Spring 5-21-2021

Mapping Grounds for Reparations in Jaraguá Peak

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Recommended Citation

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A Thesis submitted to the faculty of the School of Architecture in partial fulfillment of the requirements for the degree of: Master of Environmental Design

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Yale University
May 2021

Abstract

For the Guarani Mbya, *ka'aguy* (Atlantic Forest) is sacred.[1] Yet, only 12 percent of the Atlantic Forest original coverage remains. A portion of that is in Jaraguá Peak. The Peak is also the highest point within São Paulo, located in the northwest region of the city. Anyone who lives in São Paulo knows Jaraguá Peak as a point of visual reference—the only forested area rising above dense urbanism. Two hundred years ago, São Paulo was *ka'aguy*. Now, the city occupies part of Guarani territory, which spans across the borders of what is now known as Paraguay, Argentina, Uruguay, and Brazil. São Paulo exists entirely within Guarani territory.

São Paulo's urban growth and the expansion of infrastructural networks (roads, power lines, dams) have disrupted Guarani infrastructures (the presence of Atlantic Forest, the continuity of paths between Guarani villages, access to clean water). The three busiest roads in São Paulo—the first began in 1940—cut through the peak area. Since the roads opened for car use, urban growth, starting on the roads' borders, have encroached continuously on the Atlantic Forest. The São Paulo state government also transformed the peak into a state park for tourism, 60% of which overlaps Jaraguá Indigenous Land, demarcated for the Guarani. Two telecommunication towers installed at the top of the peak in the 1960s broadcast electromagnetic pollution over the Atlantic Forest and its inhabitants. Nonetheless, Guarani communities in São Paulo remake Guarani geographies every day, resisting Atlantic Forest encroachment and circumventing colonial networks. Guarani communities in the north and south of São Paulo hold a crucial infrastructural and environmental role for the entire city, increasing São Paulo's environmental security by recovering degraded soils and recuperating Atlantic Forest areas.

This project maps the history of infrastructural expansion in Jaraguá Peak. It represents the history of each infrastructural layer (roads, telecommunication towers, power lines) in sectional maps that expose long-term changes on the ground. Each map accompanies a set of case studies that received reparations for infrastructural harm. Maps and case studies are organized in appendix-tools, which can serve as detachable documents from the larger body of the thesis. Each appendix-tool (infrastructural reparations cases for reference, activist mapping, and public engagement strategies) aspires to contribute to Guarani activism.

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[1] http://cinturaoverdeguarani.info/

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Land Acknowledgment

This project is centered on Guarani territory, in Jaraguá Peak, in what is now known as the state of São Paulo, Brazil.

While working in the Yale School of Architecture, this work process took part on the traditional lands of the Mohegan, Mashantucket Pequot, Eastern Pequot, Schaghticoke, Golden Hill Paugussett, Niantic, and the Quinnipiac and other Algonquian speaking peoples, in what is now the state of Connecticut, United States.

This project honors the past, present, and future relationships between these nations and their lands.

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Introduction

In September 2017, as a protest against the reduction of the Jaraguá Indigenous land demarcation from 532 hectares (ha) to 1,7 ha, a group of Guarani Mbya demonstrators shut down the antennae towers that transmitted telephone and television signals in Jaraguá Peak, the highest point in the city of São Paulo.[2] The antennae shut-down caused 600,000 people to be without television and mobile signals.[3] The group of demonstrators allowed the restoration of the antennae signal only after meeting with representatives of the State Government to renegotiate the designation of Jaraguá Indigenous Land back to 532 ha.[4]

Fort the Guarani Mbya, Jaraguá Peak, where the towers are installed, is sacred. It sits in the heart of approximately 600 hectares of endangered original Atlantic Forest, of which only 12 percent remains—only 7 percent above an area of 100 hectares.[5] Two hundred years ago, the entire city and state of São Paulo were Atlantic Forest. Now the city occupies part of the original Guarani territory, which spans across the nation-states of Paraguay,

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[2] As Brazilian Anthropologists Valéria Macedo and Dominique Tilkin Gallois argue, the term "Guarani" involves an extremely complex multiplicity of collectives, networks and relations. The Guarani Mbya are one among the many Guarani groups: Ava, Nhandeva, Xiripa, Tupi, Tupi Guarani, Kaiowa, Pai Tavyterã, among others. Each name brings multiple histories, languages, knowledge and cosmologies. The term "Guarani" indicates a millenary connection between groups: from more than 600 years from now since before the colonization, to connections taking part today, in 2021. In the book "Nas Redes Guarani," organized by Macedo and Gallois, the authors argue for the understanding of the term "Guarani" not to designate the many nations the term encompasses, but to designate the dynamic and complex network of relations between the multiplicities of groups. The authors also describe how the term Guarani is an incomplete and ever changing term. No fixed names or contours are able to depict the complexity and multiplicity of Guarani groups. Anthropologist Lucas Keese dos Santos also remind how the term Guarani is considered a colonial term by some Guarani, who identify themselves as *nhande kuery* or as *mbya kuery*. See: Gallois, Macedo. Nas Redes Guarani. São Paulo: Hedra, 2018, p.9 and Lucas Keese dos Santos. A esquiva do Xondaro: Movimento e acao politica entre os Guarani Mbya. Universidade de São Paulo: Faculdade de Filosofia, Letras e Ciencias Humanas, 2017.

[3] PIB. Indígenas ocupam Jaraguá, desligam antenas e 600 mil ficam sem televisão. 2017. https://pib.socioambiental.org/en/Not%C3%ADcias?id=182477.

[4] Ibid

[5] See: SOS Mata Atlântica e INPE lançam novos dados do Atlas do bioma. Access: http://www.inpe.br/noticias/noticia.php?Cod_Noticia=5115

Argentina, Uruguay, Bolivia, and Brazil.[6] To perform their *nhanderekó* (way of life), the

Guarani depend on Atlantic Forest presence. Threats to Atlantic Forest further

deforestation, as caused by São Paulo urban expansion, consequently threaten the Guarani

capacity to practice their customary and ancestral way of life.[7]

      Atlantic Forest deforestation began with settler-colonial gold mining extraction in

Jaraguá Peak, during the 1500s. At the time, all the areas now known as São Paulo state and

other states such as Paraná and Santa Catarina, south of São Paulo, were primarily inhabited

by Guarani speakers, as well as by various non-Guarani groups.[8] The mining in Jaraguá Peak

was led by the settler-colonial, known as "Bandeirante," Alfonso Sardinha, who enslaved and

displaced the Guarani living and traveling through the region.[9] In the eighteenth century,

mining workers in southeast Brazil, and the resulting population growth, also demanded land

for food production. Coffee cultivation additionally unleashed population growth,

urbanization, and the implementation of railroads. Since the 1850s, the human population

inhabiting original Atlantic Forest areas in the southeast of Brazil multiplied from 1 million

in 1808 to 6.4 million in 1890.[10] Paved roads, starting in the 1930s—also facilitated the

spread of urban population, which increased from less than 20 million in 1940 to 120

million in 2000. In addition, areas of intense urban growth between 1940-2000 coincided

with all the extension of the Atlantic Forest. Atlantic Forest deforestation was fundamental

to the abstraction of "Brazil" as a nation-state. Nonetheless, the "Brazilian" perspective still

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[6] Gallois, Macedo. Nas Redes Guarani. São Paulo: Hedra, 2018
[7] Timóteo Verá Tupã Popygua. Yvyrupa: A Terra é uma só. São Paulo, Hedra. 2018, p.59
[8] Monteiro, John M. Blacks of the Land: Indian Slavery, Settler Society, and the Portuguese Colonial Enterprise in South America. Cambridge University Press, 2018. P. 52
[9] Ibid.
[10] Dean, Warren. With Broadax and Firebrand: the Destruction of the Brazilian Atlantic Forest. University of California Press, 1995, p. 191.

constitutes only one narrative among more than three hundred Indigenous nations geographies, flows, and networks whose territories overlap with Brazilian boundaries.

The term "Atlantic Forest" is a colonial term. It relies on the colonial geopolitical division of oceans in the "Atlantic Ocean."[11] For the Guarani, the ancestral, original forest is *ka'agüy*. This work travels between terms that can be read in the context of Brazilian legal terms ("Atlantic Forest")— terms that reproduce epistemological violence, and Guarani Mbya terms (*ka'agüy*). I use Atlantic Forest throughout the text given the audience and political intentions of this work: to provide maps and case studies as instruments that engage city council members and raise *juruá* public concern to support Guarani initiatives.[12] The work intends to speak to public and private enterprises responsible for constructing roads, power lines, telecommunication towers, and real estate development in northwest São Paulo to redress the Guarani communities in São Paulo for Atlantic Forest loss. Even though every person who lives in São Paulo should learn the original language of the place where they live, very few *juruá* speak Guarani Mbya. This research faces limits of translation, nonetheless the choice of words is political.

In Brazil, the Guarani Mbya territory spans the entire coastline from the state of Rio Grande do Sul to the state of Espírito Santo.[13] As of 2020, approximately 20,000 Guarani inhabit 153 *Terras Indigenas - TIs* (Indigenous lands) in Brazil's south and southeast portions.[14]

[11] Cristine Takuá, Carlos Papá e Ailton Krenak. Selvagem Ciclo de Estudos sobre a vida. April 7, 2021. Access: https://www.youtube.com/watch?v=znGTLLXAxpI

12 *Juruá* is the Guarani Mbya term for "white," or "non-Indigenous," or colonizer. In a literal translation it means "bearded men."

13 Schaden, Egon. Aspectos Fundamentais da Cultura Guarani. Universidade de São Paulo, Faculdade de Filosofia, Ciências e Letras: Antropologia n. 4, Boletim n. 188. São Paulo, 1954, p. 21

[14] CTI. Fortalecimento cultural e restauração da floresta: Como os Guarani estão usando seu Território para viver melhor e preservar a riqueza ambiental de São Paulo. 2020. Access:< https://trabalhoindigenista.org.br/wp-content/uploads/2020/07/FORTALECIMENTO-CULTURAL-E-RESTAURAÇÃO-DA-FLORESTA_.pdf> Accessed December 2020.

At the time that settler colonizers arrived in Guarani territory in 1580, the Guarani population was estimated to have been two million. The current Guarani population is 250,000—around 67,500 living in parts that overlap with Brazil.[15] For the Guarani, the fight for the land and for their right of self-determination is not restricted to the state of São Paulo, but to all extension that comprehends *yvyrupa* (yvy=land, rupa=support), Guarani term that designates a territory without frontiers, or, in other words, a continuous and unbounded earth platform.[16]

The use of the term "Terras Indígenas" (Indigenous lands) does not refer to the self-determination of Indigenous territories by Indigenous communities or the Guarani Mbya understanding of their territory. Instead, the term Indigenous land is a technical one, used by the Brazilian government to demarcate Indigenous territories. As Brazilian anthropologist João Pacheco de Oliveira defines, "Indigenous land" is a legal category, defined by Brazilian law n. 6.001/1973 in the Brazilian constitution of 1988.[17] The use of the term is political, not neutral. It equalizes very different spatial understandings, land relations, and cosmologies into one term. According to the public body Funai (National Foundation of the Indian), 274 Indigenous languages are spoken in 2020 in the territories that overlap with Brazil, comprehending a population of 817,963 by 2010, who belong to 302 different ethnicities.[1] The Brazilian state deploys the same term "Indigenous lands" for all different Indigenous nations whose territories and territorial cosmologies it refers to.

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[15] Ladeira, Along Yvyrupa's Paths: Beyond Borders. In: Harvard. ReVista: Guarani. Spring 2015, p.10. Also in https://cpisp.org.br/indios-em-São-paulo/povos-indigenas/guarani-e-tupi/
[16] Ladeira, Along Yvyrupa's Paths: Beyond Borders. In: Harvard. ReVista: Guarani. Spring 2015, p.10. See also Timóteo Verá Tupã Popygua. Yvyrupa: A Terra é uma só. São Paulo, Hedra. 2018, p.57
[17] Oliveira 1998, 18.

São Paulo exists entirely within Guarani territory. Two Guarani Mbya Indigenous Lands overlap with the urban area of the city of São Paulo: the Jaraguá Indigenous land, in the north-west portion of the town, and the Tenondé Porã Indigenous Land, in the south of São Paulo. As of 2021, 18 Guarani villages exist in the city of São Paulo, 6 of them in Jaraguá Peak, in addition to 16 archaeological sites.[18] Within the larger area of the state of São Paulo, about 85 Guarani villages exist in 2021, and around 210 archaeological sites.[19] (see figures 8 and 9) According to a report from 2012, 37 percent of Indigenous populations (324,834 people) in Brazil live in urban areas.[20] Urban planning and real estate development are two of the main forces that cause the dispossession and displacement of Indigenous nations in Brazil.[21]

Urban constructions in the surroundings of Jaraguá Peak have undermined the recognition of Guarani Mbya land rights and encroached upon the Atlantic Forest historically. Since 1580, when settler colonizers found gold in Jaraguá Peak, the area has been environmentally impacted. Gold mining in the Jaraguá also initiated the dispossession of Indigenous inhabitants from their lands—the Guarani Mbya populations living there were one of them. Five hundred years later, additional infrastructural layers in the peak area continue to undermine the Guarani land rights. The three busiest roads in São Paulo—the first began in 1940—cut through the peak area and encroach on Atlantic Forest. The São

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[18] Mapa Guarani Digital. Access: https://guarani.map.as/#!/?z=9&x=-23.897138274308283&y=-46.61224365234375

[19] Ibid

20 Povos Indigenas no Brasil. "Quantos São?," PIB, revision date 2019. Access date: December 2020. Access: <https://pib.socioambiental.org/pt/Quantos_s%C3%A3o%3F>

[21] The Guarani Mbya name themselves as Povos Originarios (which in literal translation to English is Original Peoples, or First Nations), and also as Povos Indigenas (Indigenous nations). This research will make the use of the term Indigenous nations throughout the text as a form of choosing a coherence on terms used, but the reader should keep in mind the terms used by the Guarani to name themselves and the limits of translation of such terms to English.

Paulo state government also transformed the peak into a State Park for tourism, 60% of which overlaps Guarani territory. Two telecommunication towers installed at the top of the peak in the 1960s broadcast electromagnetic waves over the Atlantic Forest and its inhabitants. Even though the history of Guarani land theft and Atlantic Forest deforestation in Jaraguá Peak starts with settler-colonial occupation in 1580 for gold mining in the peak, this work will focus on the specificities of urban infrastructural constructions in the region since 1940—inaugurated with the construction of Anhanguera road.

The Guarani Mbya communities in the Jaraguá use these same infrastructural layers as tactics of resistance to expose the impacts of urban growth over their territory. Strategies for reclaiming their land back have involved infrastructure disruption, as the protest in 2017 with the telecommunication towers shut down. In 2013 another demonstration obstructed access on the Bandeirantes Road, one of the roads that cuts through the peak. The Guarani Mbya communities in São Paulo, living in the north and the south of the city, hold an important infrastructural and political role. Among the many Guarani initiatives that fight for their land demarcation is the Guarani Yvyrupa Commission, which represents the Guarani activism in the south and southeast of Brazil.[22] One of the main appointments of the commission is to counter large governmental infrastructural constructions that historically destroyed forest environments and threaten to deforest the remaining Atlantic Forest areas.[23] Guarani initiatives in São Paulo also protect and preserve the only clean river in the city, the Capivari river, and maintain the remaining areas of Atlantic Forest. The areas of Atlantic Forest that remain in São Paulo coincide with the regions where Guarani

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[22] See: http://www.yvyrupa.org.br/

[23] Timóteo Verá Tupã Popygua. Yvyrupa: A Terra é uma só. São Paulo, Hedra. 2018, p.59

communities live. Their long-term activism in Jaraguá Peak maintained the remaining Atlantic forest tracts.

This research dissects historical layers of infrastructure that cut through the Guarani ancestral lands and surveys the multiple infrastructural layers that overlap on the Atlantic Forest remaining in Jaraguá Peak, considering the impacts on both humans and non-humans. Each layer served as an instrument for land dispossession and fragmentation, enabling the settler state and private companies to profit from Guarani land. The investigation of clashes between urban design principles in São Paulo, and principles of Guarani Mbya cosmological territorial understanding can expose how governments, public and private companies profited from Atlantic Forest deforestation in Guarani territory, using urban constructions to initiate a landgrab or generate monopolies. And how Guarani communities in São Paulo have been presenting alternative models of spatial construction that benefit the entirety of São Paulo.

To analyze the clashes between these two modes of spatial understanding, I will focus on two kinds of impacts in Jaraguá Peak that have had compounding effects since the 1940s: property dispossession and infrastructural dispossession. The difference between "property dispossession" and "infrastructural dispossession" is spatial. Real estate development and the Jaraguá State Park configure property dispossession. The area that the state park and real estate constructions encroach upon coincide with the areas of marked land—the fences of the park or the walls that bound each real estate construction. Differently, infrastructural layers: roads, cell towers, power lines, sewage, and water contamination, configure infrastructural dispossession. Infrastructural constructions impact an area much more extensive than those bounded by cadastral markers. If a cell tower is an

infrastructural point in space (a tower), the extent that the electromagnetic signals of this tower serves can reach a radius of 30km from where the tower is installed. Similarly, road construction does not affect only a linear spatial network for car use but also generates a buffer area for real estate development starting on the border of the roads and extending more than three kilometers from each side of the road.

This research tries to unpack the idea of infrastructural dispossession: how an infrastructure broadcasts beyond its footprint. I will focus on three specific layers of infrastructural networks: roads, power lines, and telecommunication towers.[24] I try to foreground how their spatial occupation is not only linear, but prompt a volumetric, multidirectional encroachment. Beyond their linear spatial implementation, linear infrastructures also encroach on the surrounding space in height and in width. A stack of interwoven factors enable infrastructural dispossession: agreements between governmental and private entities, international agreements, legislation, court decisions, economic interests, construction companies, architecture, and urban planning projects, are some of these factors. Forms of infrastructural dispossession are spatial and temporal. The construction of urban layers unleashed long-term environmental impacts that repeatedly affect Guarani communities in São Paulo with Atlantic Forest deforestation, fire hazards, water pollution, and food insecurity.

Departing from the Guarani perspective of space to understand how urban constructions have undermined the Guarani cosmological understanding of territory, two

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[24] By the terms "linear" and "punctual" I am referring to the infrastructure print over territory: roads and power lines are installed as continuous linear networks. And cell towers are installed as punctual, single elements, generally composed by a structure of assembled metal parts that compose a tower. This tower, installed on the ground by telecommunication technicians, occupies an area of approximately 5x5 meters on the ground.

specific Guarani Mbya terms accompany this inquiry: *yvyrupa,* and *tekoa.* These are not static concepts and require a multi-scalar and multi-temporal analysis. I ask how São Paulo's history of urban growth and infrastructural expansion assumes different contours when the history of Atlantic Forest deforestation and the continuous theft of Guarani lands are foregrounded. A shift that decenters São Paulo's history to center on Guarani territory and Atlantic Forest history can foreground unaccounted forms of violence, which São Paulo's growth allowed.

Krenak activist, leader, and writer Ailton Krenak tells that, in 2018, on the verge of the catastrophe of Brazil becoming governed by Jair Bolsonaro, some White people asked Ailton Krenak: "What are the Indigenous going to do to escape this?" and Krenak replied: "Indigenous peoples have been resisting for over five hundred years now. I'm more worried about the Whites, and what they're going to do now to get out of this one."[25] This research is learning from the long history of Guarani resistance. Guarani communities are the ones responsible for São Paulo still having Atlantic Forest within the city's boundaries. Guarani geographies overlap with Brazilian settler geographies and resist Brazilian settler occupation for centuries.

The research sources Guarani oral histories and their understanding of territory. It also sources state documents — the process of the Guarani land demarcation in the Jaraguá, from 2015, the Jaraguá State Park management plan, from 2012, numerous legislations, and historical documents from the process of protection of the park as heritage, from 1978, and environmental impact assessments produced by interdisciplinary teams including anthropologists, lawyers, biologists, and geographers. These primary source documents, all

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[25] Ailton Krenak. "Ideas to Postpone the End of the World. House of Anansi Press, 2020.

written in Portuguese, help to understand the Guarani territorial struggle not as an event, but as a structural and historical process over five hundred years of settler colonialism.[26] This work also sources the work of many Guarani activists, scholars, and Brazilian Anthropologists working for decades with the Guarani Mbya communities in São Paulo. These include Maria Inês Ladeira, Fabio Nogueira, Valéria Macedo, Daniel Pierri, Adriana Testa, and NGOs such as the Centro de Trabalho Indigenista and the Programa Aldeias working as allies with the Guarani for the recognition of Guarani land rights, the demarcation of their lands, the preservation and restauration of Atlantic Forest.

When learning about relations to the land, and how the construction of mobility, electricity and telecommunication infrastructures have disrupted Indigenous lands in São Paulo and Brazil, this research sources Indigenous scholars who have long discussed the deep infrastructural effects of colonialism, as well as the constant remaking of Indigenous geographies. Guarani Mbya leader, writer, and professor Timóteo Verá Tupã Popyguara; Guarani Mbya professor and activist Jerá Guarani; Maxakali philosopher, educator and artisan Cristine Takuá; Krenak leader, activist, and writer Ailton Krenak; and Yanomami shaman Davi Kopenawa; as well as Native American land rights activist, environmentalist, economist Winona LaDuke; and Kul Wicasa (Lower Brule Sioux Tribe) activist; and decolonization, U.S. imperialism, environmental justice, and Oceti Sakowin scholar Nick Estes, are some of the Indigenous scholars this research is learning from.

Methodologically, this work incorporates online archival research, digital ethnography, and critical investigations of activist mapping. It intersects three modes of

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[26] Patrick Wolfe theorizes on how settler colonialism is a structure, not an event. In: Patrick Wolfe, "Settler Colonialism and the Elimination of the Native," *Journal of Genocide Research* 8, no. 4 (Dec. 2006): 387–409.

analysis: a historical analysis that tells the story of Guarani activism facing the impacts of infrastructural layers in Jaraguá Peak since the 1960s, a theoretical analysis on reparations focused on infrastructural impacts on Indigenous territories, and an activist intervention offering cartographic tools. My argument is theoretical and practical. Theoretically, I argue that each layer of infrastructure in Jaraguá Peak unleashed infrastructural dispossession and perpetuated colonial dispossession. Practically, I argue that spatial practitioners (architects, urban planners, designers, geographers) hold skills to counter-map the spatial evidence of infrastructural dispossession as a potential tool for activism to strengthen the claim for land reparations.

Maps (Appendix 2) accompany the story of each layer of infrastructure. The maps' intention is not to represent Guarani cosmologies, given my limitations and position as a settler (*juruá*) mapping Guarani territory, but to foreground cartographies of infrastructural harm and land deformation that have undermined Guarani land rights in the Jaraguá. Maps trace complicated and non-binary conflicts between *juruá* urban development and Guarani cosmologies and geographies. I am interested in untangling what social, political, and economic consequences, and spatial, on the ground effects, the history of each infrastructure carried.

Each map aims to foreground how infrastructural impacts perform in space and in time: to make temporally dispersed impacts into palpable, quantifiable values. Maps can serve as tools for advocacy, contributing to the long-term Guarani Mbya activism in São Paulo. Or they may simply expose previously hidden spatial perspectives. Each map sources similar cases of environmental impacts in Brazil that cite anthropological reports, lawsuits or court documents that value such impacts and claim redress with reparations.

This analysis is incomplete. It attempts to foreground a complex system that operates in multiple layers and scales of time and space. It is also establishing a dialog between three areas often seen as unrelated: the long time existing Guarani activism and anthropological works with the Guarani Mbya communities in São Paulo; spatial design theories taught in architecture and urbanism schools that inform urban constructions in São Paulo; and the spatial and economic politics that underlie urban constructions. Proposals and speculations about reparations for infrastructural dispossession are limited and potentially controversial. They by no means compensate for the harm and risk historically imposed in the Jaraguá since settler colonial occupation began in 1580. The analysis can offer an initial glimpse of cases that provide parameters on how spatial evidence is used as a factor for infrastructural reparations claim, and how spatial designers can contribute with strong spatial evidence for such claims.

I would like to situate myself while writing this research. I engage in this research as a *juruá*, from non-Indigenous settler origin, and I present an outsider perspective. I am a visitor and was born and raised in Guarani territory, on the region today known as São Paulo, living and learning on what is now called Brazil—a nation-state that occupied and dispossessed Guarani Mbya and other Indigenous nations' territories and replaced native languages with Portuguese. Part of this research is also my responsibility to respect Guarani protocols and self-determination on their lands. As an architect from São Paulo, I carry many pre-conceptions of the idea of space that limit comprehending the spatial and cosmological meaning of the Guarani territory.

This research faces limits in translation. The work travels within three (one native and two colonial) complex languages: Guarani Mbya, Portuguese and English. While doing

this research, I have been learning Guarani Mbya language, and their beautiful words (belas palavras) with Guarani *xondaros* and leaders from different *tekoas*. Classes were online due to Covid pandemic, which allowed me to attend courses in Jaraguá Peak while residing in New Haven. I will not mention the professors' names out of respect for their privacy. I learned with the course organizers that any knowledge that I might use from the classes for this research should be first cleared with the Guarani and accompanied by a signed document giving permission. The use of Guarani knowledge without permission is one of many acts of extractivist violence that *juruá*/non-Indigenous settlers reproduce. To learn Guarani Mbya language is also to learn space, and to acknowledge the violence of translation erasure (either in maps or in spoken and written language). As a spatial practitioner, I am interested in learning with and from the Guarani about spatial practices and activism. I hope to broaden my view on how many spatial perspectives and spatial cosmologies are left as blind spots in architecture and urban planning schools when considering only White and *juruá* standards. More than a contribution to Guarani activism, this thesis is learning from, and with, the Guarani Mbya what architectural, planning, and spatial-activist practices can mean. And to contribute to disentangling the historical harm and debt of majorly White settler-led development that continuously stole and steals Guarani lands and degraded Atlantic Forest soils and ecologies.

The research is structured in four chapters and three appendixes. Chapter One: "Jaraguá Peak, Guarani Mbyá Territory" focuses on Guarani perspectives and understandings of territory and spatial mobility. It also presents the theoretical ground for Brazilian legislation, how its treatment of Indigenous land tenure works, and how legislation can influence spatial outcomes. It concludes by referencing both historical and present

Guarani Mbya activism as tactics of resistance to regain their lands in the Jaraguá. Chapter Two: "Infrastructural Dispossession" focuses on the São Paulo state government's perspectives on urban development through spatial and economic perspectives. It provides a historical analysis of spatial effects resulting from the clashes of Guarani Mbya territorial cosmologies and Western urban design in Jaraguá Peak, exposing its spatial political ecology. Chapter Three: "Reparations for Infrastructural Dispossession" examines theories about reparations for Indigenous peoples that reflect on the impacts caused by infrastructural constructions. Case studies from this chapter result in Appendix One. The chapter's main questions concern how infrastructural dispossession and urban growth can serve as factors for reparations, and what kinds of reparations can serve as reference for an infrastructural claim. Chapter Four: "Mapping Grounds" discusses how maps can serve activist purposes, and complicates its potentials and limitations. Appendix One, "Case Studies: Spatial Evidence for Infrastructural Reparations," lists many kinds of value from case studies that redressed impacts of road construction and electromagnetic infrastructures. In Appendix Two, "Spatial Metrics for Reparations," each infrastructural layer analyzed is accompanied by maps that can serve as a detachable document from the larger body of the thesis. They aspire to contribute to Guarani activism as potential activist documents, or become an appendix of other reports for increasing government pressure. To aid in increasing government pressure, Appendix Three lists contacts for São Paulo city council members.

While Chapters One and Two draw historical narratives, Chapters Three, Four, and Appendix One, Two and Three lay out a set of tools (reparations cases for reference, activist mapping, and public engagement strategies) that aspire to contribute to ongoing Guarani activism.

Chapter 1: Jaraguá Peak, Guarani Mbyá Territory

For the Guarani Mbya, the territory is one continuous and unbounded.[27] Private property does not exist in the Guarani spatial comprehension. Land is not conceived of as a commodity for trade and profit, but rather as a sacred, continuous territory. Spatial mobility without obstacles defines Guarani territoriality.

The Guarani concept of *yvyrupa* determines the amplitude of the Guarani Mbya traditional territory. *Yvyrupa* can translate as "terrestrial support," or "terrestrial platform": *yvy* means *terra* (earth), and *rupa* means support, platform, or place of permanence. *Yvyrupa* can also translate as "embodied earth" or "earth as body."[28] *Yvyrupa* means a world without frontiers, and comprehends vast territorial mobility and the creation of spaced villages along this extensive territory. It also means the territorial occupation before settler colonizers' arrival and the refusal of frontiers imposed by nation-states.[29] In other words, *yvyrupa* is the terrestrial platform without nation-states boundaries, or any other political-administrative boundaries: a place that hosts all diverse species, traditions, costumes, and models together in co-existence.[30]

The Guarani identify two main territorial references: the *yvy apy*, which refers to the end of the earth, and the *yvy mbyte*, or the center of the earth. The territorial extension between *yvy apy* and *yvy mbyte* comprises the *yvyrupa*. Guarani cosmology determines their

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[27] Each Indigenous nation whose territories coincide with Brazil have their own self-determination and understanding of space, according to their own cosmologies, histories and cultures.

[28] Notes from Guarani Mbya language class, 14.10.2020.

[29] Pierri, Daniel Calazans. A caminho do sol. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 35.

[30] Ladeira, Maria Inês. Comunicação, convívio e permuta em Yvy vai. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 266.

need to constantly move between the *yvy mbyte* (today coinciding with the triple frontier between Paraguay, Argentina, and Brazil) and *yvy apy* (today coinciding with the Brazilian ocean coast). This movement connects Guarani territory and demarcates the area where they can establish their villages. According to a narrative commonly told by the Guarani, known by anthropologists as the "myth of the twins," the path from the *yby mbyte* to *yvy apy* is significant because it follows the path walked by the sun and the moon. As one version of this narrative tells, the universe creator Nhanderu Tenonde Papa, and a women who lived in this universe, Nhandexy, gave birth to Nhamandu (the sun).[31] After a misunderstanding between Nhanderu and Nhandexy, Nhanderu traveled back to his celestial house, located east from where Nhandexy was. After his father left, Nhamandu (the sun) migrated with his mother Nhandexy through the terrestrial platform to search for his father. During the walk, Nhandexy was murdered by a leopard. To have company on the journey after his mother was killed, the sun created Jaxy (the moon), who becomes his little brother. At the end of the journey, their father and universe creator Nhanderu received them in his celestial house. Brazilian Anthropologist Daniel Pierri argues that the "myth of the twins" holds a narrative that is deeply territorialized.[32]

Spatial mobility structures Guarani kinship on this terrestrial platform as a fluid migration between villages—through continuous networks and exchange of news, seeds, rituals, and plants for traditional medicines.[33] As one Guarani leader in the Jaraguá

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[31] According to the Anthropologist Valéria Macedo, the Guarani tell many varying versions of this story. See: Valéria Macedo. Mundéu de Mundo. In: Gallois, Macedo. Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 197.
[32] Pierri, Daniel. A Caminho do Sol. In: Gallois, Macedo. Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p.33
[33] Pimentel, Spensy (org.), Relatório Circunstanciado de Identificação e Delimitação da Terra Indígena Jaraguá. Brasília, Funai/Ministério da Justiça. 2009, p.55.

Indigenous Land describes, the Guarani understanding of territory is guided through freedom; it is a territory of long-distance walks.[34] The earliest colonial sources that identified the presence of the Guarani, written by the Spanish settler colonizer Alvar Nunez Cabeza de Vaca (1542) and the German explorer Ulrich Schmidl (1553), described the vast territorial knowledge of the Guarani. The German geologist and geographer Reinhard Maack narrates that manuscripts from Schmidl reported the Guarani as the "population that do the longest travels compared to any other nation in the River della Plata region, frequently migrating to the ocean coast and knowing all interior trails."[35]

This continuous terrestrial platform is interconnected through a large network of Guarani villages, known as *tekoas*. One *tekoa* cannot be understood as an isolated village, but rather exist as part of an extensive network of mobility and exchange between all *tekoas* distributed along *yvyrupa*. *Tekoa* means the space where the Guarani perform their modes of being: *"teko"* means "way of life," and *"a"* means place, or action.[36] Each *tekoa* comprehends a territory larger than where houses are located: they are the spaces where the Guarani encounter water, non-human life and the opportunity for hunting and fishing, materials for the maintenance of their houses, and access to medicinal plants. One *tekoa* comprehends all territorial extension that allows the Guarani to perform their traditional mode of life— *nhanderekó*.[37]

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[34] Cretã, Romancil Gentil; Popygua, A, Davi Karaí. Interview by: Carmem Susana Tornquist e Raquel Mombelli. Trajetórias de vidas e lutas pela demarcação das terras indígenas. 09 April, 2018. Revista PerCursos. Florianópolis, v. 19, n.39, p. 206 - 228, jan./abr. 2018.

[35] Maack, Reinard. Sobre o Itinerário de Ulrich Schmidel através do Sul do Brasil (1552-1553). Boletim de Geografia física, n.1, Universidade do Paraná, Curitiba.1959, p.9

36 Notes from Guarani Mbya language class, 08.12.2020.

[37] Pimentel, 2009, p.147.

When deciding where to establish a *tekoa*, the Guarani root their parameters in spatial conditions analyzed under socio-cosmological terms. The most important factor is whether the *tekoa* is close to Atlantic Forest. The Guarani hold ancient knowledge of the Atlantic Forest on its climate, other-than-human inhabitants, medicinal plants, hunting, and fishing for food access.[38] Other important factors for choosing the *tekoa* position are constant spatial mobility between other *tekoas*, vast space of fertile grounds for agriculture, and considering distance from White (*juruá*) settlements, far from potential territorial conflicts. No White person (*juruâ*) should live in a *tekoa*.[39] The Guarani use the term *tekoa porã*—which means "life with freedom"—to refer to *tekoa* spatialities.[40]

The Guarani concepts of *tekoa*, and *yvyrupa* are dynamic. *Tekoas* are fluidly changing—the communication and transit between different villages is constantly fluctuating. Each *tekoa* is composed of at least one family, but family members that founded one *tekoa* might also live in other *tekoas* and migrate between them. In recurring exchange, Guarani paths and kinships transcend nation-state borders.[41] If Guarani spaces are constantly changing, Guarani orality, words, and concepts are also periodically changing and renewing. According to anthropologists Valéria Macedo and Dominique Tilkin Gallois, the Guarani networks, spatial relations, and communication systems are part of extremely complex territorial kinships that span multiple worlds and agents that reach far beyond nation-state borders and White, human-centered, spatial relations.[42]

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[38] Pimentel, 2009, p.144.
[39] Ladeira. Espaco Geografico Guarani Mbya. Hedra. 2008, p. 162.
[40] Azanha, Gilberto; Ladeira, Maria Inês. Os índios da Serra do Mar: a presença Mbya Guarani em São Paulo. São Paulo: Centro de Trabalho Indigenista e Nova Stella, 1988, p.23
[41] See the video by Maria Ines Ladeira Jaguata pyau. 2015. Accessed December 2020. Access in: <https://m.youtube.com/watch?v=hIFh9PPBc8Y&feature=share>
[42] Gallois, Macedo. Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p.14.

Spatial Coexistence: Atlantic Forest and the Fields

According to Guarani cosmology, Nhanderu created spaces for both *juruá* and Guarani—the forest was created as space for the Guarani and all other-than-human forest inhabitants', while open fields were *juruá* spaces for cultivating crops, cows, pig, and horses. For the Guarani, Nhanderu created the forest as a big garden to be cultivated. In the forest, Nhanderu created all Guarani needs for nourishment and living, medicinal plants, with no dependence on an external supply system. Anthropologist Maria Inês Ladeira says that Guarani frequently testify that the original spatial division reserves forests as a space for the Guarani and other Indigenous nations and the fields as a space for White people.[43] Nhanderu created a space that supported all earth inhabitants to co-exist, but settler colonizers occupied both the fields and the forests.

Nhanderu created the forest so each forest inhabitant could have its own place. The Guarani term for Nhanderu's work into preparing the Earth land is *Nhanderu rembiapo.* Nhanderu created trees and *yvyra* (plants), *oejava ekue* (birds), and each forest inhabitant. The Guarani name for the Atlantic Forest is *ka'agüy, or ka'agüy ete* (authentic forests)—the original forests and fertile grounds that keep medicinal plants, fruits, vine, trees, and all forest diversity. *Ka'a* can be translated as "bushes," "herbs," or "grass," and *güy* means "under." As Ladeira describes, the forest is the major entity that sustains all forest beings—including its trees, rivers, rocks, grounds, and undergrounds—in reciprocity. Hills support plants that grow upon it and are paths to boars and all moving beings. Opposed to the idea of nature as

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[43] Ladeira. Espaco Geografico Guarani Mbya. Hedra. 2008, p. 154.

a separate entity, *ka'agüy (forests)* compose an interconnected system of relations between air, ground, sounds, and all layers of connections and interactions.

For the Guarani, everything has a spiritual owner (*-ja*). The trees have an owner, rocks have an owner, mist has owners, words have owners, and even the creation of words has owners.[44] If someone wants to use anything, they need to ask permission for the owner. Plants have spirit and are wisdom, and the plant's spirit can feel disrespected if someone harvests them without care. The Guarani need to ask the spiritual owners for each interaction with the forest, respecting each element's own time cycle for harvesting. Decisions regarding spatial organization—such as where a house or a new *tekoa* should be built—need to respect the Nhanderu creation and organization of the forest.[45]

Ka'agüy porã (healthy forested areas) host all vegetal species that are part of the Guarani forest kinship. *Ka'agüy poru* (untouched forest areas), which cannot be walked through or stepped by humans, exist in the tallest hills. Other-than-human forest inhabitants live and protect themselves on the *ka'agüy poru.* According to Ladeira, when the Guarani walk near a *ka'agüy poru* area, they need to walk fast and avoid looking to the side. *Itaja* (the owner of rocks) throws rocks on anyone who tries to get close to the area, and those who insist will suffer harmful consequences. *Kaguy yvi* (the lower woods) are the areas for Guarani agriculture, herbs and crafts materials; *yapo* are areas of mud.[46] Deforested areas, or areas that forest inhabitants no longer walk are *Kaguy rive*, areas that became useless/no longer serve a purpose. The Atlantic Forest is the space where elements that maintain the Guarani way of

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[44] See movie: Guairaka'i ja - O Dono da Lontra. Centro de Trabalho Indigenista, 2014. Access in: https://www.youtube.com/watch?v=cvq7cZjIrk4
[45] Ladeira, 2008, p. 159.
[46] Ibid, p. 155.

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life are present. It is also where they keep their forest archives. The Guarani maintain their traditional knowledge through learning with the use of this living archive, which needs constant maintenance and respect of their own temporal cycles.

Other-than-human forest inhabitants choose their own spaces in the forest (*retã*). Armadillos and cutias (*acuti*) prefer living on *yvyty* (hills) during the day, so they can stay restfully without interference from other activities. During the night they move through their trails to lower areas to find food. According to a statement from one inhabitant of the *tekoa* Rio Silveira in the state of São Paulo, registered by the anthropologist Adriana Felipim in 2000, armadillos like to eat a small bitter fruit known as *bacuri*, which grows during November and December. K*araja* (monkeys), *jaexa* (pacas), and *mbore* (tapirs) live on the hills but move to lower areas to find food. *Capiva* (capybaras) and *anguja guaxu* (beavers) only live in lower areas, and *gua -xu* (deer) prefer lower areas or smaller hills within dryer areas. Among the birds that live in lower areas mentioned with most frequency by the Guarani are the *araku* (saracura), the *ype kaguy* (duck of the forest), the *carão,* and the *socó* (white heron). Birds that live on higher hills are the *tukã* (toucan), the *jaku*, the *jaku etei*, the *nambu* and the *jacutinga*. Other forest inhabitants don't have a fixed area of living and remain in constant migration. One example is the *koxi* (boars). For the Guarani, the *koxi* are a special creation by Nhanhderu, and they can live as a companion pet. The *koxi* travels between the terrestrial world (*yvy vai*) and celestial world of Nhanderu (*Nhanderu retã*), carrying spiritual messages back from the celestial world. Only a spiritual leader can receive the messages the *koxi* brings.[47]

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[47] Ibid, p. 156.

Among the vegetal species known and used by the Guarani some of the most mentioned are the vine, the imbé from the hills that serve as food, the imbé from the lower lands that serve for crafts, the ximbopé, and the white and red embira—existing both on hills and lower parts. The Guarani know thousands of Atlantic Forest vegetal species, which are carried and thought through generations as ancestral knowledge.

The *yary* (cedar tree) is the column that supports the earth. The Guarani use *yary* bark to make medicinal baths and to give blessings during sacred ceremonies. The Guarani *petyngua* (pipes), *rave* (violins), and the *popygua*—the stick for ritual use that symbolizes the moment Nhanderu created the world—are also made with cedar. The cedar tree is becoming rare to encounter in Atlantic Forest areas. When one *tekoa* does not have cedar in its surroundings, inhabitants from that *tekoa* travel to another *tekoa* that has cedar, to bring back with them a fluid substance that is produced with the infusion of the tree bark. To travel between *tekoas*, the Guarani open small paths to harvest materials and food, without leaving traces of their passage.

The Guarani calendar is organized in two seasons: the *ara pyau* (new times) and *ara ymã* (old times). The *ara pyau* corresponds to the *juruá* notion of "spring" and "summer," or warm weather, and the *ara ymã* corresponds to winter. Dates for the beginning and ending of each season are not fixed. What determines the beginning of *ara pyau* or *ara ymã* are variant signs of change in climate, such as the sound of *tokoiro* (cicadas) song, or the arrival of a special wind. These signs indicate *ara pyau* has begun, and that it is time to start planting again.

The activities performed in a *tekoa* follow protocols adequate for each season. Changes on climate determine the activities and rhythm of life on a *tekoa*. The Guarani have their

own legislation and laws based on their calendar, which establishes parameters for conviviality and determines the right period for constructing houses and harvesting materials for houses, agriculture, hunting and fishing.

All activities on a *tekoa* follow Guarani laws and Guarani relations of time. During each season the moon makes six turns, and each moon turn determines which crops should be planted. The beginning of the first moon turn in *ara pyau* (during the new moon, *jaxy ray),* is a period when hunting is not allowed, but it is time for fishing. This period is also ideal for planting *xanjáu* (watermelon), and *manduvi* (peanuts). Fishing period lasts four moon turns, and the Guarani are allowed to fish any time of the day—but fishing during each time of the day encounters different fish: catfish can be found during the night, and lambari only during the day. When the fourth moon turn ends, the Guarani need to stop fishing until the beginning of the next season (*ara ymã). Jaxy oua guaxu* (full moon period), is ideal for planting *jety ju* (sweet potato) and *mandio* (manioc), and the *avaxi ete'i* (Guarani corn) is planted between full moon and waning moon (*jaxy nhapytũ*). Only after the corn is born, do the Guarani plant *kumanda* (beans) together with the corn. They can harvest seedlings any time for eating, but only during *jaxy nhapytũ* (waxing moon) the Guarani can harvest to open space for a new crop.[48] *Ara pyau* ends with a special thunder (*yapua*). It is a thunder flash, without rain, and there is no right moment for it to happen (it can happen during any moon). The thunder indicates the beginning of *ara ymã* (winter). *Ara ymã* is time to rest in the Guarani villages, and make repairs on the *opy* (house for rituals and praying). This season does not allow the harvest of wood—the wood harvested during winter will get rotten if used for constructions. The best period for hunting during *ara ymã* is from the middle to the

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[48] Ladeira, 2008, p. 173.

beginning of the end of the season, when hunted species are fatter and stronger. But the final days of *ara ymã* are not recommended for hunting because it coincides with the period of forest beings' breeding.[49]

Planting is a collective act that coordinates social cycles in the *tekoas*. Agricultural practice integrates all *tekoa* members and activities, and structures their calendars, facilitating internal organization, exchange of seeds, and the time for making rituals. Agriculture also shape trade practices between different *tekoas*—since each can produce different crops, the difference in agricultural products incentivizes constant exchange of seeds between *tekoas,* and the migration of people and materials between them. The Guarani constant practice of agriculture structures their society both physically and spiritually. Guarani agriculture is only meant for internal consumption, not for commerce.[50] This research will not explain in detail the Guarani systems of agriculture, which are extremely complex and nuanced, with varying practices on each *tekoa*. However, the introduction to how agriculture structures Guarani spaces is crucial to understanding the importance of Guarani access to large areas of fertile land to performing their way of life and their networked territorial relations. Impacts on one *tekoa* will affect all other *tekoas*.

Jaraguá Indigenous Land

The Guarani *tekoas* in Jaraguá Peak are part of this vast territorial network that composes the Guarani territory. Since before Portuguese colonization, Jaraguá Peak has been an important spatial connector for the Guarani. It is a strategic point for resting in between walking from

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[49] Ladeira, 2008, p. 173.
[50] Ibid, p. 181.

the Guarani center of the earth—*yvy mbyte* (triple frontier between Brazil, Argentina and Paraguay) and the *yvy apy*—end of the earth, or earth border, by the ocean coast. The Guarani villages in the Jaraguá are an important point for temporary living: some families live there until finding a new Guarani *tekoa* in which to live.[51]

The Funai 2013 report, which served as the main court document for the Jaraguá legal demarcation as a Guarani traditional area, denote that the first Guarani Mbya that arrived back in the Jararguá was André Samuel dos Santos, also known by his Tupi-Guarani name *Avajikuapynhemboaele*, in the 1950s. Before arriving to the Jaraguá, Samuel lived in an Indigenous reservation, known as Bananal, in the South coast of the state of São Paulo. The Bananal was a settlement instituted by the Service of Protection of the Indigenous (SPI) as an attempt to keep the Guarani peoples far from claiming their traditional territories that were also areas of urban interest in the city of São Paulo.[52] According to the SPI records, their agents claimed that Santos, together with his four brothers, had a "rebellious spirit" and currently opposed to the imposed forced work regime. Santos argued against the SPI recurring attempt to push the Guarani to live in lands that did not hold conditions to sustain their traditional way of life. As an answer to the Samuel dos Santos family conflicts with the SPI authorities, the SPI official Victor Tonollier banned the four brothers from the Bananal village. A few years later, André Samuel dos Santos arrived in the Jaraguá, where he remained, living in the Atlantic Forest region.[53]

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[51] Pimentel, 2009

[52] *Service of Protection of the Indigenous*, originated through the Decree n. 8072, in 1910. The SPI was known for the constant attempt of concentrating the Indigenous populations far from their traditional lands, and liberating the native territory for settler colonization. According to the report of the Guarani Jaraguá Indigenous land demarcation, this attempt is openly stated by the SPI agents, and this documentation is available for consultation in the National Indigenous Museum, in Rio de Janeiro. In: *Relatório Circunstanciado de Identificação e delimitação da terra Indígena Jaraguá. Portaria 659/2009, 1178/2009 e 1415/12. São Paulo: 2013*

[53] Pimentel, 2009.

The Second Guarani family that arrived in the Jaraguá came a few years later, in 1960. The family of Jandira and Joaquim came in response to their forced displacement from the property where they lived in Cidade Dutra, a neighborhood in the south region of São Paulo. There they lived near the Guarani Indigenous Land Tenondé Porã. One member of the Geographic Brazilian Society ceded a terrain for them in Jaraguá Peak, due to precarious life conditions for the Guarani in the city. As mentioned previously, Jaraguá Peak was an area that the Guarani inhabited before settler colonizers displaced them and enslaved Guarani peoples as work forces for gold mining.[54] At the time Jandira and Joaquim arrived, their family lived in reciprocity with the family of André Samuel dos Santos by sharing their agriculture and daily experiences. As of 2020, Jandira and Joaquim children, grandchildren, great-grandchildren and now great-great-grandchildren live in the Jaraguá.[55] When Samuel, Jandira and Joaquim arrived in the Jaraguá, the neighborhood was predominantly rural and with many areas not containing titled landowners. They could plant and hunt in different spaces.[56] The São Paulo State Government established the Jaraguá State Park a few years later of their arrival, but the park did not contain fences or boundaries that undermined Guarani capacity to move through the territory, find food and plant their agriculture.

In 1987, the Brazilian government homologated eight Indigenous Lands for Guarani use in the State of São Paulo. The Brazilian government accepted the recognition of two Indigenous Lands in the city of São Paulo: the Jaraguá Indigenous Land, in Jaraguá Peak, and the Krukutu and Barragem Indigenous Land (since 2016 demarcated as Tenondé Porã),

[54] M. Monteiro, John. Blacks of the Land: Indian Slavery, Settler Society, and the Portuguese Colonial Enterprise in South America. Cambridge University Press, 2018.
[55] Macedo, Valéria. "Dead food" and the owners in the city: commensality and alterity in a Guarani village in São Paulo. Revista do Centro em Rede de Investigação em Antropologia, 2019.
[56] Ladeira e Azanha, 1988.

in the south of São Paulo.[57] The Jaraguá Indigenous Land was recognized with 1,7 ha—

which became the smallest area of Indigenous land in Brazil. Instead of recognizing the

entire *tekoa* spatiality—areas for fishing, hunting, collecting medicinal plants and materials for

the repair of houses—the government only recognized the area where Guarani houses

were.[58] This erroneous recognition, which did not consider the total extent of Guarani use

of the territory to perform their traditional way of life, resulted in innumerous future

consequences for the Guarani communities in the Jaraguá.

A strategy used by the Guarani communities in the Jaraguá to retake their land

and claim for the expansion of the area demarcated is through establishing new *tekoas*. As of

2020, six *tekoas* exist in the Jaraguá Indigenous land: *Tekoa Ytu, Tekoa Pyau, Tekoa Itakupe,*

Tekoa Ita Verá, Tekoa Yvy Porã and *tekoa Ita Endy.* They are organizing to keep expanding the

tekoas on the region to support the retake of their land.[59]

Each of the *tekoas* in the Jaraguá have their names attached to spatial conditions. *Tekoa*

Ytu is the first *tekoa* in the peak, from the 1960s. *Ytu* means "path of the water," referring to

the river close to the *tekoa* named Ribeirão das Lavras. Today the water of the river is

contaminated by the State Park pollution and urban constructions sewage draining there.

The *Tekoa Itakupe* means behind the rock, which refers to its geographic position in relation

[57] See Terra Indígena Guarani do Krukutu https://terrasindigenas.org.br/pt-br/terras-indigenas/3677 and Terra Indígena Jaraguá https://terrasindigenas.org.br/pt-br/terras-indigenas/3707
[58] Pimentel, 2009.
[59] As the Tupinambá leadership Cacique Babau describes, a "retomada" is not the same as a stable ownership of a private property.Instead, a retomada comprehends dynamic and ongoing relations and the continuous stewarding of the land, planning agriculture in relation to the land and to other beings that inhabit this land. As Babau says, a basic principle in stewarding a land, part of a "retomada," for the Tupinambá is that one inhabitant does not destroy the other. See: Babau. Retomada. Pise a Grama 13: Desobediência. Minas Gerais: 2017. Accessible in: piseagrama.org/Retomada Even though the Jaraguá context is different from the Tupinambá context, as of 2020 many Indigenous nations are regaining their lands with the "retomadas," the retake of their lands previously stolen by Brazilian public and private parties.

to Jaraguá Peak. The *Tekoa Itakupe* is located behind the peak if related to the sunrise. The *Tekoa Pyau* means little new village. The name "little" follows a Guarani Mbya principle: everything that is born after something else is born, is considered little. One Guarani leader said that they want to change the name of this *tekoa*. *Tekoa Itaendy* means "shining rock" (*ita* means rock, while *endy* means shining). And *Itá Verá* means "luminous rock." The most recent of the *tekoas* is the *Tekoa Yvy Porã*, which portion of land was retaken in 2015. *Yvy Porã* means "sacred earth." Before, the Yvy Porã area was used for disposal of trash and dead animals by São Paulo inhabitants in the Jaraguá surroundings. But in 2015 the Guarani communities recuperated the area, and implemented several ecological initiatives, of which I will speak more deeply in the final part of this chapter. [60]

Infrastructural layers that cut through Jaraguá Peak—Roads, Power Lines, the State Park, and urban growth since the 1980s hinder the Guarani possibility to perform their *Nhanderekó*. Urban infrastructural networks fragment the Guarani territorial network. Or, in other words, *Juruá* infrastructures fragmented Guarani infrastructures.

The Guarani and each other non-human beings that inhabit the Atlantic Forest have their own spatiality and temporalities. Each group of forest inhabitants hold their own set of thick relations and infrastructures. In his book *With Broadax and Firebrand: the Destruction of the Brazilian Atlantic Forest*, Historian Warren Dean describes the Atlantic Forest immense diversity—270 different tree species were found in a single hectare in South Bahia. A single tree canopy can host a thousand species of insects, while the Atlantic Forest as a whole had one million species of insects on its origin. More than half Atlantic Forest trees were endemic, as well as innumerous endemic birds, mammals and reptiles. Dean also describes

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[60] notes from Guarani Mbya language class, 10.14.2020.

the close cooperation between plants and animals: "some plants offered shelter for and even nectar to ants that protect them from predation and that clip competing weeds away from their seedlings."[61]

Dean traces the historical causes of Atlantic Forest deforestation, beginning with settler colonial mining extraction from the 1500s, in the region of Jaraguá Peak. In the eighteenth century, the growing mining population also demanded land for food production, which required on average 600 square kilometers of forest.[62] The nineteenth century marked the coffee cultivation in Brazil, producing 10 million tons of coffee—and clearing 7,200 square kilometers of primary forest. This was also the last century of slavery in Brazil. The coffee trade also induced population growth, urbanization and implementation of railroads—the human population in the Southeast region of the Atlantic Forest during the nineteenth century multiplied from 1 million in 1808 to 6.4 million in 1890.[63]

Since the increased urban expansion from the nineteenth century onward, and different people in Brazil started to encroach upon Atlantic Forest, the Guarani have encountered White people's food in the forest—species of fauna and flora, some vegetables, some fish, and commercial goods. Those foods are not made for the Guarani and they should not eat them, even though they exist within their lands.[64] In her work "'Dead Food' and the Owners in the city: commensality and alterity in Guarani Village in São Paulo," Anthropologist Valéria Macedo describes how one inhabitant of the *Tekoa Pyau* in the Jaraguá differentiated

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[61] Dean, Warren. With Broadax and Firebrand: the Destruction of the Brazilian Atlantic Forest. University of California Press, 1995, p. 15.

[62] Ibid, p. 99.

[63] Ibid, p. 191.

[64] Ladeira 1992, apud Ladeira. Espaco Geografico Guarani Mbya. Hedra. 2008, p. 159. See also: Macedo, Valéria. "Dead food" and the owners in the city: commensality and alterity in a Guarani village in São Paulo. Revista do Centro em Rede de Investigação em Antropologia, 2019.

the concepts of "living food" and "dead food." For the Guarani, living food are the foods that have spirit, and which build a connection with that food owner not only before consuming it but also before hunting, harvesting or cultivating the food. The use of elements without consulting their owners can cause diseases or other forms of reprisals conferred by their spiritual owners. Industrialized foods, foods contaminated by pesticides, water arriving by water pipes which origin is unknown, or medication bought in pharmacies are considered "dead food" or "dead medicine," in contrast to forest medicines (*ka'aguy moã*).[65]

In addition to the deforestation and extinction of innumerous Atlantic Forest beings that urban growth unleashed, the Guarani argue that the environmental degradation that resulted from urban growth, private property land grab, and resources extraction also interfered drastically on changing non-humans costumes. Urban pressure on forest borders confined them in limited areas, and interrupted their paths—making them easier prey, and with an unbalanced quantity of food to feed all in these fragmented portions of forest. Car and truck noises also scared them away from their original areas.[66]

The Guarani define the world of relations and connections between peoples and spaces populated by constant challenges as *yvy vai*: imperfect earth. Anthropologist Maria Ines Ladeira says that *yvy vai* (with the present of urban and anthropogenic pressures) implies that the maintenance of Guarani way of life and relations are not stable and demand constant work to be maintained.[67] Roads, mining, urban growth, meat production, and coffee plantations are part of the many layers that almost deforested an entire biome in two

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[65] Macedo, Valéria. "Dead food" and the owners in the city: commensality and alterity in a Guarani village in São Paulo. Revista do Centro em Rede de Investigação em Antropologia, 2019.
[66] Ladeira. Espaco Geografico Guarani Mbya. Hedra. 2008, p. 155.
[67] Ladeira, Maria Inês. Comunicação, convívio e permuta em Yvy vai. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 279.

hundred years—fragmenting Guarani and Atlantic Forest continental infrastructures while implementing settler colonial infrastructures. As professor of Environmental Justice Dorceta Taylor's argues, the process of "divide and conquer" is a classic and repeating case of Environmental Justice cases. Similarly, English professor Candace Fujikane describes the settler colonial mathematics of subdivision:

> "cartographies that dismember land into smaller and smaller pieces isolated from one another, to the point where each fragment is, according to the occupying state, either no longer "culturally significant" or small enough to be given a token easement."[68]

Legal Space-Time

Comparative law scholar Katharina Pistor brings to evidence the paradoxes of land rights, and how land rights "code land."[69] The same legal apparatus that can assure Indigenous land protection can also assure land divides for capital profit. The demarcation of Indigenous lands in Brazil is a complicated process that faces a similar legislative contradiction. An Indigenous Land demarcation process *per se* is contradictory: an Indigenous Land demarcation follows settler colonial laws to establish boundaries on an originally unbounded Indigenous territory. To protect Indigenous land, demarcation processes are also fragmenting the land continuity. But given the present context of common threats over non-demarcated Indigenous lands, demarcation became crucial to protect smaller areas where Indigenous nations live.

Since 1996, with the implementation of the Decree n. 1775/1996, the demarcatory process requires an anthropological report that demonstrates to court the traditional use of

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[68] Candace Fujikane. Mapping Abundance for a Planetary Future. Duke University Press, 2021, p.32

[69] Pistor, Katharina. The Code of The Capital. Princeton University Press, 2019.

the land. After the making of this document, the Brazilian government evaluation to approve or not the demarcation might take years.[70]

In his article "We belong to the Land," the *quilombola* activist, writer, and small farmer Antonio Bispo dos Santos reminds the reader that group rights for both the *quilombolas* and the Indigenous nations whose territories overlap with Brazil only became recognized as individuals rights in the Brazilian constitution in 1988 with article 231, which includes the category "land traditionally occupied."[71] The Brazilian government promised to demarcate all traditional lands within five years after the article creation - by 1993—but as of 2020 they still have not fulfilled the promise.[72] By 2019, 676 Indigenous lands were recognized by the Brazilian government as traditionally occupied by Indigenous peoples, with more than 650 thousand people inhabiting them.[73] Each of these lands exist under different phases of the demarcation process—67% of them are homologated, while 32,2% are still under evaluation. Those under evaluation are threatened continuously by infrastructure projects, mining projects, and eventual land claim by non-Indigenous "owners." Legislative time to approve an Indigenous Land demarcation and homologation might take up 10 years. The timing of legislative processes can be crucial—1 or 10 years to

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[70] Barbosa, Samuel. Usos da História na Definição dos direitos territoriais Indígenas no Brasil. In: Carneiro, Manuela; Barbosa, Samuel (org). Direitos dos Povos Indígenas em Disputa. São Paulo, Ed. Unesp. 2018, p.127
[71] Brazilian writer, scholar, artist and politician Abdias do Nascimento defines Quilombos as the "exigency for enslaved Africans to recover their liberty and human dignity through escape from captivity, organizing viable free societies in Brazilian territory." The first quilombo, known as "Quilombo dos Palmares" was established in 1597. Quilombos remain today as a mode of land collective ownership and as a permanent sociopolitical movement of Afro-Brazilian praxis, as Nascimento defines Quilombismo. Read more in: Abdias do Nascimento. Quilombismo: An Afro-Brazilian Political Alternative. Journal of Black Studies, 1980. SANTOS, Antonio Bispo. Somos da terra. PISEAGRAMA, Belo Horizonte, número 12, página 44 - 51, 2018. https://agitatejournal.org/we-belong-to-the-land/
[72] See http://www.senado.leg.br/atividade/const/con1988/ADC1988_12.07.2016/art_67_.asp
[73] Instituto Socioambiental. A omissão do governo federal na homologação das Terras Indígenas ameaça os povos indígenas no exercício de seus direitos universais. 2019. Access: https://www.socioambiental.org/sites/blog.socioambiental.org/files/nsa/arquivos/nota_tecnica_monitoramento.pdf Accessed 25 May, 2021.

approve an Indigenous Land demarcation can generate two completely different spatial realities, and life conditions.

According to the 1988 constitution, Indigenous land rights constitute original rights: their land rights precede the creation of the Brazilian state. Article 20, XI of the same constitution determines the Indigenous land tenure in Brazil as belonging to Brazil federal state —a property category that grants the Indigenous original rights to the land ancestrally and traditionally occupied by them.[74] However, the definition of Indigenous land rights and land tenure through the Brazilian law parameters carries the risk of undermining traditional uses of land conceived outside of the concept of property. Professor of civil law José Antônio Peres Gediel describes the problem of using concepts of land tenure based on the principles of property as established by the Brazilian constitution. It places Indigenous populations at a disadvantage since they do not produce agriculture in the same way that Europeans do. Their activities are seasonal and don't belong to an area of land delimited by property limits. Their traditional houses and religious practices leave minimal spatial evidence that make difficult to achieve the parameters of "proof" established by the Brazilian constitution.[75]

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[74] Silva, José Afonso da. Parecer. In: Carneiro, Manuela; Barbosa, Samuel (org). Direitos dos Povos Indígenas em Disputa. São Paulo, Ed. Unesp. 2018, p. 21

[75] Gediel, José Antônio Peres. Terras Indígenas no Brasil: o descobrimento da racionalidade jurídica. In: Carneiro, Manuela; Barbosa, Samuel. Direitos dos Povos Indígenas em Disputa. São Paulo, Ed. Unesp. 2018 p.119.

Guarani Activism

Guarani communities in São Paulo have been using legislation as a strategic tool and potential process to protect their territory. In 2016, Guarani communities in alliance with certain São Paulo city council members proposed the creation of the law project 181: the Guarani Greenbelt. One Guarani leader argues that the Guarani Greenbelt is a model to be adopted not only in the Indigenous Lands, but in all of São Paulo: it can serve as a model for recuperating areas in the city center and other degraded areas.[76]

Continuously facing the growth of urban encroachment over their traditional territory since the 1950s, the Guarani communities in São Paulo had to adapt their traditional understandings of territorial relations to be able to maintain their territories and reclaim their land. With the expansion of new *tekoas* in the surroundings of Jaraguá Peak they have been regaining their territorial rights.

The activist proposition to counter development in Jaraguá Peak is not new: the Guarani Mbya communities have organized and protested against infrastructural impacts in the Jaraguá since the 1970s. Guarani activist groups from the south and southeast of Brazil have an Indigenous collective organization called *Guarani Yvyrupa* commission (CGY), which advocates for the recognition of the Guarani territorial rights. Since the beginning of the 1980s, each Guarani village has organized youth activist movements, each composed of tens of *xondaros* and *xondarias*, the Guarani term to designate those who are in the front line of political actions and who work with spiritual leaders within the Guarani villages. Between 1984 and 1989 the Guarani activist organization in São Paulo was named the AGUAI "Ação

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[76] Thiago Guarani lecture, personal notes from the class "A Aldeia Guarani no Jaraguá" taught by the architect Flavia Bueno. November 2020

Guarani Indígena" (translation: "Guarani Indigenous Action"). Over the years Guarani

leaderships in São Paulo and in other states (Paraná, Santa Catarina, and Rio Grande do Sul)

strengthened their work as a collective group between all south and southeast of Brazil. The

Guarani Yvyrupa commission was created in 2006 resulting from these growing Guarani

alliances beyond state borders. According to leaders of the movement, the main requirement

for the Brazilian government is for the demarcation of Indigenous lands. But the movement

accompanies closely all infrastructural development and real estate projects that impact

Indigenous lands, such as the duplication of road lanes and dam constructions.[77] They have

two principal offices: one in the *tekoa Tenondé Porã* in São Paulo, and another in the city

center of São Paulo. One Guarani leader from the *tekoa Kalipety* located in the south of São

Paulo, describes how the Guarani activism works as a collective movement. She argues that

one of the most important moments in the Guarani activism in São Paulo was in 2013, when

they closed the Bandeirantes road.[78]

The Guarani Mbya in the Jaraguá use these same infrastructural layers that divide

their territory as tactics of resistance to expose state contradictions. Strategies for reclaiming

the Guarani Mbya land in São Paulo have involved infrastructure disruption. The protest of

2017 shut down the telecommunication towers, and protests in 2013 obstructed access on

the Bandeirantes Road. In 2020, there have been ongoing conflicts with the Real Estate

enterprise Tenda. Tenda plans to construct housing towers that encroach on Atlantic Forest.

The Guarani have been using different strategies to counter the towers construction, such as

[77] Tupã. Aguyjevete pra quem luta! A Comissão Yvyrupa e a busca por nosso espaço de viver. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 28.
78 Tupã, Marcos. Jaguata Joupive'i: Caminhando Todos Juntos. In: Povos indígenas no Brasil 2011/2016 - instituto socioambiental. 2017. p. 789

Instagram live and virtual film projections that can be accessed from afar. Their long-term

activism in Jaraguá Peak is the only reason the Atlantic Forest still exists in São Paulo.

For important public announcements, the CGY commission uses the term

"Aguyjevete pra quem luta!" ("Aguyjevete for who fights"). Anthropologist Lucas Keese

describes aguyjevete as a sacred process of corporal maturation which allows bodies to

ascend to celestial spheres without going through death. Aguyjevete means true

transformation. The term is also used when one enters the *opy* (praying house), receives the

petyngua (pipe), or when someone receives the petyngua smoke.[79] The term "Aguyjevete pra

quem luta!" is both a cosmological and activist term of political resistance.[80]

The Guarani communities living in 18 *tekoas* in northwest and south of São Paulo are

also the agents of several initiatives that benefit not only their territorial relations, but the

entirety of São Paulo. The Atlantic Forest reforestation in São Paulo today relies on Guarani

groups that live in close relationship to the forest and non-human inhabitants. With the

cultivation of their traditional agriculture in São Paulo they have been recuperating soils

previously degraded by monocultures.[81] With the use of green manure they are also creating

additional spaces planting traditional agriculture and seeds. A system of ecological disposal

of polluted water maintained by the Guarani communities in the Jaraguá also have been

efficiently improving the water quality in some of the *tekoas*.[82] In 2019 alone, the Guarani

communities in São Paulo planted 300 seedlings including pitanga, cambuci, palmito-juçara

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[79] Keese dos Santos, Lucas. A esquiva do Xondaro: Movimento e acao politica entre os Guarani Mbya. Universidade de São Paulo: Faculdade de Filosofia, Letras e Ciencias Humanas, 2017, p. 275.
[80] Ibid.
[81] CTI. Os agricultores guarani e a atual produção agricola na Terra Indígena Tenondé Porã. Municipio de São Paulo. 2020b. Accessed December 2020. Access in:< https://trabalhoindigenista.org.br/wpcontent/uploads/2020/12/AgriculturaGuarani_14mb.pdf>
[82] CTI, 2020a.

and araucária. The planting is a collective action between Guarani and Juruá allies. Guarani

agriculture and their food also brings back birds that had abandoned the region previously

due to deforestation. In one of the Jaraguá *tekoas*, the *tekoa Ytu*, Guarani communities have

been re-constructing Atlantic Forest bees' infrastructures. Originally, more than 300 bee

species existed in the forest, but they had disappeared years ago, as one of the Guarani

leaders in the *tekoa Ytu* describes. As of 2021, 28 beehives and seven different species of

Atlantic Forest bees without stung are being raised and cultivated in Guarani villages in the

Jaraguá. In return, the bees being raised in the Jaraguá pollinate areas as far as 5km to 10km

from Jaraguá Peak.[83] In addition, the last large clean river in São Paulo is in Guarani territory.

The Capivari river, is situated in the Guarani Indigenous Land Tenondé Porã, south of São

Paulo.[84] Guarani geographies in São Paulo maintain the present and future of Atlantic Forest

infrastructures. If approved, the project law 181: Guarani Greenbelt will increase life quality

and for both humans and non-humans in all of São Paulo.

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[83] Sesc Itaquera. Round table with Marcio Boggarim Wera Mirim and Tiago Barros. Abelhas-sem-ferrão: biodiversidade, cultura e tradição indígena. 28 April, 2021. Access: https://www.youtube.com/watch?v=Hg9FN1qiwmM . Accessed 25 May, 2021.
[84] Programa Aldeias. O último rio limpo #CinturãoVerdeGuarani . 20 July 2020. Acces: https://www.youtube.com/watch?v=8UzwprKbJvY . Accessed 25 May, 2021.

Chapter 2: Infrastructural Dispossession

> "Indigenous geographies have quietly overlapped and coexisted in tension with the geographies of the settler colonial state. They have been submerged, but not eliminated. While they have changed to survive the violences directed at eliminating this overlap and coexistence, indigenous peoples have sustained Native spaces."
> Natchee Blu Barnd, Native Space: Geographic Strategies to Unsettle Settler Colonialism, Oregon State University, 2017, p. I.

As critical ethnic studies scholar Natchee Blu Barnd argues, Indigenous geographies are "not simply places," but are also "choices, ways of understanding the world, and actions" that create spaces. Guarani Mbya geographies, as one among thousands of different Indigenous geographies whose lands overlap with Brazilian settler occupation, are remade and reworked everyday. Each non-human geography, whose paths, houses, food, and customs have been disrupted by the construction of a road in São Paulo, are constantly being remade and re-adapted. The substitution, demolition, or interruption of Indigenous infrastructures (such as a Guarani Mbya paths in between Guarani villages) or non-human infrastructures (a boar path, or a bird aerial path) for a colonial infrastructure (a road construction for cars, trucks, and buses, or a dam and power lines construction which transmit energy from the dam to settler colonial cities) enables the continuation of Brazilian colonial violence. Deformation, fragmentation, or extraction of ancestral forest in Guarani territory not only disrupts access to land, but also to customs, and possibility to action that facilitate the Guarani way of life. Nonetheless, Guarani communities in and beyond São Paulo have been living with colonial infrastructures, and continuing their continental paths while remaking Guarani geographies. São Paulo's settler colonial occupation in Guarani territory, and Guarani geographies, are not

static, seamlessly "ongoing" conditions, nor permanent, but are actions being unceasingly

remade, re-produced, and therefore open to contestation.[85]

Infrastructure, settler colonialism, and racial capitalism scholars have long-term

theorized on the coloniality of infrastructures. Indigenous scholars as the Native American

land rights activist, environmentalist, and economist Winona LaDuke; Kul Wicasa (Lower

Brule Sioux Tribe) activist, decolonization, U.S. imperialism, environmental justice, and the

Oceti Sakowin scholar Nick Estes, American Studies scholar Manu Karuka; Maxakali

philosopher, educator and artisan Cristine Takuá; and Yanomami shaman Davi Kopenawa

are some who emphasize the deep, long term unfolding, harm caused by settler

infrastructures. Only Indigenous scholars, or scholars who are from colonized spaces, are

able to theorize the deep effects of infrastructures in relation to colonialism from each of

their own Indigenous nations, and their own, self-determined perspectives. Learning from

Indigenous scholars from very different backgrounds is also important as they reveal the

repetition of infrastructural harm in very different contexts. In "Beyond Wiindigo

Infrastructure," LaDuke and Geographer Deborah Cowen argue that "the transformation of

ecologies of the many into systems of circulation and accumulation to serve the few is the

project of settler colonial infrastructure. Infrastructure is the how of settler colonialism."[86] In

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[85] In the discussion "Racial Capitalism and the U.S. Colonial Present," (4 March 2020) American Studies scholar Alyosha Goldstein argues that the idea of "ongoing colonialism" is problematic because it flattens how "colonialism" is very different depending on the specific context and time period. Goldstein argues for analyzing racial capitalism and settler colonialism in relation and how both of these terms carry very different meanings depending on the different contexts and historical moments. Goldstein argues for a discussion of settler colonialism as "ongoing" not as "permanent" but ongoing as "always in flux" and open to contestation. In the same way, forms of appropriation are "never final, but always ongoing and contested." Access in: https://www.youtube.com/watch?v=vwTLGE-YWe4

[86] Cowen, Deborah; LaDuke, Winona. Beyond Wiindigo Infrastructure. Duke University Press: The South Atlantic Quarterly 119:2, April 2020, p. 245.

his article "'Freedom is a Place:' Long Traditions of Anti-Colonial Resistance in Turtle

Island," Estes says:

> "while there are infrastructures of Indigenous resistance, they confront infrastructures of
> settler colonialism in the form of police, prisons, dams, and oil pipelines that intend to
> destroy, replace, and erase. These infrastructures of dispossession have forced destroyed and
> attacked communities to re-imagine and reconstitute themselves once their homes and lands
> have been taken. Settler colonialism is typically seen as taking Indigenous lands to extract
> value from those lands. Equally so, however, in the case of oil pipelines and hydroelectric
> dams, Indigenous land and water is coveted simply so that it can be wasted. For our nation,
> our lands were coveted so they could be destroyed, to put water on top of them."
> Estes, Nick. "Freedom is a Place:" Long Traditions of Anti-Colonial Resistance in Turtle
> Island. In: The Funambulist 20: Settler Colonialism in Turtle Island. The Funambulist.
> November-December 2018. https://thefunambulist.net/articles/freedom-place-long-
> traditions-anti-colonial-resistance-turtle-island-nick-estes

Karuka calls the process of railroad construction in the United States "railroad colonialism,"

revealing how rail construction also served to commodify the land: "Railways enabled the

circulation of colonial commodities throughout the imperial core, and even more

importantly, they made the large-scale export of financial and industrial capital to the

colonies a central feature of global capitalism."[87] From a more close analysis on the violence

embedded on ground extraction, Takuá describes the act of extracting, excavating land for

constructing roads or other infrastructures, and land movements that perforate the ground

as "the rape of the Earth:"

> I always remember a great spiritual leader who said something that I never forgot: our body
> has veins and blood, and one who suffers from blood circulation problems will likely suffer a
> heart attack and die; so the blood that runs through our veins is what gives us life. The Earth
> has its veins of water, which are the rivers. But men, out of interest, transpose, change, build
> dams, these various things that change the course of water, and that is a rape. To seize a
> river and change its direction, without asking if this can be done, this is a great
> aggression.(…) the Atlantic Forest is a great example of this rape: of the 100% of the
> Atlantic Forest that existed, today there are less than 7% — and these 7% are in the
> indigenous areas, preservation parks and quilombola areas. We see the struggle of the
> Guarani indigenous lands in the state of São Paulo as a great scream for care and attention
> for this remaining forest, because if this forest is destroyed completely, it'll become
> impossible to live here.

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[87] Karuka, Manu. Empire Tracks: Indigenous Nations, Chinese Workers, and the Transcontinental Railroad.
University of California Press, 2019, p. 40.

Takuá, Cristine. Interview by Bueno, Claudio, Nobre, Ligia. YVYRUPA, Terra Livre. Fields of Invisibility, São Paulo, 2018. Access: https://camposdeinvisibilidade. org/ Entrevista-Takua Accessed 25 May, 2021.

And, as Yanomami shaman Davi Kopenawa says:

"The forest is alive. It can only die if the white people persist in destroying it. If they succeed, the rivers will disappear underground, the soil will crumble, the trees will shrivel up, and the stones will crack in the heat. The dried-up earth will become empty and silent. The xapiri spirits who come down from the mountains to play on their mirrors in the forest will escape far away. Their shaman fathers will no longer be able to call them and make them dance to protect us. They will be powerless to repel the epidemic fumes which devour us. They will no longer be able to hold back the evil beings who will turn the forest to chaos. We will die one after the other, the white people as well as us. All the shamans will finally perish. Then, if none of them survive to hold it up, the sky will fall."

Davi Kopenawa, Bruce Aubert. The Falling Sky: Words of a Yanomami Shaman. The Belknap Press of Harvard University Press, 2013, p. xvii

LaDuke, Estes, Karuka, Takuá and Kopenawa are some among many Indigenous scholars who analyze the colonialism of infrastructures, or in other words, how infrastructures maintain colonial occupation.

Adding to Karuka, Cowen, LaDuke, Estes, Takuá, Kopenawa, and many others, this chapter traces the story of what I frame as infrastructural dispossession in Jaraguá Peak. It aims to disentangle how the history of roads and power lines expansion was simultaneous to Atlantic Forest deforestation. In the same way that, as Barnd suggests, Indigenous geographies are not only spatial, but also choices, actions, and ways of understanding, infrastructural dispossession is not only spatial, but also cultural, and agential. Simply put, changes in space also carry changes in relation, layers of use, possibility of movement, cultural and cosmological relations. Infrastructural dispossession is spatial—a volumetric encroachment interrupting relations to land, polluting water and air. It is also temporal and multilayered. It is the loss of land and the many layers of relations that land is. Infrastructural dispossession is also not a one-time event, but a long term unfolding change. Urban growth on the borders of a new road continue encroaching upon forest for decades, and even

centuries, after the road construction is concluded. Infrastructural presence (roads), or even

more importantly, infrastructures in use (thousands of cars travelling in a road per day) make

the fragility and deep contradiction of settler colonial occupation seem natural, or logic.

Infrastructures available for settler colonial occupiers' use are a fundamental part of *making*

colony into *home*: a road alone has no sense, but a road in use gives sense of belonging to the

one using that road. An expanding web of roads available for everyday use of settler colonial

families allowed, in the long term, to entrench and settle the fragile fiction of Indigenous

lands as belonging to settler colonizers. Infrastructural dispossession is the active role of an

everyday act that maintains the settler colonial and racial capitalism projects. Through

infrastructural expansion, governments and companies have continuously encroached upon

Indigenous lands. Specifically, in Jaraguá Peak's context infrastructural constructions

deforested the Atlantic Forest and tried to fragment Guarani's continuous transnational

network of kin and mobility. Nonetheless, the Guarani networks are being constantly

remade.[88]

      This chapter first recapitulates Guarani understanding of territory and the

importance of territorial continuity as discussed in the last chapter. Then, it traces how each

infrastructural layer—Roads, Telecommunication Towers, Power Lines, State Park—

functioned as spatial components, built as a partnership between São Paulo State

Government and private real estate companies. It tells how this partnership treated land use

deals and shared profit on the land, while infrastructure and construction companies

undermined Guarani cosmological understandings of territory and access to land. Each

section of this chapter—Roads, Electromagnetic Infrastructures, Conservation Units, State

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[88] Ladeira, 2008.

Park, Urban Growth, and Zoning—dives into the history of each layer of construction to foreground how they changed ground contours and disrupted relations for both humans and non-humans in Jaraguá Peak.

Roads

The construction of the Anhanguera road, begun in 1940, initiated the Atlantic Forest fragmentation. The road connected two cities: São Paulo and Campinas. Over a period of forty years Anhanguera became the busiest road in São Paulo. The impacts caused by the road, however, were not immediate. When it opened in 1948, the difficult topography of the road and the lack of other buildings and commercial activities in its vicinities initially discouraged real estate interests.[89]

Together with the Anhanguera road construction, the street that opens the path for accessing Jaraguá Peak slowly took shape. The São Paulo State Government named the road as Jaraguá Tourist Road. Access to the road remained difficult even two decades later. An article from December 1961, published in the newspaper *Folha de São Paulo*, announced an intention to pave the road. The article describes that this would enable the enjoyment of the marvelous panoramic views from the peak over the city. According to the article, the peak would be equipped with belvederes, restaurants, lakes and a monumental statue. However, another article from the newspaper O Estado de São Paulo, from 1969, described that the access was still only possible for trucks or "farm cars."[90]

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[89] Pimentel, 2009.
[90] No Bondinho, A Esperanca do Jaraguá. O Estado de São Paulo, July 1969.

The second major road, named Bandeirantes, unleashed more development.[91] The road construction began in 1976, and opened to traffic in 1978. The road inauguration launched real estate interest in the neighborhood, opening space for Industrial establishments to arrive on the edges of both the Bandeirantes and Anhanguera roads. Bus lines linking the surrounding neighborhoods to downtown increased economic interests in the region even more. As a result, real estate companies divided Atlantic Forest areas into small plots of land for sale.[92] Road construction directly impacted the Guarani Mbya territory by separating the Guarani *tekoas*, houses and families on different sides. It also polluted water, interrupted rivers, and disrupted access to medicinal plants, crafts materials and material for the construction and repair of the Guarani houses.[93]

During the roads construction period, which unleashed real estate expansion and urban growth over Guarani territory, the São Paulo state government did not demarcate Jaraguá Peak and the Atlantic Forest as Guarani Mbya Indigenous land. At that time, the 1988 constitution, which established the demarcation of Indigenous lands, did not exist yet. Guarani territory in the Jaraguá was first acknowledged in 1987, by the Decree n. 94.221. However it only recognized the footprint of Guarani houses as the Indigenous territory, not including the land that they relied for living.[94] This lack of recognition caused serious problems for the Guarani living in the Jaraguá. Real estate companies sold areas long term used by the Guarani, and part of Atlantic Forest, to private buyers, generating enormous

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[91] Bandeirantes is a term invented on the eighteenth-century to describe the participants of the bandeiras (term to which the direct translation is *Flags*): expeditions during the seventeenth-century to enter the so-called wilderness and colonize the Brazilian territory beyond the coast. The Bandeirantes are responsible for the Guarani displacement and enslavement.
[92] Pimentel, 2009
[93] Ibid.
[94] Ibid.

conflicts between the Guarani and illegal land buyers. The Guarani communities eventually had to live in the Atlantic Forest environment with new landowners in Jaraguá Peak, who were buying ancestral Atlantic Forest plots as pieces of land for sale.[95] The forest encountered a continuous process of fragmentation and environmental degradation.

Construction of a third major road, known as Rodoanel Mario Covas, was launched in 2002. The Rodoanel road unleashing even more urban growth in the region. With this road, the Jaraguá Peak became an island in between the three roads. Before its construction, Jaraguá Peak was still a continuous territory, linked to a neighboring Atlantic forest area inhabited by boars and other non-human inhabitants. The Rodoanel construction destroyed their habitat. Their presence was important to the Guarani both as nourishment and as sacred.[96] Today, this Atlantic Forest area separated from Jaraguá Peak by the Rodoanel construction is also classified as a state park, named Anhanguera Park.

The three roads, Rodoanel, Bandeirantes and Anhanguera, are administered by the same private company CCR group, which administers 1.922,6 kilometers of roads in the states of São Paulo, Rio de Janeiro and Paraná. Each car that travels over one of the roads pays 115 Reais (U$ 27.00) in toll taxes per one-way trip. In 2009 the Anhanguera-Bandeirantes roads system alone supported the traffic of 210,3 million of vehicles, resulting in a profit of 700,6 million from tolls. The *CCR group* average gross annual income is three billion Reais ($USD 750 million).[97]

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[95] Salles, Camila. A luta Guarani pela terra na metropole paulistana: contradicoes entre a propriedade privada capitalista e a apropriacao indigena.Tese de Doutorado, USP, 2017.

[96] Pimentel, 2009.

[97] Anhanguera e bandeiranets somam R$ 115 em pedagios. G1, 2018. Accessed December 2020. Access in: <g1.globo.com>

Minor roads also impact the Guarani Mbya community. The road *Comendador José de Matos* today divides the Guarani Mbya houses into three separate areas. In the 1960s the road was only a land path, used by pedestrians. When paved, cars and trucks arrive, raising the risk of accidents. Children living in the community who need to cross the street daily to attend school and visit other houses are the most affected. Paving the street also further reduced space for agriculture production in the vicinity of the community houses.[98]

Road construction interrupted what had been a continuous territory hosting Atlantic Forest endemic fauna and vegetation. Still, in 2012 the Jaraguá State Park management plan registered the presence of 149 bird species and 11 mammal species in Jaraguá Peak area. Among the bird species, 17 are endemic to the Atlantic Forest biome. Among the mammals, the skunk Didelphis Aurita is endemic. The ocelot and the jacuaçu *Penelope obscura* are in danger of extinction.[99]

Electromagnetic Infrastructures

On November 16, 1962, under the authority of State Law Nº 7.458, the São Paulo State Governor Carlos Alberto de Carvalho Pinto ceded the land use rights of a 1400m2 tract of land to the media company *Radio Bandeirantes S.A.*, for a period of twenty years. The ceded area was the summit of Jaraguá Peak. The *Bandeirantes* media group wanted to install their first Television Tower on the highest elevation in São Paulo.[100]

The contract between the São Paulo State Government and the media company was simple: the Bandeirantes group could install their telecommunication tower on the top of

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[98] Pimentel, 2009
[99] Pimentel, 2009
[100] Leonel, 2012

the peak and use the land as the anchor point for spreading their electromagnetic waves without paying any rent or taxes to the state government. In addition, other television companies could also install their equipment on the tower free of charge. For the first twenty years after the tower installation, in 1962, the use of Jaraguá Peak for broadcasting television signals was provided to television companies *free of cost*.[101]

This was a deal beneficial to both government and private enterprises. The owner of Radio Bandeirantes S.A., João Jorge Saad, with help from his father in law, Ademar de Barros, the previous owner of the company, consolidated the Bandeirantes television branch. Prior to the television tower installation, the group only broadcast Radio. Barros transferred the company ownership to Saad. In addition to his role as an entrepreneur and former owner in the Bandeirantes media group, Barros was a doctor, an aviator, a politician, and a charismatic public speaker.[102] Leading the political party known as Partido Social Progressista (PSP) he was twice elected Governor in the State of São Paulo—from 1947 to 1951 and from 1963 to 1966. He once served as mayor of São Paulo, from 1957 to 1961. And he was invited by the Brazilian president Getulio Vargas to become the Federal Intervenor during his presidential mandate from 1938 to 1941.[103] While performing his role as State Interventor, he was the agent who claims to have bought the Jaraguá Farm, in 1939 —which would become the Jaraguá State Park in the 1960s.[104]

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[101] Leonel, 2012
[102] Schwartz, Lilia, Starling, Heloisa. Brasil: Uma Bibliografia. São Paulo: Companhia das Letras, 2015
[103] Getulio Vargas creates this government position during his presidential mandate. The Interventor role was to take over the governance of certain Brazilian states that were not conforming with the Federal Government directions during the Vargas dictatorship.
[104] Salles, 2017.

Bandeirantes remains as an important name among the media oligopoly in Brazil: five families control 50% of the mainstream media vehicles. The Saad family, owner of Bandeirantes group, occupies the second position on the rank. The first position, however, belongs to *Globo*, owned by the Marinho family. Globo alone has an audience bigger than the 2nd, 3rd, 4th and 5th biggest media groups in Brazil together.[105] The second antenna installed in the pioneering television tower in Jaraguá Peak belonged to Globo.

The Funai report from 2013 describes the friendship between the Guarani Mbya families who lived in the Jaraguá and the workers who constructed the television tower. Mário Martim, son of Jandira and Joaquim—the Guarani Mbya leaders in the Jaraguá in the 1960s—described these friendships with the Guarani community. Often the workers came to visit them. Martim also describes that, before the tower installation, the region did not have any asphalted roads crossing the Atlantic Forest area in Jaraguá Peak.[106]

A second tower arrived in the peak seven years later, in 1969. The newspaper *O Estado de São Paulo* released the news on the upper-left corner of page 15, on a Wednesday edition: *The Tower of TV Cultura is ready*. The new tower would transmit the television signal of the "Educative TV", also known as channel 2, owned by another media group, *Cultura*. According to the article, this became the tower with the strongest signal in Brazil—power of 25 kw, and a signal range of a 120km radius. The height of this new tower, however, remained a little smaller than the Bandeirantes tower: 63 meters of height. It contained 24 antennae installed on its structure, distributed along its four sides—six in each.[107]

[105] Carta Capital. Cinco Familias controlam 50% dos principais veiculos de midia do pais. 2017. Access: https://www.cartacapital.com.br/sociedade/cinco-familias-controlam-50-dos-principais-veiculos-de-midia-do-pais-indica-relatorio/ Accessed 25 May, 2021.
[106] Pimentel, 2009
[107] Pronta a tôrre da TV Cultura. In: O Estado de São Paulo. March 19, 1969.

In the same article, one of the subheadings: *from Italy*, notes that the tower material

was imported from the Italian company COELI, which specialized in fabricating materials to

construct television transmission structures. Even though the material flew from Italy,

assemblage of the pieces took place in São Paulo. The article reveals that, even though the

new TV channel transmission was supposed to begin on the 18th of March, a delay in the

flight that carried the transmission cables of the tower hindered the inauguration. "Today

the airplane containing the transmission cables departs from the United States, and hopefully

tomorrow the installation of the cables can begin" the article concludes.[108]

One year later, in 1970, in response to the new tower from TV Cultura, and due to

the upcoming 9th edition of the World Cup, the Bandeirantes Group decided to also make

improvements on their antennae equipment. The 1970 World Cup was an important marker

in Brazil. It was the first live broadcast of the games on television. In the previous World

Cups, broadcasts were delayed two days. To become one of the main companies to

broadcast the upcoming World Cup, Bandeirantes Group installed new signal amplifiers on

the tower. The improved equipment heightened their transmission capacity, and quality to

reach a radius range of 200km.[109]

In addition to the two iconic towers on the peak, smaller towers were also located on

the peak after 1970. They served as infrastructure for spreading signals for government

companies and military services. In 1970 the public electric utility *São Paulo Light and Power*

Co. Ltd. also earned a plot on the peak, adjacent to the one ceded to *Radio Bandeirantes S.A.*

ten years earlier. In 1971, the military also received an adjacent land plot, to construct a

[108] Ibid
[109] A historia das antenas. 2012. Accessed December 2020. Available in:<https://www.pirituba.net/pico/>

shelter hosting their microwave equipment. The plot ceded by the government to the

military was increased in 1974 to install the antennae that spreads the military radio channel

signal.[110] All the land cessions were established without paying any taxes for using and

degrading the surrounding Atlantic Forest.[111]

Initially, the public rejected the aesthetic appearance from the towers installed in the

Peak. An article from 1971, published in the newspaper *O Estado de São Paulo*, argues that the

towers did not respect the Jaraguá topographical contours as a *Monument of Nature*.[112]

Another article from the same newspaper refers to the towers as "anti-aesthetic" elements

planted there by television companies, calling it a "metallic skewer" that recalls a "lame

petroleum tower." The author concludes by saying the tower completely disrupted the Peak's

topographical contour.[113]

While the aesthetic critique reached a large public audience, environmental impacts

caused by the towers were rarely mentioned in the news. Not until forty years after the

installation of the towers did the Jaraguá State Park management plan, from 2012, recognize

those impacts. The report describes the common issue of birds dying from collisions with

the towers. The report also notes that the installation and maintenance of the towers

surrounding area caused erosion of the land.[114]

The report, however, does not mention other risks resultant from the towers'

activities. The antennae installed in Jaraguá Peak emit Radio Frequency (RF) energy,

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[110] Leonel, 2012.
[111] Ibid.
[112] Ha um Plano Para Remodelar o Pico. O Estado de São Paulo, 03.16.1971
[113] Estátua ficou na promessa. São Paulo: O Estado de S.Paulo, 1971. Acess December 2020. Available in
<http://acervo.estadao.com.br/>.
114 Leonel, 2012.

characterized by the range of frequencies between 1 MHz to 3 GHz, which include

television (54-216 MHz), and cellular phones (900 MHz). RF waves have long wavelengths,

about an inch or two in size, propagating through the low-energy range of the

electromagnetic spectrum, known as non-ionizing radiation. They do not have enough

energy to break chemical bounds and remove an electron from an atom or molecule when

traversing matter. However, even if RF radiation cannot damage DNA cells the concern

remains that RF waves cause other types of cancer.[115] According to the American Cancer

Society, the absorption of RF radiation in large amounts, or for a long period, by elements

containing water, such as body tissues, can produce heat, leading to burns or tissue

damages.[116] Few studies have focused specifically on cellular phone towers and cancer risk

considering long-term exposure, as the case in Jaraguá Peak. Even though health effects

from cell and television towers electromagnetic emission are not scientifically conclusive,

they create risk. Despite conclusive proof, health risks exist for long-term exposure. The

Atlantic Forest human and non-human inhabitants have been exposed to the tower's

electromagnetic health risks continuously since 1962.

 Twenty years after the installation of the first tower from the Radio Bandeirantes

S.A. media group, the initial land cession expired. However, the contract was promptly

renewed by the Decree No 25.556/1984, still ceding the same area without charging rent.

Only in 1997, with a new decree—Nº 42.533/1997, did the state government request the

payment of a monthly rent for the use of the land. The state administration argued that the

towers occupied the peak's highest point with the best tourist view. Since then, the towers

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[115] American Cancer Society. What is radiofrequency (RF) radiation?, 2018. In:
https://www.cancer.org/cancer/cancer-causes/radiation-exposure/radiofrequency-radiation.html
[116] Ibid.

pay rent to the State Park. The new payment regime, however, still does not compensate for environmental risk and damages that result from the towers' installation and maintenance.[117]

The telecommunication towers in the peak serve as real estate agents. One tower can host complex economic transactions and relations between tower owners and antennae spot renters. A tower's lease configures an agreement between two parties: a property owner with space available for the cellular equipment installation and a cellular provider. This agreement is similar to an outright sale of land, but the original owner retains the legal ownership of the property after the lease is over. Another common agreement is a tower collocation lease, when a carrier rents a space on an existing cell tower, which commonly does not involve the primary property owner as part of the lease agreement.[118] Both forms of lease are present in Jaraguá Peak tower agreements.[119]

Both the São Paulo State government and media groups commonly depict the Atlantic Forest as empty, putting thousands of living beings into a blind spot. The presence of the Guarani Mbya families that inhabit the peak forest was constantly undermined by both the media and government who occupy their lands. The newspaper *O Estado de São Paulo* declared, in 1969, that due to the hard conditions of accessing Jaraguá Peak, the only inhabitants that remain in the peak were the technicians responsible for the television towers maintenance.[120] The representation of the Atlantic Forest as empty also appears in the architectural drawings produced by the Sports and Tourism Secretariat responsible for administering the state park where the towers are installed. The architectural drawings

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[117] Leonel, 2012
[118] Cell sites may also consist of antennas mounted on rooftops, water towers, billboards or other tall structures. https://www.landmarkdividend.com/cell-tower-lease-rates-explained/
[119] Leonel, 2012.
[120] No Bondinho, a esperanca do Jaraguá. O Estado de São Paulo. 06.12.1969

include the towers, the roads that surround the towers, and the colonial house that marks the Guarani's displacement from their traditional land. Both the Atlantic Forest and the Guarani territory do not appear in the drawings.

For facilitating the economic transactions and bureaucratic demands of the new rent statute, the companies behind the towers and antennae in Jaraguá Peak formed a new legal entity: Jaraguá Peak *Condominium*. The rent the condominium paid to the State Park goes to its maintenance and amounts to an average of 1.1 million reais per month (U$ 250,000.00). However, several mobile phone companies who have their antenna installed on the tower structure are not officially registered. According to the Jaraguá State Park management plan, since 2012, if the number of telecommunication companies that use the towers installed in the peak becomes updated, the rent value paid by the towers should cover all the State Park monthly expenses.[121] Bandeirantes, Globo and TV Cultura television channels moved to regions near to Paulista Avenue. Paulista Avenue is one of the most well known avenues from São Paulo, and known for its corporate buildings. The avenue is located in another elevated area within the city—its buildings of high elevation have a comparable altitude to Jaraguá Peak, but have the advantage to locate in the city center. The new antennae also transitioned to digital television signal. Even though some television companies do not host their antennae on Jaraguá Peak anymore, their antennae have broadcasted over the peak surroundings for more than 50 years. In addition, it remains unclear whether Bandeirantes and Cultura media groups still own the towers, profiting from other antennae rents. Their television antennae don't need to be hosted there in order to tower owners remain profiting from the structure where other antennae are installed. While the companies that gather in

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[121] Leonel, 2012

the towers pay rent for the State Park, the health impacts resulting from the electromagnetic risks that have accumulated over 50 years together with the territorial damages caused to the Guarani Mbya and the Atlantic Forest remain to be computed.

The telecommunication towers are not the only infrastructural layer in Jaraguá Peak that emmit electromagnetic pollution over the forest. The state company *São Paulo Light and Power Co. Ltd.*, who also owns their own telecommunication tower in the Peak, installed in 1955 a power line known as "Transmission Line Anhangabaú-Jundiaí." The power line crosses through both the Guarani Mbya Indigenous territory and the Atlantic Forest in the Jaraguá. The line, which transcends the forest limits, hosts ten high tension towers inside the Jaraguá Indigenous Land, cutting through Atlantic Forest.[122] The presence of Power Lines in the peak deforested adjacent areas in a buffer area of 30 meters from where the towers are installed. The noise of electric cables frightened non-human inhabitants in the towers surrounding, changing their customs. The power lines presence also threaten birds flying in Atlantic Forest areas from risk of colliding with the high voltage lines and towers.[123]

The energy transmitted through this power line origins at the Itaipu dam hydroelectric complex.[124] Itaipu was constructed during the Brazilian military dictatorship, between 1964 and 1985, over the frontiers between Paraguay and Brazil. This frontier coincides with the region that the Guarani consider to be the center of the world. The energy distributed to São Paulo, through the same power line that encroaches the Guarani Mbya territory in Jaraguá Peak, originates from the dam that inundated one of the most

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[122] Ibid.
123 Pimentel, 2009.
[124] See: https://www.itaipu.gov.br/en/energy/integration-brazilian-system

important Guarani territories. Part of the Guarani population displaced by the Itaipu dam construction migrated to the Jaraguá Indigenous land.

State Park and Conservation Units

Health and environmental risks resultant from the towers installed at the peak started to be considered in 2000, when the São Paulo government categorized the Jaraguá Atlantic Forest area as a conservation unit. The concept of Conservation Units was established in Brazil with the Federal Law no 9985, from July 18, 2000, as a reference to the creation of the Yellowstone National Park in the United States, in 1872.[125] With the Jaraguá State Park framed as a conservation unit, the free use of natural resources became restricted, admitting only certain activities, such as ecotourism, academic research, and environmental education.[126]

According to anthropologist Maria Inês Ladeira, the proposed model of usage within conservation units envisages a sustainable economy. Even though conservation units hinder extraction and the construction of new infrastructures over the protected areas, they still commoditize the land they theoretically safeguard. This mindset sees the forest as a resource supplier to which humans are not part of but can make use of. This understanding differs drastically from the understanding of the Atlantic Forest by the Guarani—to whom nature is not a separate commodity. For the Guarani, humans are part of the forest as much as non-humans, living in interdependence.[127] The logic that conservation units propose as

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[125] Unidades de Conservacao. São Paulo State Government. Accessible in:
https://www.prefeitura.sp.gov.br/cidade/secretarias/meio_ambiente/unid_de_conservacao/index.php?p=333
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[126] Leonel, 2012.
[127] Ladeira, Maria Ines. Terras indígenas e unidades de conservação na Mata Atlântica - áreas

sustainable can also undermine the Guarani and other Indigenous nations' land rights, self-determination and, sovereignty over their traditional territory.

The overlap between conservation units and Indigenous nations' sovereign territories is a repeating condition over the Brazilian national boundaries. During the decades of 1980 and 1990, the number of parks and reserves in the Atlantic Forest domain doubled to 205. About 100 of those reserves overlap with Guarani Indigenous Lands.[128]

The Jaraguá State Park receives around ten thousand visitors per weekend. As the highest point in São Paulo, with an altitude of 1.135m, the park offers a panoramic view over the city of São Paulo, with visibility extending to a radius of 55km. Visits are open from Monday through Friday, from 7AM to 5PM, and the entrance is free. With an area of 492.68 hectares, 60% of the State Park overlaps with the Jaraguá Indigenous Land.[129]

The clashes between the Guarani Mbya families that inhabit the Atlantic Forest in the peak, and the State Park, did not surface during the early years of the park. Initially, the park as a tourist spot was more of a desire projected by the São Paulo State Government than a reality.[130]

Nonetheless, the violence done to the Guarani territory by the park began prior to the park existence. The park landscape design perpetuated settler-colonial violence even when it was still a plan on the paper. The planning team was White and male. Led by two historians and one artist, the intention was to create a place that honored the settler colonial and genocidal figure of the Bandeirante.[131] The initial plan of a park to honor the

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protegidas? São Paulo: Revista Eletronica do CTI, 2004.
[128] Ibid.
[129] Pimentel, 2009.
[130] Pimentel, 2009.
[131] O Estado de São Paulo. No Pico do Jaraguá, a memoria do bandeirantismo. February 2013. Access

Bandeirante figure soon became considered inadequate and was never built. But intention

remained in play. The colonial house of Alfonso Sardinha, constructed in 1580 when gold

was first mined on the peak, exists within the park limits. The park administration claims the

house is one of its main attractions. While architects hired by the park represented the

Atlantic Forest as a void, the Alfonso Sardinha colonial house was drawn in detail.

The state of São Paulo hoped Jaraguá Peak would become a tourist success and an

international reference as important as Rio de Janeiro's peaks. However, despite the efforts

to transform the peak into a tourist attraction, the difficulties of accessing the top of the

peak posed a constant problem. Successful park attendance relied on the construction of a

paved road with public access. Even though the State of São Paulo wanted to transform the

peak into a tourist spot as early as 1940, the Jaraguá Tourist Road pavement was repeatedly

postponed.[132]

The park administration was creative in finding other ways for accomplishing their

will. For instance, the park name shifted from Jaraguá State Park to "Amusement center Park

Jaraguá," in 1971. In the same year, the government of São Paulo decided to build a statue

of the priest who "founded" the city of São Paulo on the peak next to the

telecommunication towers. The hope was that with the statue, the peak could become as

famous as Corcovado with the Art Deco statue Christ the Redeemer, in Rio de Janeiro. In

1971 the São Paulo state government launched a public competition for architects and artists

to design the statue. It was to be called the "monument for the apostle São Paulo."[133]

December 2020. Accessible in: <estadao.com.br>
[132] No Bondinho, A Esperanca do Jaraguá. O Estado de São Paulo, July 1969.
[133] Leonel, 2012

Inspired by the monument idea, others attempted to create a future for the peak as an attractive destination for weekend leisure. With the subtitle "This is the plan that can attract tourists to the Jaraguá," a newspaper article from 1969 described the plan of the architect Carlos Siqueira for solving the Peak's accessibility problem. The architect proposed the construction of a cable car similar to the one constructed in Pão de Açucar Mountain, also in Rio de Janeiro.[134]

Another article, from 1971, titled "A plan exists for remodeling the Peak," described a planning idea by another architect, Paulo Pestana. Beyond the monument and the cable car, he proposed that the peak should be equipped with a theater, a museum, leisure area, a pond, two bars, and restaurants. However, neither the Monument of the apostle, nor the cable car project were ever initiated.[135]

In 1972, the park created a dual administration. While the major park area was administered by the Forestry Institute, the promising tourist areas were transferred to the Tourism Secretariat. The elected areas were the pond area, and the top of the peak, where the telecommunication towers were installed.[136] The pond area proposed as a spot for leisure and tourism was Guarani Mbya source, used by them for fishing and swimming. When the park started polluting the ponds and rivers, problems between the park and the Guarani community in the Jaraguá started to surface. These and other park activities began to undermine the Guarani Mbya livelihood and its dependence on the Atlantic Forest.[137]

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[134] No bondinho, a esperanca do Jaraguá. O Estado de São Paulo. 07.12.1969.
[135] Leonel, 2012
[136] Leonel, 2012.
[137] Pimentel, 2009, p.215

In 1980, the park administration installed fences in the park perimeter. However, the park area held important part of the Guarani agriculture, harvesting, material collection and forest management. One of the Guarani Mbya residents in the Jaraguá, Maria, described how the park fences disrupted her access to the area where she used to plant lettuce, cabbage, and many other vegetables.[138] The park encompassed the best areas for the Guarani agriculture. Trees and plants used for the Guarani house maintenance and repair also lay within the park boundaries, as did materials used for manufacturing crafts, which sustained many families. By closing its boundaries, the park undermined the interdependency of the Atlantic Forest and the Guarani Mbya. The fence made the community dependent on outside systems of consumption.[139] The park fences also unleashed health risk. The Jaraguá Peak is one of the coldest areas of São Paulo during the winter. If families cannot collect firewood in the forest, they are exposed to health risks. Most families also didin't have money for buying gas cylinders to heat their houses.[140] The park area also contains important medicinal plants. Without access to the plants, the community is forced to use western medicine and lose their connection to botanical knowledge.[141]

A leader in the Jaraguá community explains that the creation of parks or forest reserves by the Brazilian government served as an intermediary step in the process of using those reserves for other economic and politic interests.[142] This logistics of fragmenting forest into plots for trade has led to the reduction in the Atlantic Forest area. According to Martins,

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[138] Ibid.
[139] Ibid
[140] Ibid.
[141] Ibid.
[142] Popygua, Davi Karaí, Cretã, Kaingang. Interview by: : Carmem Susana Tornquist e Raquel Mombelli. Trajetórias de vidas e lutas pela demarcação das terras indígenas. Uma entrevista com Cretã Kaingang (PRF) e Davi Karai Popygua (SP). 09 April 2018. Revista PerCursos. Florianópolis, v. 19, n.39, p. 206 - 228, jan./apr. 2018. Access: https://doi.org/10.5965/1984724619392018206

the original Atlantic Forest was as big as Amazonia. For the Guarani it was the center of the earth. Its original area covered fifteen states in Brazil and crossed into the nations of Paraguay and Argentina. Establishing State Parks was a landgrab technique that fragmented the Atlantic Forest into smaller parks.[143]

In 2013, with the statute number 249, the São Paulo state governor Geraldo Alckmin proposed to privatize 25 parks. The Jaraguá State Park was included. The statute authorized the exploration of previously protected State Park areas for a period of 30 years, encouraging the potential investors in activities such as ecotourism, logging and forest extraction. According to the statute, the Jaraguá State Park provided an enormous tourist interest, but the park conditions could only be improved with large investments in infrastructure. Such investments it concluded, would only become possible in partnership with private initiatives.[144]

Protests organized by the Guarani Mbya in 2013 against this proposal managed to subtract the Jaraguá State Park from this list of 25 parks.[145] The other parks remained in the privatization plan. Even though the protests stopped the Jaraguá State Park privatization, the risk remains for the time being. The privatization of state parks would also impact most Indigenous Territories in Brazil since they commonly overlap. The same protests that stopped the park privatization also had other important outcomes. Together with the public body FUNAI, the Guarani communities organized workshops to expand the Indigenous territorial recognition in the peak. Instead of the area recognized of 1,7 hectares, the study

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[143] Ibid.
[144] Statute 249, 2013.
[145] Comissão Guarani Yvyrupa. Manifesto dos Guarani sobre o fechamento da rodovia dos bandeirantes. 2013. Access: http://www.yvyrupa.org.br/2013/09/

proposed the Guarani territorial recognition should span at least 532 hectares. [146] A court

decision from 2015 accepted the area expansion. However, two years later, in 2017, the state

government canceled the previous court decision of the Indigenous territory expansion,

reducing it again to the area of 1,7 hectares.[147] The argument the state used to support the

reduction was the overlapping area with the state park.[148]

As an answer, a Guarani protest shut down the telecommunication towers installed

at the peak. The antennae shut down also foregrounded how the towers sustain political and

economic interests: the towers serve as a tourist symbol that historically undermined the

Guarani territorial rights and is also the medium that sustains the state park financially.[149]

The shut-down foregrounded the activity of the towers, interrupting its broadcast of

electromagnetic waves over the Atlantic Forest.

The demonstrators' group only allowed the restoration of the antennae after meeting

with state government representatives.[150] The Secretary of Public Security, the secretary of

the committee on the Environment, and the Secretary of Justice came to the peak to meet

with the demonstrators. State government representatives promised the shared management

of the park between the state and the Guarani communities, to create a committee to discuss

the overlap between conservation units and Indigenous Territories, to support the Guarani

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[146] Pimentel, 2009.
[147] Gabriel, Thiago. Os Guarani contra o fim do mundo. Vai da pe, march 2020. Accessible in:
http://vaidape.com.br/2020/03/os-guarani-contra-o-fim-do-mundo/
[148] Marilu Cabañas. Comunidades indígenas guarani ocupam Parque Estadual do Jaraguá. 14 September, 2017.
Access: https://www.brasildefato.com.br/2017/09/14/comunidades-indigenas-guarani-ocupam-parque-estadual-do-Jaraguá
[149] Leonel, 2012. See also: Takuá, Cristine. Interview by Bueno, Claudio, Nobre, Ligia. YVYRUPA, Terra Livre.
Fields of Invisibility, São Paulo, 2018. Access: https://camposdeinvisibilidade. org/ Entrevista-Takua Accessed
25 May, 2021.
[150] Bonfim, Samia. Guarani São Paulo Resiste. 2017. Access: https://samiabomfim.com.br/blog/guarani-Jaraguá-sao-paulo-resiste/

land tenure, and not to privatize the Jaraguá State Park.[151] As of 2021, the state government has not yet fully addressed any of the promises.

Urban Growth

According to São Paulo's housing syndicate (Secovi-SP), the number of new real estate projects launched in the park surroundings almost quadruplicated between 2016 and 2017–the initial 273 projects increased to 1020 in one year.[152] Since the 1980s, with the construction of two major roads on the peak surroundings: the Jaraguá State Park, and the roads (an express connection between the neighborhood and the city center) offered a means to sell houses and properties in the region. Since then, urban growth continuously encroaches on the Atlantic Forest.[153]

In January 2020, the real estate company *Tenda* started the construction of a new housing project. The terrain they claim to own is part of the Atlantic Forest. Tenda wanted to construct six residential buildings there, with a total of 396 apartments. The tract was adjacent to the Guarani community. To start the construction, the company cut down five hundred trees in the dawn between the 29th and the 30th of January 2020.[154] Tenda did not consult the Guarani Mbya community before deforesting the Atlantic Forest area. According to the agreement n. 169 in the International Labor Organization (OIT Brasilia), no civil work

[151] Ibid.
[152] PIB. apud Sá, Vanessa de. Disputa territorial e crescimento da cidade pressionam índios guarani que vivem em SP. 11 November, 2018. Access: https://pib.socioambiental.org/pt/Not%C3%ADcias?id=194876. Accessed 25 May, 2021.
[153] Pimentel, 2009.
[154] Indigenas Ocupam tereno para protestar contra a derrubada de arvores. Globo G1. In: https://g1.globo.com/sp/São-paulo/noticia/2020/01/30/indios-ocupam-terreno-particular-no-Jaraguá-para-protestar-contra-a-derrubada-de-arvores.ghtml

can start within 10 km of an Indigenous land without previously consulting them. For the Guarani Mbya, each tree cut is as violent as the killing of a close relative.

From January through the end of March, public protests organized by the Guarani Mbya brought the conflict to the court, which released a provisional decision to put a hold on the construction progress.[155] However, on March 27th, Tenda used the quarantine period during the Corona Virus pandemic to continue the construction surreptitiously.[156]

To protest against this illegal activity, the Guarani community has been sharing updates on Instagram.[157] They also have been projecting videos on the peak topography to protest against Tenda. One Guarani leader who was organizing the protests, argues that the São Paulo State Government should transfer Tenda's building potential to another area and vacate the land. He also argues the area damaged by Tenda should become a public ecological area called Ecological park Yary Ty.[158] Ponds where the Guarani Mbya used to swim and fish are in the area.

According to another Guarani leader, this pattern repeats. Outside urban centers, the rural lobby undermines Indigenous lands' demarcation, and inside cities like São Paulo, the real estate sector has a similar influence.[159] The enterprise Tenda made a profit of R$ 2 billion in liquid sales in 2019.[160] The Company has among its investors Constellation

[155] Instituto Socioambiental. Vitória dos Guarani-Mbya: juíza proíbe obras da Tenda em área vizinha à Terra Indígena. 09 April, 2020. Access: https://www.socioambiental.org/pt-br/blog/blog-do-monitoramento/vitoria-dos-guarani-mbya-juiza-proibe-obras-da-tenda-em-area-vizinha-a-terra-indigena

[156] midiaguaranimbya. Instagram, 27 march, 2020. Access: https://www.instagram.com/p/B-PqoTKnN0N/. Accessed 25 May, 2021.

[157] Ibid.

[158] Gabriel, Thiago. Os Guarani contra o fim do mundo. Vai da pe, March 2020. Accessible in: http://vaidape.com.br/2020/03/os-guarani-contra-o-fim-do-mundo/

[159] Popygua, 2018.

[160] O Diario do Centro. Lemann e Itau estao entre construtora que assusta povo Guarani no Jaraguá. January 2020. Accessible In: https://www.diariodocentrodomundo.com.br/lemann-e-itau-estao-entre-acionistas-de-construtora-que-assusta-povo-guarani-no-Jaraguá-em-sp-por-alceu-castilho/

Investimentos *e Participacoes* and the *Itau bank* – with 5.36% and 4.74% of the total stocks, respectively. Tenda's major shareholder is the Brazilian private equity company Patria Investments.[161]

Beyond operating in the real estate market, another branch Patria Investments operates is in the field of infrastructure. Patria owns four telecommunication enterprises: Atisgroup; Odata; Vogel and Highline do Brasil II.[162] Founded in 2012, Highline do Brasil has wireless infrastructure assets. In June 2014, the telecommunications enterprise announced a joint venture with the Bandeirantes Group, owner of the first tower installed on Jaraguá Peak. In partnership with Patria, the Bandeirantes group announced the launch of the enterprise Highline Broadcast to produce, construct, and rent radio and television infrastructures.[163] Highline Broadcast launched with 100 Bandeirantes tower, and Bandeirantes transferred 400 more in 2015. The towers are valued at approximately R$ 120 million, and each tower costs approximately R$ 300 thousand.[164] *Highline Broadcast* owns 40 percent by the *Bandeirantes Group*, and *Patria Investments* holds the other 60 percent.

Ground Work

For the Guarani, every element created by *Nhanderu* has an owner and guardian (*-já*). Everything has an owner: a trail, rocks, trees, birds, each non-human being has an owner. To someone enter the forest, it is necessary to ask permission for *Nhanderu*, ask permission for the owner of each being each time someone uses them, and know how to use them with

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[161] Ibid.
[162] See: https://www.patria.com/infrastructure
[163] Fusões e Aquisições da semana. July 2014. Accessible in: https://www.apsis.com.br/blog/noticias/fusoes-e-aquisicoes-destaques-da-sema
[164] Ibid.

respect. The Guarani can use everything they received from *Nhanderu* if asking permission, but cannot sell or negotiate anything. The profit from a gift from *Nhanderu* risks terminating the structure of relations between humans and sacred beings.[165] The use of each *Nhanderu* creation needs to be controlled and ritualized. When White institutions and enterprises profit from forest extraction, deforest areas for roads construction, or impose environmental laws over Guarani territories, they are also unbalancing Guarani sacred relations.[166] If a sacred owner feels disrespected, they can become revengeful.[167]

São Paulo economic interests, and the city's growth, relied on ground fragmentation and on the commodification of the land. A combination of factors that originated as deals between public and private companies—urban legislation, fragmentation and commodification of land for real estate profit, roads construction which also allowed the commodification of land through tolls economies, telecommunication towers long term tax exemptions and profit through antennae rent economy—allowed the extraction and deforestation of Atlantic Forest. Even though the time frame of analysis of each layer in this section: roads, electromagnetic Infrastructures, state park, urban growth, and zoning, refers to a timeframe between 1940 and 2020, spatial clashes between the Guarani Mbya and the Juruá (non-Indigenous) in Jaraguá Peak starts with settler colonialism. More specifically in 1580, when settler colonizers found gold in the Peak. Land commodification through the expansion of roads, urban growth, power lines, telecommunication towers, and conservation units are part of a 500 years process of Guarani land dispossession through land

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[165] Ladeira, Maria Inês. Comunicação, convívio e permuta em Yvy vai. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 275.
[166] Ibid, p. 276.
[167] CTI. Guairaka'I ja - O Dono da Lontra. 2014. Access in: https://www.youtube.com/watch?v=cvq7cZjIrk4

fragmentation. Land division allowed the São Paulo State and private companies to profit from the land. As registered in 2015 by the "Atlas of Guarani Lands," 153 Guarani Indigenous lands were registered, but the Brazilian government only declared the demarcation of 13 of the 153, and regularized the demarcation of 17 Guarani Indigenous Lands.[168] According to the same report from 2015, since 1980, urban pressure, environmental degradation, and illegal landgrabs had dispossessed more than one hundred Guarani villages.[169]

Yvyrupa is the terrestrial platform, a platform without boundaries where all diverse species, traditions, costumes and models live together.[170] From the *yvyrupa* perspective, the spatial conflict between the Guarani territoriality and settler colonial space is not the co-habitation between White settler peoples and Indigenous peoples, but how settler infrastructures impacted and degraded the terrestrial platform, limiting areas for exclusive White use. Anthropologist Maria Inês Ladeira describes how a Guarani woman mourns the impacts that settler infrastructures caused over the *yvyrupa*: "*Yvyrupa* was clean, it was all forest. (…) But the white men drilled the earth platform, ruined and weakened the soil created by *Nhanderu*."[171] If, for the Guarani, the terrestrial platform is one unbounded, roads, power lines and other networked infrastructures are as harmful as nation-state borders—infrastructural networks crumble the Guarani networks and terrestrial platform continuity.

[168] CTI. Atlas das Terras Guarani no Sul e Sudeste do Brasil 2015. Access in:
http://bd.trabalhoindigenista.org.br/sites/default/files/Atlas%20CTI%20media%20CC2015.pdf
[169] Ladeira, Maria Inês. Comunicação, convívio e permuta em Yvy vai. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 267. Original source: CTI. Atlas das Terras Guarani no Sul e Sudeste do Brasil 2015. Access in:
http://bd.trabalhoindigenista.org.br/sites/default/files/Atlas%20CTI%20media%20CC2015.pdf
[170] Ladeira, Maria Inês. Comunicação, convívio e permuta em Yvy vai. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 266.
[171] Ibid.

The degradation caused by the infrastructural constructions and extractive practices that exhaust ground destabilize the entire *yvyrupa* (earth platform).

The *Juruá* infrastructural layers here analyzed are only part of the many spatial frontiers that overlay with Guarani cosmological understandings of spatial relations and territory. According to Ladeira, the sea (*paraguassu*), mountains (*yvyty*), untouchable forest areas (*kaguy poruey*), and death, are some of the many obstacles that the Guarani cosmology face. Each layer of obstacle that exist and overlap on what the Guarani call as imperfect earth (*yvy vai*) are not definitive barriers to disrupt the Guarani territorial continuity. Even with spatial obstacles, the Guarani are in constant communication between villages, circulating traditional and sacred knowledge, and cultivating traditional seedling that maintain their territorial continuity through secular methods that maintain reciprocal networks. In short, the settler infrastructures and obstacles that fragment the Guarani territory don't impede the vast circulation of people and knowledge between Guarani villages.[172] Nonetheless, their territorial maintenance remains latent due to colonial infrastructures and other spatial obstacles.[173]

As described in the previous chapter, each Guarani *tekoa* is not an isolated village, but part of a vast network. Impacts over one *tekoa* and one Guarani Mbya family can have negative consequences on many other villages connected to the one first impacted, since close parents travel constantly between villages and keep constant reciprocal relations for instance of trade, marriage, and sacred ceremonies. Moreover, impacts over non-humans

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[172] Macedo, Valéria. Mundeu do Mundo: Predação e troca em relações entre os Guarani e os Juruá. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 200.
[173] Ladeira, Maria Inês. Comunicação, convívio e permuta em Yvy vai. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 267.

that live on a *tekoa* surrounding also impact Guarani networks. One *tekoa* needs to contain

space for hunting, space for fishing, and fertile soil for agriculture. The *tekoa* is the space that

sustains Guarani lives—the space where one can live according to the Guarani mbya way of

life. If a *tekoa* don't have access to clean rivers and forests the Guarani cannot live there.[174]

Importantly, infrastructural webs, and Guarani geographies, are constantly being

remade. Power Lines, Telecommunication towers, and roads, constantly break and need

repair. The myth of infrastructures as static heavy spaces camouflage the fact that settler

colonial occupation and racial capitalist values are not ready forms, but relations constantly

being remade and re-worked. In "Race and Webs of Empire," New Zealand Historian Tony

Ballantyne describes how "empires were not just structures, but processes as well."[175] As

Ballantine writes, webs, and empires, are "fragile (prone to crises where important threads

are broken or structural nodes destroyed), yet also dynamic, being constantly remade and

reconfigured through concerted thought and effort." [176] Even though roads cut through

Guarani territories, Guarani communities continue and remake their continental paths

between Guarani *tekoas* from the Brazilian seashore to the Guarani center of the world

(today overlapping with the triple frontier between Brazil-Paraguay-Argentina), making (the

fiction of) nation state boundaries move with them.

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[174] Silva, Fabio Nogueira da. Um tekoa, uma cidade e a sidade. In: Gallois, Macedo (Eds.). Nas Redes Guarani. São Paulo: ed. Hedra, 2018, p. 173.
[175] Ballantyne, Toni. Race and Webs of Empire https://muse.jhu.edu/article/7399 apud Renisa Mawani, Across Oceans of Law p. 12
[176] Ibid.

Chapter 3: Reparations for Infrastructural Dispossession

The São Paulo government funded and supported the construction of Infrastructural and urban networks that have cut through Guarani territory since the 1940s.[177] Agents responsible for constructing one of the roads surrounding the Peak (the Rodoanel road) have paid Environmental compensations to the Guarani communities in São Paulo living in the Jaraguá Indigenous Land (in northwest São Paulo) and in the Tenondé Porã Indigenous Land (in south São Paulo).[178] The other two major roads and infrastructural layers that have undermined Guarani land rights for six decades configure a case for reparations. To build a reference for reparations for harm that compounded over time in the Jaraguá context, the next part zoom out from Jaraguá Peak context. It will reference a global discussion on different theoretical understandings of reparations and environmental compensation to infrastructural constructions that have impacted Indigenous communities and undermined access to land. Infrastructural constructions play a daily active role in keeping Indigenous lands divided and dispossessed. Roads, power lines, and telecommunication towers change ground relations in an area much larger than the immediate infrastructure contour—reaching up to 3km or even 200 km, to a television tower.

The difference between reparations and environmental compensation is both spatial and temporal. Environmental compensations are often claimed in the present time, when an infrastructural project is being proposed, as a way to mitigate future harm. Environmental

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[177] Leonel, 2012.
[178] Pimentel, 2009.

compensation often focuses on one specific construction (e.g., one specific road). Reparations address wrongs committed in the past that still impact the present, and they can address both localized and larger-scale networks of infrastructure that are compounded layers of historical injury.

This chapter will focus on the spatial evidence used for reparations and environmental compensation claims. Many variables determine and are used to negotiate reparations and environmental compensations—the agents that caused historical harm, the temporality of the harm, the scale of the harm done, systems that maintain segregated and racialized uneven relations over a long time, laws and court decisions involved in each case, to mention a few components. Focusing on the spatial evidence used in past cases of reparations claims can help foreground how infrastructural constructions have historically impacted Indigenous communities with similar spatial methods, even in very different geographies, contexts, and cosmologies. Focusing on reparations' spatial perspective helps to situate each case in specific geographies, where specific agents have acted and disrupted grounded relations.

Cases referenced in this chapter tellingly reveal that often the same kind of spatial impacts repeat in very different Indigenous geographies—such as loss and fragmentation of land, deforestation, water pollution, and disruption of agricultural sites. Spatial evidence includes tracing changes on the ground that infrastructural constructions historically unleashed upon Indigenous lands. Some of those are deforestation, loss of land access on areas traditionally used for harvesting medicinal plants, traditional agriculture, hunting and fishing, and land fragmentation. Sourcing how spatial evidence was used in past reparation cases can inform cases not yet redressed that suffer from similar spatial, grounded impacts. Looking into the spatial evidence of past cases of reparations—how long-term harm

perpetrated by settler colonialism, nation-state governments, and international concessions, racialized legislation disrupted relations on the ground—can foreground how similar spatial evidence can support other cases not yet acknowledged.

Reparations for Indigenous nations are very spatial because they are directly related to the loss of land. In Jaraguá Peak, Indigenous land dispossession is not a past condition but a contemporary effort, maintained continuously by many actors—state agents, real estate companies, and private institutions. There are many layers of historical impacts in Jaraguá Peak that have not been accounted for yet. Past cases in which infrastructural impacts have been compensated could serve as a reference for Jaraguá Peak. Cases sourced are located in different geographies and time periods. Even though cases collected in this chapter can serve specifically as a reference for Guarani Indigenous lands in São Paulo, cases can also serve as a reference for other spaces facing similar long-term infrastructural construction conflicts.

Time is also an essential variable in cases referenced in this chapter—changes on the ground have occurred over long periods. Court processes claiming redress for a historical wrong might take years and are not a linear process. Reparations that address infrastructural impacts as colonial violence need to acknowledge the temporality of infrastructural dispossession: roads and electromagnetic towers, as well as power lines, dams, and mining, might appear to be one isolated event, a one-time construction, but in reality, they perform in a network where all of these layers join, and with impacts that remain unleashing long after the construction period is over. Humanities and the Environment scholar Rob Nixon proposes the concept of "slow violence," which he explains to be "a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and

space, an attritional violence that is typically not viewed as violence at all."[179] Nixon explains that slow violence is exponential and that long-term destruction can multiply conflict over years. The construction of infrastructures, such as a road, or a pipeline, inherently carries changes on the ground. Such ground changes are often disruptive to previous relations to the land in the same area, depending on each Indigenous nation's perspective living in relation to that land. The damage caused by road construction is not one-time damage at the moment of the ground extraction and deforestation to open space for a new road. Impacts keep unfolding years after the infrastructure completion since it can unleash development in the surrounding area or deforestation beyond the road footprint. For this reason, impacts resulting from infrastructural constructions are a case of slow violence.

Governments often frame new infrastructures as a gift to the population, city, or in-between spaces the new infrastructure claims to connect. This way of framing a new infrastructure as a new asset for population use can mask this construction's violence when erasing relations that existed previously to the infrastructural construction. For instance, the Bandeirantes road construction in 1978 in Jaraguá Peak was seen as an important path to connect the city of São Paulo with Campinas and with the Santos port. However, while facilitating the connection between cities, the road fragmented Guarani paths and other-than-human forest paths and opened space for real estate development, unleashing more Atlantic Forest deforestation, which kept expanding decades after the road construction ended. Compounded effects of infrastructural dispossession over Guarani territory are not a one-time event but keep unfolding for hundreds of years.

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[179] Rob Nixon, *Slow Violence and the Environmentalism of the Poor*. Cambridge: Harvard University Press, 2013.

Compensation values can be very localized without taking into account different scales of impact. Even though environmental compensation for a road construction upon Indigenous territories often considers the construction of that single road, the fragmentation of Guarani territory by roads is a continental network of which that single road is a small part. Compensation and reparations for historical wrongs that resulted from Infrastructural constructions often overlook the complex multi-scalar spatial analysis that considers the complexities and self-determination of Indigenous cultural and cosmological points of view.

This chapter sources multidisciplinary perspectives—from architecture and urban planning, to law, anthropology, economy, geography, and history. Selected case studies reveal and complicate parameters and negotiations used in each case to claim redress. The chapter ends with a list of tools that can help prevent future harm and concludes with some reflections on the incompleteness of some reparations and compensation values. This is not a detailed or comprehensive discussion about reparations theory. Rather it opens space for reflection about how a complex and in-depth spatial analysis can account for long-term infrastructural impacts. Appendix 1 accompanies this chapter, listing a set of case studies for reference.

It is also essential to complicate how compensation and reparations values have measured space. Situated spatial analysis needs to source each Indigenous nation's self-determination of what space and spatial relations can mean and how infrastructural constructions have disrupted spatial relations. Each case study describes distinct conditions with extremely complex and heterogeneous belief systems, cultures, ways of life, and languages. Case studies can serve as reference but they are not entirely comparable from one context to another.

Reparations Beyond Western and Racial Capitalist Values

Black's Law Dictionary defines reparation as "the redress of an injury; amends for a wrong inflicted."[180] Scholars of law, anthropology, and economy offer different definitions more suited to the different focuses that reparations might address. In *From Here to Equality: Reparations for Black Americans in the Twenty-First Century*, American economist William A. Darity Jr. and folklorist and writer Kirsten Mullen discuss reparations methods. The authors analyze what they claim to be the three "essential elements" of the reparations program for which the authors advocate: acknowledgment, redress, and closure.[181] Darity and Mullen argue that reparations claims start with foregrounding the system of agents that caused historical harm. Identifying individual perpetrators such as corporations or universities need to be accompanied by the government's obligation to address reparations. Government agents establish the common ground that enables and maintains legal inequality, segregation, and racially unequal systems.[182] Chiricahua Apache Attorney Dr. William C. Bradford describes the "question of reparations," specifically referring to the United States, as "a tort-based mode of redress whereby a wrongdoing group accepts legal responsibility and compensates victims for the damage it inflicted upon them."[183] Bradford also remembers

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[180] Black's Law Dictionary, 1979. Access in: https://thelawdictionary.org/reparation/

[181] William A. Darity Jr., Kirsten Mullen, From Here to Equality: Reparations for Black Americans in the Twenty-First Century, The University of North Carolina Press, 2020.

[182] Ibid.

[183] William Bradford, Beyond Reparations: An American Indian Theory of Justice. Aboriginal Policy Research Consortium International (APRCi), 2004. Access: https://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=1227&context=aprci

how reparations carry many layers beyond a technical law term. Reparations are attached to reopening old, long-time carried, and harmful wounds, which harm stay through generations.[184]

Bradford highlights how reparations and justice measures vary—in his words: it is not a "one-size-fits-all commodity." [185] Each "specific claim posed by each aggrieved group bears examination and evaluation on their unique merits." [186] What might be considered by one group as a rightful redress might be regarded as inadequate or even harmful to another group. Bradford also argues that it is impossible and even morally harmful to "objectively quantify" the value of historical harm inflicted upon Indigenous nations.[187] Compensation cannot dismiss or reach "wrongful deaths of ancestors, the denial of the use of tribal lands and resources, and legal assaults on Indigenous religions, languages, and cultures. These harms can never be repaired with money." Bradford also states: "The harm suffered is inherently inestimable to peoples for whom ancestors, land, and culture are spiritually interwoven and constitutive of identity in a manner irreducible to comprehension by Western legal minds."[188] Environmental Justice and Law scholar Gerald Torres argues that reparations for Indigenous peoples are insufficient and controversial: the idea of reparations is inherently inadequate as a legal strategy because its discourse is centered on

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[184] William Bradford, Beyond Reparations: An American Indian Theory of Justice. Aboriginal Policy Research Consortium International (APRCi), 2004. Access:
https://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=1227&context=aprci
[185] Ibid.
[186] Ibid.
[187] Ibid, p.50.
[188] Ibid.

the relationship between Indigenous nations and the settler state. However, Torres argues, its importance cannot be denied.[189]

As law scholar James Anaya says, "Any reparations for Indigenous peoples must entail, at a minimum, recognition of their surviving customary land tenure and remedy those state institutional mechanisms and related conditions that continue to allow for invasion or dispossession of indigenous lands."[190] Indigenous loss of lands was usually underpinned by colonial rules, state legislation, and policies that erased the pre-existing Indigenous land tenure. They normalized, and continued normalizing Indigenous land theft until the present day. Anaya also highlights how the dispossession and invasion of Indigenous lands does not only constitute a past wrong but is also an ongoing condition, an everyday act of accepting land theft as normal.

Nation-state responses to reparations for Indigenous peoples to redress historical violence vary. International law scholar Dinah Shelton explains, they can take the form of an apology, as offered by the U.S. Congress's Apology Bill for Hawaii in 1993.[191] Shelton also argues that instead of mitigating, apologies might exacerbate injury since an apology's meaning and sincerity can often be unclear.[192] The legal advisor and law professor Bradford

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[189] Torres, Gerald. Indigenous Peoples, Afro-Indigenous Peoples and Reparations.. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009

[190] Anaya, James. Reparations for Neglect of Indigenous Land Rights at the Intersection of Domestic and International Law—The *Maya* Cases in the Supreme Court of Belize. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p. 570

[191] U.S. Public Law 103–150, known as the Apology Bill, states: 'the indigenous Hawaiian people never directly relinquished their claims to their inherent sovereignty as a people or over their national lands to the United States, either through their monarchy or through a plebiscite or referendum.' In: ThDinah Shelton, The Present Value of Past Wrongs. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p.55

[192]. Dinah Shelton, The Present Value of Past Wrongs. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p.55

W. Morse argues that governments are wary of providing formal apologies fearing that an apology might unleash a chain reaction of lawsuits.[193] Nation-states can also offer reparations in the form of land restitution, as was the case of the 1971 Alaskan Native Claim Settlement Act, which awarded U$ 1 billion and 44 million acres of land back to Indigenous nations in Alaskan.[194] A third possibility is monetary compensation, such as the one proposed by the Canadian government in 1998 with a $245 million "healing fund" to compensate "First Nation children who were taken from their families and transferred to residential schools."[195] Independently of the form it takes, the implementation of reparations is deeply rooted in law.[196]

International cases of reparations claims also take part. A U.S. judge dismissed the lawsuit in 2019 of Namibian claims for German reparations over the genocide of the Herero Indigenous population during the Namibian war from 1904-1907.[197] Herero people demanded $600 million in reparations. Their claim for redress included the filing of lawsuits against "German companies Deutsche Bank, Terex Corporation and Woermann Line in United States federal court for the District of Columbia" asking for U$2 billion from each company with the claim that they were partners of Imperial Germany in the Namibian

[193] Bradford W Morse, Indigenous Peoples of Canada and Their Efforts to Achieve True Reparations. In: In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p.278
[194] 43 USCs 1601 (1998)
[195] Dinah Shelton, The Present Value of Past Wrongs. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p.56
[196] Gerald Torres. Indigenous Peoples, Afro-Indigenous Peoples and Reparations. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009
[197] Stempel, Jonathan. Lawsuit against Germany over Namibian genocide is dismissed in New York. March 6 2019. Access: https://www.reuters.com/article/us-namibia-genocide-germany/lawsuit-against-germany-over-namibian-genocide-is-dismissed-in-new-york-idUSKCN1QN2SQ see also Sidney L Harring, 'German Reparations to the Herero Nation: An Assertion of Herero Nationhood in the Path of Namibian Development?' (2002)

War.[198] International reparations claims help to foreground the expanded geography of specific agents who cause historical harm. If the impacts appear in a specific community or region, the authors of such impacts, responsible for reparations, can be in very different regions, and far away from the impacted areas.

Part of addressing reparations involves choosing methods to translate historical and present harm into "compensatory" reparations values. A problem of translation appears when environmental impacts over a community are measured as a capitalist value, and ignores cosmological values from the group that suffered the consequences. International Law scholar Federico Lenzerini defines reparations as "all measures aimed at restoring justice through wiping out all the consequences of the harm suffered by the individuals and/or peoples concerned as the result of a wrong."[199] Lenzerini highlights the importance of unearthing terms such as "wrong," "loss," "harm," and "damage" and understand them from the perspective of the group concerned.[200] Professor of law and reparations scholar Katherine Franke suggests that racial reparations should advocate for other than "market-based" approaches to land use and contemplate "creative new forms of collective land ownership" since speculative real estate markets historically served as a tool to divest freed people from the land rights promised as reparations for enslavement.[201]

Reparations for infrastructural construction impacts need to consider the spatiality of racism and require a critical understanding of scale. The study *Toxic Waste and*

[198] Dinah Shelton, Reparations for Indigenous Peoples: The Present Value of Past Wrongs, 2009, p.52. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009
[199] Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009
[200] Ibid.
[201] Franke, Katherine. Repair: Redeeming the promise for abolition. Chicago: Haymarket Books, 2019

Race in the United States, by the United Church of Christ and the Commission for Racial Justice, from 1987, proposed the term "environmental racism" to address how non-White peoples are more exposed to pollution than White people areas.[202] Scale also has long been a subject of debate between scholars of environmental racism.[203] As Neil Smith and other geographers argue, scale is a social product.[204] Different scales of analysis can result in diverging evidence. Programs for reparations cannot rely on the same parameters that create racial inequality in the first place and require a multi-scalar analysis.

The payment of capitalist values for historical racial inequality in Indigenous reparations is insufficient to address how capitalism was responsible for originating this harm. The essay *Predatory Value* offers the term "economies of dispossession" to describe racialized property and dispossession, which colonialism and capitalism shape historically.[205] It argues for a "grounded relationality" and advocates that land should not be understood as property but as a set of grounded relations and kinship networks between human and non-human worlds that decenter the human and understand agency beyond the concept of "property" or "self."[206] The article concludes by stating that if one sees land as "a mode of

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[202] United Church of Christ and the Commission for Racial Justice. Toxic Waste and Race in the United States, 1987. Access in: <https://www.nrc.gov/docs/ML1310/ML13109A339.pdf>

[203] Laura Pulido, Rethinking Environmental Racism: White Privilege and Urban Development in Southern California. Annals of the Association of American Geographers, Mar. 2000, Vol. 90, No. 1 (Mar. 2000), pp. 12-40

[204] Smith, N. Contours of a spatialized politics: homeless vehicles and the production of geographical scale. Social Text 33, 55–81. 1992. See also Sallie A. Marston. The social construction of scale, Progress in Human Geography 24,2 (2000) pp. 219–242 and Neil Brenner, The limits to scale? Methodological reflections on scalar structuration, Progress in Human Geography 25,4 (2001) pp. 591–614

[205] The essay is authored by Chickasaw Indigenous critical theory scholar Jodi Byrd, American Studies scholar Alyosha Goldstein, professor of English and Africana Studies Jodi Melamed and Gender, Women, and Sexuality Studies scholar Chandan Reddy. See: Byrd, Jodi; Goldstein, Alyosha; Melamed, Jodi; Reddy, Chandan. Predatory Value: Economies of Dispossession and Distributed Relationalities. Duke University Press. 2018. See also: Glen Coulthard. Red Skin, White Masks: Rejecting the Colonial Politics of Recognition. Minneapolis: University of Minnesota Press, 2014.

[206] Ibid.

reciprocal relationship," the loss of land is not just the loss of property, but the loss of all relationships that the land activates.[207] The evaluation of reparations for infrastructural dispossession needs to consider not only the value of impacts but also a much larger web of relations that are lost by separating Indigenous nations from their traditional territories. Reparations need to consider not only the loss of land but also the loss of land stewardship and interdependence. To view the value of land beyond racial capitalism is to deconstruct the idea of land as property.

Dr. Bradford describes that non-monetary modes of redress may be more effective "in inducing the national government to accept moral responsibility, in restoring the dignity and autonomy of injured groups."[208] The Brazilian public body FUNAI also advocates for Indigenous communities never accepting the payment of environmental impacts under a monetary payment format. The evaluation of the amount due can be monetary, but receiving the compensation should not be a financial deposit. Instead, environmental compensations for Indigenous peoples should be received as land area or environmental monitoring programs.[209] Reparations need to be critical about addressing any previously established standards and consider measures proposed and self-determined by the group to whom redress is owed.

Land restitution constitutes one potential approach for valuing reparations beyond monetary payments. Cases for reparations in Canada for Indigenous Nations to regain their

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[207] Ibid.
[208] William Bradford, Beyond Reparations: An American Indian Theory of Justice. Aboriginal Policy Research Consortium International (APRCi), 2004, p.2. Access: https://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=1227&context=aprci
[209] Funai. Planos de mitigação e compensação. Access: http://www.funai.gov.br/index.php/programas-de-mitigacao-e-compensacao.

traditional territory can offer some references. From 1975 to 2007, Canada gave back control

of approximately 1,192,000 square kilometers of land to Indigenous Nations, Inuit, and

Métis peoples through land claims negotiations and agreements.[210] According to Lawyer

Bradford Morse, who served as legal advisor to Indigenous Nations in Canada, each

agreement negotiation is unique.[211] Bradford also highlights the variables of a negotiation

process: the party in power, the property value of the territory under evaluation, its location

related to urban areas, and the current legislation. In 1992, the Gwich'in Council, the

Government of Canada, and the Government of the Northwest Territories (GNWT) signed

the Gwich'in Comprehensive Land Claim Agreement. The treaty gave the Gwich'in people

the title for 23,976 square meters of land and 6,158 square kilometers of subsurface,

including minerals and mines. The resolution also established a tax-free payment of

CDN$75 million to be paid over fifteen years, a share of the royalties revenues from

development resources in the Mackenzie Valley, a 15-year subsidy of property taxes on

certain Gwich'in lands, hunting rights, the right to participate in decisions regarding land-use

planning, water, land and the use of renewable resources regulation.[212] Canada's largest land

claim agreement took place in Nunavut, also in 1992. It established the payment of

CDN$580 million plus interest to the Inuit to be paid over fourteen years. It also

acknowledged hunting rights, participation in decision-making on land use planning, water

use regulation, and a procedure for reviewing the environmental implications of

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[210]. Bradford W Morse, Indigenous Peoples of Canada and Their Efforts to Achieve True Reparations. In: In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009. See Also: Indian and Northern Aff airs of Canada, Resolving Aboriginal Claims: A Practical Guide to Canadian Experiences (Ottawa: 2003) <https://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/rul_1100100014175_eng.pdf>
[211] Ibid.
[212] 1992, Gwich'in Comprehensive Land Claim Agreement <https://www.rcaanc-cirnac.gc.ca/DAM/DAM-INTER-HQ-LDC/STAGING/texte-text/gwichin_Land_Claim_Agreement_PDF_1427372111130_eng.pdf>

developments before their approval.[213] In opposition to the idea of reparations as a one-time payment, many reparations agreements in Canada resulted as a combination of factors to be valued and paid over several years.

International Pressure

Historical impacts on Indigenous territories rarely appear alone—and reparations should consider not one factor alone but compounded factors. During the 1990s, the Belizean Ministry of Natural resources, authorized 17 logging concessions in Toledo District, in south Belize. The concessions opened an area of 480,000 acres. The two largest concessions, which were covered with 185,000 acres of tropical forest, were granted to two Malaysian companies: Atlantic Industries Ltd and Toledo Atlantic International Ltd. In addition to the logging concession, the Belizean Ministry of Energy, Science, Technology, and Transportation also granted an oil exploration concession years before the logging concession. The oil exploration concession would automatically change for an oil extraction concession if significant commercial quantities of petroleum were found. The regions given over as logging and oil concessions are within the ancestral lands of Mopan and K'ekchi-speaking Maya, who presently inhabit the region withover 10,000 people.[214]

Belize gained its independence from the United Kingdom in 1981, and during the British colonial government, all of Toledo's District configured "Crown land"—

213. Bradford W Morse, Indigenous Peoples of Canada and Their Efforts to Achieve True Reparations. In: In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009.

[214] Anaya, James. Reparations for Neglect of Indigenous Land Rights at the Intersection of Domestic and International Law—The *Maya* Cases in the Supreme Court of Belize. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p. 570

including Mayan land. Mayans began to re-populate their lands in the early twentieth century, having been displaced by Spanish colonization previously. In addition to granting a concession for logging and oil extraction in Maya lands, the Belizean government also parceled Maya lands for lease. And the only form of land tenure security the Belizean government had been offering to Maya people was in the form of land leases up to 30-acre plots. Also, the Belizean government has frequently been granting the lease for internationals. Lawyer James Anaya argues that this parceling and leasing of Maya land undermines Maya ancestral land-use practices such as rotation agriculture, requiring large portions of land, hunting, and gathering, which cannot be accommodated in areas separated in 30-acre plots, and their communal land tenure. In addition, Anaya points out the absurdity of the Belizean government's assumption that they have the right to lease Maya land.[215]

In the mid-90s the Belize government also announced the intention to pave a road from Santa Cruz to connect to Guatemala's highway system. The road project raised concern within Maya communities in the area that would be disrupted by the road and other forms of land change along the road length, such as real estate development. Previous road constructions over Conejo lands without consultation with villagers destroyed an ancient Maya burial site.

Maya leaders and Maya organizations have been protesting the Belizean government on the issue of the land concessions and land parceling for lease for decades. In late 1997 Maya activist groups filed a lawsuit to the Supreme Court of Belize, but the government never responded. Having failed in the domestic level, the Toledo Maya Cultural

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[215] Ibid.

Council (TMCC), assisted by the U.S.-based Indigenous rights advocacy group Indian Law

Resource Center, brought the case to an international level, by petitioning the Maya claim to

the Inter-American Commission on Human Rights (IACHR). International instance

increased pressure on the Belizean government, and brought it to the table to sign the "Ten

Points of Agreements" with Maya leaders. Despite signing the document, the Belizean

government did not formally recognize Maya land rights and continued its land exploitation

as before. Fortunately, the IACHR continued to follow the case. Upon seeing that the

negotiations did not produce material change, the Commission declared that Belize should,

"through fully informed consultations with the Maya people, the legislative, administrative

and other measures necessary," secure Maya land tenure and repair the environmental

damage resulting from logging.[216]

Nonetheless, the Belizean state continued to grant land use to international

companies. In April of 2006 the Belizean government permitted the U.S. Capital Energy-

Belize Ltd to conduct seismic testing for oil exploration in the Sarstoon-Temash National

Park. The park was created in 1994 as a "natural preserve" without previously consulting

Maya communities and restricted Maya areas of land use. Oil exploration compounded the

park disruption, increasing harm. The Sarstoon-Temash Institute for Indigenous

Management (SATIIM) was created to negotiate a co-management agreement and return

land stewardship within the park's boundaries back to Maya communities in the areas

surrounding the park. Finally, in October 2007, the Supreme Court of Belize ruled "entirely

in favor of the Maya parties," releasing a 67-page decision.[217] The Court ordered the Belizean

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[216] Ibid, p. 572.
[217] Anaya, James. Reparations for Neglect of Indigenous Land Rights at the Intersection of Domestic and International Law—The *Maya* Cases in the Supreme Court of Belize. In: Lenzerini, Federico. Reparations for

government to demarcate and title the Conejo and Santa Cruz lands as Maya lands and forbade the government from issuing any future leases or permits without the full consent of the Maya communities that occupied and stewarded them.[218]

Another case which involved international instances for reparations was the Xákamok Kásek ancestral and present lands against the Paraguayan government. Several Indigenous nations inhabited the Paraguayan "chaco" region for thousands of years. Their practices of seasonal agriculture, hunting and fishing required a vast territory. Between 1885 and 1887, the Paraguayan government sold two-thirds of the "chaco" region to the London stock exchange to pay the Paraguayan war debt. The region was exclusively inhabited by Indigenous nations who did not learn about the Paraguay government selling their lands. Since then, the area became targeted for cattle expansion and logging, making Indigenous communities previously living in extensive and unbounded territories isolated in small land plots. As of 2010, 45% of the 525 Indigenous communities inhabiting the region did not have their land rights recognized. One of the Indigenous nations, Xákmok Kásek, contacted the Inter-American Commission on Human Rights to reclaim two areas of stolen land, part of their ancestral lands: a 10,700 hectares area occupied by the Salazar Farm, and a 1,500 hectares area known as "25 de Febrero."[219] The court decision analyzed the situation, foregrounding that Xákmok Kásek children suffered from malnutrition, and some adults had tuberculosis and Chagas. The closest hospital was more than 400km away from where communities resided. Schools did not have food or water for students, and since 2003

Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p. 575. See: *Aurelio Cal et al. v L e Attorney General of Belize and the Minister of Natural Resources and Environment*, Claims Nos 171 and 172 of 2007, Judgment of (18 October 2007).
[218] Ibid, p. 574
[219] Manual de Jurisprudencia dos Direitos Indigenas. P. 155.

community members did not have access to water distribution. Xákmok Kásek had cultural losses due to losing their traditional lands, undermining both the physical and spiritual relation to their lands. Not having access to Xákmok Kásek ancestral lands also undermined daily practices of fishing and hunting. A court decision from 2010 issued that the Paraguayan government should redress Xákmok Kásek communities with $ 700,000 for education projects, food security, sewage construction, and clean water supply. The decision also established a compensation of U$260,000.00 for Xákmok Kásek community leaders for immaterial damage considering community members who died due to poor health conditions. And the decision also confirmed that Paraguay should give back to the Xákmok Kásek the 10,700.00 ha reclaimed.[220]

The Maya case in Belize and the Xákmok Kásek case in Paraguay involved compounding spatial impacts, like those in Jaraguá Peak context in Guarani lands. Facing challenges to make the Belizean government redress the Maya people at the domestic level, Maya activist groups brought the case to an international level that increased pressure on the government and the domestic court to recognize and assure Mayan land tenure.

In *Medium Design*, design scholar Keller Easterling offers the concept of compounding reparations as a potential strategy to bargain for reparations in the form of assets that increase in value over time. Instead of a one-time compensation for an incalculable value, compounding reparations gain in value over the years, depending on how the "ingredients are combined."[221] Lenzerini also lists strategies that could maximize the possibility of obtaining Indigenous reparations depending on the specific context of each

[220] Manual de Jurisprudencia dos Direitos Indigenas. P. 162. See also http://www.corteidh.or.cr/docs/casos/articulos/seriec_214_esp.pdf
[221] Easterling, Keller. Medium Design: Knowing how to work in the world. Verso, January 2021.

case. Among the strategies he cites is the use of both domestic and international laws as "legal basis for claim," the combination of reparations to other remedial measures—such as restitution or compensation; and the combination of different "remedies"—judicial, political, and diplomatic processes. Lenzerini also argues that how the reparations claim is organized is crucial. Presenting each layer of impact in a separate document instead of combining evidence in one single document can strengthen the claim's visibility.

Inspired by Lenzerini's and Easterling's arguments, this work argues that spatial designers might hold skills that can help increase the value for reparations. Strong and precise visual evidence might serve as additional tools for strengthening the narratives that support reparations claims. Political scientists Margaret Keck and Kathryn Sikkink argue that non-state actors can activate international networks to pressure state governments for change.[222] The authors refer to cases where national channels of communication between governments and non-government groups were ineffective. They call the activation of international allies networks a "boomerang pattern." Similarly, Spatial designers might offer a combination of rich aesthetics and metric precision to create tools and activist documents that might serve as instruments to pressure governments and increase the chance to unblock communication channels.

Documents as instruments

The production of documents and reports that serve as instruments for reparations claims has a long history. Different kinds of documents and their methods are produced by

[222] Keck, Margaret E. and Kathryn Sikkink. Activists Beyond Borders: Advocacy Networks in International Politics. Cornell University Press: Ithaca, NY, 1998.

activists, policy makers, and scholars from various fields—anthropologists, architects, geographers, and lawyers are some of them. Darity and Mullen argue that the first step towards reparations is to establish a commission to investigate and produce reports stating the history of racial injustice as an instrument to widen the public support for reparations projects.[223] These documents can take different formats.

Anthropological reports

Anthropological reports consist of the production of a report that presents evidence to the court. They can serve as proof for demarcating an Indigenous territory or for claiming impacts compensation over Indigenous lands. The document is structured in four parts: a) report b) summary of main points c) answers to specific questions d) scientific appendix.[224]

Mapping composes a critical part of anthropological reports to make impacts and Indigenous traditional land use as factors visible for court claims. Anthropologic documents are produced for non-Indigenous use and intended for court proof.

The Brazilian government did not require anthropological reports as part of the process for demarcating Indigenous Lands until 1996.[225] Since then, it has become mandatory to include a "specialist" in environmental issues on the Working Groups for identifying Indigenous lands.[226]

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[223] William A. Darity Jr., Kirsten Mullen, From Here to Equality: Reparations for Black Americans in the Twenty-First Century

[224] Silva, Orlando Sampaio, et al. A Pericia Antropologica em Processos Judiciais. Florianopolis: Editora da UFSC, 1994. Access: https://cpisp.org.br/wp-content/uploads/2019/02/A_Pericia_Antropologica.pdf. Accessed 25 May, 2021.

[225] Portaria no. 14, de 9 de Janeiro de 1996, reference ao parágrafo 60 do artigo 20 do Decreto no. 1.775, de 8 de Janeiro de 1996.

[226]. Funai, PPTAL, Levantamentos Etnoecológicos em Terras Indígenas na Amazônia brasileira: uma metodologia Versão revista e atualizada, 2004

Ethnomaps

Ethnomaps consist of maps made by Indigenous communities on their territorial components, areas of agricultural use, ecosystems, environmental conflicts, sacred sites, and cultural and historical elements. Ethnomaps can serve as a tool for negotiating Indigenous rights with governments and supporting land claims.[227] The difference between Ethnomaps and anthropological reports is that Ethnomaps can also serve an internal use for the community and serve as external proof.

Ethnomaps are often organized as books that can serve as activist documents. The book *Mapping and estimating the forest coverage in 18 Indigenous Lands and 7 Conservation Units* presents the book goals—separated into two categories: main goal and secondary goal. The book's primary purpose is to present quantitative data on deforestation through mapping deforestation areas in the state of Acre, on the border between Brazil and Peru. The secondary goals include creating buffer zones between 10 to 20km in the surrounding of the selected areas and the provision of visual evidence on land alteration.

Some ethnomaps also serve to maintain traditional knowledge and practice. The book "Uɪ̃ Bena," written in the Hãtxa Kuɪ̃ language, is made for guidance and formation of the Indigenous Huni Kuɪ̃ as agroforestry agents. The book's drawings serve as guidance for maintaining traditional knowledge and technique of creating and taking care of turtles.

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[227] Rosélis Remor de Souza Mazurek. Mapping in the Oiapoque Indigenous Territories: Community Appropriation for Local land management. Revue dethnoécologie, 2016.

Environmental Impact Assessment & Environmental Impact Report (EIA/RIMA)

The Brazilian environmental council CONAMA resolution n. 001/86 defined the parameters for making Environmental Impact Assessments in Brazil. The document consists of two parts: the EIA (Environmental Impact Assessment), a collection of studies made by an interdisciplinary team, which consists of up to 1,500 pages of research, and the Rima (Environmental Impact Report), a summary of the EIA. The Rima presents the EIA conclusions translated to an accessible language for both experts and non-experts.

The CONAMA resolution from1986 made the EIA/RIMA assessment mandatory for infrastructural or urban projects that might cause environmental changes. Among the projects that require the EIA/RIMA are roads with two or more lanes, railways, ports, mining, oil extraction and refineries, pipelines, airports, power lines, dams, and landfills.[228]

The production of EIA/Rima documents is polemic. The enterprise that is responsible for causing environmental impacts hires the company, producing the impact's assessment. The resulting reports often advocate for the interests of the enterprise under evaluation. The urbanist João Sette Whitaker problematizes how the Brazilian government can use the production of EIA/RIMA documents as a strategy to validate governmental projects.[229]

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[228] Unicamp. Ibama considera Trecho Sul do Rodoanel ambientalmente viável. 26 February 2006. Access: http://www.labjor.unicamp.br/midiaciencia/article.php3?id_article=166. Accessed 25 May 2021.
[229] Ibid.

Presented as neutral documents, the EIA/Rima are political documents. These documents intend to contain environmental degradation but might also be the agents that create the project construction opportunity.

Basic Environmental Plan (Plano Basico Ambiental)

The Basic Environmental Plan presents compensation measures for the impacts of the construction identified in the EIA/RIMA. If approved by environmental bodies, the promise for compensation described in the document becomes a term of commitment signed by the entrepreneur responsible for the project that causes the environmental impacts.

The Basic Environmental plan cannot offer the payment of a monetary value as redress for impacts. Instead, it provides long-term measures for environmental monitoring and spatial quality care. For instance, if an urban construction risks polluting water, the basic environmental plan proposes implementing a program for monitoring the water frequently and being responsible for maintaining the water quality.[230]

Technical Reports

Technical reports are similar to anthropologic reports, but scholars and technicians from different areas of study produce them. They are usually interdisciplinary documents. In 2019 the Brazilian public federal ministry hired the Brazilian education institute *Fundação Getulio Vargas* for producing technical reports on the Impacts caused by the *Fundão* dam rupture

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[230] See: http://www.funai.gov.br/index.php/programas-de-mitigacao-e-compensacao

administered in 2015 in Minas Gerais.[231] Lawyers, architects, and anthropologists can compose the team working on the production of technical reports.

Terms of Adjustment of Conduct (TAC)

The Terms of Adjustment of Conduct is a document that pushes enterprises to accomplish promised compensations established by previous environmental risk assessments. It provides additional pressure over the responsible agents of environmental harm to pay the compensation for their action that caused an impact.

This is an incomplete list of documents, and it does not analyze each kind in depth. The intention is to understand the common points of leverage and failure for reparations claim in these different documents.

The making of documents for environmental compensation can be controversial. They also sustain an entire economy and market of an environmental consulting firm specializing in environmental impacts reports made for enterprises' licensing. The company *Master Ambiental*[232] realized more than 2.300 projects and 750 clients since the company started. They offer the services of studies of neighborhood impacts, environmental studies and licensing, environmental management, sustainable construction, residues management, and training courses. The most required services are the plan of management for Solid Residue and Environmental Licensing. One of their clients is the Real Estate Tenda[233] that deforested 500 Atlantic Forest native trees in Jaraguá Peak in January 2020. CCR[234], the

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[231] See all reports produced in: http://www.mpf.mp.br/grandes-casos/caso-samarco/atuacao-do-mpf/pareceres-e-relatorios

[232]. https://www.masterambiental.com.br

[233]. https://www.tenda.com

[234]. http://www.grupoccr.com.br/negocios/concessão-de-rodovias

enterprise responsible for constructing the Rodoanel, one of the three roads that cut through the Atlantic Forest in the Peak, is also their client. Other clients of theirs include the shipping enterprise FedEx, the American electric power holding Duke Energy, and the Italian multinational energy company Enel Group, and the world's largest processor of beef and pork, Brazilian company JBS S.A. Documents that serve as court evidence, or as a tool of public engagement for reparations claim can take many formats, and they can be controversial. Documents that report impacts resulting from infrastructural constructions can be biased and can actually impede redress. Some impact assessments establish shallow parameters of redress as a strategy to approve the project under evaluation. In this sense, impact assessments can benefit certain companies' interests while claiming to benefit communities under risk. As environmental justice scholar Dorceta Taylor highlights, "one cannot fully negotiate compensation if one does not know *what* can be negotiated for and *with whom to negotiate*."—as Taylor says, certain compensation measures can "only scratch the surface."[235]

Groups of anthropologists and lawyers developed methodologies to guide the creation of some of those documents. The PPTAL (Projeto de Proteção às Populações e Terras Indígenas da Amazônia Legal) set a method for writing anthropologic reports.[236] It consists of a period from six to seven months with a three-phase process: (1) research of theoretical ground, (2) field research and data collection on-site, (3) consolidate results, and final document elaboration. Specifically in the Amazon region, the Brazilian public body

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235 Taylor, Dorceta. Toxic Communities: Environmental Racism, Industrial Pollution, and Residential Mobility. New York University Press, 2014. p. 143.
236 Funai, PPTAL, Levantamentos Etnoecológicos em Terras Indígenas na Amazônia brasileira: uma metodologia Versão revista e atualizada, 2004

"National Foundation of the Indian" (Funai) provided limited funding of US$ 300.000,00 for conducting reports. Since this was a one-time payment, it was impossible to conduct independent research for each of the Indigenous Lands selected for the reports. Instead, they were produced in a collection of sites of Indigenous lands already demarcated. The group for the making of such documents consists of "technical specialist consultants" and Indigenous participants. According to PPTAL, the ideal consultant needs to be accepted first by the Indigenous community they will be working with; have experience already of working in the Brazilian Amazon, know the language that Indigenous groups speak in the territory they will be working in, have considerable experience with participatory practices of field data collection and previous experience in multidisciplinary research teams, and finally have previous experience in ethnobiological and ethnoecological research (the study of relations between Indigenous groups and their environments and techniques). The final document results in two formats: one for the internal use of Indigenous communities and another for external evidence in court decisions.

The *quilombola*, activist, writer, and small farmer Antonio Bispo dos Santos critiques anthropological reports to recognize traditional communities' land rights. In his article "We belong to the Land*,*" Santos argues that anthropological reports constitute another document invented by the settler state to "diagnose and read the traditional communities' costumes." He asks: "Why do we need an anthropological report to have the recognition of our land rights"? Santos defines himself as a scholar and translator between the *quilombolas* oral tradition and the white settler colonial language.[237]

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[237] Santos, Antonio Bispo. Somos da terra. PISEAGRAMA, Belo Horizonte, número 12, página 44 - 51, 2018. Access: https://agitatejournal.org/we-belong-to-the-land/ . Accessed 25 May, 2021.

Additional tools

This part lists some additional tools that can serve for community organizing in practice. One example is creating land taxes or tools for preventing future harm, such as Community Benefits Agreements and Comprehensive Plans. The Ecocide law in present debate might also serve to provide compensatory values for future risk or serve as an additional instrument to acknowledge past wrongs.

Land Taxes

Some autonomous activist initiatives for redressing historic harms for Indigenous nations are monthly payment of land taxes. In Oakland, California, the Sogorea Te' Land Trust, an Indigenous women-led land trust founded to restore their lands, created the Shuumi land tax. Business and local residents can pay the tax. The Chochenyo and Karkin Ohlone Indigenous activist Corrina Gould, one of the land trust leaders, explains that the tax is an option for non-native residents to express gratitude for Indigenous nations hosting them on their ancestral lands. The Shuumi land tax program created a calculation system based on the taxpayer homes' size, depending on whether they own or rent the property.[238] Another program also in California organized by a group of white people living in Humboldt Bay created the honor tax as a voluntary annual tax payment to the Wiyot Nation by people who live on their ancestral territories.[239] The honor tax website provides a toolkit for anyone who wants to start an honor tax project.[240]Road tolls also configure a potential target for

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[238] Maanvi Singh. Native American "land taxes": a step on the roadmap for reparations." The Guardian, 2019. Access in:<https://www.theguardian.com/us-news/2019/dec/31/native-american-land-taxes-reparations>
[239] See: http://www.honortax.org
[240] See: http://www.honortax.org/toolkit.html

establishing Indigenous repair funds through land taxes. In South Dakota, the Cheyenne River Sioux tribe is negotiating with the federal government to implement toll booths on federal and state highways that run through their reservation.[241] Land taxes establish an autonomous strategy to engage people to pay land taxes beyond depending on nation-state government acknowledgment and accountability for reparations. In Jaraguá Peak context, relying only on land taxes would be insufficient. These examples provide models that non-Indigenous allies could start to engage their social circles concerning Indigenous land restitution and acknowledge their position as settlers living on Guarani and other Indigenous nation's lands.

Community Benefits Agreements

Community Benefits Agreements (CBA) are private contracts that can take part between a company proposing a project and a coalition of community groups. CBAs can serve as an instrument to include communities that have been excluded from planning negotiation processes and make companies respond and become accountable to their interests and needs. The agreement can help prevent the harm of large-scale construction, planning project, or dwelling in contract terms. As a private contract form—not depending on state agents to make decisions—the process can be faster and more directly guided through community organizers, without relying on third parties to communicate their parts' choices.[242] A Community Benefits Agreement might also be controversial, and depending on

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[241] Are Toll Roads an Option for Indian Reservations in Need of Road Repairs?
https://nativenewsonline.net/currents/are-toll-roads-an-option-for-indian-reservations-in-need-of-road-repairs
[242] Salkin, Patricia E., Lavine, Amy. (2009), "Community Benefits Agreements and Comprehensive Planning: Balancing Community Empowerment and the Police Power." Journal of Law and Policy 18(1, 4): 157-216.).
See references here: https://www.forworkingfamilies.org/page/policy-tools-community-benefits-agreements-

the type of contract and the parts involved, it might risk being reductive to monetary values.

For instance the U.S. Department of Energy report on "Community Benefits Agreements

for Mega-Energy Projects" describes some CBAs established between energy projects and

Indigenous reservations.[243] The report describes CBAs as "an agreement signed by a

Community (First Nation/Tribe) and a developer which outlines a range of community

benefits the developer agrees to provide in return for the community's support of the

project." Common benefits include "workforce training for community members; local-hire

provisions; and subcontracting set-asides or goals." Depending on the parts that make the

contract, the agreement can also risk not representing an entire community interest. A CBA

must be considered in each specific context. But it can serve as an additional or alternative

tool for negotiation. For example, in 2016, the company PSEG Power Connecticut LLC

made a Community Environmental Benefit Agreement with the Bridgeport (C.T.)

community organization Connecticut Coalition for Environmental and Economic Justice,

the University of Bridgeport, and the West Side/West End Neighborhood Revitalization

Zone Implementation Committee. PSEG proposed to install a "combined cycle facility"

with an electric generating capacity of 47 M.W. at an existing Bridgeport Harbor Station. As

part of the agreement, PSEG promised to contribute with $ 2 million to create a fund

managed by Fairfield County's Community Foundation or other similar organization

recommended by the Environmental Task Force (ETF) of the city. PSEG also destined $ 5

and-policies-effect and also here: http://communitybenefits.blogspot.com/2009/01/connecticut-statute-defines-cbas-sort.html.
[243] The U.S. Department of Energy. Community Benefits Agreements for Mega-Energy Projects. Reservation Economic Summit, March 5, 2018. Access: https://www.ncsl.org/Portals/1/Documents/energy/Tribal_Energy/tribal_energy_J_TallBear_present_32087.pdf . Accessed 31 May, 2021.

million in renewable energy projects recommended by ETF. Among other agreements, PSEG promised to support the 2016 Regional Greenhouse Gas Initiative and contribute to emissions reduction in Connecticut, committed to supporting local hiring including "minorities, women and veterans" and construction firms owned by the same.[244]

Ecocide Law

The term "ecocide" refers to all forms of environmental destruction, which first received public attention at the 1972 United Nations environmental conference in Stockholm when the premier of Sweden Olof Palme used the term to describe the environmental damage caused by the Vietnam War. An "ecocide convention" was proposed during the conference but did not become official. The idea of an international ecocide law has been being crafted since then between environmental advocates to penalize individuals or companies responsible for environmental destruction. In December 2020, environmental lawyers gathered to draft a legal definition of ecocide as an international crime. If this definition is approved, environmental destruction can become framed in the same "legal category as war crimes, genocide, and crimes against humanity."[245]Advocates drafting the international ecocide law also believe the law could change how "the environment is valued" and raising the idea that "nature has rights."[246] Many steps remain for the law to be ratified. After drafting the law, a state member needs to propose the law to the International Criminal

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[244] PSEG Power Connecticut LLC. Community Environmental Benefit Agreement. 25 February, 2016. Access: https://bridgeportharborstation.com/wp-content/uploads/2017/09/ceba_final.pdf See also https://bridgeportharborstation.com/ceba-2-2/

[245] Godin, Melissa. Lawyers Are Working to Put 'Ecocide' on Par with War Crimes. Could an International Law Hold Major Polluters to Account?. Time, 19 February, 2021. Access: https://time.com/5940759/ecocide-law-environment-destruction-icc/. Accessed 25 May, 2021.

[246] Ibid.

Court (ICC), where 50% of ICC member states need to approve it. And after approval, states will re-debate the definition of the law to finally ratify it. This process can take up to 5 years.[247]

Spatial Evidence for Redressing Situated, Shifting Grounds

Reparations models to redress Infrastructural construction impacts can provide partial guidance for present and future decision making. But outcomes vary on a case-by-case basis, according to each case actors' specifics, issues, narratives, histories, spatial relations, and legal regimes.[248] Monetary compensations are derisory—no monetized value can compensate for the loss of land that results from settler colonialism. But reference values serve as starting points to leverage government action. And even then, values or reparations measures need to be assessed from the perspective of each specific group's self-determination considering how each community or Indigenous nation's costumes, values, and cosmologies understand space and spatial relations. It is only possible to know how land has been disrupted by an infrastructural construction from the perspective of the self-determined values of each community in each specific context since each group holds their own process of decision making.[249]

The act of measuring reparations and environmental compensation values is not neutral and can carry bias. Measuring repair from a western perspective of space carries limitations and can maintain settler colonial structures while claiming to address settler-colonial

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[247] Ibid.
[248]. Dinah Shelton. Reparations for Indigenous Peoples: The Present Value of Past Wrongs. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009
[249] Manual de Jurisprudencia dos Direitos Indigenas, p. 569.

violence. This chapter has been about the restriction of using limited and controversial settler-Brazilian nation-state law standards for measuring historical risk and harm of more than 300 Indigenous ethnicities whose costumes and cosmologies vary enormously.

Reparations and environmental compensation are different in time and in spatial range. Reparations address structural violence, while environmental compensation can address a specific environmental impact, for instance, one road construction. And while reparations address historical wrongs, compensation addresses future wrongs or recent past wrongs. This thesis argues that isolated cases of environmental compensations need to be contextualized in the long history of networked infrastructure constructions—one road construction is part of a networked-combination of numerous roads. Each road unleashed deforestation and opened space for profit on the surrounding land, changing its land use—for instance, real estate profit, cattle, or coffee plantations. Roads construction opened space for Atlantic Forest deforestation as a process, not as an event. The analysis of one road's impact is vital to understand the specific implications that road construction unleashed, but each road is part of a larger picture of infrastructural dispossession—in this work seen as a system that fragmented Guarani and Atlantic Forest territory to open the surrounding land for use by settler colonizers. While this chapter has referenced environmental compensation cases such as land restitution due to a road construction's impact, it acknowledges that isolated environmental compensations are insufficient for colonial reparations.

Reparations for the Guarani peoples need to address colonial violence. Roads and power lines maintain settler-colonial violence by dividing the Guarani and other Indigenous nations' territories. Roads, power lines, and telecommunication towers change ground relations in an area much larger than the immediate infrastructure contour—reaching

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up to 3km or even 200 km from the television tower base. Reparations that address

infrastructural impacts as colonial violence need to acknowledge the temporality of

infrastructural dispossession: roads and electromagnetic towers, as well as power lines, dams,

and mining, might present each of themselves as one isolated event, a one-time construction,

but in reality, they perform in a network where all of these layers join, and with impacts that

remain unleashing long after the construction period is over.

Proposals and speculations about reparations are limited and potentially

controversial. Those long-term impacts are incalculable, and reparations can never fully

compensate for the harm they address. This chapter constitutes an incomplete and initial

approach to spatial evidence on reparations claims and cannot fulfill the numerous specific

injustices committed by governments upon entire Indigenous nations.[250] It can offer an

initial glimpse of cases that provide parameters for how infrastructural reparations might

gain traction. It aims to discuss how infrastructural dispossession and urban growth can

serve as factors for reparations claims and how spatial designers can contribute to providing

strong spatial evidence for such claims.

Chapter 4: Mapping Grounds

In her book "Mark My Words: Native Women Mapping Our Nations" Tonawanda Seneca
Professor of gender studies Mishuana Goeman proposes the concept of (re)mapping:
"(re)mapping is not just about regaining that which was lost and returning to an original and
pure point in history, but instead understanding the processes that have defined our current
spatialities in order to sustain vibrant Native futures."[251] Goeman asks: "What happens when
non-normative geographies are examined?"[252] Goeman cites feminist geographer Doreen
Massey's book *For Space*, which claims that space needs to be reimagined. Instead of seeing
and representing "space as a surface," Massey argues, and Goeman endorses, spaces should
be thought as "meeting-up of histories."[253] Space, as Goeman posits, "can be defined 'as the
product of interrelations;' second, 'as the spheres of possibility;' and third, 'as always under
construction' or a 'simultaneity of
stories-so-far.'"[254]

  This chapter inventories attempts of non-normative forms of activist mapping. It
follows Goeman and Massey's proposition. Instead of mapping flat surfaces as "space," it
attempts to map "meetings in space." The first part of the chapter draws from
anthropologists, geographers, architects, and historians to address the controversies of
"mapping" dynamic relations that take part on the ground. It enters a long and ongoing
discussion about the risks of mapping Indigenous geographies and reproducing

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[251] Goeman, Mishuana. Mark My Words: Native Women Mapping Our Nations. University of Minnessota
Press, ,2013, p. 3.
[252] Ibid, p. 4.
[253] Massey, Doreen. For Space. SAGE Publications Ltd, 2005.
[254] Goeman, Mishuana. Mark My Words: Native Women Mapping Our Nations. University of Minnessota
Press, 2013, p. 6.

epistemological and colonial violence. The chapter concludes with five selected examples of mappings that could illustrate the intersections of "non-normative forms of mapping relations" and "activist mapping for Infrastructural dispossession." It discusses the maps not only as visuals, but also how they have been used or performed as documents.

Reflections on non-normative forms of activist mapping, and on the critical view of a map author's positionality, are chosen specifically as references for mapping Infrastructural dispossession in Jaraguá Peak, but they also serve as a broad collection that can offer further discussion on how to represent ground change not as static but as complicated, ever changing geographies, and how to contribute with spatial evidence for activist purposes.

Mapping Shifting Grounds

In "Seeing Like a State," American political scientist and anthropologist James C. Scott argues that the strategy employed by state cadastral maps to tax land is *simplification*. State simplification, what Scott describes as the "basic givens of modern statecraft"—such as not representing people, movement, relations—on state maps, leaving space as blank territories, allowed states to perform a more efficient system of taxation, and specific official's interests.[255] Map simplification is a method for the state to control and to profit from the land.[256] Similarly, in "Sins of War and Trade, Shipping and Capitalism in the Arabian Peninsula," Iranian-American International Politics scholar Laleh Khalili calls attention to the politics of shipping routes maps. Ships crossing the sea don't leave marks as roads do on

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[255] Scott, James C. Seeing Like a State: Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed. Yale university Press, 1988, p. 3.
[256] Ibid.

the ground. Because ship flows don't leave traceable marks on the ocean, it becomes more difficult to track, quantify, and commodify the route. Maps of maritime routes create "a solidity, a durability that the marine ephemerality does not have." Mapping maritime routes as solid traces, instead of vanishing foam, was a method to commodify the ocean.[257]

Environment scholar Jessica Barnes also problematizes the fixture and simplification of water in maps. In "Cultivating the Nile: The Everyday Politics of Water in Egypt," Barnes describes a top-down view map of the Nile. As Barnes argues, the color of the river is constant, without representing water flow or movement. The edges of the river are neat and static, erasing the everyday changes of water ebb and flow. Barnes also drives the reader's attention to the map's people-less quality, depicting man-made dams and canals, but erasing the social processes that make and control these infrastructures daily. It also does not represent global networks and flows of trade, funds, and technologies that flow on the water.[258]

Maps risk essentializing and transforming dynamic relations into static concepts. Architects and urban planners are used to drawing static lines to depict dynamic relations. Marxist geographer Doreen Massey advocates for a politics of space-time: space is not fixed but "an ever-shifting social geometry of power and signification."[259] Massey's arguments regard space as ever-changing relations—offer a critical reference for activist map makers. A line in a map represents dynamic and complex relations.

[257] Laleh Khalili, Sins of War and Trade, Shipping and Capitalism in the Arabian Peninsula. Verso, 2020.
[258] Jessica Barnes, Cultivating the Nile: The Everyday Politics of Water in Egypt. Duke University Press, 2014, p. 171
259 Massey, Doreen. Space, Place, and Gender. University of Minnesota Press, 1994, p 3.

American Anthropologist Laura Nader argues that a necessary exercise for anthropologists is to change their focus for "studying up"—instead of "searching the colonized," search the colonizer.[260] This research uses Nader's argument as a provocation to reverse the focus or point of view of maps. Activist mappers should not only map the place where the impacts appear but also turn the "camera" on the agents who benefit from the causes of the impacts. Nader's suggestion can also serve for mapping, with the exercise of "mapping up." Temporally dispersed disruptions caused by infrastructural constructions (such as roads, power lines and telecommunication towers) could result in 5 kinds of maps:

1. Maps of impacts

2. Map of agents (Government and private companies)

3. Map of subsidies and funding

4. Map of who benefits from the infrastructure construction

5. Maps of involved legislation and court decisions

Each map should be precise in metrics. Maps can be as accurate as an architectural drawing with directions for pouring a building foundation's concrete and raising the building structure. Both activist maps advocating for the redress of a past wrong, and architecture drawings provide execution parameters. But they also need to depict multiple facets to fuel their full potential.

Maps play an essential role in infrastructural impacts reports and anthropological reports. A map can depict how infrastructural risk and encroachment materialize in space. Maps can turn visible the spatial dimensions of long-term disruptions caused by

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[260] Nader, Laura. Up the Anthropologist –Perspectives Gained from studying Up. Reinventing Anthropology, 1972

infrastructural constructions. Figures 2 to 4 are part of the publication *Plano de Gestão Territorial e Ambiental das Terras Indigenas Timbira. Hëmpejxà ampô pjë inpej*. The publication served both for the Timbira communities internal organization, as well as an instrument for negotiation with the Brazilian Federal and local state government.[261]

These maps, made by and for Timbira communities and made by anthropologists represent different angles, and perspectives of Timbira territory. Land is not empty, but replenished with inhabitants and relations. Both qualities (clean water where fishes can swim, diversity of vegetation) and conflicts (construction of power lines, degraded areas, and dam constructions) are depicted.

In a similar strategy of representing different angles and relations, instead of simplified maps, voided of relations, the artist Carolina Caycedo mapped the Watu river with Indigenous communities whose territories were disrupted by the Fundão dam collapse in Mariana, Minas Gerais, in Brazil. According to the Caycedo, the drawings interpret "Indigenous rituals and myths of rivers in dispute."[262] The drawings were exposed in different exhibitions, such as the 32nd São Paulo Biennial and the Fields of Invisibility exhibition.[263]

Maps, also, can *not* be flat documents, or pieces of paper. Maps, and more precisely activist maps, can take infinite forms, for instance as a movement of a body in space. Cherokee artist Shan Goshorn proposes a powerful activist map, which complicates the

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[261] CTI. *Plano de Gestão Territorial e Ambiental das Terras Indigenas Timbira. Hëmpejxà ampô pjë inpej*. 2012. http://bd.trabalhoindigenista.org.br/sites/default/files/CTI%20-%20PGTA%20TIMBIRA%20-%20MIOLO%20VSitelight.pdf
[262] See: http://carolinacaycedo.com/river-books-libros-rio
[263] See: https://camposdeinvisibilidade.org/Carolina-Caycedo

coloniality and static quality of maps by cutting an ancient colonial map and making it into a basket as a map. The piece is titled: "Our Lands Are Not Lines on Papers."

In "The Land of Sacred Proof: Indigenous Truth and Representation," Architect Nina Valerie Kolowratnik created, in collaboration with the Indigenous nation Jemez Pueblo, encoded maps that at the same time respect their sacred secrecy and represent the Pueblo traditional use of the land. The map "Hemish Spiritual Pathway," (Figure 8) represents the sacredness of the Waavema Mountain for the Hemish people, representing the spatiality of sacred dances around the mountain, without revealing dance movements, clothes, ritual masks, and the meaning of the dance— which are not to be revealed.

Activist maps can play an active role in preventing future infrastructural dispossession. Maps were essential documents during Canada's land agreement negotiations between Indigenous Nations and the Canadian state. For arguing against the construction of a hydroelectric project in Quebec in 1972, Crees of James Bay needed strong evidence to depict how such a project would impact their territorial rights. The Cree produced maps of their use of territories for hunting, harvesting, and growing food to present to the Quebec government. The use of maps for litigation constituted graphic evidence that served to convince the court audience.[264] Also, from the 1970s, the maps from the Inuit land use and occupation survey depict the Inuit presence to counter colonial ideas of "empty land."[265]

Mapping for court evidence is not a novelty. Maps used in court that reveal the long-term use of space by Indigenous nations for claiming land rights, such as the Inuit land-use, have provided evidence for courts since the 1970s. Forensic architect Eyal Weizman points

[264] Anker, Kristen. Aboriginal Title and Alternative Cartographies. Erasmus Law Review, 2018.
[265] Ibid.

to the fact that because there is no professional registration to "forensic architects" it is difficult to determine a precise date when the practice of forensic architecture emerged. But Weizman cites Dale Paegelow, a forensic architect who claims that the term "forensic architecture" emerged in the early 1980s.[266] Weizman describes forensic architecture as a practice which "employs buildings as instruments of historical measure." Weizman also highlights how, in forensic architecture lenses, buildings are not static. Buildings' stories are non-linear, compounding, chaotic entities. According to Weizman, forensic architecture does the opposite of successful and photogenic architecture forms—it digs into architectural failures. The interdisciplinary group Forensic Architecture, created by Weizman in 2010 as a research project within the Center for Research Architecture at Goldsmith, University of London, uses architectural language and mapping as evidence for court. Other schools labs are also doing similar forms of work of mapping for advocacy: the LabCidade, at the University of São Paulo and directed by the urban scholar Raquel Rolnik,[267] the multidisciplinary group Autonoma, at the University of Brasilia architecture school and directed by the architect Paulo Tavares,[268] the Urban Theory Lab, at the Harvard School of Architecture, led by the urban theorist, geographer, and sociologist Neil Brenner,[269] and the the "Mapping Indigenous LA" project, at UCLA.[270]

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[266] Weizman, Eyal. Forensic Architecture: Violence at the Threshold of Detectability. New York: Zone Books, 2017, p. 51.
[267] LabCidade: http://www.labcidade.fau.usp.br ,
[268] Autonoma: https://www.advocacia.autonoma.xyz,
[269] Urban Theory Lab: http://www.urbantheorylab.net.
[270] Mapping Indigenous LA: https://mila.ss.ucla.edu/

Controversies of Mapping for Activism

Activist maps hold problems of translation. A map, as a written document, printed on paper, speaks in settler-colonial language. For the Guarani Mbya, any written form is a settler language document. To make a map that depicts the impacts on Guarani territory is to translate Guarani to the settler language. And for me, a White Brazilian, doing this translation of impacts over the Guarani community into a map also risks reducing the understanding of territory from the Guarani perspective. The maps offered by this work speak in the settler language, and they are incomplete in revealing the impacts of urban constructions over the Atlantic Forest and the Guarani traditional lands. Using maps for Indigenous land claims carries the risk of reproducing colonial violence. As feminist, activist, and American writer Audre Lorde states, "the master's tools will never dismantle the master's house."[271] But, as Antonio Bispo dos Santos argues, the use of written documents can also serve to shift the "enemy's weapon into self-defense."[272] An alternative is to produce multiple maps that combine different methods.[273]

An activist map also needs to consider how to express different voices for different audiences. To understand the cost of impacts—such as why a road construction undermines Guarani Mbya livelihood—the person who analyzes the document also needs to learn from Guarani cosmology and self-determination, including all the layers in which a road construction can affect their lives. Such maps should be done in conversation with the

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[271] Lorde, Audre. "The Master's Tools Will Never Dismantle the Master's House." 1984. Sister Outsider: Essays and Speeches. Ed. Berkeley, CA: Crossing Press. 110- 114. 2007. Print.

[272] Santos, Antonio Bispo. Somos da terra. PISEAGRAMA, Belo Horizonte, número 12, página 44 - 51, 2018. https://agitatejournal.org/we-belong-to-the-land/

[273] Mei-Po Kwan. Feminist Visualization: Re-envisioning GIS as a Method in Feminist Geographic Research. Annals of the Association of American Geographers, 92(4), 2002, pp. 645–661.

Guarani communities, considering what a map can depict or not, according to their own spatial, temporal, and sacred cosmologies and understandings.

The question of what constitutes a map can cause a lot of dissents. A map is a choice of a perspective/point of view. Maps choose which aspects to represent, and which parts to leave out of representation. Maps associate ideas to particular places. A map can orient a person in an area, give coordinates, indicate paths. Maps select which memories to foreground. Every map has an author, or several authors, who choose what to highlight. Maps give names. Maps don't need to be visual. They can give a full, body experience. A map can also represent what exists and relationships to be created, serving as a potential mobilizing tool for activism, advocacy, or social change. An equally important question of what is in a map, is what is left outside of a map—what is not represented. Related questions include: Who is creating the map? Whose interest is a map depicting? What voices are not being represented? Where is the funding coming from? Who is the public intended?

In *Mapping Abundance for a Planetary Future: Kanaka Maoli and Critical Settler Cartographies in Hawai'i*, English Professor Candace Fujikane proposes how to engage with the practices of "critical settler cartography."[274] As Fujikane proposes, "critical settler cartography" both needs to expose the ideological interests, contradictions, and erasure of settler colonial cartography, and work to present evidence that can contribute to "unlocking colonial systems of power."[275] As thinking how to do settler maps that argue to be allies for Indigenous activism, and adding to Fujikane's argument, I propose five key points that a "critical settler cartography" map could contain: soil representation according to the self

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[274] Candace Fujikane. Mapping Abundance for a Planetary Future: Kanaka Maoli and Critical Settler Cartographies in Hawai'i. Duke University Press, 2021.
[275] Ibid, p. 34.

determination of the communities living in the land, and respecting what can be depicted

and what should not be revealed; never depicting land as empty; not reproducing colonial

views (top-down view) that facilitate land fragmentation and justification of "land as empty;"

source and accompanying oral histories or histories that tell the specifics from each context

according from self-determined narratives and foreground agents responsible for soil

degradation. In addition, subtitles need to foreground the map's controversies, situate the

author, and discuss the limits of the information presented, and blind spots that remain.

Scale, time, and value need to be critically reviewed beyond western measures.

Designing Territories and the Implications of Spatial Knowledge

Spatial analysis of urban construction impacts over Guarani territory requires a multi-layered

and multi-scalar analysis. Agents of impacts are often not located in the areas where impacts

appear. And for this reason the scales of analysis of urban and Guarani spatial clashes

extend beyond Jaraguá Peak. Since the 1970s the Guarani communities in the Jaraguá have

needed to adapt their traditional use of the land drastically due to impacts resulting from

urban and infrastructural constructions. The main impact over the Jaraguá Indigenous land is

urban growth, resulting especially from roads construction, urban projects, sewage

infrastructures and Power Lines constructions.[276]

   Cultural clashes between urban constructions and cultural values of territorial

use that challenge western models are often overlooked in Architecture and Urban Planning

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[276] Pimentel, 2009, 296.

schools. The Guarani spatial concepts of *tekoa* and *yvyrupa* are not included in the scope of learning in Architecture and Urbanism schools in São Paulo. Principles of urban design in Brazil generally source and admire European and North American models, overlooking non-Western spatial references. When courses that teach spatial design choose Western models as reference and overlook Guarani and other Indigenous nations territorial understandings, they are making a political choice.

Architects and urban designers are also designing territorial relations. The Brazilian anthropologist Dominique Tikin Gallois discusses the differences between the terms "land" and "territory". For Gallois, "territory" refers to the living experience and construction of relations between a society and its territorial base, while "land" refers to a legal process conducted by the state.[277] Following the definition proposed by Gallois of territory as a construction of relations between a society and its territorial base, when architects and urbanists design buildings or urban infrastructures, they are not only designing a static form of a building, but are also designing several layers of dynamic relations: construction site, earth removal, transportation of materials, sewage and electricity connections, and carries risk of potential displacement of populations, among many other layers that perform in time and carry vast social, political and economic consequences. While not considering Guarani Mbya concepts of space, urban design projects in São Paulo contribute to constructing spatialities that conflict with the Guarani principles of territorial relations and territorial mobility.

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[277] Gallois, Dominique Tilkin. Terras ocupadas? Territórios? Territorialidades?. In: Fany, R. (Org.). Terras Indígenas &Unidades de Conservação da Natureza: o desafio das sobreposições. 1ª ed., São Paulo: Instituto Socioambiental, 2004, p.39.

Drawing lines in a blank paper is often the initial step for architects and urban designers starting a project that will, in the future, become spatial. Architects are used to drawing static lines to refer to dynamic relations. Architect Keller Easterling highlights how the construction of cities is not based on "singular masterpiece buildings," but instead by a combination of networks and spatial connections that form infrastructure space. Easterling highlights the potential of spatial designers to design relations and spatial interplays instead of fixed forms.[278] Geographer Doreen Massey advocates for a politics of Space-time: space is not static but "an ever-shifting social geometry of power and signification."[279] The arguments presented by Massey—to regard space as ever changing relations, and by Easterling—on spatial designers potentially designing relations, help to foreground how architecture and urban principles carry social consequences and might be used in alternative modes than the ones traditionally used.

This research considers that roads construction, power lines and other forms of linear infrastructures, construct borderlands spatialities that differ from nation-state borders but perform similar forms of cultural division. Social struggle that unfolds in spatial contexts should be represented not as a one time act, but as an everyday, repeating action. When a spatial designer or a mapper draws a line to represent a wall, a border, or a road, complex relations are radically simplified. A line in a drawing from the plan perspective (or "god's/bird's view") also effaces cultural complexities. The question remains on how to depict space as a dynamic relation of affect, coexistence and constant collision of trajectories. In other words, I ask the question: how can designers visually unpack what a line

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[278] Easterling, Keller. Extrastatecraft: The Power of Infrastructure Space. Verso, 2014, p. 78.
[279] Massey 1994, p. 3.

on a drawing means as physically situated in specific territories where complex relations between specific bodies, cultures and political interests keep co-existing and colliding as dynamic relations.

Urban scholar and sociologist Neil Brenner critiques the dichotomous view between "urban" and "rural." Brenner argues that this imaginary of an urban bounded area does not exist. Instead a multi-scalar analysis of complex relations explode the "urban idea" to expose a larger spatial ecology.[280] Similarly, when questioned about his position on studies of urban anthropology, Eduardo Viveiros de Castro replied: "I don't like this expression, 'urban anthropology', as I don't like suburban anthropology, rural, coastal, submarine"[281] Castro counter argues that instead of "urban anthropology" he would prefer the name "anthropologies of complex societies." Brenner and Viveiros de Castro complicate the dichotomies between urban and rural. The design of urban spaces in São Paulo, or any other spatial construction, also comprehends the landscapes of extraction and displacement that results from its construction. The design of space needs to source other than Western spatial references in order to become conscious of all the dimensions of its spatial impacts.

Tracing the different modes of space-making practices over this specific context of the Guarani Mbya territory in the Jaraguá offer important references for urban and architecture designers. Spatial designers are also agents of territorial design. And understanding sites where urban design takes place should span all scales of its impacts. An activist document database accompanies this chapter.

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[280] Brenner, Neil. New Urban Spaces: Urban Theory and the Scale Question. Oxford Scholarship Online, 2019, p. 3

[281] Castro, Eduardo Viveiros de. A inconstância da alma selvagem. São Paulo: Cosac Naify, 2013.

Conclusion: Re-mapping São Paulo as future Guarani-*Juruá* geographies, for *ka'aguy*-Atlantic Forest Infrastructures

On August 20, 2019, a grey cloud approximately 12km in diameter traveled from the Amazon forest. It installed itself upon São Paulo, making noon-time in the city look like nighttime. The traveling "cloud" was the Amazon Forest in burning ashes.[282]

The area now known as São Paulo was once *Ka'aguy* (Atlantic Forest). Guarani communities in São Paulo have been stewarding the Atlantic Forest without deforesting it since time immemorial. Since settler-colonizers, known as *bandeirantes*, arrived in the region in 1580, they have deformed Guarani and *Ka'aguy* lands (including ground, underground, air, and all relations that land sustains).

Nonetheless, even for the *juruá* (non-Indigenous), São Paulo is collapsing. In 2020, "extreme rainfall" events, "when more than 80mm or 100mm falls within 24 hours," have increased in the largest Brazilian cities, including São Paulo. According to Brazil's National Institute of Meteorology (Inmet), in São Paulo, a weather station reported 15 extreme rainfalls from 1960 to 1990 and 44 from 1990 to 2000. In Rio de Janeiro, another weather station recorded 134 extreme rainfalls from 1960 to 1990, and 221 from 1990 to 2020.[283]

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[282] Frente Fria ou Fumaça de queimadas? Entenda a Segunda-Feira escura em São Paulo. 20 August. Tempoagora, 2019. Access: https://www.tempoagora.com.br/noticias/frente-fria-ou-fumaca-de-queimadas-entenda-a-segunda-feira-19-escura-em-sao-paulo/. Accessed 25 May, 2021.

[283] Phillips, Dom. Climate crisis blamed for rains and floods that have killed 150 in Brazil. Rio de Janeiro: The Guardian, 13 March 2020. Access in: https://www.theguardian.com/environment/2020/mar/13/climate-crisis-blamed-for-rains-and-floods-that-have-killed-150-in-brazil. Accessed 25 May 2021.

The city has been collapsing for a long time, but not homogeneously. Areas impacted by floods or land slides— overlap with areas segregated by race and class. Wealthier neighborhoods often exist in higher areas less impacted by floods or far-removed from land-slide risk. Existing as "neutral," wealthier neighborhoods need to become accountable for the long history of deforestation and Guarani land theft in São Paulo. As Achille Mbembe describes, Necropolitics is the decision of who lives and who dies.[284] To question the view of São Paulo as a "White imagined community," in his essay *Blackpolis*, activist and anthropologist Jaime Amparo Alves connect Mbembe's concept of necropolitics to Black women's spatial practices of resistance within, as Alves frames, the São Paulo racialized systems of citizenship.[285] Black and Indigenous geographies of resistance in São Paulo are very different. However, forms of state action in Brazil, which have centered White perspectives on informing legislation boundaries and racialized and gendered spatial practices, have long been present in the Guarani geographies of resistance in the Jaraguá. In the situated context of how urban growth took place historically in Jaraguá Peak, urban growth was not merely a factor of spatial change but was actively used as a form of necropolitics over racialized and gendered human and non-human bodies. It is crucial to identify the specific historical and present agents that profited from urban growth and Guarani land fragmentation to become accountable for their long-making environmental and cosmological harm.

Three years before the cloud of Amazon ashes arrived in São Paulo, the Guarani momentarily turned off another cloud, a radiological cloud, fed by the telecommunication

[284] Mbembe, Achille. 2019. Necropolitics. Theory in Forms. Durham, NC: Duke University Press.
[285] Alves,Jaime Amparo. From Necropolis to Blackpolis: Necropolitical Governance and Black Spatial Praxis in São Paulo, Brazil. Antipode, 11 October 2013. https://doi.org/10.1111/anti.12055 .

towers installed in Jaraguá Peak. They caused 600,000 people to be without television and

mobile services. As Guarani Nhandeva philosopher Cristine Takuá describes in an interview

with the "Fields of Invisibility" exhibition curators Ligia Nobre and Claudio Bueno in 2019,

the antennae shut down demonstrated how all the financial webs fueling Brazil's economy

are based upon Indigenous lands.[286] This infrastructural economy is also fragile. The forces

that run it (electric cables, microwave antennae, and the flow of cars on top of roads) can be

quickly shut down or interrupted.

Guarani *xondaros* and *xondarias* practice continuous insubordination, as

anthropologist Lucas Keese proposes, in a constant dance and maneuver that combine

cosmopolitical action, combat, and festivity.[287] Continuously facing the growth of urban

encroachment over their traditional territory since the 1950s, the Guarani communities in

São Paulo had to adapt their traditional understandings of territorial relations to maintain

their territories and reclaim their land. With the expansion of new *tekoas* in the surroundings

of Jaraguá Peak they have been strategically regaining their territorial rights. Guarani

initiatives in São Paulo of forest recovery contribute to all of São Paulo's environmental

security. The Guarani Greenbelt is a multispecies proposal, which decenters and unearths

São Paulo human-centric geographies to re-center non-humans, and Guarani, and *juruá*

technologies to work together as entangled systems. The Guarani Greenbelt already exists,

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[286] Takuá, Cristine. Interview by Bueno, Claudio, Nobre, Ligia. YVYRUPA, Terra Livre. Fields of Invisibility, São Paulo, 2018. Access: https://camposdeinvisibilidade.org/ Entrevista-Takua Accessed 25 May, 2021.
[287] Moraes, Alana, Schavelzon, Salvador, Guarani, Jera, Keese, Lucas, Hotimsky, Marcelo. Um Levante da Terra na Metropole da Asfixia. Piseagrama, Belo Horizonte, seção Extra!, 04 fev. 2021. Access: https://piseagrama.org/um-levante-da-terra-na-metropole-da-asfixia/ Accessed 25 May, 2021.

but the power play remains with São Paulo's government needing to approve the law to make it "official."[288]

Clashes of territorial understanding between the Guarani principles of *yvyrupa* and *tekoa*, and urban design principles in Jaraguá Peak have a long history, with it's origins dating back to the arrival of settler colonizers in the peak area. Such impacts began from 50 to 500 years ago. These incursions have compounded over five hundred years, leaving Guarani Mbya territory in a diminished state. The São Paulo government and private enterprises benefit from the prevention of the Guarani from enjoying their traditional uses of the land. I argue these failures are not a simple governmental lack of care, but a designed form of spatial government that provides practical measures for maintaining power relations to control and profit over those urban areas.

While the Brazilian government postpones the homologation of the Jaraguá Indigenous land as Guarani Mbya territory, the area remains highly exposed to risk and urban degradation. Reparations for urban constructions and infrastructural impacts to redress the Guarani Mbya are not a one-time payment but require compounding measures to ensure the long-term Guarani and Atlantic Forest maintenance. An important question remains on what it means to measure and quantify redress from Guarani self-determined perspectives, other than racial capitalist measures of value, time, and scale. Long-term impacts, Rob Nixon's "slow violence," demands reparations for infrastructural harms that were, and are, long in the making. With case studies for reference, organized in Chapter Three and Appendix One, this work initiates a discussion to be expanded: What kind of reparations are to be warranted in cases where harm and dispossession have taken an

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[288] Ibid.

infrastructural form? And what would it mean to take an infrastructural—or counter-infrastructural—approach to reparations? Values for reparations claims that this essay starts to reference are incomplete and controversial. The State of São Paulo owes to the Guarani a priceless compensation for damages as perpetuating settler-colonial memory in the Guarani territory. Enterprises such as Tenda, Bandeirantes, and CCR need to become accountable for redressing the long-term harm they caused.

Mapping grounds for reparations is inherently a complicated, controversial proposal. This research has several aspects—it learns from Guarani cosmologies, epistemologies, and spatial practice, to start seeing the violence of São Paulo's urban growth upon Guarani territory and the Atlantic Forest's human and non-human inhabitants. In this project, spatial mapping needs to be accompanied by a thorough understanding of non-normative culture and law. Maps foreground the violence embedded in ground change, land movement, which is extracted, perforated, and violently manipulated for infrastructural constructions. In addition to disrespecting sacred Guarani ties to the land, and disrupting non-humans habits and habitats, infrastructural owners (both private and public entities) have used roads, power lines, telecommunication towers, and state parks to profit from Guarani land. While installing their infrastructures on Guarani territory, enterprises have also escaped, with São Paulo's state consent, from paying local taxes. Zoning and legislation also play an active role in this story. Learning from numerous Indigenous and non-Indigenous scholars studying infrastructural political economies, ecologies, and its ties to racial capitalism, this work focused on mapping the harm of what this research frames as infrastructural dispossession. Infrastructural dispossession in Jaraguá Peak is not static, but an active geography that remakes itself every day.

Activist maps are only one possible way to contribute to Guarani activism. Such maps require a multi-layered, multi-scalar, and multi-temporal spatial analysis of urban construction impacts over Guarani territory. The scales of analysis need to extend beyond Jaraguá Peak immediate surroundings to identify the agents that unleash infrastructural dispossession. Agents are often located far away from where their impacts appear. And for this reason, the scales of analysis of urban and Guarani spatial clashes extend beyond Jaraguá Peak. A construction project includes all territorial, social, and economic layers that design unfolds, including its resulting impacts. Architectural histories that place multiple worlds into blind spots need to be unsettled.

Design practices need to reference Guarani Mbya and other than Western spatial perspectives to become conscious of all dimensions of its spatial and temporal impacts. Tracing the different modes of space-making practices over this specific territory offer an important reference for urban and architectural designers. Spatial designers are also agents of territorial design. And the understanding of sites where urban design takes place should span all scales of impacts: from the construction site to sites of population displacement to the geographies of agents who profited from the construction. Urban constructions are not neutral projects and carry vast economic and social impacts over the long term after the construction ends.

Even though infrastructural layers fragment Guarani territorial continuity, spatial and nation-state frontiers will never be acknowledged as part of Guarani territoriality. Guarani *xondaros* and *xondarias* activists have continued to reopen paths that bypass settler-colonial control for centuries now. But reparations need to be granted. First and foremost, spatial designers have a lot to learn with the Guarani Mbyá communities about past, present, and

future space-making practices. This work engages with an everyday practice of unlearning, decentering, and unsettling colonial infrastructures to learn with Guarani Mbya and *ka'aguy* past, present, and future infrastructures.

The work concludes with three tools-appendix:

- Appendix 1: Case Studies: Spatial Evidence for Infrastructural Reparations (accompanied by an activist documents database)
- Appendix 2: Spatial Metrics for Reparations (accompanied by a website, in process, and a folder with spatial evidence for download
- Appendix 3: Tools for Government Pressure

Figures:

Atlantic Forest 1500

Figure 1.1: Atlantic Forest, 1500. Map by the author. Data Sources: IBGE, SOS Mata Atlântica. Map by the Author.

Atlantic Forest 2016

Figure 1.2 Atlantic Forest, 2016. Map by the author. Data Sources: IBGE, SOS Mata Atlântica. Map by the author.

Guarani communities in 2016

Legend:
- Guarani communities in 2016 (Source: Guarani continental map. ISA and Centro de Trabalho Indigenista - CTI 2016.)
- Projection of Atlantic Forest original coverage (Source IBGE)
- Borders between Nation-States
- Borders between states in Brazil

Jaraguá Peak

Figure 2: Guarani communities in 2016 and the Jaraguá Peak. Data compiled from: Mapa Continental "Guarani Retã" 2016, IBGE, Geosampa and Funai. Map by the author referencing the Mapa Continental "Guarani Retã."Access: http://campanhaguarani.org/guaranicontinental/author/emgc/

Legend:

Terra Indígena Jaraguá
e Parque Estadual do Jaraguá

Escala 1:25000

Fontes: Mapa Guarani Digital, Geosampa, Funai, IBGE.

- Mata Atlântica
- Terra Indígena Jaraguá (532ha)
  Portaria Funai n. 54/2013
- Area Indígena Jarauga (1,7ha)
  Decreto n. 94.221/1987
- Tekoa
- Parque Estadual do Jaraguá
- Sistema Viário
- Antenas
- Rios
- Construções

Figure 3: Map of the State Park area overlapping with Jaraguá Indigenous Land. Map by the author. Data Sources: Mapa Guarani Digital, Funai, IBGE, Geosampa.

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Appendix 1:

Case Studies: Spatial Evidence for Infrastructural Reparations

The following part lists a series of cases that inform how past infrastructural impacts on Indigenous communities received reparations or environmental compensation and how the mapping of spatial change served as evidence. In other words, this list of cases foregrounds how infrastructural changes impacting specific communities were historically compensated. They list the agents involved and how long each redress process took, and if promises of redress were accomplished or are still in process. Cases are divided into six categories: roads, telecommunication infrastructures, power lines, contamination, land fragmentation, and extraction.

Many cases listed below have granted redress or compensation in the form of monetary values. As discussed in chapter 3, economic values that compensate historical wrongs for Indigenous nations can be incomplete and even increase harm depending on the specific context and self-determination of each group and particular agents responsible for perpetrating historical harm. The cases listed might be controversial and are not an in-depth conversation of each, even though the reader can research more through references provided in the text. However, cases serve as a reference to deepen the discussion of similar cases of infrastructural constructions that have historically unleashed environmental and social harm.

Roads

1. **Case Study 1: Rodoanel, São Paulo/B.R., 2000**

- Reparations or compensation form and measures: land restitution, 300 ha

- Case status: concluded

- Spatial evidence: Rodoanel construction opened a buffer zone for increasing development in the road proximity and also increased land value, attracting more real estate development to encroach upon Atlantic Forest areas.

Case resume:

The Rodoanel construction required an environmental impact assessment (EIA/RIMA) for compensating for the resulting impacts. Its structure is divided into four parts, to be constructed during different periods: West, South, North, and East. The road construction in the west portion began between 1998 and 2002. The west part is also the road's closest portion to the Jaraguá Indigenous land. The environmental licensing process to approve the road construction lasted five years. Construction works on the south part of the road started in 2006, opening for use in 2010. This portion was close to other Guarani Indigenous lands south of São Paulo: Barragem and Krukutu. The cost of the southern road was R$ 4 billion. And one-eighth of this total (R$ 500 million) is paying for environmental compensations from the construction.[289] As of 2020, the Rodoanel construction is still in process.

The initial report measuring the Rodoanel impacts did not consider compensation for the Guarani lands in São Paulo. However, the Brazilian Insitute of

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289 Secretaria de Estado do Meio Ambiente. Relatório Ambiental Rodoanel Mário Covas. 2012.

Environmental and Renewable Natural Resources (IBAMA) required a revision on the first assessment, establishing the compensation of R$ 2 million for each of the Indigenous lands impacted (for the Jaraguá, Barragem, and Krukutu), providing a total of R$ 6 million.[290] The enterprise responsible for the road construction, Dersa, established with the public body Funai that those values should be used for buying land. The money was used to acquire 100 hectares for each Indigenous Land impacted by the construction (Jaraguá, in north-west São Paulo, and Barragem and Krukutu, in south São Paulo), receiving 300 ha of land in total.[291]

2. Case Study 2: **Transamazonica Road (BR 230), Amazonas/B.R., 1972/2014**

- Reparations or compensation form and measures: Monetary for public policy purposes, R$ 20 million (U$ 4 million)

- Case status: Waiting for Decision.

- Spatial evidence: deformation of surrounding soil use for agricultural production, atmospheric pollution, trash accumulation on the sides of the road, deforestation, waterways pollution and transformation, and biodiversity decrease, which impact upon hunting activities.

Case resume:

Starting in 1972, the Transamazonica road construction (BR 230) unleashed long-term harm for many of the more than 200 Indigenous nations living in the Amazon rainforest within the Brazilian border.[292] Since 2014 a court case is advocating for the reparations of the harm

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290 Recomendation MPF/SP n. 17/2005. Source: http://www1.dnit.gov.br/anexo/outros/Julgamento%20de%20Recurso%20Administrativo_edital0496_13-00_1.pdf
291 Secretaria de Estado do Meio Ambiente. Relatório Ambiental Rodoanel Mário Covas. 2012.
292 See: https://ispn.org.br/biomas/amazonia/povos-e-comunidades-tradicionais-da-amazonia/

caused by the road construction to the Tenharim and Jiahui peoples.[293] The lawsuit claims that the road construction caused social and environmental harm. It caused perpetual damage to the communities that inhabit the road surroundings—affecting agricultural production, atmospheric pollution, trash accumulation, deforestation, waterways deformation, and decreased biodiversity.

Amazonas state Public Prosecutor (MPF/AM) determined that the federal government and the public body Funai ("National Foundation of the Indigenous") owe redress to the Tenharim and Jiahui peoples on the value of R$ 10 million for each, total R$ 20 million (U$ 4 million). The amount is not being paid as a monetary value but in the format of public policy services under the coordination of Funai and in closeconversation with the communities. Among the public policy resolutions are the protection of sacred spaces and access to education.

3. **Case Study 3: Mindu Corridor, Amazonas/BR, 2011.**

- Reparations or compensation form and measures: implement programs of environmental recovery in degraded areas, control soil erosion in areas affected by the road construction, monitor the road's margins, and plan the road design without interrupting transit of other-than-human forest inhabitants, R$ 10 million (U$ 2 million) to compensate for environmental damages.

- Case status: Concluded.

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[293] See court case, nº 0000243-88.2014.4.01.3200. See also: MPF/AM obtém reparação a povos indígenas em razão da rodovia Transamazônica. Access in: http://www.mpf.mp.br/am/sala-de-imprensa/noticias-am/justica-federal-determina-reparacao-a-povos-indigenas-por-danos-causados-pela-construcao-da-rodovia-transamazonica

- Spatial evidence: deforestation, soil degradation, and erosion

Case resume:

Reports produced by the federal prosecutors from Amazonas state in Brazil from 2009 and 2011 revealed environmental damage caused by the construction of the Avenida das Torres in 2007 (Towers Avenue). The reports revealed that more than the road construction impacts remained visible more than one year after the construction was over. To gain an environmental license that allowed the road construction, the Amazonas state promised to implement programs of environmental recovery in degraded areas, control soil erosion in areas affected by the road construction, monitor the road's margins, and plan the road design without interrupting the transit of other-than-human forest inhabitants. Until August 2011, the state had not accomplished any of the promised mitigation measures. In a court decision from 2018, the Amazonas state, the Instituto de Proteção Ambiental do Estado do Amazonas – IPAAM, Município de Manaus, Construtora ETAM Ltda., and the Construtora Amazônidas Ltda was commanded to recuperate the area environmentally impacted, and to execute compensation measures to the environmental impacts caused by the road construction, and to pay R$ 10 million (U$ 2 million) to compensate for environmental damages.[294]

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[294] Processo N° 0006135-17.2010.4.01.3200
https://portal.trf1.jus.br/lumis/portal/file/fileDownload.jsp?fileId=2C90833867C4AD0B0167C723C37A1CF9 See also: http://www.mpf.mp.br/am/sala-de-imprensa/noticias-am/mpf-am-acordo-sobre-medidas-de-reparacao-de-danos-ambientais-ao-corredor-do-mindu-sera-discutido-em-audiencia

4. **Case Study 4: Fulni-ô claim for land demarcation and compensation by the National Department of Transport Infrastructure**

- Reparations or compensation form and measures: monthly compensation of R$100,000.00 (U$ 20,000.00) for the Fulni-ô communities

- Case status: Compensation denied.

- Spatial evidence: Land dispossession, land fragmentation, and restriction of area for performing Fulni-ô way of life in relation to the land.

Case resume:

In 1974, in the Pernambuco state in Brazil, the road BR-423 was paved upon Fulni-ô lands, restricting land use areas. In 2014, Fulni-ô activists closed the road claiming they would only reopen the road after receiving compensation for the historical harm of the road construction and land dispossession. Federal prosecutors filed a public civil action to make National Department of Transport and Infrastructure (DNIT) and the Federal Government responsible for paying a monthly compensation of R$100,000.00 (U$ 20,000.00) for the Fulni-ô communities impacted by the road construction.

The court decision denied the payment of the compensation, arguing that the road was constructed more than 35 years ago, when the 1988 constitution, which established the demarcation of Indigenous lands, did not exist yet.[295] The Funai ("National Foundation of the Indigenous") public body contested the decision, arguing that the road impact causes continuous damage. For this reason, reparations for the Fulni-ô are indefeasible. Funai argues that despite the demarcation of Indigenous lands only initiating with the 1988

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[295] https://trf-5.jusbrasil.com.br/jurisprudencia/24855097/ag-agravo-de-instrumento-ag-411814820134050000-trf5

constitution, Indigenous land rights are original rights (preceding Brazilian boundaries and preceding any federal constitution). This case is another clear example of how road construction impacts upon Indigenous lands do not end with the road construction's completion but keep unfolding over a long time after the construction is over. Road construction impacts initiated during the road planning, increase during the construction period, and continue permanently while the road functions for vehicle transit.[296]

5. **Case Study 5: Road MS-156. Lane duplication in Jaguapiru, Bororó e Panambizinho Indigenous villages, B.R. 2010/2020.**

- Reparations or compensation form and measures: reorganize the car traffic inside the Indigenous villages, install illumination infrastructures, provide roads signalization in four languages: Guarani, Kaiowá, Terena, and Portuguese, protect Indigenous cemeteries close to the road border, promote projects of transit education, and construct spaces on the road for commercializing products produced by the Indigenous communities.

- Case status: Concluded

- Date issued: 2010/2020

- Spatial evidence: Impact on Indigenous villages organization, Indigenous cemeteries

Case resume:

In 2010, the Mato Grosso do Sul state government duplicated the lane of the MS-156 road between the cities of Dourados and Itaporã, without previously consulting the

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[296] Carolina Augusta de Mendonça Rodrigues. Empreendimentos em terras indígenas no Brasil: as controvérsias da reparação por danos socioculturais. Curitiba: Revista Tecnologia e Sociedade, v.13, n.27, p. 156-169. Jan-apr 2017.

Jaguapiru, Bororó e Panambizinho Indigenous communities, who were directly impacted by the road duplication. Consultation with communities living close to a large-scale construction is mandatory, as established by the Indigenous and Tribal Peoples Convention from 1989, part of the 169 International Labour Organization Convention. Federal prosecutors pointed out that the road duplication was executed without compensatory measures previously established by anthropological and environmental studies realized by the Mato Grosso do Sul state government.

A court decision from 2020 decided that the Mato Grosso do Sul state need to compensate for the damages caused to the communities by the road duplication. The decision determined the state needs to reorganize the car traffic inside the Indigenous villages, install illumination infrastructures, provide roads signalization in four languages: Guarani, Kaiowá, Terena, and Portuguese, protect Indigenous cemeteries close to the road border, promote projects of transit education, and construct spaces on the road for commercializing products produced by the Indigenous communities.[297]

6. **Case Study 6: Recommendation to Alter Road Name in Manaus/B.R.**

- Reparations or compensation form and measures: Change road name

- Case Status: Concluded

- Date issued: 2018

- Spatial evidence: refusal to name roads after slavery and racist perpetrators.

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[297] TRF3 confirma compensação a indígenas por danos causados pela duplicação da rodovia MS-156 https://www.cnj.jus.br/trf3-confirma-compensacao-a-indigenas-por-danos-causados-pela-duplicacao-da-rodovia-ms-156/

Case resume:

In 2018 Federal prosecutors from Manaus in Brazil recommended the Manaus municipality to alter Domingos Jorge Velho Avenue's name. The name honors a settler colonizer, Bandeirante, responsible for the genocide of many Indigenous nations and the slavery of Black populations. At the end of the XVII century, Velho was also responsible for commanding a campaign to end the Quilombo dos Palmares and defend the slave system in Brazil.

The federal prosecutor who dispatched the recommendation to change the name of the road established a deadline of 45 days to change the name of the avenue (as of May 2018) and determined that the new name should be chosen by representatives of the Black movement in Manaus and Quilombola communities in the Amazonas state: Quilombo do Tambor Community, in Novo Airão, Andirá river community, in Barreirinha; Quilombo da Praça Quatorze de São Benedito, in Manaus; and Quilombo do Sagrado Coração de Jesus do Lago da Serpa, in Itacoatiara. Federal prosecutors from Manaus said that altering the name of a road or any public asset which references a figure who transgressed human rights is a means redressing the memory of victims of slavery in Brazil. [298]

The decision was based on Article 37 of the Federal Constitution, which forbids the reference of individuals when identifying public assets, and on Article 1º of Law 6.454/77, which forbids, in all Brazilian territory, naming associated with those who contributed to slavery, slave trade, or slave work. [299]

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[298] MPF recomenda alteração do nome de avenida de bandeirante escravocrata em Manaus (AM). http://www.mpf.mp.br/am/sala-de-imprensa/noticias-am/mpf-recomenda-alteracao-de-nome-de-avenida-de-bandeirante-escravocrata-em-manaus-am
[299] Ibid.

Telecommunication Infrastructures

1. **Case Study 1: Tijuca National Park, Rio de Janeiro/B.R., 2019**

- Reparations or compensation form and measures: R$ 7,239,078.00 (U$ 2 million) for illicit commercial exploration, the enterprises responsible for the towers pay Tijuca National Park a rent of R$ 8 million (U$ 2 million) per year.

- Case status: concluded

- Spatial evidence: Antennae towers undermine soil fixation, which can provoke rivers' silting. Antennae towers also alter and diminish biodiversity. The need for repair and maintenance of the towers cause other impacts: such as the opening of roads to have access to the tower electric cables and installations—towers require constant maintenance. And the siting of the cables in deforested areas additional areas beyond the site where the towers are.

Case resume:

In 2019 the Brazilian Federal Justice condemned the businessman Diego de la Vega and the enterprise RH NET Telecomunnicações Ltda for criminal activity for installing telecommunication towers in the Sumaré hilltop, inside the Tijuca National Park, illegally, and without remunerating the Park administration. The towers' installation caused deforestation and environmental degradation without the previous authorization of an environmental public body. Vega used the hilltop illegally for commercial profit for 14 years, profiting more than R$ 25 million (U$ 5 million). Vega sub-located the 110m high tower to other 35 telecommunication enterprises without paying any rent to the Park or Federal Government for 14 years.

The Veiga and RH NET were condemned to pay a fee of R$600,000 (U$120,000) for a crime indicated in the Law of Environmental Crimes (Federal Law n. 9.605/98). According to law Article 38 it is a crime to "destroy or damage forest in areas classified as permanent preservation." Article 48 (it is a crime to "prevent or hinder the regeneration of forests") and 60 ("to make use of polluting agents without previous authorization of environmental agents, or contrary to environmental laws") also served to frame the telecommunication towers' activity as illegal. Federal Judge Rosália Monteiro Figueira, from the 3ª *Vara Criminal*, also condemned the parts to pay R$ 7,239,078.00 (U$ 2 million) for illicit commercial exploration.[300]

However, the tower's impact in Tijuca National Park originated earlier. In 2002 the Brazilian Institute of the Environment (IBAMA) created the first draft of the "Environmental Compensation model for projects of Power Lines, Pipe Lines and Communication Infrastructures in Conservation Units."[301] The document establishes six categories for measuring environmental impacts from such constructions: loss of opportunity, scenic implications, loss of the number of visitants, ecosystem loss, risk, and social factors. The model served to value the impacts of 10 telecommunication towers (which contain 170 antennae together installed in the towers) in the Tijuca Forest in Rio de Janeiro. Biologist Sônia Peixoto describes how the lay public often thinks antennae towers as only visually impacting the "forest beauty." Still, cell towers' impacts have a large number of effects. They can undermine soil fixation, which can provoke rivers' silting. Antennae towers

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[300] https://direitodescomplicado.com/justica-condena-empresario-e-operadora-de-telecomunicacao-por-crimes-ambientais-no-parque-nacional-da-tijuca/ See also: https://www10.trf2.jus.br/portal/trf2-ordena-remocao-de-torre-de-antenas-no-rio/
[301] "Modelo de Valoração Econômica dos impactos Ambientais em Unidades de Conservação: Empreendimentos de Comunicação, Rede Elétrica e Dutos"

also alter and diminish biodiversity. The need for repair and maintenance of the towers cause other impacts: such as the opening of roads to have access to the tower's electric cables and installations. The tower cables also cause soil erosion beyond the site where the towers are. That determined that the enterprises responsible for the towers pay Tijuca National Park a rent of R$ 8 million (U$ 2 million) per year. Another tower owned by the media company Globo installed in the Ipanema National Forest since 2000 pays its environmental compensation as social and environmental services instead of monetary compensation.[302]

2. **Case Study 2: Resident from São Paulo/B.R., 2013**

- Reparations or compensation form and measures: the payment of R$15.000,00 for non-pecuniary loss and an additional payment for property depreciation.
- Case status: concluded
- Spatial evidence: Metallic beams and construction tools fell into the pool and damaged the house's ceiling.

Case resume:

In 2013, a resident from São Paulo brought a legal case against one of the major Brazilian carriers, Claro S.A., seeking damages for a cell tower installation one meter away from their residence. The installation caused both health risks and depreciation of land value. The tower was fixed to three bases and equipped with one container and two air-conditioning machines. The equipment emitted an unbearable noise. During the tower's installation, there were several property damage incidents: metallic beams and construction tools fell into the pool and damaged the ceiling of the house. The claimant won the case,

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[302] https://www.oeco.org.br/noticias/numero-de-antenas-dentro-do-parque-nacional-da-tijuca-sera-reduzido/

receiving the payment of R$15.000,00 for non-pecuniary loss and an additional payment for property depreciation.[303]

The Brazilian Federal constitution from 1988 also determined the need for studies of environmental impact related to any installation or activities with the potential to cause environmental degradation

3. **Case Study 3: Rajasthan, India, 2013**

- Reparations or compensation form and measures: Relocation of mobile towers adjacent to schools, playgrounds, and hospitals, due to the risk of electromagnetic radiation.

- Case status: concluded

- Spatial evidence: Relocation of mobile towers adjacent to schools, playgrounds, and hospitals, due to the risk of electromagnetic radiation in distances smaller than 500m or 100m, depending on the case.

Case resume:

In 2013, the Rajasthan high court in India decided to relocate mobile towers adjacent to schools, playgrounds, and hospitals due to the risk of electromagnetic radiation and cancer, brain tumors, and potentials for cancer digestive disorders, or tachycardia. The court claimed that "These waves cook human tissues just like a microwave oven if the body is exposed to this radiation for long." The court decision also prescribed other standards separation distances: at least 500m between cell towers and jails and 100m from

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[303] http://www.cartaforense.com.br/conteudo/noticias/empresa-de-telefonia-condenada-por-transtornos-e-desvalorizacao-gerados-por-estacao-de-radio-base/10220

monuments.[304] Even though standards for cell towers radiation exposure are still not

established globally, they are actively debated.[305]

4. **Case Study 3: New Zealand**

- Reparations or compensation form and measures: allocation of a commercial

    broadcasting frequency, money for its establishment, plus an ongoing commitment

    to its annual funding.

- Case status: concluded

- Spatial evidence: Allocation of broadcasting frequency for Maori broadcast

    initiatives.

Case resume:

In New Zealand, to provide reparations for the loss of the Maori language due

to colonization, the New Zealand government has been funding broadcasting assets for

disseminating the Maori language.[306] This decision resulted from a claim in the Waitangi

Tribunal to preserve the Maori language.[307]

In 1994, the New Zealand government established a Maori Broadcasting

Funding Agency named Te Mangai Paho.[308] The government also provided money for

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[304] https://economictimes.indiatimes.com/industry/telecom/rajasthan-hc-orders-relocation-of-mobile-towers-from-schools-hospitals/articleshow/17397645.cms
[305] Ibid.
[306] Catherine J. Iorns Magallanes. Reparations for Maori Grievances in Aotearoa New Zeland. In: In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p. 561.
[307] The Waitangi Tribunal was established by the Treaty of Waitangi Act 1975, with the foundation of a parliament and legal processes to investigate Māori Treaty claims, issues between Māori and the Crown, and to judge Crown action. The Tribunal has also organized Maori interests to be protected and priority order. Some of these interests are lands, forests, fisheries, Maori language, broadcasting frequencies, representation in government decision-making, geothermal energy, petroleum reserves, rivers and lakes.
[308] https://www.tmp.govt.nz/

allocating a broadcasting frequency and ongoing commitment to annual funding for the commercial establishment and providing funds Maori radio stations and Maori language television programs, videos, and music and creating a Maori television channel in 2003.[309]

Power Lines

1. **Case Study 1: Cabrobro/PE, Brazil, 1990**

- Reparations or compensation form and measures: Chesf and Coelba compensate the Truká in R$20.9 million (U$ 5 million) for collective damages, R$ 10,4 million (U$ 2 million) for material damages, and R$ 4,5 million (U$ 1 million) for compensating the historical harm in Truká lands.

- Case status: concluded

- Spatial evidence: damaged portions of land traditionally used by Truká communities and reduced the diversity of plants for daily use and medicinal use.

Figure: https://jc.ne10.uol.com.br/economia/2021/01/12022408-mpf-pede—na-justica—uma-indenizacao-milionaria-a-chesf-e-a-coelba-pela-implantacao-e-uso-de-linha-de-transmissao-em-terras-indigenas.html

Case resume:

During the 1990s, the electric power enterprises Companhia Hidroelétrica do São Francisco (Chesf), and Companhia de Eletricidade da Bahia (Coelba) installed power lines inside Truká Indigenous Lands, in the Pernambuco State municipality of Cabrobó. Chesf was the owner of the power lines, while Coelba operated and maintained the lines.

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[309] Catherine J. Iorns Magallanes. Reparations for Maori Grievances in Aotearoa New Zeland. In: In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p. 562.

Both companies installed the power lines without issuing any previous environmental license. The power lines caused damage to portions of land traditionally used by Truká communities and reduced the diversity of plants for daily use and medicinal use.

In 2002 a civil inquiry was opened to make the companies responsible for redressing damages to the Truká communities. Still, the responsible agents Chesf and Coelba and the public body Funai and the Brazilian Environmental Institute (Ibama) did not sign the inquiry. In January 2021 Brazilian federal prosecutors reopened the case, claiming for the Brazilian national justice to require Chesf and Coelba to redress Truká communities for the invasion of their lands without permission to install the power lines and for the long term impacts that resulted from the power lines installation. Public prosecutors are requesting that Chesf and Coelba compensate the Truká with R$20.9 million (U$ 5 million) for collective damages, R$ 10,4 million (U$ 2 million) for material damages, and R$ 4,5 million (U$ 1 million) for historical harm in Truká lands. Chesf and Coelba are also required to ask for an official apology to appear on the company's public websites.[310]

2. **Case Study 2: Barragem and Krukutu communities and the Power Line Itabera Tijuco Preto III, 2000**

- Reparations or compensation form and measures: program for environmental recuperation with costs sponsored by Furnas, and financial support for a technical group to amplify areas demarcated as Indigenous Lands in São Paulo.

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[310] Ação do MPF busca reparação de danos causados por instalação de linhas de transmissão em terra indígena. Racismo Ambiental, January 2021. https://racismoambiental.net.br/2021/01/25/acao-do-mpf-busca-reparacao-de-danos-causados-por-instalacao-de-linhas-de-transmisSão-em-terra-indigena/. Lawsuit nº 0800012-84.2021.4.05.8304 – 20ª Vara Federal em Pernambuco.

- Case status: concluded

- Spatial evidence: The construction of the power lines affected areas traditionally used by the Guarani for agriculture and harvesting, trails between Guarani villages, areas of resting in between Guarani villages, and areas of old Guarani villages.

Case resume:

In 2000 the public-private power corporation Furnas Centrais Eletricas had the plan to install a 750 kV Itaberá-Tijuco Preto III power line, with 306 km in the São Paulo state, departing from the Itaipu hidreletric system, and crossing 17 municipalities: Itaberá, Itapeva, Buri, Itapetininga, Sarapuí, Salto de Pirapora, Piedade, Ibiúna, Juquitiba, Itapecerica da Serra, Embú-Guaçú, São Paulo, São Bernardo do Campo, Santo André, Rio Grande da Serra, Suzano and Mogi das Cruzes.[311] To acquire an environmental license to build the power line towers in São Paulo, federal prosecutors required that Furnas realized an anthropological study to evaluate potential interference of the power lines construction upon Guarani communities in the Indigenous Land Tenondé Porã and Jaraguá. Furnas gained the environmental license to build the power lines by creating a Term of Adjustment of Conduct (TAC), which established environmental compensation for the São Paulo Secretariat of the Serra's Environment Mar State Park and the Guarani communities in São Paulo. The construction of the power lines affected areas traditionally used by the Guarani for agriculture and harvesting, trails between Guarani villages, places of resting in between Guarani villages, and areas of old Guarani villages.

As compensatory measures for the Guarani, the TAC established a program for environmental recuperation with costs sponsored by Furnas—with Guarani agriculture,

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[311] https://www.furnas.com.br/noticia/103/noticias/89

agroforestry practices, and birds raising. The TAC also determined that Furnas needed to remunerate a technical group for identifying Guarani areas of collective use to amplify areas demarcated as Indigenous Lands in São Paulo (Tenonde Pora and Jaraguá) and to cover all costs related to the study.[312]

3. **Case Study 3: Waimiri Atroari, Presidente Figueiredo e Novo Airão no Estado do Amazonas e de Rorainópolis e São João da Baliza no Estado de Roraima, BR. 2019.**

    - Reparations or compensation form and measures: Transnorte offered R$ 50 million for Waimiri Atroari, but

    - Case status: open

Case resume:

On 6 July 2019, the newspaper "O Estado de São Paulo" published an article titled: "Indigenous have an offer of R$ 49,6 million for power lines. Compensation tries to implement power line Manaus-Boa Vista; the license will be approved with or without the Indigenous approval."[313] The article claimed that Waimiri Atroari communities had been offered R$ 49.6 million (U$ 10 million) by the electricity company Transnorte to implement the "Linhão de Tucuruí" Power Lines passing through Waimiri Atroari territory, and inferred that they would probably accept the offer. Members of Waimiri Atroari communities wrote a reply to the newspaper two days after the article was published. Their response problematized how the article framed the decision to build the power lines or not

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[312] Pimentel, Spensy (org.), 2009, Relatório Circunstanciado de Identificação e Delimitação da Terra Indígena Jaraguá. Brasília, Funai/Ministério da Justiça.
[313] https://economia.estadao.com.br/noticias/geral,indios-tem-oferta-de-r-49-6-mi-por-linhao,70002907866

as a merely commercial decision, without considering all layers of incalculable negative impacts that the power line construction brings. Power lines construction would disrupt the balance of the Indigenous Land's ecosystem, and the land is considered sacred as part of Waimiri Atroari's ancestral land.[314] This case reinforces how monetary compensations for the construction of infrastructures upon Indigenous Lands are insufficient and can be controversial. An economical value cannot simply compensate for an impact on the ground.

Contamination

1. **Case Study 1: Reparations for Environmental Damage in Manaus/B.R. caused by construction of Real Estate Dwelling**

    - Reparations or compensation form and measures: "collective damage" and are condemning the responsible parts to repair impacted communities with at least R$ 10 million (U$ 2 million) due to the *igarapé do Acará* watercourse and the Dona Conceição pond pollution—areas previously used by local communities for swimming and leisure.

    - Case status: under analysis for decision.

    - Spatial evidence: watercourse pollution and pond erosion, impossibility to swim and to use the water.

Case resume:

In 2014, federal prosecutors issued a public civil action in the Federal Courts to make the Federal government, the construction company *Direcional Engenharia S/A,* the *Superintendência de Habitação do Amazonas* (Suhab), and the Caixa Econômica Federal (CEF)

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[314] https://comisSãoarns.org/blog/2019-07-18-consulta-aos-waimiri-atroari-n%C3%A3o-se-trata-de-barganha/ see also https://www.pib.socioambiental.org/pt/Not%C3%ADcias?id=200193

responsible for the environmental damages caused by the construction of the *Viver Melhor* dwelling inside an area classified as permanent forest preservation in Manaus, in the Amazonas state in Brazil. The building was polluting and eroding the watercourse *igarapé do Acará* since 2010. The construction also eroded the Dona Conceição pond, making it improper to swim, given the high water turbidity.

Federal prosecutors ask for a court decision that makes the parts responsible for the construction recuperate the environmental degradation of the water course and the pond. And in case it is not possible to recover the similar quality of the water, the companies need to implement a compensatory measure "in similar value and proportional to the damage caused." The compensation should be valuated in two instances: intermediary damage (to consider the damages that remain between the moment it was made and the moment the damage will be restored) and for the residual damage (assuming the environmental degradation that resides despite all effort of environmental recuperations). The Brazilian Federal Justice will determine values.[315]

Federal prosecutors also framed the case as a "collective damage" and are condemning the responsible parties to repair impacted communities with at least R$ 10 million (U$ 2 million) due to the *igarapé do Acará* watercourse and the Dona Conceição pond pollution—areas previously used by local communities for swimming and leisure. The case is awaiting a decision.

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[315] MPF/AM quer reparação de danos ambientais causados pela construção de conjunto habitaciona https://www.pib.socioambiental.org/es/Not%C3%ADcias?id=137031 see also http://www.mpf.mp.br/am/sala-de-imprensa/noticias-am/mpf-am-quer-reparacao-de-danos-ambientais-causados-pela-construcao-do-conjunto-habitacional-viver-melhor

Land Fragmentation

1. Case Study 1: Wanniya-laeto *wanni*

- Reparations or compensation form and measures: Indigenous co-management with Federal Park.

- Case status: concluded, but redress promises were not accomplished.

- Spatial evidence: National Park as land fragmentation. Forest deforestation, deprivation of areas for hunting and harvesting.

Case resume:

In Sri Lanka, the Indigenous Wanniya-laeto (forest-dwellers) have survived colonization over centuries by the Sinhalese, Tamil, Portuguese, Dutch and English, and have maintained their ancestral identity and lifestyle in close relation with the *wanni,* the "semi-evergreen dry monsoon forest where they have been living since time immemorial."[316] Because the Wanniya-laeto do not hold any form of property rights or any notions of real estate ownership, their collective land rights have never been sanctioned by Sri Lanka legislation. Since the 1930s, their forest has been continuously eroded by colonization and immigration. In the 1970s, a large-scale irrigation project displaced the Wanniya-laeto from part of their traditional lands. And in 1993, the creation of the Maduru Oya National Park encompassed the remaining forest area where they lived, prohibiting all traditional hunting and harvesting activities. As a result to the park implementation, the Wanniya-laeto were forced to migrate from their ancestral lands to a 1,500-acre area outside the forest.

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[316] *Phutoli Shikhu Chingmak. International Law and Reparations for Indigenous Peoples in Asia*. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009, p. 440

In 1997, Sri Lanka's president declared the intention to redress the Wanniya-laeto by returning their ancestral forested lands to them, allowing them to practice their traditional hunting and harvesting activities with special identity cards.[317] The land restitution would take part as a shared governance system, with the Wanniya-laeto participating in the National Park management. However, even though the Sri Lanka government made the decision for the Wanniya-laeto, it was not yet accomplished in practice.[318]

2. **Case Study 2: Ratanakkiri Land Dispute**

- legally affirming the land rights of Jarai and Tampuan villagers.

- Case status: concluded

- Spatial evidence: displacement by government land development project.

Case resume:

In 1997 the Cambodian government issued an "official communication" requiring Jarai and Tampuan people's land development project. The government forced Tampuan and Jarai villagers to abdicate their 1,250 hectares of land to General Nuon Phea "in exchange for 2 kg salt for each family living therein."[319] In 1999, the villagers that had been

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[317] *Phutoli* Shikhu Chingmak. International Law and Reparations for Indigenous Peoples in Asia. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009,P. 441
See also: UN Doc E/CN.4/Sub.2/1997/14 of 13 August 1997, Report of the Working group on Indigenous Populations on its 15th session, para 43.
[318] *Phutoli Shikhu Chingmak. International Law and Reparations for Indigenous Peoples in Asia*. In: Lenzerini, Federico. Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009,P. 442

[319] *Phutoli Shikhu Chingmak. International Law and Reparations for Indigenous Peoples in Asia*. In: Lenzerini, Federico.

displaced by the Cambodian government filed a lawsuit to the Taranakkiri provincial Court accusing General Nuon Phea of issuing false contracts of land cession by Indigenous populations. In 2001 the court denied the Tapuan and Jarai claims, ruling in favor of Nuon Phea to have the legal title for the 1,250 hectares of land in dispute. In 2002, the Land Unit Legal Aid Cambodia filed an appeal in favor of the Indigenous claimants. In August 2003, the Court of Appeal issued a decision in favor of the Tapuan and Jarai, giving all land titles illegally acquired by Noun Phea back to them, in addition to also legally affirming the land rights of Jarai and Tampuan villagers.

Extraction

1. **Case Study 1: Saramaka, Suriname, 1960s.**

- Reparations or compensation form and measures: compensation for immaterial damages for the logging and Hydroelectric construction resulting damages of U$ 75,000.00. And a compensation of U$ 600,000.00 for the land destruction and disrespect to Saramaka's spiritual connections to the land.

- Case status: concluded

- Spatial evidence: logging concessions destroyed Saramaka sacred spaces and reduced fishing, hunting, and harvesting areas for food and medicinal plants and water access.

Reparations for Indigenous Peoples: International and Comparative Perspectives. Oxford University Press, 2009,P. 449

Case resume:

       The Saramaka peoples inhabit the region today known as Suriname, in the north of the Suriname River. In the 1960s, the construction of a hydroelectric dam inundated part of the Saramaka territory, displacing the population from their ancestral lands. The Suriname government ceded the remaining portion of Saramaka territory for logging extraction—which destroyed Saramaka sacred spaces and reduced fishing, hunting, and harvesting areas for food and medicinal plants and water access. The Suriname government did not offer any form of redress to the Saramaka, who decided to bring the case to the Inter-American Commission on Human Rights. The court decision established compensation for immaterial damages for the logging and Hydroelectric construction resulting damages of U$ 75,000.00. And a compensation of U$ 600,000.00 for the land destruction and disrespect to Saramaka's spiritual connections to the land. This value was used to create a collective fund for the community to fund education projects, agriculture, clean water, and sewage projects to benefit the Saramaka communities.[320]

2. **Case Study 2: Tenharim and Jihaui, BR, 2014.**

- Reparations or compensation form and measures: the payment of R$ 50,000.00 (U$ 10,000.00) for each Tenharim and Jihaui community member.

- Case status: concluded

- Spatial evidence: Extraction of materials for BR-101.4 lane duplication construction

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[320] Manual de Jurisprudencia dos Direitos Indigenas. P. 334.

Case resume:

In 2014 the Indigenous nations Tenharim and Jihaui suffered from the extraction of *saibro*, mined from their Indigenous lands (2,19 ha) for use in constructing a lane duplication in the BR 101.4 road. In addition to the road duplication impacts, the site were s*aibro* was mined was part of Atlantic Forest. The extraction also deforested Atlantic Forest reminiscent tracts in the region.[321] A court decision established the payment of R$ 50,000.00 (U$ 10,000.00) for each Tenharim and Jihaui community member.

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[321] *laudo técnico nº 307/2008 – DITEC – IBAMAM/SC*

Appendix 2:

Spatial Metrics for Reparations

Many geographic stories overlap, but only some are chosen to be mapped, while thousands of others are left out of sight, or out of representation. Critically approaching the layers that were chosen to be mapped historically in São Paulo, I try to see the layers unmapped. I ask what were the layers historically excluded from representation in the history of São Paulo's urban growth. Maps ask the question: what are the geographic stories being told?

Maps included in the next section work in the intersections of forensic documents, anthropological reports, and architecture mapping projects. Beyond serving forensic purposes alone, they intend to engage multiple audiences. Each map aspires to serve as an additional piece of spatial evidence, as a tool that adds to Guarani activism. Ways in which the maps could be used are manifold, serving as ephemeral documents to be distributed for broadening public engagement, or as documents to be attached to existing reports. The intention of maps that accompany the story of each layer of infrastructure is not to represent Guarani cosmologies, given my limitations and position as a settler ally mapping Guarani territory, but to foreground cartographies of infrastructural harm and land deformation that have undermined Guarani land rights in the Jaraguá. The goal of each map is to untangle and foreground how infrastructural impacts have performed in space and in time: to make temporally dispersed impacts into palpable spatial evidence, and incomplete but quantifiable values. Nonetheless, values for infrastructural reparations in the Jaraguá Peak context depend on the self-determined perspectives of Guarani communities in the Jaraguá according to their own relations, epistemologies, cosmologies, histories and practices. Maps

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can serve as an additional tool for advocacy, contributing to the long-term Guarani Mbya

activism in São Paulo. Or they may simply expose previously hidden spatial perspectives.

Mapping Jaraguá Peak requires a sectional view to indicate the loss of mobility and

connections. Sectional maps allow viewing the volume and violence attached to ground

change from a perspective commonly hidden in top-down views. Sectional maps also allow

to see forest as a space of connections, not resources. Importantly, maps of roads, power

lines, and telecommunication towers are not discussing if those infrastructures are important

or not, or if they should exist or not. Instead, the maps highlight the ground change they

caused, making visible the erasures (material, relations, displacement, possibility of action)

that infrastructures caused for both humans and non-humans.

Mapping impacts of urban constructions in Jaraguá Peak context should also be

attentive to the risks it carries. Drawing boundaries and hard lines on Indigenous territories

should be a careful act: hard lines might be used against Indigenous claims of expanding

their territory. A line in a map represents a complex set of kinship and multilayered

relations. Problems of mapping discussed in Chapter Four are present in all maps in this

appendix. Maps are incomplete. Each sectional and perspectival map combines qualitative

and quantitative sources. Guarani oral histories reporting ground changes from 1950 to 2009

from the 2009 Funai report for the Jaraguá Indigenous Land demarcation are the main

voices informing the maps. The use of GIS shapefiles provided by the São Paulo

government, and satellite Landsat images since 1972 also served as tools for visualizing and

measuring spatial change over time, such as urban growth and deforested areas for roads

construction. GIS and satellite images are not neutral tools. The use of satellite images risks

reinforcing the idea of a "no where's view" and erase on the ground relations. GIS outcomes

also carry limitations of analysis.

This Appendix accompanies a website: https://groundsforreparations.com/

Appendix 2 Contents
Spatial Metrics for Reparations

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    Atlantic Forest Deforestation
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    Disruption of Non-human paths
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2. Telecommunication Infrastructures
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1. Roads

The construction of the Anhanguera road, begun in 1940, initiated the Atlantic Forest fragmentation. The road connected two cities: São Paulo and Campinas. Over a period of forty years it became the busiest road in São Paulo. The second major road, named Bandeirantes, began in 1976, and opened to traffic in 1978, launched real estate interest in the neighborhood. Industrial establishments have been popping in the edges of both the Bandeirantes and Anhanguera roads since, encroaching over Atlantic Forest. The Jaraguá Peak lies between them. Bus lines linking the surrounding neighborhoods to downtown also increased economic interests in the region.

The São Paulo state government did not recognize the Jaraguá Peak and the Atlantic Forest as Guarani Mbya Indigenous territory. The territory was first acknowledged in 1987, by the Decree n. 94.221. However it only recognized the footprint of Guarani houses as the Indigenous territory, not the land that they relied for living. This lack of recognition caused serious problems for the Guarani living in the Jaraguá. And the sale of Guarani territory generated enormous conflicts between the Guarani and land buyers. The Guarani communities eventually had to live in the Atlantic Forest environment with new land owners, who were illegally buying Atlantic Forest plots as pieces of land from real estate companies. The Bandeirantes road construction started a continuous process of fragmentation and environmental degradation.

Figure 1.1 History of Ground Extraction. 1900, Scale 1:15. Map by the author.

Figure 1.2 History of Ground Extraction. 1976, Scale 1:15. Map by the author.

Figure 2.1 History of Ground Extraction. 1900, Scale 1:100. Map by the author.

Figure 2.2 History of Ground Extraction. 1976, Scale 1:100. Map by the author.

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Figure 2.3 History of Ground Extraction. 1977, Scale 1:100. Map by the author.

Figure 3.1 History of Ground Extraction. 1900-1976, Scale 1:1000. Map by the author.

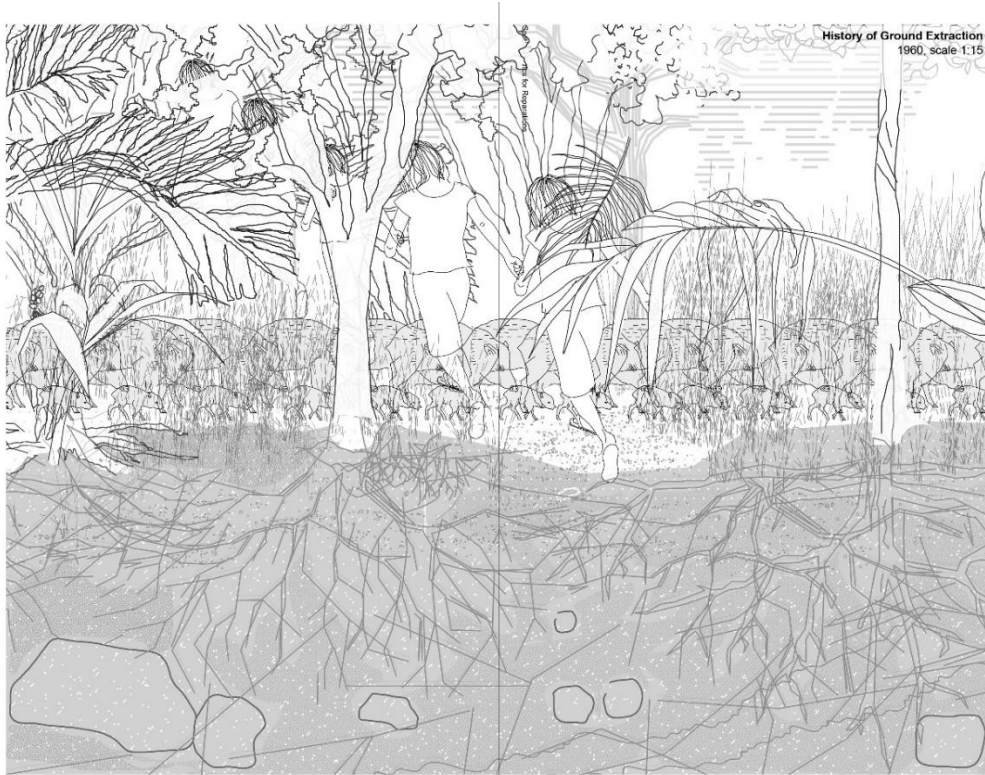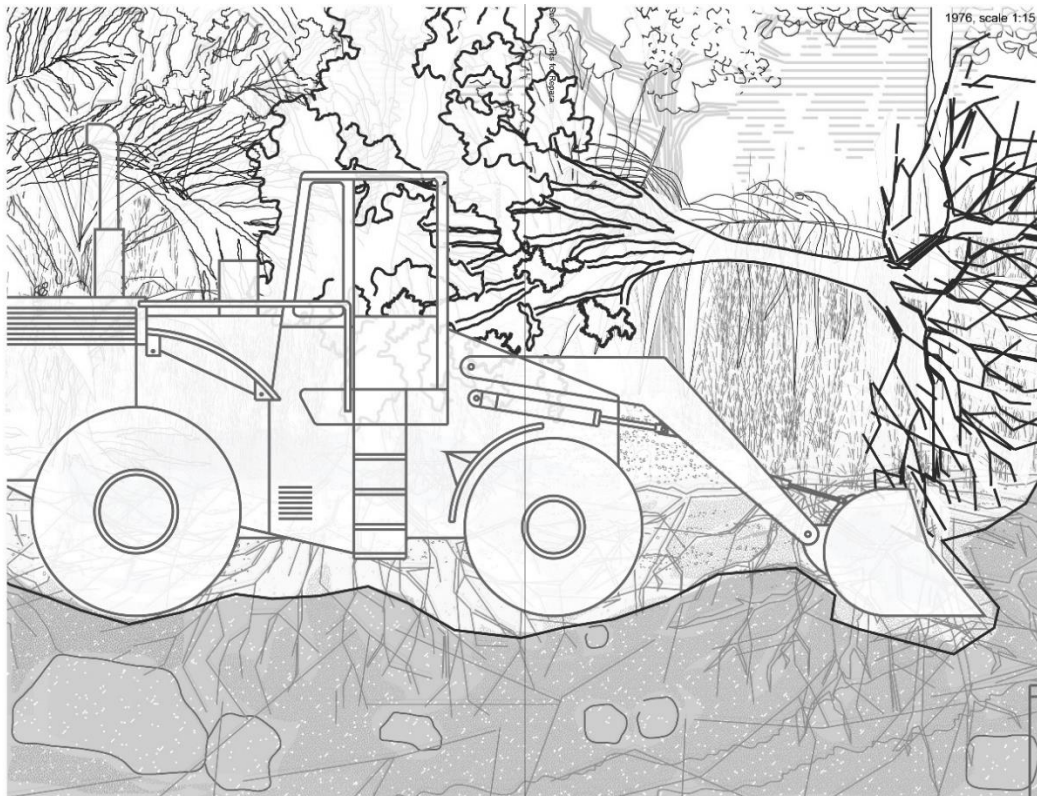Figure 3.2 History of Ground Extraction. 1977-1978, Scale 1:1000. Map by the author.

Figure 3.3 History of Ground Extraction. 1979, Scale 1:1000. Map by the author.

Figure 3.4 2013, Guarani Protest closed Bandeirantes Road, 2013. Scale 1:1000. Map by the author.

Dimension of Continental Paths

Guarani continental networks, paths between tekoas, or paths to harvest materials and food are small and do not leave traces on the ground behind their passage.

In the extreme opposite are roads/Juruá networks. The construction of Bandeirantes road destroyed the dimension equivalent of more than three hundred Guarani paths to build the road. Roads construction left irreversible damages.

Figure 4. Comparison of dimension of continental paths. The construction of Bandeirantes road destroyed the dimension equivalent of more than three hundred Guarani paths to build the road. Diagram by the Author.

Disruption of Non-Human Relations

Before the Bandeirantes and Rodoanel roads construction, the Jaraguá Peak was still a continuous territory, linked to a neighboring Atlantic forest area inhabited by boars and other animals. The road construction destroyed their habitat. Their presence was important to the Guarani both as nourishment and as sacred beings.

As Latin America Historian Warren Dean describes, 270 different tree species can be found in a single hectare. A single tree canopy can host a thousand species of insects, while the Atlantic Forest as a whole had one million species of insects on its origin. More than half Atlantic Forest trees were endemic, as well as innumerous endemic birds, mammals and reptiles. Dean also describes the close cooperation between plants and animals: "some plants offered shelter for and even nectar to ants that protect them from predation and that clip competing weeds away from their seedlings." (Dean, Warren.1995, p. 15.)

Figure 5. Disruption of non-human relations. Diagram by the author.

Atlantic Forest Deforestation

Roads construction facilitated the commodification of land starting in the roads margins, dividing Atlantic Forest areas into small plots of land for sale.

Construction of a third major road, known as Rodoanel Mario Covas, was launched in 2002. With this road, the Jaraguá Peak became an island and unleashed even more urban growth in the region.

Road construction directly impacted the Guarani Mbya territory by separating the Guarani tekoas, houses and families on different sides. It also polluted water, interrupted rivers, and disrupted access to medicinal plants, crafts materials and material for the construction and repair of the Guarani houses. Cultivating agricultural land and hunting Atlantic Forest species was disrupted due to the decrease of access to fertile land areas.

Figure 6: History of Atlantic Forest Deforestation on Jaraguá Peak. Figures by the author. Data Sources: Satellite Images from 1960, 1980, 2010, Geosampa.

Toll Economy:

The three roads, Rodoanel, Bandeirantes and Anhanguera, are administered by the same private company CCR group, who administers 1.922,6 kilometers of roads in the states of São Paulo, Rio de Janeiro and Paraná. Each car that travels over one of the roads pays 115 Reais (U$ 27.00) toll taxes per one way trip. In 2009 the Anhanguera-Bandeirantes roads system alone supported the traffic of 210,3 million of vehicles, resulting in a profit of 700,6 million from tolls. The CCR group average gross annual income is three billion Reais ($USD 750 million).[322]

2. Telecommunication Towers

Since 1962, under the authority of State Law no 7.458, television towers emit electromagnetic waves from the peak in the format of television signals for the 2nd biggest media group in Brazil: Bandeirantes group, with a signal range reaching over 200km. A second tower arrived in the peak, in 1969, to emit signals for the TV Cultura media group. In addition to the two iconic towers in the peak, smaller towers also located on the peak after 1970. They serve government companies and military services. In 1970 São Paulo Light and Power Co. Ltd., owner of the power lines that encroach Atlantic Forest since 1955, also earned a plot on the peak, adjacent to the one ceded to Radio Bandeirantes S.A. ten years earlier. All the land cessions were established without paying any taxes for using and degrading the surrounding Atlantic Forest.

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[322] Anhanguera e bandeiranets somam R$ 115 em pedagios. G1, 2018. Accessed December 2020. Access in: <g1.globo.com>. Accessed May 2021.

Figure 7.1 Jaraguá Peak before 1960. Map by the author.

On November 16, 1962, the São Paulo
State Governor Carlos Alberto de Car-
valho Pinto ceded the land use rights
of a 1400m2 tract of land to the media
company Radio Bandeirantes S.A., for a
period of twenty years. The ceded area
was the summit of Jaraguá Peak.
        The contract established that
the Bandeirantes group could install their
telecommunication tower on the top of
the peak and use the land as the anchor
point for spreading their electromagnetic
waves without paying any rent or taxes to
the state government. In addition, other
television companies could also install
their equipment on the tower free of
charge.

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Figure 7.2 Bandeirantes Telecommunication Tower, 1962, scale 1:1000. Map by the author.

Figure 7.3 Bandeirantes Telecommunication Towers, 2021, scale 1:1000. Map by the author.

1974
scale 1:100

Figure 7.4 Bandeirantes Telecommunication Towers, 1974, scale 1:100. Map by the author.

2017
scale 1:100

In September 2017, as a protest against the reduction of the Jaraguá Indigenous land demarcation from 532 hectares (ha) to 1,7 ha, a group of Guarani Mbya demonstrators shut down the antennae towers that transmitted telephone and television signals in Jaraguá Peak, the highest point in the city of São Paulo. The antennae shut-down caused 600,000 people to be without television and mobile signals. The group of demonstrators allowed the restoration of the antennae signal only after meeting with representatives of the State Government to renegotiate the designation of Jaraguá

Figure 7.5 Guarani Protest Shut-Down Telecommunication Towers, 2017, scale 1:100. Map by the author.

Health Risk for Long term exposure

Even though health risks remain unclear, the amount of electromagnetic emissions uninterruptedly broadcasted in the area over 50 years carries potentially health risks for living beings under long-term exposure.

The antennae installed in the Jaraguá Peak towers emit radiofrequency (RF) energy, characterized by the range of frequencies between 1 MHz to 3 GHz, which include television (54-216 MHz) and cellular phones (900 MHz). RF waves have long wavelengths, about an inch or two in size, propagating through the electromagnetic spectrum's low-energy range, known as non-ionizing radiation. They do not have enough energy to break chemical

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bonds and remove an electron from an atom or molecule when traversing matter. However, even if RF radiation cannot damage DNA cells, the concern remains that RF waves cause other types of cancer.

Health risks vary according to the RF radiation type. Cell and television RF differ according to the distance each needs to cover between base stations: cell phone antennae cover a delimited area (a cell) between 5 to 30 km of radius. Its signal coverage needs to overlap with another cell tower signal area to transmit a call. Therefore, to ensure signal coverage across large distances, operators need thousands of overlapping cells, each equipped with a base station, distributed continuously over the territory. Television and radio towers work differently, having a more spaced territorial presence, reaching up to 200 km. This spaced condition between base stations makes television towers bigger--even hundreds of meters high, due to emitting powerful signals over long distances. Therefore, the energy emitted by cellular phone antennae is much lower than the energy emitted by radio and television broadcast stations.

The towers in Jaraguá Peak serve both cell and television antennae. However, television emissions arrived thirty years before cell antennae. For both cell and television antennae, the signal propagation is not linear, functioning as an exponential curve that drops as the distance grows, making the concentration of radiation in the peak's surroundings even greater. A cloud of radiological energy pollution envelops the Atlantic Forest in the Jaraguá since 1962.

Even though speculation about Cell Tower radiation risk values is inconclusive, exposure time is an important consideration. The International commission on Non-Ionizing Radiation Protection (ICNIRP), references laws from several countries, including some States in Brazil, when they set a standard of 6 minutes for exposure time. Following ICNIRP, the CADES Resolution n.153 from 2010, in Brazil, establishes that wave-emitting equipment must be 200 meters from hospitals, health clinics, and schools and must not exceed the an electromagnetic field intensity of 3 V/m (three volts per meter). Other studies argue for a minimum distance of 400m to be safe from the wave's impact, given the long periods of exposure to micro-waves and radio frequency signal emissions for population that live and work in the surrounding area.

Risk of Bird Collision

the Jaraguá State Park management plan, from 2012, recognized those impacts. The report describes the common issue of birds dying from collisions with the towers. The report also notes that the installation and maintenance of the towers and the tower cables surrounding area caused erosion of the land.

Figure 8. Telecommunication towers risk of long term exposure and risk of bird collision. Map by the author.

Microwave Economy

The telecommunication towers in the peak serve as real estate agents. One tower can host complex economic transactions and relations between tower owners and antennae spots renters. A towers lease can be compared to a building rent--similar to buildings that can lease appartment to renters, towers can lease the tower "storeys" to different renters. The higher spots in a tower are more expensive then lower ones, given the fact that higher spots have a wider signal range. A tower's lease configures an agreement between two parties: a property owner with space available for the cellular equipment installation and a cellular provider.

This agreement is similar to an outright sale of land, but the original owner retains the legal ownership of the property after the lease is over. Another common agreement is a tower collocation lease, when a carrier rents a space on an existing cell tower, which commonly does not involve the primary property owner as part of the lease agreement. Both forms of lease are present in the Jaraguá Peak tower agreements.

If the State Park monthly cost maintenance is almost in its entirety covered by the antennae rent, profiting 1.2 million per year, this value remains an incomplete calculation. The decree n. 49.475 from 2005, and the resolution SMA-16, from 2005, establishes the rent value for installing telecommunications equipment alone, such as the installation of a new antenna in an existing tower, of R$ 13.397,00 per month by private organizations that transmit images or sounds (Televisions); R$ 6.978,00 for cell towers, and R$5.373,00 for non-lucrative institutions. The value of the rent is readjusted annually according to the IPCA, established by the Brazilian Institute of Geography and Statistics – IBGE. The article 2 in the same decree affirms that the use of the land where the cell tower is installed is only allowed if, besides paying the rent, the telecommunication enterprise guarantees the conservation of the area where the cell tower relies.

The telecommunication towers installed in Jaragua Peak have a signal range from 5 km (cell phone antennae) to 200 km (Bandeirantes television tower).

Lines in green in the satellite image indicate Indigenous lands within the area where the signal arives (Jaragua Indigenous land is in the center of the radius).
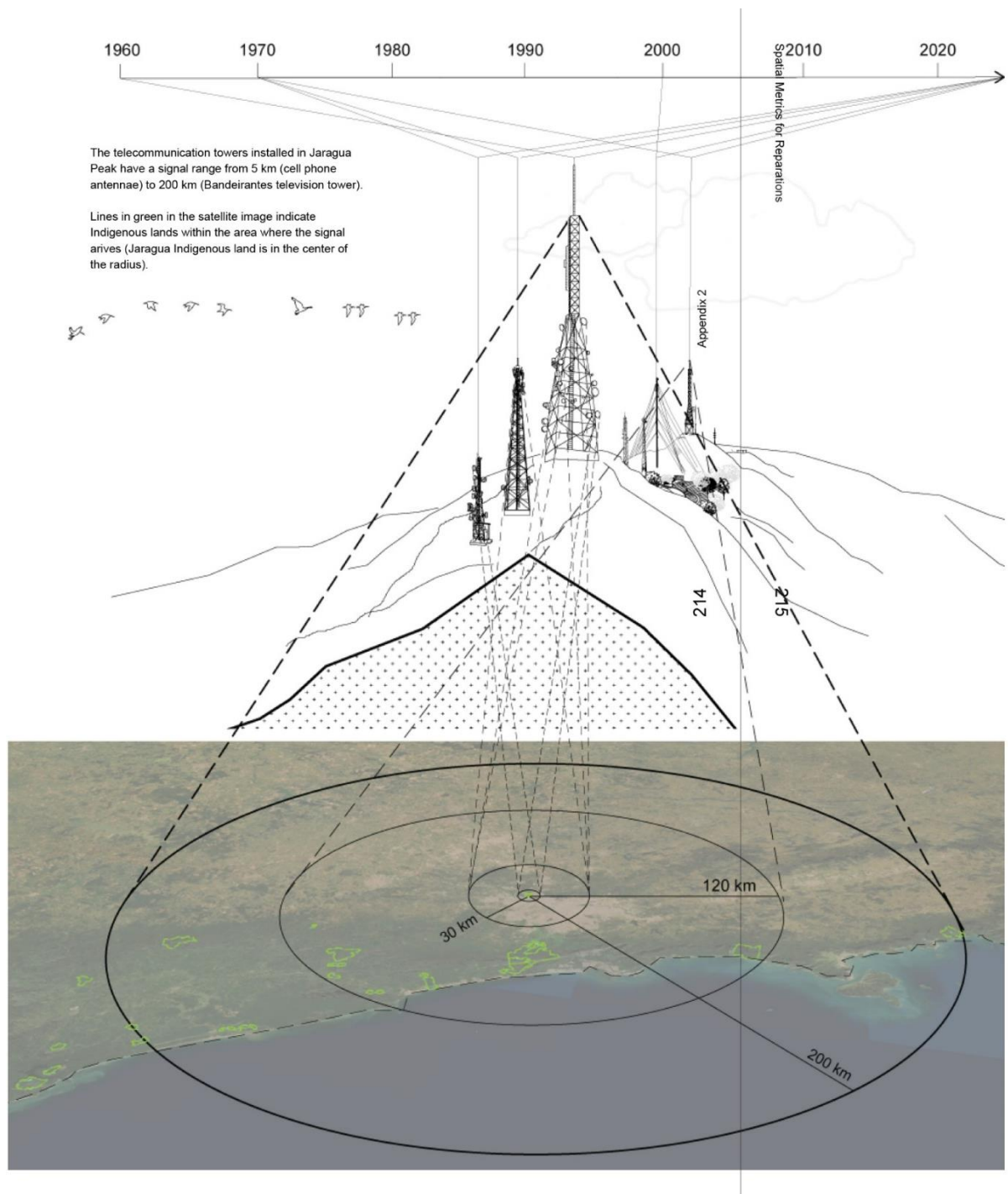
Figure 9. Telecommunication towers signal range. Map by the author.

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3. Power Lines

The public electric utility state company São Paulo Light and Power Co. Ltd. installed, in 1955, a power line known as "Transmission Line Anhangabaú-Jundiaí" that crosses through both the Guarani Mbya Indigenous territory and the Atlantic Forest in the Jaraguá. The line, which transcends the forest limits, hosts 11 high-tension towers inside the Guarani Mbya territory.

One of the main impacts caused by power lines in the Guarani territory is soil erosion that result from the removal of vegetation for the towers installation. In addition, The electric cables that provide energy to the Guarani tekoas in the Jaraguá are very old and in constant risk of causing fires.

Power Lines configure infrastructural dispossession because of their pattern of extensive deforestation. They work as ever-growing webs that connect electric powerplants, such as Itaipu Dam, to distribute electricity to cities and houses. The NBR 5.422/85 illustrates the estimated areas of deforestation caused by power line installation. According to the environmental impact assessment "Empreendimentos Elétricos que Integram o Lote 21 Leilão ANEEL 005/2016," from 2018, power lines have three categories of "areas of influence": areas of direct damage (footprint of where the towers and cables are installed, consisting on a 30 to 35m buffer zone to each side), areas of direct influence (1km buffer zone from the towers footprint), and areas of indirect influence (5km buffer zone from the towers footprint). These areas of influence are calculated as buffer zones from where each power line tower is installed on the ground. Each new power line constructed over Atlantic Forest areas deforest and disrupt non-human habitats, impacting an area up to 5km from where the power line is installed.

Figure 10.1 Atlantic Forest on Jaraguá Peak, 1940. Scale 1:1000. Map by the author.

Figure 10.2 Atlantic Forest deforested by Power Lines installation, 1950. Scale 1:1000. Map by the author

Figure 10.3 Power Lines installation and risk of bird collision, 1960. Scale 1:1000. Map by the author

4. **Compounding Land Deformation**

Entire São Paulo is part of Guarani *yvyrupa*. To become the now known city of São Paulo,

state officials, construction companies, foreign investors, stole and perforated Guarani

sacred lands, displaced and enslaved Guarani communities, in addition to also displacing and

murdering thousands of forest non-human species. As Latin America Historian Warren

Dean describes, 270 different tree species can be found in a single Atlantic Forest hectare.[323]

A single tree canopy can host a thousand species of insects, while the Atlantic Forest as a

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[323] Dean, Warren. With Broadax and Firebrand: the Destruction of the Brazilian Atlantic Forest. University of California Press, 1995, p. 191.

whole had one million species of insects on its origin. More than half Atlantic Forest trees were endemic, as well as innumerous endemic birds, mammals and reptiles.[324] The disruptions caused by land perforation and ground deformation for for roads construction, pipelines, dams and power lines, large monocultures, and deforestation, starting with gold mining in Jaraguá Peak in 1580 by settler colonizers known as Bandeirantes, continue five hundred years later. This continuity is only possible because the São Paulo government, construction and private companies such as Tenda are, until today, daily remaking the theft of Guarani lands and Atlantic Forest deforestation.

Loss of Fog

Atlantic Forest makes fog. The fog that exists due to forest presence, such as the one in the Amazon Forest, or the fog that used to appear every morning in all Atlantic Forest extension from the south to the north coast of Brazil, are also known as flying rivers.[325] Since Colonial arrival, and intensified Jaraguá peak is one of the few spots in São Paulo where fog appears over the Atlantic Forest.[326]

In Guarani cosmologies, the fog is a strong sacred representation. It is attributed to the communication between special beings that inhabit the Atlantic Forest and their sacred owners. The rituals of special beings with their gods generate fog and ensure the universe's maintenance.[327] Loss of fog due to urban growth and resulting deforestation disrupt numerous human and non-human relations, environments and cosmologies.

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[324] Ibid.
[325] Ailton Krenak, Antonio Nobre. Nave Gaia. Selvagem Ciclo de Estudos sobre a vida. March 5, 2021. Access: https://www.youtube.com/watch?v=ueLmin9IIqk
[326] Pimentel, 2009, p. 290.
[327] Ibid.

Figure 11.1 Fog 1960, scale 25000. Map by the author.

Figure 11.2 Fog 2010, scale 25000. Map by the author.

Fire

In June 2020 a fire reached the surroundings of the Tekoa Itakupe. According to one Guarani leadership in the Jaraguá, the fire reached the Guarani sacred cemetery close to the Tekoa Itakupe. According to the Fires database gathered by the national institute of spatial research Inpe, fires repeat in the Jaraguá Atlantic Forest almost once a year.

Fire

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2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

Figure 12. Fires on Jaraguá Peak from 2002 to 2020. Data Source: Inpe. Map by the author.

State Park

The Jaraguá State Park, founded in the 1960s served both as a landgrab technique and as an attractive for foreign investments. The Park is also used in surrounding real estate properties propaganda, to increase property sales value. In addition, the park administration, and more broadly the São Paulo government allowed tax exemptions for enterprises to install their Telecommunication towers in the peak, using Atlantic Forest and Guarani territory, and causing further deforestation and soil erosion through the towers cables, towers

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maintenance, as well as changing the environmental noise levels which changed non-human habits.

In 1990 the park constructed fences on its limits, which impeded Guarani communities to access areas that were used for traditional agriculture, as well as areas for collecting materials for houses repair, and medicinal plants. The park overlaps in 46% of the area of the Jaraguá Indigenous land demarcated area. This means that half of the area in Jaraguá Peak demarcated for Guarani use is isolated from them by the park fences and the park regulations, not allowing, for instance, the Guarani to construct houses or continue planting activities within park boundaries.

Jaragua Indignenous Land
Jaragua State Park Fences

The state park overlaps 46% with the area of the Jaragua Indigenous Land demarcated area, impeding the Guarani to use half of their demarcated lands in Jaragua Peak.

Figure 13. State Park fenced area overlapping with Jaraguá Indigenous Land. The Jaraguá State Park administration installed fences on the park perimeter in 1990. The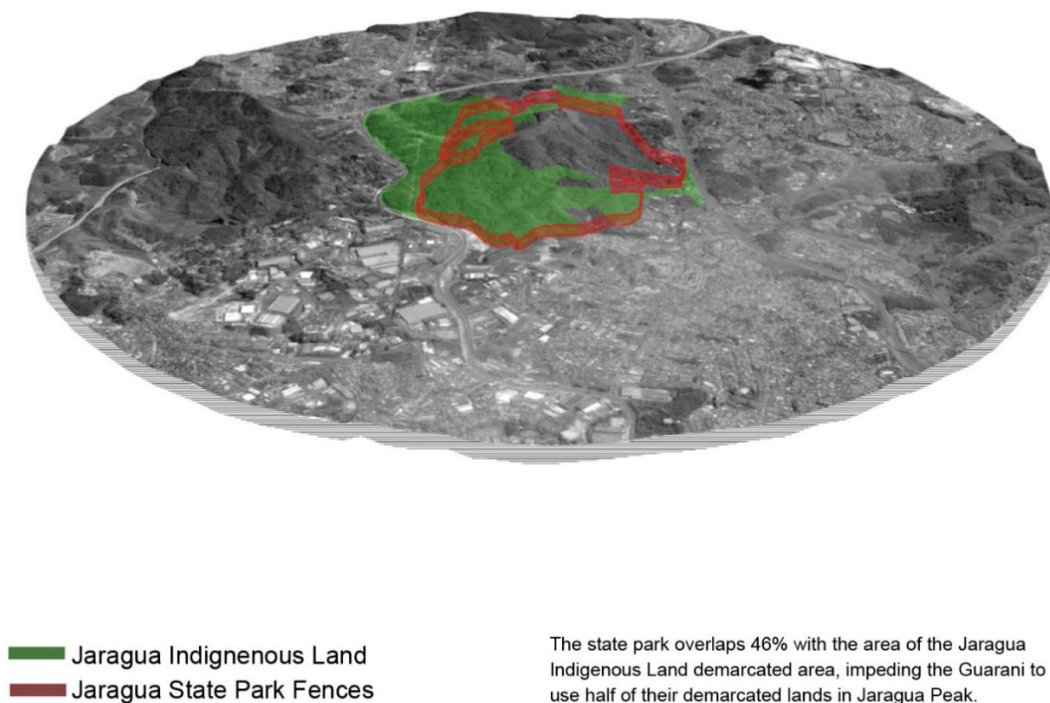 fences interrupted Guarani communities access to Guarani agriculture, medicinal plants, and materials for houses repair. The fences also interrupted non-human paths. Map by the author. Data Sources: Mapa Guarani Digital, Funai, IBGE, Geosampa.

Food Insecurity

Compounding factors—as the park fences and the park regulation, São Paulo zoning regulation, urban growth and infrastructural constructions—have increased food insecurity for the Guarani in the Jaraguá. As Guarani leader, activist, professor and land steward Jerá Guarani says in her article "Tornar-se Selvagem," for the Guarani, planting is an act that goes beyond food for nourishment.[328] The practice of Guarani agriculture, and to eat food which grows from and in Guarani territory, within areas of land stewarded by the Guarani, is part of the Guarani sacred and spiritual being. Food growth in Guarani lands, the act of the body ploughing the land, eating this food from this land stewarded with Guarani principles of land relations, and all the sacred, as well as temporal and relational dimensions of this process, are all part of what land, and access to land, means.[329] In addition, the diversity of trees, and foods planted increased non-human diversity, since different non-human forests inhabitants also come to Guarani agriculture and reforestation sites to eat.[330]

Limit to land access is a matter of the possibility or not for the Guarani to live with their nhandereko--way of life, and for non-human inhabitants continue to live in their lands now occupied by São Paulo's urban growth. In addition, Certain areas previously use by Guarani and non-humans Atlantic Forest inhabitants became deforested for planting eucalyptus. The harm of eucalyptus plantations—called as "green deserts"--in Atlantic Forest areas are well known. The eucalyptus monoculture is long term fought against by

[328] Guarani, Jerá. Tornar-se selvagem. In: PISEAGRAMA, Belo Horizonte, no 14, p. 12 - 19, 2020. Access: https://piseagrama.org/tornar-se-selvagem/
[329] Ibid.
[330] Guarani, Jerá. O povo Indígena se fortaleceu. Cinturão Verde Guarani, 30 April, 2021. Access: http://cinturaoverdeguarani.info/podcast/

different Indigenous nations who inhabit the Atlantic Forest—Including the Guarani Mbya, Nhandeva and but also other Atlantic Forest nations such as the Pataxo.

As the 2017 report "Observations on the State of Indigenous Human Rights in Argentina," organized by the NGO Cultural Survival, stated eucalyptus and pine monoculture plantations on Guarani lands in the Iberá wetlands, today known as Northern Argentina, "plantations threaten biodiversity, devastated freshwater levels and even eliminated entire sections of wetlands."[331] The plantation unbalanced the entire regional ecosystem, "reduce the availability of water for farming or fishing, worsening summer droughts, creating water shortages, and restricting access of Indigenous Peoples to their sacred sites." Eucalyptus plantations disrupt both physical and spiritual Guarani ties to the land, in this case starkly undermining the possibility to continue their way of life within the Iberá wetlands. The report also reveals that Harvard University is a shareholder in the enterprises who own the plantations: Empresas Verdes Argentinas Sociedad Anonima and Las Misiones S.A, who "control approximately 350 square miles of the Iberá wetlands system."[332] Similarly, in Jaraguá Peak, eucalyptus plantations since the period of the Bandeirantes road construction have degraded and dehydrated soils of areas previously used by the Guarani, deforesting large swaths of Atlantic Forest ancestral trees to replace with eucalyptus trees.[333]

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[331] Cultural Survival. Observations on the State of Indigenous Human Rights in Argentina. Massachusetts, March 2017. Access: https://www.culturalsurvival.org/sites/default/files/uprargentina%202017.pdf
[332] Ibid.
[333] Pimentel, 2009.

5. Recovering Land Interactions, Reworking São Paulo

The Guarani Greenbelt, also known as PL 181/2016, is a law project written by Guarani communities in São Paulo, and Jurua city council and deputies allies.[334] The Guarani Greenbelt proposes that São Paulo infrastructures become integrated with the Atlantic Forest infrastructures to increase the climate and environmental safety in present and future São Paulo. Guarani ongoing initiatives of environmental recuperation in São Paulo, such as the recuperation of soils previously degraded by monocultures and the cleaning of polluted rivers, benefit the entire city and its surroundings, while increasing Atlantic Forest preservation.In the last five years, 7.2 million square meters (720,000 ha) of Atlantic Forest were deforested in the city of São Paulo alone. In contrast, in 2019 alone, Guarani communities in São Paulo recuperated and planted more than 300 tree species such as Pitanga, Cambuci, Araucária, Palmito Juçara, in the surrounding of the tekoa Yvy Porã in the Jaraguá.[335] The trade of seeds between tekoas through Guarani mobility networks have increased both the variety of Guarani food agriculture, increasing food security, while also recuperating soils. As of 2021, the tekoa Kalipety, in the south of São Paulo, today produces more than 50 varieties of jety (sweet potato), 16 types of avaxi (corn), 14 of mandi'o (manioc), 10 of kumanda (beans), 11 kinds of pumpkin, pineapple, among others.[336] The

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[334] PL 181/2016. Cinturão Verde Guarani. Access:
http://documentacao.saopaulo.sp.leg.br/iah/fulltext/projeto/PL0181-2016.pdf
335 CTI. Fortalecimento cultural e restauração da floresta: Como os Guarani estão usando seu Território para viver melhor e preservar a riqueza ambiental de São Paulo. 2020. Accessed December 2020s. Access in:<
https://trabalhoindigenista.org.br/wp-content/uploads/2020/07/FORTALECIMENTO-CULTURAL-E-RESTAURAÇÃO-DA-FLORESTA_.pdf>

[336] Os agricultores guarani e a atual produção agricola na Terra Indígena Tenondé Porã. Municipio de São Paulo. 2020b. Accessed December 2020. Access in:< https://trabalhoindigenista.org.br/wp-content/uploads/2020/12/AgriculturaGuarani_14mb.pdf>

plants and seeds produced in the tekoa Kalipety are replanted and shared with other Guarani communities within and beyond São Paulo urban area.

Recovering Degraded Soil

Figure 14. Recovering degraded soils. Illustration by the author.

The work of Guarani communities in São Paulo is the only reason the Atlantic Forest still exists in São Paulo. With their traditional agriculture, the Guarani have been recuperating degraded soils in São Paulo. Combining their traditional agriculture methods and recent techniques such as agro-ecology and permaculture, the Guarani are reforesting deforested areas, taking care of polluted water fountains and rivers. The Guarani as land stewards, who have been stewarding the lands underneath São Paulo for thousands of years, even after São

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Paulo and Brazilian government stole and land grabbed Guarani and Atlantic Forest inhabitants lands, remain responsible and keep increasing the present and future of environmental security in entire São Paulo.

Guarani Greenbelt

Approximately 13,000 hectares of Atlantic Forest are deforested per year. 150 years ago, the state of São Paulo was composed of Atlantic Forest.

The Guarani Greenbelt, also known as PL 181/2016, is a law project that strengthens the initiatives of environmental recuperation proposed by the Guarani, as an initiative that benefits the entire city and its surroundings, and increases Atlantic Forest preservation.

Atlantic Forest surrounding Jaraguá Peak, 2020

Atlantic Forest surrounding Jaraguá Peak, 1900

Figure 15. Atlantic Forest deforestation 1900-2020. Data Sources: Satellite images. Map by the author.

Multispecies Entanglements

The greenbelt highlights and recreates the Atlantic Forest and Guarani infrastructures as entangled infrastructures of multi-species care. In one of the Jaraguá tekoas, the Tekoa Ytu, Guarani communities have been re-constructing Atlantic Forest Indigenous bees'

infrastructures. Originally, more than 300 bee species existed in the forest, but they had

disappeared years ago, as one of the Guarani leaders in the Tekoa Ytu describes. As of 2021,

28 beehives and seven different species of Indigenous bees, which is what the

founders/leaders of the Guarani greenbelt call them, without stung are being raised and

cultivated in Guarani villages in the Jaraguá. In return, the bees raised in the Jaraguá pollinate

areas as far as 5km to 10km from the Jaraguá Peak.[337]

Figure 16. Bee infrastructures in the Tekoa Ytu, in Jaraguá Peak, and bees pollinating area. Map by the author.

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[337] Sesc Itaquera. Round table with Marcio Boggarim Wera Mirim and Tiago Barros. Abelhas-sem-ferrão: biodiversidade, cultura e tradição indígena. 28 April, 2021. Access: https://www.youtube.com/watch?v=Hg9FN1qiwmM

In addition, the last large clean river in São Paulo is in Guarani territory. The Capivari River, is situated in the Guarani Indigenous Land Tenondé Porã, south of São Paulo. The guarani agriculture and their food availability also brings back birds which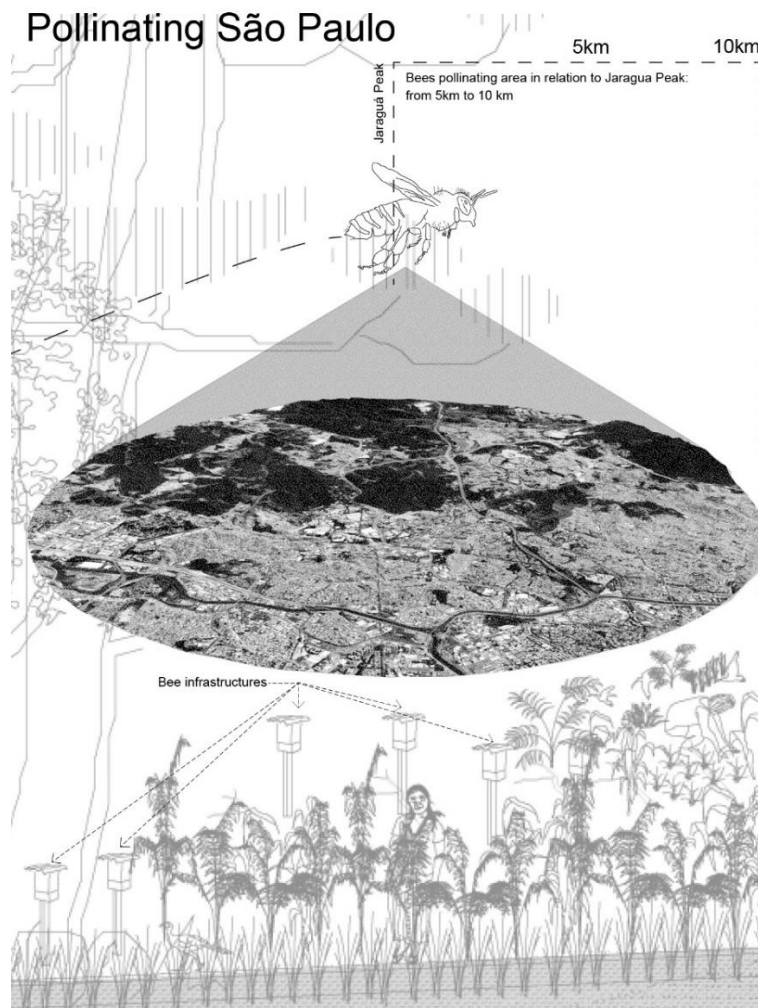 had abandoned the region previously due to deforestation. Initiatives by Guarani communities in north and south of São Paulo are benefiting all of São Paulo inhabitants, considering their lives and environmental quality inside and outside their houses.

Distance to Clean Water

For the Guarani *yy* (water) is sacred.[338] As the title of one of the Guarani Greenbelt podcasts from April 2021 underlie, for the Guarani, access to clean water is essential for Guarani existence.[339] Urban growth in the Jaraguá surroundings has increased the pollution of rivers. Incomplete domestic sewage systems dispose their pollution in the Ribeirão das Lavras, the major river that serves the Guarani Tekoas. As one Guarani leader in the Jaraguá communities describe, when he was a children, the river that crosses the tekoa Ytu, Ribeirao das Lavras, was clean and he used to swim there. According to another testimony, in the 1960s the river Ribeirão das Lavras was clean, they used to drink its water, swim, fish, and wash clothes there.

Since the 1970s trash and pollution from surrounding irregular urban growth drains into the ponds and rivers in the area where Guarani tekoas are. The water pollution contaminated children and adults and undermined the Guarani communities' water source,

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[338] Cinturão Verde Guarani. Access: http://cinturaoverdeguarani.info/yy/
[339] A água é nossa existência. Cinturão Verde Guarani, 30 April, 2021. Access: http://cinturaoverdeguarani.info/podcast/

used by them for fishing, swimming and facilitating their nhanderekó. In addition, the largest

part of the tekoas in Jaraguá peak don't have access to sewage pipes. The septic tanks

provided for the tekoas often flooded and leaked, contaminating and restricting even more

the areas where Guarani houses resided.

The Funai report for the Jaraguá Indigenous land demarcation from 2013 mentions

that the water and waste management company SABESP was taking measures, in

partnership with the São Paulo government, for improving the water quality in the Jaraguá.

With the implementation of the "Programa Córrego Limpo" (clean stream program)

SABESP had plans to grow the sewage network.[340] Nonetheless, still facing challenges to fix

the sewage system in the area, since 2015 the communities in the Jaraguá, together with

Jurua allies with experience of permaculture constructions, and support of the Programa

Aldeias, have decided to construct their own ecologic sewage systems, with filters that clean

the water before giving it back to the ground.[341] Each tekoa in the Jaraguá now has its own

ecological sewage system adapted for the specific conditions of each tekoa. In the tekoa Ytu,

a composting toilet was installed in 2018, and a system called "sceptic filter" substituted

common sceptic tanks, without generating common sewage.[342] The last large clean river in

São Paulo, the Capivari River, is is situated in the Guarani Indigenous Land Tenondé Porã,

south of São Paulo.[343]

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[340] Pimentel, 2009

[341] CTI, 2020a

[342] Ibid.

[343] Cinturão Verde Guarani. Access: http://cinturaoverdeguarani.info/yy/. See also: Programa Aldeias. O último rio limpo #CinturãoVerde Guarani. 20 July 2020. https://www.youtube.com/watch?v=8UzwprKbJvY

Figure 17. Distance to clean water: Rivers in São Paulo and Guarani demarcated Indigenous Lands. The last large clean river in São Paulo, Capivari River, is situated in the Guarani Indigenous Land Tenondé Porã. Datasources: Geosampa, Funai. Map by the author.

Heat Islands

Tellingly, an urban heat map of São Paulo reveals how the areas where Guarani Indigenous

Lands exist are also the lower incidence of urban heat in the city.

Figure 18: Heat Island profile in relation to São Paulo heat islands map. Areas where Atlantic Forest exist, which coincide with the Guarani Indigenous Lands Jaraguá and Tenondé Porã, are also the areas with lowest temperatures in São Paulo. Original heat island map source from: Hugo Rogério de Barros, A ilha de calor urbana e o uso e cobertura do solo no município de São Paulo-SP. 2016. Diagram by the author.

The Guarani greenbelt is not a project that would benefit only the Guarani; it is

meant to be maintained in collaboration between Guarani and *juruá*, to increase life quality

and environmental security in entire São Paulo, already working to face future challenges

such as the rising of climate change.

Appendix 3:

Tools for Government Pressure

Guarani communities from the 18 Guarani villages that exist as of 2021 within the city of São Paulo wrote the Guarani Greenbelt law project in collaboration with eleven *juruá* São Paulo city council members.[344] To be enacted the law needs to be approved three times: in two voting processes within the city council, (2) by the mayor of São Paulo, and (3) passed by 2/3 of São Paulo state deputies.[345] According to one Guarani leader from Jaraguá Peak, the most effect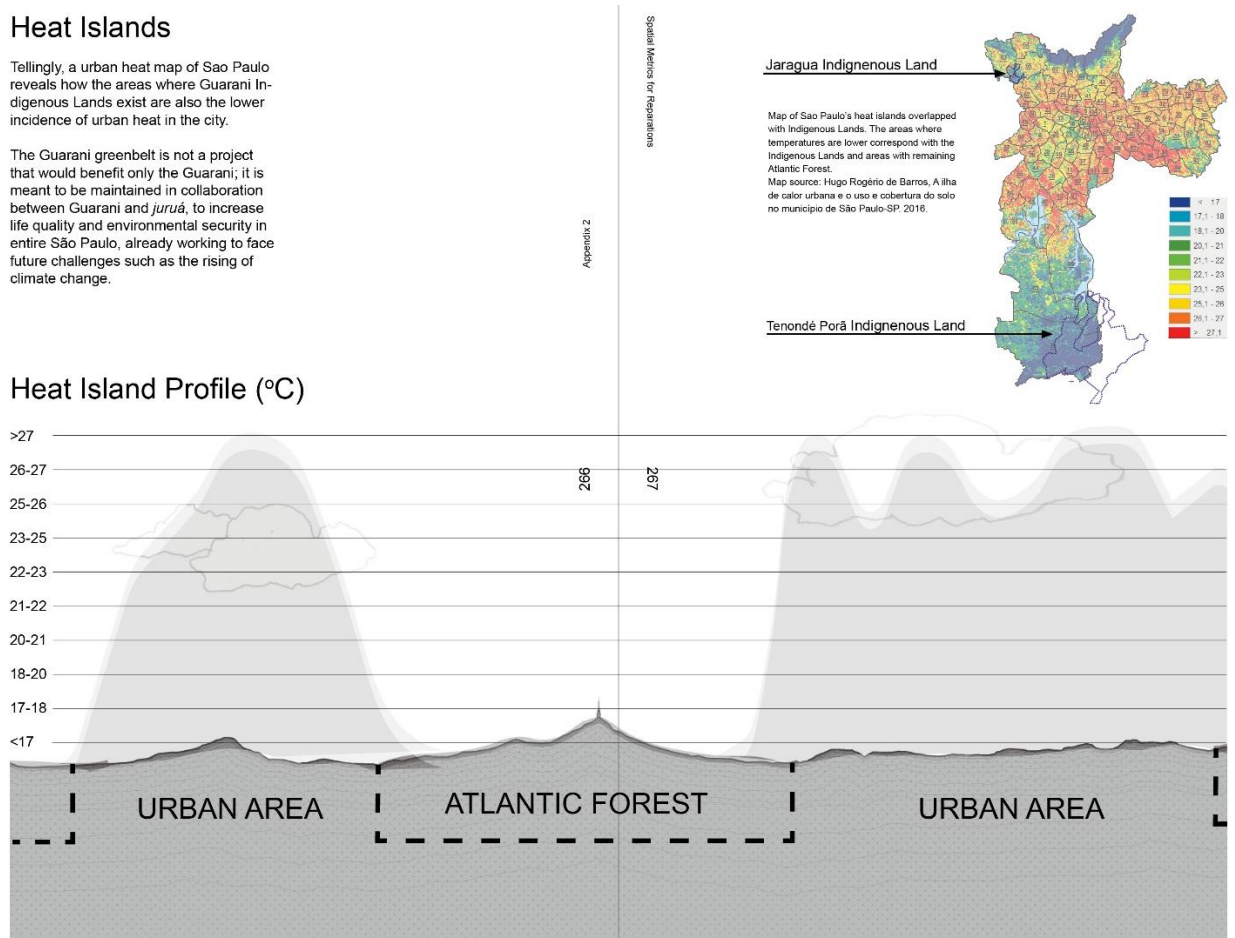ive action that non-Indigenous allies can take for contributing to the Guarani activism now is to pressure government agents. To support the Guarani Greenbelt send an email to the 2020 elected São Paulo city council members:

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[344] PL 181/2016. Cinturão Verde Guarani. Access:
http://documentacao.saopaulo.sp.leg.br/iah/fulltext/projeto/PL0181-2016.pdf

[345] Assembleia Legislativa do Estado de São Paulo. Sobre o Processo Legislativo. Access:
https://www.al.sp.gov.br/processo-legislativo/sobre/

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Twitter: https://twitter.com/quilomboperifa

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