

Paragraph 2 The Indian is guaranteed the exclusive exercise of hunting and fishing in the areas occupied by him, and the police measures that may eventually have to be applied in relation to him must be carried out in their own right.

Art. 25° The recognition of the right of Indians and tribal groups to permanent possession of the lands inhabited by them, pursuant to article 198 of the Federal Constitution, will not depend on its demarcation, and will be ensured by the federal agency for assistance to foresters, in compliance with current situation and the historical consensus on the antiquity of the occupation, without prejudice to the appropriate measures that, in the omission or error of the referred body, any of the Powers of the Republic may be taken.

Chapter 3 Reservations

Art. 26° The Union may establish, in any part of the national territory, areas destined for possession and occupation by the Indians, where they can live and obtain means of subsistence, with the right to the usufruct and use of natural wealth and the goods existing in them, respecting legal restrictions.

Single Paragraph The areas reserved in the form of this article are not to be confused with those of immemorial possession of the indigenous tribes, and may be organized under one of the following modalities:
a)indigenous reserve;
b)indigenous park;
c)indigenous agricultural colony.

Art. 27° Indigenous reserve is an area destined to serve as habitat for an indigenous group, with sufficient means for their subsistence.

Art. 28° Indigenous park is an area contained in land owned by Indians, whose degree of integration allows economic, educational and sanitary assistance from the Union bodies, in which flora and fauna reserves and natural beauty of the region are preserved.

Paragraph 3 The subdivision of lands in indigenous parks shall comply with the regime of tribal property, uses and customs, as well as national administrative rules, which shall adjust to the interests of indigenous communities.

Art. 29° Indigenous agricultural colony is the area destined for agricultural exploitation, managed by the Indian assistance agency, where acculturated tribes and members of the national community coexist.

Chapter IV Indigenous Land Domain

Art. 32 Lands owned by any of the forms of acquisition of domain, under the terms of civil legislation, are fully owned by the Indian or the indigenous community, as the case may be.

Art. 33 The Indian, integrated or not, who occupies as his own, for ten consecutive years, a stretch of land less than fifty hectares, will acquire full property from it Single Paragraph "The provisions of this article do not apply to lands under the domain of the Union, occupied by tribal groups, to reserved areas referred to in this Law, nor to lands collectively owned by a tribal group.

Assets and Income from Indigenous Heritage

Art. 39° The following constitute Indigenous Heritage assets:

I Lands belonging to the domain of tribal groups or indigenous communities;
II The exclusive usufruct of the natural wealth and all the utilities existing in the lands occupied by tribal groups or indigenous communities and in the areas reserved for them;

Art. 40° The holders of the Indigenous Heritage are:

I The indigenous population of the country, with regard to goods or income belonging to or intended for forestry people, without discrimination against people or tribal groups;
II The tribal group or determined indigenous community, as to the possession and usufruct of the lands exclusively occupied by it, or reserved to it;
III The indigenous community or tribal group named in the acquisition title of the property, in relation to the respective real estate or furniture.

Art. 41° Not part of the Indigenous Heritage:

I The lands of exclusive possession or domain of the Indian or forestry, individually considered, and the usufruct of the respective natural wealth and utilities;

II Housing, furniture and domestic utensils, objects for personal use, work instruments and products from farming, hunting, fishing and gathering or from work in general by foresters.

Art. 42° It is the responsibility of the assistance agency to manage the Indigenous Heritage, providing, however, the participation of foresters and tribal groups in the administration of their own assets, being fully entrusted with the responsibility, when they demonstrate effective capacity for its exercise.

Single Paragraph The listing of Indigenous Heritage assets will be permanently updated, with a rigorous inspection of their management, through internal and external control, in order to make the responsibility of its administrators effective.

Art. 44° The richness of the soil, in indigenous areas, can only be exploited by the foresters, and they are exclusively responsible for mining, sparking and digging for the aforementioned areas. (Regulation).

Art. 45° The exploitation of subsoil wealth in areas belonging to the Indians, or under the domain of the Union, but held by indigenous communities, shall be carried out under the terms of current legislation, subject to the provisions of this Law.

Paragraph 1 The Ministry of the Interior, through the competent body for assistance to the Indians, will represent the interests of the Union, as owner of the land, but the participation in the result of the exploration, the indemnities and the income due for the occupation of the land, will revert to the benefit of the Indians and will constitute sources of indigenous income.

Paragraph 2 In safeguarding the interests of Indigenous Heritage and the well-being of foresters, the authorization of research or mining, to third parties, in tribal possessions, will be subject to prior agreement with the Indian assistance agency.

Art. 46° The cutting of wood in indigenous forests, considered under permanent preservation, in accordance with letter g and § 2, of article 3, of the Forest Code , is subject to the existence of programs or projects for the use of the respective lands in agricultural exploitation, industry or reforestation.

Brazilian Constitution: Article 231and 232.

Ailton Krenak speaks at the Constituent assembly in Brasilia in 1987.

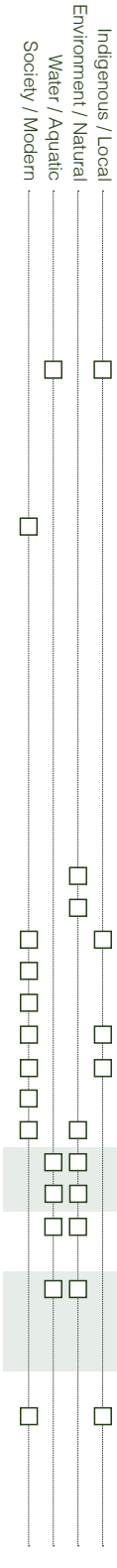
The articles dedicated to the Brazilian native indigenous conditions present since the formation of the Brazilian constitution of 1988, therefore a formative right of the nation, configures a new moment for the indigenous population. The previous legislations which considered indigenous existence were in tune with the concept of indigenous assimilation, and that the indigenous existence was once of inevitable transitioning to an integrated one into modern society and customs. With the new constitution, their rights to difference were assured and to be protected. This condition would also not alienate them from other rights granted by the constitution but allow them to continue existing as their traditions and cultures while still having the same rights of all other Brazilians.

The main changing paradigm brought about was the recognition of the indigenous existence prior to the existence of the state itself. In this way, the constitution recognizes the original rights of indigenous peoples to their land, their ways of life and the way in which they chose to utilize resources, and that these must be respected and protected. This shift in perspective recognizes the history embedded in the constitution of the Brazilian state, realizing its colonial condition.

	Indigenous / Local	Environment / Natural	Water / Aquatic	Society / Modern	
Art. 231	☐	☐	☐	☐	The Indians are recognized for their social organization, customs, languages, beliefs and traditions, and for the original rights over the lands they traditionally occupy, and the Union is responsible for demarcating, protecting and enforcing all their assets.
Paragraph 1	☐	☐	☐		The lands traditionally occupied by the Indians are those which they inhabit on a permanent basis, those used for their productive activities, those essential to the preservation of environmental resources necessary for their well-being and those necessary for their physical and cultural reproduction, according to their uses, costumes and traditions.
Paragraph 2	☐	☐	☐		The lands traditionally occupied by the Indians are destined to their permanent possession, and they are responsible for the exclusive use of the riches of the soil, rivers and lakes existing in them.
Paragraph 3	☐	☐	☐	☐	Research and mining of mineral wealth in indigenous lands can only be carried out with the authorization of the National Congress, after hearing the affected communities, and they are guaranteed participation in the mining results, in the form of law.
Paragraph 4	☐	☐		☐	The lands dealt with in this article are inalienable and unavailable, and the rights over them, indefinite.
Paragraph 5	☐			☐	The removal of indigenous groups from their lands is prohibited, except, ad referendum of the National Congress, in the event of a catastrophe or epidemic that puts its population at risk, or in the interest of the sovereignty of the Country, after deliberation of the National Congress, guaranteed, in any case, the immediate return as soon as the risk ceases.
Paragraph 6	☐	☐	☐	☐	Acts that have as their object the occupation, domain and possession of the lands referred to in this article, or the exploitation of the natural resources of the soil, rivers and lakes therein, are null and void, with no legal effects existing, subject to the relevant public interest of the Union, according to the provisions of a complementary law, not generating the nullity and extinction of the right to indemnity or actions against the Union, except, in accordance with the law, for the improvements derived from occupation in good faith.
Paragraph 7					The provisions of art. 174, §§ 3rd and 4th.
Art. 232	☐				The Indians, their communities and organizations are legitimate parties to take legal action in defense of their rights and interests, with the Public Ministry intervening in all acts of the process.

IBAMA
Environmental Liscence
For Belo Monte Operation

The approval of the dam's operation granted by Ibama with the Belo Monte License of operation was widely contested since many conditions accessed for social and environmental impact had not been met. In truth, the projected operation and output of the dam was incompatible with the adherence of compliance to the existing laws and regulations as well as the Impact Assessment Report conclusions. Nevertheless, with considerable political pressure, the Dam's operation was allowed and approved by the submission of this license. 41 conditional aspects were annexed to the approval of operation and subject to monthly to yearly reviews as well as an expiry date of 6 years (2015-2021) for this license, where new assessments on the compliance of conditioning would favour or not a renewal of operation. Many of the concession points were problematic in the sense that they acknowledged the ecological destruction which would come to the region with the operation of the dam, and proposed mitigation measures which proved unrealistic logistically and from a local community adherence standpoint. Other measures, such as the proposed Consensus Hydrograph, was proposed as trial mitigation measure in site, which ultimately meant that the "testing" would happen along the operation, and any harm which would come from it, still cause severe consequences. The License is still contested to this day with the Federal Public Prosecutors actively embargoing the Dams operation from time to time.



General Conditions:

1.2. IBAMA, upon motivated decision, may modify the conditions, the control and adequacy measures, as well as suspend or cancel this license, if:

a) Omission or false description of relevant information that supported the issuance of this license;
b) Serious environmental and health risks;
c) Violation or inadequacy of any legal conditions or rules.

1.5. Norte Energia SA is solely responsible to IBAMA for complying with the conditions set forth in this Operating License.

1.6. In the event of any environmental accident, the entrepreneur must immediately communicate the fact to Ibama, pursuant to IBAMA Normative Instruction No. 15/2014, through the National Environmental Emergency System — SIEMA.

Specific Conditions:

2.1. Uninterruptedly carry out the programs and projects included in the plans listed below:
a) Environmental Management Plan
b) Environmental Construction Plan
c) Service Plan for the Affected Population
d) Urban Requalification Plan
e) Institutional Articulation Plan
f) Population Relationship Plan
g) Public Health Plan
h) Equity Appreciation Plan
i) Geological/Geotechnical and Mineral Resources Monitoring Plan
j) Water Resources Management Plan
k) Terrestrial Ecosystem Conservation Plan
l) Aquatic Ecosystem Conservation Plan

2.4. Carry out, without detriment to the semiannual reports, a technical seminar with the licensing body, on an annual basis, to discuss the results of the environmental programs, providing an explanation by the specialists involved.

2.5. Incorporate the recommendations contained in Opinion 02001.004317/2015-25 COHID/ IBAMA to carry out the control, monitoring, mitigation and social communication measures provided for in the Reservoirs Filling Plan of the Belo Monte HPP.

Indigenous / Local
Environment / Natural
Water / Aquatic
Society / Modern

2.6 In relation to the resettlement activities of the affected population:

a) Carry out a review of the treatment offered to riverside dwellers and residents of islands and banks of the Xingu River, in accordance with guidelines approved by Official Letter 02001.009719/2015-16 DILIC/ IBAMA, ensuring access to double housing for all those affected who have the right.

2.10 Under the Urban Requalification Plan, Norte Energia must:

b) Complete, within a period of 180 (one hundred and eighty) days, the works of the parks around the Altamira streams; the redevelopment of the edge of Altamira; and the urban drainage works associated with parks and the redevelopment of the edge;

2.14 Regarding water quality:

c) Carry out the adaptive management of the reservoir compartments, in order to meet the demands for multiple uses and the maintenance of living conditions for aquatic biota.

2.16 Regarding Volta Grande do Xingu, Norte Energia should:

a) Carry out the tests provided for the implementation of the Consensus Hydrogram, with a minimum duration of 6 (six) years from the installation of full generation capacity in the main powerhouse, associated with the results of the Integrated Management Plan of Volta Grande do Xingu;

b) Control the flow of the Volta Grande do Xingu, always with the objective of mitigating impacts on the quality of the water, ichthyofauna, alluvial vegetation, turtles, fishing, navigation and ways of life of the population of Volta Grande.

2.17 Regarding navigation:

a) Operate, without interruption, the Vessel Transposition System;
b) Submit, within 90 (ninety) days, an independent technical report assessing the suitability of the equipment for the vessels used by the residents of Volta Grande do Xingu.

2.18 Implement and protect the Permanent Preservation Area (APP) approved by Ibama.
a) Present, within 120 (one hundred and twenty) days, the Revegetation Program for the Permanent Preservation Areas of the reservoirs and the Channel.

Indigenous / Local
Environment / Natural
Water / Aquatic
Society / Modern

2.19 In the scope of fauna rescue, during the filling of the Xingu and Intermediate reservoirs:

a) Submit monthly reports, containing the information requested by the Authorization for Capture, Collection and Transport of Biological Material No. 647/2015;
b) Maintain the fauna rescue during the aftermath period, until a manifestation by Ibama authorizing the interruption of the activity;
c) Forward all animals received or informed by Ibama in the region surrounding the project to CETAS at the Belo Monte HPP.

2.22 Within the scope of the Aquatic Fauna Conservation Program, Norte Energia should continue the Aquatic and Semi-Aquatic Mammals Monitoring Project, the Aquatic and Semi-Aquatic Avifauna Monitoring Project and the Crocodilians Monitoring Project, by, no. minimum, two years after the filling of the reservoirs, as specified in Opinion 02001.003622/2015-08 COHID/IBAMA. Monitoring activities can only be interrupted after consent from Ibama.

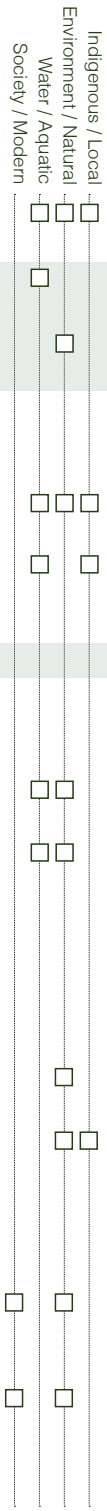
2.23 Within the scope of the Turtle Conservation and Management Program, Norte Energia should continue the activities of the Research Project on the Ecology of Turtles and the Belo Monte Turtle Management Project, in order to measure and mitigate the impact on the turtle fauna. Comparative analyzes with previous phases, such as pre-filling and filling, must also be presented.

2.24 Under the Sustainable Fishing Incentive Project:

b) Initiate, within 60 (sixty) days, a fishing technical assistance project, for a minimum period of 3 (three) years, in the stretch that undergoes alterations due to the formation of the Xingu reservoir and the Reduced Flow Section; and
c) Develop a fishing technical assistance project for fishermen and riverside dwellers living in the Riozinho do Anfrísio and Iriri Extractive Reserves, in the region of Terra do Meio.

2.25 Within the scope of the Ichthyofauna Rescue and Rescue Project:

a) Present, within 45 (forty-five) days, an Action Protocol for the activities of rescue and rescue of ichthyofauna for the operation phase of the enterprise, including activities to be carried out in the event of fish mortality;
b) Carry out ichthyofauna rescue during commissioning activities, at the stoppages of the Generating Units (scheduled and emergency), and in others. activities potentially impacting the ichthyofauna;



c) Immediately report to Organs competent bodies, including DILIC/IBAMA, any occurrences of fish mortality;
d) Record, during ichthyofauna rescue activities, measurements of the following water quality parameters: temperature, dissolved oxygen and pH;
e) In the case of rescue of exotic species, the specimens of these species must be sacrificed and not returned to the water body.

2.26 Under the Ornamental Fish Aquaculture Project:

a) Provide technical assistance for a minimum period of 3 (three) years after the transfer of technology packages;
b) Present, within 30 (thirty) days, an alternative proposal for mitigation actions for the public that does not adhere to the project.

2.27 Under the Project for the Implementation and Monitoring of the Fish

Transposition Mechanism:

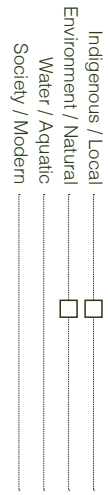
a) Start operation of the Fish Transposition System — STP — before the 2015/2016 ichthyofauna reproductive migration period;
b) Carry out an evaluation of the effectiveness of the STP, after the first three hydrological cycles, based on the monitoring data from the Ichthyofauna Monitoring Projects and the Implementation and Monitoring of the Fish Transposition Mechanism and submit a report to Ibama.

2.28 Regarding forest replacement:

a) Submit, within 90 days, the forest replacement project, using the information contained in the Final Suppression Report;
b) Consider the Permanent Preservation Areas of the reservoir, for planting forest species for the purpose of generating credit for forest replacement.

2.30 Within the scope of the Wood Market Design Program:

a) Allocate 100% of the usable volume of protected species in the form of processed forest product, through donation or internal use, prioritizing uses that provide better added value;
c) Optimize the internal use of forest products from the suppression for use in infrastructure and assembly works, as well as in other environmental programs of the PBA that require any type of wood consumption.

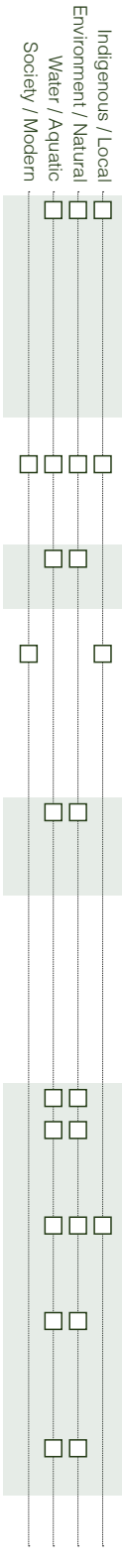


2.32 In relation to the bodies involved in environmental licensing, observe the following guidelines:

c) FUNAI — continue with the implementation of the plans and integral programs of the Indigenous Component of the Basic Project Environmental (PBA-CI), observing at FUNAI recommendations for complementation and adequacy of measures, as well as deadlines and guidelines estabilished by the Foundation.

Consensus Hidrogram

The Consensus Hydrograph was a water flow and discharge plan for the so called “Section of Reduced Water Flow” also known as the Volta Grande do Xingu. Although named as “Consensus”, the plan has little dialogue with stakeholders in its conception. The Plan arose from the demands of local populations which were in direct line of fire from the consequences of the dam’s construction and operation as well as research institutions, specialists and NGOs which were concerned by the impacts on the Socioecological systems in the region. The “Consensus” plan was between Government agencies IBAMA and the State Power Company ELTRONORTE, which was responsible for the dam’s operation management. The consensus was one set to reduce the water flow and control its discharge points varying every 2-4 years with the argument that in this way sufficient water would be released to guarantee ecosystems to maintain themselves as well as provide enough water for power generation. In realty the values allowed to flow downstream were and continue to be insufficient for the existing ecosystem dynamics to occur as well as contribute to the acceleration of the destruction of the ecosystem and extinction of certain species. Opposing organizations to this plan argue for an Ecologic Hydrograph which respects the natural cycles of the river in detriment of the power output of the dam.



Art.1°	Declare reserved, to the National Electric Energy Agency - ANEEL, in the section of the Xingu River located at coordinates 03° 07' 35" of South Latitude and 51° 46' 30" of West Longitude, water availability characterized by natural affluent flows, contained in Annex I, subtracted from the average flows intended to serve other uses upstream consumptives and flow rates for the maintenance of a flow hydrograph in the reduced flow section, according to Annexes II and III.
Art.2°	Reserved flows are intended to ensure water availability necessary for the feasibility of hydroelectric development Belo Monte.
Paragraph 2	The arrangement of the planned structures should seek to favor the passage of sediments;
Paragraph 4	The current conditions of navigation, appropriate to the size, must be maintained. currently existing in the region, including regular transport vessels from passengers, for all communities that use this transport, during the phases of construction and operation of the enterprise;
Paragraph 7	The effects on water uses, associated with any processes of downstream erosion and upstream siltation, resulting from the implementation of the project, shall be mitigated by the granted future;
Art. 4°	The current conditions of navigation, appropriate to the size, must be maintained. currently existing in the region, including regular transport vessels from passengers, for all communities that use this transport, during the phases of construction and operation of the enterprise;
I	Minimum flow rate to be maintained in the channel reservoir: 300 m^3/s;
II	Average monthly flows to be maintained in the reduced flow section (TVR), alternating hydrographs A and B in consecutive years, as per Annex III.
Paragraph 1	If, in a given month, the affluent flow is lower than that prescribed in Annex III, flow equal to the affluent in the TVR must be maintained;
Paragraph 2	The minimum NA of the reservoir may be reduced to meet simultaneously the conditions expressed in items I and II, when the influent flow is less than the flow prescribed for the TVR added to 300 m^3/s;
Paragraph 3	The instantaneous flow in the month of October on TVR cannot be less than 700 m^3/s, except if the influent flow is so;

Society / Modern	Water / Aquatic	Environment / Natural	Indigenous / Local		
	☐	☐		Paragraph 4	In the months of hydrograph ascension, the instantaneous flow in the TVR did not should be less than the average flow prescribed for the previous month, except if the inflow flow o be;
	☐	☐		Paragraph 5	In the months of hydrograph recession, the instantaneous flow in the TVR does not should be less than the average flow prescribed for the following month, except if the affluent flow o be;
				Art. 6°	This Declaration will be automatically transformed by ANA into granting the right to use water resources for hydroelectric development to the holder who receive from ANEEL the concession or authorization for the use of hydraulic energy potential, upon presentation of:
	☐		☐	V	Basic Project of the mechanism for the transposition of boats from the dam on the site Pimental, showing its technical feasibility for the transposition of vessels operating currently in the Volta Grande do Xingu region, including regular transport vessels of passengers;

Stakeholder Analysis

The catalogued Stakeholders involved have been selected based on their involvement in the region or related to the territory under influence of the Belo Monte Dam Complex. They have been mapped out on a stakeholder relational diagram according to the level of decision power vs. the desire to control or allow the river to flow. What is most evident is the power disparity between government institutions and local communities and institutions with some form of participation in the affected region. Even government agencies which were designed to bridge and safeguard local communities such as Indigenous and Ribeirinhos as well as protect biodiversity have been unable to approach the desires of those local populations.

It is notable that some more formalized organizations, especially indigenous associations have somewhat power leverage and there is an opportunity to work with these groups to propose an intermediary bridge between state institutions and apparatus and local desires and concerns.

<u>Social / Community Organizations</u>

1. AYMIX - Yudjá / Miratu Community Association
2. APIB - Association of Indigenous People of Brazil
3. Conselho Ribeirinho
4. AMOMEX - Extractive Reserve Dwellers Association
5. YARIKAYU - Yudjá / Juruna Association
6. ATIX - Xingu Indigenous Land Association
7. Juruna People
8. Arara People
9. City of Altamira Population
10. INCRA Settlers
11. Ranchers
12. Miners

<u>Academic Organizations</u>

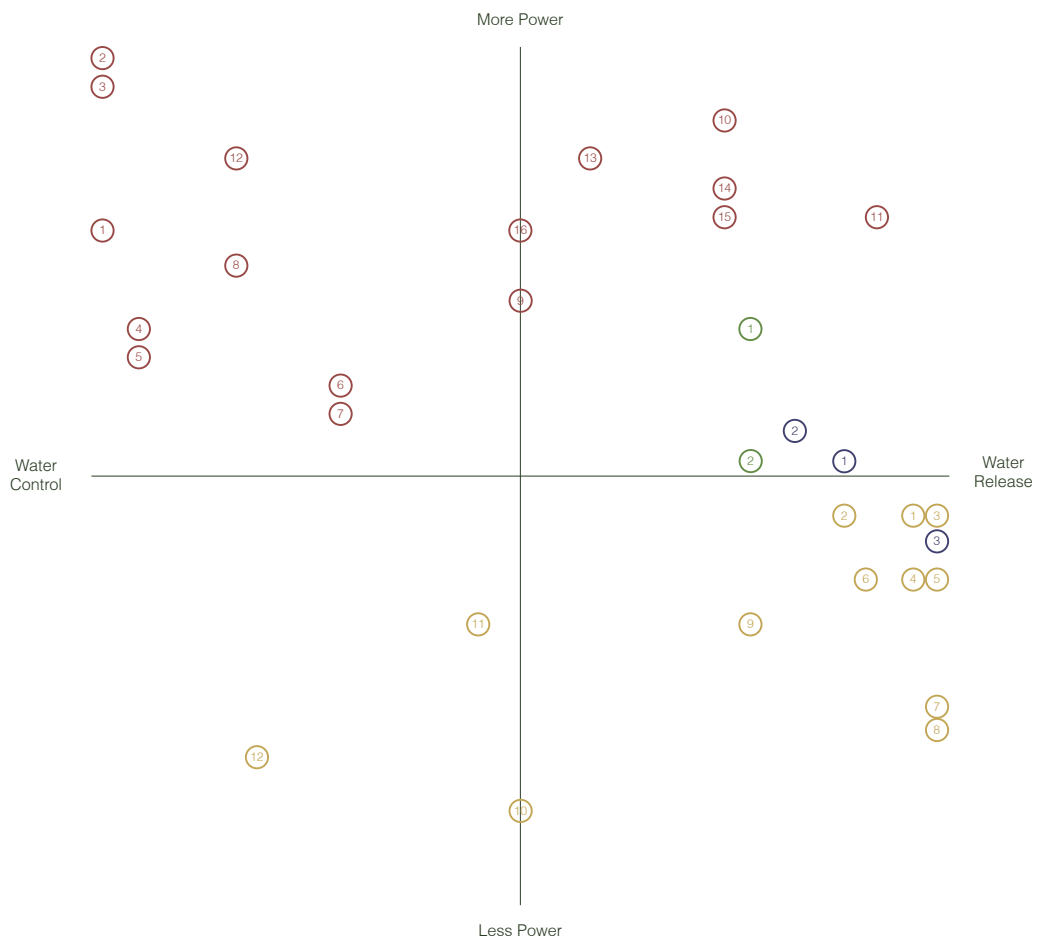
1. UFPA - Pará Federal University
2. IPAM - Amazon Environment Research Institute

<u>Non-Governmental Organizations</u>

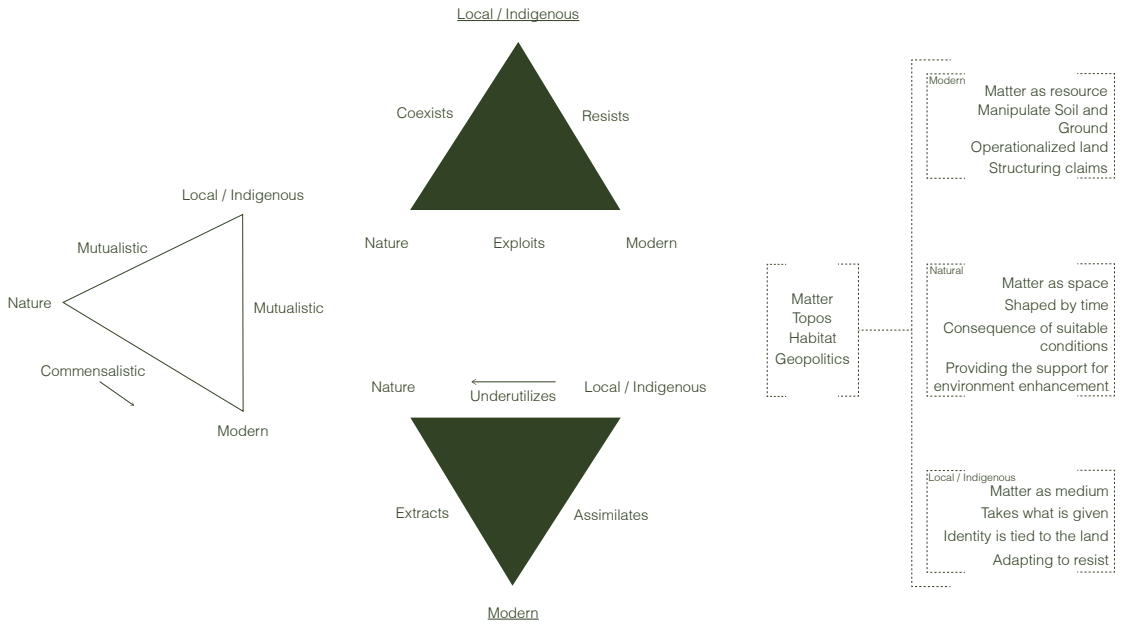
1. NGO Xingu+
2. ISA - Socio-enviornmenmental Institute
3. NGO Xingu Vivo Para Sempre

<u>State Organizations</u>

1. ELETRONORTE - Dam Operating Company
2. Federal Government
3. Pará State Government
4. Altamira Municipality
5. Vitória do Xingu Municipality
6. Senador José Porfírio Municipality
7. Anapu Municipality
8. National Water Resource Council
9. Hydrographic Basin Committiees
10. Federal Public Prosecution (MPF)
11. FUNAI - Indigenous Autarchy
12. MME - Ministry of Mining and Energy
13. MMA - Ministry of the Environment
14. IBAMA - Environmental Inspection Agency
15. ICMBio - Environmental Management Agency
16. CONAMA - National Environment Council



The varying opposing positions of stakeholders is justified given the opposing values that these have to each other and the territory in question. Essentially modernity wishes to utilize natural resources to maintain itself and integrates into its worldview whatever seems different to this model. Local / Indigenous seeks to coexist with nature and views modernity as the exploitation of nature.



General Values and translation through Lines of Inquiry. The Author, 2020.

Synchronization Field

Understainding the Synchronization Field.

The Synchronization Field looks to identify the cosmopolitical aspects within three main worldviews (Modern, Natural and Local / Indigenous) through the four Lines of Inquiries utilizing the Landscape Planning Method in order to territorialize these aspects. For each Line of Inquiry, the identified values filter through for the subsequent worldview.

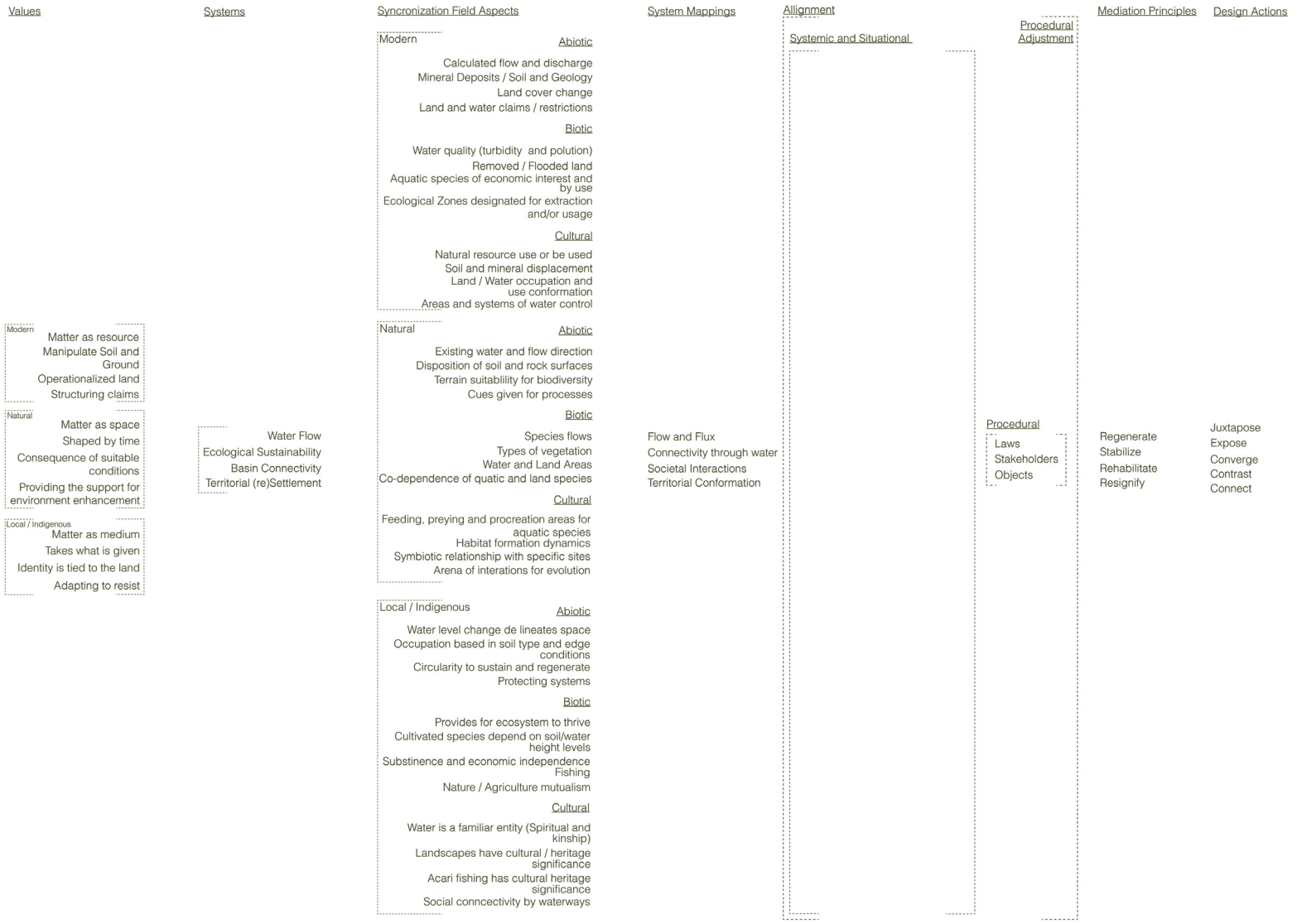
This allows for the identification of key synchronized or de-synchronized aspects for a given system in place over the studied territory, and so potential systemic alignments can be drawn to enable mediation interface designs.

Dynamics Lines of Inquiry		Modern Values	Abiotic	Biotic	Cultural
MATTER	Earth Water Air	Resource	Calculated flow and discharge	Water quality fish Survival (turbidity and polution)	Natural resource use or be used
TOPOS	Terraform Erasure Translations Flux	Manipulate Soil and Ground	Mineral Deposits / Soil and Geology	Removed / Flooded land	Soil and mineral displacement
HABITAT	Mutualism Competition Diversity Entropy	Operationalized land	Land cover change	Aquatic species of economic interest and by use	Land / Water occupation and use conformation
GEOPOLITICS	Climate Change Ethics Ownership Displacement	Structuring claims	Land and water claims / restrictions	Ecological Preservation zones Areas designated for extraction and usage	Areas and systems of water control

Worldviews											
Natural								Local / Indigenous			
Values	Abiotic	Biotic	Cultural					Values	Abiotic	Biotic	Cultural
Space	Existing water and flow direction	Species flows	Feeding, preying and procreation areas for aquatic species					Medium	Water level change de lineates space	Provides for ecosystem to thrive	Water is a familiar entity (Spiritual and kinship)
Shaped by time	Disposition of soil and rock surfaces	Types of vegetation	Habitat formation dynamics					Takes what is given	Occupation based on soil type and edge conditions	Cultivated species depend on soil/water height levels	Landscapes have cultural / heritage significance
Consequence of suitable conditions	Terrain suitablility for biodiversity	Water and Land Areas	Symbiotic relationship with specific sites					Identity is tied to the land	Circularity to sustain and regenerate	Substinence and economic independence Fishing	Acari fishing has cultural heritage significance
Providing the support for environment enhancement	Cues given for processes	Co-dependence of quatic and land species	Arena of interations for evolution					Adapting to resist	Protecting systems	Nature / Agriculture mutualism	Social conncectivity by waterways

Elements / Artefacts Lines of Inquiry		Modern Values	Abiotic	Biotic	Cultural
MATTER	Earth Water Air	Resource	Satelite monitoring. Measuring Gauge. Dam locks.	Dam wall. Untreated sewage.	Pipes. Sewage Infrastrucutre. Water storage. Water towers.
TOPOS	Terraform Erasure Translations Flux	Manipulate Soil and Ground	Sensoring Satelite. Field Research. Perfuration machinery.	Dredging. Trucks. Excavators. Explosions.	Extraction sites. Truck. Barges. Extraction vessels.
HABITAT	Mutualism Competition Diversity Entropy	Operationalized land	Fences. Buldozers. Cattle. Trucks. Chainsaws.	Fishing boats. Ice coolers. Fishing nets. Fishing rod.	Roads. Ports. Palaphitas. Farm houses. Fence. Energy towers.
GEOPOLITICS	Climate Change Ethics Ownership Displacement	Structuring claims	Policies. Fences. Servailance.	Policies. Fences. Signage. IBAMA resources.	Dams. Fences. Policies. Zonings. Flood lights. Quays. Levees.

Natural				Local / Indigenous			
Values	Abiotic	Biotic	Cultural	Values	Abiotic	Biotic	Cultural
Space	Rain. Watershed.	Aquatic species.	Pipes. Sewage Infrastrucutre. Water storage. Water towers.	Medium	Soil. Landuse.	Cultivated species.	Waterfall sites. River sites. Living species.
Shaped by time	Water. Wind. Sediment.	Types of vegetation.	River flow. River pulse. Sediment flow.	Only takes what is given	Landuses.	Cultivated species.	Land artefacts.
Consequence of suitable conditions	Sediment types.	Sand. Soil. Rock formations. Vegetation. Water.	Aquatic species. Land species.	Identity is tied to the river	Agroforestry. Agroextractivism.	Seasonal fish species.	Snorkle. Canoes. Motorized vessels. Harpoons. Javelling. Bow and Arrow.
Providing the support for environment enhancement	Rain.	Aquatic species. Land species.	Aquatic species. Land species.	Adapting to resist		Nets. Baskets. Tanks. Snorkle. Planting.	Canoes. Motorized vessels. Trade. Dam vessel. Transfering.



Synchronization Framework

The Synchronization Framework Integrates the Aspects identified in the Synchronization table and according to the main systems identified for this region, we can propose the System Mapping Themes which are: 1. Water Flow, 2. Ecological Sustainability, 3. Basin Connectivity and 4. Territorial (re)Settlement. Through the Systemic Mappings, the Alignment Strategy is done utilizing the identified Systemic and Situational Mapped elements and their consequent alignments with Procedural Aspects such as Laws, involved Stakeholders and identified Objects from the Synchronization Field table. With these elements we have identified the specific elements needed or part of the system in question. To mediate the system in question, Mediation Principles indicate which strategy must be utilized to achieve mediation in the given System, Site and involved aspects. By utilizing the Design Actions, spatial propositions can be placed to achieve set mediation strategy.

Synchronization Field: Water Flow System

Given the impact caused by the construction and operation of the Belo Monte Hydropower Dam complex, both Up and down stream, the Water Flow System is the first in need of analysis and proposals for synchronization through mediation.

The selected aspects of this system have been highlighted in the adjacent Synchronization table.

Dynamics	Lines of Inquiry	Modern Values	Modern Abiotic	Modern Biotic	Modern Cultural
MATTER	Earth Water Air	Resource	Calculated flow and discharge	Water quality fish Survival (turbidity and polution)	Natural resource use or be used
TOPOS	Terraform Erasure Translations Flux	Manipulate Soil and Ground	Mineral Deposits / Soil and Geology	Removed / Flooded land	Soil and mineral displacement
HABITAT	Mutualism Competition Diversity Entropy	Operationalized land	Land cover change	Aquatic species of economic interest and by use	Land / Water occupation and use conformation
GEOPOLITICS	Climate Change Ethics Ownership Displacement	Structuring claims	Land and water claims / restrictions	Ecological Preservation zones Areas designated for extraction and usage	Areas and systems of water control

Elements / Artefacts	Lines of Inquiry	Modern Values	Modern Abiotic	Modern Biotic	Modern Cultural
MATTER	Earth Water Air	Resource	Satelite monitoring. Measuring Gauge. Dam locks.	Dam wall. Untreated sewage.	Pipes. Sewage Infrastrucutre. Water storage. Water towers.
TOPOS	Terraform Erasure Translations Flux	Manipulate Soil and Ground	Sensoring Satelite. Field Research. Perfuration machinery.	Dredging. Trucks. Excavators. Explosions.	Extraction sites. Truck. Barges. Extraction vessels.
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Worldviews	Natural Values	Natural Abiotic	Natural Biotic	Natural Cultural	Local / Indigenous Values	Local / Indigenous Abiotic	Local / Indigenous Biotic	Local / Indigenous Cultural
Space	Existing water and flow direction		Species flows	Feeding, preying and procreation areas for aquatic species	Medium	Water level change de lineates space	Provides for ecosystem to thrive	Water is a familiar entity (Spiritual and kinship)
Shaped by time	Disposition of soil and rock surfaces		Types of vegetation	Habitat formation dynamics	Takes what is given	Occupation based on soil type and edge conditions	Cultivated species depend on soil/water height levels	Landscapes have cultural / heritage significance
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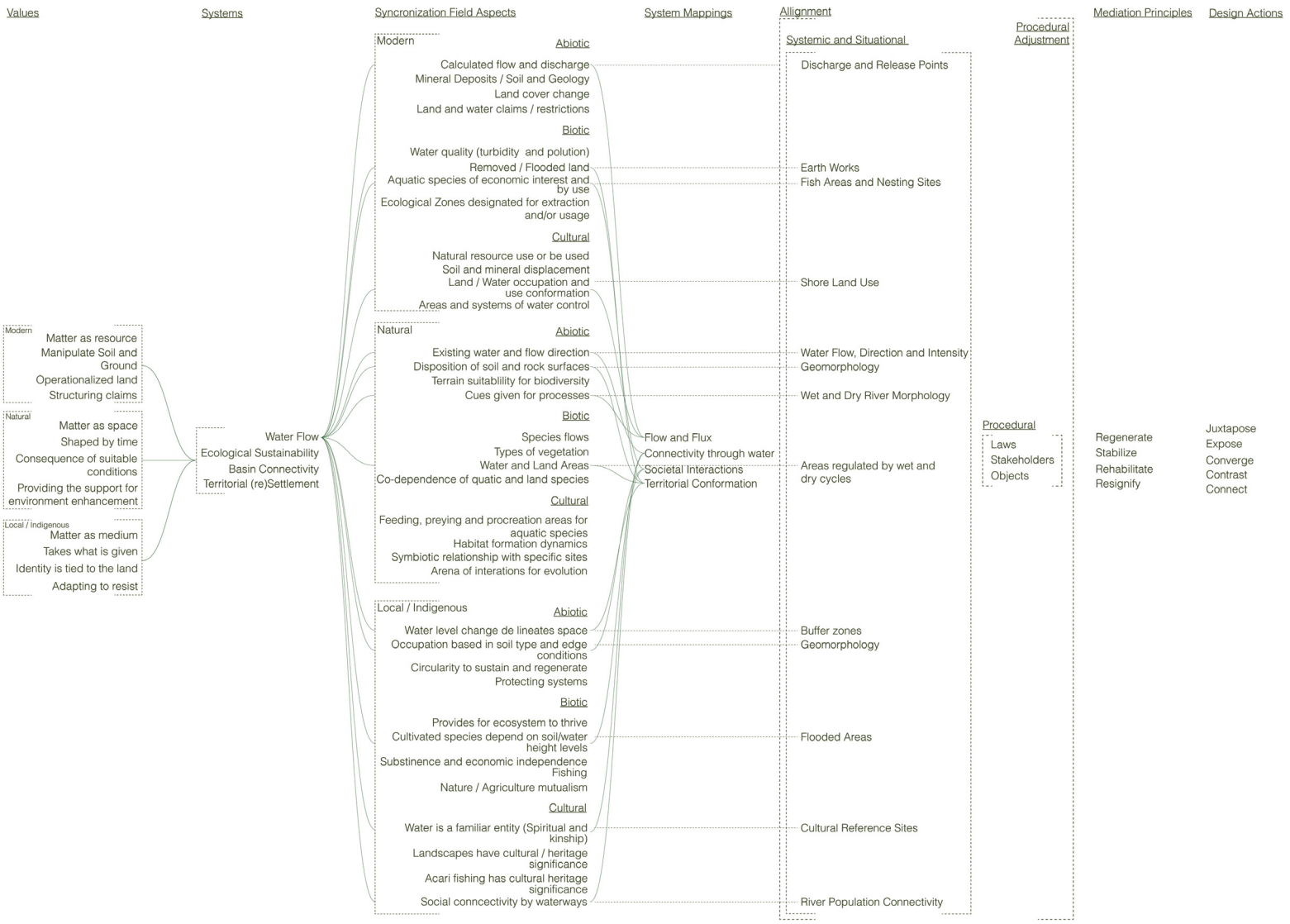
Providing the support for environment enhancement	Rain.		Aquatic species. Land species.	Aquatic species. Land species.	Adapting to resist		Nets. Baskets. Tanks. Snorkle. Planting.	Canoes. Motorized vessels. Trade. Dam vessel. Transfering.



Synchronization Framework: Water Flow Systemic Mappings

For the instance of System 1. Water Flow, System Mappings were required in order to comprehend how this system operated in space. These were: 1. Flow and Flux; 2. Connectivity through Water; 3. Societal Interactions and 4. Territorial Conformation. These System Mapping categories allow for a series of mappings (sourced from the consequent Synchronization Field items) which inform the current state of the Water Flow System. These will be the generated maps to describe the systems within the Water Flow System and compose the Systemic and Situational Aspects for Allignment with Procedural Aspects further on.

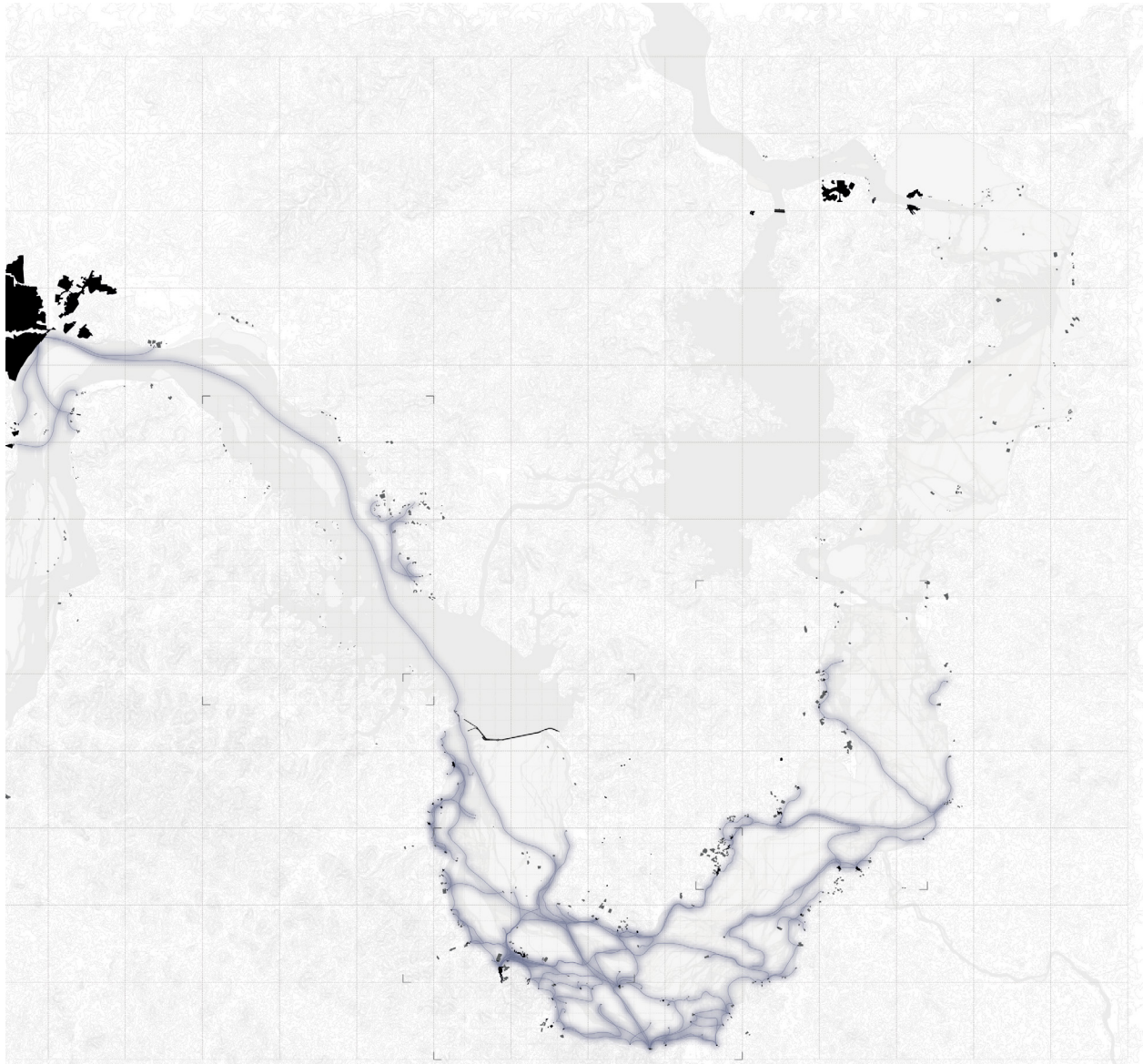
River Population Connectivity

Islands and shores are highly connected based on land use activity.

Settlements are connected to larger urban areas by water.

Pimental Dam provides a constraint to free flow.

The water flow areas in the middle of the Volta Grande do Xingu prove difficult for movement disconnecting the lower basin to the rest of the basin.



Shore Land Use

Most of the shore is still forested and well preserved.

Areas close to road networks or larger urban setlements have more deforested patches closer to riparina and shore vegetation.

Many small agriculture and agroforestry patches on river islands

Vegetation Cover
Human Settlements
Roça Agriculture
Cattle Ranching
Mining
Bare Soil
Water

S

Wet and Dry River Morphology

Low water flow is dispersed through out the extension of the natural pre-dam water flow paths.

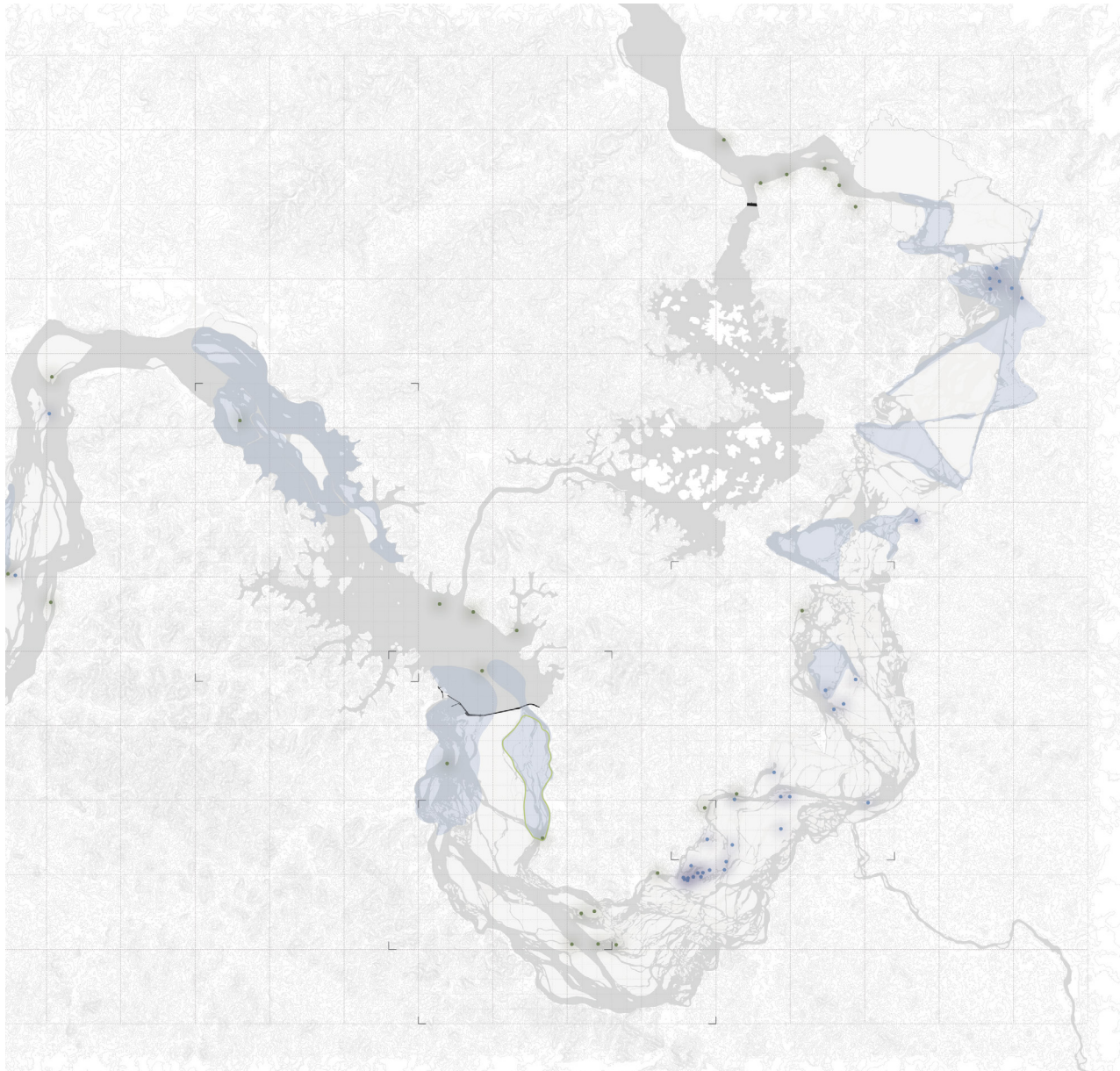
High Water Paths
Low Water Paths
Dam

S

Fish Areas and Nesting Sites

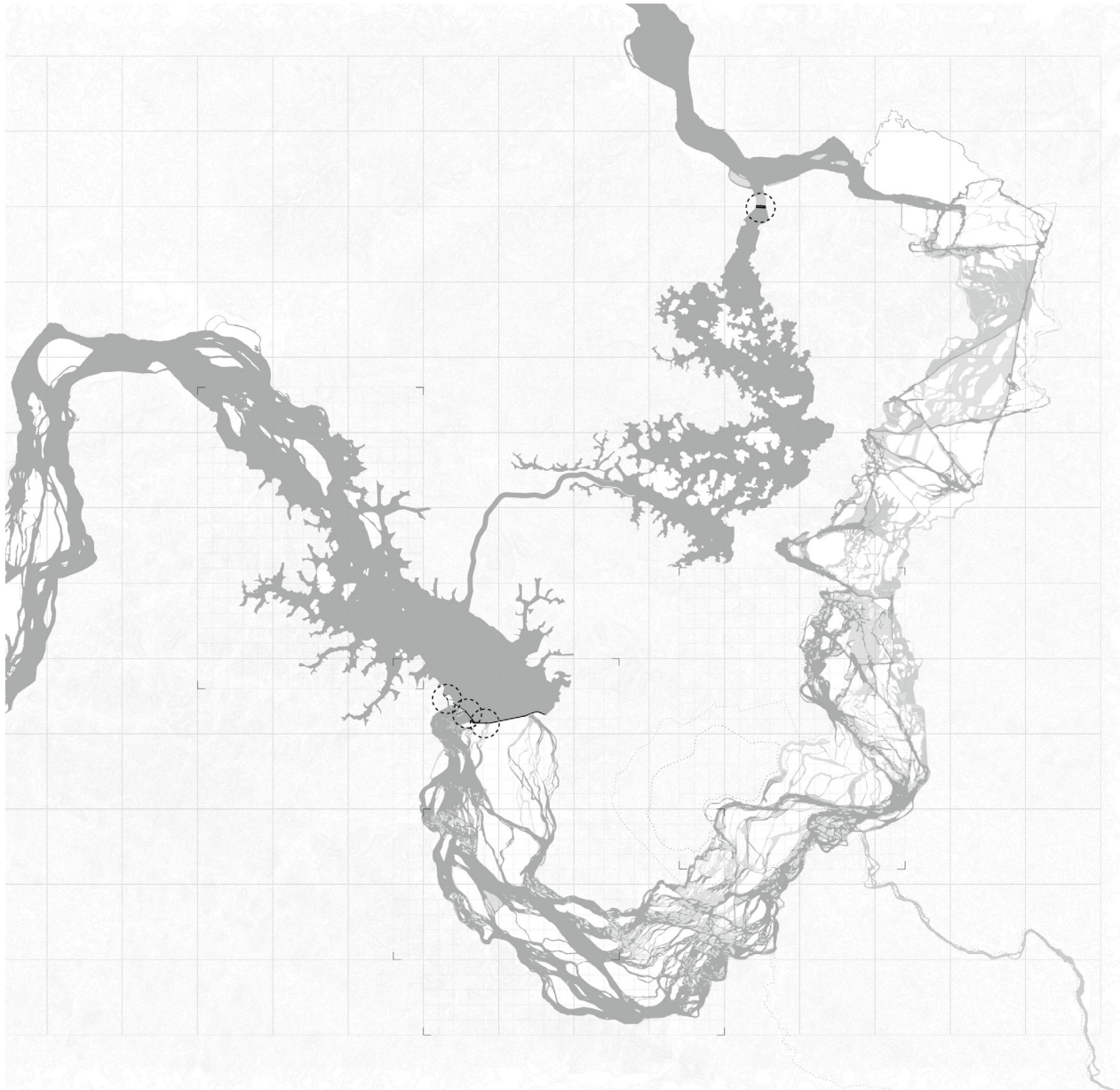
Fish Sites downstream to the dam have been greatly affected by the reduction of water flow.

Some nesting areas have been completely dried.



Discharge and Release Points

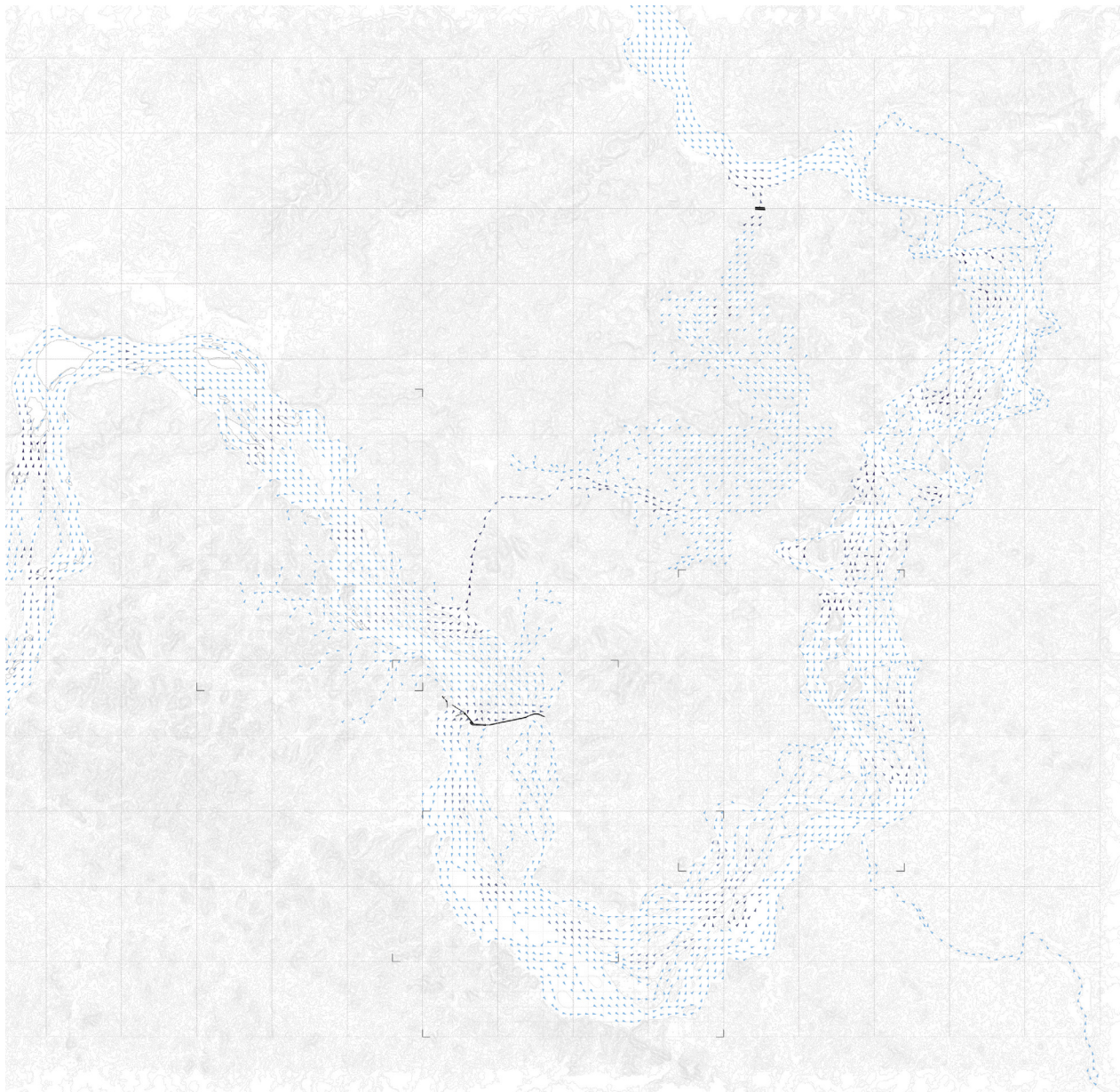
Most of the water is controled on one arm of the river.

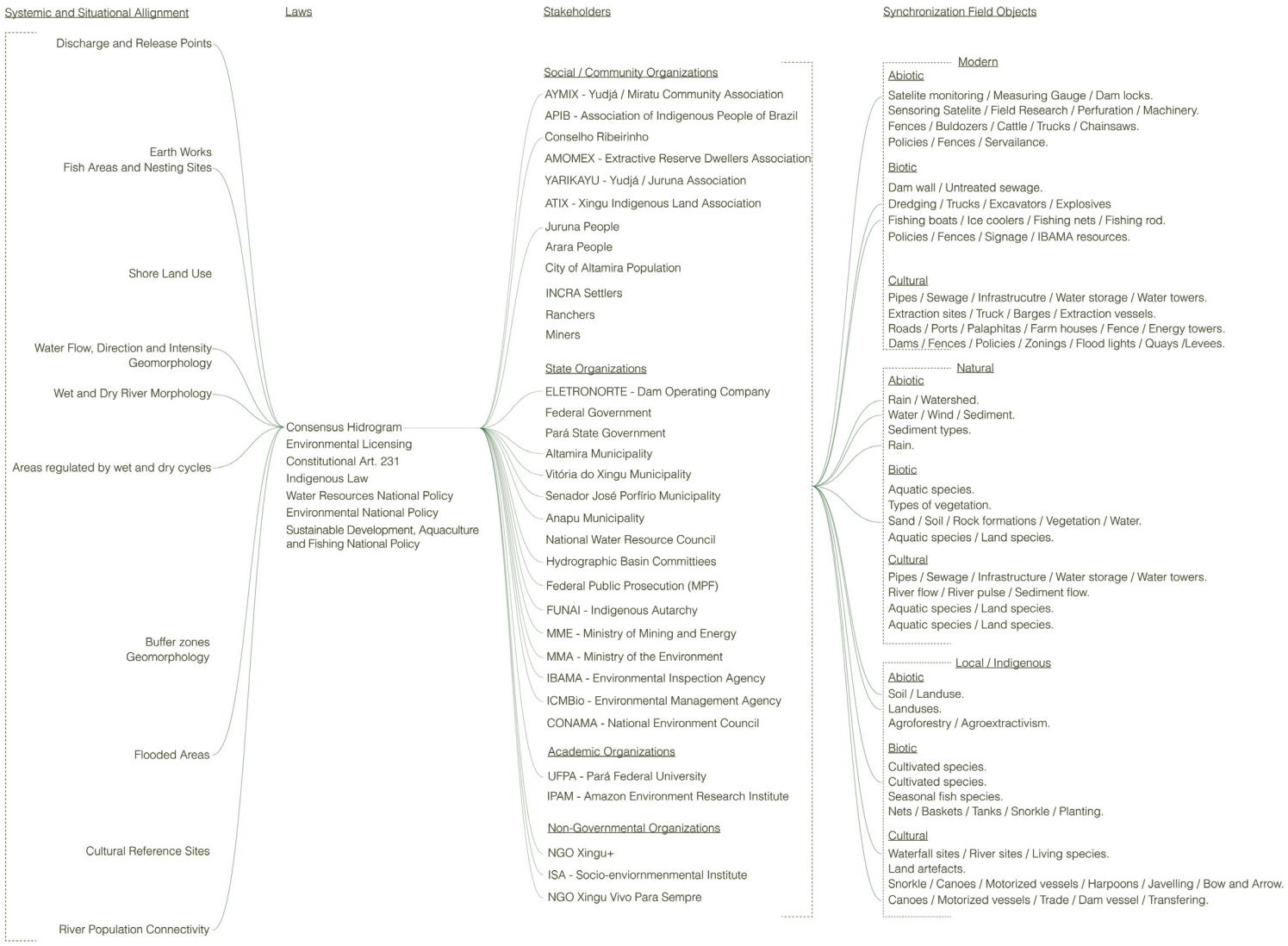


Water control points
Dam

S

Water FLow Direction and Intensity





Synchronization Framework: Procedural Alignment

From the Identified and Mapped Systemic and Situational Themes selected, the analysed Existing Rights and Laws which govern such systems are linked to identify which Stakeholders could be engaged and must be taken into consideration for Alignment of the Mediation Design Proposals. The Synchronization Field Objects related to the Selected Synchronization Field Aspects for the Water Flow System, complete the Procedural aspects by relating to the specific rights which govern them and the stakeholders which utilize them in some way. For the purpose of clarification of the diagram, only the Objects and Stakeholders directly involved with the Consensus Hydrograph have been demonstrated.

Descent

Members of the Munduruku indigenous tribe
walk on a sandbar on the Tapajos River as they prepare for
a protest against plans to construct a
series of hydroelectric dams on their river in Para State, Brazil.
Photo by Aaron Vincent Elkaim , 2014.

Manifesto
Allignment Strategy
Proposed Rights
Design Actions
Mediation Principles

Projection:
Manifesto

The truth of worlds

A New way through
The author, 2020.

I have been here long before you
I have witnessed more than you can remember
When you brought to me truths
I only saw lies

As you fool yourself believing it will be you to save us all,
all I see is that it is you who needs saving.
As you grasp ever tighter, attempting to keep to your truths,
the only to know is mine.

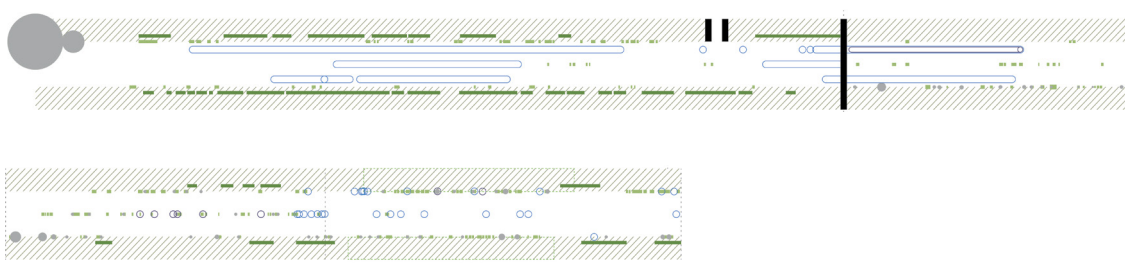
Ultimately,
I will continue here,
When all that is you ceases to exist,
because I have learned to be true to myself.

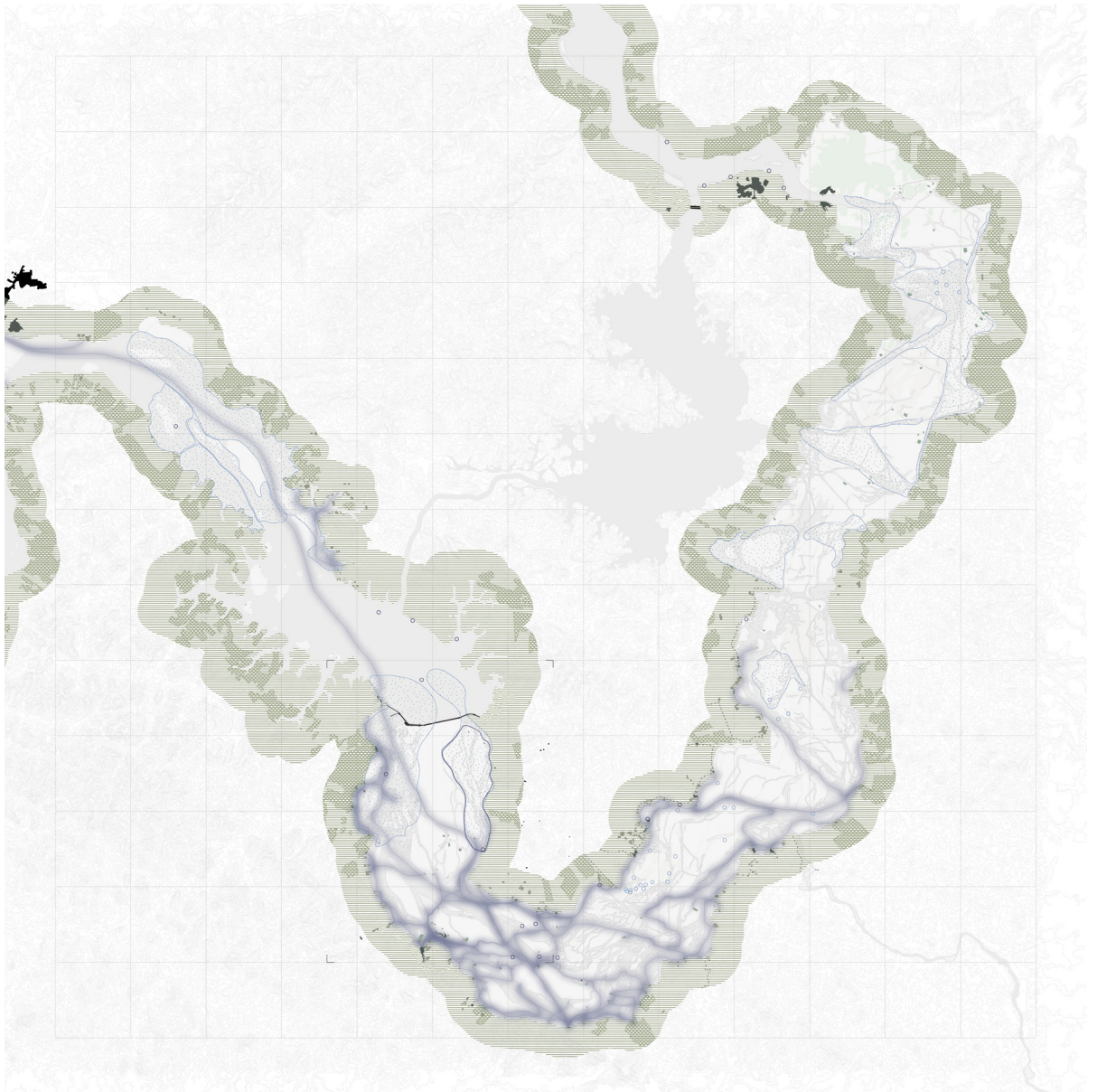
And as you continue to deny the only truth there is to know:

There is no me and you, but only us.

Allignment Strategy

Utilizing the Mapped Systemic and Situational Aspects for the Water Flow System, we understand that the Dam needs to allow water flow through it in certain openings in order to permit water to flow in now dryed up areas which are essential for fish ecology which in turn local populations rely on. The Diagramatic Shore Transect indicates the close urban relation between water spaces and islands and shore occupation, and the need to guaranteee this connectivity is also essential to sustain life and livability in this portion of the Xingu River. The necessary Stakeholders indentified within the Procedural Aspects will engage or be engaged accordingly to put into practive the proposed interventions and the subsequent miantenance of this model of medation.





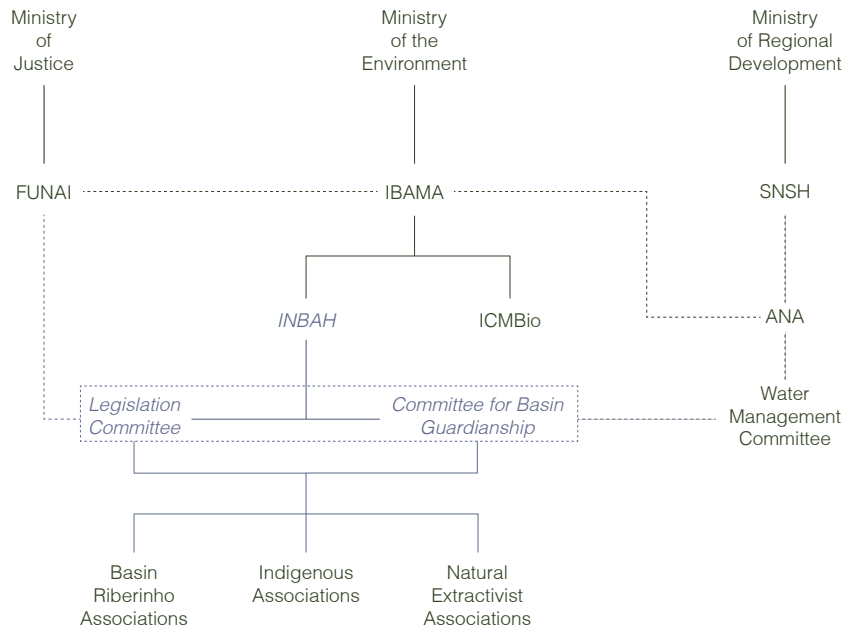
Proposed Rights and Institutional Arrangement for Rights to Rivers

Most institutional entities from governmental spheres overlap in their range from local to global and vertical accessibility for decision from local actors. It is apparent that there is a lack of articulation that functions horizontally and at a local scale. Although these community organizations exist, they have little or no jurisdiction and institutional underpinning.

The porposed governance arrangement seeks to solidify the role of Basin legislation and action giving institutional embodiement to the proposed Rights to Rivers Universal Delcaration.

The creation of a new autocrhy within the Minstry of the Environment dedicated to River Basins would strengthen the rights of those who rely on rivers. The creation of INBAH – Insitiuto de Bacias Hidrograficas. (Institute of River Basins) at the same level as ICMBio, Funai and ANA can position this agency to act on shared interests and spaces.

The Legislation Committee and Committe for Basin Guardianship would integrate the INBAH as legislation advisor and monitor committee and management committee. These would fundamentally brigde localized basin associations which already exist and, with memebers of intersectional committees of Funai, ICMbio and ANA (National Water Agency) guaranteeing that decisons can be taken through minstrys addressing all ecosystem issues. Decisions on these proposed comittees are binding and inform the proposition of a national Policy for Rights to Rivers which would solidify the importance of maintaining river basin ecologic and environmental integrity.



International Declaration of Rights to Rivers:

1.Declares that all rivers are entitled to the fundamental rights set forth in this Declaration, which arise from their very existence on our shared planet;

2.Further declares that all rivers are living entities that possess legal standing in a court of law;

3.Establishes that all rivers shall possess, at minimum, the following fundamental rights:
(1) THE RIGHT TO FLOW
(2) THE RIGHT PERFORM ESSENTIAL FUNCTIONS WITHIN ITS ECOSYSTEM
(3) THE RIGHT TO BE FREE FROM POLLUTION,
(4) THE RIGHT TO FEED AND BE FED BY SUSTAINABLE AQUIFERS,
(5) THE RIGHT TO NATIVE BIODIVERSITY,
(6) THE RIGHT TO REGENERATION AND RESTORATION, AND
(7) THE RIGHT TO MAINTAIN LATERAL AND LONGITUDAL CONNECTIVITY;

4. Further establishes that these rights are intended not only to ensure the health of rivers, but also the health of watersheds and river basins of which rivers are a part, as well as the health of all ecosystems and natural beings therein, all of which possess, at minimum, the fundamental rights to exist, thrive, and evolve;

5.Maintains that in order to ensure full implementation and enforcement of these rights, each river shall be entitled to the independent appointment of one or more legal guardians that acts solely on behalf of the river's rights and who may represent the river in any legal proceeding or before any governmental body empowered to affect it, with at least one legal guardian being an Indigenous representative for those rivers upon which Indigenous communities traditionally depend;

6.Determines that rivers shall have their best interests, as determined by their legal guardians, assessed and taken into account by both government and private entities in all actions or decisions that concern such rivers;

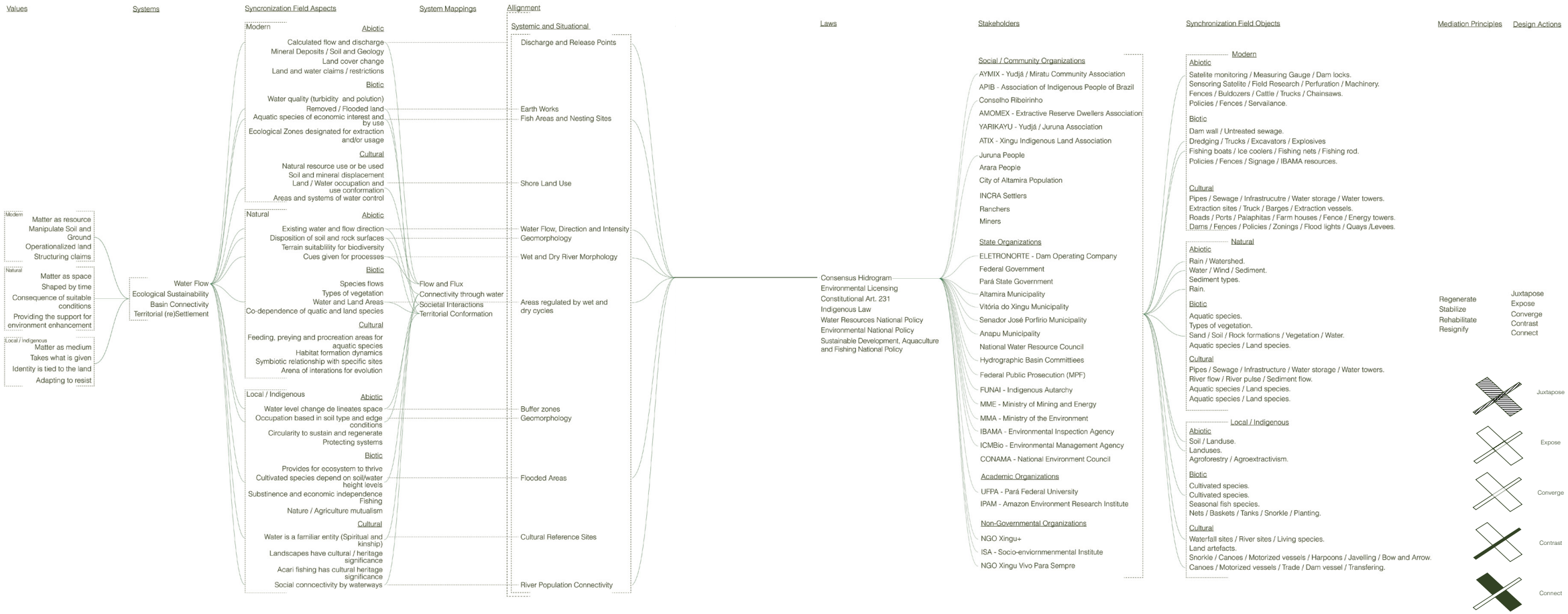
7.Resolves that all states shall implement these rights in full within a reasonable amount of time, including by developing and acting upon an integrated assessment of watershed health according to the most recent scientific understandings and in partnership with all stakeholders,

8.Strongly urges all governments to ensure prompt and adequate financial mechanisms to realize these fundamental river rights, including the right of all rivers to restoration,

9. Asserts that governments shall consider for decommission all dams that lack a compelling social and ecological purpose, and that new dam construction shall only occur when necessary to achieve a compelling social and ecological purpose that cannot be met by other reasonable means, with the full free, prior, and informed consent of impacted communities and Indigenous peoples. Where deemed necessary, dams and other water infrastructure shall utilize the best available technologies by which to preserve ecosystem health. In the longer term, society shall find dam alternatives that allow for free-flowing watershed corridors and incrementally progress towards a dam-free world in a manner that is respectful of the rights of those human and nonhuman communities that have adapted to the status quo.

Design Actions and Mediation Principles

The Approach to Design Diagram
The author, 2020.



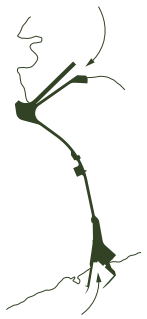
Landing

Resting by the river.
Photo by Aaron Vincent Elkaim , 2015.

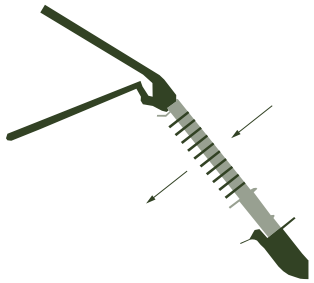
Territorial Directives
Strategic Interfaces
Site 1:
Dam Interface:
Natural Water Flow &
Ecosystem Renaturalization
Site 2:
Pathway Interface:
Crossing the Xingu waters

Territorial Directives and Strategic Interfaces

Xingu River Control Infrastrucutres.
The author, 2020.



River transposition system controls vessel flow



Dam sluice gates control water flow

Constructed fishway controls fauna movement

Design Intentions for mediation

Rehabilitating water flow to provide nesting areas and rehabilitate natural ecology.

Enhancement of local connectivity.

Directing water flow will allow for traditional sites to flourish

Given the close relationship to the river and species and ecology knowledge, indigenous populations are valuable stakeholders to manage and monitor water quality and ecosystems.

Strategic Site Interventions

1. Re-settlement arrangement

2. Re-naturalization landscape

a. Returning the natural seasonal river pulse with a graded dam opening design which allows for variability in water flow downstream.

b. A series of dikes downstream which channel the water flow from the dam opening, in order to guarantee a constant flowing body of water to sustain local ecologies.

3. Re-connection pathways

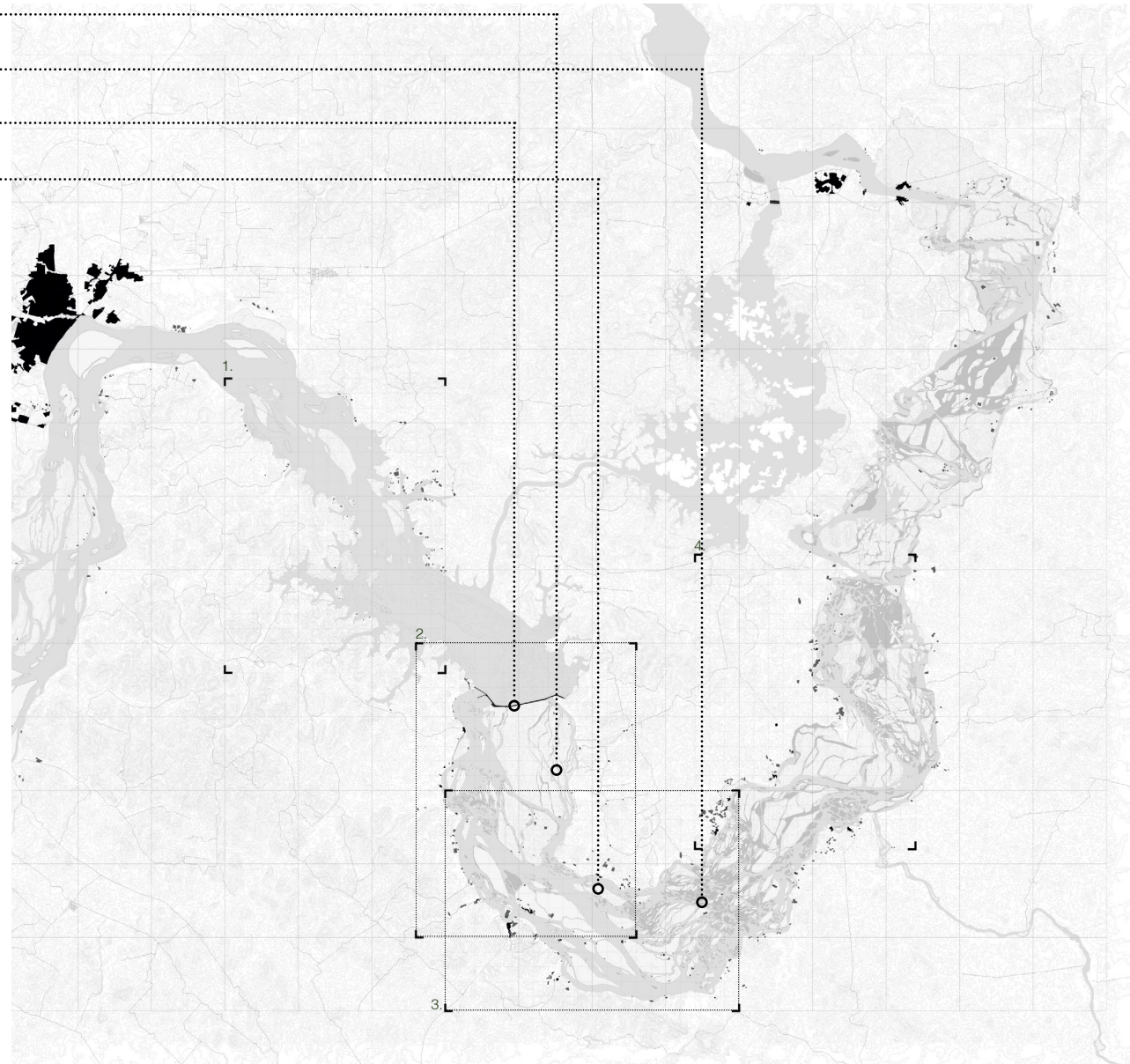
c. Given the redistributed water allowed downstream by the dam, part of the existing shoreline will recede and with this communities will become disconnected from the water and its basin connections. For this reason, pathways are designed to reconnect these shore communities with the water and other sites of importance along the landscape.

4. Re-engagement with cultural sites

River

Human Settlements

S



Dam Interface: Natural Water Flow & Ecosystem Renaturalization

A naturalized fishway

Mediation Principles

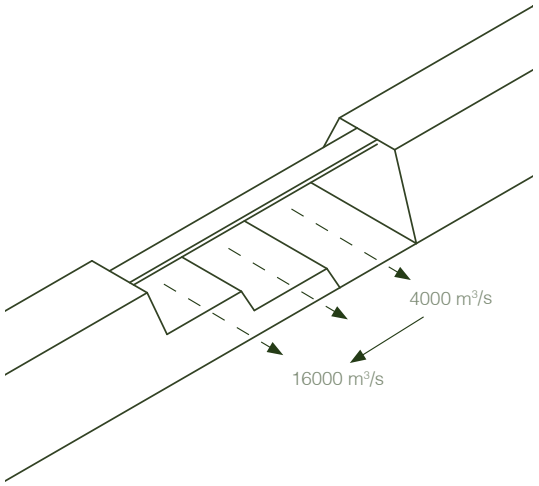
Regenerate
Stabilize
Rehabilitate
Resignify

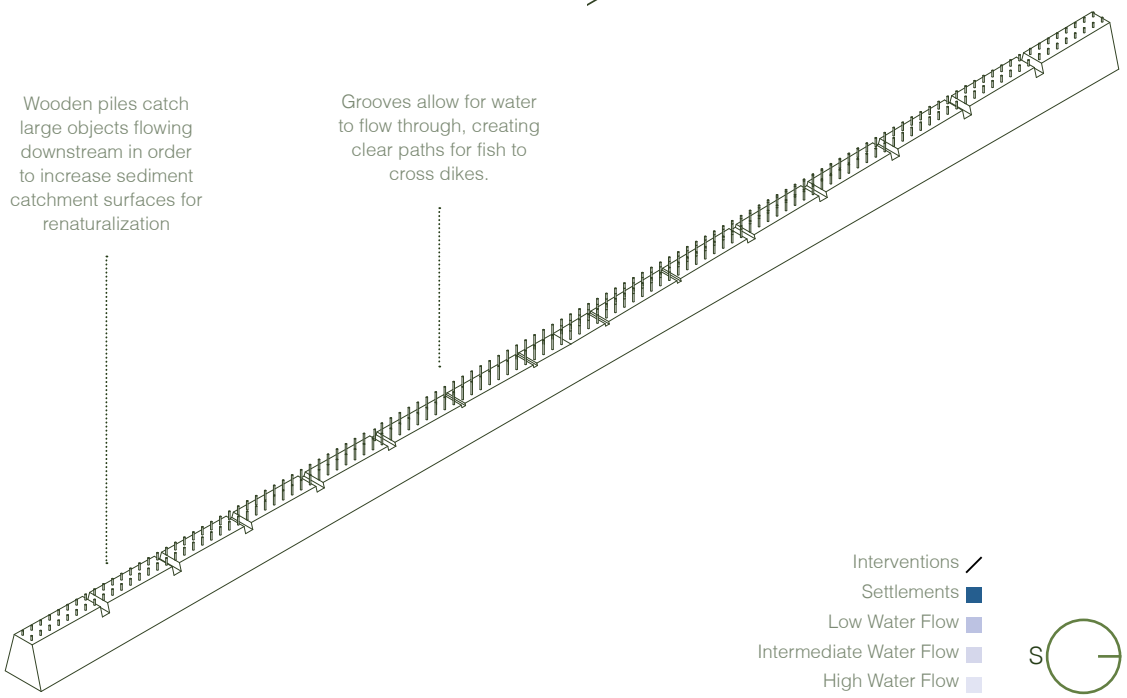
Design Actions

Juxtapose
Expose
Converge
Contrast
Connect

The re-naturalization of this branch of the river will allow for fish to return to their natural nesting and feeding cycles in the area, reconnecting species throughout the river basin. Allowing for the natural river pulse to occur and natural river movements to flood forested land areas will facilitate the entry of fish species which are dependent on falling fruit to sustain their diets and so guarantee their cycles of nesting.

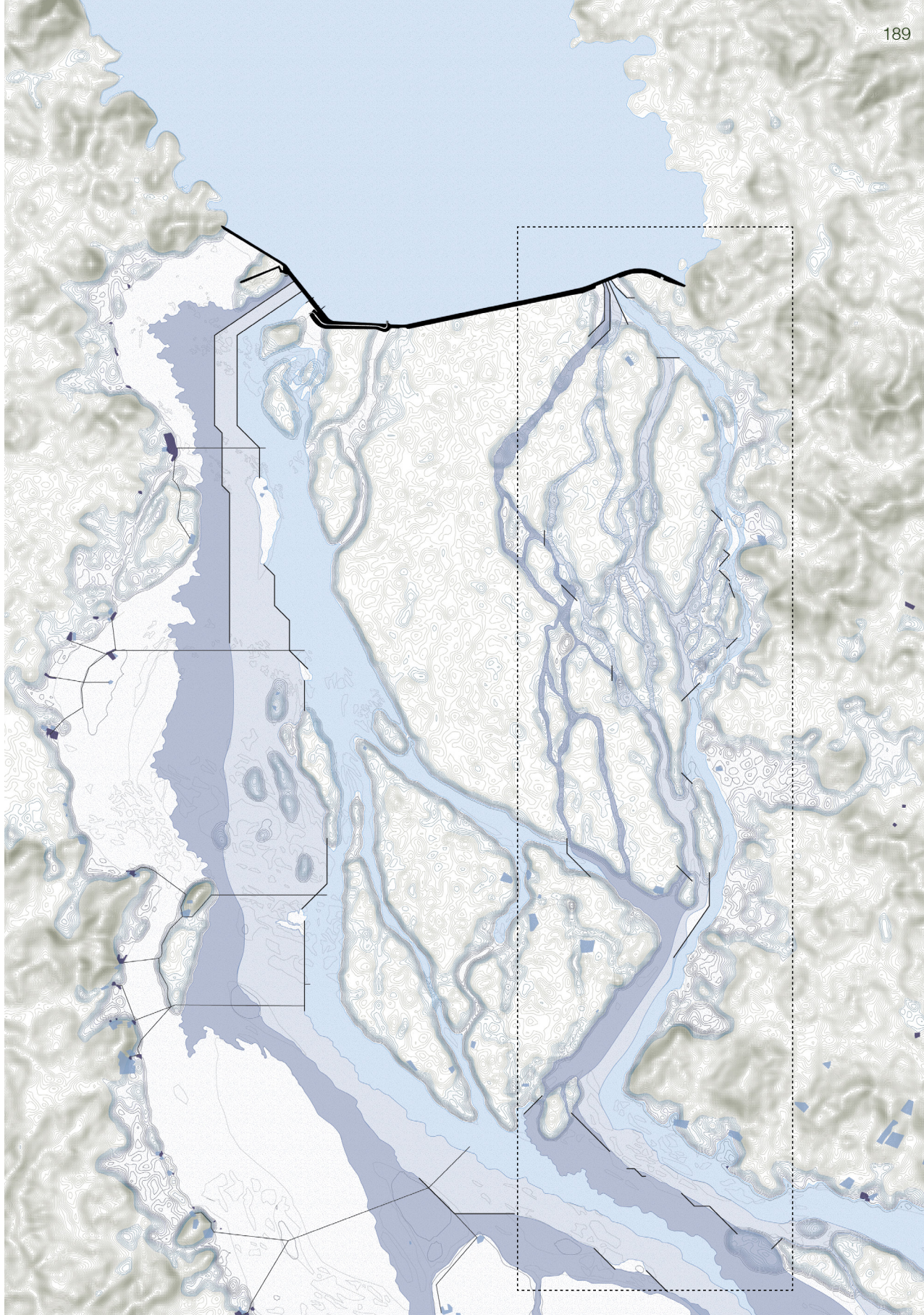
This is possible with a constant open flow of water through the dam, with a design that considers the reservoir's need for water storage as well as the river pulse water level changes which guarantee the cues for fish given by the river's movement.





Interventions
Settlements
Low Water Flow
Intermediate Water Flow
High Water Flow

S



Dam Interface:
An opening for natural water flow

The opening on Pimental Dam is designed to permit water flow levels in accordance to the permitted hydrograph projections from IBAMA and ELETRONORTE, whilst maintaining the natural pulse dynamic of the river. In this way, the necessary water volume necessary for the dams hydroelectric generation is sustained while ecologies may continue to thrive in the basin according to their natural evolutionary life cycles which depend on the right water level cues determined by the river.

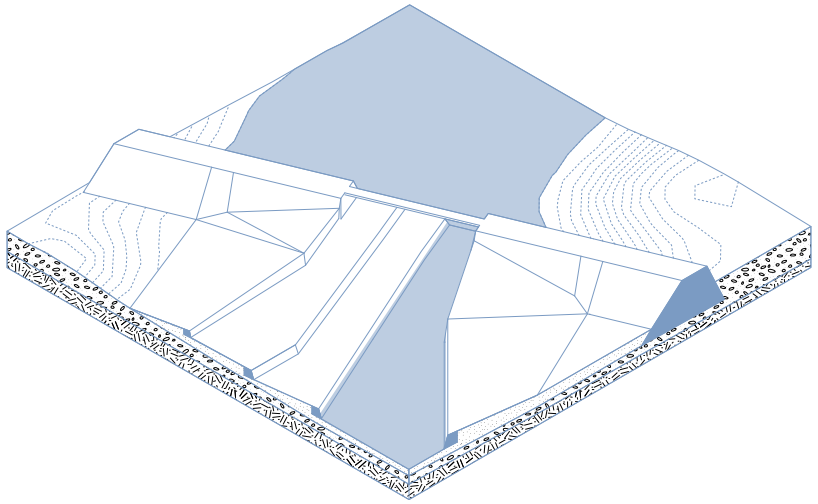
The dam requires reinforcement along the opening to ensure structural integrity of the complete structure as well as channels with a height variation and steady and smooth decline for minimal acceleration of the water downstream, allowing for vessel and fauna movement upstream through it.

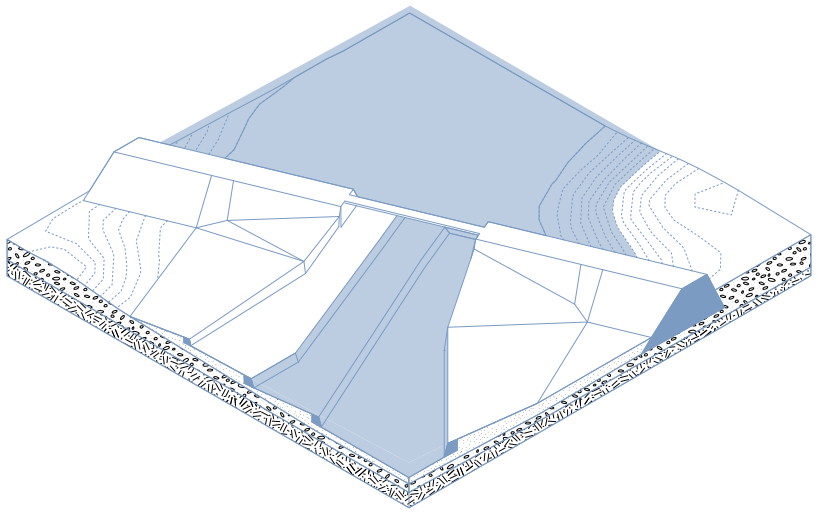
Governance for Coexistence

The Dam and its opening are still maintained by ELETRONORTE while no closures of the opening are permitted.

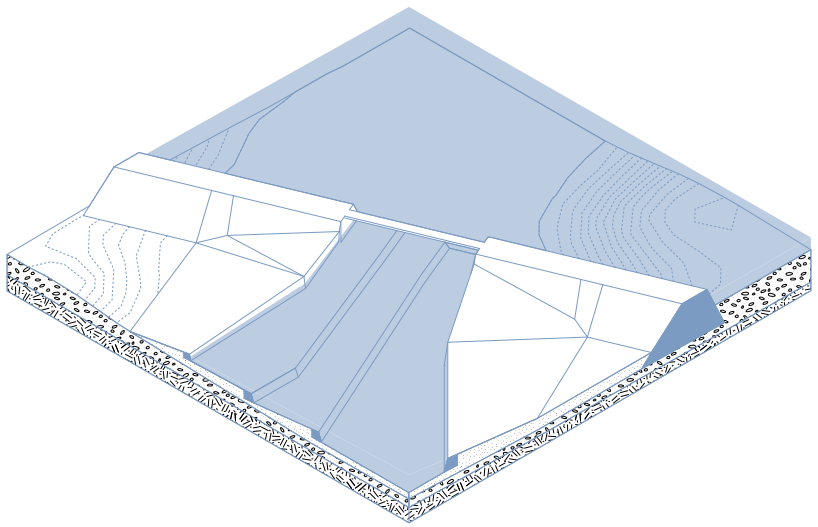
Water levels and flow variations are monitored by the Basin Committee local members to ensure ecological sustainability.

Dry Season
Low water flow



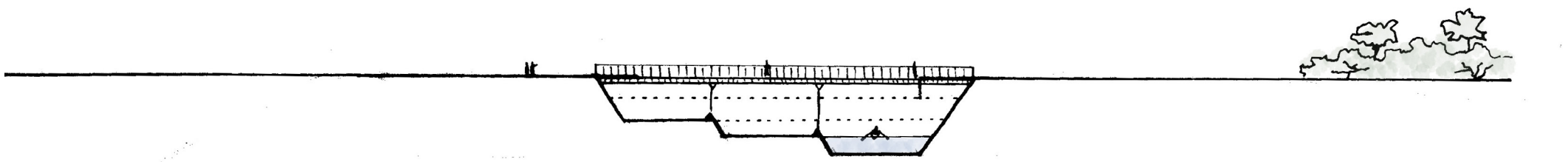


Wet Season
High water flow

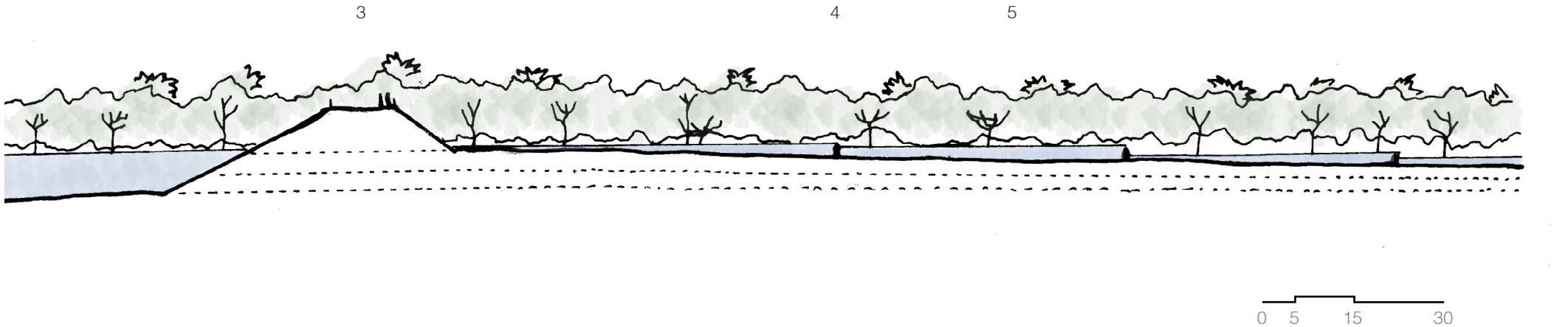


Dam Interface:
An opening for natural water flow

Longitudinal Dam Section



Transverse Dam Section



1. Footbridge
2. Dike step canals
3. Dike
4. retention walls
5. Pool plateaus

Dam Interface: Renaturalizing river dikes

Dikes are strategically placed downstream directing and concentrating the flowing water in order to sustain river ecologies and sufficient water to flood the forest when fruit and other nutrients are consumed by nesting fish and quelonio turtles.

By guaranteeing filled canals year round, connectivity of indigenous and ribeirinho populations in the Volta Grande do Xingu region assured with the entirety of the basin. This also allows for free flow of people and vessels along the basin without the need to depend on ELETRONORTE's vessel transposition system.

The dikes are designed with wooden piles along them which act as a net, retaining large rocks, branches and other debris that flow with the water. With time, this holds enough sedimentation to form river sand banks which are common along the Xingu River, and eventually vegetation will form over these sand banks, re-naturalizng the landscape.

Small grooves along the dikes help maintain streams for fish to swim through, even when these have re-naturalized.

<u>Governance for Coexistance</u>

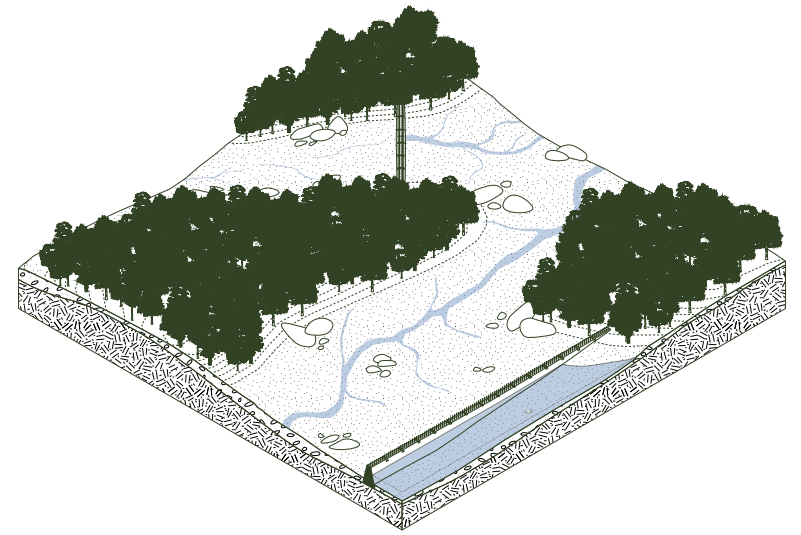
Dikes are implemented by ELETRONORTE for their Mediation Compliance accord with IBAMA in order to mitigate the dams impact

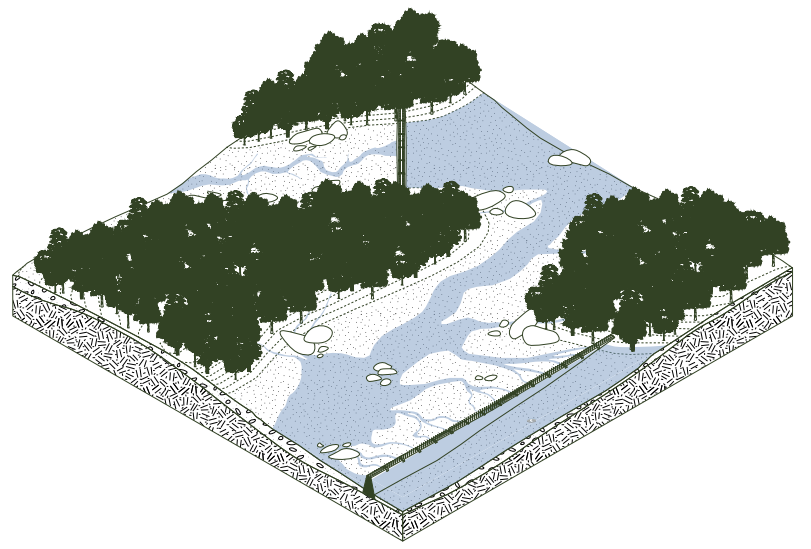
.

Co-managed by Basin Committee, Local Community Associations and ELETRONORTE

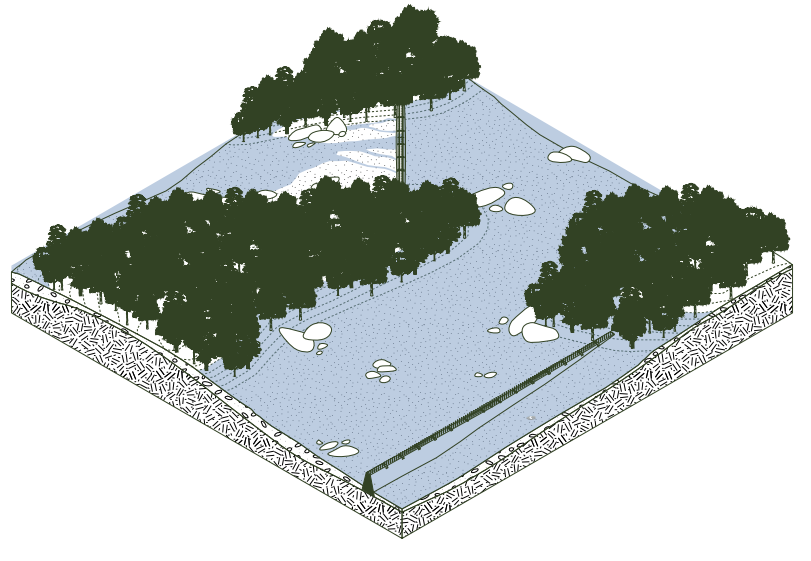
Flooding areas are monitored by Basin Committee local members to ensure that ecology is sustained.

Dry Season
Low water flow



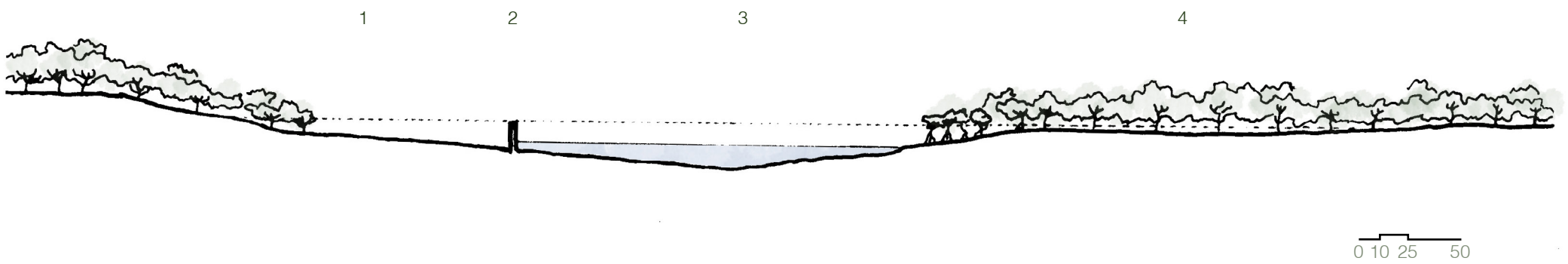


Wet Season
High water flow

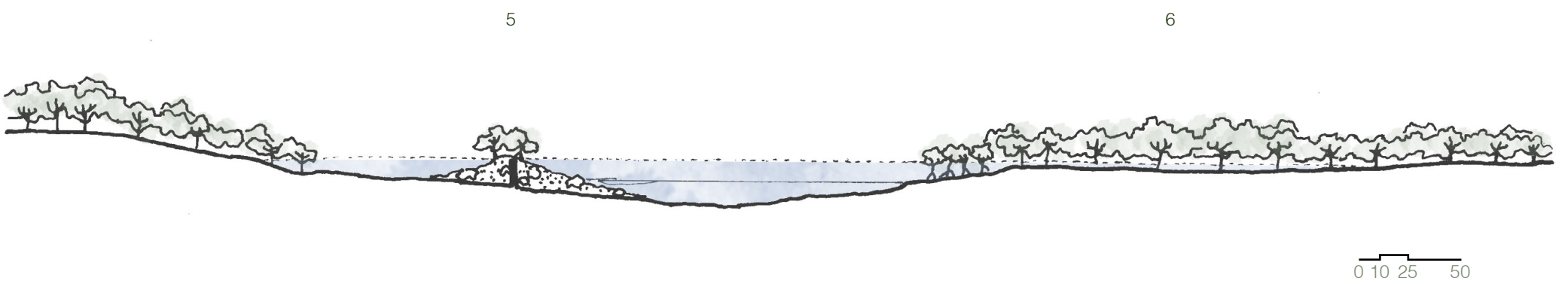


Dam Interface: Renaturalizing river dikes

Downstream River Section



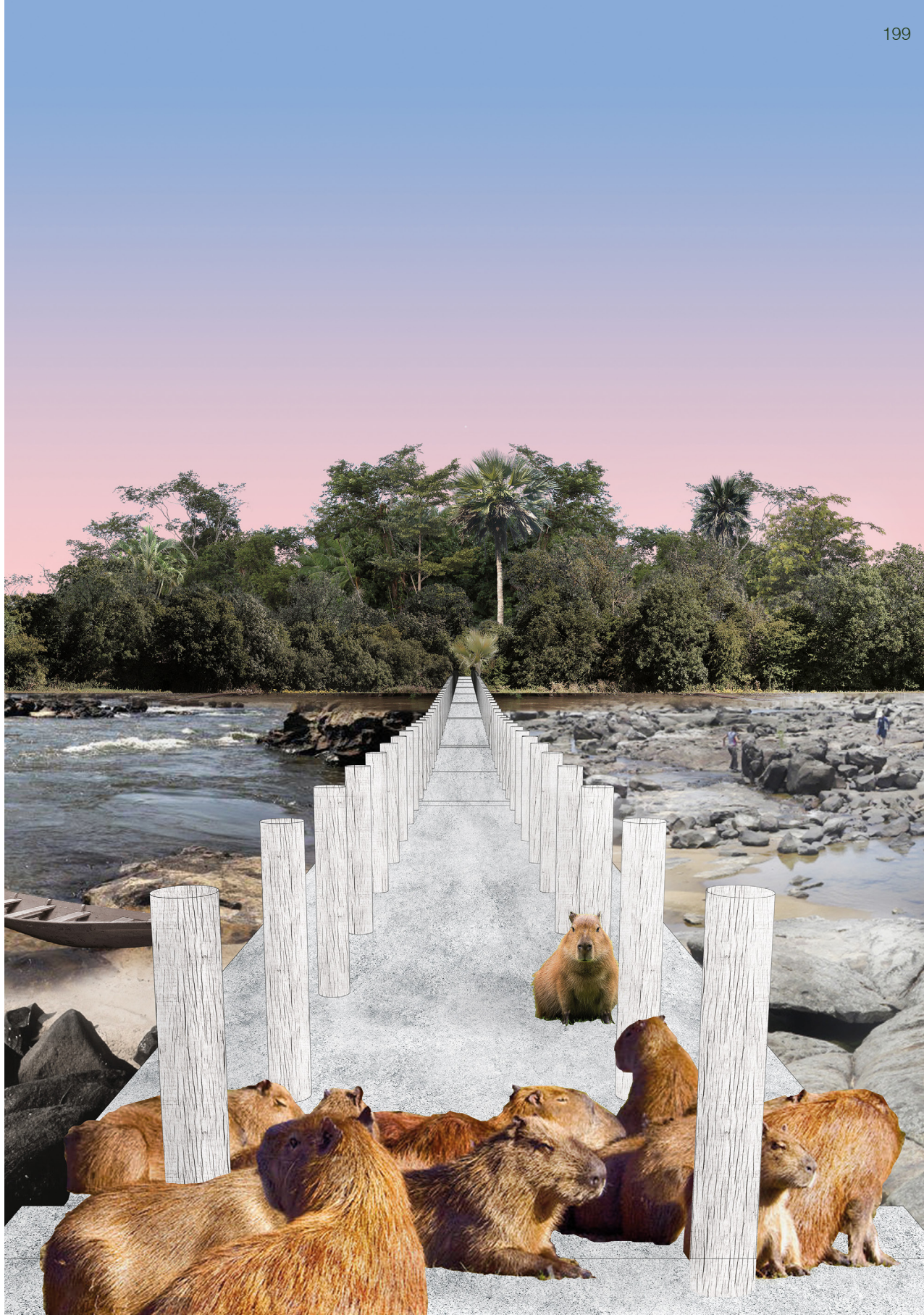
Downstream River Section



1. Intermediate River water level
2. 2m Dike
3. Dry River water level
4. Igarapé Creek
5. Sediment Trap 2m Dike
6. Flooded Forest for Fish to catch falling fruit

Dam Interface:
Dikes in the dry season

"My water flows strong and meandering, finding a path down through the rocky landscape. *Capybaras* lie comfortably on my banks, drying their pelt in the sun, gathering strength to cross through me into the forest searching for fruit."

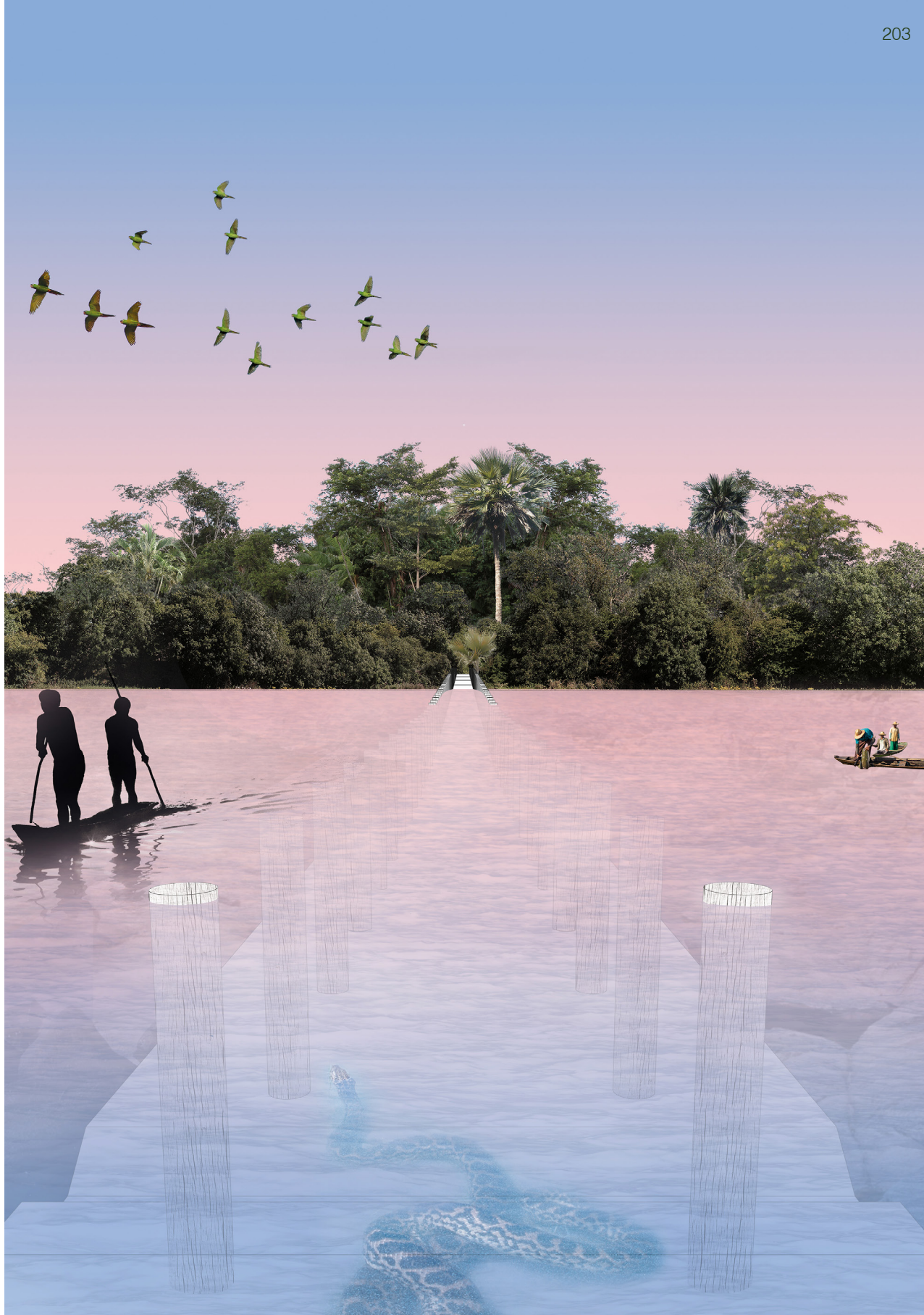


Dam Interface:
Dikes in the flood

"My water rises, bringing with them fish from upstream to settle around the island shores in search of creeks and *iguapós* to feed and nest. Thick skinned alligators wait by resting for the next hunt."

Dam Interface:
Dikes in the wet season

“My waters are unstoppable. I decide when and how my water will be used. Those who use it, the fish and the men, are grateful to me for it. they are shaped by it and their existence only makes sense through mine.”



Dam Interface:
Dikes catching sediment

"As I move through the forest, sediment and debris is sometimes slowly worn away, sometimes torn off. No matter, it all finds a new place. A new meaning. It is through me that the cycles are maintained."

Dam Interface:
Dike vegetation

"As I bring sediment through years and years of water brushing past the forest, new islands and even river peninsulas are formed. I am ever changing and ever dancing with the life around me. In this sway, all you can do is join me."

Dam Interface:
The landscape is restored

“Me and the forest, we are one. We have been dancing under this sky for eternity. We will be here long after you are gone. Wouldn’t you instead care to join us?”

Pathway Interface: Crossing the Xingu waters

Mediation Principles

Regenerate
Stabilize
Rehabilitate
Resignify

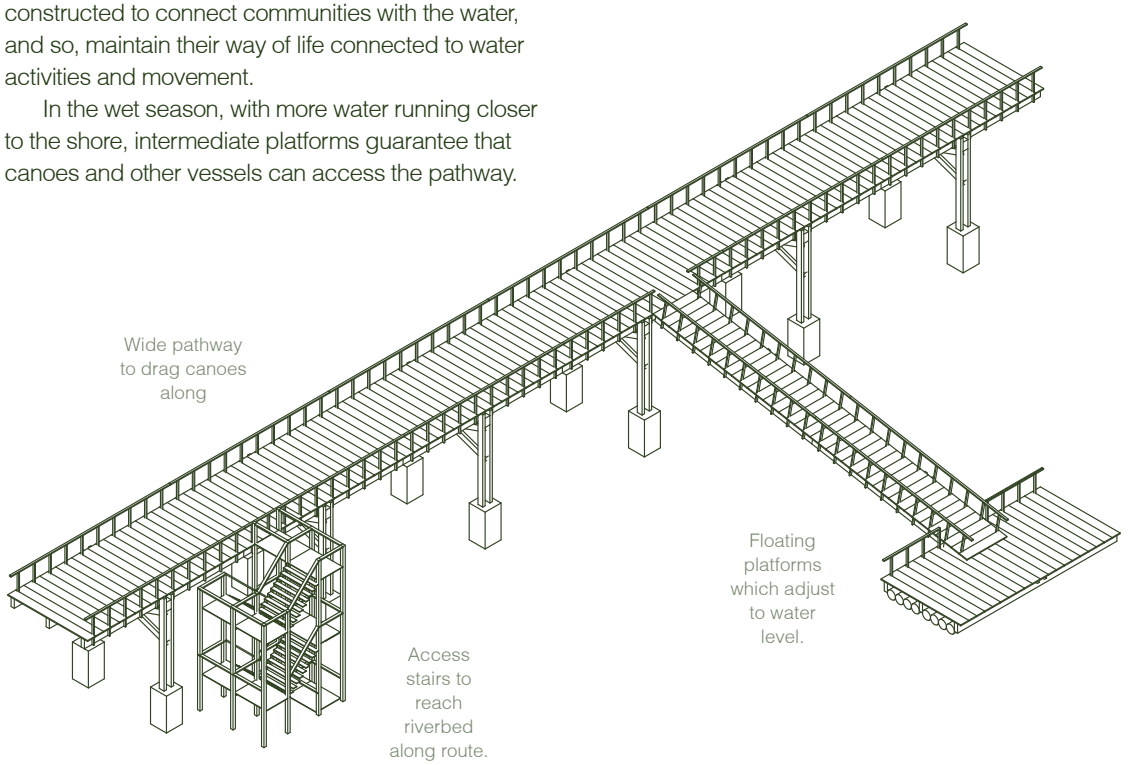
Design Actions

Juxtapose
Expose
Converge
Contrast
Connect

Given the re-direction of water, some parts of the river will become permanently dry. With a very rocky and rugged river bed, there would be immense difficulty to walk through the land to reach plantations and communities spread over river islands and the shoreline.

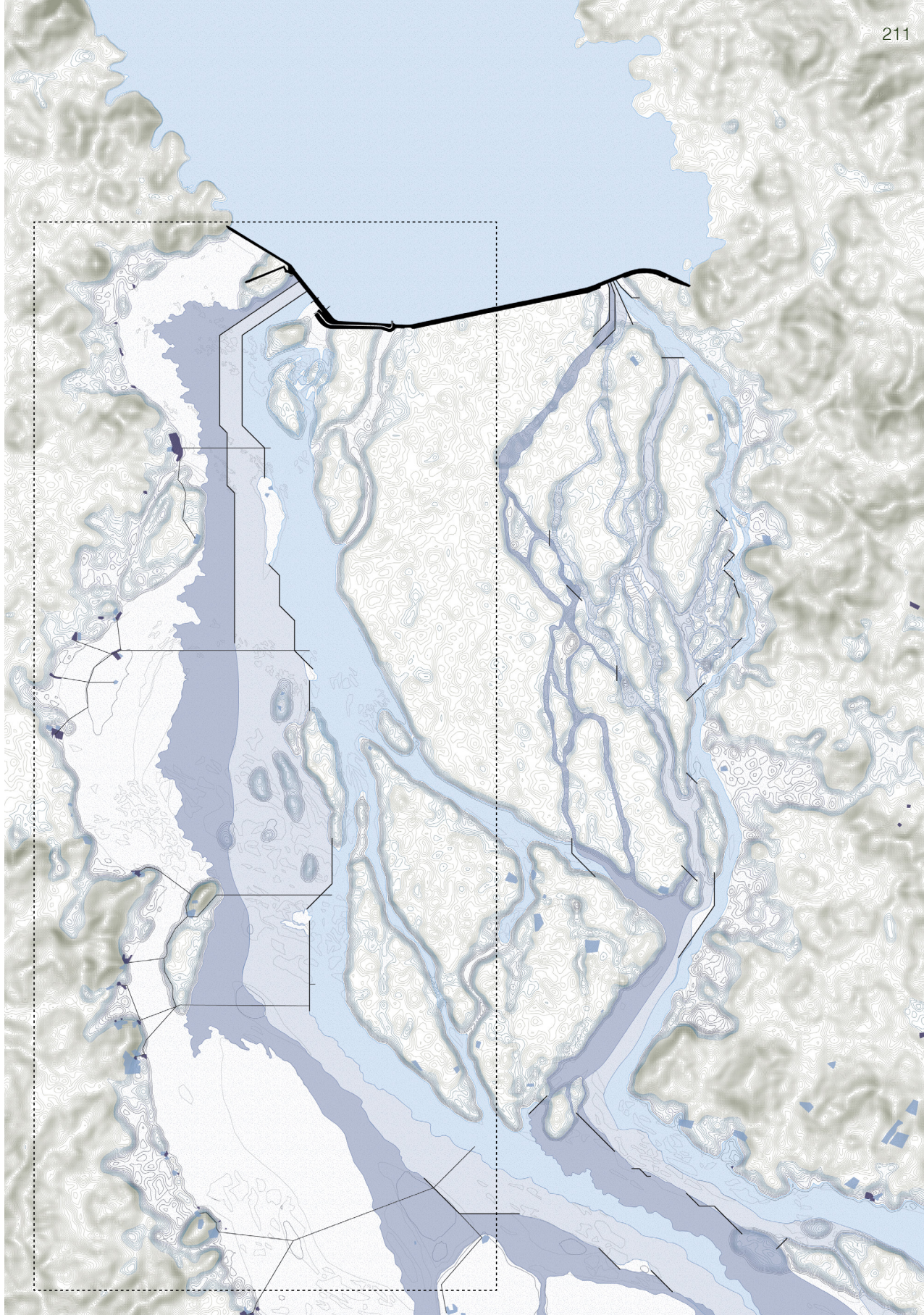
For this reason supporting pathways would be constructed to connect communities with the water, and so, maintain their way of life connected to water activities and movement.

In the wet season, with more water running closer to the shore, intermediate platforms guarantee that canoes and other vessels can access the pathway.



Interventions
Settlements
Low Water Flow
Intermediate Water Flow
High Water Flow

S



Pathway Interface:
Variable water level.

Given the re-direction of water, some parts of the river will be permenently dry. With a very rocky and rugged river bed, there would be impense difficulty to walk through the land.

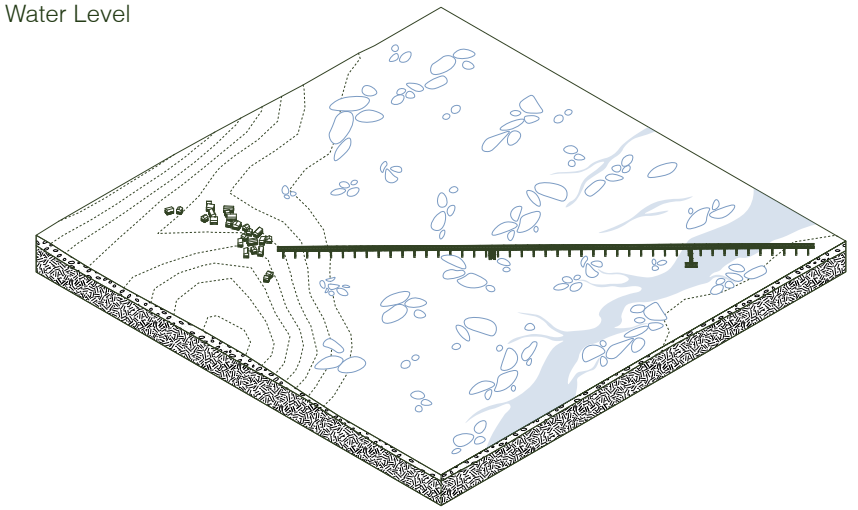
For this reason supporting pathways would be constrcuted to connect communities with the water, and so, maintain their way of life connected to water activities and movement.

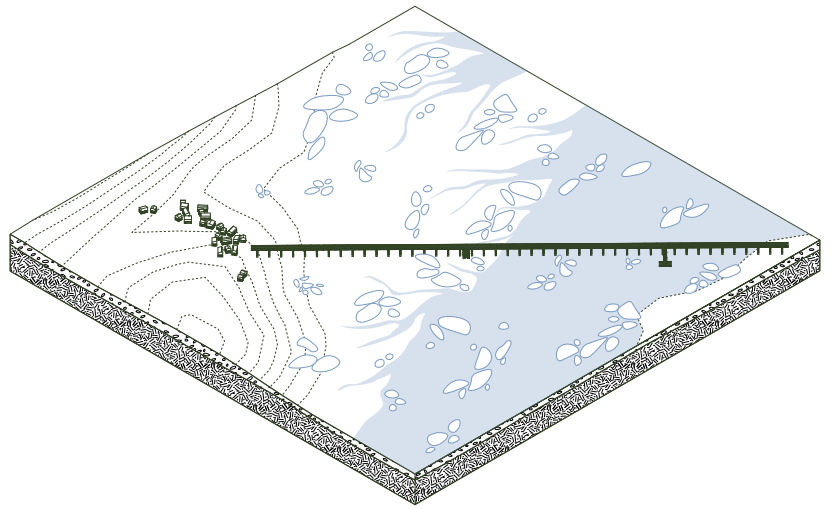
Governance for Coexistence

Pathways are implemented by ELETRONORTE for their Mediation Compliance.

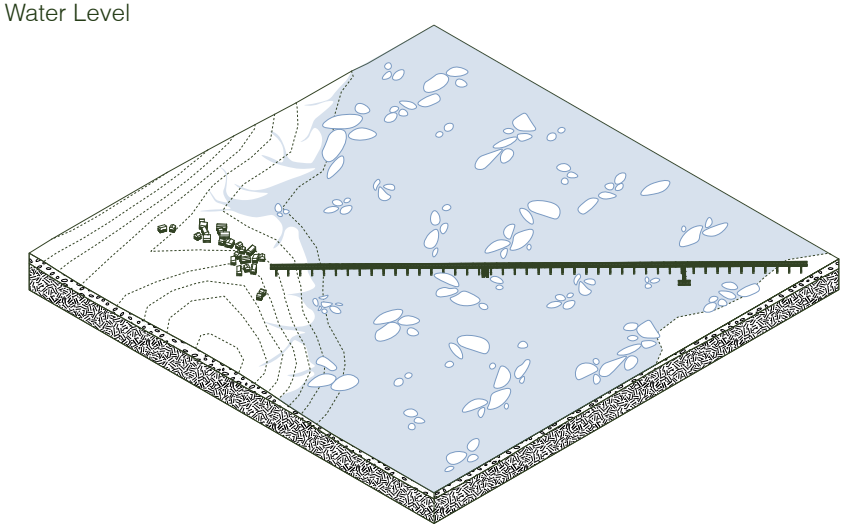
Co-managed by Basin Committee, Local Community Associations and ELETRONORTE

Low Water Level



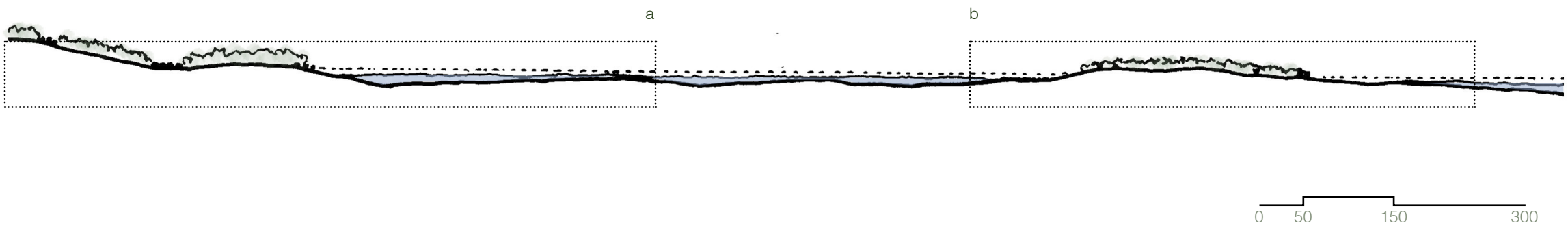


High Water Level

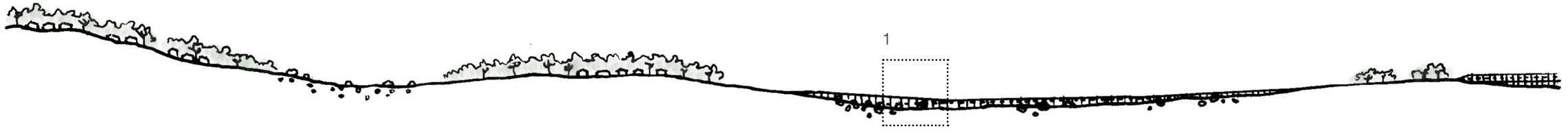


Pathway Interface:
Variable interfaces

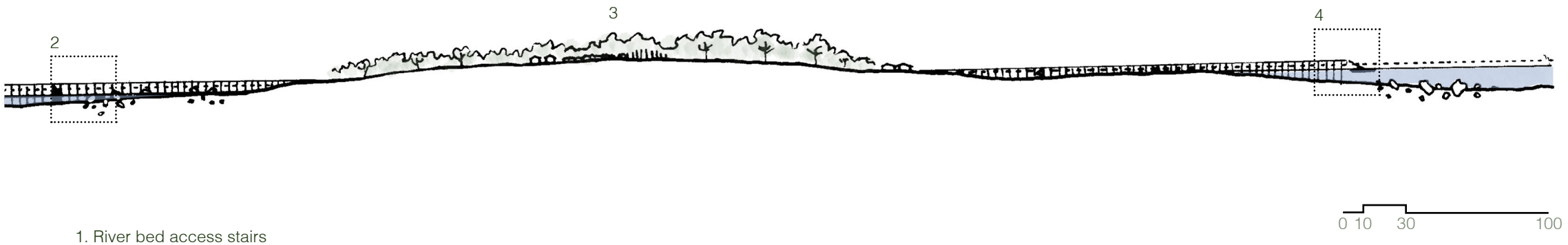
Downstream River Section



a. permenent dry river shore



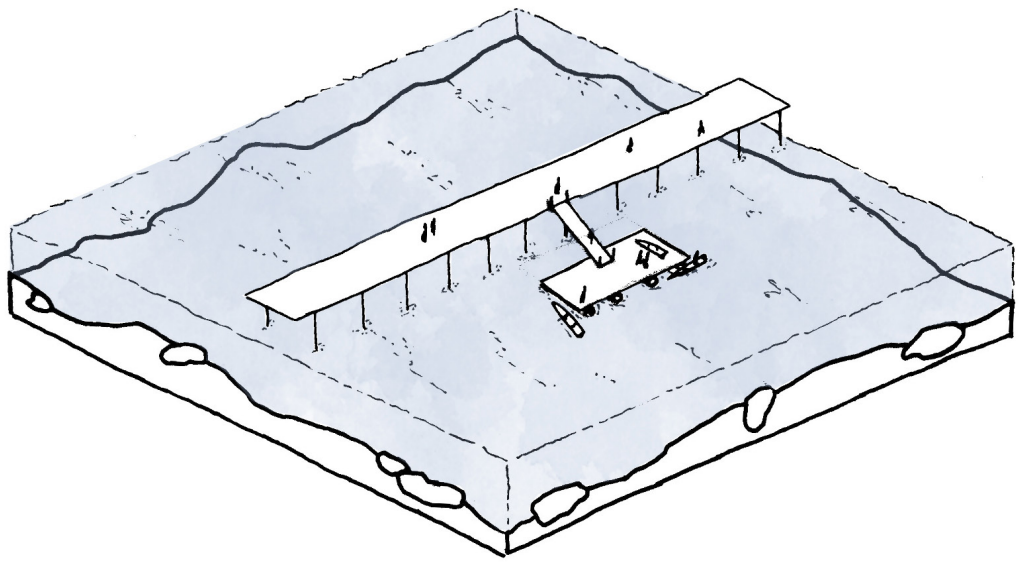
b. Island connection and river approach



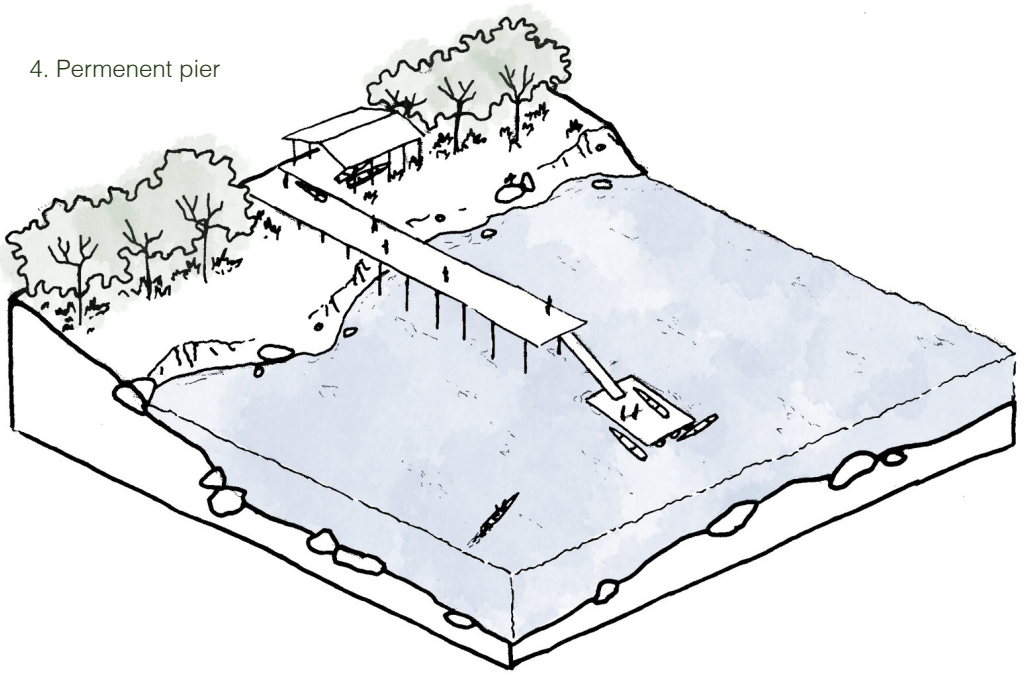
1. River bed access stairs
2. Intermediate Pier
3. Permaculture and Roça
4. Permenent Pier

Pathway Interface:
Variable interfaces

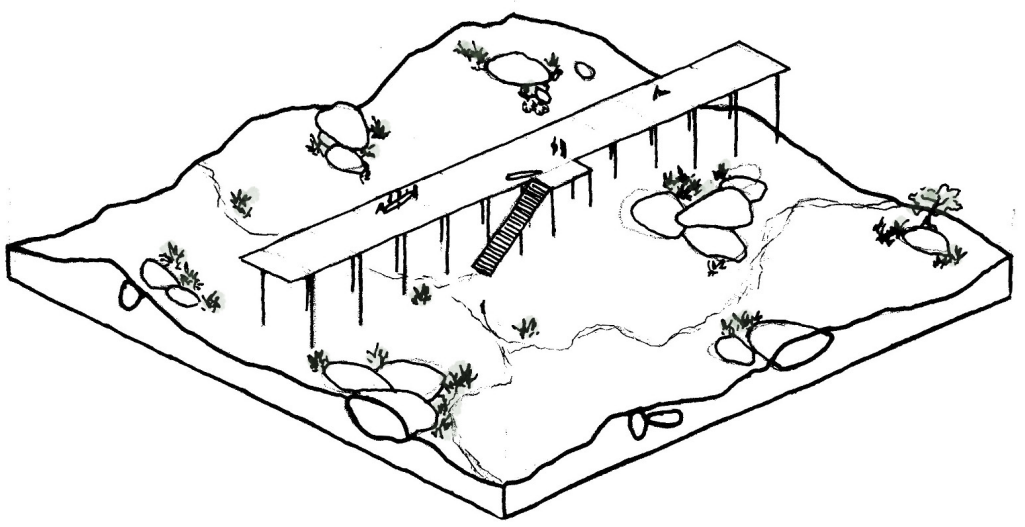
2. Intermediate pier



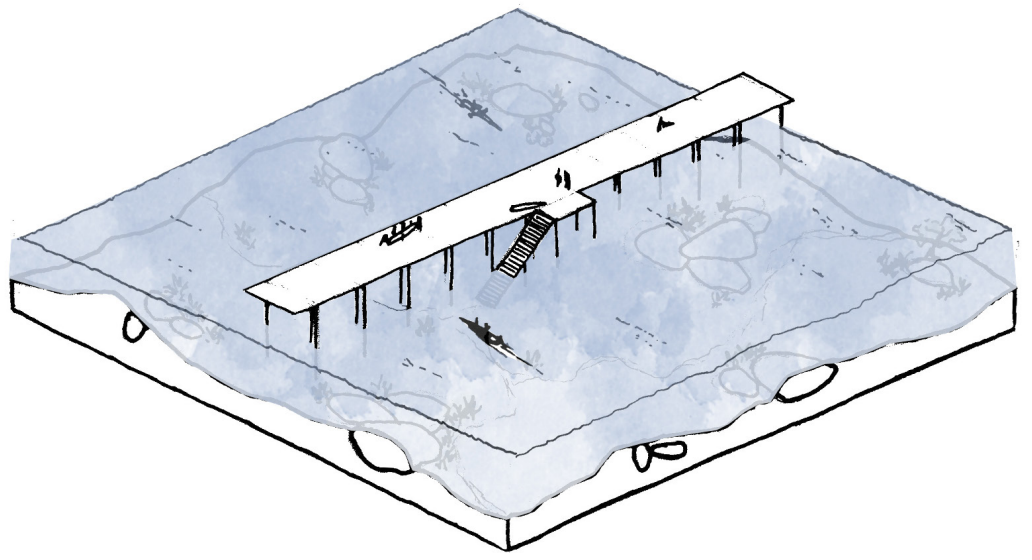
4. Permenent pier



1. River bed access stairs - Dry season



1. River bed access stairs - Wet season



Pathway Interface:
Dry season

"I flow timidly between the rocks and boulders left behind thousands of years ago. In the pools and puddles which I leave behind, nesting fish rest waiting anxiously for the return of my high waters , when they can be released from their natural aquariums and swim upstream."

Pathways Interface:
Territorial connectivity

"Over my waters, men travel carrying objects they use to flow through me and catch my fish. These men that once only moved from land to land through me, now carry above me what they find in the forest islands on their backs."

Pathways Interface:
Wet season

"Before dawn, men set out on their boats to to catch the *pirarucus* that were spotted hunting other fish by my rocky riverbed"

Conclusion

Limits & Ramifications
Critical Review

Belo Monte Reservoir.
Photo by Lalo de Almeida , 2018.

Conclusion: Limits and Ramifications

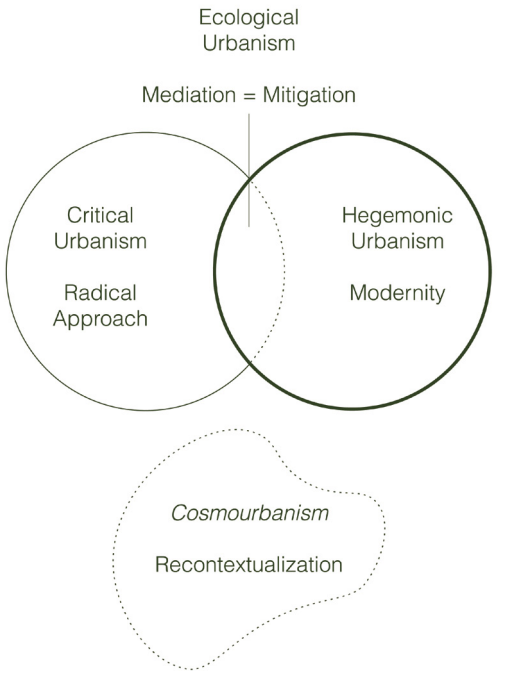
Assuming a position where the best solution for the identified problems caused by the Dam is its dismantlement, we can now state that there is no space for Large Infrastructure projects within the Amazon that can secure social and ecological balance and sustainability. This project has looked deeply into the possibilities of Design as a tool for mediation of the impact of such infrastructures in sensitive territories such as the Xingu River in the Amazon. The thesis was an exercise to devise a methodology which could attempt the alignment of varing wirldviews and cosmologies, proposing sistemic changes which would enable shared existance. The project exists only from what is already there, and attempts to work through the identified conflicts utilizing the known methods for ecological urbanism and social justice in design. Nevertheless, all the efforts to propose systemic changes through design and governance systems cannot address the enormity of the problem caused solely by the existence of the dam. The project does not position within critical urbanism with a revolutionary design approach,but rather as an exercise proposing conditions for systemic change.

Planning and Design fields are limited in their capacity to act in regions that are radically different by nature and have fundamentally diverse concepts of occupation and built environment priorities. Our field is strictly limited to its binding origins in modernity, looking to rationalize and approach the world as a measurable, scientific construct which produces solutionist results. In regions with fundamentally distinct and even diverging worldviews considering society, nature and time, our current planning and design tools have been unable to deal accordingly to such spaces, falling short to deal with these varying world models since the application of our paradigms do not translate, or simply, reduce such views as religion or myth. We need to reevaluate how we position ourselves and our profession when approaching such spaces of action, not anymore from a standpoint of a colonial tool, historically speaking, but as enablers and conduits for the desires of sovereignty and autonomy of such people and worlds. Urbanism needs to reconceptualize its capacities by recontextualizing its foundations seeking from the origin to acknowledge and accept plurality in design action. Attempting this coming from the foundations of modernity which reduces life to binary concepts and archetypal solutions, will always fall short to truly acknowledge the potential of human diversity. If our field cannot move beyond the paradigms which continue to exist within the limits of modernity, we risk to fall short everytime we address and act on territories which cannot be simplified and necessarily exist, rejecting imposition of one construct over multiple others.

Through the project, the exercise of testing the limits of urbanisms capacity to deal with such territories has also shown that solutionist approaches acting on such conflicting territories not only risk falling short of truely addressing the main problem, but through the proposed recommendations ``make things compatible and so it will be ok to have dams because you can always make them compatible" and so further perpetuate the existence and construction of such large infrastructure projects within these regions. In this sense, the act of attempting synchronization not only exists because of the hegemonic modern urbanism approach but will ultimately sustain this model.

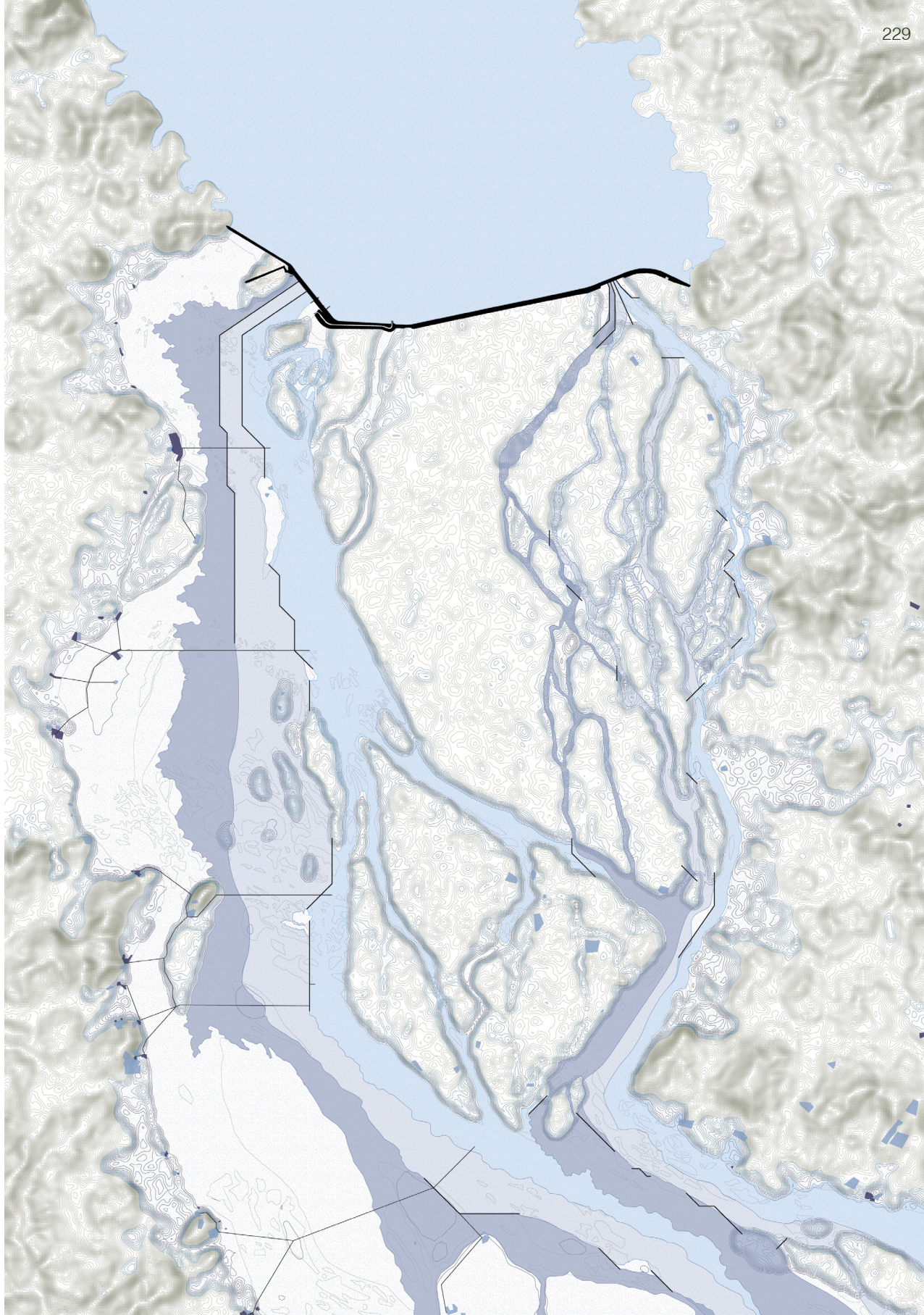
The thesis poses a question to our field that possibly cannot be answered with the tools we have at our disposal. But, if we are to be able to reposition ourselves in such territories, we must begin to ask these questions. The importance of visualizing worldview asymmetries and conflicts is essential, since it is in the physical sphere, the land and its territorial systems, that these de-synchronisations have the most impact. For this reason, Urbanism must claim its role in thinking and proposing designs which act exactly in and for these territories, very much under the influence of an urbanizing planet. The synchronization framework approach begins to unveil a model that could aid in the comprehension of such conditions, and possibly allow for actions to take place in a non definitive and solutionist way.

In order to move beyond the limiting urbanism paradigm embedded within the hegemonic worldview and biased by its modernist foundations, it is necessary to seek the territorialization of cosmopolitics theory. Would cosmourbanism be possible?



Ecological Urbanism sits within Modernity

Critical Review: Mediation from a Radical Urbanism Perspective



Intervention Masterplan
The author, 2020.

The project set out to develop a framework for mediation that could inform design propositions which would synchronize the various existences juxtaposed in the region.

Ecological Urbanism proposes to regenerate and stabilize habitats and ecologies through design and has been a leading paradigm to mitigate the consequences of the climate crisis. Nevertheless, the paradigm is still set within the solutionist approach of modernity, where all problems can have a derived solution.

This approach has shown to be inadequate and insufficient to deal with issues such as those caused by projects like Belo Monte as well as act accordingly in territories such as the Amazon.

The Critical review here proposed is based on the Interview conducted with Philip Fearnside, who commented on the general approach of the thesis and , in more detail, the proposed designs for mediation.

Phillip is a Biologist and activist living in Altamira for 40 years with hundreds of published papers on the effect of dam infrastructure construction in the Amazon as well as other projects in the region which have threatened the biome and its inhabitants. His work on the climate crisis with the IPCC has led him with other researchers to receive a nobel prize in 2007.

1.

The scale of the issue undermines any attempt for Mediation.

"The problem is so great, The Volta Grande area is 30km long, this section after the pimental dam is just the first part of it. You have a tremendous variety of other problems there."

"In terms of how you present it (the design proposal), it isn't something that's going to make modernity compatible with local people. It's a small part of the problem even assuming all this works exactly as has been projected (by the design proposal)."

"It may help with a small part of the problem but it's not the conclusion that (the worlds) are now compatible."

2.

Attempting to mediate Belo Monte's impact will only justify the construction of more dams upstream given the path dependency, political ecology and energy crisis in Brazil today.

"In terms of what the energy sector wants to do, (...) they're going to go ahead and build all these dams in indigenous areas. That includes those dams upstream of Belo Monte.You have a delicate situation here.

The fact that Belo Monte is unviable justifies (the construction of) these dams upstream. Putting the amount of water you need in the "vault of gravity" that is needed there makes (Belo Monte) even more unviable and (so, the proposed designs) can have this boomerang effect by justifying even more (construction) of dams upstream."

3.

The Energy Crisis and water shortage in Brazil and the low cost-efficiency of fossil fuel plants increase popular pressure for favouring the construction of more hydroelectric power plants. Norte Energia, as well as the government and state institutions will not change or demand the release of water flow into the Volta Grande do Xingu given the current scenario. There is absolute unwillingness at the government and institutional level as well as pressure from urban centers to maintain the full operation of dams.

"Basically Norte Energia S.A is not going to agree to do anything, they're only going to do things that they're forced to do and the question is; "who pays for these things?"

It's a matter of decision that comes from above as opposed to Norte Energia S.A making the decision, so far it's been working the opposite way, the powers above have been favouring the electricity as opposed to the people and obviously that's the political climate at the moment where you have this big water shortage in southern Brazil.

They're going to be building fossil fuel plants to supplement it and raising the price to consumers, obviously tremendous opposition to something like this in terms of the political scenario.

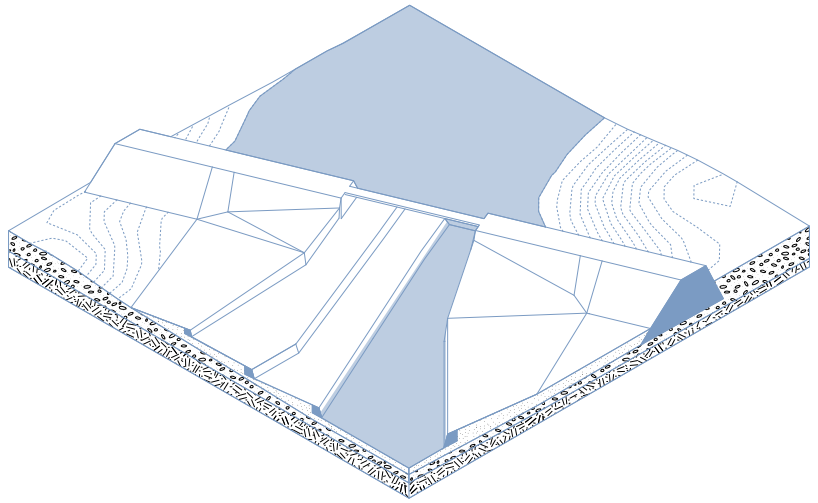
The main thing is to get the lesson from this so that you don't go on building more dams."

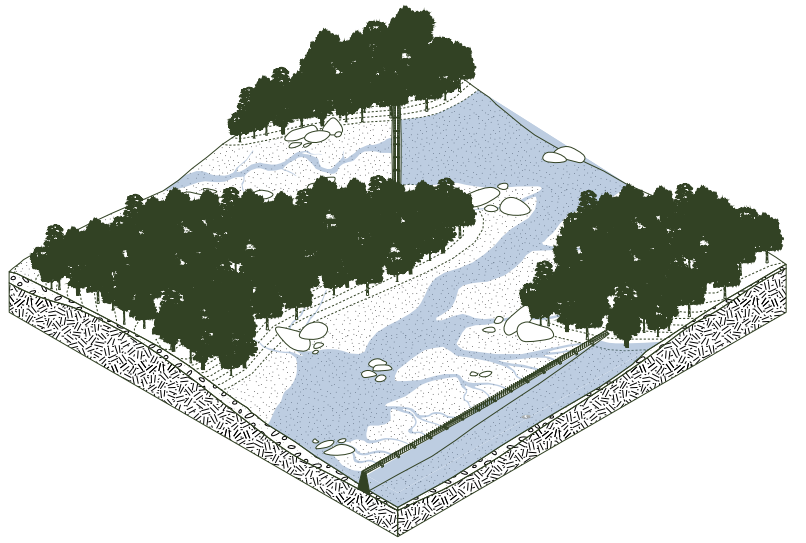
4.

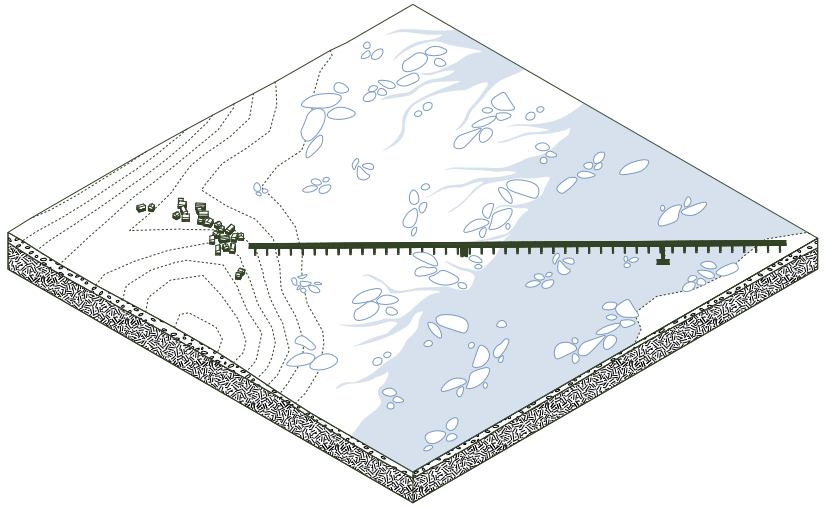
The dam is only financially viable if all the water is diverted to its reservoirs to generate its maximum calculated energy output. This essentially would mean drying up the Volta Grande do Xingu and condemning its habitats and endemic species to extinction. To achieve any form of mediation, Nature would need to be placed above other systems but given the political and societal pressures, there is not enough support for this to happen.

"If you release enough water for the Volta Grande, Belo Monte is going to generate less electricity, so the company is going to make less money and so who's going to pay for that? (...) it's not as profitable as they want.

It's a matter of paying for these mistakes and you need to have enough water to go to the Volta Grande and the rest goes to Belo Monte and what you get out of what that generates."







5.

The maintenance of such large structures is too challenging for the local communities and authorities. The risk of not having regular maintenance might lead to a failure in the system and communities becoming isolated from the water for long periods of time or even permanently.

“Significant investment to try to build and maintain something like that (...) they just degrade, you need constant replacement of the pieces of wood and it’s a major thing , it winds up, this project has had financial difficulties and everything just degrades and it becomes practically impassable.”

“with the river bed you can walk between the boulders and things it’s not easy going but certainly people do manage to get from one place to another, so what is it that’s really limiting and the basic problem is that the you don’t have water there to produce the fish that you had before.”

6.

Ultimately, if compatibility through mediation could be achievable for this region it fails to comprehend the full extent of the influence and which systems are dependent to fully achieve a synchronization of worlds. inevitably, design is placed within modernity, and every decision taken from this perspective is limited to its capacity to understand the world (or “a” world).

“The implication of this is that you’re going to have a recommendation that’s going to make these three things compatible and so it’s ok to have dams because you can always make it compatible, but the conclusion should be that you shouldn’t.”

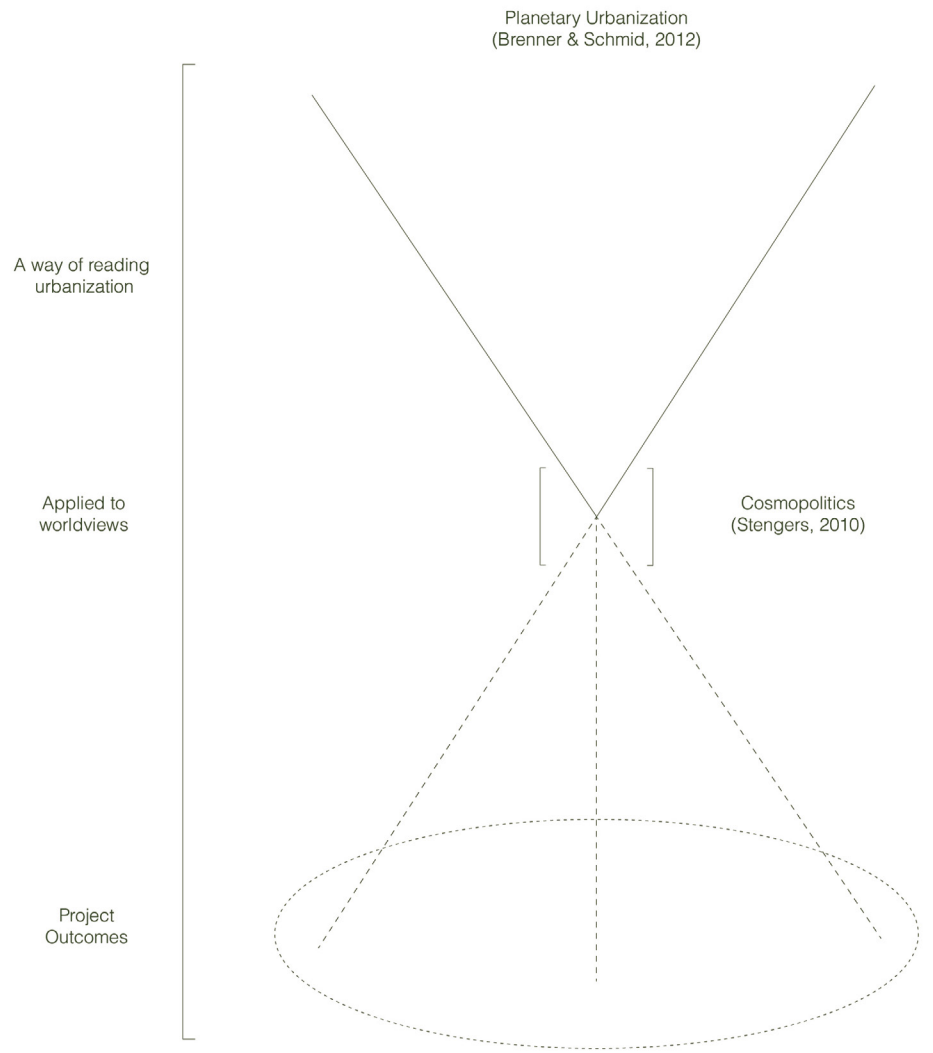
Reflection

Fire in the Xingu River Basin.
Photo by Lalo de Almeida , 2017.

Reflection

This thesis proposes an approach which can help position the field of urbanism sensibly when operating within “not so obvious” urban environments and territories. Specifically, to the project case, the method developed serves to initiate investigation and analysis which directly inform designs which operate within these conditions. As urbanization expands beyond the traditional definition of the urban / rural dichotomy according to planetary urbanism theory (Brenner & Schmid, 2012), it becomes clear that so too must the field of urbanism encompass and consider the transition of these territories and their inhabitants as results/or under the influence of urban decisions and demands. From an anthropological/philosophical position of cosmopolitics theory (Stengers, 2010), the methods utilized, adjusted to this theory, allow for a multi-perspective comprehension of the territorial aspects which are defined by varying worldviews and their perceptions and values. In order to propose urban designs fitted within overlapping and merging worldviews, it is necessary to incorporate their values equally, and mediate potential frictions between these territorial desires. The developed method can be replicated to other regions around the world which face similar conditions of frontier urbanization (Becker, 1988) and extended urbanisation (Monte-Mór, 2014).

Approach.
The Author,
2020.



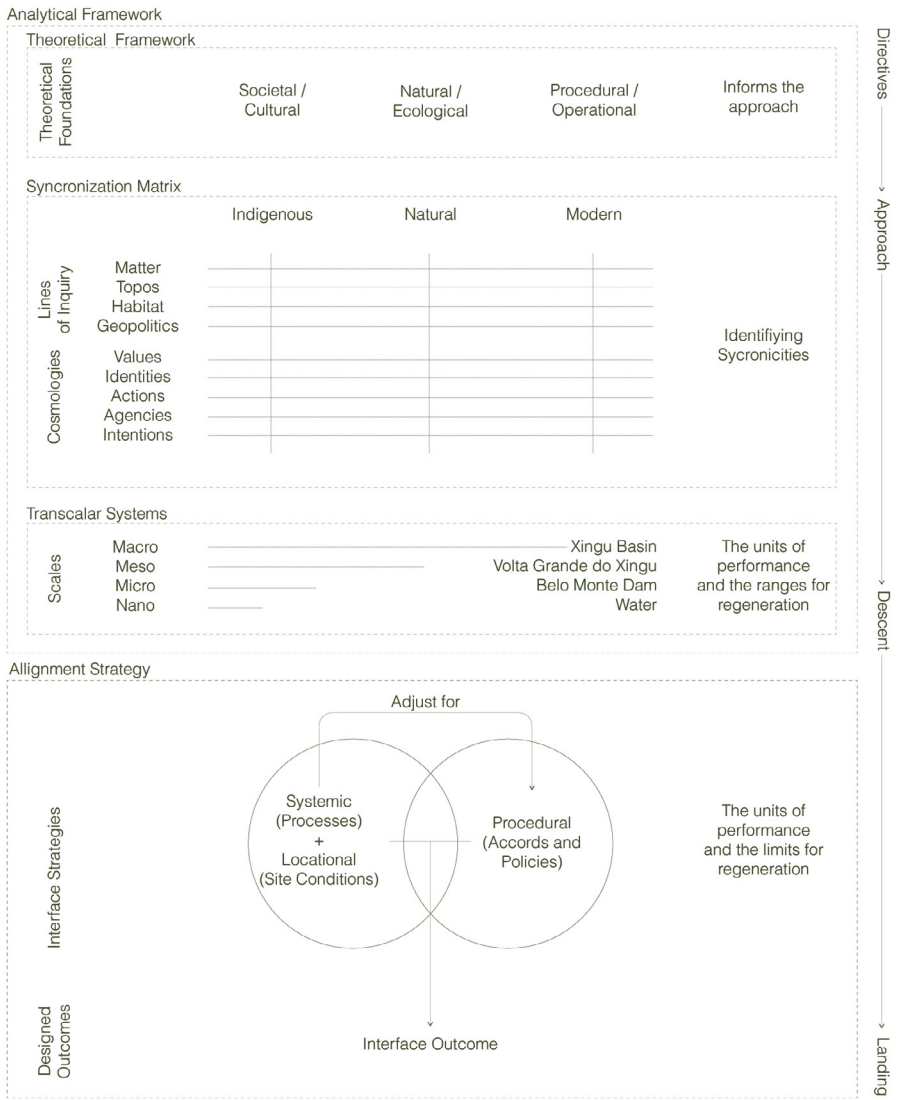
1. Relationship between Research and Design

The thesis approaches the problem through a research by design method, where collected data and their analysis are qualified and portrayed through design elements, which then allows for new conclusions and inquisitive pathways. This dynamic subsequently facilitates the process of design proposals given that it is already developed through design.

The thesis has three dimensions of analysis through research and design. Starting with the Synchronisation Matrix, territories and their systems are disassembled by the studies Lines of Inquiry Framework (four categories of analysis: Matter, Topos, Habitat and Geopolitics) which in turn are cross-referenced within the Worldview Prism (Modern, Indigenous and Natural) with their subsequent landscape planning reading model Abiotic-Biotic-Cultural (ABC Model).

The identified systemic confluences are then carefully represented through scales (Macro, Meso, Micro and Nano) and representation plans (Top view Plan, Transection, Section, Detail Section and Systemic Flow Diagram). This model of representation allows for a complete overview of the specificities of each system, allowing for an integrated evaluation of the systems performance, from the river basin to the living-organism scale.

With this collection of these results, the design alignment strategies necessary to achieve meditative interfaces between worldview systems are proposed. These are then crossed against the existing arrangements and accords that conform and regulate such systems. Adjustments to the systemic design are made according to the necessary procedural conditions.



Approach.
The Author,
2020.

2. Relationship between graduation topic, studio topic, master track and programe

The object of the new three years cycle of Transitional Territories Studio is the de- / re-territorialization of places, structures and cultures between land and sea. Entitled ‘Inland-seaward. The trans-coastal project’ the studio topic looks at the socio-ecological relations undergoing pressure from climate crisis and natural depletion due to the modern project’s colonization of nature. We look at the interface between land and sea, where the biggest transitions are being witnessed. The central question is how an informed and radical reorganization of water, land/soil, built environment and societies ought to contribute to a new condition of living.

For my thesis topic, we look deep into the Brazilian Amazon forest to understand the urbanization dynamics which are accelerating deforestation and ecosystem degradation in the region and consequently threatening trillions of living organisms across the planet which will suffer the effects of increased Carbon gases released into the environment. The relationship between dam infrastructure and deforestation and ecosystem degradation in Brazil is undeniable, since following their construction, deforestation, urban sprawl, and large-scale mining soon follow. For the site of Volta Grande do Xingu in the Xingu River Basin, the completion of the Belo Monte Dam has cut off water to one of the most biodiverse aquatic regions in the Amazon known. Water flow and its control is key to maintenance of biodiversity in the area directly affected by the dam, as well as under threat by the acceleration of deforestation in the region facilitated by large energy infrastructure projects such as Belo Monte Dam. The reduction of dense tree cover is affecting the forest’s ability to replenish water at the source of rivers, which in turn causes increasing drought events along rivers of the Amazon affecting hydropower output. This vicious cycle brings into evidence the role of water and hydrologic cycles in the maintenance of tropical environments and biodiversity.

The thesis is positioned within the subject of urbanism master track by discussing the extent of the profession within a planetary urbanized dynamic proposed by Brenner & Schmid (2012) theories of operationalized landscapes and planetary urbanization. In this logic, the planet is already completely urban, serving directly or indirectly the production and reproduction of urbanity through the accumulation of resources and capital since the mid-20th century, accelerated by late-capitalism. To act in such territories, urbanism must be conscious of its influence and capacity to contribute to this dynamic, and so, as we are more and more responsible for the changes at the farthest extents of the urban reach, so too must we consider its study within the subject.

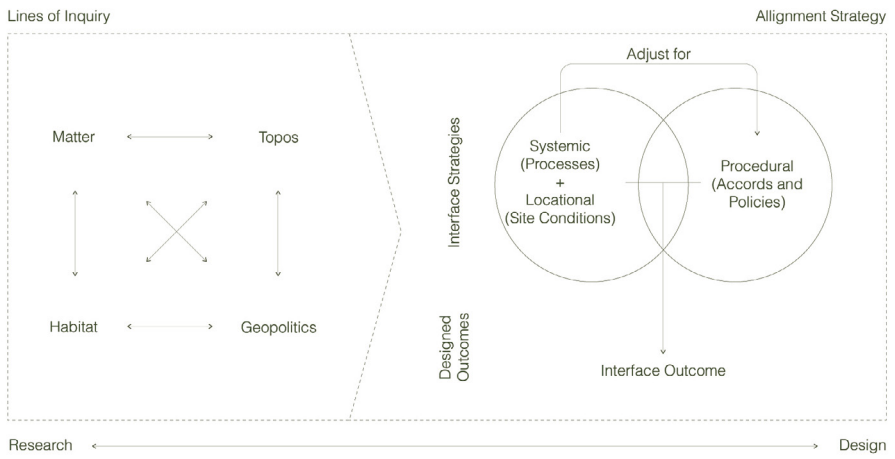
Within the Master program, the thesis has taken inspiration from the complexity of stakeholder involvement and policy planning as well as hydro ecology notions and infrastructure design techniques from Msc 2 subjects.

3. Relationship Method and Approach

The studio utilizes a research framework to read the territory in question and its systems based on four themes of investigation which allow for the overarching studio themes (territorialization, infrastructural space, ecology and landscape design, environmental degradation and climate crisis and geopolitics). The Lines of Inquiry (Matter, Topos, Habitat and Geopolitics) are responsible for the adjustment of the projects research and analysis development in a manner that a full and comprehensive assessment of the state of things can be decrypted under the studios overarching themes, as well as identify interrelated systems.

My project appropriates the studio's Lines of Inquiry reading model and inserts this within the Analytical framework, within the synchronization matrix, expanding this reading model to look at the Modern, Indigenous and Natural worldviews. In this way, the lines of inquiry serve as the fixed factors utilized to compare Worldview systems.

The resulting confluent or conflicting systems are then processed through the Alignment Strategy. Here the selected systems are decrypted in three phases, one of which, the Procedural alignment, is processed after the System and Locational Alignments which facilitates the identification of the involved accords and policies managing these systems and sites. According to the resulting elements, the Procedural alignment adjusts for the Systemic and Locational alignments, allowing for policy and accord gaps to be handled. The readings brought by the Lines of Inquiry within the synchronization matrix and aligned through the Alignment Strategy, allows for complex and sensitive cases to be properly considered, delivering design directives which are in tune with systemic performances across worldviews.



Approach.
The Author,
2020.

4. Relationship between the graduation project and the social, professional and scientific framework, and the transferability of the project results.

Societal

The importance of preserving the ecology and biodiversity of the Amazon is one of the fundamental actions necessary to decelerate climate change. In this sense, studying the urbanizing conditions in the region is essential in order to mitigate impact, and reinforce models of life which preserve and cooperate with the existing systems and dynamics. The thesis looks at dam infrastructure, one of the key contributors to environmental degradation and destruction in the Amazon and proposes methods to approach systemic conditions as well as grounded interventions which can lessen and revert destructive dynamics for those who inhabit affected areas. By exploring proposals which are embedded within the current indigenous practices and their systemic programs, conservation measures can become sustainable for those who inhabit and depend on the forest.

Scientific

This thesis is strongly concerned with discussing the limits and limitations of our urbanism field when addressing spatial production at the frontier of extended urbanization within the context of planetary urbanization theory. In this sense, this project questions the capacity of our current urban paradigm, very much related to sustainability, circularity and climate adaptation when discussing our involvement towards mitigating climate change but has produced little to no discussion regarding the territories subjugated to the production of the urban space at the frontier of extended urbanization, or even, urbanism beyond the modern paradigm worldview. We still address the planet only through our own eyes (and here, I place myself with you, under the modern paradigm which has shaped my existence as well) and attempt to propose change within our forms of scientific determinism. But those civilizations and existences which also co-inhabit (or have in the past), constructed their worlds from a different set of knowledge and science. Considering this aspect, anthropology and philosophy proposes that this planet is inhabited by different worlds, and as modernity continues to engulf earth for its own reproduction, these worlds collide. In this context, politics only cannot resolve conflict since it is fundamentally embedded within our worldview. To incorporate other worlds, we must also dialogue with other politics and sciences. Cosmopolitics is proposed by Stengers (2010) and other anthropologists and philosophers as an approach which must dialogue the shared planet with all worlds.

Returning the discussion back to the field of Urbanism, as a profession that materializes social and political desires and decisions, we must then redirect our field to the centre of worlds and not only look at worlds through the modern paradigm. Taking this into consideration, a paradigm shift is necessary, and this thesis attempts to propose one aligned to cosmopolitical theory. A claim for Cosmo-urbanism or Cosmo-planning must be made if we are to address the complexities of the Anthropocene, with all worlds included. From human to non-human.

Transferability

The thesis proposed a method in which policies on infrastructure implementation and appraisal, community participation, indigenous and natural conservation land demarcation and management can become more integrated and precise, allowing for the involvement of all stakeholders within a cosmopolitical construct (human and non-human) in the shaping of the territorial dynamics.

This method can be replicated and produce equally founded results for other infrastructure projects under planning and implementation in the amazon, as well as around the world where such projects are conflicting with indigenous and natural dynamics.

5. Ethical considerations throughout the project.

i. Ethical issues arisen during research.

In a fiercely disputed territory, often made invisible by authorities and media to most of the population and the world in order to favour exploitative narratives, it was important to keep in mind the sourcing of data and material, considering its validity by date and provider, since this could determine the reliability of material according to the most accurate count and data. In qualitative data, narratives were validated by recurrence in other sources and cross referencing. In this way, arguments could be substantiated by the number of varied sources which had similar argumentation.

As an urbanist embedded within the modern paradigm, it was crucial to be aware of the limits that this imposed the research on these other existences and cultures. It was fundamental not to incorporate knowledge or speak for cultures from a place of certainty regarding their cultures and worlds. In this sense, given this limit to our professions positioning - bound to our worldview – I could only work with certainty from within our world. Yet, with the use of anthropological sources, primary sources (readily available interviews and documents) and secondary sources (reports and articles) which had been produced in conjunction with Amerindian indigenous peoples, research conclusions and design proposals were held accountable given the aforementioned conditions.

ii. Elaborating design

As described previously, the thesis has considered the ethical implications of speaking for. As well as minding the limits of the research regarding cultural appropriation and misinterpretation, the proposed design interventions should also be scrutinized by local and indigenous stakeholders, as well as strictly respect their desires since these are interventions that would still influence their cultures, just like the dam did, even if the intent is the betterment of their existing condition which was caused by the dam. In their understanding, these continue to be disrupting interventions, even if on different impact degrees.

iii. Potential applications of results during practice.

Scientific determinism intrinsic to the modern worldview can generate conflicting results with other worldviews considering that spaces, territories and systems in place have had their significance and meaning misinterpreted across worldviews and in some cases peoples and places do not need or want to be analysed, researched and defined by our science.

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Appendix

Interview
Graduation Plan
Article
Theory Paper
Other Drawings

Xingu River waters.
Photo by Aaron Vincent Elkaim , 2015.

Interview with Philip Fearnside

Fearnside was born in Berkeley, California, and has a bachelor's degree in biology at Colorado College. At the University of Michigan, he did his master's and PhD in the same area. He has worked especially on issues of tropical agro-ecosystems, deforestation, environmental degradation and their impact on society, sustainable development and climate change. Philip has a large published bibliography, which includes studies that contributed to the increase of the knowledge about the fires, the capacity of human support in colonization areas, the rhythm, environmental causes and impacts of deforestation in the Amazon; for the development of techniques for sustainable management of nature, and for the renewal of methodologies for assessing greenhouse gas emissions, among other topics.

Characterizing the Xingu Basin

Lucas: Within this context, how has Belo Monte dam affected the Water system of the basin, as well as contributed to its process of deforestation?

How has Belo Monte specifically contributed to the process of deforestation in the Xingu Basin?

Philip: A tremendous migration to the area during the construction and you've dislodged the people who were there before. What is most frightening is what could happen upstream, that is building Babaquara, Altamira or other dams upstream of Belo Monte, is very likely, despite the denials and that of course would involve a lot of deforestation.

Operationalized Power

Lucas: Studies have indicated that a minimal flow value of 15 thousand m^3/s would sustain ecology within the reduced water flow section. What other parameters should also be taken into consideration in order to sustain the ecologies and habitats in this area other than just the water flow? So related to the water as well but not just it's water flow.

Philip: This isn't just the amount but the timing of it, you have all these releases where the water suddenly goes up and down and so forth that, completely disrupt the biotic and also the humanness of the river but obviously the water flow is what is affecting most in the Volta Grande, of course there are all sorts of other things that are on the horizon you have a bellow sun that is huge and so forth being planned but water flow is certainly the big problem there and of course this last year it's been exceptionally low and you just had this decision to allow them to release less water to the Volta Grande than had been agreed before.

Lucas: How was this decision taken, was there any technical advice?

Philip: Well, the technical advice is all the contrary, you know, they need the water, it was because of a request from "Norte Energia S.A".

Institutional Ground Conditions

Lucas: What processes and actions have the local and indigenous populations affected by the dam taken to voice and demand their rights over the territory and their ways of life? So how do they manifest their voices and the demands, their requests and relationships process?

Philip: Certainly, things have changed since the time when "Norte Energia S.A" was handing out all sorts of benefits to these groups. So there were two years where there was a preparation for the "plano básico" , where they were giving outboard motor boats, fuel, vehicles, food all

sorts of things and they gave it on the basis of the number of villages, each village got so much, so it led to fragmenting villages inside these reserves and different groups would splinter off. It had a disastrous impact on the social structure of the three groups, there are two on the Volta Grande and on the Bacaja tributary you have another that also depends on it. They were basically the leaders of those groups, they were basically silent, they were bought off by this. Now that it's over they're voicing all these complaints and want to have a different tact which of course is a good thing because they really needed to be active before. The leadership and the opposition were all with the Kayapo people and the Shipaya people and so for the upstream groups, not the ones that were downstream, that's changed now.

Lucas: So, the level of the involvement varied throughout time and also with these different populations. Has the act of the dam, since its planning implementation and operation, helped bring a union of interests of these populations or do you think they are still very diverging in their desires?

Philip: Well, there's been all sorts of splits within the groups opposing the dam, some of these splits between the environmental groups went on efforts to oppose the dam, of course you had a political problem that Lula was the one who was pushing the dam and a lot of the groups were "PT" supporters, so they sort of split. Even Mobby (???) had really unique role there compared to the other dams they worked on, they only arrived in 2009 and were basically proposing to help the people get a better deal in term of resettlement and compensation, instead of opposing building a dam they were trying to get a better deal, assuming the dam was going to be built, so that obviously split with the groups that were actually trying to stop the dam, like "Xingu Vivo"

Lucas: So, you would say that certain different actors some have a position of trying to mediate, some had a position trying to resist and they also are in conflict with each other, it's not only a conflict between local and opposing government or state, there's also these clashes.

Philip: Yes, definitely, we had a lot of clashes internally.

The Brazilian Hydropower Landscape

Lucas: How is the discourse of this "Brazilian nation", society and nation state, which says that they support this "guaranteeing national energy security" is the reason why you have to build these dams. That's the reason given, how has this been reaffirmed or contested by the local actors and society in the region?

Philip: I certainly wouldn't take it as a given that you need dams for energy security, you can see now with the droughts in the southern part of Brazil, it's not secure, all those dams including Itaipu don't have water they need, it's going to get worse with climate change. If the money spent on Belo Monte had been spent on wind and solar power and so forth instead, you'd have a very different outcome and of course there are other things that must be done, you need to use less electricity. One of the most obvious is not export electricity in the form of aluminium and other products, that' a Belo Monte worth of electricity, there are all other things that you could be doing in terms of improving the efficiency of the transmission lines, obvious thing is electric showers, Brazil is the only country in world that uses electric shower heads to heat bath water, which is 5% of all electricity in Brazil, it's been a governmental goal to do away with them since the national plan for climate change in 2008 but they haven't done anything, only build more dams. The reason for Belo Monte was different, it wasn't that you needed energy security and support, the political reasons, obviously the corruption that's come out with "Lava Jato" explains Dilma's positions on it and that is financed both campaigns, paid the publicity that led to the election result. Lula needed "Carro chefe" before his campaign and the business of transposition São Francisco river wasn't working out in being his main project so he switched to Belo Monte, it's something that isn't related to the actual costs and benefits and certainly you can see now with the lack of water to run the dam and give enough water for the Volta Grande there are basic problems in the planning and of course it can go on if it leads to these other dams upstream that would have tremendous damage or all of it's indigenous areas, the Babaquara is twice the size of the Balbina Dam area.

Lucas: So these projects end up being nearly as a propaganda of governments and their achievements rather than actually supporting the actual energy production.

Philip: You have something that you can actually point to, like the dam. It helps a lot getting elected if you do away with electric showers it is not something to point as a big achievement.

Lucas: Being aware of the insufficient volumes to sustain the ecologies in the segment of the river. Have there been steps to promote a viable solution to tackle this issue which considers the operation of the dam whilst providing conditions for life downstream? Is it possible that a certain "Hidrograma" be valid for both those who exist but also for the operation of the dam?

Philip: The operation of the dam is not viable, this basic fact so that if you make it you have to have enough water to make the dam profitable and forget about what happens to the Volta Grande, obviously you wind up with a disaster. What has happened is in the opposite direction, instead of giving more water they give you less water and the mitigation measures are just fictitious, and they are going to put out fruits on

platforms for all the aquatic animals to eat, it's unrealistic, the idea you're going to revegetate with these flooded forest trees when you no longer have floods.

Research and Design Approach

Lucas: In this case that it has been constructed, the approach has been here to try to manage forms that we can revert the actual implementation as much as possible to what was before, so if it's not exactly but try to understand the systems that were there and how we can guarantee those ecological systems again, knowing that it is there, so it's the conflict the whole issue and question between these two.

Philip: Well it's going to cost money, that is if you release enough water for the Volta Grande, Belo Monte is going to generate less electricity, so the company is going to make less money and so who's going to pay for that? You've already spent 40 billion reais (R$) building the dam and the transmission line, which is basically a giveaway from the taxpayers, 80% of it financed by BNDES with 4% interest, when government's financing itself selling paper for 10% interest makes a enormous subsidy to building the dam and now just operating the dam independent of the what it costs to actually build it, it's not as profitable as they want, it's a matter of paying for these mistakes that have been made and you need to have enough water to go to the Volta Grande and the rest goes to Belo Monte and what you get out of what that generates.

Lucas: That would imply for that to happen because the way things have progressed for the construction of this dam had to do with very clear values which weren't values that considered this whole ecological system, environment system and climate system and now there are the consequences that there's less water coming in, so it's jeopardizing even more the dam's operation. There would need to be some form of shift in those initial values to understand the importance and that locally you would need to not extract it's full potential, allow equilibrium.

Values

Lucas: Following the same structure shown by the Relationships between worlds diagram, how could we position the "Indigenous" and "Modernity" according to the perspective of "Nature"? And how would Nature see the relationship between Modernity and Indigenous? If it was an entity that could view these, if that's even possible. If there are three entities, local indigenous, modern and nature, would there be a way to do that or it's not possible?

Philip: Obviously the modern part represented by the dam is obviously what's dominating the others and so long as that's just assumed as what happens you obviously lose out those other parts and of course you've already destroyed a lot. The idea that you are going to have all these things get along with each other and have all the benefits is not going to happen.

Synchronization Field

Philip: Again, the implication of this is that you're going to have a recommendation that's going to make these three things compatible and so it's ok to have dams because you can always make it compatible, but the conclusion should be that you shouldn't.

Design Outcome

Strategic Interface: Dam Intervention

Lucas: What could be the predicted implications of such a system for the natural flows of fauna and sediment travel through this section of the river? Any comments

Philip: Have you been there? Most important thing is actually to go there and see these places because trying to figure out something like this just by looking at a map, so that's the first thing in terms of trying to figure out the viability, I can't really judge it without seeing more of how it actually worked there.

Lucas: From what I have shown you is it incredibly off to the existing conditions, do you think there is any possibility that this could be in some way a possibility if not why?

Philip: The problem is so great, it's 130km, the Volta Grande, this is just the first part right after (50:11 a word I didn't understand) so you have a tremendous variety of problems there, so in terms of how you present it, it isn't something that's going to make modernity compatible with people, it's a small part of the problem even assuming all this works exactly as the concept is here. So, the message of the whole thing has to be different, this is a proposal that makes them compatible. It may help with a small part of the problem but it's not the conclusion that you made them compatible.

Reduced Water Shore

Philip: It seems that the idea of making these walkways for the people to cross over to the island so instead of going in a canoe, you walk on one of these causeways here.

Lucas: Considering that the water is now concentrated in a certain part so that area would not have water for them to flow to move in canoes anymore most of the year. This is absolutely utopian.

Philip: I think you need to go there and see the actual places, is the first thing. In terms of the idea that the limiting thing is getting to their fields to plant, you know, they have land that's not on the islands, if they want to plant "mandioca", what

they're really missing is the fish, what they had from the river, not that they can't get to a place to plant "mandioca".

Lucas: In this case because of the smaller area of water, this would also serve them to reach this part , dry and wet, always with water for them to fish.

Lucas: How are these buildings/structures usually constructed? Would it be possible to use the same materials and methods to construct and maintain these pathways? Would you think that these permanent connectivity to the river, would these be desirable or even accepted?

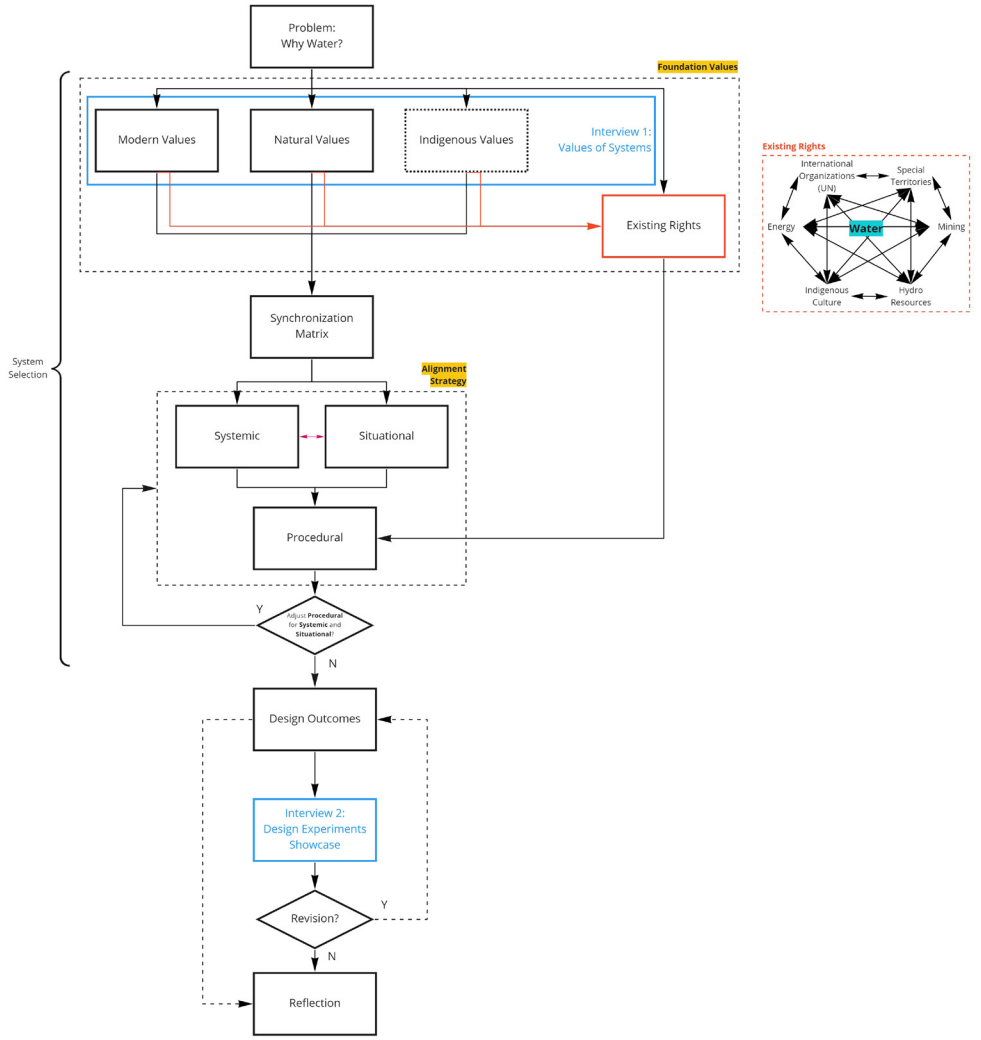
Philip: Yes, first of all it is a significant investment to try to build and maintain something like that and you can see the some similar things that have been built by the "LBA Project" near north of Manaus and though they just degrade, you need constant replacement of the pieces of wood and it's a major thing , it winds up, this project has had financial difficulties and everything just degrades and it becomes practically impassable. To the extent that this is going to be viable and working overtime, I'm not so sure. The question is, is that really the limiting factor, to be able to walk to the place to get into a boat, obviously even with the driver bed you can walk and between the boulders and things it's not easy going but certainly people do manage to get from one place to another, so what is it that's really limiting and the basic problem is that the you don't have water there to produce the fish that you had before, it's the main thing that has to be solved.

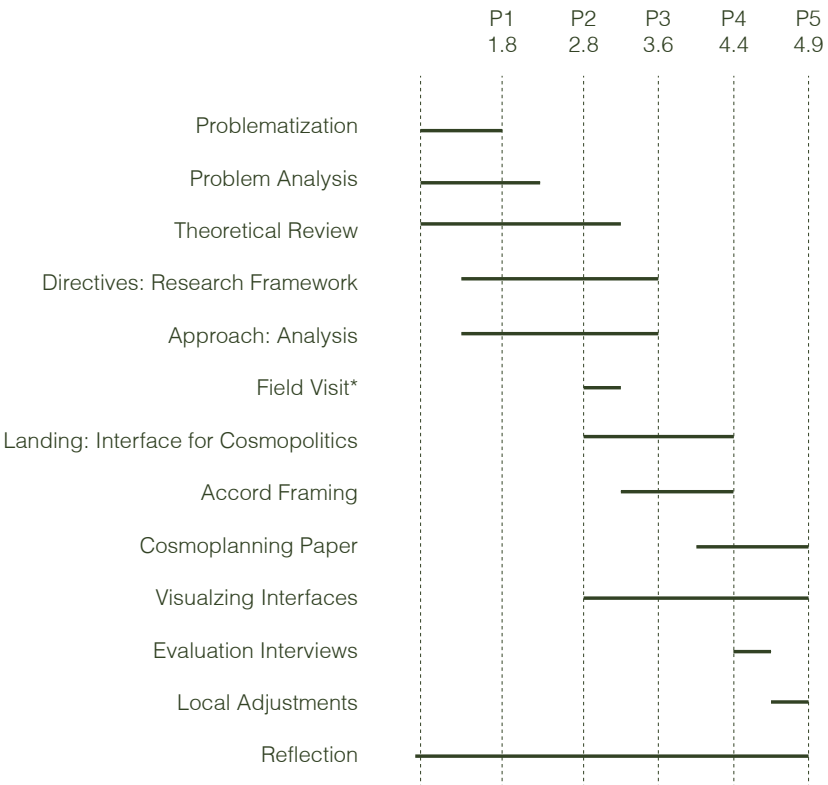
Lucas: Considering the fact that opening that would be proposed on the dam, it is of course a situation where those who run the dam and decide for it are agreeing for a reduced right they're agreeing for a reduced energy production because they're now allowing more water to flow into this area, with that being physical hole in the dam, that the water is now allowed to flow in and out, will that only guarantee the fish survival or is there other aspects that you think would be need to be considered for the fish's survival, other than just allowing a part of the water to flow?

Philip: You must have both, the peak of the flood which with this plan to have A and B hydrograph, you alternate years whether you have a higher flood or not. You really need to have a flood every year and of course that is something that costs a lot of money in terms of what would happen with the water otherwise, it must be a flood high enough to get into these areas that have flooded ecosystems. Basically "Norte Energia S.A" is not going to agree to do anything, they're only going to do things that they're forced to do and the question is, who pays for these things, it's a matter of decision that comes from above as opposed to "Norte Energia S.A" making the decision, so far it's been working the opposite way, the powers above have been favouring the electricity as opposed to the people there and obviously that's political climate at the moment where you have this big water shortage in southern Brazil they're going to be building fossil fuel plants to supplement it and raising the price to consumers, obviously tremendous opposition to something like this in terms of the political scenario, the main thing is to get the lesson from this so that you don't go on building more dams and that is the plan, if they get permission to build dams in indigenous areas, which is the key thing, it just cuts loose, that's what they're going to do, otherwise if they're not allowed to then they have to go for more solar and wind energy, there's plenty of potential to supply Brazil without dams but in terms of what the energy sector wants to do, if they get permission, they're going to go ahead and build all these dams in indigenous areas, that probably includes those dams upstream in Belo Monte, you have a delicate situation here, the fact that Belo Monte is unavailable sort of justifies these dams upstream and putting the amount of water you need in the vault of gravity that is needed there makes it even more unviable and that can have this boomerang effect in giving even more justification of the dams upstream, the question is how to approach it, you have to have some alternative and that is something other than dams.

Lucas: So, the issue at hand is much more in the political sphere, above this had to be involved before.

Analytical Framework with Interview stages to validate each step
of the process
The author , 2020.





Mediation Through Design in the Brazilian Amazon.

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1. Introduction

The Project

The Xingu River sits within the Eastern Amazon Biome, flowing into the Amazon River. Its basin is part of the deforestation belt of the Amazon, where encroaching activities threaten the rainforest. The Xingu Basin holds a multitude of endemic species and is home to around 26 indigenous Amerindian nations across 21 Indigenous territories and 9 nature conservation units. The complexity of its spatial arrangement is only surpassed by the extent of its history and ecological complexity. As we face our planet's ecological collapse due to resource based developmentalism, life on a planetary scale is increasingly threatened. Under the Anthropocene, urbanization networks have expanded beyond the traditional concept of hinterland. Planetary urbanization theory (Brenner & Schmid, 2012) unravels how untouched regions are now operationalized and incorporated into global resource networks.

Prior to this exploitive model, pre-Columbian human activities coexisted with the natural cycles of the biome. Recent studies indicate that in many instances anthropogenic activities have enhanced biodiversity and shaped landscapes which were once fully natural (Duran, 2019). Since the 1950s Brazilian State Developmentalism defends social and economic development through the exploitation of natural resources and in detriment of the few in benefit of many.

In the Xingu River basin, all life has developed around water in the physical and metaphysical. The importance of the river pulse, which in turn depends on continental and planetary water flow cycles, has been suddenly altered by the Belo Monte Dam project. Such conditions are stark reminders of the detrimental effect that infrastructure projects of this magnitude can have when environmental and ecological cycles are not fully taken into consideration.

This project aims to study the impact on urbanization systems related to water in the Xingu River where the Belo Monte Dam project was constructed. Traditionally, water bodies in the Amazon are spaces that allow for shared occupation. In a disputed territory where local conditions are undermined in favour of a discourse which prioritizes national developmentalism demands, it is important to signal which elements and systems manifest power dynamics and how these can generate externalities beyond their institutional limitations.

The project considers water as a mediative space, enabling the reconfiguration of worldview coexistence and forms of life in the Xingu River. The sensitive approach towards local existences looks for a type of urbanization different from that of the modern project. Through a process of drawing and mapping spatial interactions, the project identifies the systemic elements which compose and dictate certain social, economic and ecologic conditions with potential for mediation designs. In this way, the necessary research results are achieved through drawings which then inform the design approach. Furthermore, the project questions the role of urbanism in such territories, demanding an approach which can reposition the field of urbanism sensibly when operating within "not so obvious" urban environments and territories. As urbanization expands beyond the traditional definition of the urban-rural dichotomy, according to planetary urbanism theory (Brenner & Schmid, 2012), so too must the field encompass the transition of these territories as results / or under the influence of urban decisions and demands.

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2. Approach

Investigation.

The project discusses the importance of the amazon forest as a space and system for supporting life not only within, but across the continent and even the planet with the key element being water. With a national energy agenda trusting on hydropower production mainly of amazon rivers, Belo Monte dam takes centre stage as the biggest and most recently concluded dam of this endeavour. With the construction of dams, deforestation, urban sprawl, and large-scale mining soon encroachment follows. This increases droughts along amazon watersheds affecting hydropower output. This vicious cycle brings into evidence the role of water and hydrologic cycles in the maintenance of tropical environments and biodiversity.

Part of the interdisciplinary graduation studio Transitional Territories research framework, the project reads the territory and its systems utilizing four themes of investigation (Lines of Inquiry): Matter, Topos, Habitat and Geopolitics. These focus the project's research and analysis development for a full and comprehensive assessment of the state of things as well as identify interrelated systems.

The Lines of Inquiry entry points are utilized to discriminate the systems and values of the Modern, Local/indigenous and Natural worldviews and allow for the identification of shared dynamics. The project utilizes the Lines of Inquiry studio research framework, which enables critical reading of the territory and its systems investigating territorialization, infrastructural space, ecology and landscape design, climate crisis and geopolitics, and adapts this framework to enable the reading of other worldviews. The incorporation of the worldview dimension is brought by cosmopolitics theory (Stengers, 2010), which argues that there are no ethnographic perspectives on a "single world" (or a common "thing") but a pluriverse of worlds coexisting. With regards to how Amerindian nations relate to the rainforest compared to western society, they do not "refer to different cultural perspectives on the same "thing," but to altogether different (albeit not unrelated) things." (Latour, 2004). The same land, rain, trees or fishes are constructed with meanings that cannot be translated through one's worldview ontology. The urgency lies in developing a conversation on equal terms and shared intentions. A form of "politics" which enables these universes to relate and realize the agencies from every being, human and non-human.

The Analysis framework is developed in order to position systems and dynamics which sit shared in each Line of Inquiry and shared throughout worlds. Later, a relational diagram (Synchronization Field) is set to visualize these systems by first placing the values for each Line across worlds. By utilizing the Abiotic-Biotic-Cultural Landscape Planning Reading Model (ABC Model) within each worldview, these values could be broken down to their physical systemic elements informing the parts that compose a system which requires mediation.

The identified systems in need of mediation and their elements are transcribed into mappings which illustrate spatial and territorial implications. Utilizing the so-called 'Alignment Strategy', selected systems are decrypted in three phases: Procedural, Systemic and Locational alignments. The Procedural alignment adjusts for the Systemic and Locational alignments, handling policy and accord gaps. This method allows for complex systems to be properly considered in all dimensions, delivering design directives which are in tune with systemic performances across worldviews.

3. Outcome

System Mappings: Indicating how and where to deal with systems.

Following from the Synchronization Diagram, the identified values for each Line of Inquiry and worldview indicate four main territorial systems which would be considered for mediation: 1. Water flow, directly disrupted by the Dam's implementation and diversion of water from in the Volta Grande do Xingu river section; 2. Ecological Sustainability, which has been radically destabilized by the dam; 3. Basin Connectivity, implicating systemic linkages of Abiotic, Biotic and Cultural relations; and 4. Territorial (Re) Settlement, related to the occupation conformation along the basin of various systems.

These key systems were mapped according to their corresponding items, identified in the Synchronization Field. For the instance of System 1. Water Flow, System Mappings were required in order to comprehend how this system operated in space. These were: 1. Flow and Flux; 2. Connectivity through Water; 3. Societal Interactions and 4. Territorial Conformation. These System Mapping categories allow for a series of mappings (sourced from the consequent Synchronization Field items) which inform the current state of the Water Flow System.

Utilizing these mappings, and juxtaposing their layers, the potential opportunities for spatial mediation interfaces arise and inform the needs of interventions which are sensitive not only to the site conditions, but to the varying values and worldviews which perform over such territories. Through four Mediation principles – (1) Regenerate, (2) Stabilize, (3) Rehabilitate and (4) Re-signify – the project proposes actions following one, a selection or all four principles which could act on the system in question. Utilizing clear design actions, namely (1) Juxtapose, (2) Expose, (4) Converge, (5) Contrast or (6) Connect, interventions guarantee clear proposals on how to interface for mediation.

4. Discussion

The role of Research and Design.

The thesis approaches the problem through a research by design method, utilizing the Synchronization Field method to extract maps characterizing specific territorial conditions which inform project and design decisions. Through representation techniques such as diagrams, maps, plan views, transects, sections and scenes, the researched elements brought by the Synchronization Field and the System Mapping Layers are manipulated and visualized in conjunction with the act of design itself.

The identified systemic confluences are also carefully represented through scales (Macro, Meso, Micro and Nano) allowing for a complete overview of system specificities, achieving an integrated performance, from the river basin to the living-organism.

It is important to mention that a Research and Design approach developed through continuous feedback between the research and design, where one informs the other constantly and vice versa. This allowed for continuous enhancement of knowledge of both and necessary reassessments of decisions along the process which guaranteed that outcomes are always in tune with the overall process.

5. Conclusion

The research-by-design methods used in the thesis attempt to visualize the possibilities for mediation through design in conflicting territories with seemingly discrepant values. The importance of visualizing worldview asymmetries and conflicts is essential, since it is in the physical sphere, the land and its territorial systems, that these de-synchronisations have the most impact. For this reason, Urbanism must claim its role in thinking and proposing designs which act exactly in and for these territories, very much under the influence of an urbanizing planet.

The proposed Synchronization Framework could be replicated for other territories of extended urbanisation which face situations of conflicting worldviews. In this sense, this thesis presents clear ramifications for the replication of its methods, attempting to position the field of urbanism beyond its more traditional practice spaces. In order to move beyond the limiting urbanism paradigm embedded within the hegemonic worldview and biased by its modernist foundations, it is necessary to embrace a territorialization through cosmopolitics theory. Would cosmourbanism be possible?

Regional Projects, Territorialisation and Urbanization in the Brazilian Amazon.

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Keywords

Regionalization
Integration
Territorialization
Infrastructure
Brazilian Amazon

1. Introduction

The Amazon is an essential region for the guarantee of sustained climate conditions for an inhabitable planet (Lovejoy & Nobre, 2019). In this sense, it is essential to respect the regions natural dynamics, which not only regulate most of South America's climate but the world's as well as acting as the largest carbon deposit on earth (Lovejoy & Nobre, 2019). In this sense, human occupation and activities in the region must be careful to not disrupt the environmental process that the region provides for the planet.

Unfortunately, care has not been taken throughout the centuries of colonization in the region (and here, I mean ever since European colonizers claimed the region their own, exploiting the land and their original inhabitants). In the last century, processes of modern occupation and urbanization have radically shifted the habitable characteristics of the region (Lovejoy & Nobre, 2019). Where once occupation relied on hydro ways and riverine occupations, with the modern project it has have expanded into and within the forest itself, exploiting and depleting natural resources (Calisto Duran, 2019). These processes have radically altered the occupation conditions and yet have been planned to do so, as a result of regional planning visions and institutional accords acting with various stakeholders which intend on developing and integrating the region with the rest of the modernized global network.

This paper will investigate two recent regional integration visons for the Brazilian Amazon which approached this integration with different perspectives and intents. The first, during the military regime between 1964-1985, where the action of the state sought integration of the region for reasons of national sovereignty. The second, during and after the period of re-democratization and stability (1988-2016), where the region would be integrated with the discourse of economic growth and logistic facilitation (Becker, 2001; Calisto Duran, 2019). Both moments had considerable and decisive action from the state although articulated differently given the nature of those in power.

During both periods, the visons for development and integration dealt differently with natural and environmental conditions as well as social existances of local and traditional inhabitants. In many cases, projects for infrastructural integration were implemented and resulted in conflicts regarding these local conditions. This resulted in mobilization from local peoples and in the articulation and instrumentalization of new societal organizations locally, nationally and internationally to counter act the pressures of the state (Becker 2010, 2005, 2001; Calvi, 2019; Nascimento, 2017). In many instances, during the later phases of integration, the state acted to manoeuvre around such previously accorded conditions, causing new forms of conflicting interests and actions.

This paper cannot attempt to resolve the conditions to which state led regional integration projects must develop in order to minimize conflicts, but rather identify the variables in the regional scale projects implemented during these two eras of state led planning and argue for a local and an "Amazon focused development" approach that does not leave the interests of the region as secondary.

2.
Territorialisation and Regionalization

There is still much discourse around the conditions of urbanization, as new systems and dynamics shape the processes that form and delineate what is meant by urban. More recently, our understanding of the "limits" of urbanization (If we can even still speak of a limit) have been well investigated and understood that the post capitalist economic condition has hyper connected the urban at a global scale under a phenomena of planetary urbanization (Brenner & Schmid, 2012). This networked condition of the urban at the planetary scale has conformed and performed differently towards its territories and sphere of influences. Extended urbanization[1] (Monte-Mór, 2014) explains the condition of territories and settlements that are under the influence of larger urban agglomerations and cores, economically and productively, where the central element of recognition of the urban influence becomes its extended spatial network.

There is then the need to study the urban in its extended configuration, given that the urban object itself is insufficient to tell the full story of urbanization in the 21st century. As we look to the processes of urbanization around the world, far from the regulation and conditions under a western sphere, urbanization has progressed differently to the well-known definitions from a Eurocentric perspective. These varying forms of territorial articulation are defined by social, economic, geographical and political accords that produce different forms of territorialisation (Raffestin, 2012) and must be understood from the specificities of their contexts. It is, however, common to most cases that the state has acted, in one way or another, to coordinate the actors over the territory according to its own arrangements and visions for such territory (Brenner, Jessop, Jones & Macleod, 2008). It is in the state, and at the scale of the state, that the articulation of larger networks of production and consumption begin and eventually form the agglomeration patterns of extended urbanization (Monte-Mór, 2014). This scale of action can only be coordinated through such overarching vision and requires an arrangement under the regional scales (SOJA, 2015). Thus, it is through the processes of planning from the state level (at first) for the regional scale, that we understand how and why extended urbanization is a consequence of such arranged procedure.

This is important to bring into attention because, given the nature of production under late capitalism, and considering what has been said before regarding different contexts, which must be considered when reading processes of urbanization around the world, we can begin to understand the determinant role of regional planning visions done by the state as a primordial agent of and for this model of territorialisation. However, we must keep in careful consideration the scale at which the state conducts such regional planning. There is an intrinsic difficulty of approximation towards the local as well as challenges regarding the approach framing. In many instances, the state can only content with integration visions for the varying territories under such state scale perspective (Brenner, Jessop, Jones & Macleod, 2008; Vainer, 2002) and it is precisely because of this, that local conditions might be overlooked, purposefully or not.

3.
The Origins of Urbanization in Brazil and the Brazilian Amazon

Since the Portuguese colonization of the Amazon in the 17th to 18th century, the region has been disputed between foreign powers and against local populations. The condition of settlement and occupation of colonial Portugal focused mainly on the Atlantic coast, settled port cities and hinterland towns with economies focused mainly on mineral extraction and monocultures destined for foreign trade. However, in the amazon, they were unable to expand inland as with other regions of South America, and so the strategy to control and withhold this territory was by settling strategically around water, on river deltas and converging rivers within the region (Risério, 2012). The act of territorialisation in the amazon has always been intricately related to issues of sovereignty and how to withhold control over the vast territory with minimal efforts.

It is important to understand and differentiate the urbanization process in Brazil, and especially in the Brazilian amazon, from the definitions that describe the western Eurocentric process of urbanization[2]. Occupation in the tropics started from the city, where only later would these relate to hinterlands and nearby landscapes to consume and produce (Risério, 2012). This shift is important to understand the relationships that such urban settlements had with their territories. Rather than spaces of liberation of the rural and wilderness through industrialization, these cities were born from a colonial mind set and institutions built fundamentally to extract and exploit the regional landscapes (Becker, 2001; Risério, 2012).

In the case of the Amazon, this fundamental aspect would drive the intentions and the layout of the region's urbanization. Given its inherent remoteness in relation to the modernizing systems of the world, most urban settlements can be defined as proto-urban forms, represented by the "incomplete manifestations of the urban industrial patterns that are characteristic of contemporary regional and nation social formations" (Monte-Mór, 2014). Becker (2005) explains that the economic system that forms such settlements in the amazon as economies of frontier where the exploitation of natural resources is seen as infinite and linear and fuels the continuous occupation and land use change in the region. This pervasive model of occupation and development reiterates the boom and bust cycles in the region, largely related to economies all most fully dependable on the value of raw resources in the global market (Calisto Duran, 2019).

1.
Derived form Henri Lefebvre's concept of Urban Zones. For Lefebvre, the urban zone refers to the historical stage of spatial organization in which industrial capitalism, already firmly established within the city and controlling everything in its sphere of influence, cause the division of the city (successor to the 'polis' and the 'civitas') into two related parts – the core, and the urban fabric.

2.
European urbanization was fuelled by Industrialization which required the concentration of labour in cities and the consequent exodus of the rural to provide this workforce.

4.
“Integrar para Não Entregar”: Regional projects during the Brazilian Military regime (1967 – 1980)

4.1.
The Military regime and the “economic miracle”.

In 1964 the military regime of Brazil was consolidated through a coup (Becker 2010; 2005; Brandão & Siqueira, 2013; Calisto Duran, 2019; Monte-Mór, 2014; Nascimento, 2017; Veloso, 2008). Quickly this new era began to restructure the nation and its institutions, looking to promote a new phase of “developmentism”, also known in this context as authoritarian developmentism (Monte-Mór, 2014; Nascimento, 2017) which characterizes the military government’s action strategies. In this period, fiscal and taxing systems were reformed allowing for a larger intake for government spending, the financial system was reformed which allowed easier financing and loan projects for private and state projects and the opening up for foreign investment for particular sectors, especially for industry and infrastructure (Veloso, 2008). This led to the period known as the milagre economico (economic miracle) between 1969 and 1973 which saw high economic growth in brasil and when major national industrialization and infrastructural projects were planned and implemented. It was here that the amazon was placed as a region of high priority for development and national integration (Becker 2010; Calvi, 2019; Monte-Mór, 2014; Nascimento, 2017) and a series of institutional arrangements were organized to project the vision of the state over the region by articulating state and private national and foreign financing of structural projects and industry focused mainly for extraction of minerals and raw materials (Calvi, 2019).

4.2.
Integration for sovereignty

The Integration of the Brazilian Amazon under the military government era was the primordial challenge of the regime. The PIN - Plano de Integração Regional (Regional Integration Plan) and the Planos Nacionais de Desenvolvimento I e II (National Development Plans I and II) placed the amazon as the central region for expansion and occupation of modern development (Nascimento, 2017). These plans coincide with the economic miracle period as explained above and were the materialization of a series of preestablished state institutional arrangements that planned the necessary political ecology to territorialize the region, such as the SUDAM – Superintentendia de Desenvovlimento da Amazonia, the BNDE – Banco Nacional de Desenvolvimento Economico (National Bank for Economic Development, Banco da Amazonia and the Ministry of National Integration, overarching the agencies acting on the amazon (Nascimento, 2017).

Through the idea of progress and modernity, the military regime sought to integrate the region by mainly developing the conditions of natural resource exploitation, which denied the amazon as a region vastly occupied by other forms of knowledge and inhabitation (Nascimento, 2017, pp. 52). the proposed projects for occupation followed regional vectors of occupation, which looked to promote economic growth and modernization in strategic regions with high natural resource deposits. This was maneuvered in such a way to guarantee new settlement vectors and promote the occupation of what was known as the “demographic emptiness” of the region, long considered an official public problem (Nascimento, 2017, pp. 62). The issue of consolidating national sovereignty over the region was primordial for a government which saw the potential of natural resources in the amazon as a guarantee for long term and linear economic development, which could fuel industrialization of the southern states of Brazil (Becker 2010, 2005, 2001; Nascimento, 2017).

The PIN plan had two clear strategies for territorial occupation and regional planning for the region. The first, with the identification of large resource deposits using radar technology which could indicate the regions to be considered for occupation and development. It was fundamental to realize this prospection in order to arrange the interested parties for investment in mineral extraction (Calvi, 2019). After having identified these potential hubs, the vectors for expansion were drawn to reach these territories and a model for colonizing the “emptiness” was planned. The opening of road infrastructure would be the main strategy to assert and secure the geopolitical strategy (Calvi, 2019). For this, the INCRA – Instituto Nacional de Colonização e Reforma Agraria (National Institute for Colonization and Agrarian Reform), was assigned the second phase of the PIN and was in charge of developing strategies for colonization along the new roads which would be opened in the region (Nascimento, 2017, pp. 83).

In 1973 the Oil Crisis was a major blow to the government’s plans for national development. Brazils relationship between mineral extraction, energy and industrialization would be totally redefined form this moment, which definitively made way for the planning of a new hydroelectric power generation matrix in the country (Nascimento, 2017). Again, the region and its high potential for hydro energy generation, given the vastness of its water basins, would subjugate the region to the highly urbanized and industrial South, which needed a reliable source of energy, and not depend on fluctuating oil prices.

4.3.
The Transamazonica road project

The Transamazonica road project was the most emblematic project of regional integration during the military regime period and the PIN project. As stated by Nascimento (2017) this was considered “the greatest step in the direction of a rational occupation project for the “emptiness” of the amazon”. The project resumed well two propaganda mottos of the regime according to General E.G. Médici himself (President from 1969-1974) where the project was the “nationalist solution for a nation problem”, idea that resided in the motto “men without land from the Northeast for land without men in the Amazon.” He refers to the population of the Northeast of Brazil, which suffered with extreme drought and poverty for decades, and were constantly organizing rural uprisings demanding land reforms. The project sought to establish settlements for 100.000 families along the first section of the highway between Cuiabá and Santarem. The colonizing program oriented by INCRA, looked to guarantee 75% of the land opened at the margins of the

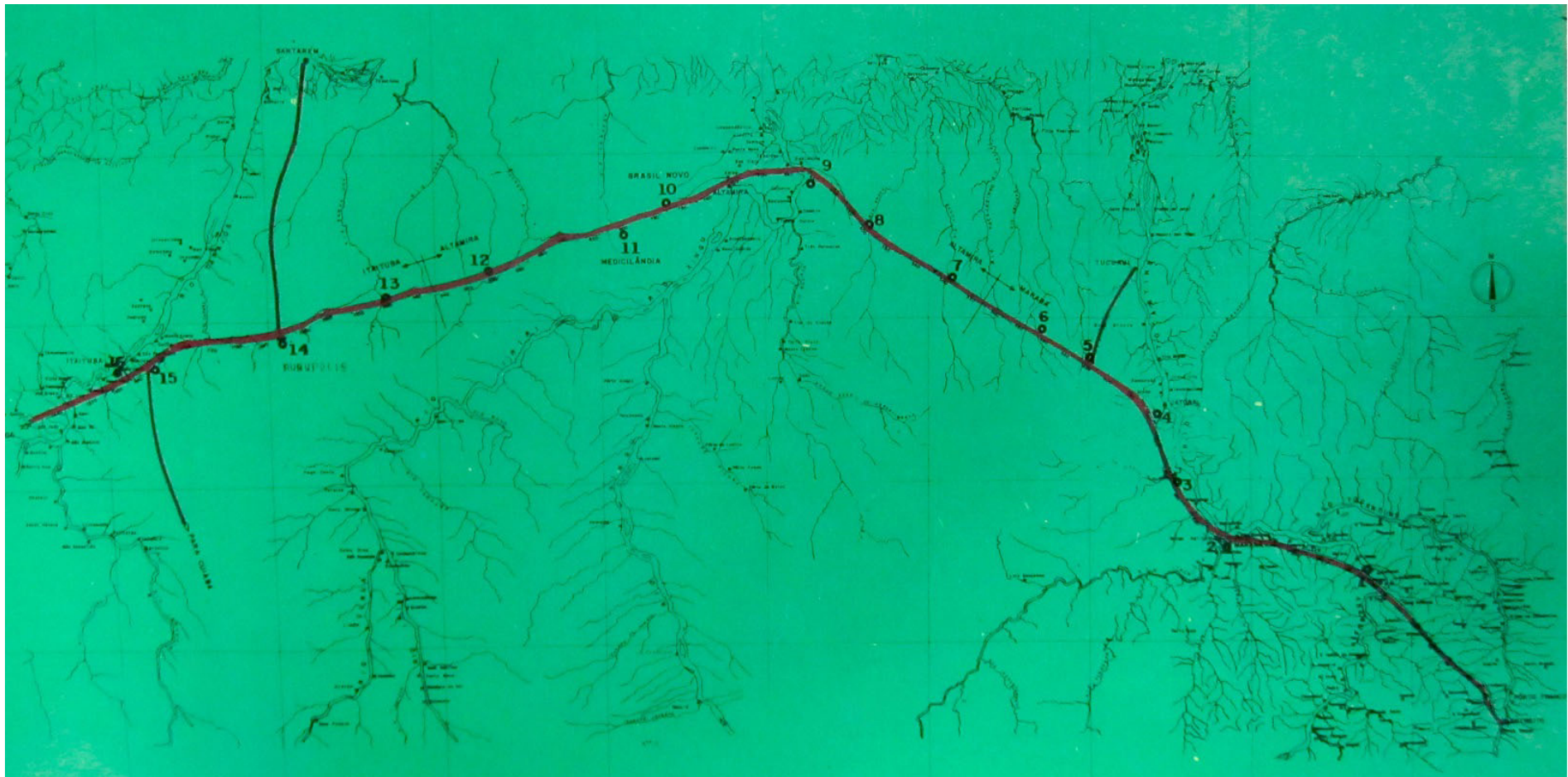
Satellite Image of the
BR-230 Transamazonian Highway.
Source:
Calisto Duran (2019)
from Rego (2017)

Transamazonica to North-Easterners.

The project was also a nationalist solution which stamped the political dominance of the regime over the region. It provided a solution for the old concern of sovereignty, which had as a motto “integrate not to hand over” (Integrar para não entregar) given the low populational density closer to the inland frontiers of Brazil and also the vast Indigenous populations of the region that inhabited within Brazilian borders (Becker, 2005; Calvi, 2019; Calisto Duran, 2019; Nascimento, 2017).

The road was planned with a model of Rural Urbanism, devised by Brazilian architect José Geraldo da Cunha Camargo whom integrate the technical body of INCRA. The plan was a downgraded version scheme of Ebenezer Howards Garden City, but infinitely linear. Urban nodes of varying levels (Agrovile, Agropolis, Ruropolis and village) would provide urban settlements along the Transamazonica BR-230. This mode of development drastically differed from the vernacular and millennial system of riparian urbanization and transportation (Calisto Duran, 2019).

This model of land use and occupation had many inherent problems as can be expected. The facilitation and incentive to occupy public land which would be legalized (to individuals or cooperatives – public or private) meant that the government was actively promoting and allowing the transformation of native forest into arable or urbanized land. Due to the promise of land, many settlers that were not accounted also occupied lands which were not meant for occupation with the hope that they too would eventually be legalized. The failure to review this plan by the



government contributed to deforestation and consolidated a culture of occupation based on occupying public land that could then be legalized which still is evident today with the act of Grileiros[3] (Becker, 2005; Nascimento, 2017).

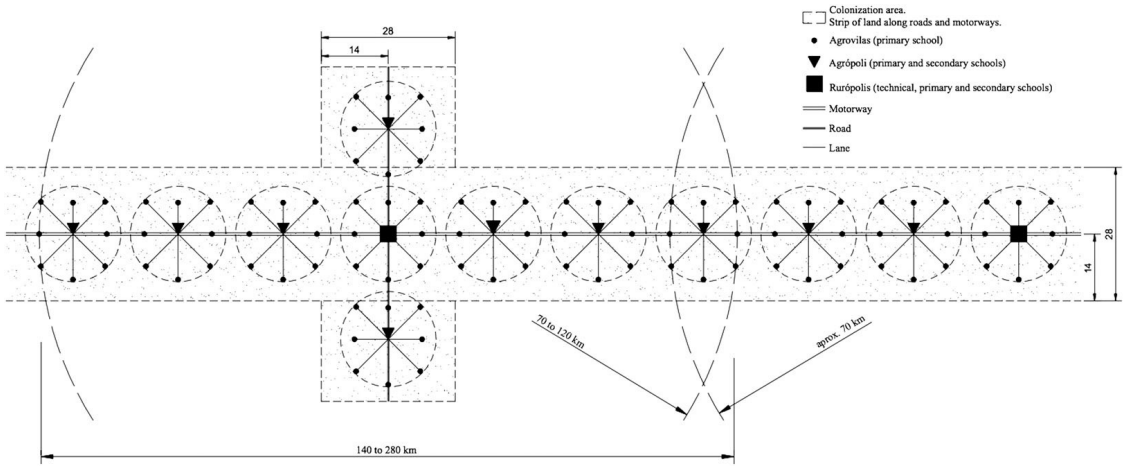
The land around the highway was organized firstly in 100ha plots along the highway margins, as these lands were occupied, new land was demarcated parallel to the offset of the highway and could continue 12km into the forest (Araujo, 2008 in Nascimento, 2017) The planning of these occupations did not consider the pre-existences of local indigenous or local settlements or either geographic limitations such as topography, waterbodies or soil conditions and as expected, caused many local conflicts. This model of occupation was coordinated by an authoritarian regime which was not prone to dialogue or attaining to human rights and answered with violence and allowed genocide (Nascimento, 2017).

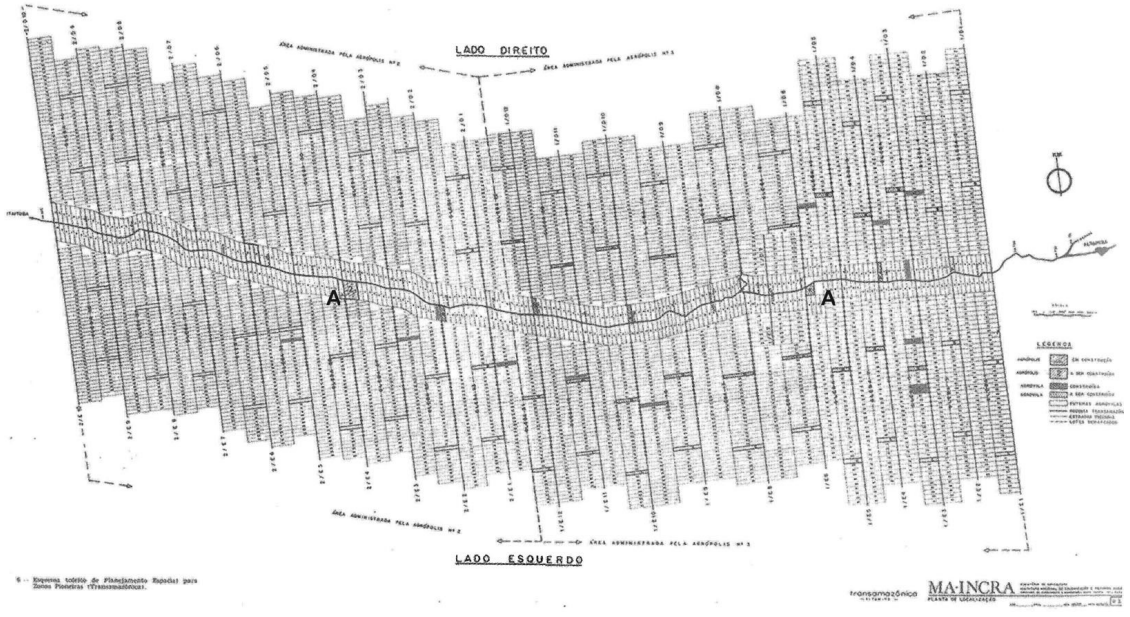
The government through the state also pushed for cattle livestock as a model for economic development in the region, which eventually lead to a disparity in the land concentration which was left unregulated and allowed for certain people to gain more land given their designated land use (Nascimento, 2017). In the end, as Nascimento (2017) explains, these development policies and planning transformed “places into places with a destination, and in practice they became areas of expulsion”.

3.
Grileiros are groups of people which actively seek to occupy and claim public land or local/indigenous land illegally, by performing small settlement actions such as cattle ranching, small farming or even mining activities to eventually legalize for economic profit in resale.

Top:
Rural Urbanism planning scheme for the Transamazonian highway.
Source:
Calisto Duran (2019)
from Rego (2017)

Bottom:
Linear land subdivision along the Transamazonian highway.
Source:
Calisto Duran (2019)
from INCRA (1971).





5.
Regionalization: Re-democratisation and continental strengthening (1988-2016)

5.1
Re-democratisation and structural failure

Following the state transition phase (1985-1988) from a failing authoritarian regime, Brazil reintegrated its democracy and forged a new constitution which would value the power of scales, decentralizing power from the federal level and distributing more to state and municipalities, which were the most benefited from this (Vainer, 2002; Veloso, 2008). This led to a new management and planning conformation of the Brazilian territory under the pacto federativo (Federal Pact) which institutionalized and instrumentalized government power to smaller scales with direct effect to local demands (Vainer, 2002; Veloso, 2008). The most noted initiatives of this new arrangement are the orçamentos participativos (Participatory Budgeting) which were municipal commissions composed by state and municipal public workers, elected government representatives and civil society representatives that planned local budget requirements democratically. Other commissions like these were formed for many branches of municipal and state level action (Abrucio, 2005; Brandão & Siqueira, 2013; Vainer, 2002) which drastically contrast with the planning management model of the previous authoritarian regime which disregarded the local and plural voices with a more horizontal approach.

One of the main reasons for the decline of the military regime was the economic decline which came right after the period known as milagre economico. Public dept and rising inflation crippled the regimes legitimacy under the industrial and rural oligarchies (Abrucio, 2005; Brandão & Siqueira, 2013). The consequent democratic government struggled to manage the inflated state and rolling debts and was unable to invest in infrastructure which could keep up with the country's urban and industrial growth. During the second mandate of President Fernando Henrique Cardoso (1998-2002) Brazil experienced large national energy deficit peaks which resulted in blackouts around the country and major urban centers (Calvi, 2019). This was due to a combination of factors (consecutive low rain seasons which were insufficient to recharge dam reservoirs4 and increasing energy demand from urban growth and industry) but the main problem could be traced back to poor energy system planning and a lack of investment in the sector to keep up with demands, stemming back from the final years of the military regime up to that moment (Calvi, 2019). This would instigate a series of new regional planning initiatives that looked to integrate the energy landscape of Brazil in order to guarantee a steady supply of energy for the country, and here, eyes were again turned back to the amazon for the long term solution which still ad a large energy output potential for hydroelectric infrastructure (Becker, 2005; Calvi, 2019).

5.2.
Integration for market growth

Brazil has been experiencing land use change from native untouched and natural to large monoculture and cattle livestock for the last half century due to incentives and public policy from governments and the state (Becker, 2005; Becker 2010; 2005; Calisto Duran, 2019; Calvi, 2019; Monte-Mór, 2014; Nascimento, 2017). Soy monoculture has become a major commodity export for Brazilian GDP growth, and the agricultural sector has become an important agent of pressure for policies and state plans that facilitate the placement of their produce in the international market (Calisto Duran, 2019).

We look at two regional integration projects that have dictated the territorial planning of brazil from the end of Fernando Henrique Cardoso's (FHC) term and the subsequent governments of Lula and Dilma (2002-2016), with considerable differences between them but both are faithful to the same visions for national and continental integration. The IIRSA - *Iniciativa para a Integração Regional da America do Sul*[5] (Initiative for Regional Integration of South America) was first proposed by FHC in 2000 (Nascimento, 2017). IIRSA had the primary purpose of planning and developing infrastructural routes and systems to promote regional integration at a continental and promote transnational commerce, and therefore looked mainly to enhance the logistic capacity of the region (Calisto Duran, 2019; Nascimento, 2017).

The continent was subdivided into 12 infrastructural axes and clearly favored regional integration that sought to bridge the Atlantic and Pacific oceans. In the case of the amazon, this was the first official collaboration planning project that considered all 8 countries with Amazon biome, and as a strategic region that it is, had an axis of its own with 91 projects and an estimate of 8 million US$ in projects (Calisto Duran, 2019; Nascimento, 2017). Although the initiative sought unprecedented regional integration, the project did not contemplate social and structural issues of unequal economic distribution and local sustainable development, rather "increasing social-territorial fragmentation given that only fractions of the territories were of interest for investments from the point of view of facilitating logistics to serve international markets." (Nascimento, 2017).

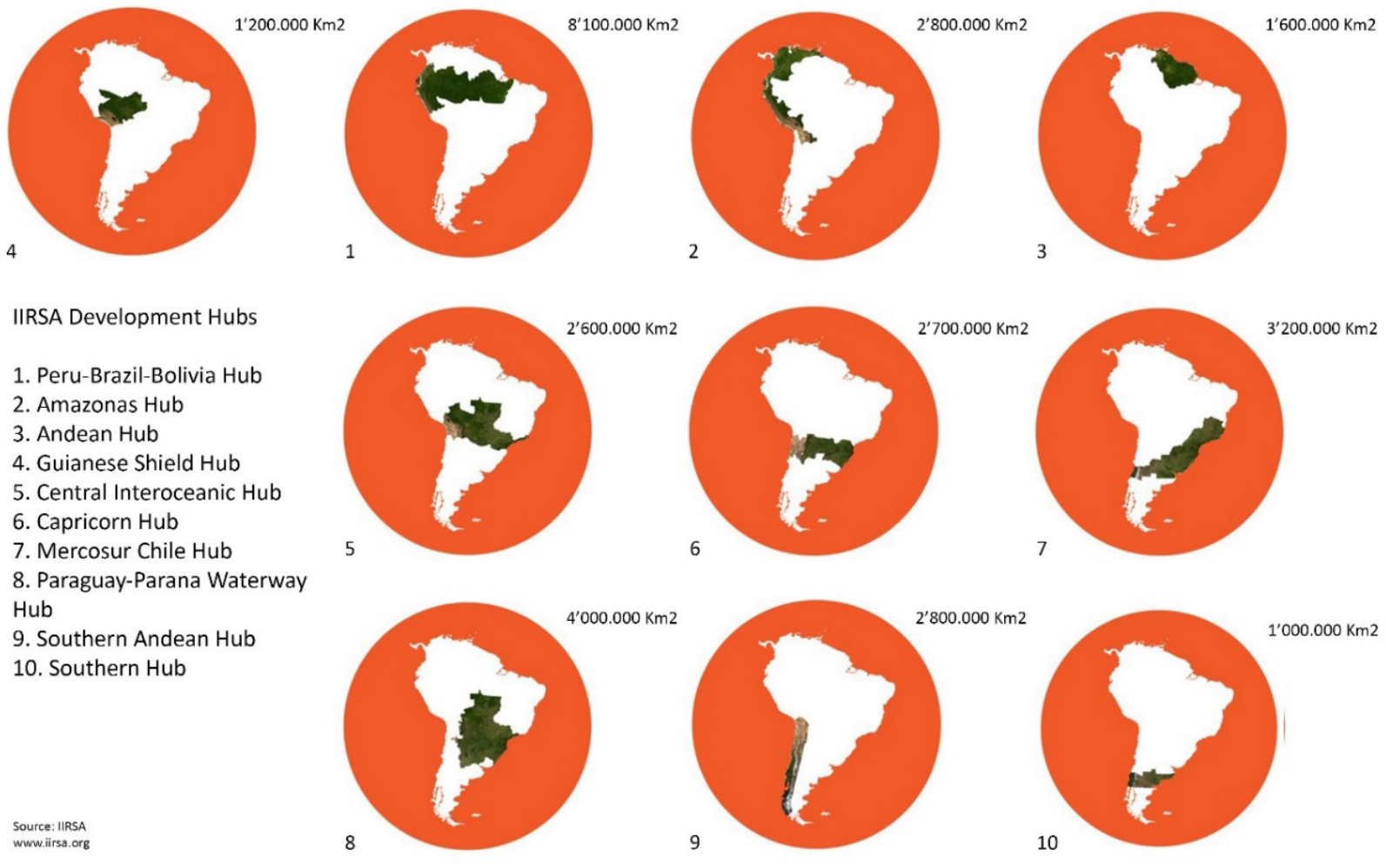
On the national level, Brazil mobilized the PAC – Programa de Aceleração do Crescimento (Growth Acceleration Program) which in many cases intersected with IIRSA orientations (Nascimento, 2017). The program sought to "leverage the countries growth, and with this, generate employment and wealth distribution" (Brasil, 2014) with a clear orientation for planning and execution of large logistic and energy

4.
In the 1990s, The Brazilian National Energy System was nearly exclusively composed of Hydroelectric Dams.

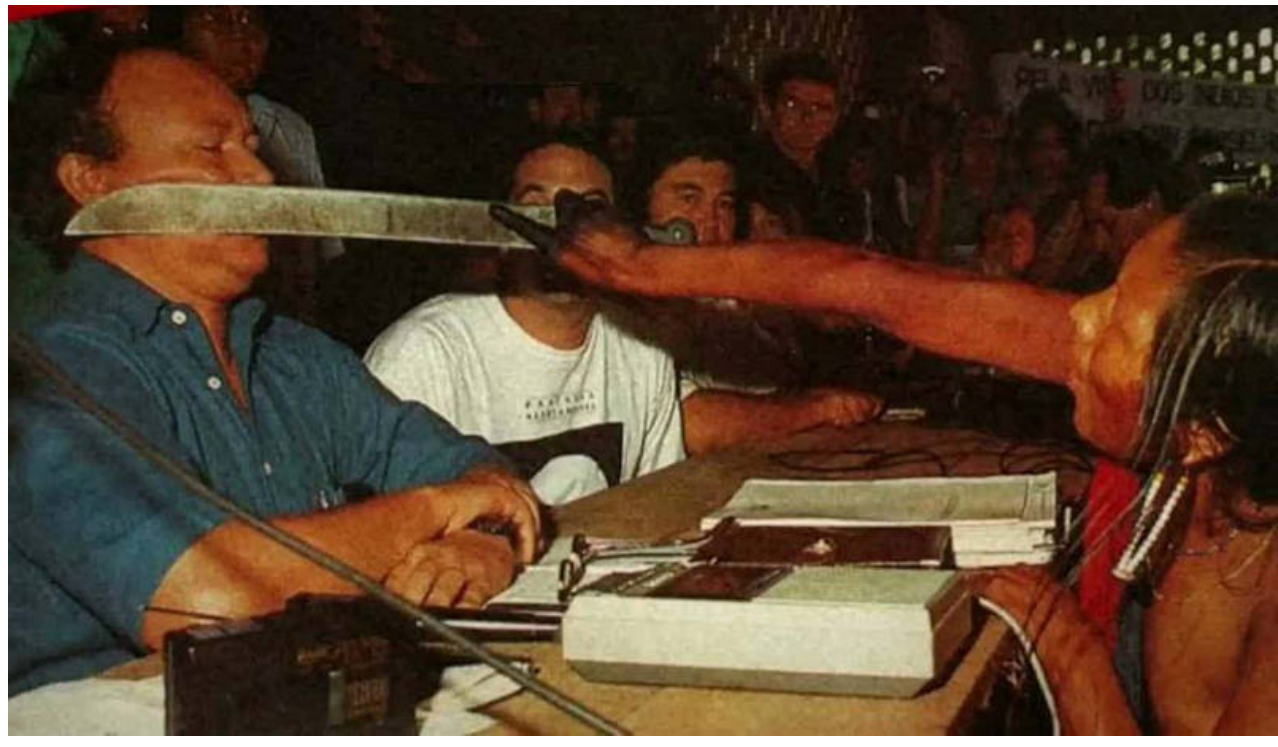
5.
IIRSA was the cooperation initiative of South American Nations that composed the regional commercial and economic alliances of MERCOSUL/MERCOSUR (Single Market Commission for South America), Aliança Andina (Andes Alliance) and was charged with the planning and facilitation of implementing transnational regional integration plans for South America between 2000 and 2016 in order to facilitate international trade routes for continental resources, (mainly primary production and commodities) (IIRSA, 2018).

infrastructural projects around the country. The logic of integration from the PAC aligned with IIRSA, since there was a focus to give access for companies to the natural resource deposits in the Amazon with the construction of reads and hydro ways, and powered by new hydroelectric dams distributed all over the amazon basin (Nascimento, 2017). It is for this reason, that Nascimento (2017) argues that both IIRSA and PAC present arbitrary integration projects for the amazon, just as in previous decades. These projects fail to dialogue adequately with the local inhabitants of the region and look only at the exploitation of resources at all costs.

IIRSA Hubs.
Source:
Calisto Duran, 2019.



Tuíra,
indigenous woman,
at the moment she challenges the
ELETRONORTE
Director Muniz Lopes.
Source:
Nascimento, 2017.



5.3.
The UHE Belo Monte Project

One emblematic case of the modern development and integration project for the amazon region recently implemented and that caused prolonged local conflict was the Usina Hidroelétrica de Belo Monte (Hydroelectric Powerplant of Belo Monte) on the Xingu river in the state of Pará, Brazil. The project had been envisioned and planned for execution already in 1975 under a different name, Kararaô which in local Kaiapô indigenous language means “War Cry” (Nascimento, 2017). With the past conflicts that surged with the implementation of infrastructural projects during the military regime, local organizations and NGOs were mobilized to confront and question the intents of such projects and their impacts. This process led to a gradual institutionalization of certain agents and the social organizations which then were ready to resist new projects already during the period of re-democratization (Becker, 2005; Calvi, 2019; Nascimento, 2017;). Already in 1987 a large social mobilization happened in the neighbouring municipality to the dam project in Altamira; Many protests and movements surge from other sectors of society, and also with the aid of certain Brazilian institutes for indigenous rights and university members which catapulted the project into national and international discussion (Nascimento, 2017).

The legacy of past conflicts with such projects and the new institutional and democratic arrangement lead the national electric sector to elaborate new environmental licencing guidelines and documents which advised on methods and measures for compensation of local parties (Nascimento, 2017). Commissions for discussion with local actors and communities were also held to legitimise the environmental and local impact reports which would be approved by national regulatory bodies such as IBAMA[6] and FUNAI[7] . These revisions would alter the flooding areas and general interference areas of the project, but ultimately the project would never be definitively cancelled. Despite this, the indigenous articulation with national and international agencies and organizations were effective in postponing the construction of the dam and forced the authorities to revise the overall initial project and the integral process of planning and implementation of such projects (Nascimento, 2017).

Hydroelectric dam projects in the amazon region present various territorial and legal difficulties, given the reduced terrain slope, which increases the inundation impact of reservoirs, affecting large indigenous territories and communities and various types of conservation units, normally located near or within these areas (Brasil, 2019). These conditions complexify the ecological licencing of such infrastructures.

6.
IBAMA - Brazilian Institute of the Environment and Renewable Natural Resources is a Brazilian Ministry of the Environment's administrative arm.

7.
FUNAI - National Indian Foundation is a Brazilian governmental protection agency for Indian interests and their culture.

6.
Discussion

As we have seen, the conditions of regional planning have structural differences between both periods studied in this paper. During the military regime period, regional and territorial planning strategies were conducted exclusively by the state and coordinated by specific agencies which intended to promote the integration of the region with the rest of the nation in a strategy to assert national sovereignty and control of the regions resources. This model sought to promote the integration of the region for national purposes, yet allowing international companies to establish industry and resource extraction infrastructures meant for export, but ultimately under the supervision and territorial strategy of the state.

These strategies were consolidated by colonization plans at the local state and municipal level a well as in the political spheres (Calvi, 2019). In this way, even with the fall of the regime, institutional and political tendencies were maintained well into the post period of democratization, which were not capable of rupturing the interventionist and verticalized geopolitical logic of the state. This is clear when looking at the regional and continental integration projects of IIRSA and PAC. Although there are significant changes in State management and planning methods and policies, the intentions of these integration projects still look at the Amazon as region to extract resources and export to other regions in order to fuel development elsewhere (Calvi, 2019).

This region has been occupied and urbanized following models of integration that have not taken into consideration the specific dynamics and models of development present in the region, and because if this, have failed to promote the so desired integration through development. The Amazon region must be seen as a region with an internal regionalization dynamic of its own, with its own productive structures from varying local actors (Becker, 2005. pp. 83). This would constitute a major paradigm shift from the nation for the region and could promote a sustainable and sensible development strategy for the unique Amazonian dynamic. As Becker (2005) illustrates, the fact that the region can identify itself as a region in itself, constitutes the strength needed to resist its own and the forests destruction".

7.
Conclusion

This paper has looked at the differing projects that have constituted the urban and infrastructural integration of the amazon region from two important government periods of Brazil. The visons of integration have shown that, although they differ in the way they have been implemented and projected given the intrinsic nature both the authoritarian regime and the democratic period have towards their methods of exerting power, they are similar in the motives that project such integration.
Both periods see the amazon as a region to be controlled by their own narratives, without a regard to the conditions of inhabitation, occupation and production that pre-exist in the amazon region.

We have also seen, through the Transamazonica and UHE Belo Monte projects, how each of these political periods dealt with the local conditions and populations and propagated, in one way or another, actions that helped aggravate social conflicts or the environment and promote deforestation. By understanding these processes, we can identify the instances that must be addressed to promote positive changes that consider the local models of existence.

Finally, we have concluded that in both periods, integration has not been idealized and implemented considering the existing and local regional dynamics of the amazon as a region in itself. Having understood that effectively it is a region in itself, the way forward would be to devise a form of politics that places in evidence local occupation and substitute the exogenous projections for control and exploitation of the region, consolidating what development today and the pre-existing forms of territorialisation in the amazon region.

8.
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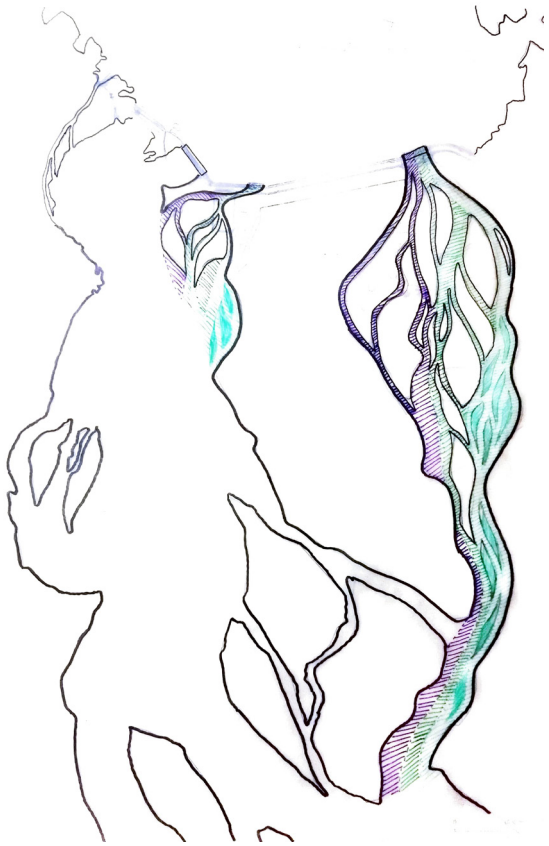

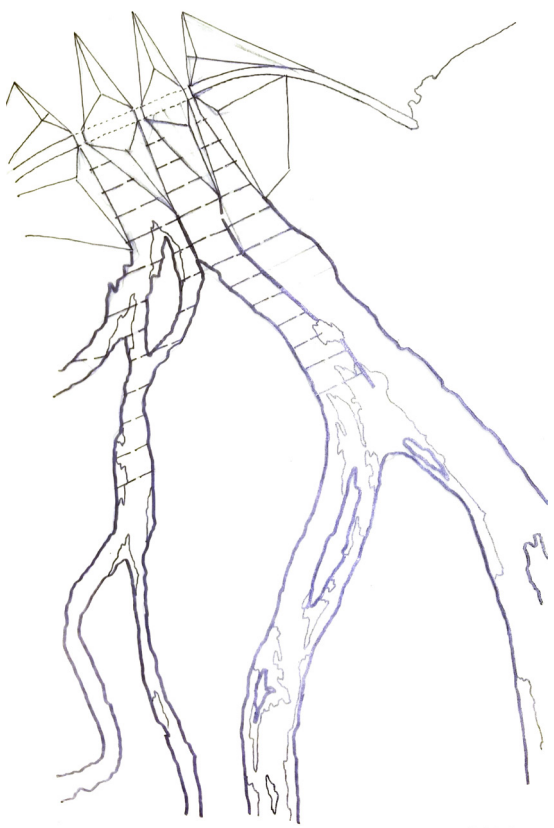

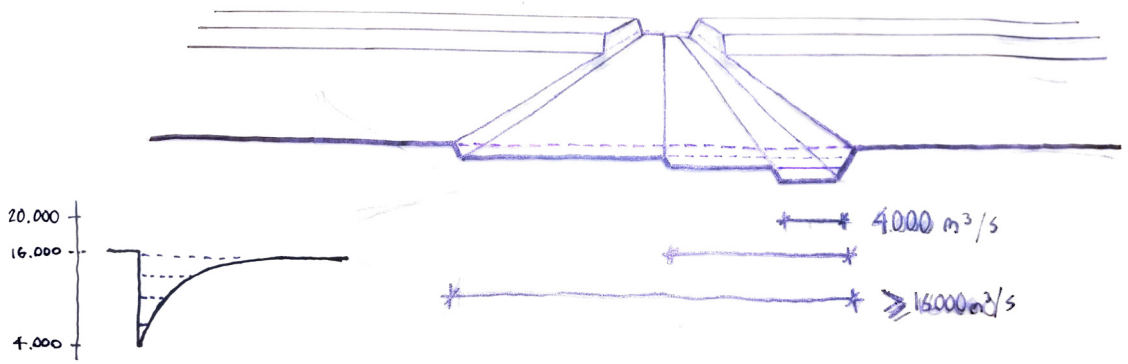
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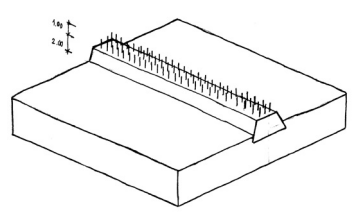

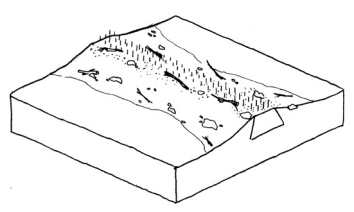

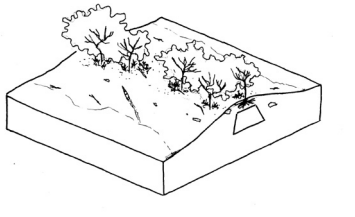

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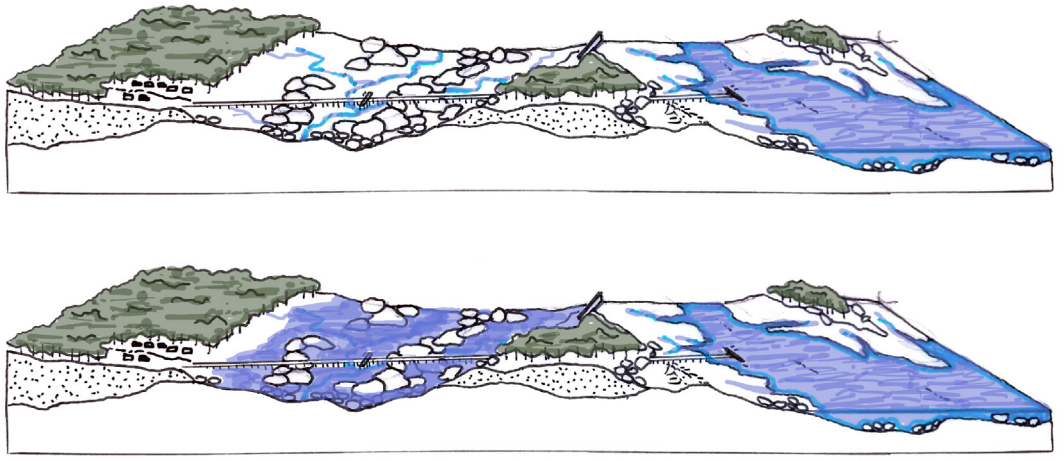

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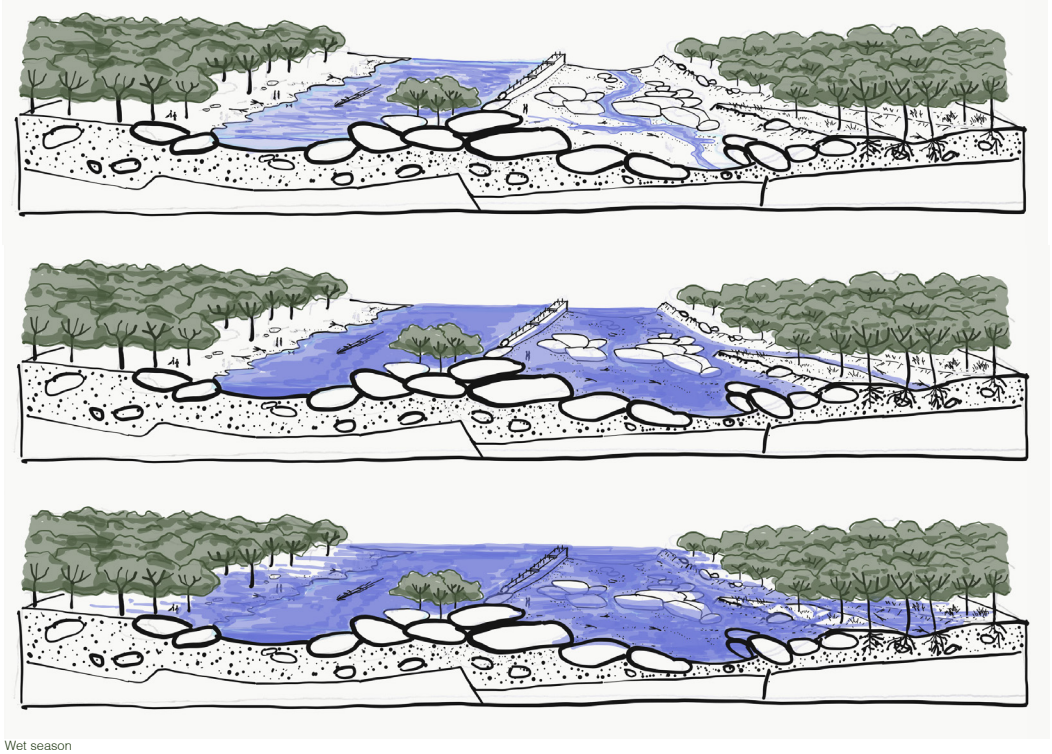

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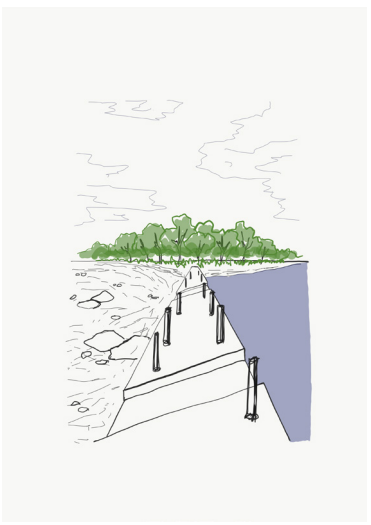

The Xingu River Basin sits within the Amazon Biome and integrates its deforestation belt. It is home to a multitude of endemic species and indigenous nations which are now threatened by the disruption of the river's water pulse caused by the construction and operation of the Belo Monte Hydroelectric Dam.

The project explores the possibilities for mediation between natural and local-social systems with the demands of development brought by modernity in the river's basin, specifically to the areas directly affected by reduced water flow caused by the dam.

This thesis questions the limits of urban practice in such territories, posing a question that possibly cannot be answered with the tools we have at our disposal. If our field intends to position itself within such territories, we must begin to propose an alternative paradigm which can adequately territorialize cosmopolitics.
Is *Cosmourbanism* possible?