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Territorial governance for transformative change? Insights from the Chico Mendes Extractive Reserve in the Brazilian Amazon

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Brazilian extractive reserves constitute a model for the territorial governance of protected areas. With a focus on the territorial rights of traditional populations, they can serve as a catalyst for transformative change that reconciles the conservation of nature with the sustainable use of natural resources. However, the sustainability of land use in the Chico Mendes Extractive Reserve (CMER) is increasingly under pressure. Located in the western Amazon, sustainable forest extractivism has traditionally constituted the main livelihood of inhabitants. Yet, over the last 20 years, deforestation rates have increased significantly. This increase has been driven by the expansion of cattle ranching, illegal land sales, and population growth. While the causes of deforestation in the CMER have been widely documented, this study aims to understand how different actors and institutions interact to shape territorial governance and land use in the CMER, and how these governance arrangements can serve as a catalyst for transformative change. The research is based on a qualitative case study design, involving qualitative interviews, participant observation, and a photo-based approach, applied during three fieldwork visits to the research region between March 2024 and April 2025. The findings indicate that governance interactions are not only influenced by state institutions. They are shaped by economic incentives provided by the market and are contingent upon the social organization of civil society. To realize its potential for transformative change, territorial governance should adopt a multilevel governance approach, consider the local context, be based on cooperation between actors, and facilitate social learning.

KEYWORDS
Amazon, Brazil, deforestation, institutions, protected areas, territorial governance, transformative change

1 Introduction

The Chico Mendes Extractive Reserve (CMER) stands out as a prominent example of the territorial governance of protected areas. Located in the state of Acre, in the Southwest of the Brazilian Amazon, the reserve was established in 1990, as a result of the movement of *seringueiros* (rubber tappers) and their collective resistance against eviction by large-scale landowners. The movement was led by land rights activist and environmentalist Chico Mendes, who was assassinated by a cattle rancher in 1988. The naming of the reserve

recognizes the successful resistance under his long-term leadership. He was an influential advocate on the international political stage and decisive in halting local deforestation through non-violent demonstrations and roadblocks known as *empates* (Allegretti, 2008; Schwartzman, 2018).

With a focus on the territorial rights and identities of traditional populations, the CMER aims to protect the forest while enabling sustainable development (Maretti et al., 2004). The idea of extractive reserves was formulated during the first national meeting of rubber tappers in 1985, when Chico Mendes was the head of the rural workers' union. A new development model was proposed that would recognize traditional patterns of land occupation and resource use and not turn large-scale forest areas into individual private properties, a practice that was common during the agrarian land reform. Instead, conceived as continuous territories that should not be fragmented but safeguard traditional communities' access to natural resources, the proposal for extractive reserves was strongly influenced by the ideals of Indigenous territories. It represents a landmark for the alliance between rubber tappers and Indigenous peoples as the united movement of the "Forest Peoples" (*Povos da Floresta*) (Allegretti, 2008; Schwartzman, 2018).

As demonstrated by the history of extractive reserves like the CMER, territorial governance can function as a catalyst for transformative change (Dallabrida, 2015; Caron, 2017; Antunes Junior et al., 2025). We understand transformative change as "fundamental, system-wide shifts in views, structures and practices" (Karen et al., 2024, p. 5), addressing the conservation of nature while creating an inclusive and sustainable environment aligned with the perspectives of Indigenous Peoples and local communities (Karen et al., 2024). Thus, extractive reserves constitute a laboratory for sustainable economic practices, preserving collective forms of life and facilitating the inclusion of traditional communities conserving nature through sustainable resource use (Maretti et al., 2004).

Traditional extractivist practices, such as rubber tapping and Brazil nut harvesting, constitute the traditional livelihoods of the population living in the CMER, while each family is entitled to use a certain area of their property for complementary activities such as subsistence agriculture or small-scale cattle ranching (IBAMA, 2006). However, the sustainability of land use has reached a critical point. Four decades after its creation, deforestation rates have increased significantly (Mascarenhas et al., 2018; Milien et al., 2021). Between 1990 and 2024, 97,786 ha of forest were lost, representing approximately 10% of the reserve's total area (MapBiomas, 2024). Across the Brazilian Amazon, the CMER constitutes the protected area most threatened by deforestation (Amorim et al., 2023).

The causes for deforestation are multifaceted and complex. Although formally managed by the Chico Mendes Institute for Biodiversity Conservation – ICMBio (*Instituto Chico Mendes de Conservação da Biodiversidade*), the state's capacities to monitor and enforce regulations are constrained by the reserve's vast extent of nearly one million hectares (IBAMA, 2006; Almeida et al., 2018). However, the inhabitants' land use decisions are strongly influenced by livelihood opportunities. Consequently, the long-term decline in rubber prices has led to a significant expansion of pasture for cattle (Vadjunec et al., 2009; Hoelle, 2015; Wallace et al., 2018). At the same time, population growth within the reserve has increased pressure on natural resources and accelerated social change. These tendencies challenge the collective identities of rubber tappers and weaken the effectiveness of the reserve's local governance arrangements in collectively defending their territories (Maciel et al., 2021; Franco and Löwen Sahr, 2022; Silva, 2024).

Territories integrate environmental, economic, and social objectives (Caron, 2017), and the developments indicate that the territorial governance of the CMER and its land use are not only influenced by state institutions. They are also shaped by economic incentives provided by the market and are contingent upon the social organization of civil society (North, 1990; Ostrom, 1990). Against this background, territories like protected areas are characterized by conflict and tension, and social interactions are always embedded in the power struggles of multiple actors (Barretto Filho, 2020; Machado et al., 2020). In the context of the CMER, for instance, political interests opposed to environmentalism aim to delegitimize the CMER and its objectives, further fueling conflicts and threatening the territorial integrity of the reserve (Barretto Filho, 2020; Machado et al., 2020).

While land use changes and the causes of deforestation in the CMER have been widely documented, there is limited understanding of how different actors and institutions interact to shape territorial governance and how these governance arrangements can contribute to transformative change toward sustainable land use. Thus, to understand the territorial governance of the CMER and assess its potential for transformative change, this paper embarks on two research questions:

1. How do actors and institutions shape the territorial governance and land use in the CMER?
2. How does the territorial governance of the CMER serve as a catalyst for transformative change?

To achieve this, we draw on a qualitative case study design, involving qualitative interviews, participant observation, and a photo-based approach, applied during three fieldwork visits to the research region between March 2024 and April 2025. Following this introduction, the next section presents the theoretical background and conceptual framework for analyzing territorial governance (Section 2), followed by our materials and methods (Section 3). Then, the formal institutions and governance actors are introduced (Section 4) before addressing our research questions in the two main sections. We analyze territorial governance and land use in the CMER (Section 5), and assess how its territorial governance serves as a catalyst for transformative change (Section 6). In the conclusion, we discuss the insights of our study for the territorial governance of protected areas, also beyond the Brazilian context (Section 7).

2 Theoretical background and conceptual framework

Territorial governance describes a process that includes the planning and management of territorial dynamics and decision-making, prioritizing innovative, cooperative, and participatory

approaches, to synthesize a shared vision for the sustainable development of territories (Dallabrida, 2015; Antunes Junior et al., 2025). Governance as a process refers to the "modes of social coordination by which actors engage in rulemaking and implementation and in the provision of collective goods" (Börzel and Risse, 2010, p. 114). In addition to its processual dimension, governance also entails an interactive dimension, providing the space for interactions among actors. By doing so, we follow Kooiman's definition of governance as "the interactive arrangements in which public as well as private actors participate aimed at solving societal problems, or creating societal opportunities, attending to the institutions within which these governance activities take place" (Kooiman, 2002, p. 3). Territories represent the spaces of interaction among multiple actors and institutions, where new forms of governance are developed and tested (Caron, 2017; Piraux et al., 2017). Beyond the hierarchical steering by state actors, these new modes of social coordination point towards articulation processes, including the involvement of non-governmental actors through non-hierarchical coordination (Börzel and Risse, 2010).

Protected areas likewise bear a territorial notion (Huber et al., 2023). Accordingly, a protected area is understood as a "clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, 2008, p. 8). Protected areas represent a globally recognized strategy for preserving the biological diversity of landscapes and ecosystems (Palomo et al., 2014; Di Minin and Toivonen, 2015; Cumming and Allen, 2017). Over the last decades, the objectives of protected areas and their management strategies have evolved to become less restrictive and more people-centered (Mace, 2014; Vimal et al., 2021). In countries of the Global South in particular, the recognition of the rights of Indigenous peoples and local communities and the securing of livelihoods through traditional lifestyles and sustainable resource extraction have become a cornerstone of protected areas (Naughton-Treves et al., 2005; Dudley, 2008; Zhang et al., 2023).

The adoption of less restrictive approaches also reflects a shift in perspective from the technical "management" of protected areas to their "governance" through participatory mechanisms (Haller and Galvin, 2008; Huber et al., 2023; Maretti et al., 2023). This evolution is evident in the diversification of the management categories for protected areas elaborated by the International Union for Conservation of Nature (IUCN) (Auhagen et al., 2021; Vimal et al., 2021) and in the addition of category VI, which states that nature conservation and sustainable resource use are not mutually exclusive, but complementary (Dudley, 2008; Shafer, 2020). Brazilian extractive reserves constitute a model of protected areas under this category (Maretti et al., 2023), where the sustainable use of natural resources is explicitly emphasized "as a means of achieving conservation" (Dudley, 2008, p. 22).

However, reconciling biodiversity conservation and human wellbeing remains a challenging endeavor. Despite evidence of the positive outcomes, the devolution of power (Huber et al., 2023; Zhang et al., 2023), and the adequate consideration of the needs of the local population to sustainably maintain their livelihoods constitute major obstacles (Maretti et al., 2023; Freitas et al., 2024). With a composition of diverse actors, protected areas also constitute territories characterized by competing interests and contested decision-making processes, leading to situations of legal pluralism and heightened conflict risks (Haller and Galvin, 2008; Piraux et al., 2017; Cotella and Rivolin, 2025).

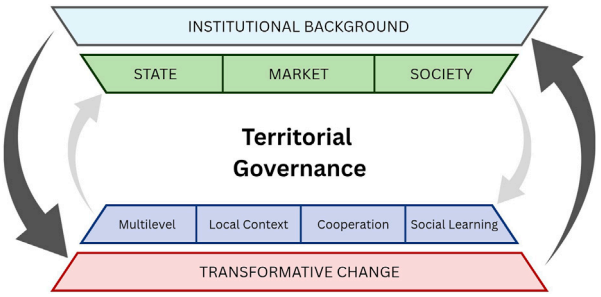


FIGURE 1
Conceptual framework for analyzing territorial governance (illustration by authors).

We provide a conceptual framework for investigating the territorial governance of protected areas (see Figure 1). In its center, it depicts the interactions among actors shaping territorial governance. On the one hand, these interactions are embedded in the wider institutional context. Following North, we emabrk on a broad conceptualization of institutions, regarding them as the "rules of the game" that "shape human interaction" in either political, economic, or social terms (North 1990, p. 3). Likewise Ostrom, states that decisions in local land and resource governance depend on institutions that "are rarely either private or public" (Ostrom, 1990, p. 15). Thus, to achieve a holistic analysis of territorial governance, our framework proposes situating the analysis in the institutional tripartite of "state", "market", and "civil society" (Sørensen and Triantafillou, 2016). By doing so, a comprehensive understanding of the interactions among actors is achieved, safeguarding that incentives for their exchange are shaped by the influences of governmental, economic, and social institutions (North, 1990; Ostrom, 1990; Dallabrida, 2015; Zhang et al., 2023).

On the other hand, the outcome of these governance interactions can serve as a catalyst for transformative change, facilitating an inclusive approach to achieving the objectives of conservation and sustainable development. To realize its transformative potential, several scholars (e.g., Berkes, 2009; Dallabrida, 2015; Caron, 2017) suggest that territorial governance must integrate the following four dimensions: (1) adopt a multilevel governance approach, (2) consider the local context, (3) be based on cooperation between actors, and (4) facilitate social learning and experimentation. To assess the extent to which territorial governance contributes to transformative change, governance interactions must be examined based on the interplay of these four dimensions.

2.1 Multilevel governance

Multilevel governance refers to the synergies of sharing decision-making processes at different hierarchical levels (Bache and Flinders, 2004). In this regard, Börzel (2020) emphasizes the importance of distinguishing multilevel governance from multilevel

government, to include formal and informal networks in which state and non-state actors coordinate their actions. Different governance levels (national, regional, local) possess comparative advantages over different kinds of capacities and resources. By combining different kinds of knowledge through the cooperation of actors at different hierarchical levels, synergies are created, leveraging their comparative advantages that complement each actor's knowledge and resources (Berkes, 2009).

2.2 Local context

Starting with local contexts and community capacities, needs, and knowledge, the potential for transformative change is heavily based on these factors and on the empowerment of the population (Zhang et al., 2023). The success of a protected area is fostered when local rights regarding land use and land access are recognized. Huber et al. call this the "devolution of rights" (Huber et al., 2023, p. 3). According to Dallabrida (2007), territorial governance processes should always aim at the acknowledgement of the social, political, and economic characteristics of the territory. This acknowledgment also means to include local knowledge systems and traditions in decision-making processes, as these represent an important success factor (Huber et al., 2023). At a fundamental level, local knowledge or "traditional ecological knowledge", as Berkes calls it, needs to be used to create a complete basis of information (Berkes, 2004, p. 624).

2.3 Cooperation

Cooperation drives transformative change by creating shared goals and promoting coordination (Caron, 2017; Moodie et al., 2023). Another important aspect is the involvement of various stakeholders and multiple perspectives through fair and inclusive processes (Huber et al., 2023). Therefore, territorial governance operates in two main dimensions: horizontal (coordination between local actors) and vertical (coordination between different levels of government, e.g., local and central) (Chan et al., 2006; Antunes Junior et al., 2025). Promoting social participation through various types of agreements, partnerships, and means (formal and informal) increases the commitment of communities and other social actors to nature conservation (Maretti et al., 2023). Territorial governance offers a platform for actors with divergent interests to create "socio-territorial pacts" as a strategy of developing harmonized visions for the protected areas (Dallabrida, 2007, p. 9).

2.4 Social learning

Social learning follows the logic of adaptive co-management, in which institutional arrangements and practical solutions are tested and revised through an evolutionary process of mutual learning and trust-building (Folke et al., 2002; Berkes, 2004). To realize its transformative potential, territorial governance cannot be imposed. Instead it must emerge from cooperation among actors on locally relevant issues. As an evolutionary process rather than a fixed state, this requires learning and experimentation (Piraux et al., 2017). Institutional arrangements of territorial governance provide space for collective learning processes and innovative exchanges, including the learning from past failures and experimentation with new ideas, through which actors gain experience and develop new skills to better meet unforeseen challenges (Valette et al., 2017; Antunes Junior et al., 2025).

These four dimensions should not be understood as isolated entities; rather, they are inherently interconnected and mutually constitutive, with the potential to either reinforce or undermine one another. For example, processes of social learning depend on cooperation among actors which becomes effective through multilevel governance structures that adequately consider the specifications of the local context. Conversely, the absence of a shared understanding among actors may weaken the interaction and coherence between the four dimensions.

As illustrated in Figure 1 through the use of directional arrows, the conceptual framework assumes a dialectical relationship: territorial governance can lead to transformative change. However, it can also have the opposite effect by reinforcing conservatism and unsustainable practices when dominant actor coalitions exert influence on prevailing institutional arrangements. The presented governance concepts of our framework are fundamental and can be applied across diverse contexts. Therefore, we provide a contribution for analysing transformative change in a variety of governance settings and policy domains beyond protected areas.

3 Materials and methods

3.1 Research area

The CMER is located in the Brazilian state of Acre (see Figure 2). The state's vegetation consists of lowland wet tropical rainforest, with 14 million hectares of natural forest covering 87% of its territory. A tropical monsoon climate dominates, with average temperatures around 25 °C and annual precipitation between 1.800 and 2.000 mm, peaking from December to March (IBAMA, 2006; Duchelle et al., 2011). With around 880.000 inhabitants, Acre, after Roraima and Amapá, is Brazil's third-least populated state with a rather low Gross Domestic Product (GDP) of only R$21 million (IBGE, 2021; 2025).

Despite Acre's relatively small size within the Amazon region, it contains the highest density of rubber trees (*Hevea brasiliensis*) (Silva, 2013). The history of land use in Acre is closely linked to the rubber boom, which began in the late 19th century and experienced a resurgence during World War II. The rise of the rubber industry triggered a large migration of impoverished farmers from northeastern Brazil to the Amazon, where they became bound in debt-peonage relationships to rubber barons through the exploitative *aviamento* credit system. Due to their isolation in remote forest areas, rubber tappers depended on access to consumer goods, supplied by the rubber barons. These goods were provided on credit, which was tied to the annual shipment of rubber. In practice, the *aviamento* system operated similarly to slavery, as it kept rubber tappers in a state of perpetual debt. This relationship bound them to their employers, who controlled both the purchasing of consumer goods and the selling of rubber (Allegretti, 2008; Wallace et al., 2018; Almeida, 2021).

Initiated in the 1960s during the military dictatorship, the government embarked on a strategy to integrate the region into

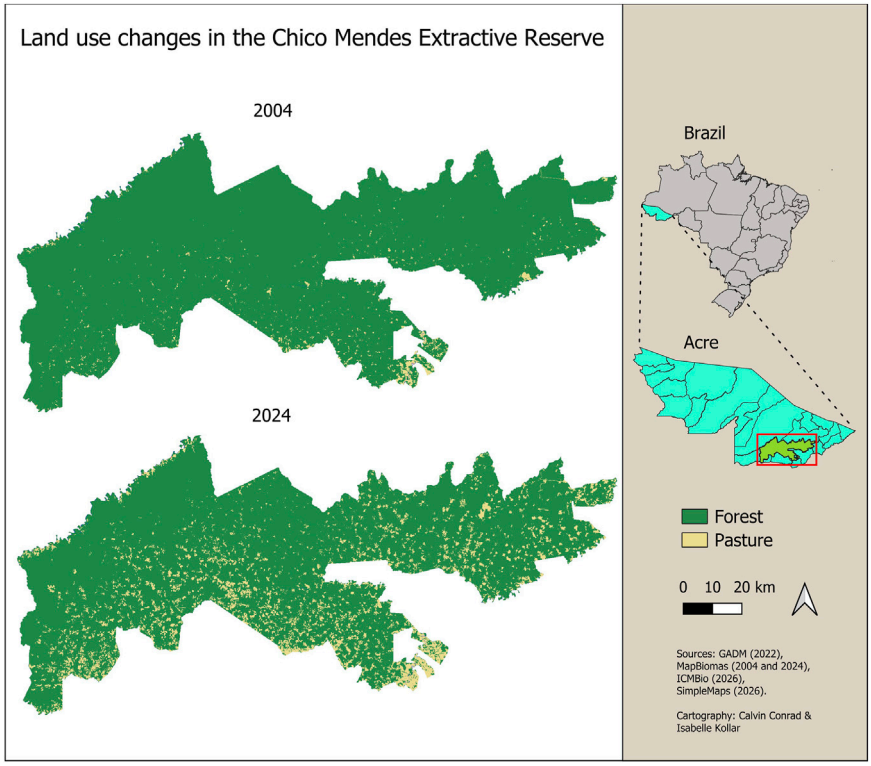


FIGURE 2
Map of the research area and land use changes.

the national economy, developing infrastructure projects to implement cattle ranching through large enterprises. The strategy brought violent land disputes to Acre. It resulted in the displacement of marginalized rubber tappers by land grabbers, ranchers, and loggers, prompting them to organize themselves in rural workers' unions. As an identity-based movement defending their livelihoods and territories, it gained momentum and international recognition through prominent figures such as Wilson Pinheiro and Chico Mendes, culminating in the emergence of the National Council of Rubber Tappers–CNS (*Conselho Nacional Dos Serengueiros*) and the coalition with Indigenous Peoples as the Alliance of the "Forest Peoples" (*Povos da Floresta*) (Allegretti, 2008; Vadjunec et al., 2009; Schwartzman, 2018).

Following the successful resistance of the rubber tapper movement, the CMER was created in 1990 as the second Brazilian extractive reserve. Covering a total area of 970,570 ha, it constitutes one of the country's largest extractive reserves (Allegretti, 2008; Schwartzman, 2018), streching across the areas of seven municipalities: Rio Branco, Capixaba, Sena Madureira, Xapuri, Epitaciolândia, Brasileia, and Assis Brasil. At the time of its creation, it was home to slightly less than 2.000 families and approximately 12.000 inhabitants (IBAMA, 2006).

The research was carried out in *seringais* (traditional names for rubber-producing estates) in the municipalities of Brasiléia, Epitaciolândia, and Xapuri. These are located along the southern fringes of the reserve, where deforestation associated with the spread of cattle ranching and population growth has been more dominant over the last years. These changes are also associated with the nearby Interoceanic Highway BR-317. Since its paving in the early 2000s, access to Acre from other Brazilian regions has improved, facilitating migration to the region and affecting changes in the CMER and its surroundings (Milien et al., 2021; Perz et al., 2022).

3.2 Data collection

A qualitative case study design was applied. Empirical data were collected over eight weeks of fieldwork, comprising three fieldwork visits to the research region in March to April 2024 (2 weeks), August to September 2024 (4 weeks), and March to April 2025 (2 weeks). Throughout the process, the fieldwork shifted from its explorative character, based on "explorative interviews" (Honer, 2011), towards a more problem-centered phase based on "problem-centered interviews" (Witzel and Reiter, 2012). Following Valentine, the aim of the qualitative interviews is "to understand how individual people experience and make sense of their own lives" (Valentine, 2005, p. 111). Thus, the aim was to obtain a more nuanced understanding of the everyday life of *seringueiros* and about the institutional context in which it takes place. With an incremental increase in empirical insights, the research interests became more specific, and data collection was more problem-centered based on semi-structured interviews focusing on land use topics and actor- and governance-specific contexts.

In total, 114 interviews were conducted, either by one of the authors or in a small group. The selection of interview

participants was based on a purposive sampling strategy. The objective was to conduct interviews with representatives from the main institutions participating in the governance of the CMER, such as ICMBio, the concessionary associations, cooperatives, and coordinators of *núcleos de base* (grassroots community units). Five interview partners also form part of the Deliberative Council (see Section 4), yet, the majority of the interviews were conducted with inhabitants. Our methodological approach aimed to achieve a diversified spatial distribution across the research area and a diverse representation by age, gender, and principal livelihood activities. The interviews lasted between 20 and 60 min, and most were recorded once the interviewees had given their consent. Although each interview was individual, some key questions prevailed (see Supplementary Material 1). The interviews were transcribed using the AI software Transkriptor. The transcribed text was then subjected to a detailed and synchronous analysis in MAXQDA 2020, with the objective of ensuring its accuracy in relation to the original content and of reflecting the intended meaning of each interviewee's statements.

In addition, a photo-based approach was used during 30 interviews. Photographs of different land use types were shown to gain a clearer understanding of how residents relate to them. Attitudes towards land use types are not merely subjective impressions, but they influence everyday practices and behaviors (Fishbein and Ajzen, 1975), thus shaping land use decisions and governance across the reserve. The method was inspired by Jeffrey Hoelle's work, who explored local perceptions associated with deforestation in southern Acre (Hoelle, 2015; Hoelle, 2018).

Based on his study and in consultation with key informants, a set of concepts was developed that captures relevant cognitive linkages between attitudes and land use. The final list included "conservation," "poverty," "decline," "beauty," "(hard) work," "development/progress," "prosperity," "happiness," "bad reputation," "culture," and "the past." Interviewees were shown four photographs representing typical land use types: forest (extractivism), agriculture, cattle ranching, and agroforest systems. Each was briefly explained during the interview, allowing respondents to ask questions or add comments to ensure a shared understanding of each land use type. Interviewees were then asked to identify which of these types they associated most strongly with each concept, addressed one at a time.

"Thematic analysis" (Braun and Clarke, 2022) was used to analyze and interpret the data, allowing the identification of shared patterns of meaning across individual cases within datasets. After the familiarization with the dataset, an inductive coding process was realized, and overarching themes were gradually elaborated, involving the reflexive reviewing and refining of themes. To ensure methodological rigor, it was realized in an iterative process by several authors of this study. Each elaborated theme contains several codes, which in turn, contain individual perspectives on, for instance, specific land use types, economic practices, or societal phenomena. By doing so, even controversial subjects concerning cattle ranching or compliance with land use rules and regulations could be systematically captured and analyzed within the broader thematic structure of the dataset.

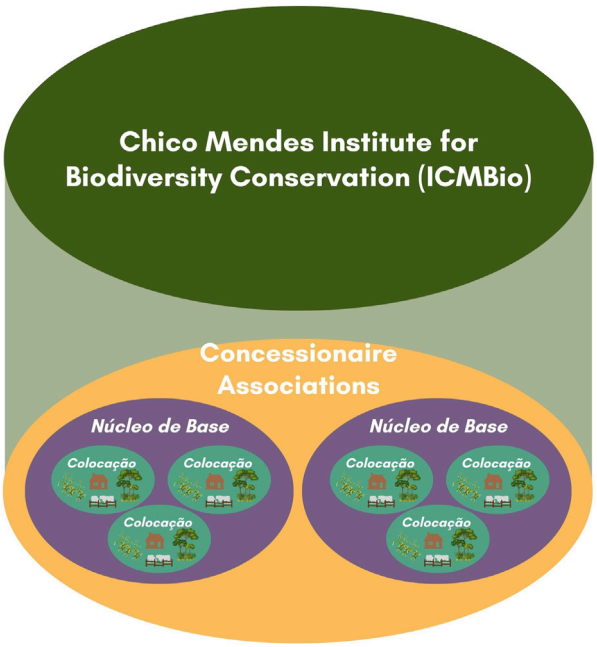


FIGURE 3
Main actors and institutions of the CMER (illustration by authors).

4 Formal institutions and governance actors

This study aims to understand the CMER's territorial governance and assess its potential for transformative change. To address these objectives, this section provides a descriptive overview of the formal institutional context of protected areas in Brazil. It constitutes the necessary precondition to understand how these rules and regulations inform interactions among actors in practice. Protected areas in Brazil are subject to the legislative framework of the National System of Nature Conservation Units – SNUC (*Sistema Nacional de Unidades de Conservação da Natureza*), established in 2000 (IBAMA, 2006). ICMBio represents the federal government agency responsible for creating and managing protected areas at the federal level. It falls under the administration of the Ministry of Environment and Climate Change - MMA (*Ministério do Meio Ambiente e Mudança do Clima*) and was founded in 2007. ICMBio took over key functions of the Brazilian Institute of the Environment and Renewable Natural Resources - IBAMA (*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis*), with responsibility for more than 300 conservation units across the nation (Mendonça and Talbot, 2014).

The SNUC differentiates between two broad categories for protected areas: integral protection (*proteção integral*), where only indirect use of natural resources is allowed, and sustainable use (*uso sustentável*), which reconciles nature conservation with the use of resources in a sustainable way (IBAMA, 2006). Belonging to

conservation units of the latter category, extractive reserves are defined by Article 18° of the SNUC:

> "The extractive reserve is an area used by traditional extractive populations, whose livelihood is based on extractivism and, complementarily, on subsistence agriculture and small animal husbandry. Its basic objectives are to protect the livelihoods and culture of these populations and to ensure the sustainable use of the unit's natural resources" (Brasil, 2000, Article 18°).

The focus on the wellbeing of local communities, their socio-economic development, and their cultural values is what makes the objectives of extractive reserves unique, "to combine nature conservation with sustainable development for local communities" (Maretti et al., 2023, p. 53). To achieve these objectives, the participation of local communities and other stakeholders in the management of extractive reserves is institutionally anchored in the SNUC through the establishment of a Deliberative Council (*Conselho Deliberativo*):

> "The extractive reserve will be managed by a Deliberative Council, chaired by the body responsible for its administration and made up of representatives from public agencies, civil society organizations and traditional populations residing in the area, as provided for in regulations and in the act establishing the unit" (Brasil, 2000, Article 18°; § 2°).

The Deliberative Council of the CMER was established in 2003. It is a participatory space in which decisions of interest to the reserve are discussed and made. It comprises 31 institutions at various hierarchical levels (see Figure 3). ICMBio holds the chair and is responsible for administration, enabling participation, and convening regular assemblies (WWF, 2015).

Each of the seven municipal councils holds a seat in the Deliberative Council. There are also six concessionaire associations (*associações concessionárias*). They are likewise located at the municipal level, representing the interests of the population residing within its administrative boundaries. To do so, each association is further divided into several *núcleos de base*. The members of a *núcleo de base* are organized within a community-based structure characterized by regular meetings, cooperative collaboration, and the collective use of agricultural resources, such as farming equipment and harvest storage facilities. The residents of a *núcleo de base* are represented by a coordinator, who forms part of the management board of the concessionaire association. Other relevant institutions of the council are the Acre state cooperative Cooperacre with its local affiliations, the representations of the Rural Workers Syndicates, the National Council of Extractive Populations – CNS (*Conselho Nacional das Populações Extrativistas*), and the Federal University of Acre – UFAC (*Universidade Federal do Acre*) (WWF, 2015).

The institutional framework that governs the CMER is guided by three main instruments: the Management Plan (*Plano de Manejo*), the Utilization Plan (*Plano de Utilização*), and the Contract for the Grant of Real Rights of Use – CCDRU (*Contrato de Concessão de Direito Real de Uso*).

The Management Plan describes the actual conditions of the CMER in terms of its environmental and socio-economic characteristics, providing long-term guidance on aligning resource use with sustainable development and the well-being of the population. The Utilization Plan is a chapter of the Management Plan that includes specific rules and regulations governing the use of land and its natural resources (IBAMA, 2006). A key characteristic of property rights in the CMER is reflected in the state's ownership of the land. Through long-term concessions from the government, the rights to use the land and its resources are contracted to associations and local communities, which can exploit them in accordance with the Utilization Plan (Goeschl and Igliori, 2006). Without the right to sell the land, the residents, local communities, and associations are responsible for complying with the Utilization Plan, whereas ICMBio is responsible for monitoring compliance (IBAMA, 2006).

The so-called *colocação* (placement) represents the socio-spatial unit, which is home to the extended family. The number of so-called *estradas de seringa* (seringa streets), referring to pathways through the forest alongside rubber trees, is used to depict the surface area of a *colocação*, where one street is equivalent to 100 ha. According to the Utilization Plan, each *colocação* should have at least two streets, each with at least 100 rubber trees, equivalent to 200 ha (IBAMA, 2006). Almeida describes the *colocação* as "a social and natural microcosm, conceived as ideally autonomous in agricultural products" (original in Portuguese) (Almeida, 2021, p. 75).

5 Territorial governance and land use in the CMER

5.1 State: hierarchical steering and institutional competition

In an interview with an ICMBio official, he explained that "the Deliberative Council is responsible for managing the reserve and making the decisions regarding it" (interview 2). Against this background, the Management Plan represents the principal governance instrument. He further highlighted its importance as a "strategic plan". However, he also asserted that, due to a lack of institutional capacity, following the plan has unfortunately been neglected throughout the last years. Stemming from 2006, the document is meanwhile also outdated and needs revision: "It does not describe the reality of the reserve. No one even reads the Management Plan. It is supposed to be the constitution of the reserve, but no one even uses it. We use the Utilization Plan that is a subchapter of it, which are the rules for occupying the reserve" (interview 2).

However, to gain an overview of the current situation in the reserve, the Deliberative Council, headed by ICMBio, recently initiated a comprehensive process to update the official register of residents of the entire reserve, which would also provide an assessment of the status of land use at the local level of family landholdings. The process started in 2024, and it is carried out by a task force consisting of specific members of the Deliberative Council, such as the concessionary associations (interview 2).

Thus, through a series of workshops held at the community level across the entire reserve, the initiative aims to identify which inhabitants of the reserve are legitimate extractivists and those who do not meet the requirements to reside in the reserve, for

instance, if they have exceeded their deforestation limits. One of the coordinators of a *núcleo de base*, where the assessment was taking place during the time of the fieldwork, explained: "Those who get along well with ICMBio are getting registered; we are already registering the entire reserve [. . .] to see who is there, who is correct, who is not in the red, who has not deforested too much" (interview 9).

To do so, a new profile of the beneficiary family (*perfil da familia beneficiária*) was developed based on extensive community consultations conducted by the task force of the Deliberative Council. As the official of ICMBio revealed, "fourteen different workshops were held in the reserve to ask the residents, because this has to be said by them. Who among you is legitimate? How would you describe a family that is legitimately in possession of land in the reserve?" (interview 2). He further explained that the Deliberative Council has recently approved the beneficiary family's profile, and it is currently effective.

Families that meet the profile are eligible to reside in the reserve and to access various social benefits. Adapted to current realities, the elaborated profile does not only include families sustaining their livelihoods exclusively through rubber tapping but also through other sustainable practices, provided that land use rules are obeyed. Therefore, there are also other requirements for qualifying as a beneficiary, such as descending from the reserve, appreciating traditional cultural values, and participating in community life (MMA, 2024).

Adopting a participatory and people-centered approach is a relatively new development. In this regard, the perception of the Deliberative Council as a participatory space for decision-making is not shared by all stakeholders. In an interview with a former member of the Deliberative Council, he revealed that reunions are only held occasionally and decisions have usually been made by ICMBio, seeking legitimation by the remaining members of the Council (interview 3). As the interviewed ICMBio official also explained, due to a lack of institutional capacity and under-equipped staff, the focus of governance was previously set on short-term compliance with the Utilization Plan instead of long-term strategies outlined in the Management Plan: "The management really couldn't cope, because they didn't have enough people [. . .] It was either surveillance or taking care. And here, the priority has always been surveillance" (interview 2). Consequently, the perceptions of the inhabitants are still shaped by the top-down approach with surveillance: "They've [ICMBio] changed in recent years. They don't have that attitude anymore. They always come, do their inspections [. . .], but they don't pull guns on people or humiliate them anymore" (interview 12).

Many interviewees expressed a feeling of being limited in their livelihood activities and freedom by the rules and regulations. One interviewee complained: "Without a license you can do practically nothing". The license refers to a permission, for instance, to cut a tree for construction purposes. Many residents feel that these permissions and ICMBio make living in the CMER difficult: "We try, for example, to use some wood to build a school [. . .], a company wants to come and install energy for us, but they don't want to let them. It's complicated living in the reserve" (interview 32).

Regarding the limited capacities to oversee the reserve with its vast dimensions, other residents also point out that ICMBio's approach was hitherto not effective to limit deforestation, due to a lack of sufficient law enforcement: "What happens is that they [ICMBio] come and put an embargo on the 50 ha [. . .] that a guy has deforested, but they do not come back. And then, the guys go there again, set fire to it, put poison on it, and raise cattle, and it seems like they've never been fined" (interview 29).

Whereas ICMBio represents the only governance actor situated at the federal state level, the institutional composition is becoming more fragmented and competitive at the municipal level.

> "One of the biggest challenges [. . .] for our extractive reserve [. . .] is that it is managed by seven municipalities, which have many different interests within the extractive reserve today. So, these interests make it difficult to manage. Politically, we have various interests. Just to give you an example, sometimes a municipality is governed by one politician, sometimes another municipality is governed by another politician, and all of this influences the extractive reserve" (interview 16).

This statement suggests that the reserve's governance is influenced by political interests. This became particularly evident during the second fieldwork stay, in the run-up to the municipal elections scheduled for October 2024. Throughout the reserve and the surrounding towns, electoral campaigns were held, and candidates for municipal councils often also held important positions in associations and syndicates, while the coordinators of local *núcleos de base* often aligned with particular candidates and used their local authority to sway voters.

Against this background, opposing political ideologies clash at the local level, which is manifested in the spread of resentment against ICMBio, aiming to delegitimize the CMER and its objectives. During the presidency of Bolsonaro of the Liberal Party – PL (*Partido Liberal*), for instance, the surveillance of deforestation by ICMBio ceased almost entirely, and the political agenda was in favor of agribusiness interests (Barretto Filho, 2020). It culminated in the attempt of a Law proposal (PL 6024/2019) to revoke the protected status of a substantial part of the CMER and to transform it into land for rural settlement. Even though the law was not enforced at the federal level, it contributed to additional deforestation (Barretto Filho, 2020; Machado et al., 2020).

5.2 Market: economic opportunities and livelihood strategies

The role of state actors and the political agenda of elected political parties have direct impacts on market dynamics. Consequently, in the context of an extractive reserve, where the inhabitants must sustain their livelihoods, economic opportunities have a profound impact on the land use decisions. In this regard, the space of the *colocação* should provide sufficient natural resources to sustain livelihoods through forest extractivism. The interviewed president of an association explained: "we have two main extractivist products, which are Brazil nut and rubber [. . .], and this is what has to sustain the family" (interview 16).

Additionally, residents may engage in complementary activities, such as family-based subsistence farming and small-scale animal raising. Such complementary activities may occupy up to 10% of the area of the *colocação* but not exceed 30 ha

(IBAMA, 2006). To do so, families may clear small patches of primary forest (*mata bruta*) and use it for plantation (*roçado*), cultivate it for a few years, and leave it to regrow as secondary forest (*capoeira*).

As one inhabitant explains, the permitted area for converting forest into a plantation is limited per year, and it may not exceed the allowed limits: "you can only clear 2 ha [. . .] one is of *capoeira* and the other is of *mata bruta*, if you're not in the red. If you're in the red, none" (interview 19). Consequently, each family pursues their livelihood while balancing their land use between forest, cropland, and pasture. However, a gradual decline in prices for extractivist products has led to the expansion of cattle ranching as an alternative source of income. A long-term resident explained how the shift towards cattle ranching as a dominant livelihood strategy occurred:

> "Then there was an aggravating factor with the price of rubber falling [. . .] Because if I live here, I want to see my rubber and my Brazil nuts selling well. Then it went down, and I have to sell very cheaply. I have to look elsewhere. Where did the extractivists look? They looked at cattle. [. . .] It's what's making money, and that's what people are going to do" (interview 3).

Deforestation is linked to the conversion of forest areas into pasture. In line with the lack of law enforcement, individual families frequently exceed the permitted limits on their landholdings. The application of our photo-based interview method has shown that people know about the rules, and often, they do not willingly break the rules. From all land use types shown in pictures, they associate "bad reputation" primarily with extensive cattle ranching. Having pastures for cattle would not be the first choice of many interviewed inhabitants, but it is influenced by the market, due to the monetary pressures to achieve an income:

> "Because the government, [. . .] wants to preserve the forest. And we, who live here also want to preserve more, but then we do not make enough money [. . .] We have a lot of work to do to make a little pasture like this. If we had a better options, no one would even raise these animals. We would just preserve and stay in the forest [. . .] But we must do it, we must have a field, we must plant some vegetables, right?" (interview 29)

It becomes evident that, even though cattle ranching is widely disparaged, it continues to carry weight as a marker of economic advancement. Therefore, the concept "development and progress" was also regularly associated with cattle ranching, and a widespread perception of positive economic effects confirms Hoelle's (2015) earlier results. Keeping cattle is often described as having a "savings account", characterized by its liquidity with immediate financial returns through the sale of a calf, which is not tied to seasonal production like crops. This creates a contradictory situation in which cattle ranching is simultaneously criticized for its links with environmental degradation, anti-conservation narratives, and climate change, while also being regarded as an economic cornerstone, forcing marginalized actors such as rubber tappers into environmentally harmful practices (Russo Lopes and Bastos Lima, 2022).

Over the last few years, however, cattle prices have declined significantly. "A weaned calf here used to cost us R$2,300 to sell. And there was no shortage of people who wanted one. Today, a calf costs R$1,000" (interview 32). Persistent droughts caused by climate change are further eroding the profitability of cattle breeding, as pastures wither and additional feed must be purchased. Regarding the prices of extractivist products, producer organizations and cooperatives are vital institutions that support economic development by establishing value chains and market access. Due to a recent partnership with a French company, Veja, which is buying natural rubber at a subsidized price, rubber production increased, and many inhabitants reengaged in tapping rubber. In an interview with the president of the regional cooperative, he revealed that, for cooperative members who follow certain guidelines, the commercial value of R$3.50 per kilo is subsidized by R$11.50 in payments for environmental services, totaling R$15.00 per kilo of natural rubber. Within the municipality of Xapuri, more than 500 families in the reserve are benefitting from this partnership (interview 17). The fourfold increase in the rubber price provides an essential incentive for embarking on sustainable activities that prevent further deforestation, and the positive outcome of the partnership is also perceived at the local level by the inhabitants:

> "At least now the price of rubber is good with the new company that's buying our rubber, Veja, so things have improved a lot. The same goes for Brazil nuts with the cooperative, they also gave us a price, and it even went up for us. It was very cheap back then, right? Nobody wanted rubber back then, either. Now, at least, we have a guaranteed price. The price of rubber is good now" (interview 12).

In addition to the subsidies by Veja, agroforestry also has a positive impact. Agroforest systems are land use models that integrate tree planting and agricultural crops. In the CMER, agroforestry often relies on a mixture of species, such as Brazil nut trees, fruit trees, industrial trees, as well as perennial cash crops. Unlike monocultures, they reproduce the diversity found in natural ecosystems, promoting beneficial interactions between different components. During the photo-based interview method, attitudes like "development and progress" or "prosperity" were primarily linked with agroforest systems:

> "This agroforest system is one of the best things that I have started 20 years ago. Why? Because in addition to reforesting, I have an income for many years. For example, if you plant a crop. What do people do? They plant a crop, like rice, corn, cassava, banana, beans, they harvest it and then plant another one, because the first one is already over. But if I plant rubber trees, Brazil nuts, açaí, cupuaçu and coffee, [. . .] at least, I'll spend about 15 years there, so to say, before I need to change anything" (interview 3).

This perception is closely tied to the nature of agroforest systems. Unlike annual agricultural crops for subsistence, which must be sown and harvested each year anew, agroforestry relies on long-lived species. These crops produce without constant replanting and complement each other in different production phases. Their

endurance signals something reliable, lasting, permanent, and financially stabilizing in the long term. The results of a study conducted in the eastern Amazon of Brazil, for example, demonstrate that fruit and horticulture products can generate 1,300% more income per hectare than cattle, and 200% more income than soy. However, the study also confirms that in remote areas, particularly, the need for storage and processing facilities, as well as the lack of supply chain infrastructure, represent a major barrier to overcome the dominance of cattle (Garrett et al., 2017). Finally, in the CMER, the livelihood strategies of families are also nested in a production model that does not primarily address the pursuit of profit, but the collective reproduction of the family (Maciel et al., 2024). Against this background, an analysis of territorial governance and land use has to take the wider societal context into account.

5.3 Civil society: societal changes and collective identities

Civil society constitutes the third institutional realm with influence on the dynamics in the CMER. In addition to the state and the market influences on the livelihoods and land use, profound societal changes are shaping the governance of the reserve. When we interviewed an inhabitant of a younger generation, she summarized the changes she had witnessed in the last two decades since her childhood:

> "We had a little house right there on the edge of the little stream. Here it was just forest, [. . .] There was no road, just a little pathway; you could only get there on foot or on horseback. [. . .] Back then, there was no transport to go to school in the city. [. . .] So, I think that the reserve has changed a lot in terms of its characteristics. Today, if you walk around, you will see that the reserve apparently looks more like a colony" (interview 39).

The observed transformation of forest areas into settlement structure is indicative of population growth within the reserve. At the time of the establishment of the reserve, the land allocated to each family was considered sufficient to sustain a livelihood based on extractivism. However, three decades later, there has been a notable shift in household structures, with an increasing prevalence of second- and even third-generation family members living on the same plot:

> "Because we are here in a second generation of the extractive reserve. Our parents fought so hard in this struggle to obtain the territory, and today, most of their children are already getting married and starting their own families. So, where there used to be one family, now there are usually two, three, four" (interview 16).

According to the interviewed ICMBio official, a dilemma arises. While the families are growing, the pressure on resources increases, but the area and the associated regulations remain constant: "The limit on deforestation allowed per *colocação* does not increase if you multiply the number of families. So, there are 30 ha for what we call complementary activities to extractivism. If you want to have a plantation, if you want to have cattle, if you want to have chickens, pigs, or an agroforest system, anything, it's within 30 ha. It doesn't matter if it's one family or 10 families living on the same *colocação*" (interview 2).

Yet, interviewees also disclosed that on some properties, it is interpreted differently: "They understand it as if each one has its own piece, as if it were not just one plot of land. There are 12 families now, and 24 ha are being deforested, each one wants to deforest 2 ha on just one property" (interview 20). In addition to family succession, population growth is being driven by an influx of people from outside the reserve and many inhabitants associate it with deforestation, since it is leading to the fragmentation of large properties that are being illegally allotted: "Deforestation and the arrival of outsiders, who start buying up land and want to clear everything at once. That's the worst change here" (interview 9).

The social organization at the community level can also serve as a control mechanism to prevent occurrences that contravene the reserve's purposes, such as the illicit allotment of land. In this regard, the *núcleos de base* constitute the local institutions that represent the collective interests of the community, and the inhabitants participate in regular meetings convened by the coordinators of a *núcleo*. The respective community must also approve potential new inhabitants before being allowed to settle. However, as a long-term resident of the reserve attests, this vital function of the local social organization is gradually eroding, particularly along the southern fringes of the reserve, where access from outside is relatively easy:

> "Anyone who entered the reserve had to tell the association where they were going, what they were going to do, why they were there [. . .] Because until a few years ago, the Chico Mendes Reserve didn't need anyone to take care of it. The residents and associations took care of it themselves. They took wonderful care of it" (Interview 3).

These developments align with the broader social heterogenization and diversification of communities. Extractivist practices no longer constitute the only dominant livelihood. Contrarily, increasing mobility, better access to nearby cities, and the recent availability of the internet open up new possibilities and different ways of seeing and understanding the world. As Hoelle describes it, "groups are heterogeneous and constantly changing in response to new influences and constraints generated by markets, migration, environmental change, and other factors" (Hoelle 2018, p. 169).

While the older generation of rubber tappers still refused to adopt cattle, it has meanwhile been associated with a more positive image. Raising cattle is commonly associated with prosperity, prestige, and social advancement. But beyond a financial dimension, the spread of a popular "cattle culture" (Hoelle, 2015) primarily refers to a dominant cattle-based lifestyle expressed in symbolic meanings of fashion and consumption habits. It ranges from typical cowboy boots to beef consumption, weekend rodeos, and *sertanejo* music, all together forming the rural identity of the *cauboi* (cowboy). Consequently, societal changes in the reserve lead to the gradual erosion of the collective identity of the *seringueiros* and their willingness to defend their territories collectively. This is reflected by lower attendance at meetings where important matters are discussed:

> "Another thing that I think has changed over the years is this unity among people [. . .] I remember that there was only one association here. We always went together to this association, there were always a lot of people, you know, to discuss what we wanted [. . .] I think that in the past there was unity, but today there is not anymore [. . .] If you have a reunion, there are, at most, about eight people, and before, it was packed" (interview 39).

When we introduced the concept of "the past" during the photo-based interviews, the image of a forest was most often associated with it. It is particularly the younger generation that sees less of a future in forest extractivism: "Young people, at least here in our community, I do not think they are very interested in extractivism" (interview 39). However, when we presented the concepts of "conservation" and "happiness", the forest was also most strongly associated with them. Similarly, Hoelle (2015) explains the perception of the forest landscapes by rubber tappers as beautiful due to their sustained interaction with the environment. Accordingly, primarily among inhabitants who have lived in the CMER for decades, the fight for its creation, as well as the nurturing of its resources, has fostered a collective identity and sense of belonging to the forest:

> "What I like most here is being in touch with nature [. . .] This beautiful forest, right? For us to take care of it and we grow together. For me, this tranquility is very important, being able to harvest the forest's products, like rubber, Brazil nuts, açaí, fish, to feed our families. It's a very important thing" (interview 49).

Following the logic proposed by Cheng et al., the interviewed inhabitants identify themselves as the "ingroup" of *seringueiros*, opposed to the "outgroup" of *invasores* who enter the reserve with the objective of exploiting its natural resources rather than living from it in a sustainable way (Cheng et al., 2003, p. 94):

> "They don't go along their *estrada de seringa* to cut rubber, so they don't develop a passion for the forest. We who work as extractivists do [. . .] We extractivists acquire this; those who don't live off it will just cut it down, and that's it, because they don't have a passion for the forest, they don't have that love for the forest" (interview 20).

Population growth and the social diversification of communities lead to the gradual erosion of collective identities. While cattle ranching is, meanwhile, often an integral part of the culture and livelihood of rubber-tapping families, this does not mean that everyone deliberately violates land use regulations. However, fueled by anti-conservation discourses and the promise of impunity under Bolsonaro's mandate, some areas of the CMER have been settled by land grabbers who do not share the idea of maintaining the CMER as a protected area. In certain areas of the CMER, these trends result in extreme polarization, dividing the community into two opposing factions. A few interviewees revealed that it is also not uncommon for inhabitants to receive threats if they report illicit activities to ICMBio. The societal changes at the local level have a profound impact on territorial governance. They are manifested in the disruption of the social cohesion of the population, disrupting collective identities. These developments critically undermine the functioning of local governance arrangements at the *núcleos de base*, which are essential for the community to effectively organize itself in the pursuit of common goals and to preserve the reserve.

6 Territorial governance as a catalyst for transformative change

This section addresses the second research question. It assesses the potential of territorial governance to function as a catalyst for transformative change based on the interplay of the identified dimensions of multilevel governance, local context, cooperation, and social learning.

6.1 Multilevel governance

The CMER's institutional design formally reflects the principles of multilevel governance. The Deliberative Council, composed of different state- and non-state actors, is intended to promote cooperation across different levels (national, regional, local). In this regard, the property rights regime of the reserve serves as a paradigmatic example of how actors at different levels cooperate, leveraging their comparative advantages and complementing each other's knowledge and resources. As explained by the interviewed ICMBio official, it involves the state as the landowner, the associations as recipients of long-term use concessions, and the beneficiary families as the resource users and inhabitants on individual landholdings:

> "In the reserve, there are associations that have a contract signed with the federal government [. . .] Because the contract they sign is a concession contract for the right to use federal land. Land in the reserve is not titled to individuals; it is public land, belonging to the federal government, and the associations hold possession of this land. So it is through the associations that this possession is passed on to each resident (interview 2).

At the federal level, the state aims to conserve nature and has the authority to implement laws and grant property rights for this purpose. At the local level, families of *seringueiros* need to sustain their livelihoods, and they know how to preserve the forest. Whereas the literature reveals the crucial role of traditional communities for biodiversity conservation (Da Silva et al., 2025), their knowledge often remains underrepresented (Da Silva Santos et al., 2026). In this regard, the Deliberative Council can improve its integration through the participation of local communities. By promoting synergies among different capacities and needs, multilevel governance can achieve the CMER's objectives of reconciling conservation with sustainable development and work towards transformative change.

With its particular property rights regime, the implementation of the extractive reserve model can be considered a fundamental contribution to achieving transformative change, entailing a fundamental shift in views, structures, and practices. Described by Goeschl and Igliori as "innovative and idiosyncratic" (Goeschl

and Igliori, 2006, p. 441). It initiated a shift from individual land ownership to collective property rights, safeguarding the rights and identities of the traditional rubber tapper population to autonomously pursue their livelihoods. The alternative implemented elsewhere by the rural land reform would entail the subdivision of land and an allotment into properties of merely 50–100 ha (Schwartzman, 2018). This would not be in accordance with the lived reality of *seringueiros*, who depend on large territories to sustain their living. It would result in the total disruption of known resource patterns, which would have catastrophic consequences for individual lives, forcing them to live in unknown conditions.

6.2 Local context

Embracing local context, the needs and knowledge of the population, and enabling participation are vital ingredients of territorial governance. Addressing the wellbeing, socio-economic development, and cultural values of its inhabitants is likewise a central objective of the CMER, as stipulated in its Management Plan (IBAMA, 2006).

Given the priority placed on a "top-down command-and-control approach", prevalent in the past, the basic needs of the inhabitants remained unsatisfied. Although the provision of infrastructure and social facilities is not one of ICMBio's primary responsibilities, some interviewees expressed resentment and distrust towards ICMBio. As one inhabitant asserted, "to take care of the forest, you also have to take care of the people who look after it. And we don't see that" (interview 32). In contrast, investments in infrastructure through municipal councils and improvements in social services, such as education and healthcare, addressed fundamental community needs. Among those families who benefited from these infrastructures, it promoted a positive attitude towards the municipal council.

Transformative change requires mechanisms of territorial governance to be aligned with local contexts. It presupposes an understanding of the perspectives of those who inhabit the territory. ICMBio conceives the CMER primarily as an object of conservation. Elected municipal councils regard it as part of their administrative jurisdiction. However, for its inhabitants, its primarily their home. The community at the local level is best informed about the governance challenges and the needs required. They posess what Berkes refers to as "scale-specific comparative advantages" (Berkes, 2009, p. 1694). ICMBio lacks the capacity to monitor local land use changes or to effectively enforce compliance with the legislation. By contrast, local coordinators of the *núcleos de base* know who enters the reserve (e.g., someone with bad intentions) and what leaves the reserve (e.g., illegal movement of cattle or timber).

Co-management between ICMBio and the *núcleos de base*, as "the sharing of power and responsibility between the government and local resource user" (Berkes, 2009, p. 1692), can provide entry points to increase the potential for transformative change. In this regard, Prado et al. (2021) reviewed institutional arrangements across several extractive reserves in Brazil and concluded that a "shared governance" approach provides a more effective framework for natural resource management. In the context of the CMER, strengthening local institutions through the decentralization of resources and responsibilities could help ensure compliance with land use regulations. One interviewed president of an association stated:

> "If you don't have an organized *núcleo de base*, you don't know who bought [land], who arrived, who entered [the reserve], do you understand? It becomes very easy for people to appear, buy and enter the extractive reserve. So, this control is very difficult if these *núcleos de base* are not organized" (interview 16).

The "genuine devolution of power to the local level" (Huber et al., 2023, p. 8) would entail the transfer of accountability to oversee land use regulations to the local level. Making local authorities democratically elected and equipping them with more resources can strengthen communities in their autonomy. By leveraging local knowledge and empowering the *núcleos de base* to become part of the solution, more effective governance arrangements can be established that are tailored to the local context and based on a collective commitment.

6.3 Cooperation

The limited cooperation among all actors involved in the territorial governance of the CMER is one of the greatest challenges to transformative change. Instead of articulating shared goals, conflicting interests among the most central actors threaten the reserve's continued existence. These conflicts are embedded in the institutional competition at the municipal level and are fueled by opposing political agendas. However, for territorial governance to thrive, cooperation among actors must consider both of its dimensions (Antunes Junior et al., 2025).

On the one hand, there is the horizontal dimension, referring to cooperation among inhabitants at the level of associations and *núcleos de base*. The collective action of rubber tappers, grounded in their close relationship with the environment surrounding them, alias the "Territoriality of Seringueiros" (Porto Gonçalves, 1999), once led to the creation of the reserve. Collective action is also needed to maintain it in its integrity, to prevent illicit land sales and the expansion of cattle. As one of the interviewed coordinators of a *núcleo de base* admitted, "everything that is happening in the reserve, I think we are responsible for it, the coordinators, the association, the entities" (interview 20).

The willingness to cooperate builds on the social cohesion and collective identities of communities. To counteract the disruption of collective identities, leading to the social alienation of the inhabitants with their surrounding forest, a shared place-identity and a collective sense of belonging have to be strengthened. In this regard, Maretti et al. state that it is vital to understand "the ties that positively connect people, places, and nature" as "being fundamental to increasing the effectiveness of conservation strategies (Maretti et al., 2023, p. 16)."

On the other hand, there is the vertical dimension, referring to cooperation between actors and institutions across hierarchical levels. The vertical dimension provides access to resources beyond the stock of knowledge attainable by the local community (Granovetter, 1973; Berkes, 2009). In the context of the CMER, successful examples of vertical cooperation include institutional partnerships with Non-governmental organizations

(NGOs) research institutes, and the private sector, such as the Federal University of Acre, through technical training and capacity-building activities in agroforestry systems. Another example is the partnership with the company Veja, which strengthens sustainable value chains by subsidizing natural rubber as payment for environmental services. Both cases represent vertical cooperation, providing economic alternatives to extensive cattle ranching while maintaining standing forests.

Other studies conducted in extractive reserves and across the Brazilian Amazon corroborate our results that financial incentives beyond local market prices for peasant products are necessary to support forest conservation (Rezende et al., 2024). These studies likewise emphasize the importance of strengthening the livelihoods of traditional communities through vertical partnerships. In this regard, Puppim de Oliveira et al. (2022), in their study of babassu nut breaker women, underscore the need to link local subsistence activities with global value chains, such as those in the cosmetics industry. Consistent with this perspective, a former member of the Deliberative Council (Interview 03) argued that the Council could play a more proactive role in establishing partnerships with external actors to promote value chains that invest in sustainable practices within the reserve. To prevent the further fragmentation of the reserve, through the allotment of properties or the further intrusions of cattle, and to ensure viable income sources for the inhabitants, a nuanced balance between both dimensions of cooperation is essential. In this regard, the coordinators of local *núcleos de base* fulfil the key role of a "bridging institution" (Berkes, 2009, p. 1696). They serve as catalysts to link horizontal cooperation among inhabitants and the vertical cooperation with external actors among different governance levels and societal realms. Neither the state alone nor the inhabitants have the capability to protect the reserve on their own. Whereas the ICMBio has the mandate to expel illicit individuals from the reserve, the organized community knows about illicit occurrences on the local level. Steering towards transformative change requires the mutual presence of both dimensions of cooperation and a shared goal.

6.4 Social learning

The creation of extractive reserves was the result of a social and territorial experiment itself that turned out to be a success story, culminating in 96 reserves established across the country (Anselmo Gonçalves Da Silva, 2024). To maintain its transformative potential, however, social learning must accompany the evolution of the decision-making structures. The shift from a top-down governing approach towards more participatory forms of governance demonstrates the capacity to reflect on past shortcomings and to respond more effectively to local realities. The findings from other extractive reserves are consistent with these results. A study conducted in the Riozinho da Liberdade Extractive Reserve, also located in Acre, found that interactions between ICMBio and local communities must accommodate a diversity of interests. While adversarial relationships can undermine conservation efforts, interactions that support local livelihoods, provide assistance tailored to specific needs, and adapt existing regulations through mutual understanding are more likely to foster both effective conservation and constructive collaboration (Mooij, Dessartre Mendonça and Arts, 2018).

The property rights regime of the reserve constitutes its strongest ingredient for transformative change. However, property rights are only handed to one person per *colocação*, which is often shared by several families. At the time of its establishment, little attention was paid to the succession of families over generations. The consequences of these developments are increasing pressure on forest resources and uncertain ownership situations for many families. Both represent challenges that still need to be met by a continuous process of institutional learning.

Social learning also refers to the adaptation to changing circumstances, such as the dynamic developments of the market, which extend to the livelihood strategies and land use decisions of inhabitants. Alternative income sources to cattle are being tested and experimented with that align with forest conservation. The development of agroforestry systems and their acceptance by the population represent a concrete example of such experimentation. The picture of an agroforestry system was widely associated with progress and prosperity, even more so than cattle ranching. The results emphasize that agroforestry can offer long-term financial stability by generating income over many years, in contrast to annual subsistence crops. It contributes more effectively to sustainable income than cattle, while promoting conservation through reforestation. The diversification of income-generating activities is a central mechanism of social learning in the CMER. It generates new knowledge about sustainable practices, while providing inhabitants with viable alternatives to cattle, which maintain the reserve as a protected area.

Social learning, like the other dimensions, constitutes a transversal element, and the transformative potential is realized by their interplay, mutually reinforcing each other. Regarding the example of agroforestry systems, vertical cooperation with actors such as the Federal University of Acre and NGOs is a source of innovation and technical input. The horizontal cooperation promotes the dissemination of positive effects within the communities, for instance, through demonstration plots. In this regard, the coordinators of the *núcleos de base* serve as "knowledge brokers" bridging across multiple levels, enabling vertical access to establish partnerships while ensuring the horizontal adoption, allowing new capacities to enter the communities.

7 Conclusion

This paper examined the territorial governance of protected areas, drawing on the CMER in the Brazilian state of Acre. We explored how actors and institutions shape the territorial governance and land use in the CMER. In a further step, we assessed the potential of the CMER's territorial governance to serve as a catalyst for transformative change. Our findings make three contributions to the existing knowledge and literature.

First, it advances a conceptual framework for analyzing territorial governance arrangements regarding their potential for transformative change. Based on the fundamental propositions from the literature on governance and institutions, the institutional tripartite of state, market, and

civil society provides a comprehensive framework for understanding the multifaceted influences on interactions between actors, which can be applied across diverse contexts. The link between territorial governance and transformative change has not been fully understood, only a few studies address this issue exist (for instance Gerhardinger et al., 2018). Hence, our findings are likely to be relevant to other extractive reserves in Brazil and protected areas worldwide that use a similar governance model and pursue transformative change. However, analyses through our conceptual framework are not limited to protected areas. The framework is open to future research across a variety of governance settings and policy domains where actors pursue a shared vision to achieve common sustainability goals.

Second, we contribute empirical insights into the territorial governance of the CMER, which offer practical implications for achieving transformative change. The example of the CMER is emblematic because it stands for extractive reserves as a particular model of protected areas. Extractive reserves have been established as a result of the bottom-up movement by rubber tappers to defend forest-based identities and collective territorial rights. However, given the challenges, such as cattle ranching and deforestation, the transformative potential of territorial governance is not yet being fully realized. The current dynamics illustrate that transformative change is not a permanent achievement but an ongoing process that requires continuous adaptation, efforts and institutional innovation.

Despite the limited capacities to oversee the vast dimensions of the reserve, the top-down approach of hierarchical steering through the "government" prevails, and the opportunities of "governance", which include non-state actors and the local needs of the inhabitants, remain restricted. A strong state presence, backed by resourceful institutions, is needed to enforce collectively binding rules and regulations. Without ICMBio as the central institution, the very existence of the CMER would be called into question.

Representing a protected area where local communities are a vital element for achieving conservation, the local context must be embraced by promoting their empowerment and socio-economic wellbeing. The social organisation of the population strongly influences territorial governance. Social life in local communities is not static, but constantly evolving. A collective sense of belonging, however, is a prerequisite for the local governance system to work effectively. It requires reinventing collective cultural values, continuously adapting livelihood strategies, and redesigning institutional arrangements.

Third, the findings of our study contribute to a deeper understanding of transformative change and the interplay between four dimensions: (1) multilevel governance, (2) local context, (3) cooperation, and (4) social learning. Transformative change, therefore, emerges not from individual institutions, but from the cooperation between actors and their ability to collectively learn and respond to new challenges. For example, it is key to understand the local context (dimension 2), and specifically, the communities' needs to sustain their livelihoods as they influence their land use decisions, weighing pasture for cattle ranching against preserving forests for rubber tapping. Cooperation (dimension 3) is key for transformative change because it provides income opportunities as alternatives to cattle ranching. Here, partnerships with external actors can play a critical role in directing land use towards more sustainable directions, as illustrated by agroforestry systems and subsidies for natural rubber. Social learning (dimension 4) was key for ICMBio to shift its CMER governance approach towards trust-building and a more participatory form, thereby enabling a more effective multilevel governance (dimension 1).

Beyond the Brazilian Amazon, the findings highlight broader lessons for protected areas that seek to reconcile conservation with sustainable development. Our findings essentially mean that a strong state institution, that cooperates closely with actors within a protected area based on trust and a participatory approach, is promising, especially when combined with external actors (such as companies) that economically strengthen sustainable income opportunities (such as rubber tapping). A shared governance approach, grounded in co-management principles, should be strengthened, with state and societal actors complementing each other's capacities and resources.

For further studies, it is promising to focus on the interactions between the identified dimensions, especially in protected reserves, where economic market forces often collide with nature-based livelihoods and conservation efforts. Future research could further examine how changes in collective identities, generational transitions, and emerging market opportunities influence territorial governance. Such research would contribute to a deeper understanding of the social conditions under which territorial governance can effectively support transformative change towards more sustainable and equitable futures.

Data availability statement

The datasets presented in this article are not readily available because the collected interview data includes personal and sensitive information and cannot be made publicly available. Requests to access the datasets should be directed to a.prestes.duerrnagel@gmail.com.

Ethics statement

The collected data was anonymized to prevent the identification of individual participants. The studies involving humans were approved by Central Ethics Committee, Freie Universität Berlin. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

APD: Conceptualization, Investigation, Writing – original draft, Writing – review and editing, Formal Analysis, Methodology, Project administration, Software, Supervision, Visualization. NR: Formal Analysis, Investigation, Methodology, Software, Visualization, Writing – review and editing, Conceptualization.

LF: Software, Visualization, Writing – review and editing, Conceptualization, Formal Analysis. VA: Investigation, Writing – review and editing. JS: Conceptualization, Funding acquisition, Investigation, Methodology, Supervision, Writing – review and editing, Formal Analysis.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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