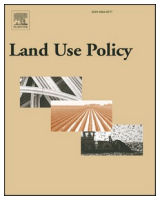
Land Use Policy 171 (2026) 108265



Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol



When co-managed conservation fails: Environmental degradation and state-backed dispossession of indigenous lands in communal reserves in the Peruvian Amazon

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ARTICLE INFO

Keywords:
Protected Areas
Tropical forests
Indigenous peoples
Deforestation
Land Use Land Cover Change

ABSTRACT

Communal Reserves were established as a co-management compromise between the Peruvian state and Amazonian indigenous peoples to promote biodiversity conservation and indigenous territorial rights. However, these areas face escalating land grabbing, environmental degradation and violence. This study utilizes archival, spatial, and ethnographic data to analyze the magnitude, drivers, and mechanisms of Land Use and Land Cover Change (LULCC) in El Sira Communal Reserve and its buffer zone. We find that current pressures stem from a longstanding legacy of state-led colonization and agricultural development preceding the reserve's creation. Our spatial analysis shows that El Sira's deforestation and agricultural expansion rates are the highest among all Peruvian Communal Reserves and their buffer zones. Finally, our ethnographic action research highlights the role of subnational governments in facilitating LULCC through state-backed dispossession of indigenous lands. Our discussion exposes the limitations of co-managed conservation in the Central Peruvian Amazon, where growth coalitions and a legacy of settler colonization provide the administrative infrastructure necessary to transform protected forests into private assets.

1. Introduction

The Peruvian Amazon is experiencing an unprecedented surge in Land Use and Land Cover Change (LULCC). Between 2001 and 2023, more than 4000,000 ha (ha) of forest have been lost in Peru (Global Forest Watch 2024). The expansion of agricultural land use takes place in proximity to Protected Areas and indigenous territories, not only bringing profound environmental impacts (Asner et al., 2014; Caballero et al., 2018), but also land dispossession and profound socio-cultural transformations for indigenous peoples whose livelihoods, territorial practices and governance systems depend on forest resources (Bennett et al., 2018).

Communal Reserves rank among the Protected Areas most affected by LULCC. In contrast with fortress conservation frameworks (Berkes, 2004), Communal Reserves emerged as a flagship of co-management with a strong emphasis on community-based conservation seeking to incorporate indigenous peoples. As a result, Communal Reserves received praise from international conservationist circles for including indigenous peoples within conservation frameworks. Nonetheless, the empirical evidence has a more nuanced stance. Scholars argue that Communal Reserves have proved not only ill-suited to halt LULCC (Ravikumar and Lock, 2025; Sarmiento Barletti and Rolando, 2024), but also unable to support indigenous self-determination (Shanee et al., 2020).

Political ecology scholars tend to agree that several community-based conservation and co-management schemes, though originally intended to empower local communities, end up serving institutional and market interests instead (Holmes and Cavanagh, 2016; Igoe and Brockington, 2007). Paradoxically, conservation schemes involving indigenous peoples in Peru emphasize empowerment and participation narratives while limiting indigenous action within state-defined rules (Paredes et al., 2025; Shanee et al., 2020), burdening them with the

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https://doi.org/10.1016/j.landusepol.2026.108265
Received 23 December 2025; Received in revised form 16 June 2026; Accepted 31 July 2026
Available online 8 August 2026
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responsibility for environmental protection without a meaningful transfer of power nor resources (Sarmiento Barletti and Rolando, 2024).

Communal Reserves safeguard approximately 2.1 million ha of the Peruvian Amazon - with their corresponding buffer zones covering 2.8 million additional ha. However, Communal Reserves face increasingly complex challenges from LULCC, particularly related to the expansion of the agricultural frontier and illicit economies (Gutiérrez-Vélez et al., 2011; Vijay et al., 2018). Cattle ranching and plantations have expanded drastically in their buffer zones (Delgado et al., 2024). At the same time, coca cultivation, Artisanal and Small-Scale Mining (ASM) are rapidly encroaching within or near indigenous territories, including those participating in the governance of Communal Reserves (Malca et al., 2023; Manrique and Hernando, 2025).

Despite such growing challenges, several research gaps persist in our understanding of the dynamics of LULCC in Peruvian Communal Reserves and their buffer zones. First, there is a limited understanding of the historical processes shaping current LULCC dynamics within Communal Reserves. Second, while multiple studies have modeled the drivers of deforestation (Bax and Francesconi, 2018; Escobedo-Monge et al., 2022; Sánchez et al., 2021), little is known about land-use transitions following forest loss (for an exception, see Móstiga et al., 2024). Third, although the role that national and subnational governments play in facilitating LULCC in Protected Areas and their buffer zones is increasingly acknowledged in the scholarship (Sears and Pinedo-Vasquez, 2011; Paredes and Kaulard, 2020), ethnographic research on these institutional practices remains limited.

Addressing this gap, this study examines the dynamics and mechanisms of deforestation and LULCC in Protected Areas of the Peruvian Amazon through a case study. Focusing on El Sira Communal Reserve, Peru's largest Communal Reserve and among the most affected by deforestation, this reserve offers a critical vantage point on how historical trajectories and local institutional practices shape current LULCC. Initially envisioned as a hybrid model of co-management between the state and indigenous peoples, El Sira is currently marked by increasing violence and dispossession of indigenous lands.

This article pursues three interrelated objectives. First, it provides historical evidence of driving forces shaping current processes of LULCC in *El Sira* that limit the effectiveness of the reserve. Second, it quantifies recent patterns of deforestation and land-use transitions in the study area. Finally, drawing on an ethnographic action research approach, the study examines the institutional practices of state-backed land dispossession targeting indigenous territories.

This study utilizes Rudel and Horowitz's (1993) lead development/coalition model to analyze LULCC dynamics in El Sira and its buffer zone. Deviating from reductive 'immiseration' theories that focus only on poverty or population growth as drivers of LULCC, this framework conceptualizes this phenomenon as a multidimensional socio-political and economic phenomenon. Central to this model are the coalitions formed between local stakeholders, political or economic elites and the state to facilitate frontier expansion (Sunderlin et al., 2005; Bedoya et al., 2023). Applying this lens to El Sira allows us to identify the specific growth coalitions that incentivize clearing and LULCC, even within a high-priority conservation landscape. While El Sira and its buffer zone enjoy a conservation and special management status, the complex network of actors identified in this article override the formal protection status of the reserve and its buffer zone, as well as the formal territorial rights of indigenous peoples inhabiting the area.

2. Institutional framework

The Peruvian Amazon is one of the world's major biodiversity hotspots and provides essential global ecosystem functions (Sobral et al., 2017). To preserve this natural wealth, the Peruvian government has designated 76 Protected Areas, 38 of which are in the Amazon, covering roughly 20% of the region (Dourojeanni, 2014; Josse et al., 2024). These areas are governed under different legal categories, including national parks and sanctuaries, which follow strict conservation models and exclude local populations. Beyond these traditional state-managed models, Peru has gained international attention by establishing Communal Reserves, a hybrid conservation scheme aiming to reconcile biodiversity conservation with the advancement of indigenous peoples' territorial rights.

The establishment of Communal Reserves was possible through major efforts from civil society, international donors and institutional entrepreneurs seeking to incorporate community-based frameworks in Peru. Community-based conservation schemes had gained popularity as an alternative to 'fortress conservation' models under the promise that they could simultaneously achieve conservation and local development by emphasizing community participation (Berkes, 2004). By the late 1990s and the early 2000s, community-based conservation had become the prevailing model promoted by international conservation organizations with references to participation, co-management and communities becoming ubiquitous in conservation narratives (Sterling et al., 2017).

Early on, Latin American governments experimented with the idea of integrating aspects of community-based conservation in response to the limited capacity of national governments to enforce strict protected areas in remote forest regions (Peres and Terborgh, 1995). In Brazil, for example, Production Reserves allow sustainable harvesting of timber and non-timber products while maintaining conservation goals through a concession system (Peres, 2011). Similarly, *Áreas de Conservación y Uso Sostenible* in Ecuador allow productive activities in conservation sites, apart from those leading to deforestation (Loayza et al., 2025). Likewise, Peru established Communal Reserves as a co-management model between the state and indigenous peoples, with the national government being represented through the National Service of Natural Protected Areas (SERNANP) and indigenous communities. By 2012, Peru's central government had established ten Communal Reserves in the Peruvian Amazon.

El Sira is the largest Communal Reserve in Peru. Encompassing over 600,000 ha across the regions of Huánuco, Pasco and Ucayali, El Sira represented the first large-scale co-management arrangement between the Peruvian state and indigenous peoples. This reserve protects the Sira mountain range, a unique mountainous ecozone covering the transition between the Amazonian cloud forests and lowland rainforest, ranging from 131 to 2274 m above sea level (SERNANP 2019). The surroundings of this mountain range have historically been occupied by indigenous peoples (Varese, 1973; Ministerio de Cultura - MINCUL, 2024).

While Communal Reserves raised high expectations within conservationist circles following Peru's return to democracy in the 2000s (ParksWatch, 2003), they face significant hurdles. These include weak institutional capacity, a limited transfer of power to indigenous communities and severe LULCC pressures (Caruso, 2011; Sarmiento Barletti and Rolando, 2024). While the scholarship has highlighted pronounced weaknesses in Communal Reserves, much less is known about the local drivers of LULCC, their land-use transitions nor how subnational governments undermine reserves' goals. These issues are most prevalent in the reserves' buffer zone, where indigenous communities are most concentrated.

A significant portion of the indigenous population resides within territories officially classified as *Comunidades Nativas* (Native Communities). These entities are governed by the Native Communities Law, which provides a legal framework for recognizing collective land rights (Sarmiento Barletti, 2016; Pinedo, 2024). To achieve this status, indigenous groups must navigate an extraordinarily complex process, including major administrative challenges and jurisdictional discrepancies (Monterroso and Larson, 2018). Nonetheless, the formal recognition of a Native Community does not automatically entail the granting of collective land title, which frequently involves a more rigorous and protracted legal procedure. The responsibility for land titling of indigenous territories was transferred to regional governments starting in 2002. In practice, this means that the responsibility for processing land

titles lies with Regional Agricultural Directorates (DRAs) under the Regional Governments. Several studies highlight a major conflict of interest within the DRAs, where the mandate to protect communal rights often clashes with regional economic development agendas that tend to favor individual titling (Paredes and Pastor, 2024).

Much like the administrative challenges involved in establishing a Native Community, indigenous peoples wishing to co-manage Communal Reserves must form an Administrative Contract Executor (ECA). These ECAs act as legal representatives for conservation efforts and the promotion of projects within the reserve. However, ECAs and SERNANP are by no means the only stakeholders influencing these reserves and their surrounding buffer zones.

While the Peruvian government designates buffer zones as areas adjacent to Protected Areas requiring special management, they only represent a management designation. Not only existing property rights and land tenure remain largely unchanged in buffer zones, but these sites are exposed to competing land use claims that affect the Protected Areas they intend to buffer (Palacios and Barletti, 2021; Weisse and Naughton-Treves, 2016). Unlike the Protected Area itself, buffer zones include a mosaic of land tenure regimes, including private agricultural plots, mining concessions and other extractive land uses (Delmotte, 2022). Decentralized regional authorities, such as the Regional Directorates of Agriculture or the Regional Directorates of Mining, are responsible for issuing these land leases. Far from working independently, these offices share a common interest with settler groups to open forest frontiers. Our case study highlights how this state-supported push for LULCC facilitates the dispossession of indigenous lands, ultimately affecting the conservation status of Communal Reserves and their buffer zones.

3. Materials & methods

This study utilizes archival, spatial and ethnographic data to analyze the magnitude, drivers and mechanisms of Land Use and Land Cover Change (LULCC) in El Sira Communal Reserve and its buffer zone.

Four fieldwork campaigns were conducted between 2023 and 2025 in Asháninka and Yánesha communities located in the buffer zone of *El Sira*. The research team implemented qualitative data collection techniques in four Native Communities: Nueva Austria del Sira, Tahuantinsuyo, Selva Dulce and Tres Hermanos del Sira. Qualitative methods primarily consisted of semi-structured interviews, informal conversations, and non-participant observation. During qualitative data collection, we applied the 'maximum variation' approach (Seidman, 2013), which aimed to capture a broad range of perspectives on LULCC and deforestation processes. Rather than seeking a representative sample, we operationalized this strategy by selecting participants across three primary dimensions of variation: (1) actor type (e.g., indigenous communities, colonist settlements), (2) geographic location across the buffer zone, and (3) varying levels of support or resistance toward LULCC. This deliberate sampling allowed us to examine how perceptions and experiences of deforestation varied both across and within groups. In total, we conducted 51 interviews, including indigenous peoples, colonist settlers, park rangers and local bureaucrats.

We evaluated LULCC in El Sira and the buffer zone between 2001 and 2022. The spatial analysis included the visualization of spatial patterns of LULCC, as well as calculating zonal statistics in El Sira and its buffer zone in R using the sf and terra modules (Pebesma et al. 2018; Hijmans et al., 2023). We obtained deforestation data for years 2001–2022 from the publicly available Global Forest Cover 30 m dataset (Hansen et al., 2013) and extracted it directly into R using the gfcanalysis module (Zvoleff et al., 2002). Data on LULCC for years 2001–2022 was obtained from the MapBiomas dataset (MapBiomas, 2023), based on Landsat imagery at 30 m resolution. Vector layers for Protected Areas and Native Communities were accessed through the National Service of Protected Natural Areas (Servicio Nacional de Áreas Naturales Protegidas por el Estado - SERNANP, 2024) and the Instituto del Bien Común (2023).

The ethnographic action research involved a member of the research team working directly with Nueva Austria del Sira, a Native Community located in the buffer zone of *El Sira*. This community, which gathers both Ashaninka and Yánesha indigenous peoples, has been the target of multiple attempts of land dispossession from state institutions and colonist settlers for almost two decades, which have resulted in a significant fragmentation of its territory. In 2016, this Native Community was withdrawn from its official recognition as a 'Native Community' by the Regional Directorate of Agriculture of Huánuco with the goal of transferring land to settler colonists. Our ethnographic action research approach enabled the research team to document both the historical trajectory of land dispossession and the everyday strategies of resistance and negotiation (Vincett, 2024). Through access to the case file and legal assistance with the community's efforts to regain their recognition as a 'Native Community' under Peruvian law, the research team gained insider knowledge to document the connection between state-supported land dispossession and settler colonialism targeting indigenous territories. Qualitative evidence was primarily used to interpret spatial patterns observed between 2010 and 2022, the period during which deforestation and LULCC accelerated across El Sira and its buffer zone.

Rather than treating the three methodological components as separate tracks, we triangulated archival research, spatial analysis, and ethnographic action research throughout the analysis. Our spatial analysis identified areas facing the most intense LULCC, which was directly linked with the qualitative data gathered during fieldwork. Furthermore, the review of archival and legal records concerning land-titling conflicts provided additional evidentiary support for our findings. This iterative approach allowed us to cross-reference quantitative trends with qualitative information, yielding a robust interpretation of the drivers behind state-backed land dispossession and settler expansion in the region.

4. Results

4.1. Conservation in a colonization front: disputed lands in the Central Peruvian Amazon

The Central Peruvian Amazon has historically been an important site for state-led colonization and agrarian development much before it became a hotspot for biodiversity conservation (Aramburú 1981). The rationale behind the colonization of Amazonian lands is rooted in the push from 20th century developmentalist state projects for agricultural expansion, which framed the region as a frontier to be made productive through settler agriculture and farming (Paredes and Manrique, 2018; Ramos-Cortez and MacNeill, 2022).

Although similar schemes in the Central Peruvian Amazon can be traced back to the 19th century (Pinedo, 2021), developmental and colonization efforts reaching the western margin of *El Sira* only gained significant momentum by the mid−20th century.[1] Colonization became a major policy during the first presidency of Fernando Belaunde (1963–1968). Belaunde's goal was to alleviate population pressures in Andean cities by promoting the colonization of adjacent Amazonian lands. In Belaunde's scheme, colonization sites would be integrated with coastal and andean cities through a national road system (Belaúnde, 1959). The surroundings of the western part of *El Sira* - in particular, its current buffer zone - became part of eight Amazonian areas targeted for colonization due to their proximity to densely populated Andean valleys. Decades later, various Communal Reserves were established near these colonization fronts to address anthropogenic pressures resulting from these policies (See Fig. 1).

[1] Due to the natural barrier represented by *El Sira* mountain belt, these colonization schemes did not include areas along its eastern margin. As a result, indigenous groups in regions such as Ucayali have experienced significantly less land pressures than those on the western side.

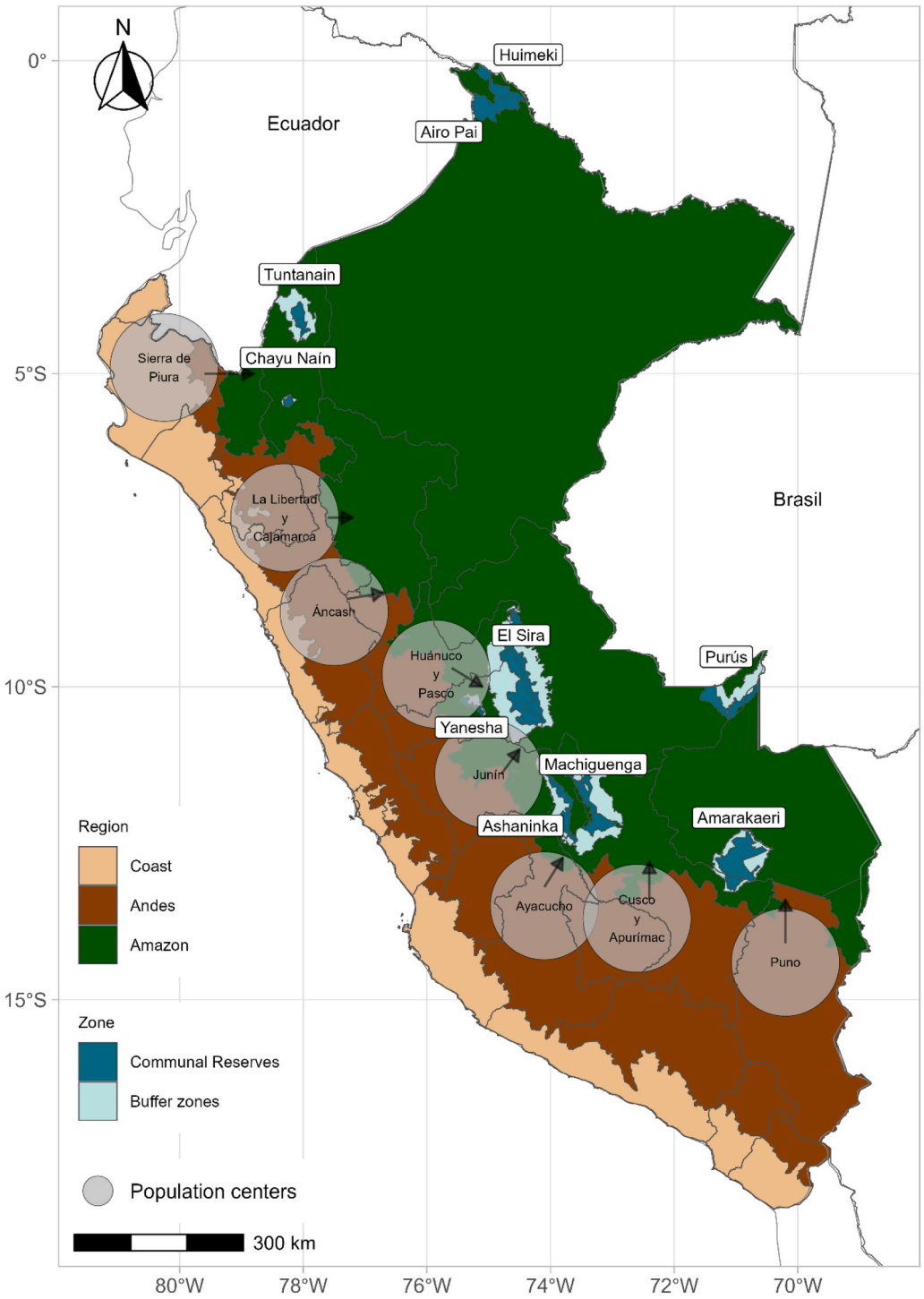


Fig. 1. State-led colonization sites and Communal Reserves. Circled areas represent densely populated Andean sites targeted in Belaunde's plan (1959) to be redirected towards eastern colonization zones in the Upper Amazon (see arrows). The map shows that colonization sites in the Central Peruvian Amazon overlapping with at least four Communal Reserves. Source: Adapted from Belaúnde (1959), Paredes and Manrique (2018).

Belaunde's second presidency (1980–1985) brought a second wave of colonization into the Central Peruvian Amazon, this time with strong support from international cooperation. In the areas that now comprise *El Sira*, USAID's Pichis-Palcazú Special Project sought to transform 1 million ha into a colonization front through investments in infrastructure, forestry and agrarian development (Smith, 1982). Immediately after assuming the presidency, Belaúnde travelled to the small settlement of Puerto Bermúdez - currently located in *El Sira*'s buffer zone - to announce the promotion of a colonization axis along new highways through the Pichis, Palcazu and Pachitea valleys (Smith, 1982). Two months later, the Department of Agriculture allocated USD 305,000 (1982 dollars) to settle thousands of colonists in the area. Towards the end of his mandate, Belaúnde founded Ciudad Constitución in 1984 to reinforce the colonization of the Pichis and Palcazú valleys (Southgate and Elgegren, 1995).

Belaunde's development plans in the Central Peruvian Amazon faced significant challenges since the beginning. During his second presidency, two terrorist organizations (Shining Path and MRTA) declared

war on the Peruvian state. These organizations were active in the Central Peruvian Amazon and profited from the poor economic outcomes of both colonization and development programs. Ciudad Constitución - the city founded by Belaunde to serve as a colonization axis for the Amazon - became a hub for illicit markets, particularly drug trafficking in the 1980s (Cotler, 1999). The local population saw little improvement in their quality of life, which partly led to their support for terrorist groups operating in the area.

In parallel with the struggles of development-oriented policies in the Pichis-Palcazu-Pachitea valleys, conservationist and indigenous rights-based organizations challenged Belaunde's plans. Organizations such as the Cultural Survival Institute highlighted major shortcomings in Belaunde's policies and pressured international funders to shift their support from road construction toward natural resource management (Cultural Survival Institute, 1981; Smith, 1982). Meanwhile, the active participation of the International Work Group for Indigenous Affairs (IWGIA) within the influence areas of Belaunde's road projects was instrumental in the formal demarcation and land-titling process of numerous indigenous communities in the Central Peruvian Amazon (García et al., 1998). These early efforts laid the conceptual groundwork for establishing a Communal Reserve in El Sira with the goal of protecting the region's biodiversity and safeguarding indigenous groups facing growing territorial pressure (García et al., 1998).

While governmental projects were frequently targeted by insurgent groups, conservation groups faced comparatively less resistance and even garnered support from local indigenous communities. The outcomes of their efforts can be observed along two fronts. First, the Central Peruvian Amazon has become one of the regions with the highest density of legally recognized indigenous territories, a substantial proportion of which hold formal land titles. Second, conservation initiatives advanced through the establishment of protected areas, beginning with the creation of the Yanachaga-Chemillén National Park in 1986 and the Yanesha Communal Reserve in 1988.

The integration of biodiversity conservation with an indigenous-rights agenda became a precedent for neighboring indigenous peoples facing land conflicts with colonist settlers. Although conservation efforts struggled under the authoritarian rule of Alberto Fujimori between 1990 and 2000 (Rosolie, 2014), the return to democracy in 2000 marked a window of opportunity for advancing conservation and indigenous-rights agendas (Orihuela, 2020). Building on the experience of the small-scale Yanesha Communal Reserve, groups of Asháninka, Yanesha and Shipibo indigenous peoples established El Sira Communal Reserve in 2001. Covering more than 600,000 ha, the creation of El Sira was widely celebrated by both conservation and indigenous organizations as a significant step toward more inclusive conservation models, helping secure funding from the World Bank and the Global Environment Facility.

Despite the support from conservation organizations, El Sira began with major flaws in its conception and design. The management of the reserve was centralized in offices in the city of Satipo, more than 200 km away from the reserve itself. Furthermore, while the indigenous federation that proposed establishing the reserve - the Regional Association of Indigenous Peoples in Selva Central - was active across much of the western margin of El Sira, it had limited reach and influence in the eastern part of the reserve. The limited knowledge of the social and political reality in the eastern sector of El Sira led to a demarcation that included land already titled to colonists living inside the reserve. Finally, the isolation and distance of both indigenous peoples and colonists in the eastern part of the reserve - who were left with only river access - created a sense of rejection toward the reserve and its land use restrictions, which in the opinion of residents became 'an obstacle to development'.

Following the reserve's establishment, the imposition of resource-use restrictions catalyzed significant friction with several indigenous communities residing in the buffer zone. Notably, indigenous groups along the Pachitea river tributaries opposed burgeoning restrictions on ASM. At the same time, those seeking to collaborate with the reserve struggled to establish a formal representative body. The establishment of El Sira's Administrative Contract Executor (ECA) was delayed for five years, primarily because indigenous communities dependent on logging were reluctant to join (Interview JZ−1205). Similarly, the formulation of El Sira's Master Plan - the guiding document outlining its objectives and management goals - took nearly ten years to be approved.

Mistrust in the reserve coupled with the complexity of forming the ECA fueled internal tensions. During fieldwork, several community members from Asháninka communities on El Sira's western flank expressed profound dissatisfaction with the reserve. One explained: "*As we are located in the buffer zone, as a community, we receive no support. Nothing benefits us. It is of no use to us. Do you know why I say this? Because it mainly benefits the professionals over there, those who work in the environment sector, the park rangers*" (Interview 5 TH−5305). Another remarked: "*For me, the reserve is just a name, only a name, and it stays that way. For us there is no benefit - no help ever comes. So what is the point of the reserve?*" (Interview 7 RT−223).

Tensions were even stronger with colonists settlers in the buffer zone and inside the reserve. Colonists settlers holding land titles inside the reserve petitioned the government to be exempted from land use restrictions, arguing that their presence predated the creation of El Sira. Responding to growing pressures from settler groups, municipal authorities in El Sira's buffer zone inaugurated a major road that cut through the Protected Area itself, fragmenting indigenous territories. Although it remains an unpaved road, local accounts suggest that it is heavily used by illegal loggers. In addition to this official road, numerous unmonitored informal trails and illegal pathways are present in the buffer zone, further facilitating the advance of logging, ASM and drug trafficking. Fig. 2 illustrates these diverse land usess and infrastructure networks.

Fig. 2 shows the official road (in dark red) that crosses the northern side of *El Sira* Communal Reserve, along with indigenous communities and *centros poblados* - settlements largely inhabited by colonists - located in the buffer zone. The figure also shows how some of these settlements even extend into the reserve itself. While certain indigenous communities have established *centros poblados* within their own territories, the map highlights a broader pattern: most *centros poblados* are situated outside indigenous communities. Their proximity has generated tensions over land. In some cases, *centros poblados* have been established within the boundaries of indigenous communities without their consent, further exacerbating disputes. Such dynamics have intensified conflict over resources, which - as the following section shows - have translated into deforestation and LULCC in the reserve and its buffer zone.

4.2. Deforestation and LULCC in El Sira

Our spatial analysis reveals that El Sira and its buffer zone exhibit the largest extent of deforestation among Communal Reserves. Between 2001 and 2022, El Sira lost 12,132 ha of forest, equivalent to 2% of its total area. This figure represents nearly six times the average deforestation rate within Peruvian Communal Reserves. Most deforestation, however, takes place within its buffer zone, with a total of 165,555 ha lost between 2001 and 2022.

Our spatial analysis shows that the pace of deforestation in El Sira and its buffer zone has increased since the beginning of the 2010s, though it stabilized 10,000–11,000 ha per year since 2019. Between 2001 and 2010, the average deforestation within the reserve was 300 ha and 4433 ha in the buffer zone. Between 2011 and 2020 the average deforestation had more than doubled with 752 ha lost within the reserve and 10,336 ha in the buffer zone. Fig. 3 shows deforestation within the reserve and buffer zone between 2001 and 2022.

Deforestation constitutes only the first stage of broader LULCC dynamics, as cleared areas are subsequently converted to new land uses. Our analysis indicates that El Sira and its buffer zone have experienced the most expansive land-use transitions from natural cover to

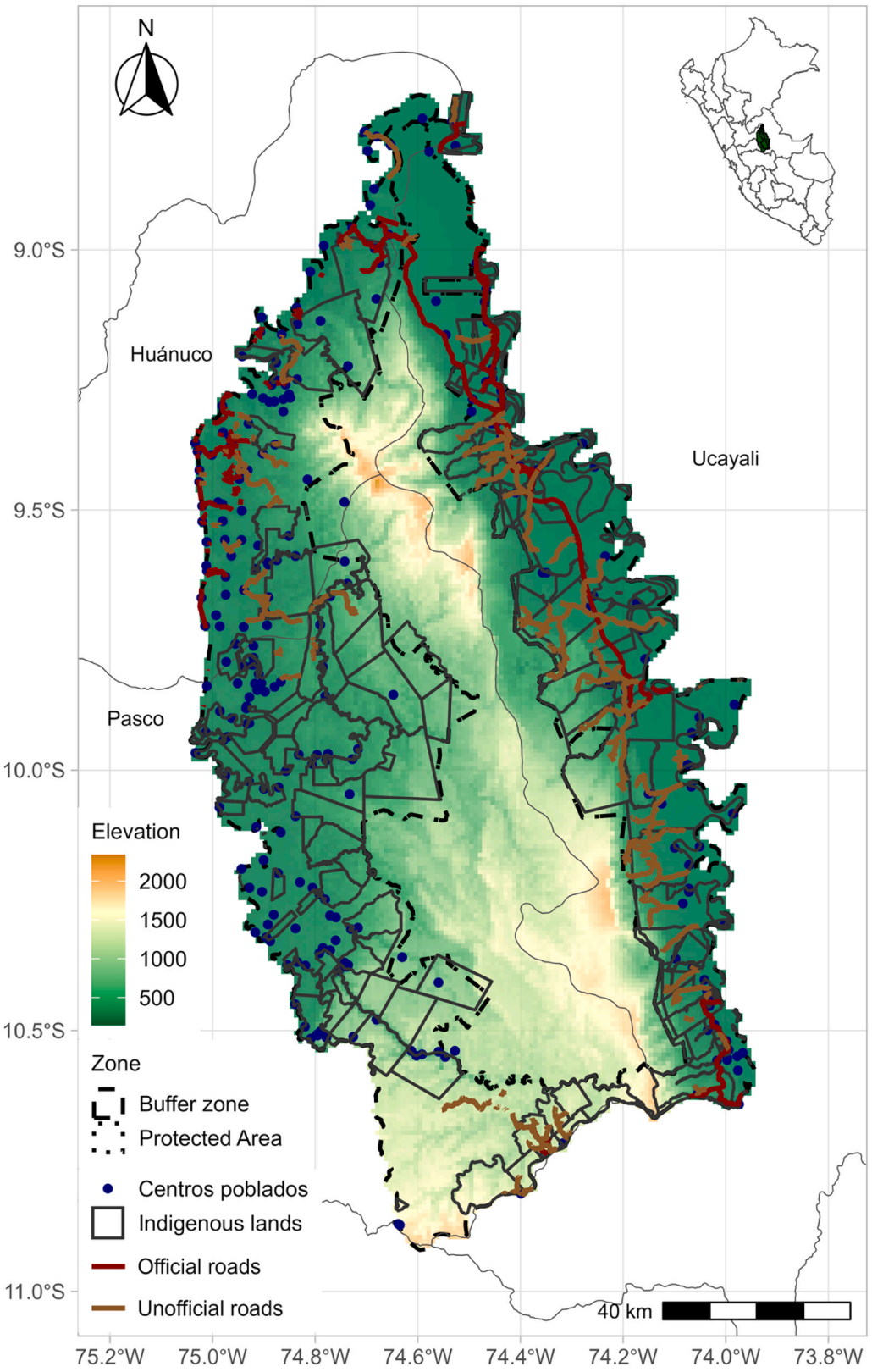


Fig. 2. Topographic map of El Sira and its buffer zone, highlighting indigenous territories, *centros poblados* and existing roads. While the rugged terrain of the Sira mountain range provides natural protection to high-elevation interior areas, lower-lying sectors show increased accessibility via established road infrastructure. Sources: IBC (2023), INEI (2017), SERNANP (2024), Asociación Propurús (2025).

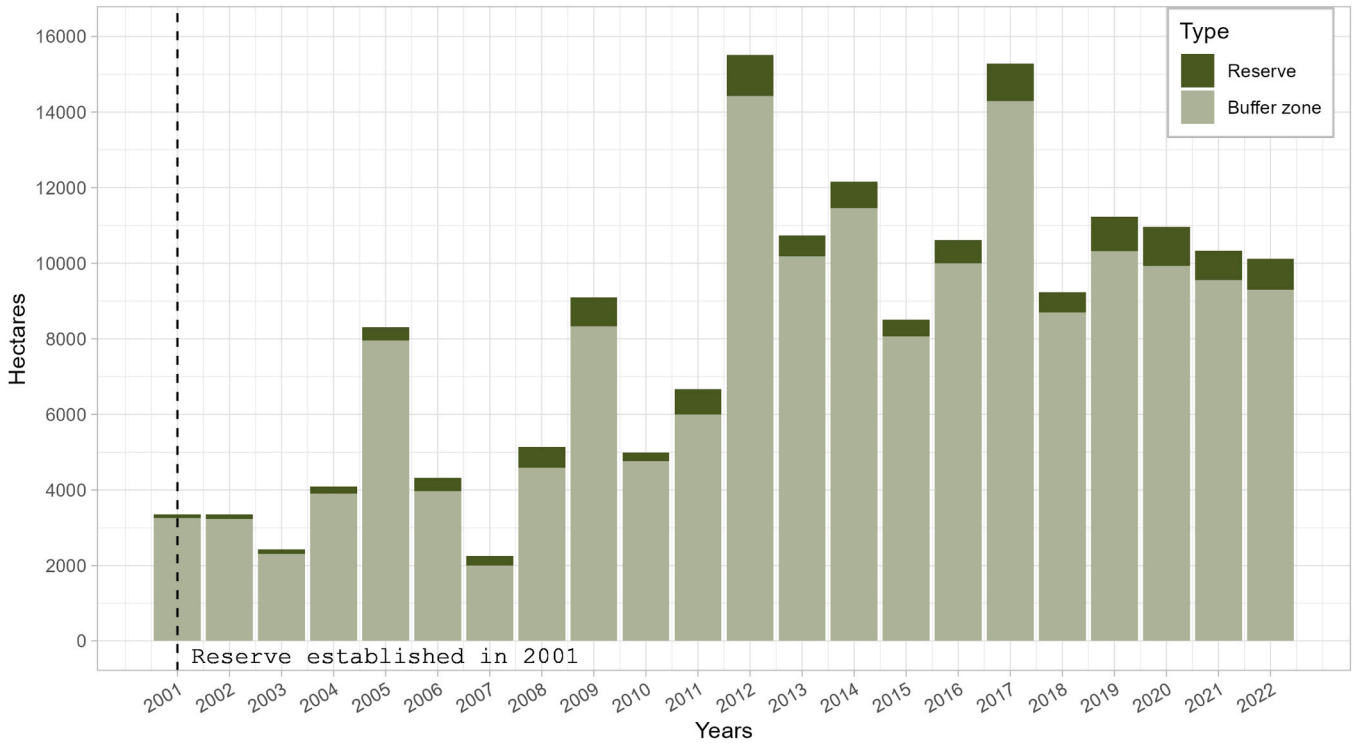


Fig. 3. Hectares of forest loss in *El Sira* and buffer zone, 2001–2022. Source: Hansen et al# (2013).

anthropogenic uses, when quantified in total hectares, across all Communal Reserves and their respective buffer zones. By 2022, the dominant anthropogenic land cover within El Sira was agricultural-livestock mosaics (7767 ha), followed by pastures (602 ha) and a minimal extent of smallholder agriculture (16.2 ha), while the buffer zone showed significantly higher levels of LULCC, led by agricultural-livestock mosaics (140,000 ha), pastures (14,384 ha), smallholder agriculture (6797 ha) and ASM (656 ha).

Fig. 4 illustrates the distribution of anthropogenic land uses across *El Sira* and its surrounding buffer zone as of 2022. Most land cover changes are concentrated in the buffer zone. Nonetheless, there is a significant portion of agricultural land use within the northeastern fringe of El Sira. Fig. 4 suggests that while the reserve's rugged and high-elevation core has deterred intensive LULCC, lower-lying areas have seen a rapid expansion of agricultural-livestock mosaics. These patterns indicate that while topography provides a natural defense for the interior, parts of the reserve remain vulnerable to the same pressures of LULCC seen in the buffer zone.

To move beyond a descriptive account of forest loss, we interpreted these spatial patterns in relation to qualitative evidence collected during fieldwork. This linkage was established primarily for the period 2010–2022, when deforestation and LULCC accelerated across El Sira and its buffer zone, and for more specific sub-periods where documentary and interview evidence allowed finer analyses. For example, the concentration of agricultural-livestock mosaics and forest loss in accessible lowland areas was interpreted alongside interviews describing road use, colonist settlements and the expansion of *centros poblados*. Similarly, land cover change around Nueva Austria del Sira was examined in relation to the 2016 withdrawal of its legal recognition, subsequent parcelization using community testimonies regarding land trafficking and forest clearing. Furthermore, the emergence of artisanal and small-scale mining (ASM) and extensive clearings in untitled indigenous territories was cross-referenced with qualitative accounts of bureaucratic delays and subsequent settler invasions driven by illicit economies. In this sense, qualitative evidence was used as a means to identify the institutional and territorial mechanisms underlying LULCC patterns found with the spatial analysis.

4.3. State-backed land dispossession and settler colonization as mechanisms behind LULCC in El Sira

The spatial patterns described above reveal a marked concentration of deforestation and LULCC in accessible lowland areas of El Sira's buffer zone, particularly where road infrastructure, centros poblados, and indigenous communities are in close proximity. Fieldwork in Asháninka and Yánesha communities, complemented by evidence from Shipibo communities, allowed us to interpret these spatial patterns through the institutional processes that make land conversion possible. Rather than treating deforestation as an undifferentiated outcome of agricultural expansion, the qualitative evidence suggests that many of these areas are also marked by unresolved land claims, delayed titling procedures and contested indigenous territorial boundaries. These conditions help identify specific mechanisms through which LULCC is produced: state-backed land dispossession, settler colonization and the legal-administrative manufacture of uncertainty over indigenous territories. Our findings reveal a deliberate strategy of state-backed land dispossession, whereby the Regional Directorate of Agriculture (DRA), the agency responsible for promoting agricultural expansion, is also in charge of titling Indigenous lands for Native Communities. Interviews with indigenous leaders from El Sira indicate that the DRA's repeated demands for additional documentation and its shifting bureaucratic requirements create administrative obstacles that delay the recognition of indigenous territories. According to our interviews, the absence of formal land titles places Native Communities in a legal vacuum, leaving their territories exposed to invasion and claims by colonists.

In our study area, DRA's actions have resulted in i) halting the constitution of new Native Communities, ii) delaying the land titling of formally recognized Native Communities and even iii) the legal dissolution of Native Communities.

Regarding the first scenario, conversations with indigenous leaders described cases of several indigenous communities along the western margin of El Sira's buffer zone whose efforts to gain recognition as

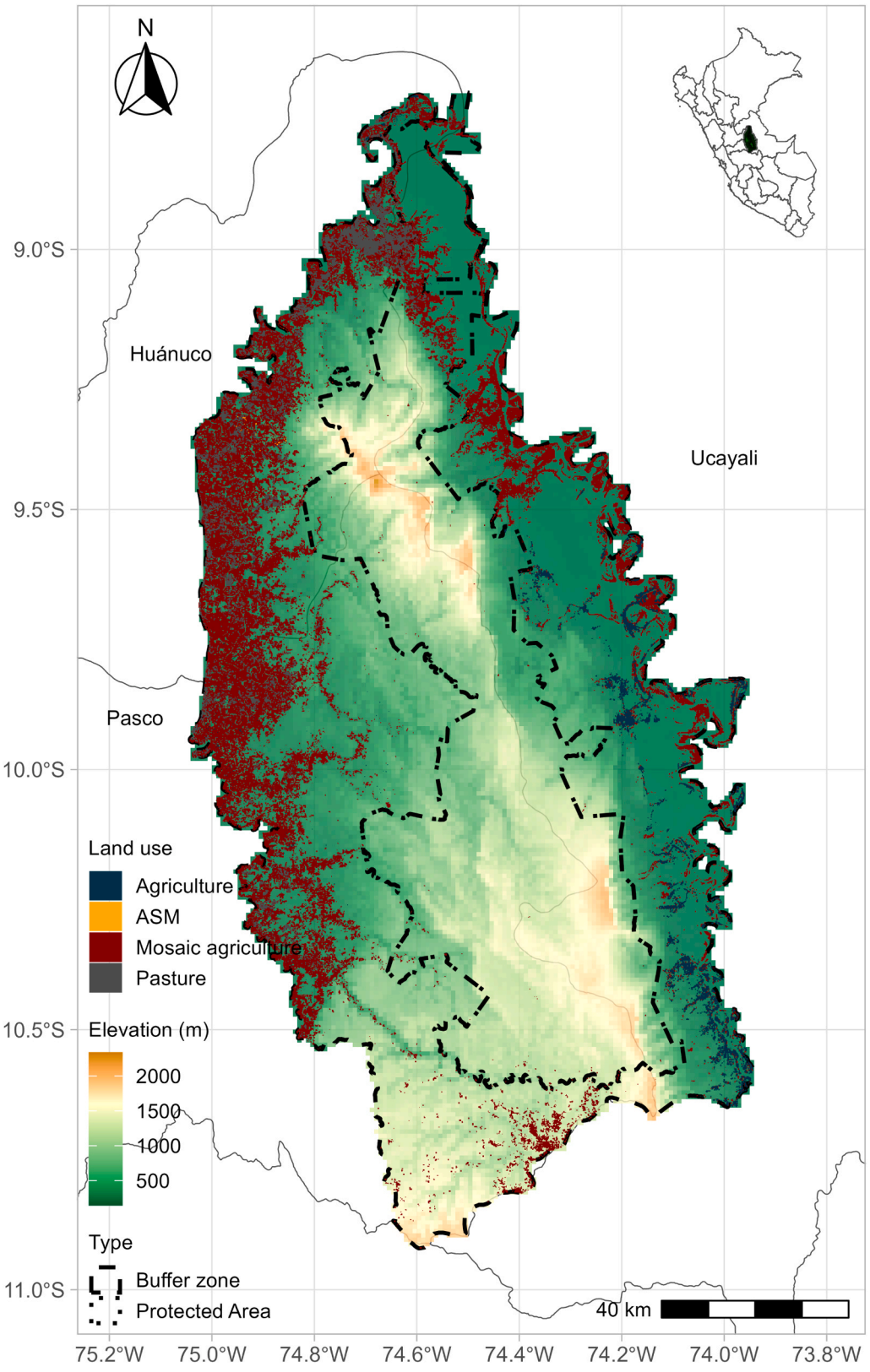


Fig. 4. Topographic map of El Sira and its buffer zone, highlighting anthropogenic land uses in 2022. Source: MapBiomas (2024).

Native Communities never materialized. We documented at least two instances, those from the communities of Micanopi and Konpiroshi, where the procedures to obtain legal recognition as a Native Community were initiated but were ultimately abandoned after deliberate and persistent delays by the DRA. The second scenario involves formally recognized Native Communities whose land-titling processes have been stalled for decades. Notable cases include Nueva Alianza and Nueva Austria del Sira, located along the western margin of El Sira's buffer zone. Although these communities obtained legal recognition and initiated official demarcation procedures, their land titles remain

pending after more than twenty years.

Finally, while the deliberate delay in titling indigenous lands are a widespread practice affecting numerous communities across the Peruvian Amazon, our examination of the case of Nueva Austria del Sira illustrates a third strategy of state-backed land dispossession. In April 2016, the DRA of Huánuco formally revoked the legal recognition of Nueva Austria del Sira as a Native Community, claiming it was uninhabited. This decision invalidated Asháninka and Yánesha collective land rights and paved the way for the fragmentation of their territory. Soon after, individual land titles for agricultural use were issued to settler colonists: more than 165 parcels covering some 5730 ha - nearly half of the community's original 13,184 ha territory (Vera, 2024). Community members described how this process unfolded further through informal parceling and resale: "*People took plots, divided them into two, three, four parts. Some were sold and resold. Even today, land trafficking continues*" (Interview GT−03). This case provides the clearest temporal linkage between institutional change and observed LULCC in El Sira's buffer zone. The 2016 revocation of Nueva Austria del Sira's legal recognition preceded the issuance of individual agricultural parcels and the fragmentation of nearly half of the community's territory. Spatially, this process is consistent with the expansion of agricultural-livestock mosaics and forest clearing observed in areas surrounding Nueva Austria and the neighboring centros poblados of Paujil and Quimpichari. The convergence of documentary evidence, community testimonies and land cover change suggests that administrative decisions actively reshaped the conditions under which collective indigenous lands became available for settler occupation.

The institutional erasure of Nueva Austria del Sira is further evidenced by the removal of its territory from national and regional databases of indigenous communities. As one leader from the community explained: *"After the annulment of our community's recognition, the Ministry of Culture also removed us from its official database of indigenous communities. I checked during a meeting and our community wasn't listed. I checked again in Lima - same result. And later, when I went to the Regional Directorate of Agriculture, there was no record of the community of Nueva Austria either" (Interviewee RT−02)*.

Interviews with community members from Nueva Austria del Sira revealed that pressures on communal lands extend well beyond legal mechanisms and include the use of violence and intimidation. Community leaders have faced repeated forms of harassment, abduction and even attempted assassination (Comisión Interamericana de Derechos Humanos - CIDH, 2019). As a result of ongoing threats in the community, nearly half of the Asháninka and Yánesha residents have been forced to abandon their homes. Similar patterns of violence were reported by members of other indigenous communities in *El Sira* buffer zone who are still awaiting land titles, such as the Shipibo community of Nueva Alianza and the Ashéninka community of Catoteni. These communities described repeated incidents of threats and aggression from colonists who had invaded their territories. It is critical to mention that these conflicts are not randomly distributed across the buffer zone. On the contrary, they tend to occur in areas characterized by overlapping indigenous claims, expanding settler occupation and increasing land conversion. The spatial concentration of LULCC identified in the previous section corresponds with territories where interviewees reported the highest levels of land conflict.

During fieldwork, a member of our research team was detained by colonist settlers attempting to obstruct the access to Nueva Austria del Sira for further interviews. This incident offered a rare and direct insight to dialogue with colonist settlers about their strategies to consolidate territorial control over indigenous lands. While land appropriation is enabled through both state support and settler violence against indigenous peoples, colonist settlers also seek to legitimize their occupation through two primary mechanisms.

A first mechanisms is the establishment of *centros poblados* in close proximity to - or within - untitled indigenous lands. Forming a *centro poblado* is a relatively straightforward process that can be completed within a few years, in stark contrast to the protracted and obstructed process of indigenous land titling (Monterroso et al., 2019). In the case of Nueva Austria del Sira, the neighboring *centros poblados* of Paujil and Quimpichari - both of which have repeatedly encroached upon its territory - have emerged as the main beneficiaries of the parcelization facilitated by the removal of Nueva Austria del Sira's recognition as a Native Community (Vera, 2021). This finding is consistent with the spatial configuration shown in Fig. 2, where clusters of centros poblados are concentrated near indigenous communities and along existing transportation corridors. Rather than functioning solely as residential settlements, these centers appear to facilitate the territorial consolidation of settler populations in areas where indigenous land rights remain unresolved or weakly enforced. One interviewee lamented: '*All this problem began with the creation of Paujil*[2]*. It was formed by two families - two Andean families. They began inviting more and more people, claiming that Nueva Austria did not exist, despite the fact that it was officially recognized by resolution. That is when the conflict started. People began destroying the primary forests and opening up their fields. More people arrived, and they gradually grew stronger*' (Interview MC−06).

A second strategy employed by colonist settlers to displace Native Communities involves the creation of agricultural associations and cooperatives. These entities not only allow settlers to institutionally represent their interests before agricultural authorities (e.g., DRA) but also grant them access to state programs and credit. While such associations are formally organized around the cultivation of legal crops such as coffee and cacao, our site visits and interviews with settlers revealed that coca is also a major cash crop in the area. Similarly, small-scale and illegal gold mining constitute another key activity in some parts of El Sira's buffer zone. These observations help explain why agricultural-livestock mosaics do not fully capture the complexity of ongoing land use transformations in El Sira. While remote sensing identifies the expansion of agricultural frontiers, field observation reveals that these same territories frequently host overlapping legal and illegal activities, including coca cultivation, logging and ASM, which remain only partially visible in existing land cover datasets. As one interviewee explained: *"These colonists come to invade the community with a single purpose: illegal logging and mining. What matters most to them is mining, illegal logging, and coca. The poor community members are being cornered. The community is on the verge of losing its entire territory. To this day, the community remains in crisis, completely abandoned by the authorities. As I said before, the mayor has forgotten about us. Instead, he supports the invaders - he even gave them land"* (MC−05).

5. Discussion

This study underscored the dynamics LULCC at play in the Central Peruvian Amazon, where decades of settler colonization and agrarian development have converged to produce one of the most contested landscapes in Peru. Long before the establishment of the reserve, the Pichis-Palcazú-Pachitea valleys within the western margin of *El Sira*'s buffer zone had already been marked by conflict between settler-driven agricultural expansion and indigenous peoples (Smith, 1982; Espinosa, 2009).

While the return to democracy in Peru opened a critical window for advancing environmental protection through community-based conservation models (Orihuela, 2020), our analysis suggests that the formal establishment of Protected Areas and the recognition of native communities are, on their own, insufficient to secure environmental protection. Environmental coalitions, supported by international donors, gained institutional footholds and promoted ambitious community-based conservation initiatives such as *El Sira* (García et al., 1998; Orihuela, 2017). Yet, despite being widely celebrated as a conservation milestone, this effort failed to curb ongoing settler

[2] The name of the centro poblado within Nueva Alianza del Sira.

colonization.

Our spatial analysis reveals that El Sira and its buffer zone exhibit the highest levels of deforestation among all Communal Reserves, with particularly intense LULCC processes in the buffer zone that extend into some accessible sections of the reserve. It is important to clarify the degree to which our findings can be generalized to other Communal Reserves. Several of the dynamics identified in this study, such as the limited capacity to regulate land use in buffer zones, overlapping land tenure regimes and weak enforcement, are not unique to *El Sira*, but rather reflect similar challenges documented in other Communal Reserve (Caruso, 2011; Sarmiento Barletti and Rolando, 2024). Yet, the specific magnitude and intensity of these processes in *El Sira* are shaped by its specific frontier condition, including its long history of state-promoted settler colonization (See Fig. 2). Rather than treating *El Sira* as representative of all Communal Reserves, this case serves to illustrate how challenges become specially acute under particular conditions. As a colonization frontier, *El Sira* was marked by weak democratic institutions and intense LULCC pressures, making both conservation efforts and the advancement of indigenous rights particularly challenging.

It is important to stress that while deforestation inside the reserve appears comparatively low, this should not be interpreted as evidence of effective governance alone. Rather, these patterns are likely shaped largely by the rugged terrain and steep slopes that characterize *El Sira* mountain belt (Oliveira et al., 2007), which limit accessibility. The presence of roads and deforestation in lower elevation northeastern areas inside the reserve suggests that where access is feasible, LULCC takes place despite the protected status of the area (see Figs. 1 and 4).

Our qualitative results suggest that, despite legal mandates for conservation, the Peruvian state remains an active promoter of LULCC within Communal Reserves and their buffer zones. While state-led colonization was explicitly subsidized in the late twentieth century (Santos-Granero, 2002), present-day dynamics reflect a more discrete mechanism of state-backed land dispossession. Applying Rudel and Horowitz's (1993) framework, we observe a shift in the nature of lead development. During the initial colonization waves of the 1960s and 1980s, the central government acted as the primary catalyst by providing the physical infrastructure necessary for forest entry. In contrast, contemporary dynamics are driven by a growth coalition composed of colonist settlers and subnational institutions, where regional offices (e.g., Regional Agricultural Directorates under the Regional Governments) actively facilitate the opening of forest frontiers by leveraging bureaucratic processes to favor settler expansion at the expense of indigenous collective rights and environmental protection. These dynamics reflect the greater influence of growth coalitions involving colonist settlers, agro-producer associations and subnational state actors supporting the transformation of forested lands into economically productive uses despite existing conservation mandates.

While media coverage frame LULCC and violence against indigenous peoples because of an alleged 'absence of the state', our findings highlight how subnational governments directly affect land dispossession. Rather than being 'absent' or possessing limited state capacity, regional authorities use the power of the state to enable the dispossession of indigenous lands in favor of colonist settlers supporting agricultural development (Paredes et al., 2024). Nonetheless, while much of the Peruvian scholarship has focused on bureaucratic bottlenecks and deliberate delays by regional authorities in titling indigenous lands (Monterroso and Larson, 2018; Paredes and Pastor, 2024), our study documents a more radical strategy: the withdrawal of official recognition of indigenous communities to facilitate land transfers to settlers. Despite the severity of this practice, it has received limited attention from mainstream civil society. Legal efforts have been initiated to reclaim these lands, yet nearly a decade later, tangible progress remains minimal.

Finally, our research provides evidence of settler colonial strategies in the context of LULCC in the Amazon rainforest. Similar to other Andean-Amazonian countries, we observe how settlers actively work to displace indigenous peoples from ancestral lands by either institutional or violent means to replace them with 'productive' landscapes (Bedoya 2023; Noroña and Aguinda, 2025). Rather than acting independently, settler actors - particularly agro-producer associations in our study area - operate through informal alliances with state institutions, facilitating land dispossession. As demonstrated in our case study, these actors strategically engage with regional bureaucracies, such as the Decentralized Regional Agriculture (DRA), to secure legal recognition for their land claims. Rather than being external threats to the state, these settler actors cooperate with subnational governance structures, operating in gray areas where the boundaries between legality and illegality are often blurred (Blume et al., 2022; Paredes et al., 2024). During fieldwork and our spatial analysis, we found that the regional government was leasing land inside the reserve itself. Once again, this reflects a deeper institutional conflict between conservation mandates and development-oriented bureaucracies incentivized to expand agricultural and extractive frontiers (Shanee et al., 2020).

6. Conclusion

This article triangulated archival, spatial and ethnographic data to analyze the magnitude, drivers, and mechanisms of LULCC in El Sira Communal Reserve and its buffer zone. We demonstrate that co-management arrangements in *El Sira* have not succeeded in halting LULCC. Instead, a perceived lack of opportunities associated with participation in *El Sira* has generated frustration and mistrust among the very indigenous communities expected to collaborate with the reserve. Our research shows that land dispossession in our study area does not stem from an 'absence of the state', but rather from concrete actions of subnational state actors who facilitate agricultural expansion and enable settler colonization in spite of indigenous peoples' collective territorial rights. Delays in land titling for indigenous peoples and the withdrawal of legal recognition, selective provision of titles to colonist settlers, and informal collaboration between state authorities and agricultural associations reveal a mode of governance in which institutions are mobilized to displace indigenous populations.

Our findings contribute to broader debates on conservation, state power and LULCC in the Amazon biome. Rather than suggesting the replacement of the Communal Reserve model, the evidence points to the need for targeted institutional reforms. First, indigenous land titling procedures should be insulated from discretionary administrative delays through clearer deadlines, transparent evidentiary requirements and legal safeguards against the arbitrary revocation of legally recognized Native Communities. Second, buffer-zone governance should be strengthened through binding land use rules that regulate the creation of new settlements, roads and individual land titles in areas where indigenous claims remain unresolved or where such actions would undermine conservation objectives. On the other hand, coordination between SERNANP and Regional Agricultural Directorates should be institutionalized through mandatory review mechanisms before land rights, agricultural concessions, leases or infrastructure authorizations are granted in proximity to Communal Reserves. Finally, monitoring systems should integrate spatial data with administrative records in order to detect land fragmentation, overlapping claims and early signs of state-backed dispossession before they become irreversible. These reforms would not eliminate the structural tensions inherent to conservation in frontier regions but would address specific institutional pathways through which land dispossession and LULCC are currently being produced in El Sira.

CRediT authorship contribution statement

Dennis Meza: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Iván Brehaut:** Writing – review & editing, Supervision, Methodology,

Investigation, Formal analysis. **Hernán Manrique:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Daniel Hernando:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Investigation, Formal analysis, Conceptualization. **Constanza Parra:** Writing – review & editing, Supervision, Investigation, Formal analysis.

Funding

The authors declare that financial support was provided by Fonds Wetenschappelijk Onderzoek (11K1724N).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.landusepol.2026.108265.

Data availability

Data will be made available on request.

References

Aramburú, C., 1981. Problemas del Desarrollo rural y la colonización en la Amazonia peruana. Debates En. Sociol. ía (6), 41–70.

Asner, G.P., Knapp, D.E., Martin, R.E., Tupayachi, R., Anderson, C.B., Mascaro, J., Silman, M.R., 2014. Targeted carbon conservation at national scales with high-resolution monitoring. Proc. Natl. Acad. Sci. 111 (47), E5016–E5022.

Asociación Propurús (2025). "Observatorio de Deforestación y Delitos Ambientales en la Amazonía". 17 de agosto. https://www.propurus.org/odda.

Bax, V., Francesconi, W., 2018. Environmental predictors of forest change: an analysis of natural predisposition to deforestation in the tropical Andes region, Peru. Appl. Geogr. 91, 99–110.

Bedoya, E., de la Torre, S.G., Basabe, S.A., 2023. Ganaderos, colonos y la deforestación de bosques primarios en Morona, Ecuador. Anthropologica 41 (51), 175–212.

Belaúnde, F., 1959. La conquista del Perú por los peruanos. Ediciones Tawantinsuyu, Lima.

Bennett, A., Ravikumar, A., Paltán, H., 2018. The Political Ecology of Oil Palm Company-Community partnerships in the Peruvian Amazon: Deforestation consequences of the privatization of rural development. World Dev. 109, 29–41.

Berkes, F., 2004. Rethinking community-based conservation. Conserv. Biol. 18 (3), 621–630.

Blume, L.R., Sauls, L.A., Knight, C.A., 2022. Tracing territorial-illicit relations: pathways of influence and prospects for governance. Political Geogr. 97, 102690.

Caballero Espejo, J., Messinger, M., Román-Dañobeytia, F., Ascorra, C., Fernandez, L.E., Silman, M., 2018. Deforestation and forest degradation due to gold mining in the Peruvian Amazon: A 34-year perspective. Remote Sens. 10 (12), 1903.

Caruso, E., 2011. Co-management redux: anti-politics and transformation in the Ashaninka Communal Reserve, Peru. Int. J. Herit. Stud. 17 (6), 608–628.

Comisión Interamericana de Derechos Humanos - CIDH (2019). Resolución 57/2019. Medida cautelar No. 887-19. Familias de la Comunidad Nueva Austria del Sira respecto de Perú.

Cotler, J., 1999. *Drogas y política en el Perú*. La conexión norteamericana. IEP, Lima.

Cultural Survival Institute (1981). The Pichis-Palcazu Project: An Update. Retrieved from: https://www.culturalsurvival.org/publications/cultural-survival-quarterly/pichis-palcazu-project-update.

Delgado, G., Manrique, H., Hernando, D., 2024. Delitos ambientales conexos en la Reserva Comunal El Sira: exploración de sus mecanismos de penetración y su impacto en la pérdida de bosque. CIES, Lima.

Delmotte, C., 2022. Access to land and natural resources in the peruvian amazon. between agriculture and artisanal gold mining. Rev. Int. Des. études du D. éveloppement 250, 159–182.

Dourojeanni, M.J., 2014. Ocupación humana y áreas protegidas de la Amazonia del Perú. Ecol. ía Apl. 13 (2), 225–232.

Escobedo-Monge, M.A., Aparicio, S., Valencia Ramos, M., Escobedo-Monge, M.F., Parodi-Román, J., García-Llatas, L.F., Marquina Pozo, R., 2022. Land vulnerability, risk zoning, and ecological protection in the protection forest of Pagaibamba (Peru). Forests 13 (3), 436.

Espinosa, O., 2009. Salvajes Opuestos al Progreso?: Aproximaciones Históricas y Antropológicas a las Movilizaciones Indígenas en la Amazonía Peruana. Anthropologica 27 (27), 123–168.

García, P.G., Hvalkof, S., Gray, A., 1998. Liberation through land rights in the Peruvian Amazon. IWGIA, 90.

Gutiérrez-Vélez, V.H., DeFries, R., Pinedo-Vásquez, M., Uriarte, M., Padoch, C., Baethgen, W., Lim, Y., 2011. High-yield oil palm expansion spares land at the expense of forests in the Peruvian Amazon. Environ. Res. Lett. 6 (4), 044029.

Hansen, M.C., Potapov, P.V., Moore, R., Hancher, M., Turubanova, S.A., Tyukavina, A., Townshend, J.R., 2013. High-resolution global maps of 21st-century forest cover change. Science 342 (6160), 850–853.

Hijmans, R.J., Bivand, R., Dyba, K., Pebesma, E., Sumner, M., 2023. Terra [R Package]. R. Program. Lang.

Holmes, G., Cavanagh, C.J., 2016. A review of the social impacts of neoliberal conservation: Formations, inequalities, contestations. Geoforum 75, 199–209.

Igoe, J., Brockington, D., 2007. Neoliberal conservation: a brief introduction. Conserv. Soc. 5 (4), 432–449.

Instituto del Bien Común (2023). *Base de datos de comunidades nativas tituladas en la Amazonía peruana*. Lima, Peru.

Instituto Nacional de Estadística e Informática, 2017. Censos Nacionales 2017: XII de Población, VII de Vivienda y III de Comunidades Indígenas. INEI, Lima.

Josse, C., Tupinambá, R., Viscarra, F.E., Armenteras, D., Barreto Filho, H.T., Guzmán León, A., Cípio Aureliano, I., Martins Machado, A., Heilpern S., Begotti, R.A., Kambeba, M.W. (2024). *Protected Areas and Indigenous Territories: Pillars for Achieving Conservation Goals in the Amazon*. Policy Brief. Science Panel for the Amazon.

Loayza, G., Pozo, S., Lascano, M., Bilhaut, A.G., Krainer, A., Teixidor-Toneu, I., Montúfar, R., 2025. Dynamic reciprocal contributions between Indigenous communities and cultural keystone species: A study case in Western Ecuador. *People and Nature*, 7 (5), 990–1004.

Malca, U.F.G., Dunin-Borkowski, A.S., Bustamante, N.F., Reaño, M.J.M., Armas, J.M.G., 2023. Alluvial gold mining, conflicts, and state intervention in Peru's southern Amazonia. Extr. Ind. Soc. 13, 101219.

Manrique, H., Hernando, D., 2025. Negotiating extraction: indigenous peoples and the upscaling of artisanal and small-scale mining in the central Peruvian Amazon. Extr. Ind. Soc. 22, 101616.

MapBiomas (2023). *MapBiomas Collection 2*. Retrieved from: https://peru.mapbiomas.org/colecciones-de-mapbiomas-peru/.

Ministerio de Cultura - MINCUL (2024). *Informe de identificación de pueblos indígenas u originarios y el ejercicio de sus derechos colectivos de la localidad Nueva Austria del Sira*. Lima: MINCUL.

Monterroso, I., Larson, A.M., 2018. Challenges in formalizing the rights of native communities in Peru. CIFOR Info *231*.

Monterroso, I., Larson, A.M., Gutiérrez, Y., Quaedvlieg, J., Jarama, L., 2019. Guía práctica para el proceso de titulación de Comunidades Nativas. CIFOR.

Móstiga, M., Armenteras, D., Vayreda, J., Retana, J., 2024. Decoding the drivers and effects of deforestation in Peru: a national and regional analysis. Environ. Dev. Sustain. 1–21.

Noroña, M.B., Aguinda, M., 2025. Settler extractive governmentality, Kichwa storytelling, and Indigenous environmental justice in the Ecuadorian Amazon. *Latin American and Caribbean Ethnic*. Studies 20 (4), 467–491.

Oliveira, P.J., Asner, G.P., Knapp, D.E., Almeyda, A., Galván-Gildemeister, R., Keene, S., Smith, R.C., 2007. Land-use allocation protects the Peruvian Amazon. Science 317 (5842), 1233–1236.

Orihuela, J.C., 2017. Assembling participatory Tambopata: environmentality entrepreneurs and the political economy of nature. For. Policy Econ. 80, 52–62.

Orihuela, J.C., 2020. Embedded countermovements: the forging of protected areas and native communities in the Peruvian Amazon. New. Political Econ. 25 (1), 140–155.

Palacios, D., Barletti, J.P., 2021. The meeting of multiple governmentalities and technologies of participation in protected areas: the case of the Amarakaeri Communal Reserve (Peruvian Amazon). Int. For. Rev. 23 (1), 90–102.

Paredes, M., Gianella, C., Olivera, S., 2024. Corrupting climate change institutions from the inside Systemic Collusion in the Peruvian Forest Governance. Political Geogr. 108, 102991.

Paredes, M., Kaulard, A., Gil, D., 2025. Participation Artifacts: Conservation and Climate Governance with Indigenous Amazonian Communities. Lat. Am. Perspect. 52 (5), 127–146.

Paredes, M., Kaulard, A., 2020. Fighting the climate crisis in persistently unequal land regimes: Natural protected areas in the Peruvian Amazon. J. Clean. Prod. 265, 121605.

Paredes, M., Manrique, H., 2018. Ideas of modernization and territorial transformation: the case of the Upper Huallaga Valley of Peru. The Origins of Cocaine. Routledge, pp. 53–83.

Paredes, M., Pastor, Á., 2024. Illicit crops in the frontier margins: Amazonian indigenous livelihoods and the expansion of coca in Peru. J. Peasant. Stud. 51 (4), 960–981.

ParksWatch, 2003. Perfil Área Protegida – Perú. Reserva Comunal El Sira. Retrieved from. https://www.parkswatch.org/parkprofiles/pdf/escr_spa.pdf.

Pebesma, E., Bivand, R., Racine, E., Sumner, M., Cook, I., Keitt, T., Müller, K., 2018. sf: Simple Features for R. R. Package Version 0. 6 *1*.

Peres, C.A., 2011. Conservation in sustainable-use tropical forest reserves. Conserv. Biol. 25 (6), 1124–1129.

Peres, C.A., Terborgh, J.W., 1995. Amazonian nature reserves: an analysis of the defensibility status of existing conservation units and design criteria for the future. Conserv. Biol. 9 (1), 34–46.

Pinedo, D., 2021. Estado y pueblos indígenas en la Amazonía peruana. Rev. De. Antropol. ía (8), 3–16.

Pinedo, D., 2024. Communities make communities: Comunidades nativas and gold mining among the Arakbut of Peruvian Amazonia. J. Lat. Am. Caribb. Anthropol. 29 (1), 50–60.
Ramos-Cortez, C., MacNeill, T., 2022. Challenging the 'absent state': Neoliberal extractivist governance and state effects in the northwest Peruvian Amazon. Political Geogr. 98, 102720.
Ravikumar, A., Lock, W., 2025. Between conservation and commodities: does Peruvian tropical forest conservation challenge or reinforce extractivism? Environ. Plan. E Nat. Space, 25148486251356196.
Rosolie, P., 2014. Mother of God: an extraordinary journey into the uncharted tributaries of the western Amazon. Random House.
Rudel, T.K., Horowitz, B., 1993. Tropical deforestation: small farmers and land clearing in the Ecuadorian Amazon. Columbia University Press.
Sánchez, A.C., Bandopadhyay, S., Briceño, N.B.R., Banerjee, P., Guzmán, C.T., Oliva, M., 2021. Peruvian Amazon disappearing: Transformation of protected areas during the last two decades (2001–2019) and potential future deforestation modelling using cloud computing and MaxEnt approach. J. Nat. Conserv. 64, 126081.
Santos-Granero, F., 2002. Boundaries are made to be crossed: the magic and politics of the long-lasting Amazon/Andes divide. Identit-.-. Glob. Stud. Cult. Power 9 (4), 545–569.
Sarmiento Barletti, J.P., 2016. La comunidad en los tiempos de la Comunidad: bienestar en las Comunidades Nativas asháninkas. Bull. De. l'Inst. français D. 'études Andin. 45 (1), 157–172.
Sarmiento Barletti, J.P., Rolando, G., 2024. Between co-management and responsibilisation: comparative perspectives from two reservas comunales in the Peruvian Amazon. Bull. Lat. Am. Res. 43 (2), 104–119.
Sears, R.R., Pinedo-Vasquez, M., 2011. Forest policy reform and the organization of logging in Peruvian Amazonia. Dev. Change 42 (2), 609–631.
Seidman, I., 2013. Interviewing as Qualitative Research A Guide for Researchers in Education and the Social Sciences. Teachers College Press, New York.
Servicio Nacional de Áreas Naturales Protegidas por el Estado - SERNANP (2019). *Reserva Comunal El Sira*. Retrieved from: https://www.gob.pe/institucion/sernanp/informes-publicaciones/1932160-reserva-comunal-el-sira.
Servicio Nacional de Áreas Naturales Protegidas por el Estado - SERNANP (2024). Geo ANP - Visor de las Áreas Naturales Protegidas. Retrieved from: https://geo.sernanp.gob.pe/visorsernanp/.
Shanee, S., Shanee, N., Lock, W., Espejo-Uribe, M.J., 2020. The development and growth of non-governmental conservation in Peru: Privately and communally protected areas. Human. Ecol. 48 (6), 681–693.
Smith, R.C., 1982. The dialectics of domination in Peru: native communities and the myth of the vast Amazonian emptiness; an analysis of development planning in the Pichis Palcazu Special Project. The Cultural Survival Institute, Massachusetts.
Sobral, M., Silvius, K.M., Overman, H., Oliveira, L.F., Raab, T.K., Fragoso, J.M., 2017. Mammal diversity influences the carbon cycle through trophic interactions in the Amazon. Nat. Ecol. & Evol. 1 (11), 1670–1676.
Southgate, D., Elgegren, J., 1995. The Peruvian Amazon: Development of tropical timber resources. Commonw. For. 74 (2), 142-46.
Sterling, E.J., Betley, E., Sigouin, A., Gomez, A., Toomey, A., Cullman, G., Porzecanski, A. L., 2017. Assessing the evidence for stakeholder engagement in biodiversity conservation. Biol. Conserv. 209, 159–171.
Sunderlin, W.D., Angelsen, A., Belcher, B., Burgers, P., Nasi, R., Santoso, L., Wunder, S., 2005. Livelihoods, forests, and conservation in developing countries: an overview. World Dev. 33 (9), 1383–1402.
Varese, S. (1973). La Sal de los Cerros: Resistencia y utopía en la Amazonía peruana. Lima: Fondo Editorial del Congreso del Perú.
Vera, E., 2021. Territorios Indígenas conquistados por el crimen organizado en la selva central del Perú. Amazon Watch. Retrieved from. https://amazonwatch.org/es/news/2021/1112-indigenous-territories-taken-over-by-organized-crime-in-the-central-peruvian-rainforest.
Vera, E., 2024. Reserva Comunal El Sira: minería ilegal y narcotráfico presionan área natural de la selva peruana. https://es.mongabay.com/2024/07/reserva-comunal-el-sira-mineria-ilegal-narcotrafico-presionan-area-natural/.
Vijay, V., Reid, C.D., Finer, M., Jenkins, C.N., Pimm, S.L., 2018. Deforestation risks posed by oil palm expansion in the Peruvian Amazon. Environ. Res. Lett. 13 (11), 114010.
Vincett, J., 2024. What is action ethnography? Reconsidering our intentions for impact in ethnographic practice. J. Organ. Ethnogr. (ahead-of-print).
Weisse, M.J., Naughton-Treves, L.C., 2016. Conservation beyond park boundaries: the impact of buffer zones on deforestation and mining concessions in the Peruvian Amazon. Environ. Manag. 58 (2), 297–311.
Zvoleff, A., Wandersee, S., An, L., López-Carr, D., 2002. Land use and cover change. BioScience 52, 143–150.