



The entrance to the Indigenous territory, along with a sign indicating the risk of forest fire.

Thesis: Erasmus Mundus MSc Global Forestry

Tosana Maria Töben

Trading trees for votes? State, human and more-than-human transformations in the politics and management of tropical forest fires in the Chiquitanía, Bolivia

Supervisors: Thorsten Treue & Sofie Mortensen

Date: September 15th 2025

Name of department: Department of Food and Resource Economics (IFRO)

Author(s): Tosana Maria Töben

Title and subtitle: Trading trees for votes? State, human and more-than-human transformations in the politics and management of tropical forest fires in the Chiquitanía, Bolivia

Supervisors: Thorsten Treue & Sofie Mortensen

Date: 15-09-2025

Grade: 12/12

Acknowledgements (thank you, gracias, chapie¹, tak, bedankt!)

This research would not have been possible without the encouragement and contributions of many people around me and around the world. . For my link to local partners, I want to thank Kathryn Dix, who moreover offered me indispensable guidance along the way. I am also very grateful to my academic mentor, Francois Questiaux, for his heartfelt help.

Tusind tak til mine fantastiske vejledere, Sofie og Thorsten, som gav mig utallige råd, opmuntring og selvtillid. Jeg følte mig utroligt vejledt, og selvom jeg er lettet over at være færdig nu, fortryder jeg også, at jeg ikke længere kan henvende mig til jer så ofte med alle mine uendelige spørgsmål.

Gracias a todos los protagonistas, participantes, informantes espontáneos, conductores de autobús y mototaxis y a la naturaleza boliviana por sus valiosos conocimientos. Estoy muy agradecida por el equipo increíble de APCOB que ha convertido mi incertidumbre en una experiencia inolvidable y empoderadora. También quiero agradecer a mi pololo, Pancho, por soportar toda la frustración que esta tesis también me ha causado y, lo más importante, por creer en mí siempre.

Ik ben ook mezelf dankbaar voor mijn moed, consistentie en veerkracht. Ten slotte wil ik mijn naaste familie bedanken voor zowel hun zorgen als steun tijdens deze uitdagende en vormende tijden.

¹ Thank you in the local Monkox Besiro language.

Trading trees for votes? State, human and more-than-human transformations in the politics and management of tropical forest fires in the Chiquitanía, Bolivia

Author: Tosana Maria Töben. Erasmus Mundus Master's Global Forestry. Department of Food and Resource Economics (IFRO). University of Copenhagen, Denmark.

Abstract

Tropical forest landscapes and their inhabitants are increasingly threatened by severe wildfires, intensifying under climate change and growing agricultural demand. Wildfires have become the leading cause of tropical forest loss and will likely intensify as climate change and global demand for agricultural products increase. This is particularly pronounced in the Amazon, where agriculture-driven fires are rising rapidly. Fire-degraded forests diminish access to forest products, leaving Indigenous communities more vulnerable to further environmental change. Although there is burgeoning attention to amplifying the voices of marginalised human communities, the question of how to include Nature's agency in research remains underdeveloped. To contribute to closing this gap, I developed a more-than-human political ecology framework that conceptualises and recognises more-than-human agents beyond their role as resources, drawing on land rights coding and posthumanist assemblage theory. Employing a case study of the devastating 2024 wildfires in Bolivia's Monte Verde Indigenous Territory, and using photovoice, participant observation, and interviews, I investigate issues of land reform, pyropolitics, and incendiary extractivism. My analysis demonstrates how fire's uncontrollable nature is weaponised in land struggles to advance a state-led productive development agenda. Forest loss by fire has resulted in more vulnerable relations between Indigenous peoples and their territory, as traditional fire users face prohibition policies and elevated fire risks. Post-fire practices are being reformed to account for and adapt to future events, which, together with taxing prohibition and control policies and higher fire risks induced by climate change, put disproportional weight on traditional fire users. Diverse community responses are explored, such as self-organisation and adaptive risk management, which constitute avenues for resilience. Ultimately, the study reveals that fire's role as a more-than-human agent is central to understanding how land rights are contested and reconfigured on this political frontier.

Keywords: *Tropical forest fires, risk, more-than-human political ecology, assemblages, adaptation, agency, Indigenous territory, land rights, land tenure, Chiquitano dry forests, Amazon.*

Contents

Abstract.....	3
Contents.....	4
Glossary and abbreviations	5
Introduction	6
Literature review.....	9
Research objectives and questions.....	11
Case study and justification	12
Conceptual framework.....	19
Methodology.....	25
Paradigm – philosophy of science.....	25
Data collection and methods	25
Data analysis	32
Results: Local impacts of and responses to forest fires	34
Introduction	34
Fire scars	36
Local actions and adaptation	51
Synthesis	71
Results: Fire control, land struggle and governance.....	72
Introduction	72
Disaster response and risk strategy	74
Land rights and reform	79
Political forest and fire governance	87
Synthesis	95
Discussion: Transformations in agency, adaptation and autonomy.....	96
Land rights transformations.....	97
Socio-nature transformations.....	99
Fire and land laws	101
Assemblages of adaptation and resistance	102
Access, autonomy and the state.....	103
Synthesis	105
Limitations and future research	106
Policy recommendations	107
Conclusion	108
Bibliography	110
Appendix: Interview guide – Household interviews at the local level.....	117

Glossary and abbreviations

Glossary of preserved terms:

- *Chaco*: Slash-and-burn farming plot.
- *Chaco sin quema*: No-burn farming plot.
- *Cacique*: Indigenous community chief.
- *Chaqueo/chaquear*: The practice of working the chaco.
- *Chiquitania*: A geographical and cultural region and the name of the world's largest tropical dry forest ecosystem found in that region.
- *Canba*: Indigenous Peoples from the Eastern lowlands of Bolivia.
- *Colla*: Indigenous Peoples from the Western highlands of Bolivia.
- *Jichi*: Mythical nature guardian from the *Chiquitania* oral tradition.

Abbreviations:

- ABT: Forest and Land Authority. Responsible for regulating, authorising, and monitoring forest use, land clearing, and timber trade within national legal frameworks.
- APCOB: Support for the Peasant-Indigenous People of Eastern Bolivia (Apoyo Para el Campesino-Indígena del Oriente Boliviano). Civil society NGO I partnered with.
- CEFO: Forest certificate of origin. A legal document indicating the species and quantity of timber, prepared by forestry engineers or auxiliaries.
- INRA: National Institute of Agrarian Reform. The state authority responsible for land titling, redistribution, and regulation of property rights, including recognition of Indigenous territories.
- PDM: Forest Clearing Plan. A regulatory instrument issued by the ABT authorising controlled clearing and burning to convert forest for agriculture (e.g., clearing up to 20 ha under PDM-20).
- POP: Property Management Plan. A parcel-level land-use plan required under Bolivian law—primarily applicable to private properties; it does not apply to collectively titled lands.
- SFMP: Sustainable Forest Management Plan. A legally approved, community-developed plan for autonomous regulation of timber use in Indigenous territories.
- TI: Indigenous Territory. The TI studied here is called Monte Verde (abbreviated to MV).

Introduction

(...) “and an interglacial epoch morphs into a distinctive era, a Pyrocene, for which fire is cause, consequence and catalyst” (Pyne, 2018).

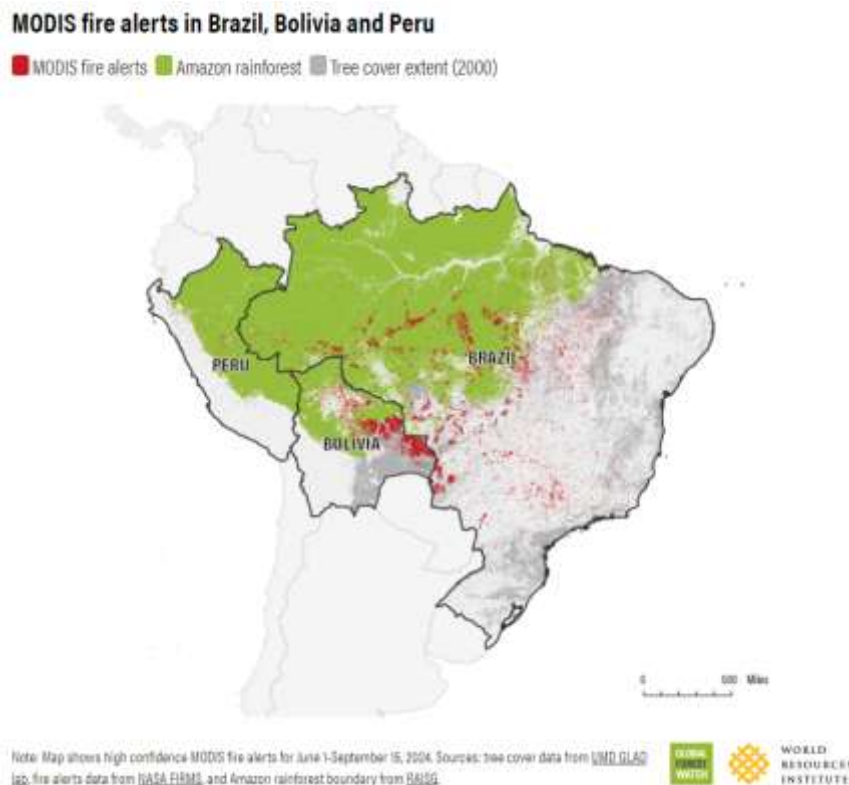


Figure 1. The spatial distribution of burned Amazon rainforest in 2024 until 15-09.

In 2024, tropical forest loss hit a global record high, marking an increase of 80% compared to 2023, and, unlike the last 24 years, where conversion to agriculture was the biggest driver, this time it was primarily driven by wildfires. Still, most wildfires are started as a result of land clearing for large-scale farming. This is particularly pronounced in the Amazon basin, where human-caused ignitions, also known as agricultural fires, are rising rapidly (Arienzo et al., 2019). An Amazon biome mapping expert explains, "Fire is not a natural component of the ecological dynamics of the Amazon forests. The burned areas that marked the biome in 2024 are the result of human action, especially in a scenario aggravated by two consecutive years of severe drought" (MapBiomass, 2024b, para. 7). In the Amazon, intensifying droughts and ongoing deforestation have already transformed southeastern forests from carbon sinks into carbon sources, which may transform into savannah states (Flores, 2024). Recent models project that these droughts will worsen, driving other

disturbances like large and destructive fires, and thus creating positive feedback loops as forest vegetation loss limits CO₂ absorption and further accelerates global warming (IPCC, 2023). It is therefore well-established that safeguarding the resilience of the Amazon requires reforestation as well as a rapid curbing of greenhouse gas emissions, deforestation and forest degradation (Lovejoy & Nobre, 2019). This underscores the pertinence of investigating the anthropogenic dynamics of deforestation by fire, which are subject to debate in scholarly, policy and practical discourse, due to their inherently political nature and implications. Many mythologies and fire origin stories express how the component and its transformative effects have enraptured cultures worldwide for generations. (Lake, 2024). Under the alarming growth of forest loss from fires, these transformations have exceeded their reach from local and traditional uses to biome- and state-wide impacts. In parallel, local fire uses maintained by Indigenous or peasant communities, for instance, the prescribed burning of forest patches in mixed swidden cultivation systems, are increasingly threatened by anti-fire discourses and policies (Eloy et al., 2019). At the same time, it is recognised that almost half (45%) of the remaining primary forest areas in the Amazon Basin are in indigenous territories (FAO 2021). Recognition of Indigenous Peoples' land rights is thus critical, given the urgent need to reduce deforestation rates in the face of escalating climate change. This poses a tension between the paradigmatic call to secure Indigenous territorial rights as a cornerstone for halting deforestation and the simultaneous erosion of their fire-related practices and ways of life under restrictive policies and hostile discourses.

Through my analysis, I further push for moving beyond isolated understandings of environmental change, specifically, climate change and “anthropogenic wildfires”, the course of which remains natural but the cause of which is increasingly human. While both climate change and the burning forest could be studied in simple single-issue terms, it requires a concern for the ties the global economy sustains with these phenomena to inspire structural socio-ecological transformation (Chung, 2023; Fraser, 2021). However, the fact that the issues are linked to the global economic, and ultimately capitalist, system, renders the situation, as Pyne (2018) describes it, “both more pervasive and, paradoxically, more amenable to treatment” since it is partly in our hands (p. 141). Without amendments whatsoever, it is likely that fires, in a continuum from climate-induced wildfires to agribusiness-driven burning, will keep fuelling themselves until they, as Shakespeare once wrote, “consume the thing that feeds their fury” (idem). On one end of the continuum, the fire burns organic fuel, and on the other end, it is fundamentally capital and the exploitative market economy that will be consumed by the fury of the fire.

To analyse both types of fires, I adopt a political ecology approach, which conceptualises environmental issues as essentially political phenomena that are intrinsically connected to economic and social contexts (Benjaminsen & Svarstad, 2019). Moreover, this field aims to elucidate how localised environmental changes are influenced by both historical and contemporary regulatory frameworks and market dynamics (idem). Yet, political ecology has tended to centre human actors, often overlooking how non-human actors, such as fires or trees, actively shape socio-political dynamics (Fischer et al., 2022; Fletcher & Busher, 2020). A more-than-human lens makes these entanglements visible and is crucial for understanding both the drivers and outcomes of megafires.

With this research, I therefore endeavoured to explore and examine the more-than-human political ecology of agricultural megafires. Specifically, I aim to analyse the socio-nature assemblages and economic-political mechanisms through which burning occurs and transforms into, for example, vulnerability or adaptive management. I thus try to identify the fire imprints on a forest livelihood level, the more-than-human responses it sparked, and the structural drivers underlying deforestation by fire. By expanding upon the theories of regimes of dispossession by Lund and access by Ribot & Peluso, and conceptually constructing nature as a political subject, I demonstrate the significance of political ecology analysis rooted in more-than-human relationality, which may be more in line with non-hegemonic Indigenous epistemologies of the South and territorial governance.

The manuscript proceeds as follows. First, I present an overview of the literature, research questions and case study. I, then, move on to outline my own heuristic approach to theorising more-than-human agency as part of land ownership and rights regimes. I describe my methods and results, the latter of which are divided into two parts: first, focusing on the local impacts and responses and second, centralising the structural drivers. Next comes the discussion where I answer all research questions, compare the results and analytical findings to those of other scholars, and reflect on differences and similarities. In the conclusion, I return to the broader implications of my arguments for transformation rooted in relationality, plurality and justice.

Literature review

Governing wildfires is inherently complex, with current frameworks, often top-down or technical risk assessment mechanisms, frequently proving ineffective in addressing the transfrontier, unpredictable and contested challenges of megafire management (Essen et al., 2023; Miller et al., 2022). The contestability of fire governance is typically entrenched in power asymmetries and conflicting interests between actors (Armenteras & de la Barrera, 2023). Fire-degraded forests tend to diminish the availability of and access to forest products, leaving local communities with shrinking subsistence options, while at the same time, these groups themselves are also users of fire in agriculture, land management, and cultural practice (Pereira et al., 2023). A recent policy review about wildfires in the Amazon by Eufemia et al. (2022) demonstrated the importance of more detailed research and policy on participatory governance for fire use and management. In line with this, several studies emphasise that the participation of local actors directly experiencing the effects of fires enhances sustainable forest management, benefiting both ecological recovery and livelihood sustainability (Welch & Coimbra Jr., 2021; Mistry & Berardi, 2016).

In the absence of such participation, fire suppression measures may separate fire management from land use and livelihoods that paradoxically depend on fire (Armenteras & Gonzáles, 2024; Dube, 2013). These measures also tend to only achieve short-term results. To illustrate, the fire ban introduced during the burning season in the Brazilian Amazon reduced the number of fires in 2019 but had already become ineffective by the following year (Machado et al., 2024). Moreover, empirical studies suggest that state-driven “resilience” policies may hinder the long-term sustainability of rural livelihoods because both financial capital and institutional interventions negatively correlate with the community's capacity to autonomously adapt to or recover from future disturbances (Yang et al., 2023). Adding to this complexity, recent research on decolonising wildfire risk management shows how the framing of “climate security” through the criminalisation of small-scale fire users not only unjustly attributes responsibility to those who are frequently least accountable for the escalation in wildfires, reflecting a case of climate coloniality, but also excludes them as active participants in managing increasingly fire-prone environments. (Rodríguez et al., 2023). Consequently, current fire risk strategies risk perpetuating a historical pattern of top-down, externally imposed command-and-control interventions, thereby undermining indigenous peoples' autonomy in land stewardship. What remains underexplored is how Indigenous fire practices interact with, adapt to, or resist related governance strategies, and how local actors negotiate their position within increasingly restrictive and punitive frameworks (idem).

This research builds on recent research in the study site by Devisscher et al. (2019), which investigates the persistent neglect of integrating traditional fire knowledge into fire risk strategies. The study identifies a knowledge gap regarding the regional effects of immigration, noting that "the consequential demographic change will inevitably spread the use of fire into new forest frontiers and influence the politics of knowledge playing out in decision-making" (p. 51). Therefore, it is useful to complement the current state of the art with an appraisal of new settlers and their implications for what Clark calls "pyropolitics," that is, the "collective decision-making over fire" (Clark, 2018, p. 74). Reasoning that pyropolitics are innately territorial, Cary (2023) suggests that further research is needed on the impact of fire management practices to develop more contextualised understandings of how pyropolitics reconfigure both territory and the modern state.

While there is growing attention to defending Indigenous territories and marginalised human communities, the question of how to address the rising recommendations in the literature for including nature's agency, voice, or stake in research is still underdeveloped. This poses a major methodological challenge, "despite the growing recognition and theoretical arguments for including the inter-subjectivities of more-than-human participants in conservation" (Fletcher & Busher, 2020, p. 232). The main theoretical argument may be that at the core of the unfolding socio-environmental crises, including the fire crisis, lies the Western worldview that detaches humans from non-humans. Scientific thinking of nature in materialistic and mechanical terms not only strips it from its sentience, agency and responsiveness (Riskin, 2016) but, consequently, exempts moral responsibility towards it, since we are exploiting things rather than sentient beings. In this way, 'science serves capitalism very well by making the exploitation of nature morally acceptable' (Milton, 2002, p. 53). Extending political ecology with a more-than-human lens explicitly counteracts this by addressing non-human entities as actors in the co-production of shared worlds (Fischer et al., 2022). Political ecology has proven indispensable for analysing how environmental issues are embedded in economic, political, and social relations (Benjaminsen & Svarstad, 2019), yet its human-centred focus often leaves the roles of non-human forces underexamined. More-than-human political ecology examines the entanglement of human and non-human actors, tracing how they jointly constitute both the conditions and the consequences of megafires. Attending to fire as an actor in its own right, rather than as a mere outcome of human activity, makes it possible to become attentive to how forests and fires dynamically interact with regulatory frameworks, economic pressures, and local practices. In this sense, the research is directed at expanding and validating the field of more-than-human political ecology.

Research objectives and questions

In sum, I identified several research gaps in the literature review, regarding (1) local responses and their position in relation to authorities, (2) the implications of immigration on pyropolitics, and (3) a methodological exploration of more-than-human agency. Taking these into account, I set out to understand how forest fires *produce* and *become produced* by the relations between state, human, and non-human actors. In other words, I aspire to investigate how fire *shapes* and *is shaped* by governance and, in turn, how this interacts with more-than-human relationships in an Indigenous territory. Hence, I formulate my research questions like so:

General research question:

How do intensifying forest fires act as both drivers and outcomes of transformations in the socio-natural assemblages and governance of Indigenous territories?

Specific research questions:

1. *How do Indigenous communities emotionally experience and cope with more-than-human losses from forest fires?*
2. *How do forest fires mediate, and how are they mediated by, land struggles, immigration, and governance?*

Case study and justification

Of what is this a case?

The Amazon biome has recently experienced record-breaking wildfires, indicative of a "new fire regime" where climate change, El Niño, and land degradation intensify blazes (Eloy et al., 2019). This has prompted calls for fire suppression across South America, particularly in Amazonian woodlands with long, complex burning histories now facing catastrophic fires (idem).

State-led fire suppression policies often create conflict by disregarding traditional local burning knowledge and practices, leading to their erosion (Carmenta et al., 2019). While there is a shift towards "new fire management," it remains contentious, relying on technology, legislation, and governance models that seek to transform, rather than integrate, traditional practices. These dynamics fuel regional tensions in Latin America, where environmental policies and development initiatives clash with local livelihoods, often perpetuated by "primitivist" views that demonise traditional land uses (Oliveira & Hecht, 2018; Eloy et al., 2016). Powerful agribusiness further leverages anti-fire narratives to undermine Indigenous and traditional land rights, despite their own significant contribution to deforestation and thus fire risk (idem). Moreover, climate change politics frequently conflate large-scale agro-industrial clearing with smallholder practices, unfairly targeting adaptive traditional systems (Padoch & Pinedo-Vasquez, 2010). The reliance of Latin American fire policies on geospatial technologies often marginalises local knowledge and decision-making power, leading to new forms of expropriation where essential smallholder practices are criminalised under top-down environmental control (Carmenta et al., 2013). As such, colonial tropes about 'the undeveloped' underpin narratives about human-environment interactions, which in turn foster policies and interventions that tend to dispossess local smallholders.

In this context, Indigenous *Chiquitanía* territories, located in the midst of last year's megafires and acting as important retainers of agricultural frontier expansion in Bolivia, emerge as a critical space to analyse tensions between fire use, forest management and Indigenous land rights. As made apparent by Figure 2, Bolivia's forests were especially devastated, with a 200% increase in primary forest loss, affecting at least 31 Indigenous territories, 36 protected areas, and 10% of the country's surface (He et al., 2025), including the Amazon rainforest and the world's largest remaining dry forests: the Chiquitano and Gran Chaco. According to data from the National Institute for Space Research (INPE) and the Food and Agriculture Organisation of the United Nations (FAO), the *Chiquitana* region, in particular, has been one of the most affected. In 2019 and 2020, the region

suffered massive fires that devastated thousands of hectares of forest, affecting biodiversity and the livelihoods of indigenous communities (FAO, 2020; INPE, 2020). Among the hardest hit was the Indigenous territory of Monte Verde, where the Chiquitano dry forests meet the humid Amazon, and over 80% of the land, or 67,483 ha, was ravaged by megafires.

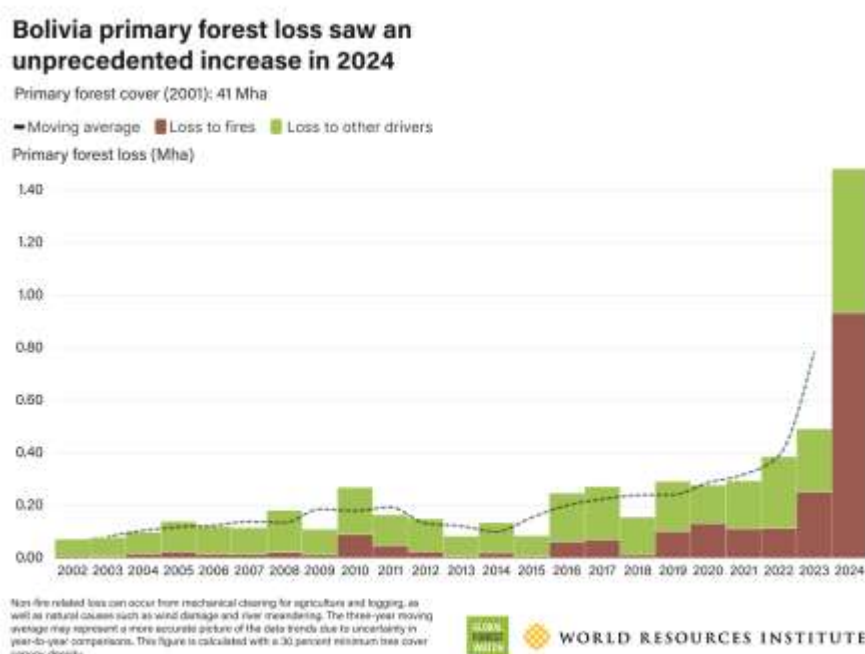


Figure 2. Extent of primary forest loss in million hectares from 2002 to 2024.

Hence, this study's geographical thematic focus is well-suited as a case of deforestation due to fire, environmental control and land rights struggles, as well as the relational, emotional, ecological, economic and political mechanisms through which these occur.

Case background

In order to situate the analysis and assuming the reader has not been there, I provide background information on the study area, describing the vegetation types, land cover changes, territorial legal recognition and people and culture. The Monte Verde Indigenous Peasant Territory (TI MV) is located in the department of Santa Cruz and was titled with an area of 974,447 hectares (Map 1) in 2007 in favour of the Chiquitano Indigenous people who have ancestrally inhabited it. As mentioned above, this territory is part of the *Chiquitanía*, one of the eco-regions in the eastern lowlands subtropical zone of Bolivia (Tamburini, 2019), which falls under the municipal jurisdiction of four municipalities: Concepción, San Javier, Urubichá and Ascensión de Guarayos (Pinto, 2022).

Biophysical characteristics

The largest natural vegetation cover is forest, occupying approximately 80.8% of the surface area, generally dominating the entire landscape of the territory, except in the southern and southeastern portions, where the rural and savannah physiognomies stand out, both representing 11.6% of the total surface area (APCOB, 2024). However, by the end of 2020, the natural land cover within the study area and its area of influence had suffered a loss equivalent to 7.3% of its extension, which was transformed into agricultural and/or livestock production areas, or into new human settlements (idem). Since the legends of the maps are written in Spanish, a short explainer will be provided for each map. Figure 3 distinguishes six land cover classes, shaded from light green to bright red: agricultural fields and Cerrado savannas, dry forest, Amazonian and transitional forest, riverine forest, saxicolous (outcrop) vegetation, and anthropic areas. The Indigenous community visited in this study, anonymised as community A, is located deep inside the territory where the forest starts becoming transitional and humid Amazonian species generally burn easily compared to the more fire-adapted dry forest taxa.

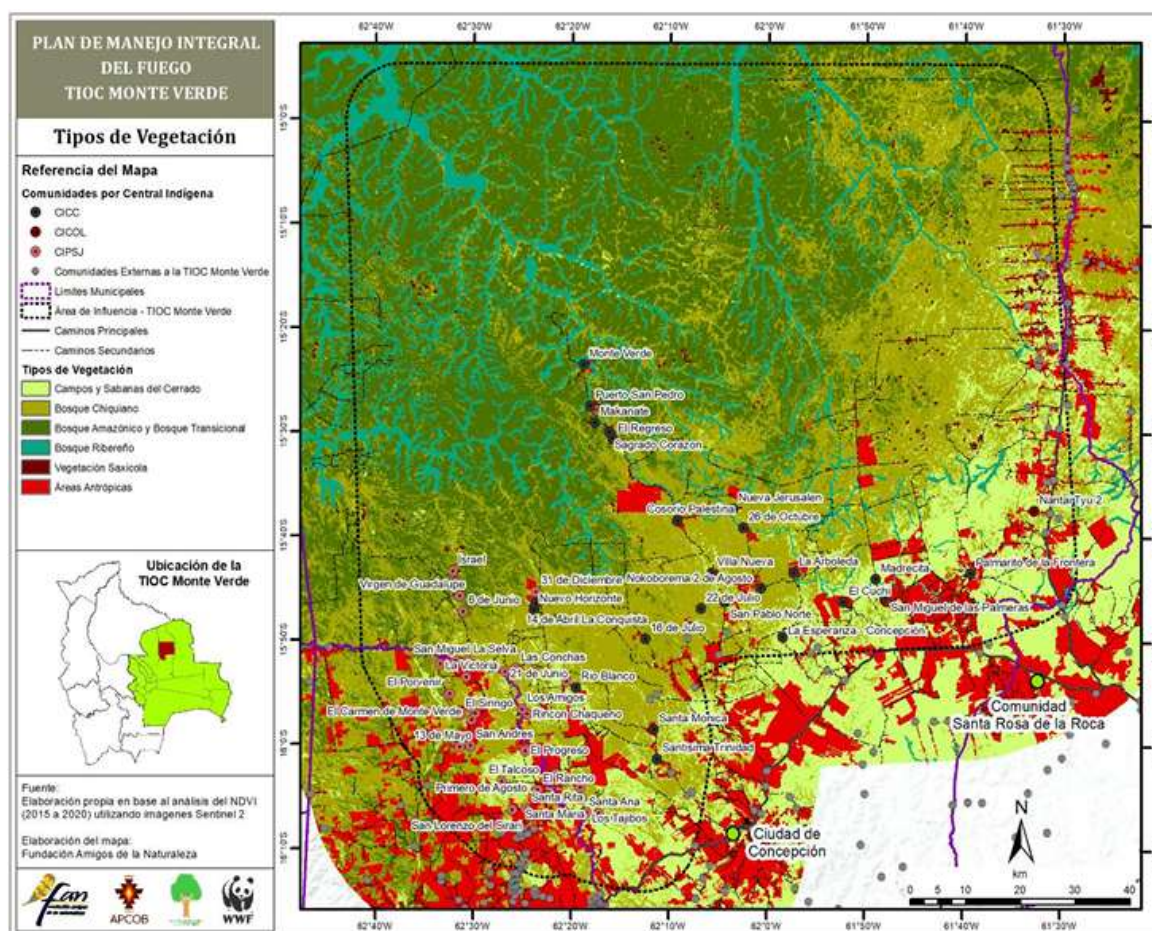


Figure 3. Land cover map of TI MV (APCOB, 2024)

Land rights and disturbances

The physical and political boundaries of the Indigenous territory can be observed more clearly in Figure 4 below, delineated with the black borders that are interrupted by empty cut-out shapes, indicating third-party appropriators in addition to supposedly pre-existing private properties owned by Mennonites². The map only considers communities living inside the territory, and the cream-colored polygons indicate the communal area confines around individual communities marked by yellow dots. Red lines signify roads, where the ones outside the territory are asphalted primary roads and the ones cutting into the territory are secondary roads.

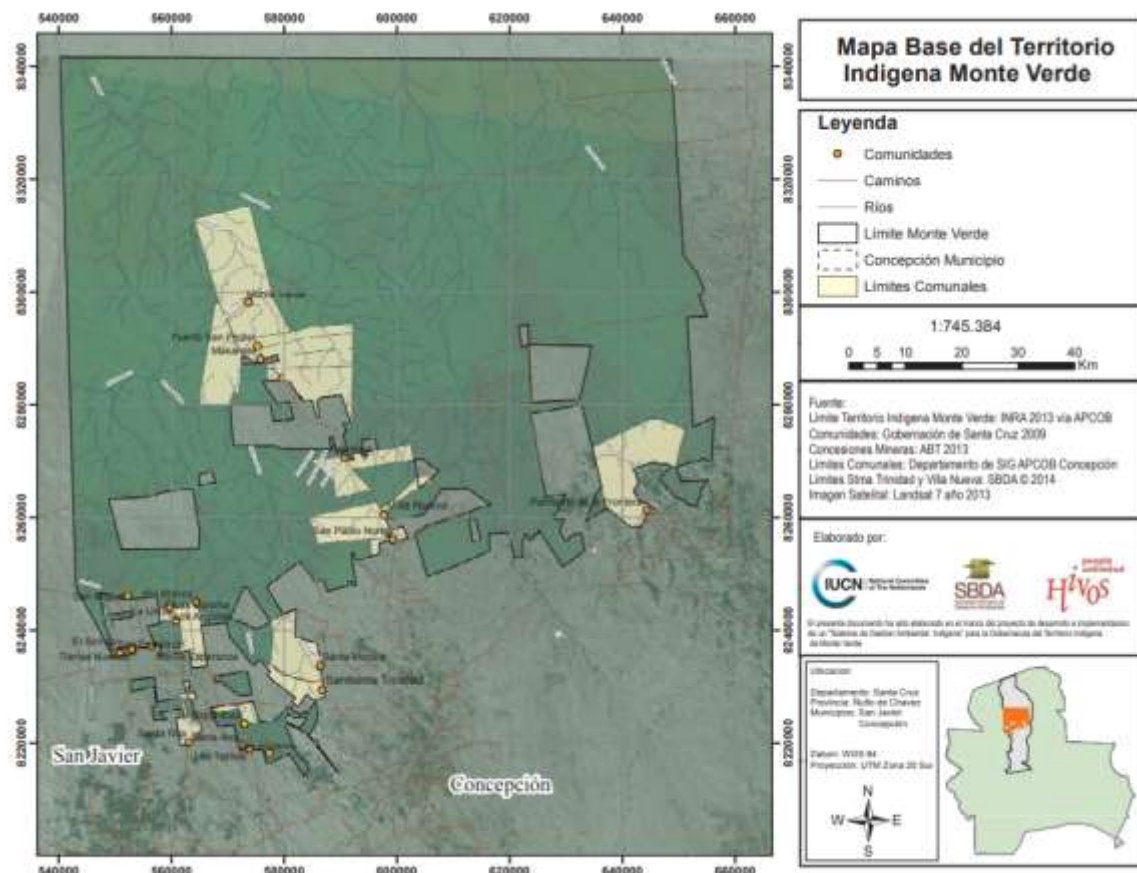


Figure 4 Base map of the TI developed by the SBDA (Bolivian Society of Environmental Law) in 2014.

Within the territory of 1,059,964 ha that was consolidated in 1997, the forestry superintendency granted forestry concessions to timber enterprises for an area of 122,000 ha (SBDA, 2014). The struggle for recognition and titling of this Indigenous territory has since then been a long and complex process, culminating in the obtaining of Executive Title No. TI-NAL-000148 in 2007, which

² Mennonites are traditionalist Christian communities known for their agrarian lifestyle, cultural separation from modern society, and have become significant drivers of deforestation across Latin America through large-scale agricultural expansion (Le Polain de Waroux et al., 2020).

recognises 947,440.8320 hectares as the ancestral territory of the Chiquitano Indigenous people (APCOB, 2023). The community land of the Chiquitano Indigenous People of Monte Verde was thus only officially and legally recognised after a qualification procedure of more than 10 years, financially supported by the Danish Embassy through the Danish International Development Agency (DANIDA). According to INRA (the agrarian authority), Law No. 1715, the original communal territory constitutes collective property, unseizable, indivisible, imprescriptible, and inalienable. Bolivia's Constitution (Art. 403, I) recognises Indigenous and peasant territorial integrity, granting rights to land, renewable and non-renewable resource use, prior consultation, self-regulation, autonomous administration, and culturally grounded development in harmony with nature.

The Executive Title of the MV TI establishes the Chiquitano indigenous people, organised into 128 communities and affiliated with the three Indigenous organisations in the Ñuflo de Chávez province, as the legitimate owners of this territory. Within this framework, the MV TI has an organisational structure that includes all organisations established in the territory, independent of other actors and external interests. The *Chiquitanos* of the Monte Verde Indigenous Territorial Government (GTI) have established that the Indigenous Territorial Government (GTI) is a process of recovery and occupation of the territory, seeking the integral development of the Indigenous people according to their cultural particularities, their norms and organisational forms, in addition to a dynamic process of self-governance and joint decision-making (APCOB, 2024). Monte Verde spans three municipalities—Concepción, San Javier, and San Antonio de Lomerío—with the majority of communities falling under Concepción's jurisdiction (II-hi). Territorial governance is decentralised across three corresponding Indigenous community councils: CICC (Concepción), CIP-SJ (San Javier), and CICOL (Lomerío). Communities belonging to one of the three councils elect representatives who can run to be part of the board of directors of their corresponding council. The full board exercises the executive and administrative powers of the territory (APCOB, 2024).

However, pressure from economic interests and a lack of adequate protection have left the territory vulnerable to extractive activities and environmental degradation. The fire scar of 2024 can be observed in Figure 5. In total, about 80% of the territory was burned, with notable exceptions of riverine areas and a few isolated forest patches. According to the estimated area affected by fires in 2024, nearly 700,000 hectares were affected, of which approximately 500,000 hectares are high forest. Of these, 176,000 hectares are productive timber areas under management and harvesting of NTFPs (APCOB, 2024).

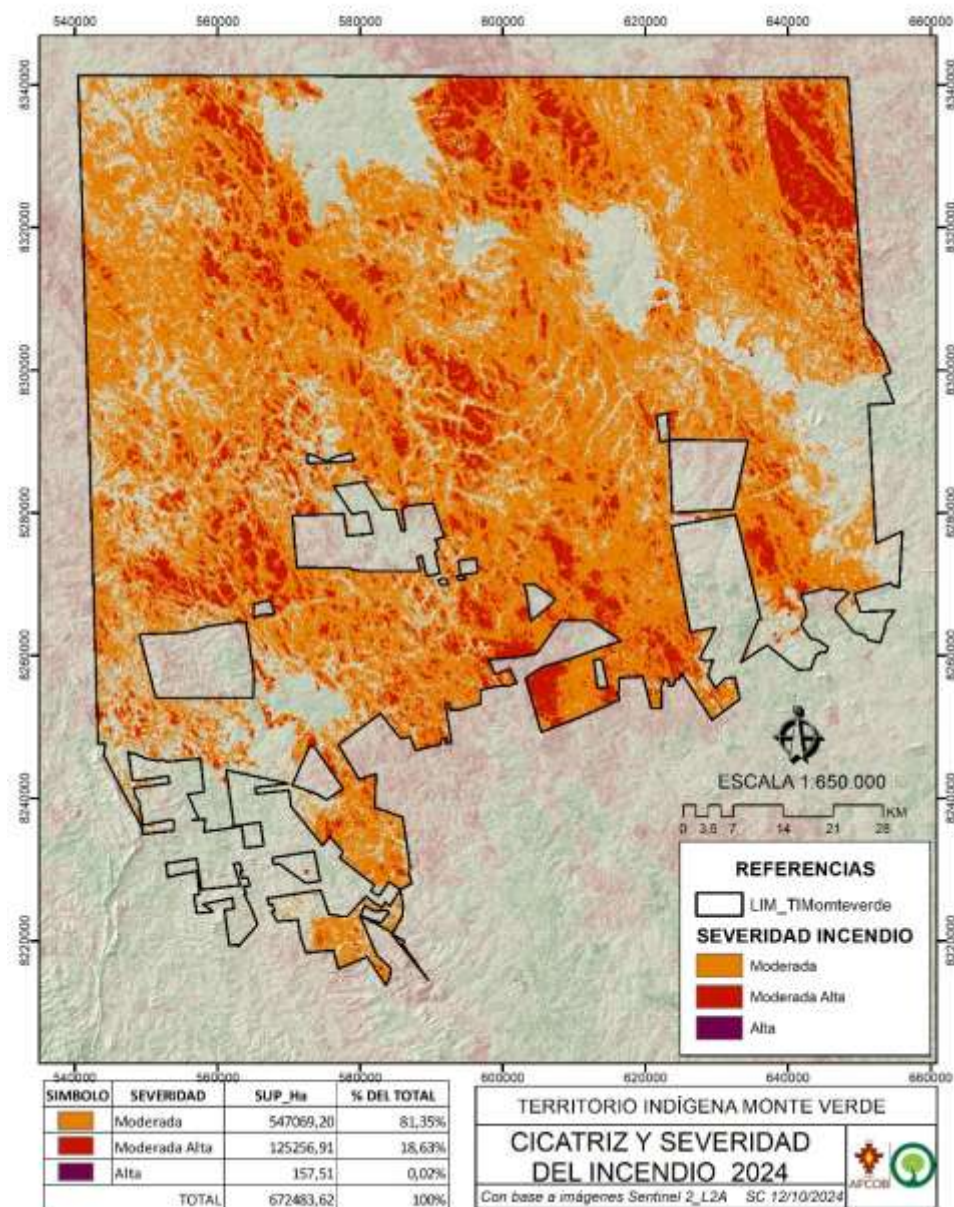


Figure 5. Scar and severity of 2024's forest fires, based on satellite images taken on the 12th of October (APCOB, 2024), with moderate severity in orange and moderate high severity in red.

In addition to collecting both timber and non-timber forest products, the Chiquitano indigenous communities also rely on the forest for hunting. Furthermore, the forest holds significant cultural and spiritual value for the Chiquitano people (APCOB, 2023).

Colonial history and cosmovision

From the outset, it is important to emphasise that although all Indigenous peoples of the Santa Cruz region are collectively referred to as *Chiquitanos*, they in fact comprise a plurality of distinct ethnic

groups. This homogenising label reflects the processes of cultural assimilation that took place during the Jesuit Reduction era (APCOB, 2016). The Chiquitano people's worldview – understood as the set of ideas, images, and constructed representations through which they interpret and explain the origin of the universe and their reality – is profoundly shaped by both the natural and supernatural environment inhabited by their ancestors, which gave rise to a rich and expansive mythology. This mythology came into confrontation with eighteenth-century Catholicism during the prolonged Jesuit mission (1701–1800), resulting in what has been termed the Chiquitano worldview: a synthesis of the diverse religious expressions of the peoples of the region with components of the Jesuit creed (APCOB, 2016).

The Chiquitano worldview is based on six principal components of religious thought. These include a belief in human predestination; recognition of the *Jichi* as the guardian spirit of nature; the conviction that each individual possesses three souls; the expectation of rebirth in an afterlife; veneration of the moon as a protective mother goddess; and, finally, devotion to a Christian-influenced deity, referred to as God or *Tupasch* (APCOB, 2016).

It is striking that, despite their sustained exposure to evangelisation from as early as 1691 within the Jesuit Reductions, the Chiquitano people have preserved key aspects of their traditional cosmology. At the same time, they also assumed the role of missionaries themselves, thereby honouring the Christian identity that had been imparted to them. Beyond recognising Indigenous cosmovisions as valuable knowledge systems, the significance of this specific cosmology lies in how the *Jichi* – though its belief is waning – still represents a meaningful medium in which Indigenous Peoples relate to the natural environment, forming part of the more-than-human assemblages that will be theoretically defined hereafter.

Conceptual framework

In this section, I present my conceptual framework. I first discuss contemporary common ways of understanding and analysing land ownership and access through the work of Lund and Ribot & Peluso. While offering useful ways to understand why and how humans are excluded from assets, they only see nature as an asset and not an agent in itself, which is why I propose a conceptual integration of these theories with more-than-human political ecology and assemblage theory.

Processes of (dis)possession and territorial control

When studying land struggles, in this case related to forest fires, possession and dispossession are key elements to reckon with. One way of looking at land (dis)possession that allows us to better apprehend the complexity of it is by Lunds' theory on coding regimes of possession. Lund (2024) argues that the ability to grant or deny rights to resources and community membership constitutes state³ power and that recognition is a reciprocal process where effective rights establish authority, and vice versa. He illustrates this dynamic by examining how "coding" and "recoding" of assets, the identity of rights-holders, and public authorities contribute to the ongoing formation of governance, often highlighting the complex interplay of legal and institutional pluralism⁴ in defining processes of (dis)possession. He defines an asset as "something of value, and the codes that specify its valences" (p. 4), rights subject as "a natural (human individuals) or artificial (entities created by law) person *and* the codes determining its specific entitlements" (p. 4) and public authority as an institution *and* the codes determining its jurisdiction" (p. 4). Codes are instrumental to each of the three components – codes themselves are construed as "a script that tells us the nature of the asset, how it appears to the social world, how it can be held, used, and transacted, as well as how it falls within different jurisdictions of regulation" (p. 2). In conclusion, Lund argues that (dis)possession is a dynamic, political process of "coding" and "recoding" the fundamental elements of assets, rights holders, and public authority. The very nature of property is redefined through these acts of coding, which can be used to either entrench or challenge existing claims, often resulting in the consolidation of power and rights for some, at the expense of others. For my case study, and in line with Lund (2024), I understand authorities as comprising both the formal state, state-like institutions, including the INRA and ABT, and local organisations, like the Indigenous councils. Hence,

³ Per Lund (2016), the state is not one unit but several institutions and "always in the making" (p. 1200).

⁴ This refers to a context "where multiple legal and political systems coexist and intersect" (Lund, 2024, p. 4).

I focus on the convergence of governments at three levels and the two state authorities ABT and INRA. With regard to rightsholders, it is important to note that not all people in a society are necessarily rightsholders – for example, non-citizens.

The condition of dispossession is conceptually closely related to notions of resistance, since public actions by dispossessed political subjects are read as a form of protest against state power or policies. It is in this context that Dhawan (2015) examines how often only privileged people find themselves in a position where their citizenship is recognised and thereby can access protest politics to negotiate their conditions, while marginalised subjects are excluded from these spaces, whose exclusion and conditions are partly produced by the same systems the former group is protesting against. Thereupon, Dhawan poignantly puts forward that: “In response to Michel Foucault’s claim ‘where there is power, there is resistance’, I would add ‘where there is resistance, there is power’.” Therefore, to expect resistance and resilience implies assuming subaltern communities have a claim to citizenship and enforceable rights to begin with (idem). In other words, people may not have the power in a political structure to challenge it (Mortensen & Questiaux, 2024).

Lund (2016) highlights that land struggles can be seen as “struggles for the recognition of a wide variety of rights to access resources in various ways” (p. 1204). If we should understand people's access, it is not enough to consider who has which rights, because this does not necessarily equate to having the ability to enforce that right. That is why I also draw on the Theory of Access to determine how people access assets, which introduces the mechanisms and “bundles of power” by which access is gained, maintained and controlled and thus mediate who can benefit from resources (Ribot & Peluso, 2003). The mechanisms are identified by a set of categories, including access to technology, capital, markets, labour, knowledge, authority, identity, and social relations. This can then be tied back to Lund’s concept of rights subjects, whose access to these assets is regulated by public authorities through their definition of people’s status as rights subjects. Public authorities defining and enforcing rules change over time and come to stand for the resource rules in use, as opposed to on paper. The status of rights subjects is constitutive of the degree to which the people have control and autonomy, which, in turn, defines their relation to the concerned asset, the forest and land on which it grows. As Ribot & Peluso (2003) note: “Some people and institutions control resource access while others must maintain their access through those who have control” (p. 154). The public authority/authorities defining what people’s status as rights subjects and thus their ability to access assets are therefore often a causal factor, though the process of possession can change at a different starting point too; this depends on the specific context.

According to Cary (2023), the control and management of fire is closely tied to the concept of territory, with authorities attempting to shape fire regimes through the delimitation of political boundaries and the territorial control of peoples and resources, highlighting the importance of considering the role of fire in the production of territory. The entitlements of natural and artificial persons (rights-subjects) are thus negotiated by boundary-drawing institutions and their jurisdiction (public authority) through the making and maintaining of territories. In the study area, there are designated zones for both natural and artificial persons, the latter denoting the forestry concessions. The essential role of this concept is in harmony with the first design principle of Ostrom (1990) that characterises robust common-pool resource management institutions: well-defined boundaries of a resource system. In addition, Indigenous territories in particular often remain one of the last barriers between conservation and deforestation in the frontier, where nature is cleared to develop more assets (Nepstad, 2006). Yet these scholarly traditions fail to understand the impacts and responses from nature in a non-anthropogenic way, which I aim to address by incorporating more-than-human assemblage theories.

More-than-human agents, assemblages and transformations

While the theories discussed above are useful in understanding my case insofar as the analysis of research question three, questions arise about the role of non-human actors, which, while here believed to only display *non-intentional* agency (Guthman, 2019), participate in the dynamic cause-and-effect process shaping political authority. Therefore, the theoretical framework presented here adds nature as a fourth component to the three components of asset, rights subject and authority (see Figure 6). Combining analytical frameworks of how processes of possession are produced in Lund (2024) and assemblage thinking where no one element "has sufficient competence to determine consistently the trajectory or impact of the group" (Bennett, 2010, p. 23-24), I understand these components as interacting in a multidimensional manner, that is, a reconfiguration of one component and relations among those are always co-constituted and can start from any point. The coding and recoding, or making and remaking, of the more-than-human agent component launches material, emotional and relational ripple effects on the rights-holders whose lives are connected to that more-than-human agent. A megafire, for example, has massive effects: it may recode assets by destroying them, reconfigure rights-subjects as it affects access or displaces them and challenge authorities by exposing institutional neglect or failure. Whereas assets comprise the access to the benefits of a (natural) resource according to Lund, he overlooks how non-human and even non-animate entities and forces also shape coding, recoding and ultimately (dis)possession.

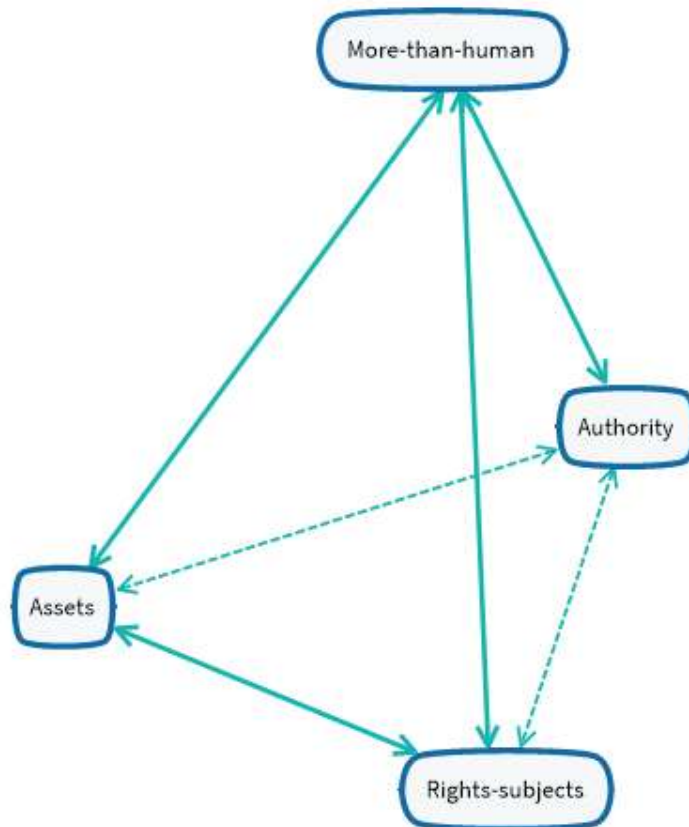


Figure 6. Three-dimensional conceptual framework linking More-than-human agents, Authority, Assets, and Rights-holders that co-produce transformations of land rights and socio-natures when any point inside the figure moves to a new place where its assemblage changes. The 3D representation⁵ is inspired by the conceptual tool by Galappaththi et al. (2019).

It would not suffice to include nature as a mere resource or asset, as it falls short of accounting for the agentic capacity that still exists outside of its utilised, exploited or otherwise economically relevant form. Whereas assets comprise things valuable to people only, including nature, more-than-human agents point to the environmental forces of and beyond natural resources. Natural agents continually shape and are shaped by rights-holders and authorities, yet assets, including nature, are also shaped by nature itself. Therefore, nature does not merely make up a pre-existing entity or external condition of, e.g. land reforms, so it must be included as a constituent component of regimes of (dis)possession. One limitation of doing so is that the non-intentionality of nature's agency may position it at a disadvantage compared to intentional agents, authorities and rights-subjects, who can decide how to direct efforts to transform rights and thereby hold more power.

⁵ If the dimension is not apparent, try visualising the Authority component positioned further back in space.

The idea behind my inclusion of natural actors is rooted in the term more-than-human, which understands non-humans, such as flora and fauna, as important social actors, moving beyond anthropocentric understandings of environmental change (Ballamingie & Szanto, 2022). Scholars like Julie Guthman (2019), Anna Tsing (2015) and Klara Fisher (2022) acknowledge and appreciate the active part non-humans play in producing phenomena and results, where agency is implied by its consequentiality, that is, the capacity to generate effects on other objects and subjects. Applying an analytical lens as such is also known as socio-natural assemblage thinking, in which “constituent parts articulate so that perturbations in one area can affect others and even reverberate throughout the whole” (Guthman, 2019, p. 17). The concept of socio-natural assemblages refers to a constellation of diverse and dynamic processes that, in conjunction, create significant and transformative effects. The socio-natural assemblage studied here is the joint expression of the four components: assets, rightsholders, authorities and the more-than-human, with the latter concentrated on fire and forests.

When referring to the term transformation throughout this thesis, I draw on the definition from IPBES’ Transformative Change Assessment report, which defines it as “fundamental, system-wide shifts in views, structures and practices” (IPBES, 2024). In the description of the conceptual diagram above, I touch on two related types of transformations, which should both be analysed not as spatially or temporally linear processes but as cross-scale, retroactive and transboundary trajectories, evocative of the climatic feedback loops discussed in the introduction. With the transformation of land rights, I mean the modification of legal frameworks, regulatory measures, or traditional practices related to land ownership, utilisation, and transfer. With transformations in the socio-natural assemblages, I refer to the changes in perceptions, relations and practices taking place in the more-than-human world with which local communities interact.

Human and non-human agency and relationality

I define more-than-human agents as animate and inanimate natural matter, to comprise both fire as an element and multispecies networks of the forest, borrowing from new materialists like Jane Bennet (2020) who ascribe the capacity of matter “not only to impede or block the will and designs of humans but also to act as quasi agents or forces with trajectories, propensities, or tendencies of their own”. To illustrate how this relates to social structures, it may be conducive to reflect on the work of Archer (2003), who argues for a conceptualisation of the relationship between structure and agency through the following three-step process:

1. The contexts within which agents operate, and how these contexts are influenced by social structures.
2. The interests and priorities of agents, and how these are informed by their contextual circumstances.
3. The projects pursued by agents within these contexts, along with their effects, such as the reproduction or transformation of existing structures.

I argue believe these steps can be applied to natural agents as well, as they operate within certain contexts (e.g. a forest is managed differently in North vs South America because of different social structures), can arguably be recognised as having interests (e.g. trees seeking sunlight), and, most relevant to the issue of agency, exhibit effects that, albeit non-intentional, can be nothing short of transformative. I conceptualise the interchange between the more-than-human world and rights-subjects relevant to socio-nature and land rights transformations as relationality, with which I mean the mutual movement of more-than-human relations and how emotions become attached to these. To understand people's experiences of and responses to socio-nature and land rights transformations, we must regard not only the material but also the emotional impacts and how this may be imbued with their cosmovision. Human agency is emotional, and part of the emotional is people's relations to nature - this relation shapes how people act and adapt (Mortensen & Questiaux, 2024). As mentioned before, marginalised people may not be recognised as citizens and enjoy full citizen rights, but they still exercise agency, which can be seen through their adaptation strategies (idem), which are important in understanding socio-nature transformations.

Synthesis

Collectively, the framework proposes a theory of socio-natural (dis)possession in which assets, rights-subjects, authorities, and more-than-human agents continuously code and recode each other, producing transformations in both land rights and socio-natures. In the field, this translates into observing how forest fires and other more-than-human forces not only disrupt existing configurations of access and authority but also catalyse new assemblages of power and resistance.

Methodology

Paradigm – philosophy of science

Since the conceptual framework considers the reality of all four key components of the social world, that is, people, ideas/meaning, material things and the relations within and between them (Fryer & Navarette, 2024), my work mainly draws on the paradigm of realism. The more-than-human or assemblage theory does not oppose a realist view; in fact, I would propose it fulfils the causal criterion of existence, which essentially posits that something is real when it has a causal effect on the world. Both the material and relational (and ideological, but that is outside my current scope) dimensions of the natural world can have identifiable impacts in the social world, and therefore they exist. In critical realism, the world must have the ontological properties of experiences, events and causes for causality to be possible, a conclusion based on the method of abductive reasoning used by Bhaskar (2008). Yet, I argue these properties are not exclusively reserved for the social world, as agents from the non-human world too produce events (e.g. weather conditions), constitute events (e.g. in natural disasters) and, debatably, experience events. So, rather, it would be an ontological mistake to exclude these agents from our analytical lens since they often directly or indirectly have bearing on social structures and agency. Extending agency to non-human agents would thus allow critical realism, and the intellectual community drawing on this paradigm, to paint a more accurate account of the world. I apply this by collecting data on both human and non-human agents' responses to forest fires and offering explanations of which state, human, and more-than-human dynamics tend to bring about these events and experiences. Since these cannot be objectively measured or quantified and because I want to gain an understanding of contested transformations, I draw on participatory and qualitative data, as set out below.

Data collection and methods

This case study employed a community-based participatory research (CBPR) approach, combining a quantitative impact analysis, participant observation including more-than-human ethnography, semi-structured interviews, and photovoice. The following will outline a more detailed description of how each method was designed and deployed in the field.

Quantitative socio-economic impact analysis

An essential component of my fieldwork involved collaboration with APCOB, a civil society organisation founded in 1980 by a group of social scientists to support the indigenous groups of the eastern Bolivian region. This partnership extended throughout my research period, beginning with an intensive two-week period at their office in Concepción, dedicated to systematising, analysing and writing a report on the socio-economic impact data from affected communities within the territory. This engagement was established as a reciprocal agreement, compensating APCOB for their facilitation of access to the communities with which they maintain close ties.

The dataset was extensive and detailed, primarily documenting fire-induced damages and associated costs throughout the previous year (2024). Using Stata software, I conducted descriptive statistical analyses to quantify total costs across different categories (e.g. education, infrastructure, NTFPs). A significant portion of the process involved data validation, as the information had been collected by multiple field personnel. This exercise provided me with a comprehensive overview of the regional impacts, situating the case study community within a broader contextual framework. Please note that the analysis surveyed 16 of the 86 communities residing in the territory (APCOB, 2024), so any total costs reported in the results represent only a sample and, hence, a conservative figure of the whole economic impact generated by the fires throughout the entire area. Also, though the expenditure associated with some donations was calculated, it was not possible to calculate the entire amount spent by donors or other entities providing assistance during the fire season, representing another underestimate.

Additionally, this collaboration fostered trust with APCOB's team and deepened my understanding of the organisation's diverse initiatives, offering valuable insights into their perspectives on wildfire impacts and the roles of other stakeholders in the region. Beyond its methodological utility, this phase of the research functioned as both an academic inquiry and a professional engagement, enriching the study's practical and analytical dimensions. I hope this research can have a higher impact by sharing findings with the organisation afterwards.

Participant observation and more-than-human ethnography

Participant observation was conducted with seven community members during work or while showing fire scars, through a practice of "knowing through showing" (Pitt, 2015). This approach involved spontaneously accompanying community members as they worked in their *chacos* (shared

agricultural land) and navigated fire-affected areas, allowing them to guide my attention to meaningful changes in their agroecosystems and surrounding woodlands. Without imposing rigid structures, I embraced an opportunistic methodology where learning emerged through shared activities, whether walking through regenerating agroforestry patches or participating in casual conversations during harvesting. I particularly focused on cultivating what Tsing (2015) calls "the art of noticing," engaging all my senses to perceive both visible and subtle transformations in the more-than-human world. This meant attending not only to ecological changes like shifts in plant composition or animal behaviour that residents pointed out, but also to the affective dimensions of these encounters – the tones of frustration or resilience that surfaced when discussing fire impacts. In line with a more-than-human political ecology lens, non-human actors such as forests, fire, and wildlife were treated as participants whose agency shaped observed outcomes. The organic, participant-directed nature of this method revealed insights that more formal and text-based interviews might have missed, particularly about embodied forms of livelihood loss and adaptation and the complex geographies of post-fire regeneration.

Semi-structured interviews

Interviews were conducted both within and beyond the local community using tailored guides for each stakeholder group. While each guide was customised to capture unique context-specific perspectives, all versions maintained consistent thematic threads for cross-comparison. In total, sixteen semi-structured interviews were conducted, averaging 70 minutes in duration, using the flexible interview guide attached in Appendix B, organised around three themes discussed later.

At the local level, purposive sampling targeted three participant categories: long-term residents with varying degrees of forest dependency in community A, two leaders of intercultural communities and their corresponding women's organisation⁶ (notably understudied and underrepresented in existing research), and the *cacique* (community leader). For the latter, I supplemented standard questions with broader context inquiries adapted from the sustainable livelihoods framework of Natajara et al. (2022). Community A counts 18 families and 67 inhabitants, but at the time of visiting, only half of the families were present, though not always permanently, as many move back and forth to the city, where a community house allows access to more healthcare and education opportunities.

Considering the small sample size, I chose to use sequential interviewing, which involved starting

⁶ These are communities consisting of both local *canbas* (Indigenous people from the East) and immigrant *collas* (Indigenous Peoples from the West). Both women's communities are located near TI Monte Verde.

with the *cacique* interview and expanding from there by adding additional households to the sample as long as the interviews generated new insights, until reaching a saturation point where no more information is gained. Municipal and regional participants were selected based on their influential roles in the fire crisis and land struggles, specifically targeting authorities and practitioners working in agriculture, forestry, or governance sectors. The idea behind using such key informant interviews is to rule out alternative explanations for the case study observations. After interviewing municipal office managers, I encountered a third local community group at a workshop, which I was not aware of before: peasant community farmers⁷ of the organisation "El Única" belonging to a national labour union, who seemed relevant to interview too due to their distinct land history compared to Indigenous and intercultural communities. An overview of research participants by method and category can be found in Table 1.

Method	Participant category	No. of participants
Participant observation (n = 7)	Community A members in their <i>chacos</i> / fire-affected areas	7
	More-than-human participants (fire, forest patches, flora/fauna)	n/a
Semi-structured interviews (n = 20)	Community A households	5
	Community A <i>cacique</i>	1
	Intercultural community leaders	2
	Peasant farmers leaders	2
	Local cattle rancher association representative	1
	Forestry engineer and timber merchant	1
	Municipal authorities	1
	Departmental authorities	2
	Forest and Land Authority (ABT)	1
	National Institute of Agrarian Reform (INRA)	1
	Regional soy farmer association representatives	2
Photovoice (n = 10)	Community A individuals	10 (5 women, 5 men)

Table 1. List of respondents.

⁷ Also known as original peasants, whose land was granted during the 1922 revolution, when whoever managed the land became the owner, that is, the INRA recognises their legal ownership.

Each interview followed a standardised protocol beginning with researcher positionality disclosure and formal consent procedures for audio recording and anonymised data use. Three thematic sections structured the dialogue: first exploring human/non-human fire-mediated relationships and responses; second analysing power networks by mapping conflicts and cooperation between different actors; and third investigating perspectives on forest governance and risk management approaches. This tripartite structure enabled both focused exploration of each theme and comparative analysis across participant groups.

Photovoice

This study employed photovoice, a participatory action research method (Wang & Burris, 1997), to explore lived experiences of forest management, more-than-human environmental changes and fire risk through community-generated imagery. The chosen method of photovoice offers a powerful lens through which, together with the community, we could analyse these experiences and changes in a co-creative way: (...) “nature does not ‘speak’ for itself nor do humans speak for nature, but rather it is about ‘speaking’ with nature in and through images and stories” (Morton et al., 2020, p. 3). The approach aligns with decolonial methodologies by centring local epistemologies and Indigenous voices through visual storytelling (McKittrick, 2021), crucial for allowing equitable environment and climate discourse (Spiegel et al., 2020; Fricas, 2022).

Design and training phase

Participant recruitment focused on six households selected through purposive sampling to ensure gender and age balance. Selection criteria prioritised long-term residency in Monte Verde and representation of intergenerational knowledge about forest ecosystems. Villagers were curious and all expressed interest in participation, which eventually led to a sample size of ten people, of which five were women and five men. Participants gave verbal consent and could opt out at any stage. For photos showing people's faces, an anonymisation protocol exists, and the use of images is restricted to academic dissemination, though participants kept copies of their own pictures.

A training workshop on the first day prepared participants for the photovoice process. The session covered three areas: technical smartphone camera skills (focus, composition, and lighting), ethical photography practices like obtaining consent from photographed individuals and conceptual framing through a "treasure hunt" exercise (e.g., capturing a colour or something unnoticed).

Data collection phase

The data collection began with a ten-day documentation period where participants took photos without specific prompts, deciding for themselves what to express or share, though during my initial introduction, I had mentioned my research focus on forest fires. Due to the community's sparse population, participants knew they could find me for questions or support regarding the documentation process.

For the subsequent individual interviews, participants and I collaboratively selected ten photos in total to analyse using photo-elicitation techniques (Harper, 2002). Each interview followed a structured three-stage process: first asking "SHOW: What do we see in this image?" to establish descriptive observations, then progressing to "THINK: Why did you choose to capture this? What story does it tell?" to draw out interpretive meanings and finally exploring "FEEL: How does this image make you feel?" to understand affective responses.

The data collection concluded with a community workshop where the protagonists presented their pictures to synthesise findings. This session served two important purposes: first, it allowed for the triangulation of individual narratives by bringing together different participants' perspectives, and second, it facilitated the co-creation of key recommendations for fire management policies. Through this group session, we were able to identify shared themes that emerged across the various personal accounts and photographic documentation.

Analysis phase

The analytical framework combined visual and narrative analysis approaches. For visual analysis, I systematically coded the photographs for recurring symbols, such as fire scars, applying Rose's (2016) visual semiotics methodology. This was complemented by narrative analysis using NVivo 14 software, where I performed thematic coding of participants' image descriptions while cross-referencing these with interview transcripts and field observation notes. The dual approach allowed for both visual and verbal data to inform the findings.

Methodological reflexivity

As a white, non-Indigenous researcher from a wealthy country, I sought to mitigate power imbalances by compensating participants by leaving them the phones purchased for the photovoice data collection, with SIM cards and internet credit, prioritising those without devices. Soon, mobile phone service will be made available in the community, which, together with the devices, will enable

timely communication with emergency agencies that were lacking during the year before. Second, I ensured co-interpretation of images rather than applying external analytical frameworks.

Several limitations emerged during the research process. One challenge during the research process involved an elder participant who experienced difficulty operating the smartphone, ultimately contributing only two photographs, which may exclude an important demographic point of view from the data. The participant proposed that I take pictures instead, and I was debating how this would change the participatory nature of photovoice. I figured it would not be viewed entirely through their personal lens anymore, literally and figuratively, since it confuses the roles of producers and viewers in representing a symbol. With this in mind, I decided not to include the couple of pictures I took for her. Also, the decision on mobile phone distribution after data collection presented an ethical dilemma regarding intra- and inter-community fairness, which was eventually addressed by accounting for existing phone ownership, adopting a needs-based approach.

General ethical considerations

Issues of tropical forest fires, access, degradation, conservation, and restoration are highly sensitive, and there was a risk of accidental findings. As such, it was vital to secure the protection of both participants and collaborators continuously. To protect confidentiality, the exact name and location of the community studied are not provided and were instead anonymised as “community A”. No identifying details are disclosed beyond the region described above; all identifiers have been removed or generalised. Following the ethical guidelines of the International Society for Ecological Restoration (ISER), I systematically solicited and documented informed consent while being transparent about my research aims. The colonial legacies of Latin America required reflection on positionality and ownership of knowledge. Working with communities that may have suffered from significant livelihood loss and trauma also places any participant and researcher in a delicate position. It was therefore essential to engage in reflexivity, acknowledging privileges and inherent biases that may have shaped my understanding of the community and its challenges. I was committed to practising cultural sensitivity, learning from local knowledge and practices and approaching the community with humility. Finally, I aim to maintain meaningful relationships and generate mutual benefits by disseminating the findings with the community.

Data analysis

Data analysis employed qualitative thematic analysis using NVIVO software. Interview transcripts, photovoice descriptions and participant observation notes were systematically coded to identify recurring patterns, key concepts, and divergent perspectives. Initial coding was conducted inductively to capture emergent themes grounded in the data. These codes were then organised into broader thematic categories through an iterative process of comparison and refinement.

The data was organised across three analytical levels.

At the local level, the material comprised household interviews (hh), photovoice contributions from individual participants (pv), and records from participant observation and “knowing-through-showing” practices conducted in group settings (po). At the municipal level, data consisted of stakeholder interviews with representatives of the municipal government (g), the cattle ranchers’ association (cr), the Única peasant farmers’ association (uf), intercultural community leaders (ic), a forestry professional (f), and the forest and land authority (abt). At the regional level, two types of material were included: (a) stakeholder interviews with representatives of the regional government (g), the soy farmers’ association (sf), and the National Institute of Agrarian Reform (inra); and (b) a quantitative report documenting the socio-economic impacts of the 2024 fires in Monte Verde (rep).

Thus, the data files were labelled and cited like so:

1. local level: ll-hi, ll-pv, ll-po
2. municipal level: ml-g, ml-cr, ml-uf, ml-ic, ml-f, ml-abt
3. regional level: rl-g, rl-sf, rl-inra, rl-rep

My coding tree moves from impacts (parent code 1) to local responses (parent code 2) and structural drivers (parent code 3 & 4).

1. Forest fire impact

- a. Forest loss
- b. Ecological emotions
- c. Livelihood loss

2. Local risk management, adaptation and agency

- a. Fire and agricultural practices
 - i. Traditional burning
 - ii. Fire-free alternatives (no-burn chaco, mechanisation)
 - iii. Livelihood diversification and adaptation
- b. More-than-human responses and relations
 - i. Restoration
 - ii. Spiritual beliefs
 - iii. Climate change
 - iv. Future scenarios

3. Land tenure

- a. Fire origin and responsibility
- b. Immigration and land struggle
 - i. Cultural divide and land dispute
 - ii. Land titling, trafficking and fire as a land grab tool

4. Unauthorised burning and structural deterrents

- a. Forest governance organisation and risk response
 - i. Community firefighting
 - ii. Burning calendars and criminalisation of fire use
 - iii. Forestry and forest management plans
- b. Institutional injustice
 - i. Legal authority conflicts and overlaps
 - ii. Coordination and data sharing
 - iii. Systemic power imbalances
- c. Regulatory enforcement
 - i. Information and hotspot monitoring limitations
 - ii. Bureaucratic and budget constraints

Results: Local impacts of and responses to forest fires

Research question: How do Indigenous communities emotionally experience and cope with more-than-human losses from forest fires?

Introduction

Communities' oral accounts reveal embodied experiences of loss and active resistance through community-based disaster responses in the face of 2024's megafires. It affected all areas of life – including health, sleep, home, education, family, water, food, air, safety – as the chief of an Indigenous community in Monte Verde emotionally emphasises

We have experienced extreme sadness. What hurt us most was not being able to contact or communicate with our children. We decided to stay to take care of our home and animals, while the children were evacuated. Only five families stayed. (Il-hi)

Many community volunteer firefighters had to be hospitalised or developed chronic health issues, such as respiratory problems, as a result of this work. In this thesis, however, I focus mostly on the material loss of livelihood opportunities and the emotional dimension this entails in terms of more-than-human relations. Yet the experience of the fire and smoke alone was already immensely impactful, and many respondents articulated how all they saw was white when they opened the door. Moreover, it often posed an actual survival threat to people at the frontlines. Farmers from an adjacent area recount how closely their fate was tied to the flames:

In 2019, we managed to protect our community; six or seven plots were saved. This year, nothing. Nothing could stop it. The fire came like a five-meter wall—it was hell. Our fence wires melted from the heat. We barely escaped. The tapirs and sloths did not. (ml-uf).

Grievance and worry over ecological loss were paramount in the stories people told me and seemed no less important to them than the direct impacts on agricultural and agroforestry productivity. As a result, hunting activity dwindled, as members of an intercultural community comment:

It hurts much to lose plant life. If we didn't identify with being part of nature, we would be in the city, where all is paved. Wild animals do frighten us sometimes. Before, there was plenty to hunt, such as armadillos, wild pigs and deer, but the fire killed many wildlife and beyond. Now, almost no one hunts; people let it recover. (ml-ic)

The socio-economic impact report (rl-rep) underlines the severity of the disaster, with an estimated cost of €134,032 from failed crop production and €18,071 from livestock losses. Twelve of the sixteen communities suffered losses of livestock feed or had to incur costs to compensate for the shortages until the pasture recovers. Approximately 69 hectares of agricultural production were lost. The Community A alone had a communal garden, featuring a large variety of vegetables: tomatoes, carrots, peppers, cabbage, lettuce, onions, leaf onions, parsley, and chard. Due to the smoke, they were unable to harvest anything, resulting in a loss of sales revenue of €1,479.

Moreover, the wildfires caused significant damage to timber species, where all but two communities counted with a Sustainable Forest Management Plan (SFMP) during the fire season (rl-rep). The majority had their plans in place for the timber harvesting phase, and many burned both in stocked piles and tree stands. On average, SFMPs covered approximately 2,000 hectares per community, but the wildfires caused the loss of 55% of the timber in these areas. This reduction not only affects the availability of forest resources but also has a direct impact on the communities' income. Before the fires, the plans generated an average income of 130,000 bolivianos (Bs) (€16,102) per community, an important economic resource for subsistence and local development. The loss of this income exacerbates the economic vulnerability of families who depend on forests for their livelihoods. Timber in the forestry stockpile was also severely affected, with an average of 450 m³ of logs burned per community. In addition to timber species, non-timber forest species and products were also affected, in the case of Non-Timber Forest Management Plans. Nine of the communities had restoration plans, ranging from 0.5 to 250 ha and agroforestry systems to natural regeneration, that were affected by the fires (APCOB, 2025). These economic impacts suggest that not only governance regimes but also nature itself affects people's access to resources. The following paragraphs will go into further detail about local communities' loss of forest, livelihoods and ecological emotions.

Fire scars

Livelihood loss

According to an Indigenous community leader, "fires have severely affected the community, impacting natural commons, such as water, animals, and plants" (Il-hi). She adds that fire frequency has increased significantly over approximately three decades. Historically, dietary staples consisted predominantly of yuca, peanuts, and plantain; however, a shift toward rice, coffee, and banana cultivation has occurred, and many banana crops are infested with pathogens nowadays. There is a food shortage because a year's worth of production was burned. The plants suffered phytotoxic damage from smoke exposure, and in addition, the ash contamination killed the fish. What's left now is expected to only sustain the community for two more months. They did everything possible to clean up the fields, so they'll have enough for the current annual cycle (Fig. 7).



Fig. 7. El plátano – The plantain

This image shows me cutting the fruits from a plantain plant that we were able to save after 2024's forest fires, thanks to the rain. We live on plantains and bananas as they form part of the daily diet. Looking at the economy right now and because we don't have a monthly pay, we cannot get it from the market. However, we do still need to buy oil to fry plantain and make *chipilo*.

Later, another community member says they used to grow and sell tomatoes, but this is no longer possible since part of the *chaco* was burned. What got compromised the most, however, was the pasture, which is fed to livestock during the dry season when they don't have enough to graze (Fig.

8). The photovoice images she took also depict how one of the most important staples, corn, incurred damage from the fire and how it is traditionally prepared and consumed (Fig. 9).



Fig. 8. Pasto the corte – pasture

Pasture that is cut to feed the cows and that has dried out because of the smoke. They will have to find out if it will be restored for the next dry season when the cutting is done.



Fig. 9. Maíz – Corn

We use corn first and foremost to make *chicha* and feed the chickens. We are only growing them for the seeds at the moment, as there was no time to do weeding during the fires.

The *chacos* closest to town were spared. Some went to the nearest city, for two to three weeks, to escape the flames. One of the five families that stayed portrays how the ashes affected everything:

The livestock could not be saved; some of them ran into the fire from the smoke. If they had entered their pastures, they wouldn't be able to get out anymore. The vegetables growing in the communal garden were lost. The post and wire in the pasture were burned. This was an investment, and there is no compensation for any of the losses. Luckily, our *chaco* could be saved during the fires. At the same time, there was no time to keep producing, and most of this year's production was lost because the sowing takes place in October. We will have to wait. Many people have left because of what was burned in their *chacos*. One moment, we thought about leaving too, but not anymore. (Il-hi)

Individuals of the same family also participated as photovoice protagonists and took the pictures of Figures 10 and 11 to demonstrate the impacts.



Fig. 10. Cachuela

We cross in the family canoe to reach the cows and to work the *chaco*. The water dried up on the other side too, leaving a *cachuela*: a dry area of pure rocks, exposed by low water levels. This was the place where we used to take the cattle. The water still hasn't returned to its original level. In this river, we also fish for our consumption. Many fish died during the burning months. We had to move the cows to the other side.



Fig. 11. Planta cítrica – Citrus plant

This is a mandarin tree. It's one of ten in my garden that didn't even flower because of ash from the wildfires. No citrus trees are bearing fruit now. Who knows how many years it'll take for the plants to recover? It's disheartening. We have to spend more now to supplement.

On top of crop and livestock loss, the wood the community had stored for sale (*rodeo*) was burned, as well as some standing tree species, such as the one shown in Fig. 13. Another family that stayed laments that everything they had planted in their agroforestry systems was in vain (Il-hi). In their case, the *chaco* had been protected, but they lost all the coffee plants, which had a serious impact. They have started to sow again; it was hard to keep farming during the fires as there was no time nor seeds to sow. Meals were cooked in a common pot with the food that was donated, from which they are still living today, though it is running out.



Fig. 12. El café

I love to consume my own coffee, and some is sold as well. For seven years, we have had an abundance, but there was no market for it. With last year's fires, three out of eight plants could be spared.



Fig. 13. Una planta mara – A mara plant

Mara wood that doesn't split when used in carving, just like cedar. Favourable for carpentry. It was protected from fires, but the heat and smoke still affected it.

More community members had invested in coffee-based agroforestry, with coffee beans representing an increasingly important income source as the market for organic coffee is rising. Fig. 12 portrays one of the plants that survived. From participant observation and knowing-through showing sessions (II-po), it could be clearly noticed how the coffee plants were affected, together with the twenty-year-old *tarara amarilla* trees. The tips of the twigs were still carbonised, and the leaves filled with burned holes. The coffee plants were just flowering when the fires came, and from the heat, the fruits fell down. Only a handful of plants had fruits on them, if any. They will have to wait another year for the coffee to regenerate. The bee houses placed in the coffee fields are no longer inhabited, either as the fire drove the bees out. On the path next to the coffee fields, a third community member was taking out the seeds of a cacao fruit. He let us taste one and showed the six trees he manages, which used to be full of fruit, but for the past two years, not anymore. That is why he is planting more trees, and because "provisions are getting more expensive, so it is important to keep working" (II-hi).

At the same time, work is becoming more cumbersome because of the invasive weed boom following the forest burns (see Fig. 14). The communities' observations correspond with APCOB's

forest cover assessment, which shows a significant reduction in the density of dominant trees. Fifteen per cent of the trees in the upper canopy lost their crowns, and thirty per cent suffered canopy damage. This results in a sparse forest with a high percentage of direct light reaching the ground and understory, which favours the proliferation of invasive species (APCOB, 2024).

Yet, multiple members of the community were actively engaged in slashing the weeds and debris to regenerate the fields (Fig. 15). Restoration efforts and challenges will be reviewed more in Local action, adaptation and agency on page 51.



Fig. 14. Chipazón prejudicial – Harmful weed

All this is *mucuna*. This weed smothers everything, covering and choking out all other plants, also the corn we grow. It's incredibly frustrating because controlling it requires constant weeding.



Fig. 15. Organización nueva – Renewed organization

The chaco of my uncle. Coffee plants and tarara amarilla trees were burned. We are cutting and clearing the undergrowth to grow bananas and recover the chaco.

The communities of both respondents from the intercultural women's organisation interviewed near Monte Verde territory also suffered burned crops, pastures, fence posts, and wires. "It burned plantains, yucca, papaya, pineapple, corn—all we had planted. We are suffering because it left us practically with nothing, swept clean. There was no water." (ml-ic)

Forest loss

"The forest used to be big, beautiful and healthy, but is getting tired now." (Il-hi)

Despite suffering substantial livelihood insecurity, the majority of respondents at the local level especially express worries about the state of the forest ecosystem in the aftermath of fires. Before presenting the emotional dimensions of this wreckage, which will be covered in the next paragraph, the ecological damage itself is addressed below.

While engaged in participant observation, the forest being one of the participants, it was not immediately clearcut that the place had recently been scorched since the trees look primarily vibrant green, but this is not to be mistaken:

The forest was more biodiverse in the earlier years. Numbers dropped because of forest fires, and since we consumed the animals. Now we are surrounded by birds because there are no fruits left in the forest. The river creeks dried out. Rain has come now and made things look greener, but trees are still dying and falling. (Il-hi)

Still, someone from the community remarks that it is now justified to call the territory Monte Verde (Green Hill) again (Il-hi). To illustrate, one protagonist exhibits how green the whole area used to be before the fire crisis (Fig. 16), which he then contrasts with the fire scar (Fig. 17).



Fig. 16. Bosque verde – Green forest

A piece of the *chaco*, a glimpse of what the natural forest once looked like. We've rescued 200 hectares of high forest near the house; the rest was burned. I took the photo to show the reference.



Fig. 17. Cicatriz del fuego – Fire scar

The impact of the fire is now visible: the tree tips are dry and leafless. Those that do have leaves, typically with thick barks, are more resilient, like the *jichiturico* and cedar. Regeneration is still very limited.

Wildfires in the Chiquitano region inflict profound ecological damage characterised by degradation at best and absolute destruction, i.e. deforestation, at worst. Municipal and regional government sources (ml-g, rl-g) report that fires trigger the proliferation of invasive species that suppress native seed germination and impede natural forest regeneration. Concurrently, pyrogenic contamination – deposition of soot and ash on soils and aquatic systems – induces secondary mortality in surviving vegetation, further compromising ecosystem resilience.

Fire behaviour intensifies between September and November due to seasonal winds, which propagate embers up to 150 meters, igniting accumulated leaf litter (ml-f). This wind-driven propagation is exceptionally destructive in Chiquitania's transitional forest ecotone due to contrasting fire adaptations: while dry Chiquitano forests include fire-tolerant species like the moisture-retaining *momoqui*, they also contain flammable deciduous species, like *cuci* and *tarara amarilla*, that shed abundant leaf litter. Crucially, this litter creates continuous fuel beds that carry fires into the adjacent humid Amazonia vegetation, which lacks fire adaptations and burns readily.

Forestry sector observations (ml-f), incidentally recorded during routine timber harvesting operations under *Planes de Desmonte* (regulatory land-clearing permits), corroborate the severity of these impacts. In one documented incident in San Silvestre, a wildfire approached within 50 meters of a timber stockpile; though reduced in intensity due to prior burning, this high-intensity burn still completely eradicated the understory and incinerated local wildlife. Elsewhere, in actively managed logging zones, widespread crown scorching was observed where flames had climbed into the canopy. These first-hand accounts emphasize that ecological damage extends far beyond tree mortality to include holistic ecosystem collapse. The convergence of cross-biome fuel connectivity, invasive species dominance and soil degradation creates a negative feedback loop, inhibiting ecological recovery and amplifying long-term regional biodiversity loss. The representative of the natural resource unit of Santa Cruz's departmental government succinctly affirmed this stating that:

Post-fire landscapes face irreversible damage: invasive species dominate, soils acidify until nothing grows, and ash runoff poisons waterways. Even vegetation that still stands dies from the airflow of fires. Now we are just trying to maintain what we still have. (rl-g)

The progressive escalation of burn severity and corresponding tree damage is visually documented in the close-up photographic sequence (Figures 19 to 21) on the next page.



Fig. 18. Quema de primer nivel – First-degree burn

There was heavy leaf litter here, which acted as a buffer so these wounds could still heal. Often, young trees' thin bark offers little protection – that's where the fire took hold and made this scar.



Fig. 19. Quema de segundo nivel – Second-degree burn

A fragile *serebó* (*Schizolobium amazonicum*) in the fire's path. It was not directly burned but scorched by intense heat.



Fig. 20. Quema de tercer nivel – Third-degree burn

Here the trees are at least 50 years old. The fire left them scarred with third-degree burns. In a few months, they will rot and collapse. This wood once contributed to the world's oxygen; now it is dead. The palm tree behind it met the same fate.



Fig. 21. Desaparecido – Gone

This wood was already hollow or dry. It burned for 30 days until only this remained. Devastating. Just charcoal and ashes left. This is now a common sight in the primary forest.

Respondents from the intercultural women's association add that trees' resistance to disturbances resembles that of humans; the young endure while the old ones succumb. When asked how they think the forest is responding, they shared that "with the rain the forest recovers, but not many big, old trees remain" (ml-ic). Ecological analysis by APCOB reveals that this is true, though only when looking ahead in time. The fires have caused a decrease in the abundance of young trees, as seen by changes in the distribution of trees by diameter class, a situation that represents an interruption in natural forest regeneration. With few young trees, some species may become endangered within a few years due to the lack of mature trees to perpetuate their species (APCOB, 2024).

The sudden appearance of an otter peeking its head from a stream prompted a deeper inquiry into hunting practices, a vital livelihood activity in the region. Local hunters report pursuing multiple species, including two deer varieties (*huaso* or *Mazama americana*; *urina* or *Mazama gouazoubira*), lowland paca (*jochi pintado* or *Cuniculus paca*), South American tapir (*Tapirus terrestris*), armadillo (*tatu* or *Tolypeutes matacus*), and peccary (*chancho del monte* or *Tayassuidae*) (ll-po). These reports document catastrophic population declines following wildfires, with burned carcasses commonly found and the lowland paca (*jochi pintado*), once abundant, now rarely seen.

Participant observations and household interviews reveal these losses form part of multifaceted disruptions to the territory's faunal communities. Herbivores, tapirs, and armadillos show reduced densities in burned areas, while opportunistic foraging in chacos has increased, with species like the *tejon* (coati) targeting banana crops (ll-po). The novel appearance of wild ducks in the village demonstrates displaced fauna abandoning fire-devastated habitats due to resource scarcity (ll-pv). These behavioural shifts may also stem from the combustion of keystone species, particularly fruit-bearing trees like the bibosi or wild fig (*Ficus dendrocida*), which burned "right down to the roots" (ll-hi), which previously sustained canopy fauna, such as parrots, monkeys, and ocellated turkeys.

Community members report encountering starving fauna, noting they "look at you and cry out, but there's nothing we can do" (ll-pv). Consequently, negative human-wildlife interactions have intensified as forced dietary shifts drive fauna toward subsistence crops. The resulting competition has transformed agricultural zones into contested spaces, where households must "produce for ourselves and for them" (ll-hi). These cascading impacts visually manifest in disrupted human-fauna relationships, as documented in the photovoice testimonies of Figures 23 and 24.



Fig. 22. Perjudicial – Harmful

This monkey was not here before. Now that there have been massive fires which left the forest scarce of fruit, a plague has formed. It makes me feel bad that we lose part of our harvests.



Fig. 23. Un atraso para la familia – A setback for the family

The corn that parrots eat. We used to see them as a forest ornament, but now they're becoming a nuisance, also due to the lack of food sources in the forest.

Two photovoice protagonists documented the degradation of a *saltral*, tropical mineral lick, which serves as a critical foraging ground for animals' mineral supplementation during dry spells (Figure 24). These patches are vulnerable to post-fire erosion, with participants reporting that animals that once gathered there have now disappeared. Other documented sites reveal the physical scars of combustion – snapped roots and toppled trees marking former gathering places for wildlife.



Fig. 24. Saltral

A saltral is an area of land that always stays damp, where collared peccaries (Pecari tajacu), red brocket deer and lowland tapirs come. Years ago, it was small, but it expanded because the animals lick the earth. We saw a brocket deer inside the hollow here. The fire came close, and in January, after it rained again, there was nothing left but ash. Now it has all washed down into the river.

The degradation of *saltrales* exemplifies how wildfires disrupt unique habitats – a pattern equally evident in aquatic systems. As alluded to earlier, river dynamics have been similarly disturbed, with consequences captured through the attentive lens of photovoice participants. The images of Figures 25 and 26 reveal sediment-choked channels, underscoring the interconnected loss of terrestrial and aquatic refugia for wildlife and livelihoods.



Fig. 25. La quebrada en su naturaleza –

The stream in its natural state

This is how it used to be: water flowing freely and beautifully. You could see downstream. In three years, it might return to this.



Fig. 26. Quebrada con árboles – Creek with trees

Many toppled trees now block one of the initial feeder streams flowing toward *Río Negro* (the main river). Some trees still stand, but they'll collapse within months, making the area completely impassable due to the obstruction.

The consequences of river flow disturbance and pollution are particularly problematic regarding the function of soil fertility. Especially the primary rivers, in this case the *Río Negro*, are found to be vital for elevating the otherwise low to moderate fertility of the land, as shown by the map below (Figure 27). Note how Community A is benefiting from the nutrient-rich riverbanks.

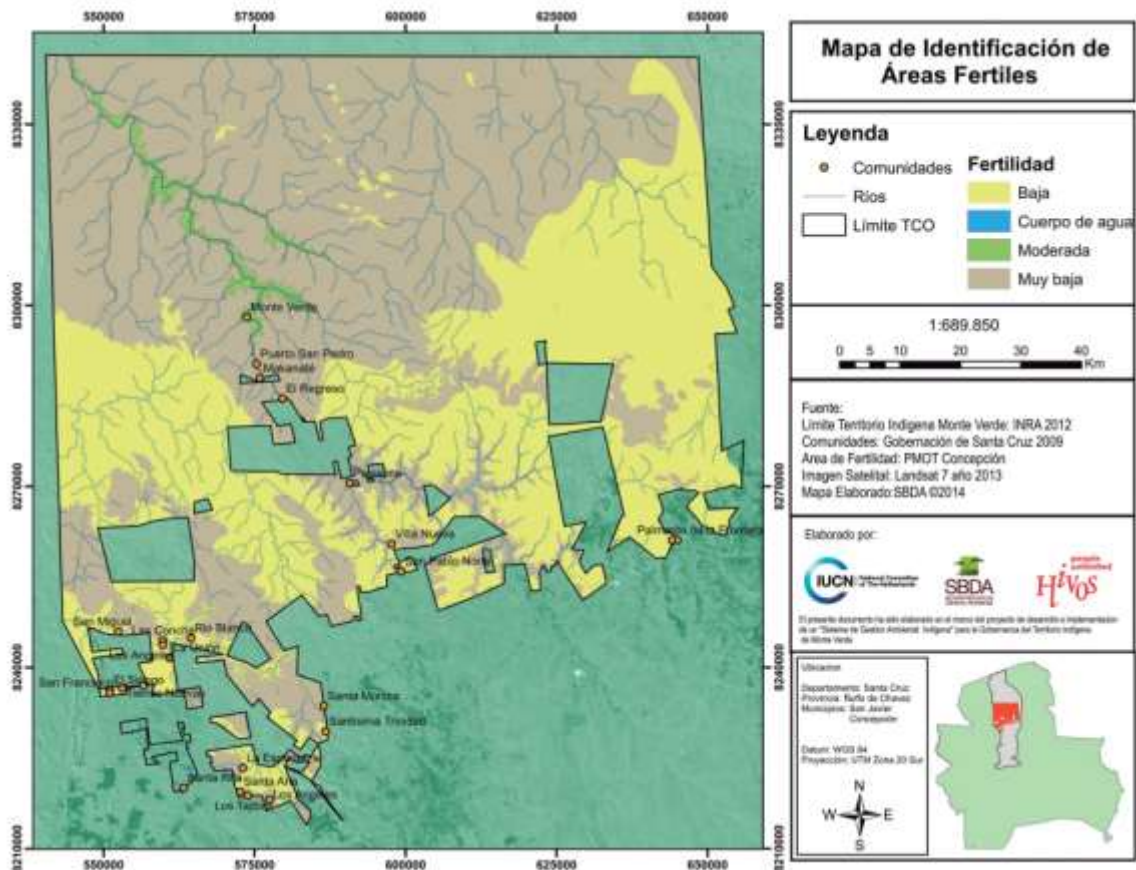


Figure 27. Fertile area identification, with brown marking very low, yellow marking low and green moderate fertility. Water bodies are shown in blue.

Drawing from Indigenous peoples' traditional ecological knowledge, these records show how wildfires have not just reduced animal and plant populations but have fundamentally altered the very ecosystems that sustained them. The compounded modifications to both livelihoods and the natural forest indicate a testament to the transformative effects of fire as a non-human agent.

Ecological emotions

"Even our dreams were filled with fire" (ll-hi)

From the photovoice exercise, many made material tethered to the felt experience – and sometimes visceral trauma as the haunting refrain above reveals – of environmental changes due to intensified wildfire events. While the previous paragraphs already indicated some examples of sadness from failed harvests, frustrations over explosive weed growth and profound grief upon seeing wildlife in need, the following text will consider the full range of emotions involved in living with the ashes.

The emotional toll manifests not only as material loss but as a profound psychological and physical imprint, evidenced by one account: "it came from all sides and terrified me... It caused throat issues, and I evacuated to Concepción for a month" (pp-hi). It manifests physically through respiratory crises and evacuations—one teacher requiring hospitalisation during the fires when breathing became impossible, with the family convinced they would have died had flames advanced further (ll-hi).

The corporeal burden intertwines with ecological mourning, where nature is perceived as sentient victims. Direct encounters with animal mortality intensified distress. A peasant farmer's testimony captures this visceral horror:

During last year's fire, I witnessed baby anteaters, sloths, and armadillos burning alive. It was devastating. When I tried to report that fire, my motorcycle tire blew out; later, my father's truck axle broke, so we had no option but to leave. Trapped overnight, we watched flames swallow forests 150 meters away. Authorities had no fuel to respond on time. (ml-uf)

This helplessness extended to forests themselves. When asked to describe what the forest looks like half a year after the burning, a respondent imagines the landscape as a wounded body: "the forest looks sad, deformed, with burned skin, asking for water. It is a pain to see its current state and almost too hard to fully take in" (pp-hi). Attempts to rescue fauna often ended tragically, as with deer fleeing flames only to be killed by dogs (ll-hi). Next to such sights, the community leader shared they also became witnesses through sound: "It was a sad situation. We went to monitor eleven kilometres away and when we returned home, we heard the trees and birds fall" (ll-hi)

Chiquitano families lived in constant fear of losing their farms, livestock, and other livelihood means. The dense and persistent smoke became unbearable, particularly affecting the most vulnerable groups, such as children and the elderly, who suffered severe respiratory problems. For several days, the smoke drastically reduced visibility, and the constant fall of ash kept communities in a state of constant alertness and anxiety, highlighting the magnitude of the disaster.

These narratives crystallise in community-captured images of devastation from finding a ruined *chaco* (Figure 28) and dismay from mourning fifteen years of care (Figure 29).



Fig. 28. Tarara rescatada – Rescued tarara

Cedarwood planted fifteen years ago. The photo was taken from a living section. They were all beautiful before, like these, but the fire left its scars. It's heartbreaking to see this wasted effort.



Fig. 29. Desastre en el chaco – Disaster in the field

There is a burned tree trunk that took down another plant. It is depressing to see the whole *chaco* reduced to ashes.

Such sights stand out in the otherwise more serene ecological conditions that characterise the area, according to a community member who recently moved there in search of better land:

It is peaceful and calm living here because you can work well on the land. The earth is fertile and supports almost any type of produce. It was hard to see the trees and the natural world burning during the time of forest fires. (Il-hi)

Within this landscape of loss, cautious hope emerged fleetingly yet meaningfully. The discovery of living *melipona* bees in a fire-damaged nest (Figure 31) prompted plans to relocate hives, a practical defiance against future threats. Similarly, recent regrowth amid the ruin, such as the *motacú* sprouts (Figure 30), signals the stubbornness of biological regeneration, mirroring the community's defiant care. These moments framed a communal ethos: "We hope that with time the forest will restore itself naturally, but until then, we suffer. It is a loss of life" (Il-hi).



Fig. 30. Retoño nuevo – New shoots

Here we see a burned *motacú*, whose leaves used to be used to make roofs. I had one, but it is rarely found nowadays. The tree is still there, and there are some fresh offshoots, but it will take time to recover fully like the one behind it. I feel sad that it is not bearing fruit now.



Fig. 31. Melipona sobreviviente – Surviving bee

The *melipona* enters the *picera* of a nest that survived the fires (at the bottom of the photo). Inside, it's intact. Its honey is a blessing in many ways, for pollination and medicine. They're peaceful little ladies; you just have to take care of them. The next time a fire occurs, the whole nest could burn, so we're going to place hives as a precaution. Whoever started the fire has no conscience. If there's no forest, there's no rain. We live off it. There have been many changes lately, especially with the fires.

The plant mentioned in Figure 30, *motacú*, was also a subject in another protagonist's photo series, who explained that it used to be the primary construction material since it has a cooling effect, and likewise comments that, unfortunately, this *Chiquitana* custom is disappearing because it is such tedious work. What follows is a closer look at the local practices and (adaptation) responses.

Local actions and adaptation

Now we will shift our focus to local human and non-human actions and responses in the context of the fire crisis and in relation to actors involved beyond the local. First, both the traditional and fire-adapted practices will be introduced, after which an overview is given of fire risk management and adaptation. Finally, the more-than-human responses and future scenarios are considered to arrive at a clearer understanding of the relational dynamics entailed.

Fire and agricultural practices

Interestingly, but perhaps not surprisingly, all actors referred to their burning practices for land management as guaranteeing no or minimal risk of the fire getting out of control. The following section presents insights into the traditional fire and agricultural practices, the fire-free alternatives that are currently being negotiated and experimented with, at what cost, for whom and how these changes translate into livelihood resilience.

Traditional (burning) practices

“The land has always been burned as an ancestral practice to prepare the chacos” (rl-cr)

As for the Indigenous communities in *Monte Verde*, traditional food systems consisted of cultivated plantains, beans, cassava (Figure 33) and peanuts, from which *masaco* (Figure 32) is made.



Fig. 32. *Masaco*

Masaco is made in a big grinder called *tacú*. First, we throw in peanuts, and later the bananas or yucca. This is what we principally eat here for breakfast because there is no bread, and it is the healthiest. Out of laziness our sons are getting crackers and fruit bars now in the town where they study. It upsets me people don't want to be part of the ancestral food practices anymore.

Fig. 33. Yucca – Cassava

Cassava is also part of our tradition, and now it has a good market too. This cassava is almost ready to harvest. We'll take some to San Ignacio [to sell] and keep the rest for our own use—to make *masaco*, for example. It doesn't require much work, just clearing and maintenance. We're only now expanding production since the market has become more reliable.

Regarding agricultural practices in the Indigenous territory, many coffee agroforestry systems integrate *tarara amarilla* (canarywood) for shade (see Figure 34). Systems span 18 hectares, incorporating *cuci*, *copaibo*, *roble*, and *ambaibo*, alongside citrus, grafted mango, bananas, and nitrogen-fixing *carnavalia*, praised for its function as natural fertiliser (Il-po). Almost all chacos are agroforestry systems in the communal lands. Fallowing occurs after 1–2 production cycles, with retired land (*barbecho*) becoming communally accessible (Il-hi). Traditionally, the Indigenous Peoples apply a slash-and-burn technique with a period of *barbechon*, where the earth is left undisturbed for two to three years so it can regrow on its own. With the current land traffic, however, they see migrants managing the land differently, without the *barbechon* and with more mechanical tools, which led them to question: “if they can, why can't we scale up?” Another way traditional land management is under pressure is that the younger generations leave to study elsewhere and often return with more modern ideas. These themes are explored further in the next chapter. Concerning fire management, the community tried to fight fire with fire, known as *contrafuego* (counterfire), which failed to contain the wildfire spread into coffee agroforestry systems. Ideally, it would go as follows: when a fire is approaching, another fire is started facing the direction of the first fire, sometimes multiple kilometres long, so that it collides and both fires are extinguished. This is only done when the fire is as close as 100 meters away so that animals get the chance to escape. They have seen turtles walking out of the fire towards them while waiting for animals to pass. For this practice, permission from the ABT, the institution that authorises controlled burns, is required. Since it



Fig. 34. Sombra – Shadow

The *Tarara amarilla* is planted for agroforestry and to provide shade for coffee plants. At 40 cm in diameter, it can be cut for construction and furniture making. When we first arrived, we lived under *chapapa* (sheets of wood or other material). Now we have more things to rest on, such as wooden tables and benches.

was not successful this time, fire barricades around the *chacos* at the opposite side of where the wind is blowing from were set up instead. The timing of this practice is typically decided at a general assembly, as everyone needs to be aware in advance (ll-hi).

According to the community, they have always used controlled burns with firebreaks, and the fire never passed over to the forest. This knowledge is shared with others and the next generations, for example, while having dinner. After three rains in October, it is safe to say the humidity is right for the fire not to get out of control. Every new respondent confirmed the traditional use of digging *callejones* (literally: little streets, firebreaks) around the *chacos*, which prevents fires from reaching the forest edges.

The information shared coincides with what the ABT (Bolivian Forest and Land Authority) had to say about traditional burning practices: "Indigenous communities manage fire ancestrally; they know burning is essential for chaco renewal and consider suitable months (July–October). They clear manually, await first rains for controlled burns when humidity prevents spread" (ml-abt).

Peasant farmers reportedly use fire in the same traditional way as indigenous communities, but manage larger land areas:

When preparing our *chacos*—agricultural plots of about three hectares—we create wide firebreaks before burning. I check wind direction and only ignite fires on the side with the weakest wind, never downwind. We wait until after the first rains, during the *veranito* (brief dry spell), when vegetation is dry enough. Around the *chaco*, I clear a 5-meter-wide barrier path. We burn slowly against the wind with water backpacks and buckets positioned at corners to control the advance (ml-uf).

A similar situation holds for intercultural communities, who likewise comment on the practice of counterfire to slow or stop the fire's advance, too. When asked in which instances fire is used and how it is managed, the answer also emulates the Indigenous practices. They explain that they start to *chaquear* – clear and fell in June, all the time up to August, when it dries out until fire is lighted in September. "Mostly we make firebreaks, so fire doesn't pass to the forest. Some people, when they

have a few pesos, use machines that knock down and pile up [the plant material] in the middle of their lot" (ml-ic).

The cattle rancher association representative repeatedly reports that there is no way that the producers have set fire to the edges, and from there it has gotten out of control because the edges are left free, and it has always been controlled. He adds: "and let's say, in one hectare, they make two strips; if there are 100 strips, they don't light all 100 at once; they throw one per night, depending on the staff they have". Cattle ranchers would not engage in clear-cutting as they retain 60-meter windbreak barriers untouched when clearing 100 meters of land, while reserving large shade trees for shade, removing only smaller growth, "unlike total agricultural clear-cutting" (ll-cr).

When questioned about departmental policies to prevent agriculture-driven deforestation, officials shed light on a driving factor behind the expansion of the livestock farming frontier:

The soil in these areas becomes degraded. Where crops are currently grown, we're implementing crop rotation to conserve the soil better - adapting techniques from pasture management. But the cattle won't even eat [the degraded vegetation], they just trample it, so producers end up clearing new areas for pasture (ml-g).

The latter quote points to large-scale deforestation in the agricultural sector. The soy producer association (ANAPO) assert to track statistics across their productive zones: 1.2 million hectares total, with 600,000 in sorghum, 600,000 in wheat, and 400,000 in soybeans and reports 80% adoption of direct seeding, crop rotation (wheat/sorghum/corn winter; soy summer), and soil cover to prevent burning. Crop residue incineration is discouraged due to flammability risks. Initial land clearance may involve controlled burns during legal periods, though illegal off-season incidents may occur, and Mennonite communities exhibit lower adoption rates of these practices (rl-anapo).

When asked to comment on links between prior industrial-scale land clearing and increased landscape flammability, ANAPO did not directly admit whether historical deforestation in the region worsened the conditions for more severe fires but shifted focus to current conservation efforts. I assessed their response implied: Yes, past clearing may have increased fire risk, but today's farmers are adopting better practices to mitigate this legacy and prevent further damage.

Fire-free alternatives

To prevent wildfires, we're experimenting with fire-free chaco farming or using machinery. We'll keep planting because these lands don't belong to us—they belong to our children. (II-pv)

In view of 2024's fire crisis, authorities have decided that people cannot burn anymore. Some in the Indigenous community say they don't know yet how they will manage the chaco now that burning is prohibited, while others are actively experimenting with ways to manage the *chaco* without burning. The experiments are assisted by APCOB, which organised a *minga*, a traditional communal work event, to prepare farmland without burning. Although the community is accustomed to fire use, especially when it comes to corn and rice, the majority of respondents accept not using slash-and-burn anymore and instead shifting to other methods, such as the *chaco sin quema*, or slash-and-mulch, a fire-free system designed not to need land clearing for nutrient cycling. Acceptance to limit fire use seems to stem from a motivation to mitigate ignition risks; "even sparks can be risky now, so it is best to avoid fire altogether," one household head states (II-hi). Next to risk mitigation, agroecological factors also play an important role; whilst most members of the community prefer to burn, they find that without fire, crops grow better because the soil nutrients are retained.

Participant observation and knowing-through-showing sessions demonstrated multiple no-burn systems. What they have in common is the arrangement of crops intended to mimic the multi-layered natural forest vertical structure. Instead of using fire to provide nutrients to the soil, the organic material that is used as mulch in this system not only provides that but also keeps the soil from drying out and promotes moisture retention at the roots. One pilot consisted of nine different crops, including coffee, beans (*Canavalia*), yucca, banana, citrus trees, mango, guava, papaya and pineapple. A second pilot is portrayed in Figure 35, about which the participant further elaborated on the initial description, explaining that the plantain is the first essential crop, alongside the *pacay*, a fruit tree that keeps birds from eating the coffee, which is the most promising crop, as it is a perennial rather than an annual. The plot is highly diversified, currently hosting around 50 species, but the aim is to reach 70 to match the diversity of a natural forest on a similar surface area. Among those species, fruit trees are planted 5 meters apart and timber trees 12 meters apart, including teak, *tarara*, mahogany, *copaiba*, *cuci*, and *chechera*; the rest is left for natural regeneration, a process that can take anywhere from 8 to 50 years. During the entire dry season, we no longer clear the chaco—this is how we maintain a no-burn system. Although the participant behind Figure 36 sees the alternative as an improvement, another respondent attests that with the no-burn projects, the coffee plants only reap fruits every three years instead of every 1.5 years (II-pv).



Fig. 35. Chaco sin quema – Fire-free farming

Here we see our intervention in an 8–10-year-old fallow field. This was a pilot plot, but it worked. Today, four more will be established. We have planted corn, beans, coffee, and plantain.



Fig 36. Café en suelo fértil – Coffee en fertile ground

Coffee is grown in the *chaco* under the no-burn system. Normally, it takes nearly 4 years to bear fruit, but with this method, it's faster because the soil stays more fertile.

Other instances of disagreement about the effectiveness and suitability of the no-burn *chaco* include that the work is more meticulous (II-hi) and that it's suboptimal for elders because it makes the pathways between plants less accessible (II-po). Additionally, the *chaco sin quema* is only 30 x 30 meters, whereas the original *chaco con quema* covers 100 x 100 meters, making the fireless option less productive and therefore economically viable for the community, according to a participant involved in the pilot project (II-po)

Another way they deal with the prohibition (despite the lack of control of compliance) and avoid burning is by cutting with a machete or, in some cases, with machine power. However, even with a machine, it means much more work. After last year's fire season, it was not so necessary to burn anymore because everything was already burned, but this year there is excessive undergrowth vegetation, which is not cultivated and therefore represents an additional slashing toll (II-po). One participant argues that these limitations point to the necessity of improved market access and collaboration with financial institutions to support the mechanised farming of at least 2 Ha per household. They clarify this does not mean new clearings but rather mechanising the damaged *barbechos*. This way, they can work more efficiently and have a greater seller's margin to purchase products they cannot cultivate (II-po).

Local intercultural communities concur with the mentioned benefits of mechanised farming, arguing that lending tools to farmers could help avoid much deforestation and thereby improve the coexistence between farming and forest protection.

Yes, working more mechanised would have less risk because when we do it by hand, there's more sacrifice, need to clear, fell and burn, we're more tired and heated from the fires.

Sometimes it escapes, they get a bit careless and quickly fire jumps, and this disgrace happens. In contrast, when it's machinery, everything is piled in a matter of hours, and then, when you make a firebreak and burn it, all will be like this *corbamba* [cleared area]. Then, where will the fire go? There's nowhere here for it to jump. Families even go into debt to buy pesticides because it's a big investment when one has parcels of 50 hectares. (ll-ic)

Peasant farmers, on the other hand, hold that machinery is not a real or complete solution since few can afford bulldozers at \$100/hour. Without machinery, organic matter decomposes slowly, enriching soil without compacting earth or destroying roots and biodiversity, they explain. The respondent proceeded to depict the differences in livelihood capacity and land use:

Mennonites clear 50 hectares and leave 10-20 forested—yet no one regulates them. Small communities like ours feed this nation more than export agribusiness! We propose renting machinery from Mennonites while prohibiting full clearances, reforesting burned areas with fruit trees instead of timber species like *tajibo*, which need 40-50 years to regenerate (too slow) and creating fire barriers (ml-uf).

Note that the intercultural communities also speak of 50 ha parcels. The peasant farmers didn't give exact numbers, but according to APCOB, it should be around the same. INRA comments that sustainable, productive alternatives that no longer use burning are promoted under the Ministry of SIPCA, which is responsible for working with agricultural advisors who disseminate that farmers do this work (rl-inra). It seems the advice is equally directed to all actors, while the work weighs more or less based on the differentiated land areas, resources and management options. The tensions introduced here will be addressed in the second chapter, which deals with question three.

Livelihood diversification and resilience

Half of the photovoice participants include a picture showing stingless bees (*Meliponini*) or their *meliponary* (hive), describing them as valuable aspects for subsistence and sustenance (Figures 37 and 38). It was well known amongst participants that they played a vital role in the pollination of fruit trees, medicinal plants, timber species, and ultimately the entire forest's biodiversity. Some villagers plant *acerola* cherry, a plant that attracts the *señoritas* – the colony of stingless bees that the community works with. Whereas hollow logs were once used as hives, they can no longer be found after the fires burned the trees. Now the community is using man-made hives, despite the risks: they're more vulnerable to cold weather. The community leader explains that beekeeping did not interest them much at first because they had no idea how to manage it, until they tried it together with APCOB. Unlike before, where all the honey was harvested, the lower half of the hive is kept for the bees now, so they do not leave. When a fire is started in the *chaco* that could threaten they are moved elsewhere, inside the wooden box hives. The village has its own laboratory where honey is turned into a variety of products, such as syrup, ointments, soap and energy bars, which makes her feel solid and empowered (II-pv). Participants express the importance of being able to count on their own medicine source, as well as an added economic asset: "it saves us because the honey provides one of our only sources of cash income, though it only allows for sales twice a year".



Fig. 37. Abejitas chiquititas – Tiny bees

Bees on a log. We ought to take care of the bees because they make honey and are brave animals. Honey is not harvested until the dry season. It was a surprise to see them this close. I love having them around.



Fig. 38. Las meliponas – The stingless honeybees

We see the honey of the little ladies (las señoritas). It helps us in many ways, providing alimentation and medicine that sustains the family. I am happy when I see this image because beekeeping is something I can manage on my own, with much delicacy.

Water tanks and reservoirs (Figures 39 - 41) also appeared multiple times in the photovoice data and are praised for the safe sources of drinking water they offer in times of fire and droughts.



Fig. 39. Mi agua – My water

We see the water tank, which was provided by a project and represents the community's priority. Without it, we would have to take water from the river, like the first fifteen years. "It makes me feel calmer that we are taking water that is healthier. "



Fig. 40. Tanque – Tank

This water tank draws water from the river to water the plants of the communal vegetable garden, so it is fundamental to produce their crops. I am grateful it got here, as we had to use buckets before, and now it is just turning on the tap.



Fig. 41. Atajado nuevo – New reserve

In the face of forest fires, this place helps to store water, for the livestock more than anything. It was a form of government support after the water reserve we had died out when there was another severe fire in the year 2000.

Whereas these accounts authenticate the external support that the Indigenous community received, the intercultural community representatives communicated that they continue advocating the same support for water access, because they lack a well or tanks to receive water in the countryside. Today, they keep maintaining themselves with rainwater like so: "(...) they put their little roof like mine of corrugated iron, place a gutter and under there a cistern, so when it rains that water fills the cistern through a filter" (ml-ic). Next to bees and water, the general resilience related to the restoration of agroforestry systems is discursively negotiated. Regional government officials argue:

Reforestation is extremely costly - about \$3500 to \$5000 per hectare, which the national government cannot afford. Local communities see this as risky since replanted areas could just burn again. There are some livelihood benefits. Agroforestry systems generate modest income through local markets. (rl-g)

Yet, the words and actions of community members don't necessarily verify the passiveness prescribed by that perceived risk, considering the observed clearing of burned wood to leverage the

nutrient-rich soil to plant new crops, which was seen as an achievement (II-pv), and participants stating that: “It is crucial to keep sowing (agro)forestry trees, so the ground is never bare and people have more diverse livelihoods” (II-po). The willingness to invest in chaco recovery despite the risk implied in these messages might mean the real resilience is found in the spirit of the people. Additional accounts of livelihood adaptation and resilience can be found in Figures 42 and 43, which portray the physical and natural capital employed to cope with environmental shocks.



Fig. 42. Joco

We see *jocos*⁸ next to a chicken. It is both water and drought resistant and therefore helps in reestablishing after the fires. The seeds were brought to us, and as you can see, it has reaped beautiful results. When another disaster hits and everything else is inundated or burned, we will have this. The chicken accompanies it to make a nice soup.



Fig 43. Caballos – Horses

Considering combustibles are getting more and more expensive, and horses only need water and grassland, I am planning to tame the horses to ride to the *chaco*. Normally, we take a motorcycle, so it would help lower external resource dependency and make me feel more secure.

Natural capital may as well be interpreted as a relational entanglement with the more-than-human world. Indeed, the emotional and adaptive landscapes – mapped through testimony and image – reveal how fire scars transcend ecology to rewrite human and more-than-human relationships, as we can see in the subsequent section.

⁸ A cucurbit from the squash family endemic to eastern Bolivia.

More-than-human responses and relations

More-than-human assemblages appear and evolve in countless ways. For the sake of brevity, a selection of the observed and photovoice-communicated relations and responses in the context of forest fires was made, where surely many more at play were not identified or non-identifiable. Next to notions of plant-woven artisanal products, such as fire fans used in cooking, multispecies relations (Figures 44, 45, 46 and 48) and intricate interactions with the river (Figures 47 and 49-54) clearly arose from data collection at the community level. Parrots and butterflies were also included by other participants, which often represent everyday entanglements: "These days, we watch the parrots flying to the *chaco* by noon. To us, they are living ornaments. Their gathering place looks like a postcard" (II-pv). Note how the parrots of Figure 44 are seated on burned branches.



Fig. 44. Las parabas amarillas - The yellow macaques

I admire them; they are gorgeous. The parrots pass and stop close to the village because they like eating the salt blocks for the cows. We co-live with them. I wish nobody would harm them and that they may always fly freely.



Fig. 45. Mi bello recuerdo – My lovely memory

I climbed into the tank. There was no reflection here during a fire because it was all smoke. It was like a bright light, very bright. During this time, you could not see the animals eating peacefully because they were all closed in.



Fig. 46. Mi hermosa mariposa – My beautiful butterfly

This butterfly likes to be on the riverbank. It is used to hunt smaller fish. The riverbank attracts other species of butterflies, but they left when I wanted to take the photo. It is conscious. It likes to feed on the nutrients from the wet wood.

The nearby river is framed in the photovoice imagery of multiple protagonists, who depict the *Rio Negro* (black river) with great admiration and feelings of unity. For a younger woman, it represents the beginning of their life, as they were living close to the river's reaches before. They still visit every day. She tells of its beauty and usefulness: "the river gives life to all humans and non-humans" (II-hi). The theme resurfaces in another person's images, which show the daily more-than-human lived interactions (Figure 47).



Fig. 47. El lugar de los animalitos – The place of the animals

This is where the lowland pacas, hogs, deer, lizards, parrots, curassows and collared peccaries come to eat mud. I enjoy watching the creatures eat; it is like a personal zoo.



Fig. 48. Sustento – Sustenance

An almond tree that nurtures other plants—greeting coffee flowers like old friends, sharing food (context: almond trees are often grown alongside coffee to improve the microclimate, soil, and biodiversity). This is why it was sown—for its fruit, and because of this kinship. The trees grow tall yet bear few almonds.

Frequent contact with the river appeared in almost every photovoice interview and thus in the experiential photographic process, bringing the place-based relations and related responses into being. Water became a "saviour" in two ways: first, the rains provided instant relief from the drought and flames, and in the end, it was the river, acting as a natural barrier, that protected the village from being burned (II-po). Since there was no vegetation left and the river became filled with soil, it was not expected that the river would be restored. (II-hi). However, the question of how to restore and protect water sources together with the Mennonites and cattle ranchers remains, as respondents report that upstream deforestation by Mennonite settlers is drying out the river (II-hi).

What is at stake? The youngest photovoice protagonist, a 17-year-old boy, takes the viewer on a dynamic and immersive journey through the river, from the confined reaches of a tributary waterfall to the wider riverbeds in the lower parts of the catchment, with each stage evoking childhood memories and close kinship with the riverscape (Figures 49-54). I want to highlight this set of images because of the narrative power of their visual and spatial arrangement, inviting us to witness the water's flow and velocity as he physically moved through the current to take these images (II-pv).



Fig. 49. Mi bella cascada – My beautiful waterfall

The current from the top expands and creates a fog. Seeing it makes me happy because during the drought, it was gone; the bottom of the riverbed was bare. Mother Earth has been rehabilitating since the entire river completely dried up.



Fig. 50. Resbalin natural – Natural waterslide

The beginning of the waterfall, which continues to flow into the brown water below. It reminds me of my childhood, around ten years old, when I used to have fun with my family, diving into the stream, like I imagine a slide at a water park.

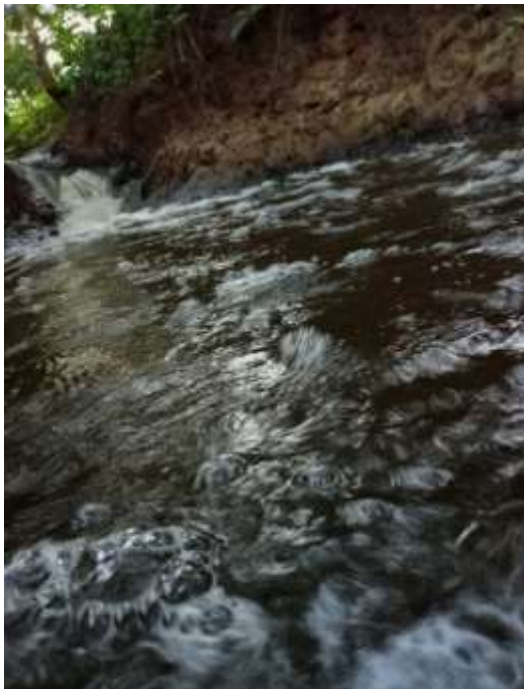


Fig. 51. Mi saltarin acuático – My water jumper

We threw ourselves into the water like little frogs. We grabbed strings, three of us climbed onto a string, and when we could not hold on anymore, we went down to this part. I consider it all my natural playground.



Fig. 52. La travesura – The mischief

When we were going to play, we started at this reservoir, went into the water, and then moved to play further down so we would not get cold.



Fig. 53. Mi rio protector – My protecting river

This is the river for fishing or playing with fish. It is also a protection in case of fire. The sun rises with a beautiful reflection.



Fig. 54. Bello atardecer – Pretty sunset

Sunset on the forested riverbanks. In the sun's rays, the trees filter the light and make everything expand with colour. A single tree is dried out by fires, and there is a bird called a cowbird.

Restoration

As mentioned before, although it was expected that the burning would stop the water's flow, six months after the disaster, the river is seen full and running abundantly again at the places where animals come to drink (Il-hi). Regarding the forest vegetation, however, overall reforestation is still limited. Besides a portion of celebrated feats (Figure 55), there are few signs of primary forest restoration, as only the small, fast-growing species have returned so far. Seeds are sprouting faster because of the burn, but this also means a predominant regrowth of thorny, herby, and invasive species, which significantly decreases forest accessibility. Tree mortality predominated among fruit and non-fire-adapted Amazonian trees, so it will take many years of passive regeneration before the forest can be used again (Il-hi). It is echoed throughout the community that restoration won't be easy, as it requires an absolute halt to deforestation. Only then will the forest get a real chance to reforest and maintain humidity. They expect that for the next three or so years, fire risk may decrease since most of the fuel and thick leaves have already burned. At the same time, droughts are perpetuating, so they fear fires will strike again. It ultimately depends on



Fig. 55. Regeneración – Regeneration

The trees are blooming again. They resisted and reawakened us. There will always be life in the forest. We will protect it because this is the life of all human beings. The few survivors will reproduce. But we humans have to be less predatory.

whether the cause continues (II-hi), which will be explored in the next chapter.

Concerning the restoration of *chacos*, a family borrowed machines from the Mennonites to speed up the process since there are none in the village. They sowed yucca, peanuts, rice and corn, but need to sell the yucca and peanuts to return the loan (II-hi). Another family active in restoring the field explains that they are not experimenting with more fire- or climate-resistant species yet, but they did take some seeds and bees from the natural forest for the reforestation of agroforestry systems. With slight worry then, they judge that the new plants have to start producing soon, since they can only keep living off of nature for a few more years (II-hi). A third approach can be found in the restoration response of planting timber trees in recovering plantain and banana agroforestry systems, to lower the temperature and radiation and aid in post-fire timber restoration. Walking beneath the shade of the leaves, the family indicated a tree that would be harvested in a few years as construction wood for their son's future house (II-po). Participant observation in the *chacos* further disclosed that coffee and *tarara amarilla*, together with cacao and *agunau*, grew new shoots at the base of the burned trees, a phenomenon called *retoño*. The two images below depict how the regrowth is received with relative hope and joy (Figures 56 and 57).



Fig. 56. Recuperación – Recovery

Burned banana trees that resprouted. The fruiting was not successful for a year, so the harvest failed, but now they can take bananas from the new shoots. There was no hope of recovery, now things are green again, the calm and desire to work is back.



Fig. 57. Arroz orgánico – Organic rice

We see a *motacú* with a black trunk. Since it is hollow from the inside, it does not die from catching fire. It has rice underneath, which was sown after the fire. We are going to restore the forest so it can become like it was before.

Spiritual tradition

Visceral contact and affective associations with the forest have, in a way, deepened because of the fires, as one respondent comments, he knows his environment on an even deeper level now (Il-hi) – a form of knowing that goes unparalleled compared to outlanders, about which he says:

People who do not live here do not feel the same connection to and conscience about nature. We live from her and therefore we value her and will not abandon her. They (outsiders) do not live that way, and that is why they have a different understanding.

Local communities predominantly identified with feeling complete oneness with nature when presented with the *Inclusion of Nature in Self Scale* (INS). Apart from a general relational understanding and bond with Mother Earth, the Indigenous communities in this region traditionally hold specific animistic *Chiquitana* beliefs in nature spirits, referred to as *Jichis*. These spirits safeguard the well-being of nature's beings and processes, so people tend to respect and often even fear them. The study participants of this community practice the belief to varying degrees, but in any case, not to the extent they used to. Where the thought of this spirit used to provoke such reverence that people would ask its permission before hunting, it is now mostly solely referred to when a strong scream is heard or wind blows through the trees: "Once we heard a scream in the wind that sounded like it was produced by a person and when it suddenly becomes very windy, the children exclaim: 'Mama, the *Jichi* is here!'" (Il-hi). However, a young mom in the community seems to take a more empirical approach, arguing: "I do not believe in the *Jichi* because I never interacted with it" (Il-hi). It is widely conceded that the belief is disappearing, as purely the elders still transmit these tales. Still, the spirits play an important guiding role in the midst of the spreading fire, as demonstrated by the following excerpt:

Through the fires in the mid-montane zones, we had gone to a hill where a strong wind blew. It sounded like the fire was already there. This was interpreted as a warning sign; it was as if the wind was saying: run away from there. Everyone felt scared as it meant the fire was close. Then we took a drink to the forest at midnight and emptied it so the *Jichi* of the forest would take it, and the strong winds calmed down. To not be scared, we bring *charuto*

(a natural tobacco plant that used to be a woman) with us when entering the forest, which is the only thing that can defend us because the *Jichis* are scared of smoke.

Next to the *Jichi* of the forest presented above, *Jichis* exist in various forms, related to the components of nature under their protection, as seen by this experience, for example: "Another time we went fishing with five fishers when the sky started to cloud and soon after, heavy rain fell. It is believed that this was the *Jichi* of the river." (Il-hi). According to the peasant farmers' community leaders, who share similar stories, the presence of the water *Jichi* in their *curichi* (wetland) diminished after the fires. The two women from the intercultural communities said that the *Jichi* appears in snake form at the dam, with a head as big as a horse's, to warn people of overfishing. The elderly woman highlighted that many have been found dead and then adds that if the *Jichi* is killed instead, the place it inhabited dries out (ml-ic). Clearly, a myriad of mythologies have surfaced around the traditional spiritual system, with additional legends of the creation of lightning, rainbows signifying the *Jichi* is sunbathing, and thunder before the rain originating from the *Jichi* trying to escape its imprisonment in a clay pot (ml-ic).

However, a clear case of Catholic-Chiquitano syncretism came to the foreground during data collection with two families in the Indigenous community. One family articulates this as follows: "We have heard the scream of the *Jichi* multiple times when people are intervening too much with the animals of the forest. But God comes first, and rules even over the *Jichis*." (Il-hi). With the other family, it seemed like the question about a spiritual relationship to nature did not resonate in the first place. After rephrasing a couple of times, the reply centred around the existence of a God who created all nature and stands between people and nature, most likely referring to the Christian church, since there was no mention of any old cultural practices honouring this belief (Il-po). It merits mention that two protagonists in the community proudly present the Jesuit Reductions church (Figure 58), insinuating the penetrating evangelisation that took place, which nevertheless did not completely erase the pre-Hispanic culture. Consider carnival, for example, which, despite its Christian roots, is celebrated in line with the original ceremonial customs and dances (Il-hi).



Fig. 58. La casa de oración – The house of prayer

Every Sunday morning, people go to Mass here. We celebrate Eastern and Christmas week. We come together there to cook and escape the smoke during the fires. The chapel is big and beautiful, perfect for singing to God.

Climate change

Fire risk rises as the climate turns hotter and drier.

The photovoice presentations toward the end co-defined several overarching themes, including a deep interconnectedness with both domestic and wild plants and animals, the importance of the river and water sources, the effects of fire and climate-change-induced drought, and the shifting management, production, and economy in response to these changes. The final point is addressed in the next chapter, which will examine the political context in greater depth and detail; this section elaborates upon climate change dynamics.

Traditional fire users have almost uniformly expressed how livelihoods depend on fire, while also being vulnerable to increased wildfire risk and aware of how traditional practices are now more prone to cause fire due to higher flammability from droughts driven by increased climatic variability. Adaptation is required to alter farming and fire-season timing: burning that previously occurred only in August must now begin earlier, with seasonal field preparation work starting in May and burning shifting to June, as severe droughts have elevated forest fire risk in August. Stronger solar radiation and rising temperatures are also perceived, with warming starting earlier in the year—now evident by March, whereas the traditional onset was May (Il-po).



Fig. 59. Manejo de siembra plátano – Plantain seeding management

Right now, we're working on planting quality plantain seeds. Most crops are being hit by multiple pests. Fungi attack them, and they collapse. With this new method, we apply lime (calcium carbonate, not the fruit) directly to the base.



Fig. 60. Semilla seleccionada – Selected seed

Plantain bulbs for selective planting. These are new fungi-free plantains. Each bulb sells for five bolivianos - they're sold by order.

Moreover, precipitation patterns changed, with increased intensity and drastic delays in rainfall:

"Rain arrives later—previously it started in November and now only in March. One no longer knows when to plant" (ml-ic). In the context of climate change, Indigenous community members observe

hotter days, cooler nights, and greater crop pathogen pressures; harvests that should occur now are postponed as crops have only recently begun to grow (II-hi). In the photovoice elicitation (Figures 59 and 60), a participant highlighted how they treat the banana pits to be more resistant and sow certain adapted species over others (II-po). Participants reported an escalation of plant (see Figure 61 and 62) and pest challenges linked to the new fire regime, observed during fieldwork while ducking the mosquitoes around us. Some bananas were found lying on the ground as a result of fungal infection. A particular banana variety, *jineo*, did not survive these pathogen pressures (II-po).



Fig. 61. La grey

The grey is a fruit that is enjoyed just like that or mixed into a drink or meal. I chose to picture this because we consume it when our immune system is low. Sadly, we don't have any now because of the prolonged droughts.



Fig 62. El tamarindo

This plant wasn't here before; we sowed it and it grows wherever. It fruits every year, and the flower is visited by the bees. We use it in time of droughts and sell it to have an income. It provides shade and helps to lower the temperature.

The interview with a private cattle rancher association representative describes climate change as a multi-faceted stressor that affects forage and water resources (ml-cr). There is currently ample pasture, allowing grazing without immediate resource shortages, but fires and pest outbreaks reduce available new grass and force the clearing of new grazing areas. Near markets, about 50 hectares suffered drought-related pest damage, linked to a rise in grass-eating insects. Extreme drought and flooding are described as recurring contrasts that threaten water security. More than 4,000 head of cattle were lost in the Beni (department north of Santa Cruz), and reserve ponds dried up in dry years. Groundwater development – drilling wells up to 150 meters deep and building water storage tanks as backup – emerges as the main adaptation strategy, though it comes at substantial costs, and effectiveness depends on local hydrogeology.

Future scenarios

According to the municipality, the prospect of catastrophic fires is small in the foreseeable future because fuel accumulates every five years, as exemplified by the previous pervasive event dating back to the year 2019 (ml-g). How do local communities imagine life will be in the future? In general, Indigenous community members, similarly, do not think another hazard of unprecedented fires will return this year, but the *cacique* still questions the liveability of their homes: "We are not sure if the forest will still be alive. We have to let nature recover." (ll-hi). Upon inquiry into migration, interviewees described that they have nowhere else to go because of a lack of formal education or professional experience other than farming and are committed to active projects on the land where they are now. (ll-po). In the same vein, participants evaluate that young people are hardly interested in *chaquear* anymore, whereas youth leadership is needed to sustain guardianship of the forest and keep the community intact for the future. To live well into the future, then, the *cacique* indicated they first and foremost need people outside the territory to "stop starting fires and respond in a more informed and coordinated manner" (ll-hi).

Peasant farmers who were asked the same question emphasised the need to reduce reliance on fire through improved seed selection, supply access, and non-bureaucratic loans, as well as greater firefighting funding and training in firefighting, environmental stewardship, and natural medicine. They also stressed the importance of voice and representation; respondents self-reported they tend to stay silent, even in terrible conditions, e.g. characterised by a lack of public institutions (ml-uf). The intercultural community leaders focus more on improving intra-community organisation and readiness, stating that there is strength in unity (ml-ic). The cattle rancher representative, on the other hand, thinks that things will only improve with the new prohibitions and when they start sanctioning everyone (ml-cr). Yet the most detailed future scenario is presented by the forestry professional (ml-f), who holds that, considering the boom in land transplants, almost everything that was previously under forest management is being deforested. He continues: "In five, maximum ten years, all the land of Concepción will be cattle pasture and soy fields", with the TIs as a last frontier:

The last stands will be in TIs—if they resist. When the trees vanish, so will jobs. The market stalls, the truckers and the roadside cafes are all tied to logging. I might migrate to where forests still exist or pivot to online carpentry sales. But the bigger picture? Bolivia is trading trees for votes, and the fires are just a tool.

Synthesis

The emotional experience of megafires is one of profound, multi-sensory grief and trauma that is deeply entangled with material and relational loss. The changes entailed were experienced in a bodily and relational way and can be explained personally and conceptually through socio-nature assemblages. During forest fires, the socio-nature assemblage of the forest landscape becomes the context that is transformed, since “Fire is a reaction that takes its character from its context (...) synthesising everything around it” (Pyne, 2018, p. 141). This transformation is experienced as a profound, multi-sensory grief and trauma, where all that was seen was white when opening the door, physical ailments were common, and dreams became filled with fire. The fire scars the participants pointed out in the forest are as much their own, in the sense that the community emotionally and effectively functions in relation to the ecosystem. Without a particular prompt, almost all photovoice protagonists chose to document their emotional kinship to the forest or agroforest systems and the ecological and livelihood losses linked to them.

Yet, the Indigenous community and forest ecosystem in part resisted destruction, and the community could adapt to these losses to some extent, within their own organisation, but also in relation to the more-than-human. This coping is achieved through active, relational practices. Communities engage in physical restoration, such as slashing weeds and clearing debris, and draw on spiritual-cultural frameworks like making offerings to the *Jichis* to calm the winds. They also diversify livelihoods through practices like meliponiculture, reinforcing their role as caretakers of pollinators. As a result, the socio-nature assemblage is transforming from one that operates through fire, e.g. in slash-and-burn systems, to one that copes with fire, by mimicking the natural forest, e.g. in the fire-free agroforestry systems designed to replicate a multi-layered forest structure.

Methodologically, I found, as expected, that ‘talking’ with elements, plants, and animals is not as straightforward as talking to people, but we can learn a great deal by being attentive and learning from Indigenous peoples who maintain a cosmological and material sense of interbeing with nature. The photovoice pictures they took are a direct expression of this relationality, serving as a window into a worldview where the more-than-human are kin and active participants in social life. To avoid reducing the more-than-human to the less-than-human or the floral wallpaper of the social world, we can practice more-than-human ethnography by following their lead: with interest in their lives, empathy for their needs, and wonder about their activities, expressions, and effects.

This analysis will be further unfolded in the discussion, where I draw the analyses of the specific research questions together in an overall analysis.

Results: Fire control, land struggle and governance

Research question: How do forest fires mediate, and how are they mediated by, land struggles, immigration, and governance?

Introduction

The predominantly local dynamics discussed in the previous chapter will now be situated in the broader political and policy landscape that surrounds and substantiates forest fires. First, perspectives on disaster response, fire emergence, and forestry are revealed, followed by a review of land trafficking, law enforcement and the politics of fire governance.

The present preamble intends to offer a brief overview of how forest governance authorities and actors are organised, independently and in relation to one another.

Community A reported strong representation through their council CICC (Il-hi). According to APCOB, based on information from the Concepción Indigenous Council (CICC), 59 communities located in Concepción are affiliated with the CICC. Of these, 26 communities are located within the TI, and 33 communities are outside it. In response to state neglect and the absence of prevention and response policies, Indigenous communities in zones 1 and 9 organised a march demanding emergency recognition and defending their territories, rights, and way of life (Il-hi).

Before embarking on fieldwork, I had the chance to attend the elections of the new CICC territorial governance board. One candidate spoke about the pressing need to stop burning in their speech, and another stressed that the territory must work on utilising and capitalising timber and non-timber forest products, along with addressing gender issues. The destabilising fuel crisis was mentioned frequently. They agreed to focus attention on defending Indigenous Peoples' rights before the municipal and national governments, considering that such efforts require greater coordination. This may denote that community-based land management in the face of forest fires and risk management has become part of a wider political self-determination agenda.

The Bolivian Forest and Land Authority (ABT) reports maintaining a good relationship and dialogue with the Indigenous territorial governance. While no formal arrangements exist with the Indigenous governance councils, collaboration occurs through municipal and departmental governments, per

the ABTs regional representative (ml-abt). So, what municipal mechanisms and practices are shaping governance and coordination?

At the municipal level, authorities claim full awareness of Indigenous territory matters, citing formalised agreements with multiple institutions to systematically address fires through contingency plans, post-fire recovery programs, and coordinated responses (ml-g). Yet no formal agreements or conventions with Indigenous councils exist, though ad hoc support, such as seedlings and tools for fire prevention and rainwater harvesting, is provided. The municipality facilitates non-timber product commercialisation, for example, in the form of *coca* and *copaiba* oils. Regarding resource use, households noted the absence of rules limiting forest product extraction, though hunting was restricted to personal consumption (ll-hi). Overall, it can be noted that their engagement occurs primarily by means of project-based, technical assistance. The municipality's fire management approach prioritises prevention, with 400 people currently in training. The annually submitted municipal POA included fire prevention measures, consisting of training and awareness campaigns, but the PTDI⁹ was copied from the previous year without updates. Notably, neither document contained guidelines tailored to local Indigenous or peasant communities, indicating policy exclusion. The municipality states that prior consultations with Indigenous leaders took place at the proposal stage, with communities retaining the right to refuse participation (ml-g).

Adjacent to the Indigenous territory, peasant farmers described reorganising after major fires by creating firebreaks around their communities. No assistance or aid was received, despite requests for machinery support that the ABT allegedly blocked. Their leadership comprises presidents for each subgroup under the *Única* party, Bolivia's second-largest labour union, which links 26 communities across four sub-centrals to regional and national confederations (ml-uf). Intercultural communities, meanwhile, operated through Grassroots Territorial Organisations (OTBs), with a general secretary and deputy secretary at the community level, alongside the regional *Sapocó* Central, the highest authority for the *Chiquitania* region (ml-ic). The Indigenous territorial governance system parallels the multi-level organisational models found in neighbouring peasant farmers and intercultural communities, but they refrain from coordinating much with each other on common challenges, such as increasing droughts and fires. This could be due to different ideas about accountability in the fire crisis, reflecting divergent farming scales and forest-resource dependencies, as seen in the agricultural practices section, as well as land tenure rights, as we will see later.

⁹ PTDI = Territorial Integrated Development Plan & POA = Annual Operating Plan.

Disaster response and risk strategy

The forest fires of 2024 sparked both immediate disaster response and delayed policy changes. To elucidate both, this section presents findings on community firefighting and the right to use fire, enveloped in so-called burning calendars, in that order.

Firefighting

When the fire reached the coffee agroforestry systems in Community A, the community created a fire barricade around the *chaco*. Next to fire management, they physically put their bodies on the line in the form of fire brigades. Attempts were made to form a big one with other communities, but without success. Fire control is generally arduous because it moves two-dimensionally, horizontally as well as vertically at the same time (II-po). Community firefighters would come back to the village physically unwell, carrying backpacks with twenty litres of water. It meant a great weight and responsibility. Together, they saved some of their surroundings.

Military help arrived, but only worked during the day, while the community firefighters worked at night, when there was less smoke and heat and because otherwise the fire would catch up again (II-hi). The nighttime was also preferred by the peasant farmers, who moreover reported not having received any aid during those months, as coordination was abysmal and volunteer firefighters never arrived (ml-uf). Therefore, they had to organise their own firefighting teams, much like the efforts by cattle ranchers who brought in two volunteer brigades for private producers, since "the volunteer firefighters were only sent to communities" and "the state firefighters just came to take photos and leave" (ml-cr). Similar signs of frustration over the shortcomings of state-led help are indicated by the commentaries of Indigenous community firefighters, who were worried when soldiers got lost because of not knowing the terrain (II-hi).

Meanwhile, the women were frightened that something would happen to their husbands, who were away to combat the fire every night for two months: "it was eight o'clock in the morning, I could not see anything and wanted to cry" (II-hi). Despite their efforts, the fire just would not get extinguished for a long time, which was a very stressful situation: "we woke up covered in ashes". For now, everyone is recovering within their own household. When the dry season starts again, the communities will begin reorganising, and there will be firefighter meetings. External support may be needed for the local firefighting crews, in terms of training, technology to monitor fires, and water wells (II-po). Leaders of the peasant farmer union and intercultural communities reported not having

received any formal fire-safety training, and the former group voiced a strong appeal to greater independence regarding risk response:

During burning seasons, we demand live satellite monitoring. ABT lacks the technology.

Santa Cruz's satellite sits at the Governor's office, not in Concepción, so fire alerts arrive 1–3 days late. Besides, the imagery itself is flawed: my deforestation permit was denied because "scars" appeared on the map, but fire never touched my land. When we provided coordinates during active fires, officials couldn't locate them—their incompetence burned our community. (ml-uf)

The municipality also argues that communities should not have to wait for government help and be able to act autonomously, and so, they promote the formation and preparation of communal firefighting teams with tools, equipment and techniques of forest fire control (ml-g). However, bureaucracy becomes both a precondition and a bottleneck in the process of obtaining the necessary resources:

Imagine if they call us, there's a fire, and they request the municipal crew. Let's look at fuel, tools, firefighters, etc., until we arrive, four or five hours later, plus the delay of completing paperwork required to apply for financial resources, everything will be ashes. (ml-g)

According to the national risk management Law 602, municipalities must respond first when fires occur. Only after exhausting all local resources does the department intervene. Resources were soon stretched throughout the municipality, but to comply with Law 602, it is required to prove limited resources through extensive documentation, such as reports of fire damage data. The bureaucratic hurdles represented a serious struggle: "imagine having to collect data while the fire is burning everywhere" (ml-g) and may explain why one respondent reflects that during this critical period, "the mayor's office wakes up three weeks late" (ml-f). According to the risk management unit, the mayor can't declare a disaster without going through the municipal council, the executive branch or the legislative branch first, and by the time they get approval, they have sometimes run out of funds already. After declaring a disaster due to drought since June, the municipality was finally able to declare a disaster due to forest fires through a decree promoted by the mayor on August 8th. Until

then, there was a severe lack of financial and human resources, while the fire started much earlier, at the start of July (ml-g).

The representative of the National Institute of Agrarian Reform (INRA) describes how the National Weather Service (SENAMHI) used satellite imagery to detect heat sources, which were then reported to civil defence firefighters; ABT subsequently certified these data, while INRA identified the tenure status of the affected areas—whether titled, in process of titling, or designated as forests or reserves—before referring the cases back to ABT. The Ministry of Health then mobilised brigades to provide medical assistance (rl-inra). One can imagine that this process is too time-consuming when dealing with a crisis. The departmental agency claims that the national government refuses to support bottom-up firefighting efforts as a way to keep them constrained, while “the military reports to their superiors through back channels”, using a lack of training as an excuse. However, training cannot be requested either since Santa Cruz is not a political ally of the current administration (rl-g). Withholding resources and coordination from non-allied departments clearly shows how firefighting is politicised. The theme of the central agency obstructing Santa Cruz’s autonomy and systemic marginalisation is discussed further in the subchapter “Inter-authority coordination and conflict”.

When the brigades eventually arrived, an extra burden emerged from the military personnel’s inexperience in firefighting and the chaos caused by deficient logistics, fuel and food, which had to be provided by the already resource-poor municipality (ml-g). In times of disaster, when a million hectares have been burned, government help has been incompetent, reinforcing a growing tension between local communities and the governor’s office. The state also prescribes the time and place at which people are allowed to use fire, which has seen recent reforms in policies of controlled burning calendars and the ecological pause.

Fire use criminalisation

“Without burning, we won’t have to sustain ourselves with, because that is what we live off” (ll-hi)

On September 24th, 2024, the national government approved the so-called environmental pause (*pausa ambiental*) by bi-ministerial Supreme Decree 952252, which would take effect from March 26, 2025. Among its main provisions, it suspended all burning authorisations previously issued by the ABT and prohibited the issuance of new ones. According to the ABT, calendarization, referring to the definition of such a burning calendar, prohibited burning in the municipality of Concepción from

June 15 onward. It has reportedly been designed following provincial meetings with governments, rancher-logger associations, and communities – specifically engaging directly with communities to integrate traditional knowledge – while also using meteorological forecasting data (ml-abt).

Illegal burning is said to be kept in check by technical teams that verify heat points on-site. The National Geospatial Monitoring Unit shares reports; if evidence confirms illegal burning, the ABT issues a citation and initiates administrative sanctions and legal processes (ml-abt). Sector-specific fines are established in the implementing regulations and based on the area cleared: communities pay 190 UFB/ha (~400–500 BOB), private properties pay 976 UFB/ha (~2000–2500 BOB). When burns damage neighbours, ABT pursues criminal charges for qualified damage.

The regional government declared the environmental pause too and implemented a controlled burning calendar, where burning is sectorised, so not all areas can burn simultaneously (rl-g). The municipality, however, believes that this has led to the option for agri-business owners to simply issue a burning order from a certain date to a certain date and proceed. That way, there is still a wildfire risk when the weather conditions are favourable, per the municipality (ml-g). Moreover, many private producers prefer to pay the fine rather than comply with the ban (rl-g), indicating a discriminatory incentive structure that criminalises those who operate on smaller scales using slash-and-burn agriculture. To add, clearing land without burning is not prohibited, allowing for the continued industrial-scale deforestation, which incidentally still leaves flammable material that can catch fire, nonetheless. The fines imposed thus affect actors differently depending on the corresponding capital and farming systems, where traditional users are targeted disproportionately.

While the environmental pause remains in force nationwide, the municipality mentions having created local legislation that serves as an amendment to accommodate subsistence farmers who depend on burning by recognising their fire schedules (ml-g). To this end, communities are already presenting their traditional burning calendars and contingency plans for slash-and-burn farming, per municipal officials (ml-g). Although the private cattle rancher representative asserts that the burning schedule, with which he meant burning before the dry season, should be managed in the communities as well, this is already the case, at least in Community A, and involves significant alterations to the farming season. Where Indigenous communities used to burn throughout the dry season, from June to September, they now only have the right to burn from November to December (ll-hi). Indigenous, intercultural and peasant farmers alike all affirmed they wait for starting

controlled burning until after the first rains, traditional burning knowledge that does not seem to find its reflection in the burning calendars imposed by the authorities discussed above.

The *cacique* encapsulated the sentiment sharply, saying, "They can tell us we cannot burn, but what are we going to eat?" (II-hi). Overall, the Indigenous community members accept the ban, or rather "will have to accept the situation as is" as one elder put it, although compliance is not controlled, and despite feeling that it is unjust, they are not allowed to use fire anymore, "because the fire never extended into the forest from here" (II-hi). Some say they are not sure yet how they will manage the *chaco* now, whereas others are shifting to cutting with a machete, or in some cases, with mechanical power, in spite of the additional workload associated with that (II-po).

Peasant farmers argue that communities must organise burning seasons collectively and make known that they will continue using fires, but in coordination with authorities through burning calendars (ml-uf). While they might have relatively more capacity for compromises considering livelihood differences, they pose the same questions: "How will peasants survive without resources for machinery?" and worries: "This year our people will not have enough to eat". The food insecurity is attributed to the government, which, using their words, "delivered nothing" (ml-uf).

Indeed, the majority of Indigenous and peasant communities rely on burning to prepare their lands and grow crops. Now that burns are prohibited without offering real alternatives - like supplies, machinery, or accessible credit - how does the state propose these families produce food without resorting to fire-based practices? In response, the regional government of Santa Cruz points out that communities use gasoline-powered tools (*diezycero*), oxen, or horses instead of machinery, and keep poultry for income. In some areas, primarily new settlements, machinery has been introduced. Beyond that, Santa Cruz appoints the national government responsible for budget constraints: "We recognise the need to provide more support, but available resources are insufficient- this depends entirely on state funding" (rl-g). Further elaboration about the regulation and enforcement of state policies will be offered in the last subchapter.

Land rights and reform

As introduced in the context of forest concessions on the previous page, the process of reallocating private to fiscal land and, subsequently, to intercultural settlement establishment, represents complex and politically charged land titling and tenure interventions. First, the debate around fire culpability is explored to introduce the positions of and relations between the communities and authorities on the policy-making and receiving end, after which insights into the East/West divide and the role of immigrants are put forward.

Fire origin stories and sectoral responsibility

What follows is an overview of the tensions around fairness and responsibility in relation to the causes, effects and disaster relief of 2024's burning events.

The differing actors and stakeholders operating in the fire-affected area around Concepción often hold opposing and contradictory views as to who is most vulnerable to and impacted by these shocks. A local government official in the risk management unit evaluates:

Well, mostly, the most affected will always be the indigenous sector because they harvest from the forest's non-timber products, which are what is burning now. Now, the big ranchers, the businessmen, no, they won't be as affected because they cultivate extensive croplands. Apart from that, they have the machinery to alleviate the needs, they have more accessibility to move around and apply to all these aid opportunities. But let's go to the indigenous sector, they will not have that. So, what will they have to do? Wait for the fire to arrive and cover their little houses and *chacos* if they can defend themselves. (ml-g)

However, peasant farmers counter that although their papaya fields and pastures burned and the cattle nearly died too, they "received no help while Indigenous communities got tons of aid" (ml-uf). The private cattle rancher association representative also declares a lack of support but challenged the idea that forest-based communities are hit hardest in the first place, claiming that pasture is the first to burn, and unlike in grasslands, fires can still be stopped in the forest. An estimated 90% of the cattle rancher association members lost pastures due to fires, meaning they had to buy hay bales themselves to feed the cows, which normally walk freely and eat the grass that grows. Yet, a forest

engineer and timber merchant posits that since the community did not need to invest in planting in harvesting, and sawmills barely flinch, it is the logger that loses, by having paid for machinery, permits, labour, and even the forestry census. In this case, we need not speculate about whether a victim role is assumed, as he explicitly declares: "the real victims are the intermediaries—the small operators who buy timber from communities. If fire consumes standing trees, the loss is ecological, not financial. But if it burns harvested wood, the logger absorbs the blow. That's the irony: the ones following the rules shoulder the risk." (ml-f). The fact that all groups of rightsholders involved position themselves as the ultimate victims points to the possibility that they instrumentalise victimisation to avoid accountability and claim rights to disaster relief.

Interviewees inside the territory consistently conveyed that the controlled burns they practice never extended into the forest and that the wildfires were started from around Concepción or Guarayos. However, discrepancies arose around the question of what or who exactly the culprit was. The responses ranged from "we do not know who provoked it, but it is certainly anthropogenic" (ll-hi), to the private cattle ranchers, to the intercultural communities, who "sometimes start fires intentionally to move Indigenous people off their lands" (ll-po). Overall, it seems like most members of the community think that the private properties do not control fire, including the Indigenous community leader, who also appeals to the potential of geoinformation records to undermine scapegoat tendencies (ll-hi):

Now, with remote sensing and satellite imagery, it is no longer possible to blame the Indigenous communities for starting agricultural fires; they are third parties, mainly ranchers. The government sets rules for us, which we abide by, but not for business owners.

Nonetheless, it seems the authorities managing such data keep it under wraps, considering the absence of access to information and public debate, as reflected by both peasant farmers expressing frustration over "officials whitewashing the truth" and demanding investigation into ignition points (ml-uf), and an Indigenous participant stating: "Nobody is speaking about this, not even the authorities. There is no justice." (ll-hi).

The head of the regional ABT unit stated that, according to their measurements, none of the recent fires originated in areas under ABT management. Instead, they attributed outbreaks to zones with human settlements, particularly intercultural communities with migrants from neighbouring regions,

who allegedly burn illegally during prohibited months (July-September), as well as to protected areas. They further noted that peasants from inland Bolivia had, out of lack of knowledge, ignited fires, while some private properties also lost control of burns due to wind, and roadside cleaning activities occasionally produced uncontrolled fires. Within ABT's jurisdiction, however, landholders are required to submit property management plans (POPs) and burn plans (PDMs) for authorisation, and no incidents were recorded in authorised areas, as permit holders were said to have followed procedures to isolate biomass and prevent the spread of fire.

Only in the interview with the INRA, a more concrete account of the heat source sites was provided, based on research by a monitoring centre that the institute participates in, alongside other state agencies, including the ABT, which is responsible for conducting investigations. According to published reports, 29% of burn scars were located on private properties, 25% on TIs and another 29% on unavailable forest land such as protected areas, RAMSAR sites, and natural reserves. INRA's own assessment highlights that the largest burned areas were private properties, both titled and under titling processes, primarily linked to cattle ranchers who routinely burn pastures to regenerate grass at lower cost. Fires were also identified in the unavailable forest areas, where, according to the representative, "people enter and burn the forest to conceal evidence of illegal logging and timber trafficking" (rl-inra), and many of the private entrepreneurs involved were longstanding landholders who do not want to make this information public.

The government of Santa Cruz stresses the distinction between production sizes, however, arguing that since large producers conduct mechanised land clearing, in most cases, it is the small producers who are responsible for starting agricultural fires (rl-g). This stands in direct opposition to the views of the *unica* farmers, who assert that small producers depend on tree shade for crops and livestock, and most fires start on large estates, especially those under Mennonite management, who, according to the *unica* representative, "burn barriers with total impunity" (ml-uf). Aligning with the position of the Santa Cruz government, ANAPO, the soybean sector association, rejected claims that large-scale producers are major fire drivers. They accentuate that slash-and-burn practices are not used in soybean cultivation and assert that most hotspots occur on state-owned lands occupied by new settlements, rather than in productive zones. Drawing on data from the NGO *Fundación Tierra*, they emphasised that around 80% of hotspots originated on public lands, while only 14% were associated with productive areas, of which 9–10% related to livestock. On this basis, ANAPO placed primary responsibility on the government, which, they argued, has permitted such clearing, while insisting that large producers have not been the main drivers of fires since 2010 (rl-sf).

For their part, the livestock rancher representative argues that the main source of wildfires is small-scale actors who practise slash-and-burn. He maintained that producers have incentives to control fire, since negligence would endanger their own property, and attributed recent megafires to younger generations abandoning chaco burns without supervision, as well as the following (ml-cr):

The fires weren't like those in recent years—they have spiralled out of control with the colonisation of people from the highlands and the livestock companies that began clearing land by burning on an industrial scale. The companies at least follow controlled burn permits from the ABT, which requires them to pile up all the wood before burning, but the *collas*, often lacking permits, just hack through the forest and light fires without precaution.

He further criticised the authorities for directing assistance primarily towards fire-affected Indigenous communities, which, he claimed, has created perverse incentives. In this framing, some intercultural groups would ignite fires intentionally to obtain such aid – whether rice, sugar, or other supplies – while communities that avoid burning receive little recognition (ml-cr).

From studies conducted in 2019 and 2023, the government of Concepción reported having concluded that the fires have occurred in sectors of new intercultural communities, razing the land for agricultural production, and since there is no control, they sometimes set fire to what would otherwise be firebreaks too (ml-g). Irrespective of the validity of this information, it is important to remember that intercultural communities are actively encouraged to deforest through politicised and legalised land grabs, which will be covered in the next section on the politics of fire governance.

Turning to our intercultural community source, then, the two informants, indignant at being the object of the blame game, contend that it is a lie that *interculturales* intentionally set fire to get more land, asserting "we are calmly conscious that we lit fire nowhere" (ml-ic). Interestingly, they did not attribute intentional arson to any actor and instead pointed to accidental cases, such as an Indigenous group living next to them, who lit a tree to harvest honey without fully extinguishing it, stressing that such incidents are unrelated to *chaqueo*, since they too rely on firebreaks to contain flames. They also underscored that ABT surveillance is constantly "on top of" them, threatening that monitoring makes it impossible for them to conceal lighting fires, yet they are nonetheless unfairly accused. As one reflected, "Before, as a *canba* [lowland local], I thought the same – that it was the *interculturales* who set fires – but now I am one of them and see what they say doesn't exist" (ml-ic).

Political divide and immigration

Upon probing for more depth regarding the division between local and intercultural communities, which the last paragraph ended with, the same respondent traces back the personal land history that preceded her identity change (ml-ic). She recounted that her mother's family had once been enslaved and was eventually granted land by her grandfather's former master, where they later established their community with several families. "When we came into the world, we were no longer enslaved," she said, but securing legal title proved difficult. Attempts through local records and the INRA were blocked because they were outside the formal indigenous territory system: "They said we give [state land] to the interculturales, not the indigenous, because they already have their TI of, I don't know how many, millions of hectares." To gain recognised land rights, they formed an intercultural organisation with migrant women. She now identifies as "an intercultural woman," valuing the openness and social norms of these communities over the divisions she experienced in indigenous ones (ml-ic).

She explained that intercultural communities are mixed, including both *canbas* ("people from here") and *collas* ("people from there"). "Since there are *canbas* inside the community, the *collas* also know how to make firebreaks," she said, highlighting the sharing of traditional burning knowledge and the absence of discrimination within these communities. From her perspective, however, state support tended to favour indigenous communities over intercultural ones. She observed, "Most times, all benefits go to indigenous, and interculturales get nothing, whereas we want to work well and coordinate." Nevertheless, she noted that intercultural organisations coordinate with various local groups, including indigenous communities, the *bartolinas* (highland migrants), and the *única* farmers' associations. Although these groups remain separate, they come together when projects or initiatives require collective action. Yet when it came to concrete assistance, Indigenous communities received more help, such as 1,200 bolivianos per community member, whereas intercultural communities were largely ignored in her view. Visits to municipal and departmental authorities, as well as requests for firefighting equipment, went unanswered: "I personally went to speak with the governor... many people were left without houses. We even filed a complaint, but nothing came of it." (ml-ic). Similarly, the respondent from the farmers' association reported that his community, along with three neighbouring communities, had to manage fires without receiving external assistance, such as water tanks or equipment repairs, while indigenous communities received substantial support (ml-uf).

Culturally, geographically and politically, eastern Bolivia is a world apart from the high plains of western Bolivia, home to the capital, La Paz, where the central government is physically based and politically oriented towards, according to state informants from the east. The forestry worker (ml-f) further contextualised these dynamics, emphasising broader structural factors: “The resentment of lowland Bolivians towards highlanders is fuelled by the government. They’ve turned land into a weapon, pitting groups against each other. Meanwhile, the forests burn.” The statement provides a firm frame for the following section on land trafficking and titling, illustrating how political and racialised divisions intersect with pyropolitics and resource conflicts.

Land titling and trafficking

The law promotes not controlled burns, but uncontrolled wildfires (rl-g)

Contestation over land distribution and allocation responsibilities emerged across interviews, with different actors attributing authority to different institutions. Indigenous communities and producer organisations described the ABT as the central authority, since it grants burning and deforestation permits. The ABT, however, deflected responsibility onto INRA, which it framed as the institution responsible for land distribution. INRA, in turn, described its role as dependent on evaluations by the PLUS (*Planes de Uso de Suelo*), a technical regulatory instrument drafted by ministerial and departmental government bodies for regional planning that designates how fiscal lands should be used. When PLUS is modified, the mandate of INRA shifts accordingly, altering the status of available land. If no decree restricts it, fiscal land is considered available, with up to 50 hectares eligible for clearing. In this way, each state institution displaced accountability, producing a fragmented governance landscape in which land conflicts persist unresolved.

From the official perspective, INRA positioned itself as an executor of PLUS, while acknowledging that land governance had become increasingly politicised. The government’s response included the issue of a presidential decree stipulating that groups with pending land claims could not continue allocation processes if the land in question had been burned. Cattle rancher organisations opposed the measure, and the decree was never implemented; instead, it was replaced by the environmental pause. The INRA observed that such government measures became politically contentious, particularly in Santa Cruz, where private entrepreneurs resisted acknowledging cattle ranching and illegal logging as primary fire drivers (rl-inra).

Critics nevertheless challenged INRA's self-portrayed neutrality. The forestry engineer argued that the agency actively confiscates forests from private owners, even those managing lands sustainably, and redistributes them to settlers, framing this as "legalised land grabs" with fire as a side-effect (ml-f). The cattle rancher representative similarly described that the only fiscal lands still available are those seized from larger landholders deemed not to have fulfilled the social-economic function requirements, after which they are reassigned to new occupants (ml-cr). INRA itself explained this procedure as follows: if new occupants request an area, it must first be verified that it is fiscal land and not already under another settlement process. If confirmed as available, a resolution authorises the settlement. After two years, compliance with the social-economic function is evaluated, requiring that production is at least enough for the household, not for profit. Where this condition is met, the resolution proceeds to title remission; where it is not, the claim is annulled, and the land reverts to fiscal status to be reassigned to another community.

INRA further clarified that Mennonite settlers can only access fiscal forest lands through purchase; they are not eligible for land allocation, which remains legally restricted to Bolivians. When no prior claim exists, INRA conducts a technical assessment to ensure that the land is available and untitled and then titles it—this being the only formal criterion for allocation (rl-inra). At the departmental level, reports indicated that INRA sometimes allocated public lands to intercultural or Mennonite groups without coordination with local authorities (ml-g). A local conservation expert working with WWF described how Mennonite colonies had approached Indigenous communities and used long-term rental arrangements (of a 1000 years) to secure effective ownership of land in another region called the Beni, and how the arrival of migrant settlers employing mechanical cultivation methods further complicated local dynamics (ll-po). Monte Verde has not seen these types of land rentals yet, and when asked if they would accept such an offer, community members told me no (ll-hi). Still, these developments, he suggested, prompted Indigenous communities to question why they should not also be entitled to scale up their practices, underscoring how land trafficking reshapes both land control and land use practices (ll-po).

In Santa Cruz, officials observed that the Evo Morales government had allocated public lands to intercultural communities, framing these moves as politically motivated. They also initiated attempts to modify national Law 741 – locally known as the arson law – criticised for promoting intentional burning as a means of land titling. As one explained:

What begins as a prescribed burn often becomes an unrestricted wildfire. This agricultural frontier advancement is supported by permissive laws that promote land use for both agriculture and biofuels like sugarcane. The law allows each family to clear 20 hectares, so 100 people could legally clear 200 hectares. (rl-g)

From the producers' side, soy representatives described their sector as exposed to fire-related disputes and legal insecurity. They explained that fines for fire damage are applied only to the portion of the property that burned, a safeguard meant to prevent bankrupting producers on large estates. However, they stressed that the real problem lies in how the state handles responsibility for fires: regulations presume the landowner is at fault, without distinguishing between intentional arson and accidental fire spread. Under these rules, the association complains that due process and defence are not always guaranteed: "How can they identify who burned the land? It's a small spark that spreads in a very dry area" (rl-anapo). According to their account, this creates opportunities for land grabbers to deliberately set fire to undermine landowners' legal tenure. Even when such invaders were eventually expelled, they noted, parts of the land had already been cleared, reinforcing their sense of legal insecurity around private property rights (rl-anapo).

At the local level, Indigenous communities described vulnerabilities under the same fire regulations, albeit within the context of collective property. They explained that if a fire is detected on community land, the community is presumed responsible, even when the fire originates elsewhere, is accidental, or is deliberately set by outsiders (ll-po). Because these communities conserve forested areas, the abundance of fuel – forest vegetation and organic material – makes accidental fire spread more likely, yet they are frequently blamed as the source. Despite occupying very different spaces and positions, both private landholders and Indigenous communities describe and labour under the same mechanism, which enables settlers to weaponise fire to destabilise tenure.

Similarly, the farmers' association recounted how legal plurality shaped their tenure strategies in a different context. Their organisation was founded after reclaiming idle lands from large estates, which they later discovered were in fact state fiscal lands. Concerned that individual titles could be sold to private actors, allowing external acquisition and exploitation, they pursued collective titles to retain control and prevent land trafficking. Despite these precautions, they reported ongoing threats from false landowners and alleged that private businesses had dispossessed them of 800 hectares by exploiting loopholes in Law 733, suggesting further failures in the legal system (ml-uf).

Political forest and fire governance

Forest management and forestry

Most communities affiliated with the Indigenous Council of Concepción (CICC) have either a forest management plan (SFMP) or a forest clearing plan (PDM) within the territory. Municipal government officials add that each community manages approximately 2,500 hectares under autonomous SFMP plans. These communities are the ones to decide whether to engage in timber utilisation (ml-g). Management plans are updated every 10 years (ml-abt).

When inquiring about the private timber concessions within the TI, the municipal government official responded that the presence of these loggers is why local communities and governing authorities maintain their own SFMPs for these extensive 2,500-hectare territories. For instance, community A has such a designated management zone where they should be able to exercise autonomous control over communal lands. The decision-making authority rests entirely with these communities – they determine whether to permit commercial extraction or preserve the areas. When logging does occur, private enterprises handle all operational aspects, including conducting preliminary surveys, securing required licenses through the ABT, and finalising contractual agreements with the communities. These business entities assume full responsibility for extraction activities and make corresponding financial contributions (ml-g). The municipality insists that there is no need for state involvement in the SFMPs that communities agree on with the timber buyers:

As municipal authorities, we maintain a deliberate policy of non-intervention in these arrangements. This position reflects our recognition of the communities' sovereign rights over their territories. Many of these groups operate through established indigenous community councils or formalised organisations that oversee resource governance, eliminating any need for municipal involvement in specific management decisions. (ml-g)

The municipality holds no power over timber trading inside the territory because the communities sign notarised contracts. Illegal logging is therefore also to be handled by the communities, according to the government of Concepción (ml-g). Only protected areas within the territory, such as the *Copaiba* area, are subject to government regulation, where forestry is prohibited. Operating environmental licenses are issued for general businesses, carpentry and sawmills in the municipality.

In addition, the officials state that there is no dialogue with the councils on the topic because the communities would not agree to change it. After all, it provides an extra income they receive without needing to work; it is the businessman who takes care of everything, they argue (ml-g).

Significantly, the above position is framed as a respectful and professional policy, but on the ground, it also means non-intervention in case of illegal conduct by third parties, such as logging. Effectively, this then leads to a state of non-protection regarding the community's rights to their forest, which has a bearing on the processes of (dis)possession. Without state protection, the communities' status as rights subjects is effectively eroded, and the municipality does not function as a public authority.

The institution managing the logging and management plans is the ABT. Its task is to oversee and control whether the volume and species of forest defined in the timber transport regulation, the CEFO (Forest Origin Certificate), are actually being harvested. According to APCOB, the ABT corruptly profits from illegal logging instead of regulating it. If this is the case, the ABT would be abusing its public authority, and the formal forest-owning community's institutional arrangements would not reflect the community's interests.

During fieldwork, the community shared that they are currently sowing seeds for new timber species. The 18-year-old forest in the community management plan was entirely burned in just two hours. Since there was plenty of fuel, the fire advanced and could not be controlled (ll-po). One respondent attributes the fuel buildup to the observation that the timber company refused to buy, and that they have not had much luck in finding a good company to work with:

We cannot harvest timber from our management plan—we are failing to benefit. An approved document is missing. The process is moving forward, but far too slowly. Still, we keep planting timber species for the future, for our children and grandchildren. Now we are beginning again with a new vision: to protect the forest and keep fire out. (ll-pv)

Not to mention, there were three SFMPs with a forestry company that took the wood but never returned to pay the community (ll-hi). What does the ABT have to say about this? An interview with the head of ABT's operational unit in Concepción reaffirmed the formal, *de facto* rules, which contradict the informal forestry practices at the community level:

Timber buyers request management plans. Communities propose 20-year cycles with Annual Operational Plans (POAs) for sustainable extraction. They lack processing centres and sell timber locally to entrepreneurs who present contracts to the ABT. Contracts are volume-based and certificated. When communities contract with buyers, part of the timber sale revenue goes to the community.

The preparation and handling of technical SFMPs are left to external forestry engineers (auxiliary agents) who must be credentialed and ABT-registered and independently set fees for instruments like POAs and CEFOs (ml-abt). The forestry engineer I interviewed describes a similar conduct:

It starts with an offer. A buyer – maybe me, maybe a sawmill rep – arrives in a community and proposes a price: "\$20 per cubic meter for *tipa*." If the assembly agrees, we will draft a contract. But the systems differ. Intercultural communities hold land titles or settlement papers, so deals move fast. The TIs are tangled in bureaucracy—every sale must go through their central council. (ml-f)

SFMP contract details are not reviewed in great detail by the ABT, but within the technical requirements, they require a resignation certificate from the council where they are assigned a legal entity. Returning to the forestry issue faced in Community A, upon being asked what recourse is available when a company deceives a community, the ABT reports that they lack jurisdiction there; communities would have to pursue civil or criminal proceedings. The ABT does sanction violations of property management plans (POPs), but these plans only apply to individuals and legal entities, so Indigenous communities require legal personality recognition from subgovernments first (ml-abt). The *cacique* of Community A mentioned that they are in the process of acquiring legal status. However, the regional ABT chief exposed that elsewhere a conflict arose, and the businessmen took legal action that led to a halt of forestry rights (SFMPs, POPs and POAs). This implies that Indigenous communities can still be at risk of losing the right to use that land, even when the land use is legalised through a POP. In general, the prerequisite for forest utilisation is obtaining a myriad of official permits and technical certificates, which indicates classic colonial-style political forestry (Basnyat et al., 2018).

To combat illegal logging, the ABT executes nightly patrols and confiscation of unmarked timber; CEFOs must match tree/codes during transport. A territorial oversight council agreement is supposed to enhance control in the future. Resource exploitation is kept in check by Article 1 of Law 1700, which demands SFMPs to be economically viable and sustainable. For the ABT, this translated into enforcing selective logging where 80% is harvested and the other 20% is preserved. He explains: "species like *morado*, *tipa*, and *tajibo* are cyclically harvested under diameter limits, preserving juveniles". Such sustainable forest management, together with a \$2 billion carbon credit initiative that is underway to avoid deforestation, would safeguard forest resources, he believes (ml-abt).

However, the forestry expert interviewed identifies a highly disputed land traffic structure that would undermine sustainable forestry in wild forests, where most timber is still harvested (ml-f). He remarks that after 30-year terms expire on state lands with management plans, forest concessions, including FSC-certified forests, are not renewed and instead revert to state lands. For example, *La Chonta*, associated with twenty-thousand-hectare concessions, was forced to pay a bribe to maintain the certified areas, as part of the state scheme that redistributes those lands to settlers, so intercultural groups occupy them (ml-f). The same process was referenced during a later interview with the departmental government (rl-g). The forester states this caused the system to collapse, including the certification system, leaving almost no certified forests. In collaboration with municipalities, forestry engineers are intercepting these areas, designating them as protected zones and inhibiting further exploitation, an intervention that has already yielded successful outcomes in one region (ml-f). In the case of the concessions within TI Monte Verde, there were no records of such areas being occupied by intercultural groups through a state scheme of land redistribution.

As to the timber origins, the two most important sources are the TIs and intercultural settlements. The Indigenous communities might clear 5 or 10 hectares but secure permits for 20, often to sell wood rather than farm. Intercultural communities use their legal allowance—20 cumulative hectares per family—for agriculture, but some also sell timber (rl-g). Timber sale is not a recognised activity for the intercultural communities that were part of this study, though, as a representative reports:

We don't extract forest products for sale; almost no one goes to the forest, maybe a bit for consumption – a few fruits or some wood to make fence posts, not for sale. Only indigenous communities have management plans. I heard on the radio that they stole a truck, even though they don't have to do anything because the foresters take care of it. (ml-ic)

The engineer criticises the forestry sector as being controlled by monopolies, asserting that a small group of large firms dominates all stages—from logging and processing to export. These companies, he claims, purchase timber from local communities at minimal prices, then profit significantly by selling processed goods at market rates. When I asked about the fairness of timber remuneration for the community, he answered:

Fair? It is relative. The logger pays the community \$20 as costs from machinery rentals, labour, permits, and a forester's salary eats the rest—it adds up. And the market is limited because Chinese buyers only want a few species: *tipa*, *morado* and *curupaú*. *Tipa* fetches \$300 per log at the port, *morado* \$200. Construction timber sells locally for \$15–20 per cubic meter. If more species found buyers abroad, communities could demand better prices. (ml-f)

The preceding paragraphs highlighted the construction of inequitable forest management, as well as their embeddedness in and contributions to the political dynamics of land use, allocation, tenure, traffic and rights, which will be discussed more in the following subsections.

Inter-authority coordination and conflict

The government of Santa Cruz held that the intercultural communities and local farmers collaborate to contain fires, but interviews with the respective groups say otherwise.

As for the private cattle ranchers, the producers who were hit hardest are said to have already started reorganising and preparing for future environmental risks by installing water tanks and pump systems, sharing supplies and clearing firebreaks around their entire property, to contain the flames and manage them better, although most were already doing this. They have also been supported by producers with more means by means of coordinated donations to share supplies (ml-cr).

Overall, the efforts to collaborate, however, seem more focused inward than outward, for all actors and sectors. The rancher association representative does not believe that there are opportunities for collaboration between ranchers and others to improve fire management:

Maybe between farmers and ranchers. We've brought firefighters to help the *comunarios* (Indigenous community members) and contributed to a food supply network. But the rancher does not interact with the *comunario*. Even though here in Santa Monica, there was

a rancher who helped the community by making a firebreak with his machinery, and they didn't help him back. He had to cover all the costs. (ml-cr)

Likewise, the intercultural women's organisation states that whereas there is already 'hardly coordination between the indigenous councils and intercultural federations', it is the duty of the mayor's office to coordinate with all farmer-communities, but aid is only received by the Indigenous ones while they are sidelined (ml-ic). The *Única* peasant farmers propose that "leaders of *Única*, interculturales, and indigenous communities must unite", since last year's machinery fund failed because they could not come to an agreement due to infighting—some wanted tractors, others demanded water pumps. However, they admit that they are also fractured internally, since factions in favour of the current administration oppose them, as opposed to the era of Evo Morales' administration, characterised by unity.

Collaborations to improve fire management reportedly only occur after disaster strikes: "prevention measures remain non-existent" (ml-f). This is in line with the remarks of the departmental state official, who confirmed the need for better coordination on preventive efforts and further explained how that depends on political change toward a greater unity of the three constitutional powers, as hitherto "everything always falls on the executive power" (rl-g). Moreover, the government is split up in terms of political orientation: "We continue to work on the farmers' side, but the central government is always limiting us". They acknowledged the charge that Santa Cruz operates with a production-oriented focus, but argued that, ironically, resources are absorbed by central government systems, with only a fraction returning to the department (rl-g).

This opposition crucially curtailed the lower government levels' capacity to act during the disaster: "The Santa Cruz government has consistently tried to curb fires, but other MAS-aligned departments block our authority to redirect resources to the governor's office, while 40% of our directorate's implementation budget has been cut, reducing staff" (rl-g). Santa Cruz officials recalled earlier efforts to train communities in first response capacity, before Evo Morales' administration, ruled by the MAS party, shifted responsibility to the ABT. Now, much of the aid distributed to 14 sectors did not reach the communities, as it was lost to corruption. Forest fires were described as an escalating social conflict, with both central and departmental governments constrained by political dynamics in which their power bases depend on popular votes (rl-g). The regional government affiliates with the

forester's aforementioned claim that, in this context, the central government's approach leads to land use change from forest plantations to agricultural land – trading trees for votes.

Not to mention that this extractivist model seems to be legally protected, too. In the interview with the department, it was brought up that, through normative hierarchy, the department can suggest modifications to land use changes, but legal pronouncements made at the national level were overridden. Moreover, the law is said to block communities from direct access to carbon credit deals, which are currently made at the central level since agreements require national government approval (rl-g). The central state legislative power, in turn, enacted laws that promote fragmented and overlapping legal frameworks: in particular, the national risk management Law 602 is hampered by bureaucracy, prompting the municipal office to create a similar version (Law 141), which also prohibits fire use, to proceed faster with incident issues (ml-g). The national environmental pause decree (Law 253) discussed before, prohibits burning as well, thus adding another layer of overlap at the municipal level (ml-g). Overlaps can create ambiguity about which rules apply and how they are enforced, which is the focus of the next section on regulatory enforcement.

Enforcement and justice

The ABT's rules exist on paper, but in the field, it is pure chaos. (ml-f)

This quote followed after asking the forester about how policies contribute to forest fires, to which he answered that the ABT could enforce order, but it is underfunded and corrupt, so no one enforces burn calendars (ml-f). The local ABT unit itself claims advanced heat point monitoring by technologically equipped field teams (ml-abt). However, since this team consists of only eight officers, it seems unlikely that the whole area can be inspected, though it was mentioned that they conduct inspections together with the local government for a supervisory council. Yet the municipal agency asserts that its ability to enforce land use and wildfire prevention laws is inhibited due to an absence of functional coordination with the ABT or INRA, limited authority and lack of access to critical information (ml-g):

As the local government, we cannot allocate land or determine ownership and burning permits since that power lies solely with INRA. This becomes particularly problematic when we regularly detect heat hotspots somewhere but have no way to verify whether these

represent authorised burns. Despite our repeated requests, INRA refuses to share its land ownership database that would allow us to check if a property owner has obtained the required burn permit. This information blackout severely hinders our ability to monitor and regulate burning activities across the territory.

The current enforcement system further complicates these efforts. Environmental Law 700 established a fine system for unauthorised burns, but the original penalty of just twenty cents per hectare was so insignificant that many landowners simply chose to pay it rather than go through the lengthy permit application process (ml-g). Interviews revealed how these mechanisms played out unevenly across actors. As one forestry professional noted, "Private producers – soy growers, cattle ranchers – have the resources to control burns. They follow ABT rules because fines hurt. Smallholders burn and pray" (ml-f). In contrast, a representative of the Unica farmers' association emphasised that resource-rich ranchers can also afford to absorb penalties, while fines are crushing for peasant communities: "If one member burns a hectare, our entire 1,200-hectare territory is fined. Meanwhile, wealthy ranchers light fires, pay penalties, and walk free" (ml-uf). In their account, sanctions do not operate as deterrents but rather exacerbate existing adaptation asymmetries.

In response to such limitations, the municipality introduced a "Life Plan" in 2023, which has recently been reactivated with stronger enforcement mechanisms. While its initial implementation was delayed by fuel shortages, the revised plan incorporates a monitoring system, regular patrols, and, crucially, municipal legal authority to issue formal notifications and sanctions. Whereas in previous years officials could only appeal to the ABT to intervene, they now hold the mandate to document violations and enforce penalties directly at the municipal level (ml-g).

While this could be a potential step forward in enforcement capacity, it currently still stands that judicial non-enforcement and executive over-centralisation, together with legislative protection of extractivist laws, have resulted in institutional and geographic inequity: centralised resource policymaking and control in the west, while fires are in the east. Such systemic power imbalances and a weak enforcement system significantly undermine just policy implementation on the ground, where local ecosystems and communities are deprived of state protection and the opportunity for self-organisation.

Synthesis

Fire mediates processes of (dis)possession by becoming a weaponised instrument for land clearing and tenure claims, while simultaneously being mediated by a politicised governance framework that does not mitigate risk but instead often exacerbates existing tensions and inequalities.

Forest fires *mediate* land struggles, immigration and governance by providing an easily amendable land grab tool that can obscure the offender behind a smoke screen through its transboundary and thus sometimes spatially and temporally displaced spread and effects. Also, as a more-than-human agent, fire escapes human control as it indiscriminately ravages titled lands, territories-in-process, and protected areas alike, rendering legal boundaries temporarily meaningless.

Forest fires *are mediated by* land struggles, immigration and governance through legal protection of short-term extractivism or development and promotion of deforestation, with burning being the most time and cost-effective way to clear woodland. Moreover, the competing claims to public authority and active complicity of the state, consisting of politically motivated land redistribution, executive over-centralisation and selective enforcement, especially regarding the ineffective burn penalty and permit structures, allow deforestation by fire to proceed with total impunity.

Ultimately, fire is a manifestation of such systemic struggles over land tenure and access

The findings reveal a governance system characterised by inter-authority conflict, fragmentation and overlap, creating significant voids and power vacuums in fire management and emergency response. This institutional disarray forces communities to rely on autonomous, self-organised firefighting brigades, which operate with immense physical burden and minimal external support, while state assistance is described as delayed, bureaucratically crippled, and often politicised, particularly disadvantaging the department of Santa Cruz due to its political opposition to the central government. It can also be argued that the so-called legalised land grabs by the highland settlers are both based on the political opposition, considering the claim that the central state facilitates this to secure more votes in the east, and reinforces the social divide, as it turns local lowlanders against immigrants from the west for being the perceived perpetrators of starting fires, separating them further. Within the intercultural communities studied here, however, the division is dissolved, with no notion of discrimination or conflict. Discriminatory is the impact of fire policies, such as the national "environmental pause" and burning calendars, that criminalise Indigenous subsistence practices while allowing large-scale actors to absorb fines or continue mechanical deforestation. These regulations disproportionately impact traditional livelihoods without providing viable alternatives, indicating institutional injustices. Forest, fire and forest fire management are therefore co-produced through socio-political, economic and environmental mechanisms.

Discussion: Transformations in agency, adaptation and autonomy

The discussion will be structured in thematic analyses first and end with the addressing of the integrative research question. To begin with, the prevailing narrative of forest fires is analysed, which predominantly demonises traditional practices while expropriating local rights to manage forests and fires autonomously. After, an analysis is provided of the co-constitutive recoding for all four components, structured per specific property arrangement and the potential links between those arrangements. Then, a set of in-depth angles is applied to better understand the contextual configurations relevant to forest fires, and the resulting transformations, consisting of the law, adaptation, and autonomy.

The prevailing narrative of forest fires

An initial empirical analysis challenge was the conflicting evidence as to the extent to which and by whom fires are started for political purposes. Profound discrepancies in the explanations for the origin and responsibility regarding forest fires were found between the actors and institutions involved. However, I ventured to circumvent this by juxtaposing the statements and the underlying narratives in a context of institutional and legal pluralism.

The land use practices of Indigenous communities in the territory are rooted in small-scale farming and agroforestry systems, accompanied by applied traditional burning knowledge adapted to seasonal and ecological conditions. It is common for the government and large-scale agricultural producers to blame indigenous communities based on the fact that they have a cultural practice of burning. But the fact that they have a cultural practice means that they also have a lot of safeguards in place. However, accidents can happen and considering their use of slash-and-burn, it may be true that sometimes it does happen on their territory, but hotspot tracking maps suggest that most fires last year originated outside of the territory (APCOB, 2024), and because the territories are better conserved, there is fuel. An argument that was brought up more than once is that the Indigenous population has no interest in burning down the forest from which they derive their livelihoods. The same rationale, however, appears to serve other actors as a politically convenient narrative to dodge accusations. While it might be the case that local farmer and producer groups also depend on a healthy environment, the forest dependencies and adaptive capacities operate on different scales, and they should not be assessed by the same standards.

Yet, the dominant narrative often positions them as primary culprits. In Lund's terms, this reflects how the "coding" of fire and its presumed perpetrators is less about empirical evidence than about political expedience: attributing blame serves the interests of those actors who seek to divert scrutiny from their own complicity in land clearing and degradation. During interviews, farmer associations, government agencies, and regional authorities consistently distanced themselves from accountability, invoking laws, technical regulations, satellite data, and research reports as proof of their compliance. The key question, therefore, is not only what the rules are but who codes them, in whose interest, and with what consequences for recognition of rights-holders (Lund, 2024), or in other words: who wins when the forest is lost?

To answer this question, I will discuss the transformations in the governance and assemblages of and around Indigenous territories.

Land rights transformations

Three property rights arrangements were identified, in which the Indigenous Peoples' territories can be categorised as common property, the land of cattle ranchers and soy farmers as private property, and the land allocated to intercultural communities as common property that used to be private property or state land. How fire is instrumentalised to reconfigure land rights differs per arrangement. First, I will analyse them only through the three original components of the conceptual framework, after which the more-than-human component is added to show the added analytical value of embedding processes of (dis)possession into socio-nature assemblages.

State-owned land reallocated to intercultural communities

Local NGOs and respondents framed fire as an instrument in the state's broader political project. According to their accounts, the national government strategically encourages the migration of highland populations to lowland forest areas. These settlers – subsequently organised into so-called intercultural communities – are recognised as legitimate rights subjects by virtue of state-sanctioned settlement schemes. When intercultural groups gain a piece of land, the institution INRA gains renewed authority, assuming the application of mutual constitution of authority and rights in this arrangement. These government-led land transfers set in motion a recoding of assets from forest to agricultural land, with fire functioning as a sort of transitional code, which turns into a legitimate tool when it changes how property is coded. Here, fire is recoded as both an agricultural necessity and a legalised tool of land clearance, facilitating the transformation of forest into farmland. Bolivia's

land-use system formalises this logic: every parcel is designated a specific use, and unless it is agroforestry, clearance is required. Burning thus becomes the cheapest and most direct means of fulfilling state expectations of productive land use.

Collective territory of Indigenous Peoples

In Monte Verde, coding and recoding processes may undermine tenure security and lead to dispossession. Current procedures code collective Indigenous land as a liability: if fire is detected, the community is often presumed guilty, even when it originates elsewhere. This enables outsiders to deliberately clear land by igniting fires, thereby recoding Indigenous communities as negligent rights holders, which allows their land rights to be weakened through sanctions. In this case, state sanctions have not resulted in the immediate fragmentation or reallocation of Indigenous territory, which is harder to formally fragment, but they nonetheless weaken tenure security in significant ways. By criminalising fire use, authorities recode Indigenous communities as irresponsible land stewards, undermining their legitimacy and moral authority to claim protection under the law and consolidating their own authority, which reinforces existing power asymmetries. The fear of further sanctions discourages traditional land management practices such as controlled burning, effectively restricting the exercise of use-rights. In Lund's terms, this constitutes a process of dispossession: land tenure rights remain formally intact, but their substance is gradually hollowed out, leaving collective lands more vulnerable to encroachment and exploitation.

Private properties

In the case of private properties, the existing rule may code landholders as responsible for any fire detected within their boundaries. This would establish them as rights-subjects whose entitlements are contingent upon compliance with environmental law, which is not bad. However, the loophole is that the code does not differentiate between intentional, accidental, or externally caused fires. Because state procedures rarely investigate thoroughly, the legal script renders the landholder culpable regardless of circumstance, while due process remains weak. This creates opportunities for settlers to deliberately set fire and expose producers' land to sanctions. Once sanctioned, legal tenure security is eroded, leaving the asset vulnerable to redistribution or encroachment.

Both in the private property case and the Indigenous territory case, fire becomes a trigger for recoding processes that destabilise tenure, but the impacts diverge because the coding scripts attach differently to private vs. collective property arrangements with different logics of landholding and livelihood. By contrast, in the case of reallocated state-owned land as a form of political patronage,

fire is not coded as a liability but as an enabling script: it becomes the legitimate means through which forest is transformed into farmland, thereby aligning landholders with state projects of productive land use. In all three situations, fire mediates the mutual constitution of authority and rights, yet in radically different ways. For intercultural communities, fire consolidates rights and strengthens INRA's authority; for Indigenous territories, fire sanctions undermine tenure while reaffirming ABT's authority and state regulatory power; and for private landowners, fire exposes them to the risk of dispossession through the presumption of guilt and weak procedural safeguards.

Socio-nature transformations

When analysed through the socio-nature assemblage lens, these divergences take on an additional layer of complexity. Fire is not only a regulatory code imposed by human authorities but also a more-than-human agent with uncertain and transformative effects: it spreads across boundaries, resists control and transforms forests into new states. These effects reverberate through the assemblage of assets, rights-subjects, and authorities, launching ripple effects that undermine or reinforce relations among the components depending on context. For new land colonisers, fire's capacity to clear land is synergetic with state logics of productive use, while in Indigenous territories, the same phenomenon recodes communities' rightsholder status as negligent stewards. In private properties, fire's untraceable behaviour creates conditions where producers are rendered culpable irrespective of intent, undermining their legal standing. Seeing fire as a more-than-human agent, therefore, highlights how land rights reconfigurations are not only the outcome of human politics and law but also the agency of environmental forces.

Zooming in on the framework, we can see that there is no proper coding link between more-than-human agents and public authority. Crucially, authorities understand and engage with Nature either as an asset or a rightsholder, meaning the natural environment is considered only when it takes the form of an asset or is mediated by people. As a result, both its agentic power and inherent value are ignored. A regime of possession is held together by "contracts of recognition," yet more-than-human agents fall outside such contracts, which may be one reason why a regime falls apart. Law and policy are often ill-equipped to adequately account for the non-asset forms of Nature. Hence, Nature must be recognised as a subject of rights itself to properly address environmental challenges that do not purely relate to the utilised version of Nature, such as climate change, by granting legal rights to Nature and its components.

Both the dynamics of the new fire and governance regimes are further complicated by the volatile dynamics of intentional and non-intentional, i.e. naturally occurring, forest fires. There are two interlocking trajectories unfolding in my understanding, here applied to only the collective Indigenous territory arrangement, where the first admittedly gravitates more toward external conditioning and the second most clearly demonstrates the agentic capacity of fire.

First, the climate is reconfigured, causing increased forest flammability and droughts, rendering the Indigenous territory in a precarious state and its communities with weakened use-rights and access to their forest. As such, it changes the use of an asset, which, according to Lund, effectively entails its recoding. Moreover, the unpredictable nature and materiality of fire and other non-human forest subjects tend to resist management and thus influence both the effectiveness of the risk strategies and the ability of rightsholders to access benefits from natural assets.

Secondly, the forest is coded to be claimed spatially by the Indigenous communities of the territory, who may oppress or be oppressed by the other local communities' spatial claims, namely the peasant union and intercultural communities, with different political identities. In any case, fire comes in to reconfigure the forest/agricultural frontier, which in turn destabilises land tenure rights, reflected by changes in land ownership and use. Here, fire constitutes an active natural agent that indirectly as well as directly recodes who is a rights subject to which area or asset.

In sum, incentivised burning becomes the impetus of the socio-nature and land rights transformations, and as a result, authority is reestablished, assets are reconfigured, and people as rightsholders are privileged or disenfranchised. By seeing nature as an agent, we can observe that not only governance, but also nature itself – in many cases as a response to governance strategies and adaptation strategies – shape access to and control over assets by recoding people as rights subjects and undermining the value of assets and the authority's ability to control them. Thus, both through climate change and arson, fire and the resulting agricultural frontier expansion recode the relationship among assets (land, trees), rights subjects (Indigenous, farmer and intercultural communities), and public authority (state and communal institutions). Inversely, conflicting claims to, and the recoding of, public authority itself also produce institutional insecurity, allowing for lawful burning and impunity for illegal burning. Understanding these dynamics is thus incomplete without turning to the legal framework, leading us directly into the question of how the law authorises, recodes, or denies such transformations.

Fire and land laws

The instrumentalisation of fire is reinforced by the legal framework. Multiple laws permit controlled burning and impose only minimal sanctions when fires escape control. Civil society mobilised against these permissive laws, but the government has remained indifferent. Compounding this, budget cuts in fire management further undercut enforcement capacity. Within Lund's framework, this demonstrates how public authority is consolidated not merely through the text of law but through selective enforcement and fiscal prioritisation. By defining which fires are legitimate and which actors count as compliant rights-holders, the state both authorises and obscures the dispossession of others.

For Indigenous communities, the forest itself represents an asset, yet one whose recognition is contingent on state protection. Property in Lund's sense is not simply possession but state-sanctioned possession. Where the state fails to enforce territorial resolutions or forestry contracts, Indigenous rights are rendered hollow. A right without enforceability is no right at all. This failure reflects a deeper struggle between overlapping and competing authorities: ministries, INRA, ABT, and local governments each interpret and enforce laws differently, often to the advantage of actors aligned with national production agendas. Recognition thus becomes fractured and inconsistent, producing what respondents described as legal insecurity.

The broader outcome is a legal framework whose official intention – Indigenous Peoples' rights and environmental protection – is undercut by its practical effects. When property laws are imposed in such a way that they demand people to validate land rights through specific proof of ownership or, in the case of forest management plans, technical documents without legal protection, the law in itself enables dispossession (theft laundered in advance) and becomes an instrument of power. Indigenous groups, despite conserving more fuel-rich forests, are disproportionately affected by fires, while agricultural actors, whose intensive cultivation aligns with the state's fiscal and political interests, can convert land into taxable commodities. Legalism becomes a political tool to push through policies and paralyse opposition with little concern for actual justice or fairness. This represents pyropolitics as rule through law rather than rule of law: the codes of legality are bent to serve economic priorities, reinforcing what Lund identifies as the mutual constitution of authority and rights. By bending legal codes to economic ends, these frameworks constrain Indigenous autonomy, making the study of local adaptation and resistance strategies essential to understanding how communities navigate and contest these regimes

Assemblages of adaptation and resistance

In Monte Verde, the loss of 700,000 hectares of forest, including 500,000 hectares of highland forest, has had direct consequences for the local economy. Agricultural production suffered economic losses of Bs. 1,082,100 (rl-rep), affecting key crops such as cassava, plantain, and coffee. These combined pressures of the Pyrocene and market dependence threaten traditional ways of life. At the same time, Indigenous communities are adapting to the new fire regime and resisting disenfranchisement by self-organisation through territorial governance, diversifying income sources, and adopting fire-free cultivation systems. The nine fire-affected communities with restoration plans reflect this adaptive orientation, which includes agroforestry systems and reforestation with native species (rl-rep). Such practices align with global FAO recommendations on ecological restoration after fire (FAO, 2020) and resonate with experiences in Peru, where similar initiatives have restored ecosystems while reinforcing Indigenous livelihoods (Pinto, 2022).

More-than-human methodologies made visible how these adaptive responses emerge through socio-nature assemblages. Post-fire practices have generated new fire-free systems that enhance the resilience of agroforestry, whose design, inspired by the vertical structure of the primary forest, reflects an intimate understanding and active participation of the natural world. A deep emotional kinship with, and intricate knowledge about, the forest ecosystem echoes the permeability and interconnectedness of more-than-human relationality in the Indigenous territory. An important source of the willingness to adapt in the first place consisted of the sense of belonging and relational interdependence that participants described in relation to the forest. Yet adaptation is not only social but ecological. With many fruit-bearing trees burned, human–animal relations have shifted: wildlife now concentrates at the forest border, intensifying encounters there, while the loss of fauna in the flames has reduced hunting and, with it, interactions deeper inside the forest. These transformations illustrate the ways in which socio-natures are reconfigured by fire, reshaping relations between humans, nonhumans, and territory.

A comparative lens further underscores the conditions under which adaptation becomes viable. Unlike the tenure insecurities in TI MV, the TI and protected area Charagua Iyambae has kept fires at bay for the last two years by combining Indigenous governance with law enforcement (Global Forest Review, 2025). Trained rangers, satellite monitoring, and swift response systems support proactive patrols, while the Indigenous-led 2024 Protected Areas Law institutionalised Indigenous authority to manage and control land use and thereby enforce territory-wide protection (IUCN NL, 2024; World Land Trust, 2024). This illustrates that fire prevention is not simply a matter of knowledge or intent –

communities elsewhere also maintain careful burning practices – but hinges on whether rules are actively enforced and backed by institutional support. Comparing the results from Monte Verde with experiences elsewhere highlights the importance of policies that not only recognise but also actively ensure state enforcement of Indigenous rights and promote territorial self-determination.

Finally, the fires themselves can be understood as socio-nature assemblages, arising from human actions – such as land clearing or pasture fertilisation – and from natural dynamics that dictate their spread, which can rebound to endanger human communities in turn. Yet those who ignite the fires are often shielded from these rebound effects, leaving Indigenous and other local communities to bear the risks, reflecting a stark expression of climate coloniality and environmental injustice. The central tension, then, lies in whether these adaptive practices can sustain cultural identity while navigating a governance landscape that enables settlers to weaponise fire and capital to recode forests into farmland. The capacity to adapt and resist is thus inseparable from access to autonomy and self-determination, particularly in the management of natural commons.

Access, autonomy and the state

While effective fire control ought to begin with territorial sovereignty (Welch & Coimbra, 2021), in Monte Verde, efforts towards greater sovereignty seem hampered by continuous environmental challenges that divert attention away from practising political self-determination. Post-fire restoration efforts are obstructed by dense undergrowth, demanding labour while limiting communities' capacity to invest in autonomy-building. Another major limitation of the governance and management of the Monte Verde territory is the lack of territorial control and constant encroachments by third parties that violate territorial sovereignty.

On paper, Indigenous communities in Monte Verde are recognised as rights-holders, endowed with collective territorial rights and autonomy over resource management. In practice, however, these rights are continually eroded, effectively erasing their status as rights-holders. Municipal non-intervention in cases of illegal logging suspends state protection. This gap between legal recognition and lived enforcement underscores that Indigenous Peoples' rights, while formally enshrined, remain fragile and reversible.

In principle, the territorial resolution recognises collective, inalienable rights over land and renewable resources, granting authority to self-govern, manage development, and secure prior

consultation for resource exploitation. Bolivia's constitutional framework for Indigenous autonomy further affirms self-determination across political, economic, social, and cultural spheres (CPE, Articles 289–290; Martínez et al., 2013). Yet, in situ, autonomy is undermined by state institutions themselves and remains partial. Forests are infiltrated and encroached upon, external authorities may contest local governance, and formal recognition is required to access the benefits of resource use, as in forest management plan regulations. Progress toward full Indigenous Autonomy in Monte Verde has been constrained by three interrelated factors: (1) complex, multi-level institutional requirements imposed by national and departmental regulations, (2) the dispersed and marginal geographic coverage of communities, and (3) persistent pressures from non-Indigenous actors coveting the territory (Martínez et al., 2013; Romero & Albo, 2009). This demonstrates how rights and authority are mutually constituted: when Indigenous peoples make claims, they rely on state recognition, and this recognition simultaneously consolidates state authority to define and validate claims. Autonomy is thus not exercised in isolation but simultaneously dependent on, and curtailed by, the state and continuously negotiated within overlapping and contested frameworks of recognition and enforcement.

These dynamics are further complicated by uneven mechanisms of access, which mediate the extent to which rights translate into tangible benefits. Access to technology has improved incrementally, with households gradually acquiring infrastructure such as wells, fences, and solar power, yet often through piecemeal external support rather than autonomous investment. Access to capital remains limited, constraining the ability to benefit from forestry or expand agricultural activities; in its absence, communities rely on intermediaries, reinforcing unequal economic relations. Access to authority is also constrained by distance and cost: long travel to urban centres, compounded by the fuel crisis, restricts contact with state representatives. Only leaders such as the *cacique*, who maintain connections with municipal Indigenous councils, can bridge these gaps. Finally, access through social identity and alliances with NGOs has proven pivotal. Framing a unified Indigenous identity enabled titling, while partnerships have facilitated diversification strategies, such as coffee projects and value-added processing of honey. Yet these gains remain contingent on external presence and resources and are not guaranteed by formal rights alone. While the initiatives have opened small channels of exchange, agricultural sales remain vulnerable to price fluctuations and the wider economic crisis. Taken together, these uneven mechanisms of access reveal that the possession of formal land rights does not guarantee protection or autonomy. Instead, access is mediated through interlocking technological, economic, political, and social dynamics that continually shape the scope of communities' capacity to respond to territorial pressures and land

use changes. In Monte Verde, the right to self-determination is an ongoing negotiation within a shifting assemblage of rights, authorities, assets, and more-than-human forces.

Synthesis

Intensifying forest fires are a symbiotic manifestation of both ecological and political forces within the socio-nature assemblage, each acting upon and amplifying the other through a recursive and politically charged relationship. The process begins with the active agency of the more-than-human world: a changing climate fuels droughts and heat, and creates the conditions for fire to act

The fires are a product of and therefore expose the fragilities and agendas within the political sphere and land rights system. This system is characterised by state-promoted extractivism, permissive laws, institutional fragmentation, and the strategic weaponisation of fire by settlers and agribusiness for land grabbing. This governance framework actively dismantles Indigenous autonomy and recodes fire from a traditional management tool into an instrument of delegitimisation at best and dispossession at worst. The fires themselves, as more-than-human agents, actively catalyse transformation by acting upon assets, rightsholders and authorities. They physically and emotionally reconstitute the landscape, leading the Indigenous communities to adapt their livelihoods and relationality, reassembling human, plant, and spiritual relations. Simultaneously, fires become a trigger in the legal system to recode land rights, destabilise tenure, and consolidate state authority by penalising traditional fire users while legitimising frontier expansion.

Thus, the fires are outcomes of a climate-primed forest assemblage interacting with a governance system that encourages burning. They are drivers because their unruly agency forces transformations in governance strategies, which in turn reshape the ecological landscape, deeply entangled within the continuous becoming of the assemblage.

Limitations and future research

In this section, I discuss the limitations and corresponding ideas for future research that arose throughout different stages of the research process.

First, despite several attempts, I was not able to make contact with the Mennonite colonies inside the territory, and even when in Concepción, where they can sometimes be found buying groceries. Together with intercultural communities, these immigrant groups are known as notoriously understudied and hard to gain access to within local research circles. Since the Mennonite communities in the study area avoid public appearances, do not own cell phones, speak in old-German, refrain from talking to women, and live extremely private lives in general, I had little chance to begin with. While I resorted to other actors' accounts of (interactions with) them, it would have been very valuable to have first-hand data from Mennonites to find out through which procedures they follow to secure land rights and validate whether they only colonise private land, as INRA says. Such data is especially relevant, knowing that across Latin America, Mennonite colonisation has been a serious driver of Amazon rainforest deforestation through their pioneering role in opening up new agricultural frontiers (see Le Polain de Waroux et al., 2020).

Second, I would have liked to collaborate with ecologists to complement the forest loss observations by local communities I documented with ecological data. However, this was partly provided for through the territory-wide impact assessment, though without specified community-level data. Third, this research would have benefited from critical cartography and countermapping to critically evaluate the heat hotspot maps authorities use to sanction unauthorised burning, but the timeframe did not allow for it. The maps presented in this thesis are thus secondary sources; I was only able to access GIS data from APCOB, as authorities often withhold GIS fire maps from public access.

Flowing from these limitations emerge suggestions for future research to complement and expand this study. The challenges call for further studies that investigate the role and local effects of Mennonite colonisation as well as richer insights into the intercultural communities, since I could only do one, though very in-depth, interview with two members. Transdisciplinary research integrating policy, participatory ethnographic, ecological and GIS data could also help to situate local realities more accurately within the governance landscape.

Lastly, another limitation I encountered during analysis was ambiguity around how much participants' political views influenced their standpoint on the rationale behind governance involvement in land redistribution, which varied between socialist and neoliberalist motives or a combination thereof. With the recent elections marking a turning point towards a right-wing president after a 20-year era of left-wing rule under Evo Morales, it will be interesting for future research to assess how new policies, which are expected to protect businesses and affect ordinary Bolivians, play out concerning the political land transfers from private to public property.

I do not claim to have provided comprehensive answers or solutions to address these gaps or other significant questions that may arise to initiate positive transformation. Rather, I intend to stimulate further dialogue that could inform strategic actions aimed at facilitating such transformations.

Policy recommendations

In this section, I examine how the fire-mediated relationship between communities and the local environment may be integrated into fire policies to improve resilience. Part and parcel of the governance of indigenous territories is whether and how these continue to exist in reality.

To strengthen resilience, fire management must move beyond technical fixes to integrate political, emotional, and relational dimensions. Policy must undergo radical reform. It must halt the state's strategic complicity in land grabs by abolishing laws that incentivise deforestation and end the discriminatory enforcement that criminalises small-scale fire users while granting impunity to large-scale arson. Resilience requires transferring real power and resources to Indigenous territories. This means directly funding and legally empowering autonomous, community-led fire brigades and restoration efforts. Supporting these practices shifts policy from a punitive, external model to one that fortifies the socio-natural assemblage from within, recognising that the most profound resilience is cultivated through everyday acts of relational care. Ultimately, resilience depends on policies that enforce Indigenous authority, nurture socio-ecological recovery, and learn from Indigenous relationality, thereby honouring the complex socio-natural realities of these territories. True resilience is impossible without territorial sovereignty and the political will to protect it.

Conclusion

This research investigates how forest fires and governance regimes dynamically co-produce one another by examining structural shifts in relations between nature, authorities and communities involved in forest and land management. Special attention is given to the effects of such shifts on the material, emotional and relational connections that local communities hold with the natural commons and vice versa, how these connections can fuel grounds for responses to growing economic and environmental changes and risks. To address these research aims, I carried out participatory research methods that sought to explore an in-depth, creative and decolonial way of illuminating the experiences and perspectives of Indigenous Peoples at the frontlines and frontiers of forest fires and deforestation. Subsequently, semi-structured stakeholder interviews were conducted with actors operating at local, municipal and departmental scales. Quantitative data about the incurred socio-economic costs from 2024's fires was derived from analysis performed based on APCOB's surveys.

Indigenous community members' livelihoods and the forest ecosystem were heavily impacted by the disastrous fires of 2024. Restoration and resilience efforts are focused on the productive systems through a combination of traditional and modern management knowledge and techniques, the latter consisting mainly of fire-free communal fire plots, which are becoming increasingly mechanised. The effects of climate change are felt by an increase in temperatures, rain and drought intensity and plagues, especially fungal pathogens. At first glance, the rainy season makes the forest look verdant, but closer inspection reveals deep scars. With communities focused on restoring their plots, regeneration occurs passively. Dense undergrowth suppresses saplings, and most respondents expect recovery to take decades.

The study finds that the original coding of land and territorial governance not only allows but also actively reinforces the large-scale ignition, spread and damage of forest fires. Clashing claims for public authority and land rights create a landscape of legal insecurity that perpetuates ambiguous interpretation and selective enforcement of fire policies, alongside government impunity for illegal practices. Drawing on more-than-human political ecology and theory on (dis)possession, I show that fires, either naturally occurring or actively used to erase and redraw land rights and use borders, recode the relations among rightsholders, assets and public authorities. In the Indigenous territory, this recoding undermines tenure security and delegitimises communities as rights-holders; on state land reallocated to intercultural communities, fire becomes a legitimate script enabling frontier

expansion. Drawing on theories on land, property and law by Christian Lund, I show that fires, either when naturally occurring or actively used as a tool to erase and redraw land rights and use borders, recode the relations between rightsholders, assets and public authorities. The consequent loss of natural resources and disruption of traditional livelihoods have exacerbated the vulnerability of Indigenous territories. Yet, an unwavering commitment to political self-determination, diversifying income sources, and modified cultivation methods resist disenfranchisement. A deep emotional kinship with and intricate knowledge about the forest ecosystem echoes the permeability and interconnectedness of more-than-human relationality in the Indigenous territory.

Treating the natural world and its relations with the human world as components in the making of both natural and human regimes reveals a more accurate view of the dynamic links constituting land (rights) transformations. A more-than-human lens makes these entanglements visible, and I therefore argue that attentiveness to Nature's non-intentional agency is not only emancipatory but also essential for analysing and understanding the constellation of state, human, and non-human actors. Such understandings can contribute to a deeper appreciation of the natural world, honour Indigenous cosmologies, and challenge human exceptionalist thinking that limits effective outcomes. Risk prevention and management fundamentally hinges upon a reconfiguration of land rights regimes that prioritises protection of collective property rights and natural commons over agribusiness expansion. As such, I invite us to rethink forest governance from a relational and political perspective, recognising the limits of conventional institutional responses and the transformative power of more-than-human assemblages in shaping policy and practice.

Bibliography

- APCOB (2024). DIAGNÓSTICO INTEGRAL DEL TERRITORIO INDIGENA DE MONTE VERDE [COMPREHENSIVE DIAGNOSIS OF THE INDIGENOUS TERRITORY OF MONTE VERDE].
- APCOB (2025). Evaluación de Impactos Socio-Económicos de los Incendios del 2024 en el Territorio Indígena Monte Verde [Assessment of the Socio-Economic Impacts of the 2024 Fires in the Monte Verde Indigenous Territory].
- APCOB. (2024). Evaluación de Daños en el Bosque a Causa de los Incendios Forestales [Forest Damage Assessment Due to Forest Fires].
- Archer, M. S. (2003). *Structure, agency and the internal conversation*. Cambridge University Press.
- Arienzo, M. M., Maezumi, S. Y., Chellman, N. J., & Iriarte, J. (2019). Pre-Columbian fire management linked to refractory black carbon emissions in the Amazon. *Fire*, 2(2), 31. <https://doi.org/10.3390/fire2020031>
- Armenteras, D., & de la Barrera, F. (2023). Landscape management is urgently needed to address the rise of megafires in South America. *Communications Earth & Environment*, 4(1), 305. <https://doi.org/10.1038/s43247-023-00964-6>
- Armenteras, D., & González, T. M. (2024). Repensando la gestión de incendios forestales en Suramérica: un enfoque integrado en la era del cambio climático. *Revista de La Academia Colombiana de Ciencias Exactas, Físicas y Naturales*, 48(186), 210-215. <https://doi.org/10.18257/raccefyn.2600>
- Ballamgingie, P & Szanto, D. 2022. *Showing Theory to Know Theory*. Ottawa, Showing Theory Press, pp. 283–289. <https://doi.org/https://doi.org/10.22215/stkt>
- Basnyat, B., Treue, T., Pokharel, R. K., Lamsal, L. N., & Rayamajhi, S. (2018). Legal-sounding bureaucratic re-centralisation of community forestry in Nepal. *Forest Policy and Economics*, 91, 5–18. <https://doi.org/10.1016/j.forpol.2017.08.010>
- Benjaminsen, T. A., & Svarstad, H. (2019). Political Ecology. In *Encyclopedia of Ecology* (pp. 391–396). Elsevier. <https://doi.org/10.1016/B978-0-12-409548-9.10608-6>
- Bennett, J. (2020). *Vibrant matter: A political ecology of things*. Duke University Press. viii. <https://doi.org/10.1515/9780822391623>
- Bhaskar, R. (2013). *A realist theory of science*. Routledge.
- Brondízio, Eduardo. (2016). The elephant in the room: Amazonian cities deserve more attention in climate change and sustainability discussions. BLOG - The Nature of Cities (TNOC). Retrieved July 11, 2025, from <https://www.thenatureofcities.com/TNOC/2016/02/02/the-elephant-in-the-room-amazonian-cities-deserve-more-attention-in-climate-change-and-sustainability-discussions/>.

- Calvo Valenzuela, Verónica. 2024. "Emancipating from Autonomy : Ethnography of Deliberation Sessions on the Status of Indigenous Peasant Autonomy of Tarabuco (Bolivia, 2010–2023)". *Swiss Journal of Sociocultural Anthropology* 30 (1): 62–80. <https://doi.org/10.36950/sjsca.2024.30.9663>
- Carmenta, R., Vermeulen, S., Parry, L., & Barlow, J. (2013). Shifting cultivation and fire policy: Insights from the Brazilian Amazon. *Human Ecology*, 41, 603–614. <https://doi.org/10.1007/s10745-013-9600-1>
- Cary, M. M. (2023). Pyropolitics and the Production of Territory. *Environment and Society*, 14(1), 104-121. <https://doi.org/10.3167/ares.2023.140107>
- Chung, Y. B. (2023). Historicising sustainable livestock intensification and animal genetic improvement in Africa: Towards a decolonial multispecies climate justice. *The Journal of Peasant Studies*, 0(0), 1–21. <https://doi.org/10.1080/03066150.2023.2285430>
- Clark, N. (2018). *Pyropolitics for a Planet of Fire*. In Peters, K., Steinberg, P., & Stratford, E. (Eds.). (2018). *Territory beyond terra*. Rowman & Littlefield.
- Devisscher, T., Malhi, Y., & Boyd, E. (2019). Deliberation for wildfire risk management: Addressing conflicting views in the Chiquitania, Bolivia. *The Geographical Journal*, 185(1), 38–54. <https://doi.org/10.1111/geoj.12261>
- Dhawan, N. (2015, September 14). The Unbearable Slowness of Change: Protest Politics and the Erotics of Resistance. *The Philosophical Salon*. <https://thephilosophicalsalon.com/the-unbearable-slowness-of-change-protest-politics-and-the-erotics-of-resistance/>
- Dube, O. P. (2013). Challenges of wildland fire management in Botswana: Towards a community inclusive fire management approach. *WEATHER AND CLIMATE EXTREMES*, 1, 26–41. <https://doi.org/10.1016/j.wace.2013.08.001>
- Eloy, L., Aubertin, C., Toni, F., Borges Lúcio, S. L., Bosgiraud, M. (2016). On the margins of soy farms: Traditional populations and selective environmental policies in the Brazilian Cerrado. *The Journal of Peasant Studies*, 43, 494–516. <https://doi.org/10.1080/03066150.2015.1013099>
- Eloy, L., Hecht, S., Steward, A., & Mistry, J. (2019). Firing up: Policy, politics and polemics under new and old burning regimes. *The Geographical Journal*, 185(1), 2–9. <https://doi.org/10.1111/geoj.12293>
- Essen, M., McCaffrey, S., Abrams, J., & Paveglio, T. (2023). Improving wildfire management outcomes: Shifting the paradigm of wildfire from simple to complex risk. *Journal of Environmental Planning and Management*, 66(5), 909–927. <https://doi.org/10.1080/09640568.2021.2007861>
- FAO, F. (2021). *Forest governance by indigenous and tribal peoples. An opportunity for climate action in Latin America and the Caribbean*. FAO, Santiago.
- FAO. (2020). *Evaluación de Daños por Incendios Forestales*. Roma: FAO.
- Fischer, K., Jakobsen, J., & Westengen, O. T. (2022). The political ecology of crops: From seed to state and capital. *Geoforum*, 130, 92–95. <https://doi.org/10.1016/j.geoforum.2021.12.011>

- Fisher, K., Makey, L., Macpherson, E., Paul, A., Rennie, H., Talbot-Jones, J., & Jorgensen, E. (2022). Broadening environmental governance ontologies to enhance ecosystem-based management in Aotearoa New Zealand. *Maritime Studies*, 21(4), 609-629. <https://doi.org/10.1007/s40152-022-00278-x>
- Fletcher, R., & Busher, J. (2020). *Convivial conservation: A critique of conservation policy and practice*. New York, NY: Routledge. <https://doi.org/10.4324/9780429029607>
- Flores, B. M., Montoya, E., Sakschewski, B., Nascimento, N., Staal, A., Betts, R. A., ... & Hirota, M. (2024). Critical transitions in the Amazon forest system. *Nature*, 626(7999), 555-564. <https://doi.org/10.1038/s41586-023-06970-0>
- Fraser, N. 2021. "Climates of Capital: For a Trans-Environmental Eco-Socialism." *New Left Review* 127 (Jan/Feb): 34.
- Fricas, J. (2022). Towards an Anti Colonial Photovoice: A Research Practice Guide to Theoretical and Methodological Considerations. *Journal of Participatory Research Methods*, 3(2). <https://doi.org/10.35844/001c.37606>
- Fryer, T., & Navarette, C. (2024). *A short guide to ontology and epistemology: why everyone should be a realist* 3rd edition. <https://tfryer.com/ontology-guide/>
- Global Forest Review. (2025, May 21). Fires drove record-breaking tropical forest loss in 2024. World Resources Institute. Retrieved on 08-08 2025 from <https://gfr.wri.org/latest-analysis-deforestation-trends>
- Global Forest Watch (2014). World Resources Institute. Accessed on 27-09-2024. www.globalforestwatch.org.
- Guthman, J. (2019). *Wilted: Pathogens, chemicals, and the fragile future of the strawberry industry* (Vol. 6). University of California Press. <https://www.jstor.org/stable/j.ctvp7d4bc.6>
- He, Y., Czaplicki Cabezas, S., Maillard, O., Müller, R., Romero-Muñoz, A., Romero Pimentel, L. F., Vadillo, A., & Vos, V. A. (2025). Enact reforms to protect Bolivia's forests from fire. *Science*, 387(6731), 255–255. <https://doi.org/10.1126/science.adt8304>
- He, Y., Czaplicki Cabezas, S., Maillard, O., Müller, R., Romero-Muñoz, A., Romero Pimentel, L. F., Vadillo, A., & Vos, V. A. (2025). Enact reforms to protect Bolivia's forests from fire. *Science*, 387(6731), 255–255. <https://doi.org/10.1126/science.adt8304>
- INPE. (2020). *Datos de Incendios Forestales en la Amazonía Brasileña*. São José dos Campos: INPE.
- Intergovernmental Panel on Climate Change (IPCC). (2023). *Global Carbon and Other Biogeochemical Cycles and Feedbacks*. In *Climate Change 2021 – The Physical Science Basis: Working Group I Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 673–816). Cambridge: Cambridge University Press. <https://doi.org/10.1017/9781009157896.007>

- IPBES (2024). Summary for Policymakers of the Thematic Assessment Report on the Underlying Causes of Biodiversity Loss and the Determinants of Transformative Change and Options for Achieving the 2050 Vision for Biodiversity of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. O'Brien, K., Garibaldi, L., Agrawal, A., Bennett, E., Biggs, O., Calderón Contreras, R., Carr, E., Frantzeskaki, N., Gosnell, H., Gurung, J., Lambertucci, S., Leventon, J., Liao, C., Reyes García, V., Shannon, L., Villasante, S., Wickson, F., Zinngrebe, Y., and Perianin, L. (eds.). IPBES secretariat, Bonn, Germany. DOI: <https://doi.org/10.5281/zenodo.11382230>
- IUCN NL. (2024, July 30). A milestone in indigenous-led nature conservation: Charagua Iyambae Protected Areas Law. IUCN NL. Retrieved on 08-08-2025 from <https://www.iucn.nl/en/news/a-milestone-in-indigenous-led-nature-conservation-charagua-iyambae-protected-areas-law>
- Lake, O. O. (2024). *The Story is in Our Bones: How Worldviews and Climate Justice Can Remake a World in Crisis*. New Society Publishers.
- le Polain de Waroux, Y., Neumann, J., O'Driscoll, A., & Schreiber, K. (2020). Pious pioneers: the expansion of Mennonite colonies in Latin America. *Journal of Land Use Science*, 16(1), 1–17. <https://doi.org/10.1080/1747423X.2020.1855266>
- Lovejoy, T. E., & Nobre, C. (2019). Winds of will: Tipping change in the Amazon. *Sci. Adv*, 5, eaba2949. DOI: 10.1126/sciadv.aba2949.
- Lovejoy, T. E., & Nobre, C. (2019). Winds of will: Tipping change in the Amazon. *Sci. Adv*, 5, eaba2949. DOI: 10.1126/sciadv.aba2949.
- Lund, C. (2016). Rule and Rupture: State Formation through the Production of Property and Citizenship. *Development and Change*, 47(6), 1199–1228. <https://doi.org/10.1111/dech.12274>.
- Machado, M. S., Berenguer, E., Brando, P. M., Alencar, A., Oliveras Menor, I., Barlow, J., & Malhi, Y. (2024). Emergency policies are not enough to resolve Amazonia's fire crises. *Communications Earth & Environment*, 5(1), 204. <https://doi.org/10.1038/s43247-024-01344-4>
- MapBiomias. (2024a, June 24). Area queimada no Brasil em 2024 supera média histórica em 62% [Burned area in Brazil in 2024 exceeds historical average by 62%]. Retrieved July 7, 2025, from <https://brasil.mapbiomas.org/en/2025/06/24/area-queimada-no-brasil-em-2024-supera-media-historica-em-62/>.
- McKittrick, K. (2021) *Dear Science and Other Stories, Errantries*. Duke University Press.
- Miller, B. A., Yung, L., Wyborn, C., Essen, M., Gray, B., & Williams, D. R. (2022). Re-Envisioning Wildland Fire Governance: Addressing the Transboundary, Uncertain, and Contested Aspects of Wildfire. *Fire*, 5(2), 49. <https://doi.org/10.3390/fire5020049>
- Milton, K. (2003). *Loving nature: Towards an ecology of emotion*. Routledge. p. 192. <https://doi.org/10.4324/9780203421413>

- Mistry, J., & Berardi, A. (2016). Bridging indigenous and scientific knowledge. *Science*, 352(6291), 1274-1275.
<https://doi.org/10.1126/science.aaf1160>
- Mortensen, S., & Questiaux, F. (2024). Extending the ethnographic toolbox: Photovoice and everyday experiences of marginalised groups. *Gender, Place & Culture*, 1–26.
<https://doi.org/10.1080/0966369X.2023.2298788>
- Morton, D., Bird-Naytowhow, K., Pearl, T., & Hatala, A. R. (2020). “Just because they aren’t human doesn’t mean they aren’t alive”: The methodological potential of photovoice to examine human-nature relations as a source of resilience and health among urban Indigenous youth. *Health & Place*, 61, 102268. <https://doi.org/10.1016/j.healthplace.2019.102268>
- Nepstad, D., Schwartzman, S., Bamberger, B., Santilli, M., Ray, D., Schlesinger, P., ... & Rolla, A. (2006). Inhibition of Amazon deforestation and fire by parks and indigenous lands. *Conservation biology*, 20(1), 65-73. <https://doi.org/10.1111/j.1523-1739.2006.00351.x>
- Oliveira, A. S., Rajão, R. G., Soares Filho, B. S., Oliveira, U., Santos, L. R. S., Assuncao, A. C., van der Hoff, R., Rogrigues, H. O., Ribeiro, S. M. C., Merry, F., & de Lima, L. S. (2019). Economic losses to sustainable timber production by fire in the Brazilian Amazon. *The Geographical Journal*, 185, 55–67.
<https://doi.org/10.1111/geoj.12276>
- Oliveira, G., & Hecht, S. B. (2018). *Soy, globalization and environmental politics in Latin America*. New York, NY: Routledge.
- Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.
- Padoch, C., & Pinedo-Vasquez, M. (2010). Saving slash-and-burn to save biodiversity. *Biotropica*, 42, 550–552. <https://doi.org/10.1111/j.17447429.2010.00681.x>
- Pereira, C. A., Tabarelli, M., Barros, M. F., & Vieira, I. C. G. (2023). Restoring fire-degraded social forests via biocultural approaches: A key strategy to safeguard the Amazon legacy. *Restoration Ecology*, 31(8), e13976. <https://doi.org/10.1111/rec.13976>
- Pinto, M. (2022). Estado de arte del TI Monte Verde con base en procesos de Planificación, Ordenamiento Territorial y Uso del Suelo para la elaboración de su Plan de Vida. APCOB. Santa Cruz. 60 p.
- Pitt, H. (2015) On showing and being shown plants: A guide to methods for more-than-human geography. *Area* 47: 48–55. <https://doi.org/10.1111/area.12145>
- Pyne, S. Here and There: A Fire Survey, 138-141 (Tucson: University of Arizona Press, 2018). Retrieved on 20-08-2025 from <https://feralatlas.supdigital.org/poster/fort-mcmurray-becomes-a-portal-to-the-pyrocene>. Tsing, A. L., Deger, J., Saxena, A. K., & Zhou, F. (2020). *Feral Atlas: The More-Than-Human Anthropocene*. Stanford University Press. <https://doi.org/10.21627/2020fa>

- Ribot, J. C., & Peluso, N. L. (2003). A Theory of Access*. *Rural Sociology*, 68(2), 153–181.
<https://doi.org/10.1111/j.1549-0831.2003.tb00133.x>
- Riskin, J. (2016). *The Restless Clock: A History of the Centuries-Long Argument Over What Makes Living Things Tick*. Chicago: University of Chicago Press. p. 337. <https://doi.org/10.7208/9780226303086>
- Rodríguez, I., Inturias, M., Masay, E., & Peña, A. (2023). Decolonizing wildfire risk management: Indigenous responses to fire criminalization policies and increasingly flammable forest landscapes in Lomerío, Bolivia. *Environmental Science & Policy*, 147, 103–115. <https://doi.org/10.1016/j.envsci.2023.06.005>
- Romero, C. y Albo, X. (2009). *Autonomías indígenas en la realidad boliviana y su nueva constitución*. La Paz. 86 p. <https://cejamericas.org/wp-content/uploads/2020/09/49AUTONOMiASINDiGENASenlarealidadbolivianaysunuevaconstituci%C3%83%C2%B3n.pdf>
- SBDA (2014). *Diagnóstico de necesidades de normas y reglamentos en el territorio indígena de Monte Verde*. Sociedad Boliviana de Derecho Ambiental. Santa Cruz. 55 p.
<http://www.sbda.org.bo/publicaciones/221255976-Diagnostico-de-necesidades-de-normas-en-el-Territorio-Indigena-de-Monte-Verde.pdf>.
- SBDA (2014). *Mapas temáticos de la TI Monte Verde*. Santa Cruz. 12 p.
<http://www.sbda.org.bo/publicaciones/243907683-Mapas-tematicos-de-la-TCO-Monte-Verde.pdf>.
- SBDA, (2014). *Diagnóstico de las actividades económicas y sus impactos ambientales en el Territorio Indígena de Monte Verde*. Santa Cruz. 42 p. <http://www.sbda.org.bo/publicaciones/221256336-Diagnostico-sobre-las-principales-actividades-economicas-en-el-Territorio-Indigena-de-Monte-Verde.pdf>.
- Spiegel, S. J., Thomas, S., O'Neill, K., Brondgeest, C., Thomas, J., Beltran, J., Hunt, T., & Yassi, A. (2020). Visual Storytelling, Intergenerational Environmental Justice and Indigenous Sovereignty: Exploring Images and Stories amid a Contested Oil Pipeline Project. *International journal of environmental research and public health*, 17(7), 2362. <https://doi.org/10.3390/ijerph17072362>
- Tamburini, L. (2019). *Atlas Sociopolítico sobre los territorios indígenas en las tierras bajas de Bolivia*.
<https://iwgia.org/images/documentos/Libros/ATLAS%202019.pdf>
- Tsing, A. (2015). *The mushroom at the end of the world: On the possibility of life in capitalist ruins*. Princeton University Press.
- Wang, C., & Burris, M. A. (1997). Photovoice: Concept, methodology, and use for participatory needs assessment. *Health education & behaviour*, 24(3), 369-387.
<https://doi.org/10.1177/109019819702400309>

- Welch, J. R., & Coimbra Jr., C. E. A. (2021). Indigenous fire ecologies, restoration, and territorial sovereignty in the Brazilian Cerrado: The case of two Xavante reserves. *Land Use Policy*, 104, 104055. <https://doi.org/10.1016/j.landusepol.2019.104055>
- World Land Trust. (2024, August 7). Groundbreaking new law for protected areas in Bolivia. World Land Trust. Retrieved on 08-08-2025 from <https://www.worldlandtrust.org/news/2024/08/victory-for-guarani-with-groundbreaking-new-law/>
- Yang, X., Li, X., Lu, K., & Peng, Z. R. (2023). Integrating rural livelihood resilience and sustainability for post-disaster community relocation: a theoretical framework and empirical study. *Natural Hazards*, 116(2), 1775-1803. <https://doi.org/10.1007/s11069-022-05739-4>

Appendix: Interview guide – Household interviews at the local level

ENGLISH VERSION

Introduction

1. Greeting and context setting

- Introduce myself, my research, and the purpose of the interview.
 - 1. Tell my story. I'm from up north. I study forest governance. I'm a very curious person; I want to learn about this topic. Will you help me?
- Emphasise that their knowledge and perspectives are invaluable to understanding livelihood and climate resilience.
- Explain the format of the interview: open-ended questions, with space for them to share stories, experiences, and opinions. There are no right or wrong answers.

2. Consent and ethical considerations

- Confirm their consent to participate and record the interview.
- Assure confidentiality and explain how their responses will be used.
- Invite them to ask questions or clarify anything before beginning.

Demographic data

What is your name?

How old are you?

What is your marital status?

What do you do for a living?

Start with a broad question:

- Can you tell me about your experiences with wildfires and the forest?
- How did you experience last year's fires?
- What do you think about fire management?

Section 1: Socio-nature assemblages in recovering forest communities

Objective: Explore how human and non-human relationships are understood and represented in the context of forest recovery and fire.

1. Perceptions of recovery

- Can you describe how (much) the forest has been recovering since last year's fires?
How does the forest restore itself? How did the trees respond to last year's fires?
Was this response anticipated? How are forests being restored by the community?
- What changes or adaptations have you observed in the forest over time (e.g., species composition, animal behaviour, water sources)?
- How did you reorganise after the fires? What kind of activities and rules arose?

Note: Distinguish between natural forests, forests managed for wood and NTFPs and agroforestry systems.

2. Human-forest relationships

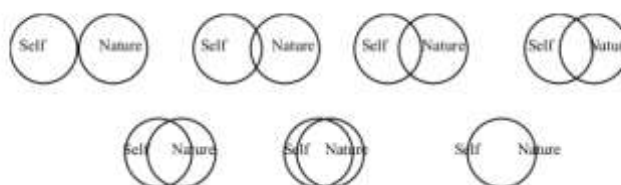
- How do you interact with the forest in your daily life?
- How important is your relationship to nature for who you are?
- How do you view the relationship between humans and non-humans (e.g., plants, animals, spirits) in the forest?
- How do you think the fires have influenced human land practices or decisions?

3. Cultural and spiritual dimensions

- Is your connection to nature part of your spirituality?
- Are there specific practices or rituals that connect people to the forest? How do spiritual or cultural beliefs influence how you manage or interact with the forest?
- Are there stories, myths, or teachings in your culture that explain the relationship between fire, forests, and people?

The Inclusion of Nature in Self Scale (INS)

Please select the picture below which best describes your relationship with the natural environment. How interconnected are you with nature?



Section 2: Power Networks

Objective: Investigate how non-human entities (forests, animals, plants) are understood as active participants in social and political dynamics.

1. Agency and responses of the more-than-human

- Do you believe that forests, animals, or plants have their own ways of influencing human decisions or actions? Can you give examples?
- How do non-humans shape the way you manage fire or other environmental challenges?
- Have you noticed changes in the behaviour of animals or plants in response to increased fires? How do these changes affect you?

2. Power Dynamics in Forest Management

- Who or what has the most influence over how forests are managed in your territory? (e.g., humans, animals, spirits, external actors)
- Are there conflicts or collaborations between humans and non-humans in forest management? How are these resolved?

3. Sociopolitical Processes at the National Level

- Have you thought about migrating? Why (not)? Were the fires related?
- How do you experience the intercultural influx?

Note: I'm interested in how new immigrant settlements influence fire management and land-use change.

- What is your relationship with the Mennonites, and how do you see their relationship with the forest?
- How do you see the impact of private cattle ranchers?

Section 3: Traditional knowledge and adaptation

Objective: Understand how traditional knowledge-based prescribed burning can enhance climate resilience in fire-prone landscapes.

1. Traditional fire management practices

- What traditional practices does your community use to manage fire in the forest?
How were these practices developed and passed down?
- How do you decide when, where, and how to use fire as a management tool?
- In what context do you use prescribed burning?

2. Challenges and adaptations

- Have traditional fire management practices changed over time? If so, what has driven these changes (e.g., climate change, external pressures)?
- In what way can traditional fire management help you and your community adapt to future extreme events?
- What challenges do you face in applying or updating traditional fire management practices?
- Are there ways that prescribed burning could be used to protect both forests and agricultural areas at the forest edge?

3. Collaboration and knowledge sharing

- How does your community share knowledge about fire management with younger generations or outsiders?
- Are there opportunities for collaboration between your community and external actors (e.g., agribusiness, policymakers) to improve fire management?
- What support (from the government, other organisations, your own community) is available when facing forest fires?

Note: Review whether projects/policies have worked.

- Do you know the burning calendar? How do you manage it?
- Do you know the Integrated Fire Management Plan? How do you manage it?

Closing Questions

1. Future visions

- What is your vision for the future of the forest and your community in the face of increasing fire risks and climate change?
- What would you like outsiders to understand about your relationship with the forest, land management and fire use?

2. Additional thoughts and gratitude

- Is there anything else you would like to share that we haven't discussed?
- Thank you for your time and insights.

Questions for the Cacique (Chief)

The entire interview plus these, based on Natajaran et al. (2022):

Livelihood Context:

1. What was traditional life like here before there were so many fires?
2. After the fires, what things have become more difficult and what new opportunities have you found, if any?

Transforming Structures and Processes:

3. How freely can the community use forest resources?
4. What government laws or rules affect how you use the land and the forest?
5. Do you think the government's agricultural or environmental policies have anything to do with these fires?

Relational Power:

6. How do relationships between different people or groups (e.g., Indigenous and non-Indigenous, people with more land and less land) influence how fires occur and are managed?
7. Do fires affect women and men in your community in the same way? Why do you think this is?
8. Does everyone in your community have the same capacity to recover after a fire?

Climate and Environmental Context/Relations:

9. How do fires affect the natural resources you depend on for survival, such as water, animals, or plants?

10. Do you think the way you traditionally care for the land and forests helps prevent fires?

Influence and Access:

11. Are you informed about how to prevent fires or what to do when there is a fire?

12. Can you give your opinion or participate in decisions about how forests are cared for and fires are prevented in your area?

13. What support (from the government, other organisations, your own community) is available to you when fires affect you?

Livelihoods in Flux:

14. What do you imagine life will be like here in the future?

15. What kind of support would you need to be able to live well here in the future?