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Looking back to move forward: historical Agroecology and reciprocity in Ecuador and Bolivia

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Abstract
Broad analyses of social change often overlook the lived experiences of rural Indigenous communities. This paper connects historical agroecology with Participatory Action Research, through collective memory and historical analysis, to examine agroecological transitions in Indigenous communities in Ecuador and Bolivia. The study uses decolonial inquiry to investigate how historical events and sociocultural dynamics shape contemporary food systems, employing river-of-life exercises (with 25 and 27 participants, respectively), 15 interviews per country, participant observation, and archival research. Results highlight that reciprocity-based customary institutions guide social and ecological dynamics shaping landscape and connecting the local to broader solidarity economies. Findings reveal that Caliata adopts a transformative, self-determined path, while Chigani Alto follows an incremental, reformist trajectory within institutional structures. These cases confirm that agroecological transitions are historically grounded and culturally rooted, the ancestral "past" is present. We propose that this approach to Historical Agroecology provides a replicable, culturally appropriate framework for guiding food system transitions.

Keywords Historical Agroecology · Food systems and/or agroecological transitions · Participatory Action Research (PAR) · Indigenous people · Collective action and reciprocity · Andes · Decolonial inquiry

Introduction

Qhiparu nayraru uñtas sartañani—"Looking back, we will move forward" (Dangl 2010)

This work honors the Aymara tradition, as exemplified in the opening quotation, showing how collective memory and reciprocity sustain adaptive strategies that guide agroecological transitions and Indigenous sovereignty. Rural communities in Ecuador and Bolivia have maintained a historically complex relationship with external forces of change. From the pre-Columbian expansion of the Inca Empire to the Hacienda System, characterized by large estates and servitude, during the colonial era, and continuing through to the present, these influences have shaped lives, livelihoods, and food systems across generations. Since 1960, factors such as urbanization, rural outmigration, the influence of both Catholic and Protestant churches, dietary changes, and the industrialization of the food system have driven significant transformations (Altieri and Toledo 2011). Contributing to rural depopulation, the erosion of traditional agroecosystems and communities, and accelerated agri-food systems degradation (Blackmore et al. 2021).

Indigenous Peoples worldwide, particularly in the Global South, have been disproportionately affected by intertwined social and ecological crises (Grey and Patel 2015). Agricultural policies promoting industrial-scale production (Méndez et al., 2015) and the accelerating effects of

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climate change have further deepened vulnerabilities among already marginalized communities (Carrasco-Torrontegui et al. 2021). Yet these communities have shown resilience. Through active resistance and adaptive innovation, Indigenous and peasant farmers continue to co-create diverse agroecosystems and cultivate resilient landscapes (Lampis et al. 2022; Deaconu et al. 2021; Carrasco-Torrontegui & Cardenas 2021). Andean landscapes often testify to communitarian life encoding ecological adaptation, social memory, and spiritual connection, shaped through millennia of reciprocal engagement between people and nature (Erickson 2018).

A growing body agroecology scholars aim to understand change in social agroecological systems and to promote sustainable food system transitions (Gliessman, 2020). However, less attention has been paid to the particularities that emerge from the experiences of rural and Indigenous communities (Catacora-Vargas 2025). That are essential to understanding how agroecological processes are deeply entwined with history and place (Rivera-Núñeze et al. 2020). This research is crucial for developing strategies that respect and preserve the unique agroecological systems of these territories.

The Andean highlands of Ecuador and Bolivia offer fertile ground for such inquiry. Indigenous communities sustain biodiversity, governance, and food sovereignty through ancestral practices and innovations (Altieri and Toledo 2011; Sherwood et al., 2017; Carrasco-Torrontegui et al. 2021). In Ecuador, studies of the Kichwa-Puruwá community of Caliata document its agroecological transitions, organization, and biocultural heritage (Carrasco-Torrontegui et al. 2021; Gallegos-Riofrío et al. 2022, 2024, 2021a, 2021b). In Bolivia, PAR with Aymara communities, like Chigani Alto, highlights how collective action, farmer learning, and ancestral technologies drive agroecological transformation (Carrasco-Torrontegui et al., 2024; PROSUCO 2020).

Despite this scholarship, comparative studies remain limited, restricting understanding of how Andean principles manifest in different sociopolitical settings. This study addresses that gap through a comparative analysis of Caliata (Ecuador) and Chigani Alto (Bolivia), two Indigenous agrarian communities that share communal governance, terraced agroecosystems, and relational worldviews but operate under distinct ecological and political conditions. Using an agroecology-based PAR approach (Méndez et al. 2017), we examine how historical processes shape present-day agroecological transitions. Specifically, we explore: (1) how historical trajectories have shaped current agricultural and food systems; (2) how these histories influence community responses to change; and (3) how ancestral technologies and collective strategies continue to guide pathways toward sustainability.

Conventional approaches rarely capture how centuries of social, political, and ecological change condition contemporary food systems. To address this gap, we apply a Historical Agroecology approach that integrates collective memory, participatory action research, and historical analysis. By combining oral storytelling, visual timelines river-of-life, archival triangulation, and thematic analysis, where researchers and community members co-produce knowledge about past and present and can reflect in a future food system. Grounded in Freire's (1996) concept of dialogue as reciprocal learning, the river-of-life exercise functions as a decolonial inquiry method that centers Indigenous historical milestones and validates orally transmitted knowledge (Swiderska et al. 2022).

To capture the biophysical, political, economic, and social dimensions of agroecological change, we organize our analysis around the agroecological principles articulated by Coopération Internationale pour le Développement et la Solidarité (CIDSE, 2018). These dimensions emphasize the integration of ecological sustainability, socio-cultural values, and economic viability (Caporal & Costabeber, 2004). Data from participatory exercises were analyzed across these dimensions to provide a holistic understanding of community histories and agroecological transitions. In doing so, this study advances Historical Agroecology as a framework for interpreting rural communities' responses to food system change and informing agroecological transitions in other contexts.

Historical Agroecology to understand food-system transitions in the Andes

Agroecology first appeared in the scientific literature in the 1930s, at the intersection of agronomy and ecology, and has since been studied as a set of relationships within agroecosystems (Wezel et al. 2009). Agroecologist Stephen Gliessman called its development an "intercultural adventure with Mexican peasants" and emphasized it as "a millenary cultural practice with many variations across peoples" (EE 10, 2015, in Aiterwegmair et al. 2019). Understanding its evolution requires examining the resistance and adaptation of rural communities. Here, food systems include production, processing, transportation, financial intermediation, marketing, distribution, consumption, and waste management (Eakin et al. 2017). Agroecology aims to transform all aspects of the food system toward greater sustainability and justice (Anderson et al. 2019).

In the Andes, ancestral agriculture has persisted, often adapting to historical changes, while also merging with

colonial and modern agriculture (Catacora-Vargas et al. 2017; Carrasco Torrontegui 2025). However, the role of history and tradition in shaping contemporary agroecological transitions in the Andes remains understudied. This gap underscores the broader need for a historical perspective to comprehend the resilience, sustainability, and equity in food systems (Anderson et al. 2025), making such an approach essential for both local and regional analyses.

Historical Agroecology was first described by Rivera-Núñez et al. (2020) to emphasize the importance of considering both temporal and spatial dimensions in agroecological studies and practices. This interdisciplinary framework seeks to provide a deeper, long-term understanding of the complex relationships between human societies and their agricultural landscapes. It connects collective memory and territorial governance to contemporary agroecological innovation, thereby reinforcing reciprocity as both an ethical and ecological principle. Understanding a territory's history is vital, as agroecology flourishes when it blends ancestral knowledge and practices with scientific insights and modern technologies to promote food sovereignty and ecological and human health (Altieri & Nicholls, 2020). Our research with two Indigenous communities demonstrates that strong connections to ancestral roots unite many communities globally (Ostrom 2017). Despite the widespread promotion of Green Revolution policies in Ecuador and Bolivia, many communities continue traditional farming practices that center on reciprocity, biodiversity, and collective land care (Tapia 2002; Catacora-Vargas et al. 2017; Intriago et al. 2017; Gortaire 2016). These systems support food security and cultural continuity, providing viable alternatives to industrial agriculture and illustrating how endurance and resistance are essential for survival and transformation.

Agroecological transitions are strategic, collective efforts aimed at achieving sustainable and equitable food systems, involving ongoing, multi-actor transformations (Anderson et al. 2022). Caswell et al. (2021) recognize the importance of incorporating PAR centers for farmers and strengthening collective agency through co-created knowledge. This study uses the historical agroecology framework (Rivera-Núñez et al. 2020) with a PAR approach to examine these transitions. Historical Agroecology was a practical framework for collaborating with communities in Ecuador and Bolivia to analyze and collectively reflect on changes, assess conditions, and plan future actions (Carrasco-Torrontegui 2025). It employs temporal analysis, integrating geography, anthropology, and archaeology to promote sustainable and just food systems. This framework fosters transdisciplinary collaboration and offers a holistic view of agroecological transitions, highlighting farmers and researchers (Rivera-Núñez et al. 2020). We analyzed historical archives, oral life histories, perceptions of change, and practices associated with change and continuity to explore changes in both communities over time.

Methods

The study sites, Caliata (Ecuador) and Chigani Alto (Bolivia), were selected as comparable yet contextually distinct Indigenous agrarian systems following different territorial transformations and agroecological pathways. Both are highland communities outside the historical hacienda system, maintaining communal governance, terraced agriculture, and ancestral relations of reciprocity with nature. Members of our research team have conducted PAR for over 7 years on both sites, building long-term, trust-based collaborations that enable the examination of how local governance, collective organization, and ecological knowledge shape food systems. Led by the first author, a culturally diverse team of Ecuadorian, Bolivian, and international scholars with expertise in agroecology, anthropology, and related fields employed a multi-method approach. Their interdisciplinary perspectives bridged ecological and sociocultural dimensions, while continued accountability to communities ensured that local knowledge guided interpretation and representation.

We followed PAR principles (Méndez et al. 2017), emphasizing co-creation, participation, and accountability. Research questions and priorities were defined in collaboration with community members through collective workshops. Community members also participated in data collection, analysis, and validation, determining how knowledge would be represented and shared. This participatory approach helped redistribute power and amplify marginalized voices (Wakeford and Sanchez Rodriguez 2018). Elders' perspectives were prioritized during group exercises, and in Bolivia, separate sessions were held to minimize the potential influence of men on women's views, in recognition of the community gender-based norm (Levkoe et al. 2019; Fine and Torre 2019).

Three complementary research activities supported community reflection and learning: a participatory river-of-life exercise to map and narrate each community's history, semi-structured interviews, and a review of historical documents that identified key agrarian milestones. The river-of-life exercise, guided by the University of Vermont's Transitions Framework (Caswell et al. 2021), enabled communities to reconstruct food system histories, identify change processes, and define themes for further inquiry. In Bolivia, this transition framework informed a participatory assessment of soil, water, cover crops, and biodiversity, facilitated by PROSUCO, enabling the community to prioritize areas for collaboration. These intentional efforts supported

the construction of a communal *qutaña* (water reservoir) through *mingas* and the management of a bio-input center through *ayni*, a principle of reciprocity meaning "today for you, tomorrow for me" (Carrasco-Torrontegui et al. 2024). While in Ecuador, it served as the basis for defining priorities and implementing concrete actions within an agroecological framework. Efforts contributed to building a community water tank through *mingas* and informed the community's agroecological vision (Carrasco-Torrontegui 2025).

Community river-of-life

We employed the river-of-life tool to reconstruct food system histories through visual timelines and storytelling, fostering critical reflection and participatory planning through personal narratives and artistic inquiry. Storytelling helped explore history and reflect on individual and collective experiences. This approach suits agroecological transitions requiring critical reflection and community engagement (Anderson, 2022). The river-of-life exercise draws on the long lineage of Participatory Rural Appraisal (PRA) methodologies. PRA encompasses a suite of tools designed to enable rural communities to analyze their own conditions, share knowledge, and plan for collective action (Chambers 1994).

In both communities, the river-of-life method was used twice. In Ecuador, participants ($n=25$) were split into two groups, each with a facilitator, a note-taker, and a Kichwa interpreter. In Bolivia, ($n=27$) participants were grouped by gender to support women's participation. Facilitators ensured all voices were heard, starting with elders, and, with note-takers, documented "key events, turning points, shocks, and stresses" (Glover and Arora 2022, p. 1). Recordings were translated and analyzed, and milestones were mapped onto a timeline aligned with CIDSE's agroecology dimensions. Both exercises allowed preferred languages and accounted for gender equity.

Each session produced a visual river-of-life. Follow-up meetings presented findings and gathered feedback, underscoring the importance of reflecting on the past and present to plan for the future. At participants' request, final versions were translated and printed in Aymara and Kichwa (Image 1: Community exercise in Chigani Alto).

Interviews

We conducted semi-structured interviews to deepen insights from the river-of-life exercises and explore key themes with participants within and beyond the communities. In Caliata (Ecuador), 15 interviews were conducted, six of which were with participants in the river-of-life identified as key informants. In Bolivia, 27 people participated in the river-of-life, organized into women's and men's groups, and 15 interviews were conducted, including six with participants from the exercise. This approach deepened understanding of local experiences and perspectives.

In both countries, we used purposive (theoretical) sampling (Patton, 2007) to determine the number of interviews, group composition, and selection criteria, prioritizing depth over statistical generalizability. Participants were selected for their relevant characteristics and lived experiences, thereby capturing diverse perspectives on food system transitions.

Interviews were conducted with community members, academics, and non-profit representatives in both countries, focusing on changes in food systems, drivers, and significant challenges. All participants provided informed consent to be recorded and were available for interview in Spanish, Aymara, or Kichwa.

Chronological perspective of historical documentation

We analyzed documents related to key events identified through the river-of-life exercises and interviews to

Image 1 River-of-life exercise with Indigenous women in Chigani Alto, Bolivia

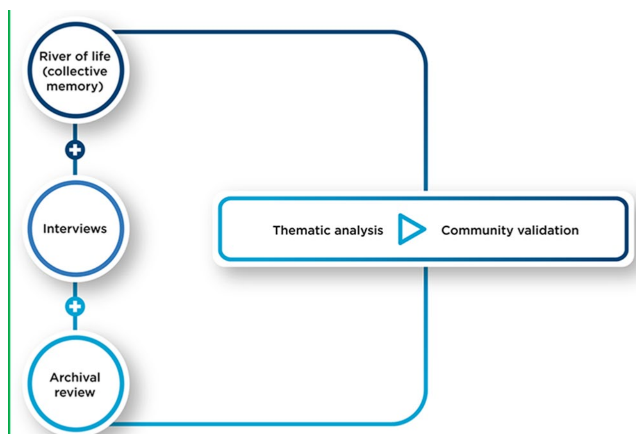

Fig. 1 Method diagram: advancing participatory action research through historical agroecology

strengthen our historical analysis. This milestone was contextualized and verified by community members and informants (Wyche et al. 2006). Sources included historical texts, academic articles, newspaper reports, and legal documents.

This approach helped to triangulate the historical insights, bringing the depth and richness of community knowledge of their own history, while addressing one key limitation of memory-based methods: the fragility and selectivity of recollection. Integrating multiple sources allowed us to place traditional and local knowledge in dialogue with documented history, enhancing robustness and depth. In this article, we focus our reporting on the material most relevant to food systems and sociopolitical change in Ecuador and Bolivia.

Data analysis

We used thematic analysis (Braun & Clarke, 2006) in three steps: (1) Recording, transcribing, and organizing all sessions and interviews, then holding a participatory workshop to select findings for community sharing; (2) Open coding, repeatedly reviewing transcripts to identify excerpts and create initial categories; (3) Grouping codes into key themes for interpretation. Thematic analysis helped identify and report data patterns. We also used selective coding to extract quotations, enrich the findings, and honor participants' voices in accordance with PAR principles (Méndez et al. 2017).

Methodological contribution: historical agroecology to PAR as a framework

This paper adds a historical analysis to PAR; it enhances a temporal depth by using historical archives and oral histories. By including participatory co-creation methods, like the river-of-life with collective validation connecting, past and present milestones. This is a decolonial approach suited to understand Indigenous knowledge systems were most of the cases preserved history through oral transmission Fig 1.

Ecuador case study

Caliata is an Indigenous Kichwa-Puruwá community in Flores parish, Chimborazo, Ecuador-one of ten Riobamba County parishes, with Caliata among 29 communities (Fig. 2; Gallegos-Riofrío et al. 2021b). The Puruwás, recognized as native, lived here before the Inca arrived (~1480). According to Ecuador's 2010 census, 99% of Flores residents identify as Indigenous, and 90% work in agriculture. Caliata has 144 residents in 57 smallholder families (Gallegos-Riofrío et al. 2021a).

Caliata's traditional language is Kichwa, influenced by Puruwá. The Kichwa Nation, Ecuador's largest Indigenous group, has deep roots in Chimborazo—a province noted for resilience despite poverty, severe soil erosion (Espinosa &

Fig. 2 Map of the location of Caliata

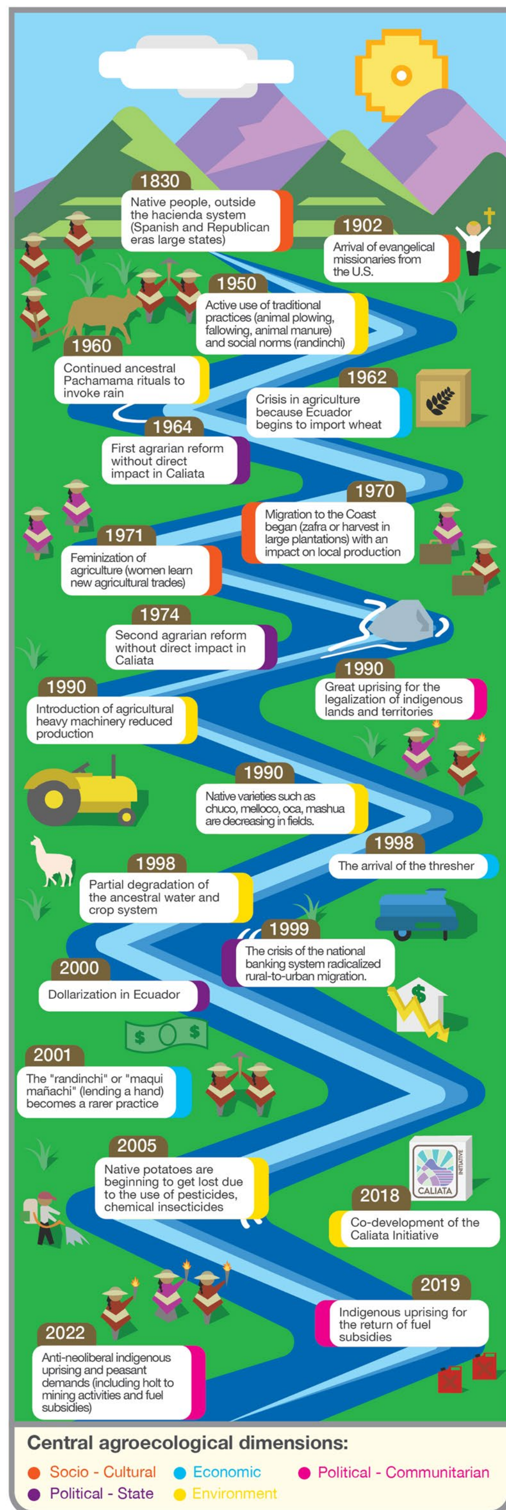

Fig. 3 Results of the river-of-life in Caliata[2]

[2] In 1990: *Chuco* (*Mirabilis expansa*), *melloco* (*Ullucus tuberosus*), *oca* (*Oxalis tuberosa*), and *mashua* (*Tropaeolum tuberosum*) are traditional Andean tubers cultivated since pre-Columbian times, forming part of the region's agro-biodiversity and cultural heritage.

Moreno, 2018), and persistent malnutrition (Gallegos-Riofrio et al., 2021a). Caliata sustains vibrant food traditions, practicing barter (*trueque*) across microclimates along historic trade routes linking the Andes, coast, and Amazon. The seven-kilometer ancestral terracing system supports diverse crops: corn, beans, squash, lupine *(Lupinus mutabilis*), quinoa, oca, mashua, and potatoes. According to community testimony, these terraces have supported a biodiverse agri-food system for generations. Their hydrological design channels rainwater, protecting crops against pests and climate extremes, reinforcing Caliata as a biocultural stronghold (Carrasco-Torrontegui et al. 2021).

Research from 2018-2022 found that Caliata's traditional agri-food system supports ecological stability and food security (Gallegos et al., 2021a). However, adopting conventional agriculture threatens ancestral food traditions. This concern arose in the 2019 Caliata Initiative (www.caliatainitiative.org), a collaborative project led by Indigenous leaders, academics, and artists. The initiative promotes resilient agroecosystems, food sovereignty, and sustainable diets through a PAR approach, advancing justice and equity.

Ecuador results: the river-of-life, interviews, and desk study

This section synthesizes data from the river-of-life, interviews, and historical research, highlighting key findings relevant to current agroecological transitions. We linked major community events (Fig. 3) to core agroecological dimensions—environmental, economic, sociocultural, political-state, ecological, and political-communitarian—based on CIDSE's five agroecological dimensions (economic, political, environmental, sociocultural). Organizing the data around these interconnected dimensions allowed us to trace how local transitions unfold across environmental regeneration, cultural revitalization, political participation, and economic solidarity.

Socio-cultural milestone: autonomy from the hacienda system/the Evangelical Church's role

From a socio-cultural perspective, several historical milestones have shaped Caliata's identity. As early as 1830, families from Caliata maintained large estates outside the hacienda system, a notable exception during both the Spanish and Republican eras that reflected forms of autonomy and local governance present to date.

Later, in 1902, the arrival of Evangelical missionaries from the United States in Caliata marked another significant milestone. As interview participants described:

> (Male) Community members worked together to translate the Bible into Kichwa for the first time.

Political milestone: foundation of the Ecuadorian Federation of Indians (FEI)

A key political milestone in Caliata was the 1945 founding of the Ecuadorian Federation of Indians (FEI), which reduced discrimination against Indigenous Peoples and peasants by reframing them as part of the national peasantry, strengthening political inclusion (Altmann, 2013).

Environmental milestone: ancestral agricultural practices and reciprocity in the 1950s

In Caliata, participants in the river-of-life recalled that in the early 1950s, community members practiced ancestral agriculture, including seed saving, animal plowing, fallowing, polycultures, and manure use, rooted in reciprocity and respect for *Pachamama*. As interview participants described:

> (Female) With neighbors, we helped each other with agricultural work, plowed with animals, and worked with cattle. We practiced crossbreeding, fallowing, and sowing this way.

> (Female) We practiced *randinchi*—which means you help me on my land and, another day, I help you on yours.

> (Male) My grandparents used to take off their hats in their parish and say: '*Pachamama*, I come to ask for your product.' Sometimes, they would bring a sack of manure and say, '*Pachamama*, here is my *kamary* (offering) for you.'

Political milestone: agrarian reforms and social change

The agrarian reforms of 1964 and 1973 were pivotal in Ecuador's rural history but had uneven effects, especially in Indigenous territories. The 1964 law aimed to modernize agriculture and reduce inequality, but it didn't dismantle elite landownership or the hacienda system (Maldonado-Lince, 1979). While it offered some land titles to tenants and rural workers, most redistribution was limited, and elite dominance persisted. As community members in Caliata noted, their experiences contrasted with neighboring hacienda-based communities:

> (Male) Before agrarian reform, Caliata's people had their own land. Elsewhere, others had nothing and were slaves to mestizos. We worked for landowners but were never slaves.

Caliata's communal land tenure system placed it outside the reach of the 1964 reform, sparing it from direct expropriation but also excluding it from state support programs. The 1973 Agrarian Reform, under the military regime, took a different approach. Rather than redistribution, it focused on industrializing agriculture and assisting landowners in modernizing (Maldonado-Lince, 1979). The reform introduced a punitive framework, criminalizing land activism and weakening peasant and Indigenous groups like the Ecuadorian Federation of Indians (FEI) (Commander & Peek, 1986). Disillusionment with the reforms led to the FEI's decline. It paved the way for the Confederation of Indigenous Nationalities of Ecuador (CONAIE) in 1986, which pursued a broader, more politicized vision of territorial rights and autonomy (Altmann, 2014).

In Caliata, the 1973 reform indirectly transformed land relations. Mestizo landowners in surrounding areas responded to new regulations by subdividing and selling their estates, thereby further fragmenting land and promoting smallholder agriculture (Jordan, 2002). One participant summarized this process:

> (Male) Large plots became smallholdings as owners disappeared or sold—what was once productive land was divided and reduced.

Socio-cultural milestone: rural-to-urban migration

The 1970s witnessed significant rural-to-urban migration, particularly to Guayaquil, where many sought employments on large export plantations producing rice and bananas. According to the river-of-life exercise, the outmigration of young men from Caliata had lasting effects, reshaping gender roles and household structures. With fewer men available for agricultural labor, local food production declined, resulting in shortages. As agriculture became increasingly feminized, traditional gender norms began to shift. Community members recalled the story of the first woman in

Caliata to use a yoke to plow with oxen, who shared this testimonial:

> (Female) I was the only woman to manage the plow; before me, it was only men. I learned from my brother at age eleven.

> (Male) Migration reduced food production. All the men left for the city, returning only after months, so women were left to plow, sow, and weed alone.

Political milestone: great uprising of the Indigenous movement

In the 1990s, under President Rodrigo Borja, Ecuador experienced a stronger Indigenous movement, fueled by the mass mobilization of 1990, which asserted indigeneity and demanded land legalization and access to irrigation (Bebbington 1991). Four years later, during Sixto Durán-Ballén's presidency, a second significant Indigenous mobilization arose in response to neoliberal reforms threatening agrarian gains through privatization.

The 1990 and 1994 uprisings significantly shaped Ecuador's political agenda and challenged the dominant portrayal of Indigenous Peoples as passive agriculturalists. Instead, they affirmed Indigenous communities as active political actors (Gallegos-Riofrío, 2024). This momentum led to the creation of the Indigenous political party Pachakutik in 1995, which quickly achieved national representation—first with eight congressional seats in 1998, and later in the National Assembly. As one Caliata community member noted during an interview:

> (Female) We stopped cars carrying food to the city, claimed our rights, and proved we still exist. We've resisted over five hundred years of colonization and showed the countryside is alive.

Socio-cultural and environmental milestones: heavy machinery

The arrival of heavy machinery in Caliata in the 1990s marked a significant change. Introduced under President Durán-Ballén's neoliberal agenda to industrialize cash crop exports (Lefeber, 2000), mechanization received mixed reactions. Some saw tractors as a solution to labor shortages from migration. Others noted negative impacts: reduced native crop diversity and production, weakened reciprocity-based institutions, and increased soil erosion. As some participants explained:

> (Male) Machinery reduced production but made labor cheaper. Now, *randinche* (labor exchange) is used less often.

> (Female) The tractor erodes and destroys the land.

> (Female) The tractor affected native seeds. Before, seeds reproduced naturally in rich, animal-fertilized soil. The tractor removed fertilizer and organic matter; animals should plow instead.

Socio-cultural and environmental milestones: turning point when native crops began to decline

Community members identified the 1990s as a turning point when native crops like chuco, melloco, oca, and mashua began to decline. An informant from the Ecuadorian Agroecological Collective attributed this loss to the Green Revolution, specifically, the global homogenization of diets and the introduction of genetically modified, high-yield varieties by national and international actors. These changes disrupted local production and contributed to the loss of agrobiodiversity.

> (Male) This global homogenization of diets is changing what we eat, affecting food markets, and reducing crop diversity. Now, the market offers only one or a few potato varieties.

> Native varieties were replaced by high-yield introduced types promoted by the government and international agencies. It's a feedback loop: consumers prefer introduced varieties and reject natives, resulting in variety loss since natives lack market value.

Economic milestones: national baking crisis

During the river-of-life exercise, community members recalled that the national banking crisis of the 1990s spurred rural-to-urban migration and international diaspora. The crisis precipitated dollarization and President Jamil Mahuad's resignation, thereby fostering political and economic instability (Anderson 2016). Participants noted that these events further weakened reciprocity-based ancestral institutions.

> (Male) The banking crisis and dollarization affected Caliata. There wasn't enough labor. *Maqui mañachi* and *randinchi* (labor exchange) began to disappear, replaced by paid support.

Political milestone: indigenous movement revitalization

Politically, in Ecuador in the early 2000s, rapid social change was driven by a revitalized Indigenous movement (Becker, 2008; Sawyer, 1997, 2004). Alliances among Indigenous and peasant movements, government agencies, NGOs, and academics led to the country's most significant Indigenous-led transformation. This period marked the formal indigenization of the Ecuadorian state, although its implementation remains contested. As an Agroecological Collective leader noted, while Indigenous proposals, such as food sovereignty and the Rights of Nature, were included in the 2008 Constitution, a significant gap persists between policy and practice.

> (Male) We were hopeful with the 2008 Constitution, but policies didn't match practice. The Ministry kept operating as usual, corporations still controlled decisions, and we lost our presence in the streets.

Economic and environmental milestones: enduring reciprocity and traditional agriculture

During the river-of-life exercise, community members noted that their food system changed during colonial times and the Republican period. However, another participant argued that the change was not absolute, noting that some in Caliata still use animals to plow and continue traditional reciprocity practices, such as *minga* and *randinchi,* among family and neighbors.

> (Female) The market and tractor use have changed our food system. Youth migration has made us more individualistic.
>
> Some still use animal plowing with a yoke, since tractors can't reach terraced land.
>
> With planting, we need help from relatives, neighbors, or friends.

Economic and political milestone: indigenous uprising

In 2019, another Indigenous uprising took place, with a key demand being the restoration of fuel subsidies (Ponce et al. 2020). A key informant noted that this mobilization demonstrated the continued effectiveness of protest for the Indigenous movement.

> (Male) People remembered that taking to the streets shows nonconformity. In 2019, they saw again that the street is a tool for political action Economic and sociocultural milestone: Indigenous uprising

These historical moments have shaped contemporary agrarian life in Caliata, directly influencing current agricultural practices and community engagement. These legacies condition and enable agroecological transitions, providing context and momentum for change. After the Bolivian case study, we revisit these themes further to discuss their significance for agroecological transitions in Caliata.

Bolivia - Chigani Alto case study

Chigani Alto is in Santiago de Huata, Omasuyos province, La Paz Department, Bolivia (Fig. 1). The community is predominantly Aymara—an Indigenous group native to the Lake Titicaca region—who speak both Aymara and Spanish Fig 4.

Chigani Alto is organized into four zones: a pine reforestation area; communal grazing lands for sheep and cattle; a lower zone for self-consumption crops such as potatoes and *cañahua* (Chenopodium pallidicaule); and a central location with homes and main plots for potatoes, barley, and cañahua. The community has 90 registered members, of whom about 40% live part-time outside the village (PROSUCO, 2022).

PROSUCO, an NGO in the McKnight Foundation's Andean Community of Practice since 2012, has supported PAR initiatives in Chigani Alto, including the "*Yapuchiri* Model," which fosters dialogues between Indigenous knowledge and researchers (Torrico and Angel 2020; F-UNAPA, 2008; Quispe, 2011; Pardo Valenzuela and Caballero Espinoza 2018; PROSUCO, 2022). "*Yapuchiri*" refers to "the peasant who holds local knowledge" and is co-developed with farmers, who provide peer technical assistance and innovate with bio-input production, ethnoveterinary remedies, and climate risk management (Torrico and Angel 2020, F-UNAPA, 2008; Quispe, 2011; Pardo Valenzuela and Caballero Espinoza 2018).

In collaboration with the Farmer Researcher Network (FRN), PROSUCO helped launch the Chigani Alto Bio-input Production and Innovation Center, now run by 30 Indigenous members, which produces foliar nutrition and sulfocalcic broths to support soil fertility, crop diversity, and local food systems (Carrasco-Torrontegui et al. 2024). As community members state, "without collective action,

Fig. 4 Map of the location of Chigani Alto

there are no agroecological transitions or healthy territories." PROSUCO continues to promote collective efforts in cover crops, water, agrobiodiversity, and soil management (Carrasco-Torrontegui et al. 2024; PROSUCO, 2022).

The river-of-life, interviews, and desk study in Bolivia

This section integrates findings from the river-of-life (Fig. 5), interviews, and historical research in Bolivia. The analysis revealed that key events in Chigani Alto are "transdimensional" milestones that intersect multiple agroecological dimensions (PROSUCO, 2022; Carrasco-Torrontegui et al. 2024). We also applied here CIDSE's economic, political, environmental, sociocultural agroecological dimensions.

Socio-cultural milestone: descendants of the Chiripa culture

From a socio-cultural perspective, several historical milestones have influenced Chigani Alto. Community members state they are descendants of the Chiripa culture, which was located near Lake Titicaca around 1500 B.C. Historical sources indicate that the Chiripa culture existed between 1500 and 800 B.C. in Santiago de Huata, where Chigani Alto is located (Hastorf 2003).

Political milestone: has tenure rights over land

Data from the desk review, river-of-life, and interviews show that Chigani Alto was never part of the Hispanic or Republican hacienda system. As a result, traditional structures, such as rotating leadership and communal assemblies, remain intact, guiding decision-making (Tapia 2002). This contrasts with communities shaped by hacienda systems, where more hierarchical, authoritarian dynamics emerged.

> (Woman) The original communities were never a colonial hacienda and had no boss; people owned their land. Still, they lacked full autonomy or freedom and were seen as second-class citizens due to unemployment.

Environmental and economic milestones: traditional farming, ritual, and ecological indicators Before modern change

According to the river-of-life and interviews, in the early 1930s, community members practiced ancestral agriculture, including seed saving, animal plowing, fallowing, polycultures, manure use, and avoiding agrochemicals altogether. They also engaged in *trueque* (bartering), reciprocity-based institutions, ceremonies honoring *Pachamama*, and used bioindicators to guide planting decisions:

> (Men) Our ancestors preserved seeds and predicted weather by watching the stars.

> (Women) Before irrigation, we planted everything by hand or with animals and used animal manure; we didn't fumigate.

> (Men) Grandparents built mountain terraces that prevented soil loss. Now, we want things easier, so we don't use terraces since tractors can't reach them.

> (Man) We bartered for fish and fruit. Our income came from animals, sheep, cows, and llamas, but once money arrived, we sold them.

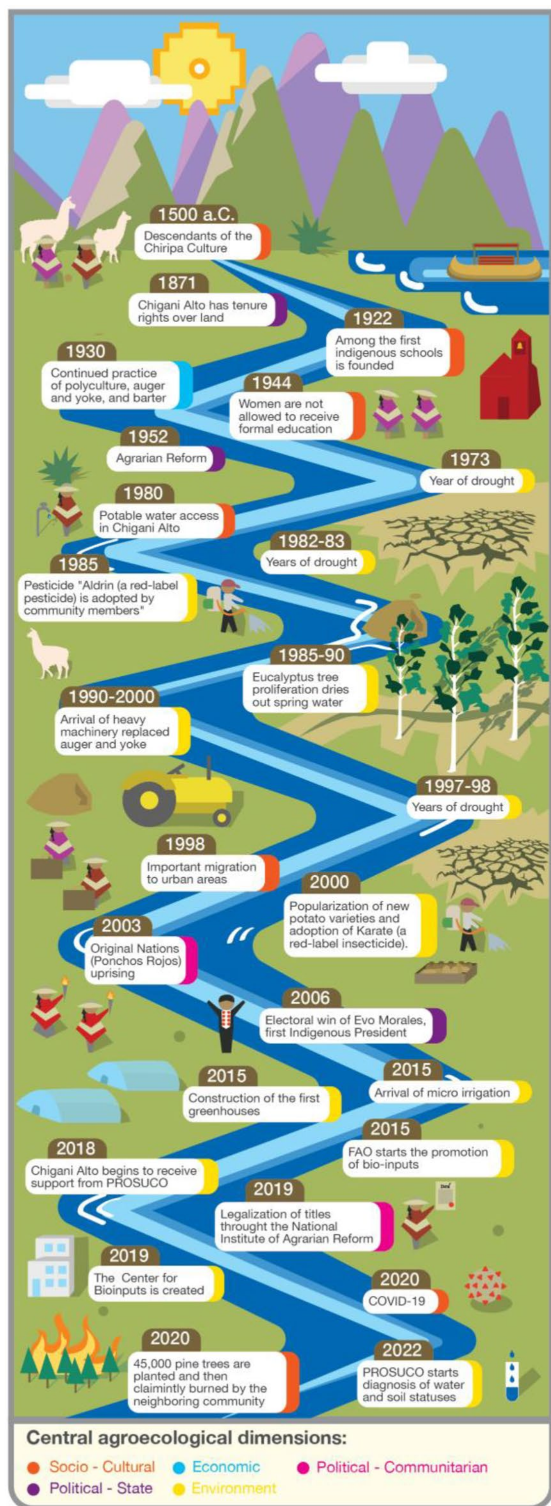

Fig. 5 Results from the river-of-life in Chigani Alto

Socio-cultural milestone: education was only available for men

A key historical memory from the river-of-life exercise was that, in 1944, education was limited to men. One elder woman, moved to tears, recalled:

> (Woman) My parents didn't send me to school because I had to herd. When I asked, my mother said, 'You're a woman and must help me graze.' There was no school, and we didn't know how to read. (tears)

Political milestone: agrarian reforms

In 1945, President Gualberto Villarroel convened Bolivia's first Indigenous Congress and backed progressive reforms. He stated: "[…] the peasant is equally a son of this flag, like any man of this land, and as a son, he must be treated as an equal by the government […]" (INRA, 2008, p. 14). Though land issues persisted, Villarroel enacted reforms to: (1) abolish unpaid labor/taxes (pongueaje, mitanaje), (2) require employers to establish schools for workers' children, and (3) draft an Agricultural Workers' Code (INRA, 2008).

Political milestone: agrarian reform

In 1951, Víctor Paz Estenssoro won the Bolivian presidential election, but the military installed General Hugo Ballivián instead (Dangl 2010). This led to widespread unrest and the 1952 Revolution, where farmers and miners allied with the Nationalist Revolutionary Movement (MNR) (INRA, 2008). Around 600 people died before the MNR took power and Paz Estenssoro assumed office (Klein 2021).

In 1990, Bolivia witnessed the First Great Indigenous March for Territory and Dignity, as Indigenous communities marched on La Paz to demand recognition of their rights. Participants in the river-of-life exercise recalled this as a pivotal moment in the Indigenous political awakening.

> (Man) Communities began to stand up to landowners. Many fell; it was a class struggle and marked the start of the land struggle in the 90s.

In 1953, following mass mobilizations for land redistribution, Bolivia enacted the Agrarian Reform Law, which

enabled the State to reclaim unproductive land on the principle that "The land belongs to those who work it" (INRA, 2008; Jemio-Ergueta 1973). President Víctor Paz Estenssoro also nationalized mines, redistributed land, granted universal suffrage, and formalized peasant militias (Jemio-Ergueta 1973; CENSED; 1985). However, as Albó (Albó et al. 1989) observes, the revolution reorganized rural communities into unions, disrupting traditional kinship- and reciprocity-based systems that once supported cooperative food production.

> (Man) Bolivia has a forceful history. In 1952, peasants became unions, allied with the Revolutionary Nationalist Movement, and won elections for 15–20 years.

> (Man) Union structure enabled control over communities—knowing members, their obligations, and roles. Land was divided; communities became dispersed. The reform ended traditional cooperatives and reduced land tenure.

Ascencio (2011, p. 23) notes, "individual property titles were granted to community members as a sneaky way of introducing the liberal and mercantilist ideology of private property." Despite revolutionary promises, agrarian reform brought limited change, impacting only 28.5% of large estate owners (Dangl 2010). Many Indigenous families received small plots (often under 5 hectares) with limited access to fertile lowlands, thereby restricting crop diversity (Ponce 2002). This led to widespread smallholdings, subsistence farming, poverty, and increased rural–urban migration (Ponce 2002; Albó 1979). One of the interviewees discussed what this meant in his community:

> (Man) The reform led to individualization. Division made it hard to manage territory and traditional systems like *suka kollos* (raised beds), which need at least 10 hectares and a lot of labor.

Environmental milestone: droughts

The highlands faced severe droughts in 1973 and 1983–1986 due to El Niño, forcing many Altiplano farmers to migrate (Francou and Pizarro 1985).

> (Woman) We produced little because there was no water—the plots were empty, and we couldn't plant anymore.

The environmental and economic crisis led to a 25% decline in production, severely affecting rural populations, particularly farmers (Soliz, 2015). This triggered the largest wave of rural-to-urban migration in Bolivia's history, marking the start of a trend that persisted throughout the decade (Soliz, 2015).

Environmental milestone: green revolution

Between 1980 and 1990, Green Revolution practices began influencing the community. In this context, a local NGO environmental official and two community members shared their reflections:

> (Man) With the Green Revolution, ancestral knowledge was seen as backward and in need of modernization. That's when agrochemicals began to be used, degrading our natural resources.

> (Man) The pesticide Aldrin arrived with an international NGO; they experimented with Indigenous communities around the parish.

> (Woman) Many community members use chemicals that harm the land. I may have good yields, but I wonder what I'll leave my children. That's why I don't use chemicals.

Socio-cultural milestone: neoliberalism and industrialization of agriculture

In the late 1980s and early 1990s, Latin America adopted neoliberal policies that privatized public companies and attracted foreign investment (Martínez & Reyes, Martínez Rangel and Reyes Garmendia 2012). In Bolivia, this led to the sale of arable land to foreign firms, sparking the "industrialization" of agriculture that favored export crops and cheap labor, especially in the Amazonian lowlands (Ponce, 2012). Local elites benefited, notably under General Banzer, who distributed land to relatives and associates during his time as dictator and later as president (Dangl 2010). As expressed by two interviewees, this contributed to another wave of outmigration and increasing precarity in rural communities:

> (Man) People now prioritize other incomes, like city minibus driving, leading to the feminization of poverty. Agriculture is now secondary for income.

> (Man) Traditional agricultural areas are being abandoned worldwide, not just in Bolivia. In the Altiplano, many communities have lost people to cities, seeking what they view as real development.

Political milestone: National Institute of Agrarian Reform (INRA)

In 1996, Bolivia enacted Law 1715, creating the INRA to oversee land regularization, reclaim abandoned lands, expropriate unproductive properties, define land assignment, and issue titles (INRA, 2008, p. 44). However, the law allows landowners to retain unused land by paying taxes, undoing gains from the 1952 National Revolution. This shift caused unrest among small Indigenous Peoples (Soliz et al. 2015).

> (Man) Small farms, market economies, and neoliberalism made escaping poverty harder, prompting communities to demand a new agrarian reform, approved as INRA in 1996.

> (Man) Peasants and Indigenous Peoples led the creation of this law, to regularize property and end the latifundio established during the 60s–70s dictatorship.

> (Man) During this time, communities stopped guaranteeing property rights. Previously, fulfilling communal duties was necessary for one's rights to be recognized. The Reform weakened community action.

Environmental milestones: El Niño, new seed varieties, arrival of heavy machinery

Between 1997 and 1998, another El Niño event occurred, causing greater damage than in previous events. From both environmental and political perspectives, this disaster compelled much of the rural population to migrate (Maldonado and Calle 1998). Community members recall that 1998 marked the beginning of a significant wave of migration to La Paz and other cities. Additionally, migration has toled in what is often termed "double residence," with men dividing their time between rural and urban areas. This shift has also increased women's workload, as they now assume additional agricultural and household management responsibilities.

> (Man) Now people prefer working 8–12 hours in a minibus for 200 bolivianos a day over agriculture, which pays less. People are pragmatic—they look for income.

> (Man) Men maintain double residence, migrating to cities for multiple jobs. Women stay in the community and take on traditional agricultural roles.

Participants noted that, in 2000, the introduction of new potato varieties and the agrochemical Karate marked a significant turning point for the environment.

> (Man) Since 2000 in the Altiplano, most people have used chemical inputs to produce tubers.

Between 2002 and 2006, the women's group in the river-of-life exercise recalled the arrival of the tractor and shared their experiences:

> (Woman) When the tractor arrived in 2006, we stopped using yokes, and there are fewer animals now. Before, we had many sheep and cows.

> (Woman) Since the tractor arrived, I can till and plant potatoes more easily. Before, we used the tractor to loosen soil and did the rest by hand; now we use it for planting entirely.

Political milestone: red Ponchos Indigenous movement

The 2003 Gas War was a major national uprising, as residents of El Alto protested President Sánchez de Lozada's neoliberal gas export plans, which lacked domestic access (Dangl 2010). Key actors included socialist and Indigenous movements, most notably the Red Ponchos from Omasuyos, where Chigani Alto is located. The Red Ponchos played a pivotal role in removing the president (Gutiérrez Aguilar 2011), mobilizing to defend ancestral culture, traditional organizations, and Indigenous worldviews (Poma 2008). As one participant recalled during the river-of-life exercise:

> (Man) The Red Poncho has become a symbol of Aymara identity.

> (Man) During the fight against Sánchez de Lozada, Achacachi's Red Ponchos were used to show we are men of struggle.

Political milestone: first Indigenous president

In 2006, Evo Morales became Bolivia's first Indigenous president, marking a historic political shift and challenging long-standing neoliberal policies (García 2015; Dangl 2010). His campaign priorities included nationalizing natural gas, supporting coca grower unions, redistributing land to Indigenous peoples, opposing U.S. free-market policies,

and rewriting the Constitution (Gutiérrez Aguilar 2011). During the river-of-life, participants reflected on Morales' rise to power and shared the following insights:

> (Woman) Before Evo became president, we faced even more humiliation for our ethnicity.

> (Men) We wear Red Ponchos during clashes since having an Indigenous president. We confronted people from Santa Cruz who tried to remove him, and the Red Ponchos defended him.

During interviews, NGO officials shared the following reflections:

> (Man) Evo promoted a peasant and Indigenous agenda, titling land and recognizing 24 million hectares for Indigenous territories, but only smallholdings from the 1950s were recognized.

> (Man) Evo's party blurred lines between peasant organizations and political structures, weakening collective capacity. While claiming to represent 'the people,' it divided and co-opted Indigenous, peasant, and social groups.

Environmental and political milestone: law reforms

The Morales government enacted the Agricultural Community Productive Revolution Law, which promoted traditional, organic, and ecological agricultural production to achieve food sovereignty and valued local knowledge and innovation (Law No. 144, 2011). In this context, key informants from NGOs offered these reflections:

> (Man) The government claims to value traditional knowledge for a sustainable, ecological economy. In practice, it stuck with neoliberal policies—building urea plants and providing tractors and seeds.

Morales enacted the New Political Constitution, formally recognizing the Rights of Nature (García 2015; Catacora-Vargas et al. 2017; Toledo 2022). Rooted in the Andean worldview, these rights reject domination over nature and promote coexistence among all living beings (Sánchez 2007). Community members and NGO informants reflected on this shift:

> (Man) In Andean thinking, an ecosystem's abiotic and symbiotic elements form a unified whole. To succeed, you don't just water plants or watch the soil, you also speak to the earth, mountain, and sky.

However, interviewees noted that, in practice, the government often failed to uphold the Rights of Nature, maintaining an extractivist approach:

> (Man) The government takes a pragmatic, capitalist approach to ecological issues and strictly applies extractivist policies.

Environmental: bio-inputs and micro-irrigation, FAO

In 2015, the community introduced micro-irrigation systems, built greenhouses, and received FAO support to promote the use of bio-inputs.

> (Woman) Now we grow everything in the greenhouse. I use micro-irrigation to produce hot pepper, chard, celery, and spinach.

Environmental: Farmers and research Network (FRN)

In 2019, PROSUCO established the FRN in Chigani Alto at the community's request.

> (Female) The FRN had 20 participants and aimed to investigate how bio-inputs could control pests and protect crops from frost and hail.

> (Woman) I sprayed with biol, and it worked well. After frost and hail, the plants recovered completely. I've also used bokashi—it works very well!

After positive results, the FRN rebranded in 2019 as the Chigani Alto Research and Innovation Center. Now with 20–25 members, the group produces bio-inputs like biol and mineral broths.

> (Female) FRN members proposed building the center and sought community support through collective work. The community made adobes and provided labor; PROSUCO provided stucco, cement, doors, and windows.

> (Man) We no longer buy external inputs; we make our own fertilizer and use *pachagrama*[1] to recover ancestral knowledge. Our potatoes now taste better, last longer, and grow well.

[1] *P*achagrama refers to daily record of climate variability, and it impacts on crops at the local level (PROSUCO, 2025).

Political milestone: land ownership

In 2019, INRA continued land reclamation efforts to secure Indigenous land ownership.

> (Woman) Land clearing led to boundary conflicts with other communities and fragmented the organization.

> (Man) Before, there were no conflicts; things were calm. This project brought boundary disputes between communities.

Socio-cultural milestone: pandemic

The COVID-19 pandemic began in 2019, but their agroecological resilience likely reduced its impact on these rural communities.

> (Man) There were some infections and deaths, but nothing severe. While the city experienced collapse, rural communities showed resilience; they have land, farming knowledge, and agroecology, which led to positive outcomes.

Environmental: forest burned

In 2020, the community planted 45,000 pine trees to restore land that had been burned, raising suspicions that the neighboring communities did so due to a land dispute.

> (Woman) The community reforested the upper part with 45,000 pines; each family planted four hundred plantlets.

> (Women) I planted trees for my grandchildren with joy, fulfilling a dream. But when they were burned, it hurt us.

Socio-cultural: collective action and agroecological transition project

In 2022, under its Collective Action and Agroecological Transition project, PROSUCO led a community-based assessment of water sources, soil management, agrobiodiversity, and plant cover (Carrasco-Torrontegui et al. 2024).

> (Man) Recovering Andean culture and diverse crops is key to family and ecosystem wellbeing. Agroecology helps communities reconnect with ancestral knowledge to manage seeds, territory, and agrobiodiversity.

> (Man) It's important for us to replant like our grandparents, who farmed ecologically without chemicals.

Discussion

Our study highlights the importance of integrating historical, regional, and local contexts into agroecological transitions. Local histories reveal how collective memory, land tenure regimes, and customary reciprocity-based institutions respond to external influences and shape contemporary transformations. By comparing historical milestones in Ecuador and Bolivia (see Appendix 1: Chronological Comparative Milestones), we observed both convergence and divergence. This paper creates a bridge between historical analysis and PAR-oriented research, offering a replicable framework for other regions. We argue that incorporating historical analysis provides a culturally appropriate response for rural communities.

Pre-Inca and Spanish administration: foundations of reciprocity and ecological knowledge

Both communities have deep ancient Andean roots, founded upon terrace agriculture, irrigation systems, and collective labor practices (*ayni, minka, randi-randi),* which reflect the co-evolution of humans and nature. These ancestral systems, called *waru-warus* by the Quechua and *suka kollus* by the Aymara, optimize soil fertility, control floods, store water, and support biodiversity management (Carrasco-Torrontegui et al. 2021). Agriculture is embedded within a cosmological framework of reciprocity with *Pachamama* (Gallegos-Riofrío et al. 2022; Toledo 2022). Drawing on these traditions is vital to agroecological transitions, as they provide sustainable frameworks rooted in reciprocity, collective action, and deep ties to nature. This is especially important because historical agroecology centers on Indigenous and local knowledge, often termed landscape knowledge or an agroecological ethos (Rivera-Núñez et al. 2020). These perspectives show how communities have sustained food systems for centuries while resisting extractive modernization.

Ancestral agriculture, like cultivation terraces, the foundation of Andean farming, has shown resilience of Indigenous agroecological knowledge (Gallegos-Riofrío et al. 2022). Built along mountain slopes and connected to water channels, terraces minimize water loss, prevent erosion, and protect crops from frost and wind (Carrasco-Torrontegui et al. 2021). Research finds that terraces can increase yields

by 43–65% for potatoes, maize, and barley compared wit sloped fields (Altieri 1996). Terraces also support diverse polycultures thanks to water retention and ecological interactions (Gallegos-Riofrío et al. 2022). The comparison between Caliata and Chigani Alto shows this pattern: both communities have extensive terraces, but only Caliata actively maintains and cultivates them. Chigani Alto's terraces, located farther from settlements, are harder to maintain. In the context of an agroecological transition, Caliata's continued use of terraces demonstrates that communities are more resilient when they develop technologies adapted to their local landscapes and ecosystems, guided by close observation and long-term assessment of productivity and ecological health (Carrasco-Torrontegui et al. 2021). This lesson is crucial amid the current climate crisis. Community-based agroecological practices, grounded in centuries of adaptation, offer critical pathways to building resilient food systems capable of withstanding climate challenges (Enoch Yeleliere et al. 2022)

Neither community participated in the colonial hacienda system, preserving communal land, governance structures, and traditional ecological knowledge. Ritual offerings, seed exchanges, and communal labor remain central to sustaining agroecosystems and cultural continuity. Their shared ancestral foundations, in ecological design, reciprocity, and cosmological balance, provided both communities with deep local knowledge and institutional resilience. In contrast, communities that endured the hacienda system faced greater challenges in maintaining their organizational structures, governance systems, languages, crops, and agricultural practices. The political and economic transformations imposed by the hacienda era weakened community cohesion and impeded governance and collective action (Tuaza Castro 2014). Because they largely escaped the hacienda system, the two communities examined here have maintained these practices, thereby strengthening their capacity to pursue agroecological transitions today.

Republican Era and agrarian reforms: land, migration, gender shifts, and resistance

In the 19th and mid-20th centuries, rural regions underwent extensive land reconfiguration and participated in a sharecropping system; however, both communities maintained their relative autonomy. Chigani Alto, *ayllu*- governance sustained irrigation and collective work despite hacienda expansion in the 1930s, which restricted Indigenous access to fertile Bolivian 1953 Agrarian Reform and Ecuador's 1964, and 1973 reforms aimed to dismantle estates but often fragmented communal lands into *minifundios*, favoring mestizo landholders (Albó 1979; Jordán 2003; Ponce 2002). Droughts and famine (1934) in Chigani Alto spurred temporary migration but strengthened cooperative production. The). Reforms deepened segregation and land fragmentation and created dependence on state programs. In Bolivia, 4% of landowners control 70% of farmland (INRA, 2008). Ecuadorian labor unions, like the FEI, opposed *latifundios* (large estates) and demanded peasant access to land (Kaltmeier, 2009; Santana, 1983). Paradoxically, partial exclusion from agrarian reforms protected local institutions, allowing both communities to retain communal governance structures that are currently pathways to agroecological transitions. From an agroecological transition perspective, maintaining knowledge and culture enhances both communities' capacity for self-organization, enabling them to govern and make decisions about their food systems and natural resource management (Anderson et al. 2019). Indigenous traditional governance of food systems offers several lessons for designing modern systems focused on Indigenous food sovereignty and agricultural land stewardship (Price et al. 2022).

From the mid-twentieth century onward, men's outmigration increased women's agricultural workloads. Women's participation in education and agriculture has expanded (FAO, 2023; Calle Collado et al. 2013), although fewer than 20% hold land titles (UNCCD 2023). Rural women—48% of Latin America's population—work long hours in undervalued and unpaid roles (Korol, 2016; Elmhirst & González, 2017). Yet, because this work is frequently categorized as 'domestic,' it remains invisible in economic and policy frameworks. The feminization of agriculture shaped the evolution of both communities' agroecological systems; reciprocal labor and local governance became feminized strategies of resilience amid migration and social transformation. This historical finding reinforces the importance of a feminist approach to agroecology, which challenges these hierarchies by reframing care not merely as unpaid labor, but as a collective and ecological responsibility essential to community well-being and planetary balance (Zaremba et al. 2021).

Post-reforms and modernization (1985–2006): neoliberalism, environmental degradation, and Indigenous mobilization

The Green Revolution's arrival in the Andes in 1960 (Cuvi 2020) brought ecological and social impacts, such as landrace loss, soil nutrient depletion, prevalent pesticide residues, increased farmer suicides, land loss to agribusiness, and abandonment of farming (Raj 2013; Nelson et al. 2019; Fraser et al. 2016; Howard 2021). The Green Revolution also increased dependency on governments and markets (Jordán 2003). The late twentieth century brought neoliberal agricultural policies that promoted privatization,

export-oriented production, mechanization, and heavy agrochemical use (Lefeber, 2000; Ponce, 2012), which have since eroded local knowledge and cooperation (e.g., *randi-randi*, *minka*). In Bolivia, droughts from the 1970s to the 1990s, often linked to El Niño, drove migration (Francou and Pizarro 1985; Soliz et al. 2015). In Ecuador, tractors damaged terraces and displaced native grains from monocultures (Cuvi 2020). The combined ecological impacts and loss of autonomy continue to affect communities today.

However, Andean agricultural practices in both countries have resisted and creatively responded to changes, posing a significant barrier to the New Green Revolution and, later, to neoliberal policies, offering a strong foundation for promoting agroecology (Cuvi 2020; Gallegos-Riofrío et al. 2021b). These communities deeply understand their ecosystems, practicing seed saving, crop diversification, integrated crop-livestock systems, recycling of organic matter, minimal synthetic inputs, pest management through biodiversity, and rotational farming (Carrasco-Torrontegui et al. 2024; Gallegos-Riofrío et al. 2022). Their agriculture is “knowledge-intensive rather than capital-intensive” (Méndez, 2015, p. 114). Andean agriculture, with its enduring and ecologically rooted traditions, is vital to facilitating agroecological transitions in the region.

Although neoliberal policies in the modernization period (1985–2006) degraded ecosystems and deepened inequality, they also reignited Indigenous political agency and collective action, laying the groundwork for the current resurgence of agroecological movements and self-determination. The Indigenous uprisings of the 1990s in Ecuador and Bolivia demanded land rights, sovereignty, and food justice (Bebbington 1991; Dangl 2010). These movements reshaped national politics, culminating in Evo Morales’s election in Bolivia in 2006 (García 2015) and Ecuador’s constitutional recognition of Indigenous rights and food sovereignty (Gutiérrez Aguilar 2011; Acosta et al. 2011). Rooted in long histories of resistance, these mobilizations reaffirmed the cultural and ecological foundations of Indigenous farming systems.

Contemporary and agroecological innovation (2007–present): *Buen Vivir*, collective action, and technological synergies

Caliata’s legacy of political activism and resistance is evident in its leadership. In the early 2010s, when the government and agribusiness promoted quinoa monoculture, Caliata’s leaders resisted, choosing to preserve a diversified traditional landscape. Unlike other communities impacted by the collapse of the quinoa boom, Caliata maintained resilience and continues to operate a diversified agrarian system that is evident both in its physical landscape (e.g. the active use of terraces), its agricultural systems (highly diversified using local seeds) and in its social practices (e.g. the continued us of traditional collective action processes such as *minga*). The importance of strong local leadership, committed to maintaining Indigenous autonomy, culture, and food sovereignty, is an essential historical antecedent that has enabled Caliata to maintain a strong agroecological foundation.

In the twenty-first century, Ecuador and Bolivia enshrine the Rights of Nature and food sovereignty in their Constitutions. Concepts like *Pachamama*, *Sumak Kawsay* (Ecuador), and *Sumak Qamaña* (Bolivia), translated as “Good Living” or “Living Well”, are central to national development (Toledo 2022). These principles support coexistence, diversity, and harmony with nature (Acosta et al. 2011; James et al. 2023) and underpin agroecological movements rooted in Indigenous cosmovisions (Montenegro de Wit 2022; Price et al. 2022). Good Living, inspired by *Pachamama*, can be viewed as a contemporary expression of agroecology (Da Silva-Araujo 2021). However, national policies frequently prioritize economic growth and export agriculture over territorial rights, environmental protection, and Indigenous values, as seen in Ecuador’s 2017–2021 National Development Plan (Merino 2020). Recent governments have favored a productivist model, emphasizing imports, single-crop exports, and agribusiness expansion, at the expense of local economies, forest conservation, and Indigenous territories in the Andes (Merino 2020).

Amid these contradictions, Caliata and Chigani Alto stand out as models of Indigenous agroecological innovation. In Caliata, the 2018 Initiative used PAR to revitalize ancestral practices and co-develop a long-term vision (Carrasco-Torrontegui 2025; HLPE, 2019) that draws on the territory’s history and culture. In Bolivia, Chigani Alto advanced food production through FAO-supported micro-irrigation systems, greenhouses, and bio-inputs (2015–2016), and the PROSUCO bio-inputs project (2018), which diversified crops and improved nutrition. These efforts strengthened the Farmer Research Network (FRN) through support from the McKnight Foundation via PROSUCO, thereby reinforcing community autonomy. In Chigani Alto, farmers now lead bioinput production, irrigation governance, and knowledge exchange, fostering intergenerational and inclusive agroecology (Carrasco-Torrontegui et al. 2024).

Case studies in agroecological debate

The comparative analysis of Caliata and Chigani Alto demonstrates that agroecological transitions are historically situated and path-dependent. While both communities share Indigenous heritage and ecological knowledge, their

trajectories differ in response to political, environmental, and institutional contexts. Both communities sustain diversified, traditional agriculture rooted in self-consumption and reciprocity, values that anchor their resilience and agroecological identity. However, their engagement with markets reflects distinct transition pathways. Chigani Alto's growing integration into local markets, through initiatives such as bartering and bio-input production, promotes economic diversification while maintaining ecological principles. In contrast, Caliata's predominantly subsistence-oriented system emphasizes food sovereignty and cultural continuity.

From an environmental perspective, both communities demonstrate how Andean agricultural systems resist industrial homogenization through biodiversity conservation, integrated crop–livestock systems, organic recycling, and ancestral agrarian technologies. For instance, their terraces and irrigation networks, technologies recognized by the FAO as Globally Important Agricultural Heritage Systems, represent more than 5000 years of coevolution with mountain ecosystems (Carrasco-Torrontegui et al. 2021). These systems are not just relics of the past; they are living proof of the vitality and adaptability of Indigenous food systems.

For these communities, it is essential to discuss not only agroecological transitions but also indigenous foodways and their resistance to modernization and agro-industrial agriculture. Here, historical agroecology supports the valorization of indigenous foodways, which are inherently agroecological. This approach is not just about preservation and resisting modernization, but also about expanding indigenous-managed territories through agroecological repossession. Agroecological repossession seeks to restore relationships with the land and establish a framework for ethical engagement between Indigenous and Western sciences (Tremembé et al. 2025). An agroecological transition from this Indigenous perspective should be understood as a process of regaining control and connection to their food systems.

Building on this, understanding agroecological transitions in these communities requires a broader perspective that includes Indigenous foodways and the resistance they embody. Historical agroecology is vital, as it shows that these Indigenous foodways are intrinsically rooted in reciprocity, ecological design, and collective stewardship. The focus, therefore, is not just on preserving traditions or opposing agro-industrial expansion, but on fostering agroecological repossession. This emerging idea emphasizes reclaiming and expanding Indigenous-managed territories, restoring connections to the land, and defining ethical engagement between Indigenous and Western sciences (Tremembé et al. 2025). From this view, agroecological transitions are about regaining control, autonomy, and connection to food sovereignty.

Today, these communities are drawing on customary institutions (*ayni, minka/minga, randi-randi*) which enable reciprocity-based governance, cooperation, and trust (Putnam 1995; Carrasco-Torrontegui et al. 2024), regulating cooperation, seed exchange, and collective work, including spiritual reciprocity with *Pachamama* (Toledo 2022; Price et al. 2022; Gutiérrez Aguilar 2011). These are all essential values and processes that underpin agroecological transitions (Anderson et al. 2019). Reciprocity is a deeply rooted value that guides the management of shared infrastructure (terraces, canals, reservoirs), ensuring equitable access to soil fertility and collective action (Carrasco Torrontegui 2025; Gallegos-Riofrío et al. 2022). Organizing *mingas* for system restoration demonstrates reciprocity, as both governance and ecological ethics are rooted in interdependence (Hoogesteger, 2013). These practices align with constitutional Rights of Nature in Ecuador and Bolivia, where cosmologies, *Sumak Kawsay* and *Sumak Qamaña*, embed reciprocity, diversity, and care into state frameworks (Acosta et al. 2011; James et al. 2023). Thus, reciprocity remains a living, adaptive institution that sustains biodiversity and social capital and embeds the Rights of Nature in daily agroecological practice.

The role of reciprocity offers critical insights into the international debate on solidarity economies in agroecology. It serves as both a moral and an economic foundation for community well-being, illustrating how social relations of mutual aid can be mobilized to sustain livelihoods while resisting dependence on external markets (Villalba-Eguiluz et al. 2023; Travieso 2021). In this sense, reciprocity operates as a living expression of solidarity economies, grounding agroecological transitions in local values of cooperation, care, and autonomy (Pimbert 2022). From a sociocultural perspective, agroecology is inextricably linked to cultural and spiritual renewal. Historically, farming practices in both communities were closely tied to rituals honoring *Pachamama* and guided by Indigenous agricultural calendars, embodying what Rivera-Núñez et al. (2020) describes as "culturally grounded agroecological visions." In Caliata, these ancestral rituals have largely disappeared, and in Chigani Alto, they are gradually fading due to the influence of churches that discourage or prohibit their practice. Revitalizing these traditions constitutes a form of resistance to the co-optation of agroecology, reaffirming its ethical and relational foundations (Rivera-Núñez et al. 2020; Price et al. 2022).

The experiences of Chigani Alto and Caliata demonstrate how reciprocity-based institutions can drive both incremental and transformative change. In Chigani Alto, the community's decision to produce and market bio-inputs to neighboring communities represents an incremental step toward economic autonomy and ecological sustainability, as

it replaces industrial inputs with local alternatives (Gliessman 2016). Such cumulative practices challenge agro-industrial dependence and can spark broader transformative change (Elzen et al. 2017). Small-scale agroecological initiatives, such as bio-input production, seed exchange, and greenhouse management, foster economic diversification, strengthen local economies, and reduce structural dependency, thereby creating resilient and autonomous rural development alternatives.

Although both initiatives are rooted in community self-organization, they occupy distinct positions along the reformist–transformative spectrum (Holt Giménez and Shattuck 2011; Gliessman 2016). Caliata exemplifies a transformative pathway focused on self-determination and cultural renewal. Through participatory planning, collective governance, and reciprocity-based practices, it redefines agroecology as both an ethical and political project. The Caliata Initiative has fostered years of trust, enhanced autonomy, and aligns with Van den Berg et al. (2022) in promoting territorial transformation. In contrast, Chigani Alto follows a trajectory from reformist to transformative, integrating institutional support with increasing autonomy. Its focus on innovation, bioinput production, irrigation governance, and peer-to-peer learning challenges industrial dependence while working within existing structures. Through collective organization and regional exchanges, Chigani Alto sets the stage for systemic change, indicating that agroecological transitions must bridge institutional reform with movement-building to empower governance and revitalize culture (Van den Berg et al. 2022).

Both organizations promote autonomy rather than dependency. Through its Community of Practice model, the McKnight Foundation connects projects across the Andean region like PROSUCO, fostering knowledge exchange, collaborative learning, and research dissemination (Nicklin et al. 2021). The Caliata Initiative has a long-standing relational history, rooted in several years of reciprocal relationships between community members and its co-founders, which anchor collaboration in trust, mutual care, and long-term commitment (Caliata Initiative 2025). Together, Caliata and Chigani Alto show how Indigenous-led agroecology, whether through movement-based transformation or reformist evolution, redefines development as collective renewal, cultural continuity, and sovereignty over territory and knowledge.

Ultimately, Caliata and Chigani Alto show that agroecology in the Andes is not merely an innovation but a continuity—a living synthesis of resistance of ancestral wisdom and participatory science. Agroecological transitions, therefore, are not only technical but also epistemic, political, and cultural transformations that reconnect humans, ecosystems, and well-being.

Conclusions

The Historical Agroecology approach used in this research enabled us to trace the evolution of food systems and understand how current conditions may shape future trajectories. The PAR framework, centered narrative and storytelling, fostered collective learning through dialogue. Oral histories, complemented by written documentation, captured lived experiences and amplified voices often excluded from mainstream discourses, promoting inclusive and decolonial participation across gender and age.

Although the Ecuadorian and Bolivian communities face similar external pressures, they respond differently due to their distinct historical and sociocultural contexts. Their community initiatives illustrate two pathways of agroecological transformation. Caliata follows a transformative trajectory rooted in self-determination and cultural renewal: through participatory planning, and collective and reciprocity-based governance, the Caliata Initiative articulates a clearly defined vision of territorial transformation. In contrast, Chigani Alto pursues a reformist-to-transformative pathway, combining institutional support (e.g., PROSUCO with funding from the McKnight Foundation and others) with growing autonomy. Its innovations, including bioinput production, irrigation governance, and peer-to-peer learning, challenge agro-industrial dependence while still operating within existing institutional frameworks.

These divergent pathways highlight the need to understand community priorities, in the context of agroecological transition, with a diachronic view. In both communities, agrarian systems draw on deep ancestral traditions, agricultural calendars, festivals, and spiritual practices, that reflect the long co-evolution of society and nature. Practices that include seed saving, crop diversification, integrated systems, organic fertilization, pest management, and crop, livestock rotations demonstrate sophisticated ecological knowledge refined over generations. Yet revitalizing these traditions represents both resistance to homogenizing forces and the renewal of cultural practices. Consequently, while a central insight from the historical analysis is the enduring relevance of ancestral agricultural knowledge, which must be preserved and revitalized to support agroecological repossession, questions remain on how to address contemporary challenges such as aging populations and urbanization.

As globalization, modernization, and religious institutions reshape ancestral life, Indigenous agroecology reasserts autonomy and reclaims knowledge systems, offering contextually grounded pathways for shaping food futures. From this perspective, agroecological transitions are not merely technical adjustments but collective processes of regaining control, autonomy, and connection to Indigenous food systems, while establishing ethical frameworks for engagement between Indigenous and Western sciences.

Appendices

Appendix 1 Chronological Comparative Milestones

Historical Period	Year	Caliata	Chigani Alto
Pre-Inca	1500 B.C.	–	Pre-Inca/Inca: Built terraces, raised fields, and irrigation systems, early Andean ecological design.
Early Republican Era	1830	Caliata's people avoided the hacienda system, maintaining communal land and self-governance.	–
	1871	–	Aymara communities organized through ayllu systems based on collective work and reciprocal governance.
Colonial to Mid-twentieth Century	1902	Evangelical missions from the U.S. introduced new religious and cultural influences.	–
	1930–1934	-	Hacienda expansion concentrated land, limiting Indigenous access; drought and famine forced migration.
	1950s–1960s	1950 *Pachamama* rituals for fertility.1960: Continued traditional practices, including animal plowing, manure use, *randi-randi* (reciprocal labor).	1950: Bolivian Agrarian Reform unevenly redistributed land, with little technical/irrigation support.
Agrarian Reform Era (1960–1980s)	1962	Wheat import crisis weakened grain systems and food sovereignty.	–
	1964	First Agrarian Reform had no direct effect due to communal tenure.	1960s: Collective labor (*ayni, mink'a*) remained essential for food sovereignty and communal strength.
	1970–1974	Migration to coastal plantations reduced local production; women assumed new agricultural roles; Second Reform also bypassed the community.	1972–73, 1982–88: Droughts reduced yields, forced migration, and triggered livelihood diversification and soil degradation.
Post-Reform and Modernization Period (1985–2005)	1985–1990s	Mechanization and market integration eroded traditional systems and reciprocity.	Expansion of commercial crops/chemical fertilizers degraded soils; hybrid seeds and livestock replaced native varieties.
	1990	Indigenous uprising for land rights; decline of native crops (*chuco, melloco, oca, mashua*).	Indigenous uprising in El Alto bolstered political identity and environmental justice.
	1998–2001	Ancestral water systems degraded; banking crisis and dollarization accelerated migration and weakened communal networks.	1998: Drought triggered migration. 2000: Water Committee founded for collective irrigation management.
	2003–2005	Ecological concerns rose as pesticides caused pollinator decline.	2003: Indigenous mobilizations broadened environmental and territorial justice discourse.
Recent Decades and Contemporary Policies (2006–2022)	2006–2016	-	2006: Evo Morales elected. 2015–16: Irrigation improvements increased water resilience; first greenhouse constructed; FAO began bio-input production.
	2018	The Caliata Initiative revitalized ancestral technologies and collective governance through PAR.	Launched PROSUCO–Chigani Alto partnership.
	2019	Indigenous uprising demanded fuel subsidy return.	Legalization of titles; Development of the Bioinputs center.
	2020	National mobilizations opposed neoliberal policies.	COVID-19 revived home food production and collective labor;
Agroecological Innovation and	2022	-	PROSUCO-led diagnosis deepened soil, water/food security reflection.

Appendix 2 Chronological Comparative Milestones Interviews and river-of-life exercise quotes in Kichwa and Aymara

Number	Gender	Quotes in Caliata, Kichwa
1	Men	Manarak reforma agraria nishka tiyakpi, Caliata runakunaka ña ashpata charirkakuna. Shuktak ayllu llaktakuna mana imata charirkakunachu; shalakunapaklla llankashpa kawsharkakuna, ashtawanpish Caliata runakunaka kikinpakllatak llankarkakuna, mana shalakunapak llakichishka kawsarkakunachu
2	Women	Ñukalla yapunata yacharkani, ñuka ñawpaka karikunalla yapunata yacharkakuna. Ñuka turi yachachirka chunka shuk watata charikpi
3	Men	Murukunata pukuchina ashayarka, runakuna shuktak llaktapi llankanaman rishkamanta. Tukuy karikuna shuktak llaktapi llankanaman rirkakuna, kutimurkakuna tawka killakuna washa. Chaymantaka warmikunalla sakirirkuna yapunkapak, tarpunkapak, shinallatak hashmankapak
4	Men	Hatun tarpuna allpakuna uchillatukushpa katirkakuna, ñuturishpa katirka. Hatun allpata charikkuna chinkarirkakuna, haturkakuna uchilla ashpatukushpa sakirirka
5	Women	Shayachirkanchik hatuncarrunuka mikunata llaktakunaman apakkunata. Ñukanchik hayñikunata kutichichun nishkanchik, kawsakunchikmari nishpa, ñakarishkanchikmi pichka pacha watakunata mishukuna shamushkamanta, ayllukuna kawsashkata rikuchishkanchikmi
6	Men	Tractorwan llankakpika murupukuna ashalla tukurka, shinallatak tractorka llankakpika yanapan; kunan punllakunaka pichillakushkita kunkuna makiwan llankashkmanta. Kayka nishanin randichitaka ashallatami ukuparkakuna
7	Women	Tractorwan llankakpika ashpata wakllichin, tractorka ashpata chinkachin
8	Women	Tractorka kikin muyukunata chinkachi kallarirka. Ñawpa pachakunaka, muyukunaka paymanta mirarirka ashpa ashka majadata charishkamanta [wiwakunapak majadakarka], tractor shamushpa tukuy majadata aparka. Chaymantami wiwakuna yapuna kan
9	Men	Ashamikunallata mikunapak tiyan […] tukuypi kan … Shuktak mikuykunata mikukunkuna, mikuy hatukunata llakichishpa, shinallatak tawka murukuna pukuna ashayarka. Shinallatak hatuna ukupika shuk papallata hatunkuna, may kimsa papakamallla
10	Men	LLaktapi pukuk papakunaka chinkarikallarirka shuktak papakunata gobiernoukupi llankakkuna apamushkamanta, shinallatak hatun yachakchayay internacionalniskkakuna ashka pukuchina yuyaywan shamunkuna. Kay yuyaykunaka randina hatuna ukupi kuyurin. Mikukkunaka shuktakmanta apamushka muru papakunata munankuna, llaktapi pukuchishka papakunataka kutichinkuna. Llaktakunapika ashalla muyukunata charinkuna, manapi randishanishkamanta, chaymanta muyukuna chinkari kallarishka
11	Men	Llaki hatun llakta bancoukupi tiyashkamanta, shinallatak shuktak kushki tiyarishkamanta Caliatapak llaki rikurirka. Mana makikuna llankankapak tiyarka. Maki mañachi (makita mañachina), shinallatak randinpak, randinchi (imata kuna-chashkinkapak), chinkari kallarirka, runakunaka kullkiwan pagaykallirirkakuna makita mañachishkamanta
12	Men	Charirkanchik munayta kay hatun kamachiwan 2008 rurarishkawan, killkashkaka mana ruraykunapi rikurirka. Ministerionishkaka ñawpashinallatak llankashpa katirka, ashtawanpish corporaciònkunawan ima yuyashkakunata harkashpa. Ñankunapi rikurina chinkarishpa rirka
13	Men	Runakunaka kutinllatak ñanman llukshishpa kaparinata yuyarkakuna, mana kushikuy kashkata rikuchinkapak. Kay 2019 wata runakunaka kutan ñankunaman llukshishpa kaparishpa, hatun kamachikkunaman uyachirkakuna
14	Women	Ñukanchik mikunata hatun mikunata hatukkuna llakichikun, shinallatak tractorkuna. Shinallatak ñukanchik kiwsakuna, musukuna shuktak llaktaman rikpi kikinpaklla kawsashkanchik
15	Women	May hankunaka wakrakunawan yapunkunarikmi, wiwakunawan allpapi yapushpa. Tractorka mana uchilla ashpapi yapuytukunchu
16	Women	Ministinchik ishki, shinallatak minsa runakunata yurakunata churankapak, chaymantami may han ayllu yanapachun shuyakrinchik, may vecinokuna, shinallatak may han mashikunata

Number	Gender	Quotes in Chigani Alto, Aymara
1	Women	Nayrïr ayllunakax janipuniw hacienda colonial ukhamäkänti ukat janiw irpiris utjkänti; ukankirinakax uraqinakapan dueñonakapäpxänwa. Ukatsti janiw taqpach autonomía jan ukax libertad ukax utjkänti ukat jan irnaqäwixa utjkanti jupanakatakixa payïr clase markachirinakjam uñjatäpxänwa
2	Women	Awk taykax janiw yaticha ñ utaru qhithapkituti iwija awatiri wakisïna. Ukatxa mamajaru jist'asta sarañataki, ukatxa situa jumaxa warmitawa, uywanaka awatiña yanapt'añamawa. Janiwa yatichaña utaxa utjkänti, janiwa ullaña yatiqapti
3	Men	Ayllunakax uraqininakar kutkatasiñ qalltapxäna, ukatx waljanipuniw jaltxapxi; ukax mä clase ch'axwawiwa, ukatx 90 maranakan uraqi ch'axwawi qalltawiwa
4	Men	Bolivia markax mä ch'amanchaw sarnaqäwiniwa. 1952 maranx sector campesino ukax mä sindicato ukar tukuwayi, ukatx Movimiento Nacionalista Revolucionario ukamp chikt'ataw 15–20 mara chhijllawinakan atipt'awayi
5	Men	Estructura sindical ukax ayllunakar irpañataki yanapt'awayi, khitinakas ukankapxi, khitinakas obligaciones ukanipxi ukat khitinakas cargos ukanakap phuqhapxañapa uk yatiñataki. Uraqix jaljatawa ukatx ayllunakax ch'iqiyataw utt'asiwayxi. Reforma ukax sistema cooperativo tradicional ukaruw tukuyawayi ukatx uraqinak apnaqañax juk'akiw utjawayi
6	Men	Reforma ukax sapa mayni jaljtawayaru puriyatayna. Jaljawix territorio ukat sistemas tradicionales de producción ukanak apnaqañax ch'amawa, suka kollos (camas elevadas), ukax 10 hectáreas ukjamaw munasiraki ukatx walja irnaqawinakaw munasispa
7	Women	Amtastwa, juk'ak achunakaxa achüna, janiw umax utjkänti, uraqinakaxa ch'usakïpxänwa ukat janiw yapuchañjamäxänti
8	Men	Nayra achachilanakasax jathanak imañ yatipxäna ukat warawaranak uñjasax pacha yatipxäna
9	Women	Janïr umamp warantkasax taqi kuns amparampix ayrupxayäta mä taladro jan ukax uywampi. Uywa wano apnaqapxayäta; janiw ch'allt'apxirïkti
10	Men	Achachilanakaxa qullonakanxa terrazanaka lurapxäna, janiw uraquixa ukhakikanti. Jichhax, kunaymaninak jan ch'amäñap munapxta, ukat janiw terrazas ukanak apnaqapkti kunatix janiw tractor ukax ukan apnaqañjamäkiti
11	Men	Challwanaka, muxsa achunak apsuñatakiw turkakipt'apxirïta. Nayrax qullqix uywanakanwa; uwijanaka, wakanaka, qarwanaka. Qullqix purinxäna ukhax uywanak aljapxta
12	Men	Revolución Verde ukampixa, nayra achachilanakan yatiñanakapax qhipharkir ukhamaraki jan apnaqañjam uñjañ qalltawayi, kunatix modernizatäñapawa. Ukjatxa jaqinakax agroquímicos ukanakamp apnaqañ qalltapxi, ukat uka pachatpachaw recursos naturales ukanakax jan walt'ayawayi
13	Men	Aldrin plaguicida ukax apnaqañ qalltawayxänwa. Mä ONG internacional ukampiw nayratpach jutäna; jupanakax parroquia ukan yaqha indígenas ayllunkirinakamp yant'asipkäna
14	Women	Masinakaxa walja químico qullanaka apnaqapxi, ukampixa uraqiriw jiwayaskapxi. Nayax suma achu poquyäxa, ukampis jiskt'asiristwa, ¿kuns wawanakajar jaytañani? Ukatpï jan químicos ukanaka apnaqkti
15	Men	Jichhax jaqinakax yaqha qulliq mantanakaru nayrar sartayapxi, kunjamakitix markan minibus apnaqaña … … … … … … … Yapu apnaqañaxa mä acción secundaria ukhamaw uñstayataxi
16	Men	Taqi uraqpachanxa, janiw Bolivia markankikiti, nayra yapuchañ uraqinakaxa jaytatäxiwa, chiqpach nayrar sartawix utjki uka markanakansa. Altiplano markanx walja ayllun jaqinakap chhaqhapxi. Jaqinakax markanakaruw sarxapxi kunatix uka chiqanw chiqpach nayrar sartawix utji sasaw amuyapxi
17	Men	Aka pachanx ayllunkirinakax janiw derechos de propiedad ukar garantizir organismo ukhamäxiti. Nayraqatax derechos ukanakax uñt'ayasiñapatakix comunidadan lurawinakap ukhamarak obligacionanakap phuqhañaw wakisïna. Reformas agrarias ukanakax acción comunitaria ukarux jan ch'amanchawayiwa
18	Men	Jichhax jaqinakax mä minibus ukan 8 jan ukax 12 horanak irnaqañ munapxi, ukatx 200 bolivianos ukhaw mä urux jikxatapxi, yapunakan irnaqañat sipansa, juk'a qullqinak jikxatañat sipansa. Jaqinakax pragmáticos ukhamawa; kunatix wakiski ukanak thaqhapxi
19	Men	Chachanakax pä residencia ukanipxi; markanakaruw sarxapxi ukatx walja irnaqäwinakanw irnaqapxi. Warminakax marcanakan qhiparapxi, chachanakan nayra yapu lurañ lurawinakap phuqhañataki ukhamaraki
20	Men	Altiplano markanx 200 maratpachaw walja jaqinakax insumos químicos ukanakamp uñstayapxi ch'uqinakaru uskuñataki
21	Women	2006 maranx tractorax purintani. Jichhax, janiw yugo apnaqxapxtati ukatx uywanakax juk'akiw utji. Nayrax walja uwijanakas wakanakas utjayatanawa

Number	Gender	Quotes in Chigani Alto, Aymara
22	Women	Tractor purinitapatpachaw wali sum sarnaqawayta. Uraq yapuchañ yatta ukat ch'uqi yapuchañax wali sumaw sarawayxi. Nayraqatax tractor ukampiw uraqinak ch'allt'apxirïta ukatx qhipharux amparampix lurapxiriyäta, ukampis jichhax phuqhat yapuchañatakiw apnaqapxta
23	Men	Wila Poncho ukax aymara saräwin identidad ukhamaw qhanstawayxi. Sánchez de Lozada ukamp ch'axwañ pachanx Achacachi markan wila ponchos ukanakax mä chimpu ukham apnaqañ qalltawayi, ukax chachanak ch'axwañ uñacht'ayi
24	Women	Janïr Evo p'iqinchirïkasax juk'amp jisk'achataw uñjasipxta, kunatix etnias ukanakaw jik'aki uñjataxi
25	Men	Kunapachatix jiwasan clase ukan indígena p'iqinchiripan ch'axwawinakapax utjki ukhax wila ponchos ukanakamp isthapt'asipxta. Santa Cruz markankir jaqinakampiw uñkatasipxta, jupanakax jupar jaqunukuñ munapxi, ukat wila ponchos ukanakaw arxatapxi
26	Men	Evo ukax agenda campesina ukat indígenas ukampiw qalltawayi. Jupax uraqiruw titulatäna ukatx 24 millones de hectáreas territorios indígenas ukanakaruw uñt'ayäna, ukampis 1950 maranakan jisk'a propiedades ukanakakiw uñt'ayasïna. Evo partido ukax organizaciones campesinas ukat estructuras políticas ukanakan fronteras ukanakaruw ch'amanchawayi, capacidad colectiva ukarux jan ch'amanchawayiwa. 'Jaqinakar' uñt'ayañ munapkchisa, grupos sociales, indígenas ukat campesinos ukanakaruw t'aqanuqawayi ukat co-optawayi
27	Men	Andino tuqitxa, mä ecosistema ukan elementos abióticos ukat simbióticos ukanakax mä taqpach mayacht'at uñjasi. Poquyañ ukax suma sartañapatakix janiw quqar umamp warantañax wakiskiti ukat uraqin uñacht'äwinakap uñjañax wakiskiti, ukampirus uraqimp, qullunakampi ukat alaxpachamp aruskipt'añaw wakisi
28	Women	FRN ukax 20 participantes ukaru uñt'ayawayi, ukatx kunjams bioinsumos ukax jan walt'awinakarux jark'aqañ yanapt'aspa ukat alinakaru juyphi ukat chijchchi ukanakat jark'aqañ yanapt'aspa uk yatxatañ amtawayi
29	Women	Nayaw biol ukamp ch'allt'awayta ukat wali sumawa irnaqawayi. Mä marax juyphi ukat chijchchi ukaw utjawayi, ukampis biol ukamp ch'allt'atatxa, quqanakax 100% ukjaw kutt'awayxi. Nayax bokashi ukamp apnaqaraktwa, wali sum irnaqt'i!
30	Women	FRN ukankirinakax marka lurañ amtapxäna, ukatx markan yanapt'ap mayipxäna, mä centro lurañataki. Ayllunkirinakax adobes lurañampiw yanapt'asipxäna ukatx irnaqäw churapxäna, PROSUCO ukax estuco, cemento, punkunaka ukat ventanas ukanakaw churasi
31	Women	Janiw qullanak alañ munktanti, abonos ukanakaw lurapxta ukatx pachagrama ukampiw nayra achachilanakan yatiñanakapar kutt'ayañataki. Jichhax ch'uqinakax juk'amp sumaw muxsaxi, juk'amp pachanakaw utji ukat sumaw jilxattaski
32	Women	Uraq q'umachawix yaqha ayllunkirinakampiw frontera ukan ch'axwawinakap utjayawayi. Jupanakax organizacionaruw t'aqanuqapxi
33	Men	Nayrax janiw ch'axwawinakas utjkänti; samarañaw utjäna, ukat aka maldito proyectox frontera ukan ch'axwawinakap ayllunakan apaniwayi
34	Men	Mä qawqha infecciones ukat jiwatanakax utjawayiwa, ukampis janiw kunas sinti jach'äkiti. Markax sistema ukan t'unjatätap amuyaskäna ukhax ayllunakax resiliencia uñacht'ayapxäna: uraqinipxiwa, yapuchäw yatiñanaka ukat agroecología ukanakaw utji, ukax askinak jikxatañatakiw puriyi
35	Women	Ayllunkirinakax pata chiqarux 45.000 pino quqanakampiw wasitat quqanak lurapxäna; sapa familiax pusi patak quqa ayrupxäna
36	Women	Allchhinakajatakiw quqanak ayruntawaytwa, ukatwa wali kusisitaw ayruntawaytxa ukat uka samka phuqhapxtwa. Ukampirus uraqiruw jaquqaniwayi, ukatx phichhantapxitu ukhax usuchjapxituwa
37	Men	Cultura andina ukar kutt'ayaña ukhamarak kunayman achunak apnaqañax familian ukhamarak ecosistema ukan suma jakasiñapatakix wali askiwa. Agroecología ukax ayllunakarux nayra achachilanakan yatiñanakapampix wasitat mayachasiñatakiw yanapt'i, ukhamarak jathanaka, territorio ukat agrobiodiversidad ukanakar apnaqañ yanapt'i
38	Men	Jiwasatakix wali askiw achachilanakjamax wasitat yapuchañax kunatix jupanakax ecológicamente jan químicos ukanakamp achuyapxäna

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Data availability The qualitative data generated and/or analyzed during this study are not publicly available due to confidentiality agreements and ethical commitments to participating Indigenous communities.

Declarations

Ethical approval A university ethics committee approved the procedures used in this study, which adhere to the tenets of the Declaration of Helsinki.

Consent to participate For all research involving human subjects, participants provided freely given, informed consent to participate in the study.

Competing interests The authors declare no conflicts of interest.

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