



Decolonizing wildfire risk management: indigenous responses to fire criminalization policies and increasingly flammable forest landscapes in Lomerío, Bolivia

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ABSTRACT

Drawing on decolonial thought, this article provides a perspective on local indigenous knowledge and governance systems as a resource for informing wildfire risk policy approaches and collaborative environmental security. In 2019, the Indigenous Territory of Lomerío in Bolivia was heavily affected by wildfires, due to a combination of fires that penetrated the territory from outside and others that spread from inside. As result, the Bolivian Forest Management Agency (ABT) started threatening indigenous people with criminal action for using fire in their livelihood practices. In response, in 2020 and with the support of several institutions, the Union of Indigenous Communities of Lomerío (CICOL) initiated a series of activities to ensure local control of wildfire risk management in the territory. These include a written burning protocol, a fire monitoring programme, water basin and forest conservation policies, participatory research conducted by indigenous researchers about the use of fire in Lomerío and cultural revitalization strategies. The article presents the results of these different strategies and their contributions to creating awareness of appropriate regulations for wildfire risk management by national authorities from the perspective of the Monkoxi indigenous people.

1. Introduction

Large-scale wildfires have become a recurring problem in the Amazonia region. Since 1987, the region has been experiencing major drought events over a 10-year cycle, which has exposed different countries to prolonged fire events affecting large areas of savanna, shrubland and forested areas. Due to their large size and severe intensity, these wildfires have resulted in major environmental and socio-economic disasters (Food and Agriculture Organization FAO, 2011). The most recent of these fire events in 2019 and 2020 in the Brazilian state of Amazonas and the Bolivian lowlands represents a case in point (Andela et al., 2022; Camargo, 2021; Rodríguez and Inturias, 2020).

Thus, in recent times we have seen a surge in fire control policies aimed at monitoring and ameliorating fire hazard. Because these policies have been developed in the aftermath of large-scale fire events, they have tended to reflect a conservationist discourse that responds to national and international environmental concerns over the global climate crisis. In so doing, these policies have framed the “fire problem”

around those who use fire in their land-use practices, especially small-scale agriculturalists and indigenous communities (Sorrensen, 2009), and have often criminalized small-scale fire users. Much less attention has been paid to large-scale land conversion processes and biomass build up, which are known to augment the risk of large wildfires worldwide (Food and Agriculture Organization FAO, 2011; Stephens et al., 2014).

This way of framing the response to “climate security” not only blames those that are often least responsible for the current increase in wildfires, but also fails to incorporate them as stakeholders in potential solutions. Thus, there is a danger of current fire risk management strategies reinforcing a historical trend of top-down and externally led interventions, taking away control of the management of their territories from indigenous peoples and silencing their own ways of dealing with an increasingly flammable landscape. This is coupled with insufficient knowledge about local responses to wildfire risk management.

In the last decade traditional knowledge of fire has begun to be widely studied, and traditional burning practices widely documented (Ponce-Calderón et al., 2022; Huffman, 2013; Rodríguez, 2007; Mistry

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et al., 2005; Laris, 2002) with important steps taken in some parts of the world to integrate indigenous knowledge into fire management policy (Goldammer, 2022; Robinson et al., 2016). Nevertheless, little is still known about how wildfire is currently managed in indigenous communities worldwide as they cope with the effects of climate change (Christianson, 2015). Scant attention has been paid also to studying how contemporary wildfire risk management strategies are accepted in forest-dependent communities and how these are being used or adapted in practice (Christianson, 2015) (for an exception, see Pasiecznik and Goldammer, 2022). Furthermore, very few studies have examined how responses to wildfire management are shaped locally when indigenous peoples are legal owners of their territories and remain in their traditional homelands.

In this paper we discuss a case of indigenous-led wildfire risk management in the territory of Lomerío, Bolivia, that provides a perspective on local indigenous knowledge and governance systems as a resource for collaborative environmental security, and as an alternative to current top-down and criminalizing fire policies. In 2006, the Monkoxi were granted legal ownership of their territories and have been unique in responding to wildfire risk management via their own institutional arrangements but also by articulating with a wide range of academic and non-governmental institutions. The aim has been to ensure that fire management within Lomerío incorporates and maintains ancestral knowledge but also adopts innovative and new technologies (Peña Supayabe et al., 2022).

This paper discusses how this process of indigenous wildfire risk management is being developed and what it can teach us about how indigenous people are trying to decolonise fire management policies in their territories.

The paper is divided into five parts. Firstly, we explain how we define a decolonial approach for wildfire risk management, with a focus on the concept of cognitive justice. This is followed by a methods section that discusses how the research was undertaken. The third introduces the current relationship of the Monkoxi with fire, which is followed by a discussion of the strategies being used by the Monkoxi to manage wildfire risk. We finish by bringing together the main findings and issuing some concluding remarks.

1.1. The need for cognitive justice in wildfire risk management

Different forms of direct and cultural violence exercised on fire-dependent indigenous peoples over the last 100 years have been extensively documented across the world (Lewis, 1989; Laris, 2002, Rodríguez, 2007, Ponce-Calderón et al., 2022). These include anti-fire repression (fines, imprisonment, displacement), anti-fire rhetoric and different policies aimed at modifying the livelihood practices of indigenous people away from the use of fire. Intrinsic to the way most fire management policies across the world have been framed is the exclusion and marginalization of local worldviews, values, governance systems and knowledge of fire.

As knowledge concerning the cultural and environmental value of local fire management practices has become more widespread, increasing attention has been paid to developing fire management systems that incorporate different perspectives of fire and forms of environmental knowledge, including those of local and indigenous peoples, or to documenting and legitimizing local fire use knowledge and practices (Laris, 2002; Mistry et al., 2005, Rodríguez, 2007, Ponce-Calderón et al., 2022).

Despite efforts to democratize knowledge and to integrate indigenous knowledge in fire management policies, epistemic domination in wildfire management continues in many parts of the world due to the strong hold that a western scientific worldview continues to have in knowledge hierarchies within the agencies and among practitioners responsible for wildfire management (see, for example, Sherry et al., 2019).

Climate change and securitization policies have exacerbated this.

The emphasis on a negative view of fire in national and international conservation policy fora (which span from colonial narratives of nature to those concerning climate change) and the increasing flammability of certain landscapes, has continued to distort local fire management practices and, in many parts of the world, has triggered a rise in the criminalization of indigenous uses of fire (Sorrensen, 2009; Ponce Calderón et al., 2020). Overcoming epistemic violence in wildfire risk management continues to be a challenge.

One issue that has received very little attention as more pluralistic approaches to fire management have been proposed, is the way in which indigenous peoples themselves cope with an increasingly flammable landscape via their own institutional arrangements and environmental governance systems (Christianson, 2015). In other words, wildfire risk management as a process led by communities themselves has been largely ignored, despite being key to overcoming epistemic violence and injustice in the current context of increasing criminalization of fire use.

In 1997, Shiv Visvanathan proposed the term *cognitive justice* to suggest a way out of such situations of epistemic domination. Cognitive justice, he said, “demands recognition of knowledges, not only as methods but as ways of life. This presupposes that knowledge is embedded in an ecology of knowledges, where each knowledge has its place, its claim to a cosmology, its sense as a form of life. In this sense knowledge is not something to be abstracted from a culture as a life form; it is connected to a livelihood, a life cycle, a lifestyle; it determines life chances” (Visvanathan, 1997).

According to this perspective, a greater recognition of alternative knowledge in fire management requires changing the conditions of dialogue between knowledge systems, so that those actors who have traditionally been excluded, such as indigenous peoples, no longer have to fit into the structures and standards of Western knowledge.

Seen in this way, cognitive justice must form part of a wider process of decolonization of knowledge that must start in universities, critically questioning “the how” and “what for” of knowledge production (Santos, 2007; Mignolo, 2008), to generate new proposals for collaboration with those conventionally considered “study subjects” (Perry, Rappaport, 2013) or “conservation beneficiaries”. This implies going beyond generating methodologies for communities and indigenous peoples serving as partner researchers or resource managers in wildfire management, to being willing to respond to the social, cultural, political, economic and environmental imperatives of local and indigenous peoples’ agendas (Smith, 2012).

As Catherine Walsh (2005) has suggested, this entails creating new knowledge in a way that confronts existing relations of domination in hegemonic paradigms, and also helps to strengthen what people themselves understand and reconstruct as ‘theirs’, in relation to identities, differences and knowledge. This emphasis on reconstructing, recovering and revaluing local knowledge is key to achieving cognitive justice in wildfire risk management. Doing so is particularly relevant in cases where indigenous people are the legal owners of their territories, such as the case examined in this paper.

We argue that this implies understanding and strengthening responses to wildfire risk as part of the self-determination agenda of indigenous people, which in the case of the Monkoxi is called *Nuxiaká Uxia Nosibóriki*, their own form of government.

In 2019, the Indigenous Territory of Lomerío in Bolivia was heavily affected by wildfires, due to a combination of, fires that penetrated the territory from outside, and others that spread from farming and hunting areas. As a result, the Bolivian Forest Management Agency (ABT) started threatening to take criminal proceedings against the Monkoxi indigenous people for using fire in their livelihood practices and to ban altogether the use of fire in the area. To fight back, in 2019 the Union of Indigenous Communities of Lomerío (CICOL) initiated a series of strategies to ensure control and adequate fire risk management in the territory.

The response of the Monkoxi to criminalization policies is linked to the sustained efforts that this indigenous nation in Bolivia has been

making since the late 1900s to develop a model of territorial governance that would enable them to break free of external control over their territory and natural resources.

What has been peculiar in the Monkoxi struggle for liberation has been the continual collaboration with a wide range of institutional actors that has helped them move towards their self-government model (Inturias et al., 2019). In the case of recent efforts to develop a fire risk management process in the area, the Monkoxi developed a collaboration with a range of organizations: the Bolivian Institute for Forestry Research (IBIF), Support for the Peasant-Indigenous of Eastern Bolivia (ABCOP), the Centre for Legal Studies and Social Studies (CEJIS), the (BLINDED for Review and (BLINDED for Review. Each of these organizations has supported CICOL in different ways, giving rise to a process of dialogues of knowledge (Leff, 2004) about fire management. The ultimate aim of this process is to ensure local control of fire use and risk but also to create awareness among national authorities of appropriate regulations for the use of fire in Lomerío according to the Monkoxi perspective. This paper systematizes these strategies with the hope of making them visible, and to help develop a counter-narrative about indigenous wildfire risk management among relevant policy-making circles in Bolivia and beyond.

2. Research methods

This paper is based on information collected via a long-standing research collaboration between NUR University in Bolivia, the University of East Anglia (UEA) in the UK and the Union of Indigenous Communities of Lomerío (CICOL), which has sought to support indigenous self-governance in Lomerío through different action-research processes.

Our collaborative research venture started in 2013 with the “Conservation, Justice and Markets” project whereby we jointly evaluated tensions and injustices in community forest management in Lomerío (Gross-Camp et al., 2019). Between 2016 and 2019, through the “Academic and Activist Co-produced knowledge of environmental Justice” (Acknowl_EJ) project, we analyzed the strategies used by the Monkoxi to achieve self-governance in Lomerío (Inturias et al., 2019). In 2018, as part of a new international project (INDIS-Indigenous Sustainable Development <https://indisproject.org/>) we developed a new collaboration to help articulate and revitalise key aspects of Monkoxi knowledge systems that could help strengthen their self-governance process. Given the severity of forest fires in 2019, one of the topics we decided to concentrate on was knowledge of fire use and of wildfire risk management. We used two participatory methods for this: video interviews and photovoice, which took place in two different phases and involved different teams. The first one was used to research local use of fire and responses to wildfire risk, and the second one to aid a process of cultural revitalization about fire.

Participatory research on fire took place between September 2020 and October 2021 and was undertaken by a joint research team consisting of three indigenous researchers (the former Chief General of CICOL, Elmar Masai and two young Monkoxi, Ignacio Soquere and Reina García) and two social science researchers, one from NUR University (Mirna Inturias) and another from UEA (Iokíne Rodríguez) with support and consent from CICOL’s board of directors and the council of elders. The aim was to develop a clear understanding of the knowledge base of the cultural significance and uses of fire among the Monkoxi, along with insights into the current application of customary and newly introduced fire use norms that communities are using in the current context of a changing climate and landscape. An interview guide was developed jointly, which the three indigenous researchers applied in seven different communities (Todos Santos, San Lorenzo, Monterito, Palmira, Puerto Nuevo, San Andrés and Salinas). A total of 40 video interviews

were carried out (70% men and 30% women). The central aspects of the video interviews with respect to the Monkoxi view of fire were brought together in a video titled: “Fire in the Monkoxi Nation”.¹

The photovoice process was carried out by the same team as above, but with an additional group of external facilitators with expertise in application of this method (Markus Martínez Burman, Sharon Gonzalez and Kevin Palacios) and eight young Monkoxi² who were keen to learn to use photography as a means to reconnect with their culture, territory and knowledge system.³ For four months, between September and December 2021, the eight young Monkoxi were trained in participatory photography and documented the Monkoxi culture, way of life and challenges in the management of their territory. Fire was a cross-cutting theme in many of the stories. The photo-stories of the eight indigenous photographers were brought together in a book entitled “Monkoxi Photovoice: a tapestry of stories of autonomy, identity and climate action from the youth of the Monkoxi Nation of Lomerío”.⁴

To discuss the strategies being used by the Monkoxi to manage wildfire risk in Lomerío, we draw on information collected through these participatory processes, as well as on experiences and data derived from additional collaborations that CICOL has developed in the last four years with other institutions to help manage wildfire risk in Lomerío. We start by describing the cultural and current relationship of the Monkoxi with fire.

3. The Monkoxi and their relationship with fire

3.1. Uses and cultural significance of fire

The communal indigenous territory (TCO) of Lomerío covers 256,000 ha in the east of the department of Santa Cruz, in the Bolivian lowlands (see Fig. 1) dominated by Chiquitano dry forest, together with shrubland, savanna and inundated swamp areas (*Pampas-Cerrado*). Some of the current shrubland and savanna areas are the result of a gradual conversion of forested areas by the introduction of cattle grazing and more recently from the repeated impact of fire (Navarro, 1999).

Lomerío is home to around 7000 Monkoxi settled in 29 communities, which range in size from 100 to 1500 inhabitants. In 2006 the Monkoxi were granted property rights over their communal territory, and via the Union of Indigenous Communities of Lomerío (CICOL) the responsibility to safeguard its environmental and cultural integrity.

Most of the families in Lomerío have a self-consumption economy, which is largely centred on the forest and the different products it provides. The principal livelihood activity is agriculture, which is carried out in forest areas with the technique of slash-and-burn agriculture, complemented by small-scale livestock farming, raising small animals and, more recently, cattle-raising. There are also families in some communities dedicated to bee-keeping. Hunting, fishing and the collection of honey and wild plant products play a complementary role in the Monkoxi economy.

On the other hand, within the territory there are community forest management plans. Twenty-three (of 29) communities in Lomerío have set aside areas for community-based commercial forestry, amounting to more than one third of the TCO. Communities are permitted to retain

¹ The video can be downloaded at: <https://www.youtube.com/watch?v=pL9D22qGGZQ>

² The Monkoxi young photographers are: Brenda Chuvirú García, Eliana Peña Chore, Gabi Irene Ipamo Ipi, Johan Pedriel Rodríguez Cesarí, Jorge Andrés Guizada Palachay, Juan Said García Chuvirú, Mary Isabel García Parapaino and Víctor Hugo García.

³ The Photovoice Project also receive support from the National Geographic Young Explorers program and the GIZ program of the German Cooperation Agency.

⁴ The Photovoice book can be downloaded at: https://ueaeprints.uea.ac.uk/id/eprint/88010/1/Photovoice_Monkoxi:Reconexion_2022.pdf



Fig. 1. Location of the Indigenous Territory of Lomerío.

100% of the income from community forestry, although in theory 5% of the income should go to the legal authority over the territory, CICOL, to help cover administration costs.

The use of fire is central in practically all activities of the family economy and the daily life of the Monkoxi.

Fire is their main tool in agriculture. The farming unit is called *chaco*. Similar to many other forest-dependent indigenous people in the Americas (Camargo, 2021), the Monkoxi clear and cultivate an area of 1–2 ha of forest, moving every two years to new areas to allow the soil to recover and to preserve natural resources and biodiversity. To clear forest vegetation before planting, the Monkoxi use fire—an ancestral method passed down through the generations that helps to fertilize and aerate the soil. This favours the regeneration of useful plants in secondary forests.

According to the traditional agricultural calendar, there are two times for burning the *chaco*: August–September for the first burn and October–November for the second burn.

Fire is also used in cattle grazing to generate fresh grass for livestock, and in hunting. It is central to cooking and preparation of *chica* (a traditional fermented drink) since most families use firewood, and as a communication tool in emergencies when they go out into the forests. Fire also serves as “a light” for the Monkoxi, since in many communities there is no electricity. In addition, it is used to burn garbage. Fire is also “a blanket, it gives heat”. In every Monkoxi house, “the fire is always lit.”

Beyond its practical uses, Monkoxi culture is tightly knit with fire. In the Monkoxi traditional belief system, fire (*Pesé*) is considered a god (*Nixhi Pesé*) (literally “My Fire”), with inanimate powers of its own, just

like the other gods (*Jichis*) of the forest.⁵ It is not simply a tool at the service of the human being; fire has a life of its own. A relationship is established with “him.” “You make him work for you” (“*lo ocupas*”) in the burning of *chaco*, “you bring it together” (“*lo juntas*”), to make a fire to cook.

During good times he is considered a “companion, an ally”, with whom a duel sometimes might take place: “you beat him”, “he beats you”. But in bad times he is very feared and cannot be controlled. Therefore, you must know how to get along with him:

“You must treat it tenderly, singing to it before setting the *chaco* on fire, caressing it. He doesn’t like to be hit with beaters. When you do so, he becomes angrier and attacks with more force. When he’s like this, only the rain stops him. That’s why it’s best to prevent him from getting angry.” (Elmar Masay, former Chief General, interview extract, CICOL)

It is also key to avoid burning during periods of strong wind:

“There are times when severe winds hit us. Fire doesn’t understand that. One tries to defend the forest, but it is impossible. Because, when the wind is strong, the stronger he becomes.” (Pedro Ipamo, interview extract, Palmira)

The good use of fire is also important to maintain a good relationship with the other gods of the forest:

“If one burns a *curichi* (water hole) where there is a water spring, it can greatly affect the *Jichi* (god) of the spring. Because the *Jichi* always lives in the bushes, where they are thickest, that is where their

⁵ In the Monkoxi worldview *Jichis* are considered the guardians of nature and the forest. In addition to the *Jichi* of fire, there is the *Jichi* of water (*Nixhi Tux*), the *Jichi* of stones (*Nixhi Kanx*), the *Jichi* of the hills (*Nixhi Yirityux*), the *Jichi* of the mountains (*Nixhi Niunx*) and the *Jichi* of animals (*Nixhi Numukyanka*). They have a guardian for each of the resources they care for and receive from the forest.

habitats are and when that is destroyed, that is a threat to the existence of the *Jichi* in that place. That's why we always keep the *Jichis* in the most wooded places, right? That's the *Jichi*'s natural habitat, because the vegetation is thickest...The *Jichis* are a very important factor in nature of us Monkoxi, as connoisseurs of our territory. The *Jichi* plays a very important role, be it from the mountain, from the water, of the animals." (Pedro Ipamo, interview extract, El Puquio)

Fire is also central to some annual Christian religious festivities like the day of Santa Rosa de Lima, August 30th, which marks the change from the dry to the rainy season and known as the day to start the burns in the *chaco*. The Monkoxi believe that if a tribute is not made to Santa Rosa that day, fires can get out of control. Fire is also central in the day of San Juan Bautista on June 24th, which is devoted to the blessing of all the agricultural staple for abundance in farming. A tribute to fire is made that day.

Thus, fire has great spiritual value to the Monkoxi:

"We use fire to attract the good spirits and also to help keep the bad spirits away" (Anacleto Peña, interview extract, Chief General, CICOL)

Due to the intimate and interconnected relationship that the Monkoxi have with fire, the Monkoxi claim it is impossible to imagine life without it: "fire is everything, without fire, there is no life".

3.2. Using fire in a changing social and ecological landscape

Despite this, fire is generating increasing problems for the Monkoxi due to the recurrence of large forest fires between August and September, linked to complex processes of climate and social change.

In 2019, Bolivia experienced an environmental crisis caused by forest fires. The territory of Lomerío was heavily affected (Rodríguez and Inturias, 2020), with a total of 84,604.00 ha (33%) of the total area of the TCO burned, 12% of which were community forestry management areas (CICOL, 2020). This was repeated in 2020, when 15.4% of the territory of municipality of Lomerío was burned, corresponding mostly to forested areas (Flores-Valencia and Maillard, 2021).

Although the magnitude of the 2019 and 2020 fires are unprecedented, forest fires in Lomerío are not a novel phenomenon. According to some elders, similar episodes have been experienced in the last four decades.

"Every year there are fires, but of lesser magnitude, right? This year has seen much greater than in previous years. When I was a child, about 40 years ago, I saw similar fires". (Esteban Chore, interview extract, San Lorenzo)

Indeed, large-scale forest fires have been documented in Chiquitania in the literature since 1987 (Devisscher et al., 2019). What is new, however, are the multiple causes of these fires, from inside and outside the territory, which often makes it impossible for community members to determine their origin.

"I couldn't tell you which side the fire started from. It came a little on this side and a little on the other side, and also over there. It felt like an L, and we didn't know exactly where it came from. I wanted to save my *chaco* so that it didn't burn, doing the firebreaks, but the fire came from everywhere and we couldn't save it". (Lidia Belen Chore, interview extract, Todos Santos)

On the one hand, climate change, drought, strong winds and a very atypical frost are highlighted as contributing causes of the wildfires.

"Because of the frost that fell, which you don't see much around here, even the little animals, the little birds are dying. We are not used to that, and this year this is what happened. There was a frost, and it has burned all the products of the *chaco* and moreover the drought and on top of that, the fire. And thus, the little *chacos*, that give life to the community, were all burned. Everything was burned. Our communal

forest management areas were also burned. Many large thick timber trees were burned, quite a loss. It's sad to see." (Joaquín Chuve, interview extract, San Lorenzo)

The increasingly flammable conditions are compounded by socio-cultural change. Many young Monkoxi are departing the territory for urban areas, seeking opportunities for higher education and jobs, leaving the traditional livelihood practices in the hands of elders, who alone often cannot cope with the seasonal burns, particularly in these more hazardous conditions. Sometimes, the young Monkoxi that do remain take the blame for not carrying out the burn adequately for farming or while hunting.

"Young people, especially when they have *chaco*, are told that they have to notify the chief... It has happened, for example, that they go hunting and over there, I don't know if it was a joke, they don't turn it off well. Or they throw a cigarette, throw it away and sometimes the fire starts from there." (Pedro Sorioco, interview extract, Todos Santos)

Linked to the above is the fact that as a result of recent government incentives for the introduction of cattle grazing in rural areas, many young and professional Monkoxi are abandoning farming in favour of cattle-grazing, which is leading to widespread land conversion from forest farming to grazing areas:

"Currently, there aren't as many *chacos* as before, there are not many *chacadores*. Now there are more paddocks" (Pedro Ipamo Jimenez, interview extract, el Puquio)

Yet, overall, most Monkoxi interviewed attribute the origin of the 2019 and 2020 wildfires to land-use practices outside Lomerío, particularly agro-industrial landowners, intercultural communities (recently settled communities within the boundaries of Lomerío) and from the Ayoreos indigenous nation who are believed to be undertaking significant land conversion processes linked to commercial forestry.

"They came from outside of Lomerío, from the Holanda community. More than 300 ha were burned near the community of Salinas." (Testimony from Salinas)⁶

"It is unfortunate that these things occur, but these fires do not originate in the community, but from outside. Last year he came from here from Los Pios on the Tacoral side." (Testimony from Monterito)

"That fire came from them, from where the Alloreos, who were taking poles from Las Conchas. That fire came from there and came here. Everything burned, and the little insects go away and right now there are no more." (Testimony from Todos Santos).

"Fires are always caused by large ranchers that are in our surroundings of the Lomerío territory. For example, on the west side, we have a cattle rancher, he will have about 100 ha of clearing. And all the clearings that the ranchers make when they clear the forest, those are the ones that cause the big fires of great magnitude, and that later reach our territory. Once it reaches our territory, when there is a heavily wooded forest, that is where the huge fire is caused." (Testimony from El Puquio).

Indeed, studies show a strong connection between the extent of damage caused by the fires and recent government policies and projects encouraging agricultural expansion (Devisscher et al., 2019). For example, the production of biofuels via soybean plantations and the expansion of livestock grazing for export fostered speculative clearing of new lands through the use of fire, both on private land (especially agro-industrial properties) and in adjacent areas on the agricultural frontier (Romero-Muñoz et al., 2019). In addition, since 2013, the

⁶ These four testimonies were kept anonymous to protect the identity of the interviewees.

government has sanctioned regulations that permitted the burning and logging of forests up to 20 ha. The result was an acceleration of land grabbing and logging in the Bolivian lowlands, evidenced by most recent fires being concentrated in protected areas and titled Indigenous territories, affecting the Monkoxi people of Lomerío among other groups (Rodríguez and Inturias, 2020).

As a result of the 2019 and 2020 fires, the Bolivian Forest Management Agency (ABT) issued a resolution (149/2020) temporarily prohibiting the authorization of burning for agricultural use in the Chaco Region.

The idea of prohibiting fire use as a solution to the problem is perceived by the Monkoxi as unfair and unviable given the central part that fire plays in their lives and the multicausal elements that are contributing to the increasingly flammable landscape in Lomerío, many of which are external to the territory. Furthermore, the prohibition of fire use is seen as an externally imposed sanction that ignores the causes of the problem, the knowledge of fire management that the Monkoxi hold, and the need for deliberation and dialogue to agree on appropriate ways forward:

“The ABT wants us not to burn more, but we as indigenous people do not have machinery to sow, it always must be through fire, to burn the *chaco*, taking good care to control it. The ABT should come to the communities to engage in dialogue, to exchange ideas so that we can fairly explain our experience, both as Chiquitanos and ABT. The person who works in the office is different from the person who works in the *chaco*. The one who works in the *chaco*, lives of the *chaco*, also the one who works in the office, cannot live without the office. Then the ABT should come here and sit down to talk to see what both ABT and the community can do.” (Juan Faldin, Interview extract, Puerto Nuevo)

As a response to this top-down fire management policy approach, in 2020 CICOL started to develop a set of strategies to self-govern the management of fire risk within their communities, which we now examine.

4. Monkoxi strategies to self-govern wildfire risk in Lomerío

The Monkoxi approach to self-managing fire risk in their territory is directly linked to their historical struggle to achieve territorial self-governance.

The Monkoxi are one of the most emblematic indigenous nations of the Bolivian lowlands in respect of political strength and organization. They have a long history of resistance to colonial rule and the patronage land tenure system set up in the colonial times. In 1964, and through the political opportunities offered by the Republican nation-state, they began organized resistance through the formation of the Agrarian Peasant Union. In 1982 they were instrumental in the creation of CIDOB (the Confederation of Indigenous Peoples of Bolivia), and later, in 1983, formed the Union of Indigenous Communities of Lomerío (CICOL). In the late 1980s, they were the first indigenous nation in Bolivia to develop community forestry as a form of territorial control, and in 2006, after a long struggle, they succeeded in gaining legal rights over their communal indigenous territory, which CICOL has the legal mandate to safeguard.

As seen from the statement below, territorial self-governance is considered the final step in freeing themselves from oppression:

“Our grandmothers and grandfathers gave their lives to give us a territory where we can be free, where we can make the dream of having our own form of government real, and thus turn our refuge into our road to freedom and our desire to live well. This is what we call: *Nuxiaká Uxia Nosibóríki*” (Masay, Chore, 2018)

In 2008, the Monkoxi were the first indigenous nation in Bolivia to use the United Nations Declaration of Indigenous Peoples Rights to give legal backing to their public proclamation as the first autonomous

indigenous territory of Bolivia. In 2009, they wrote and validated their autonomy statutes in a General Assembly with participation from the 29 communities (see Box 1) and initiated their legal claim for autonomy rights.

Article 15 of CICOL's statutes and regulations (CICOL 2019) defines four levels of participation in decision making in relation to all aspects of community life in Lomerío:

- Ordinary general assemblies are the highest authority that define institutional, organic, political, economic, social and cultural life.
- Extraordinary general assemblies are held to deal with emergencies that cannot be resolved by the Board of Directors of CICOL, and may be convened at the request of one or more of its 29 affiliated communities, by the Board of Directors or the Council of Elders.
- Zonal assemblies are the highest representative authority at community level.
- Communal assemblies are the highest representative authority at the communal level.

Fig. 2 provides a representation of the governance structure in Lomerío. The general assembly, zonal and communal assemblies provide feedback to each other regarding the implementation of policies and strategies for integrated territorial management. Strategic agreements brokered at general assemblies approve operational management instruments from the local level (communal plans) and feed into a collective vision of well-being, or *Plan de Vida*, for the territory as a whole (CICOL/Fundación Tierra, 2019). CICOL acts as an intermediary between the three assemblies and has overall management responsibility over the Lomerío Territory, helping to define, operationalize, set in motion and monitor the management instruments. For day-to-day decision making and management, CICOL operates through its board of directors and the council of elders that sit in the board as an advisory unit.

The management of risks and uncertainties related to wildfires has been approached through application of this governance model. The aim has been that fire management within Lomerío should incorporate and maintain ancestral knowledge while also adopting innovations and new technologies that can compensate for the current changes in weather patterns, increasing pressure on natural resources, generational change, and the effects of agricultural expansion around the territory (Peña Supayabe et al., 2022).

For this purpose, since 2020, CICOL started developing a set of strategies aimed at regulating, controlling, conserving common goods, researching fire use, and revitalizing the traditional knowledge system. Furthermore, CICOL established a technical territorial unit to support and articulate the cooperation with and between various stakeholders. The development of management tools and the implementation of specific actions have involved a variety of external institutions, including the Bolivian Institute for Forestry Research (IBIF), Support for the Campesino-Indigenous People of Eastern Bolivia (ABCOP) and the Centre for Legal and Social Studies (CEJIS). Participatory research and dissemination activities about Monkoxi cultural meanings, and knowledge concerning appropriate uses of fire, were developed together with NUR University and the University of East Anglia.

4.1. Strengthening local fire use and management norms: a new burning protocol

The first strategy put in place to adapt the use of fire to the changing social and environmental conditions, was the development of a new burning protocol setting new guidelines for the use and management of fire in Lomerío (see Box 2). With advice from IBIF, new rules and procedures for fire management were developed, approved in a general assembly and are being implemented as best practices for conserving natural resources and ensuring livelihoods. Although CICOL is the institution in charge of developing and monitoring the guidelines, community chiefs oversee their application at the community and communal level.

Box 1

Salient features of the Monkoxi autonomy statutes:

The definition of the ancestral territory of Lomerío as the geographical limit of their government.

The defence of communal democracy as the main form of collective decision making.

The emphasis given to principles, values and norms of communal and territorial life, such as freedom, sharing (*minga* or *bobikix*), equity, reciprocity, redistribution and solidarity.

The establishment of *besiro* as the official language and Spanish as the second one.

The designation of the General Assembly, with representation from the 29 communities, as the maximum decision-making authority.

The importance given to customary rules and norms and indigenous justice in regulating day-to-day communal life.

The definition of communal economy as the desired form of development, aimed at achieving the *Uxia Nosiboriki* (*Vivir Bien*) of the Monkoxi nation, respecting Mother Earth, the spirits of the forest (*Jichis*) and life in harmony with nature. (Flores, 2018).

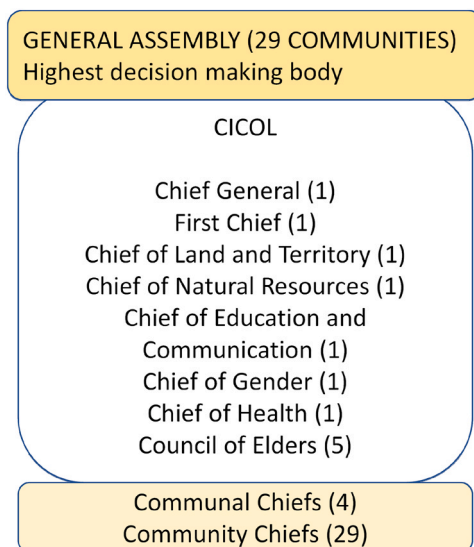


Fig. 2. Governance structure in Lomerío.

The key issue that the protocol seeks to address is the higher risk of fires expanding throughout the territory and into the forests at the end of the dry season (August–September) when *chacos* must be set to prepare the soil for sowing. There are three key problems that need to be addressed to reduce fire risk in this activity. One is the hotter and drier conditions at this time of the year, which makes fires potentially more hazardous and the vegetation more flammable. Another is the increasing closeness between cropped areas. In the past, the Monkoxi farmed areas quite far from their dwellings to prevent domestic animals from eating the crops. Currently, the fallow period between crops is shorter than before and crops are closer, even side by side, because agricultural land is not abundant. This increases the chances of fires escaping from one *chaco* to another. The third problem is the reduced numbers of young people involved in farming activities, limiting the possibilities of successfully undertaking a controlled burn.

To address the first problem, the protocol calls for making fire breaks 2.5 m away from the perimeter of the *chaco* and carrying out burns in the early morning or evening. The second and third problems are to be addressed by sharing the responsibility for family burns and ensuring oversight of the activity by community chiefs. This is to be achieved by informing the community chief and *chaco* neighbours before carrying out burns on the *chaco*, and setting burns in teams of at least five people. If there are insufficient family members to form a team of five, the community members must help each other out by making *mini-mingas* (*minga* is collective activity of shared benefit).

One important characteristic of the protocol is its advisory nature. It does not involve the application of sanctions to enforce the norms. This follows customary Monkoxi ways of setting up communal norms and regulations, which are based on tolerance and the call for individual autonomy and responsibility in actions.

“When wildfires are caused by community members, we still maintain the belief that forest fires have not been caused in purpose but through neglect. This is what we do. We practice tolerance as part of our culture...As our way of using our community justice.” (Pedro Ipamo Jimenez, interview extract, El Puquio).

In fact, as suggested by one of the interviewees, the use of sanctions, if anything will lead to less respect for the norms, and thus should be avoided:

“But the approach is more of a recommendation, not so much a sanction, so that the community members learn to coordinate with their neighbors. If it is sanctioned, the community members will not collaborate.” (Jesus Choquere Subiri, interview extract, Monterito)

4.2. Introducing new fire management methods: fire monitors and prescribed burning

The second strategy was developing strategic policies and guidelines for monitoring wildfire risks and land management. With the support of ABCOP and IBIF, CICOL set up a wildfire monitoring program which operates via a network of volunteers across the territory. The rapid-response fire control program evolved naturally from a previous environmental monitoring program developed in 2018 with the support of CEJIS to monitor mining, wood theft pirating and other threats to the territory. The training received and equipment used in the environmental monitoring program was instrumental in setting up the fire monitoring program.

Thus, when there is a need for a rapid response to control forest fires, fire monitors contact CICOL’s Territorial Unit, which keeps a record of fire events and coordinates joint actions to control the spread of fires.

“Now we have monitors who coordinate with the community chiefs to burn a *chaco*, because in the monitoring center that we have in the Central (CICOL), when there is a fire, we get a heat signal and then whoever is in the headquarters can say we have a heat hotspot in such part, and we can tell if the fire is being controlled or not. If no one reports it, it means that there is no major concern. If we get a report, we know the fire is spreading and we need to worry.” (Jose Picibiru, interview extract, Monterito)

In some villages, fire monitors are also supported by a small fire brigade. Such is the case at Monterito village:

Box 2

Main features of the new Monkoxi burning protocol.

Methodology for a controlled burn:

To carry out burning in a controlled manner and prevent the spread of the fire outside the area to be burned, the following steps must be followed:

Inform the chief about intent to carry out the burn.

Agree with neighbours adjoining the area to be burned to help manage the burn and prevent its spread to other areas.

In carrying out burns, the following aspects must be considered:

Burns should be carried out in the early hours of the day, not when the temperature is very high.

There should be no strong winds.

Clean 2.5 m around the perimeter of the area where the burn will take place, with more than five people to monitor the burn, and those in adjoining areas must also be present.

The people who participate in the burn must also have the necessary tools and equipment in the event of a fire spreading outside the area subject to burning.

Requirements for monitoring:

To adequately monitor controlled burns, the following must be considered:

Communal chiefs must keep a list of the community members who have *chacos* and a burning calendar for their community members.

Community members must request permission to carry out controlled burning from highest authority in the community and they must commit to following their advice.

The person carrying out the burn must be a member of one of the communities of Lomerío.

The size of the *chaco* should not exceed 1 hectare. (CICOL, 2020).

“This year, we started getting organized with support from ABCOP. They came to the community and talked to me and we have brought together interested people to help with any emergency, and there are about 10 people who are volunteers and became community fire-fighters. And these *compañeros* are ready for anything. We have a person in charge of that, who oversees everything where there are fires (monitor), where there is smoke. He goes to see what is happening in the *chaco* in the mountains, and he comes and meets with the rest of the 10 people and if necessary, they go to put out the fire”. (Luis Chubiro Garcia, interview extract, Monterito)

However, a small fire brigade in only one village is insufficient to control fires in the entire territory. Thus, fire prevention through controlled burns (prescribed burning) around forest, wildlife protection and in grazing areas is being proposed to complement fire suppression. Prescribed burning is particularly important to prevent large fires set outside Lomerío spreading across the territory, especially when they hit grassland areas (*pampas*):

“We want to make a plan to start fires, to burn at this time, in June or July, because it can still be put out. We just had a workshop on prescribed burning. For example, this *matacusal* [shrubland habitats with armadillos—*matacus*], if it is very dry, it is likely that the fire will enter, but you have to burn around it so that the fire does not enter. The same in the pampa. In the pampas, straw is like gasoline, right? That spreads like crazy, there is no way to deal with it. We have to prevent this from happening. So, in this time of the year, if now you set it on fire, it spreads during the day, but at night it goes out, and then in the morning with the dew, that’s it! Over there we have some almond trees, and we are going to take care of that, so if you go and set fire around them, the fire will not enter, because it is still green, but at the end of July it is something else. So, to be able to defend that area you have to light around it at this time. If you don’t defend it, fire can kill it. We are always attacked by fire from the north. Because all of that is pampa, and everything comes from beyond the pampa. Everything is pampa until Palmira and if we look

at the other side, just the same. The fires come from that side, from the cattle ranchers because they set fire to their *chaco* or their paddocks and from there fires come here. In September or October. If the sun is strong, we cannot defend ourselves. That is why, I have said, that place that we know is going to hit us when the fire comes, let’s burn it beforehand so that when the fire arrives it will go out, both from there and from here. It is easier to put out the fire in the mountains because of the humidity than in the pampas. The fire comes to us from outside and we don’t know who has set the fire. That is why it is better to burn the pampa at this time.” (Mariano Chore, interview extract, Palmira)

4.3. Documenting local knowledge of fire use and management: research on fire

The third strategy developed by CICOL was documenting the use and management of fire in the territory. Additional to the introduction of new wildfire management methods, CICOL was interested in carrying out their own research to document the Monkoxi knowledge of fire and to evaluate how the new fire prevention and control methods were being applied at the community level. This was carried out through the collaboration with NUR University and the University of East Anglia.

Research into traditional knowledge of fire included documenting the different uses and cultural meanings of fire, and perceptions of climate and landscape change, as well as traditional methods for fire prevention. Research into the application of recently introduced fire control methods involved documenting the knowledge and application of the new burning protocol and well as of the new fire control and prevention methods, discussed above.

Key findings from the uses and cultural meanings of fire and perception of climate and landscape change were discussed in Section 3.

With respect to traditional fire prevention methods, the interviews revealed that the key elements for fire prevention in the *chacos* according to the Monkoxi knowledge system are:

- the direction of the wind (always burn into the wind)
- intensity of the wind (no burns should be carried out during strong winds)
- time of the day of the day to carry out burns (midday when it is hotter and the burns can be accomplished quickly), and
- the months of the year for carrying out seasonal burns (August–September).

Additional to this, the belief system of the Monkoxi calls for avoiding the use of fire in sacred places inhabited by the *Jichis*, which are generally environmental sensitive areas.

Yet these key elements are currently less reliable due to the changing climatic and socio-cultural conditions, which is why the introduction of the new burning protocol and fire control and prevention methods have become so crucial.

The interviews revealed that the content of the new burning protocol is well known at the community level, at least in the seven communities that formed part of evaluation. The three main measures suggested in the protocol: making fire breaks around the *chaco* (*el callejon*), the need to form *mini-mingas* and to inform the chief before burning, were widely known by interviewees when asking about the new methods being promoted at community level to prevent wild forest fires.

Yet, when asking about their application, responses were mixed. In all communities, there was the sense that the community members had responded well to the recommendations and that those in greatest need when burning the *chaco* could now count on support from other community members or even from the fire control volunteers, who may be called upon to help with burns. But in all communities except one (Puerto Nuevo), it was mentioned that people do not always follow the recommendations.

“There are brothers who pay attention to the norm, but there are some who sometimes say, well, I am alone, and I am capable of doing it alone. But it’s not like that. There are people who still don’t abide by this recommendation.” (Jose Picibiru, interview extract, Monterito).

Most of the procedures suggested in the protocol (apart from burning against the wind) are not part of the traditional way of farming in *chacos*. First, farming has been traditionally considered an activity of the family unit, which does not require the consent of the chief or other community members. Second, it never involved asking for the support of other families or community members. Third, the use of fire breaks was not an habitual method of burning the *chaco*. Thus, it is natural for the transition to full application of the new burning protocol to be slow.

With respect to knowledge and application of fire control measures, the interviews showed that although the fire monitors have proved to be of great support identifying the cause and origin of fires and informing about contingency measures, human and material resources to control large fires once they spread throughout the territory are still limited.

“We don’t have much equipment for community firefighters, we only have backpacks, but we don’t have clothing. It is very necessary that each community has good fire-fighting equipment and not only Monterito, to be able to defend the forests from any fire.” (Luis Chubiry Garcia, interview extract, Monterito).

The community firefighters are useful when the scale of the fire is small and if fires are started locally, but they do not have the capacity to stop large-scale wildfires, especially those started outside the territory. In this case, fire prevention through the prescribed burning system in June–July for different types of vegetation discussed above is suggested as a more viable mechanism.

Another fire prevention method being used in some communities as a way of recalibrating the relationship with fire and adapting to the changing climate conditions, is bringing forward or pushing back the burns in the *chacos*.

As mentioned before, the date for the burns of the *chaco* in Lomerío is traditionally linked to the day of Santa Rosa, i.e., August 30th. But as many interviews showed, this day is losing validity as an indicator for

burning the *chaco*.

“All people always wait for August 30th and others burn in the month of September. At that time the *chacos* are burned. In that time the sun is hotter, the wind is stronger. So, people wait for the sun to be hot and the wind strong, then it is good to burn the *chaco*, because the wind helps the burn. But today there is a danger that it will get out of control. Before, our grandparents burned their farms on that date, but at that time, it was different from today. Because before they burned their farm and they didn’t make an alley and the fire didn’t go to the forest either. It very much depends on the weather now. Now the weather is much hotter than before.” (Jesus Choquere Subiru, interview extract, Monterito).

Until recently, by August 30th there had been already at least one or two days of rain, making the conditions for burning safe and for sowing optimal. But in recent years, this pattern has altered:

“But look, we are already in October, and we have not been able to sow.” (Lidia Belen Chore, interview extract, Todos Santos)

As a response to this in some places like in San Andrés village, families have already started to bring forward the burn to June and July,

“The time when you can burn without any danger is the time of June, July because the mountain is still wet. The month of August is difficult because the leaves have fallen from the trees, and there is no rain, and the heat is tremendous.” (Agustin Cabara Chuve, interview extract, San Andrés village)

4.4. Protecting the commons: water basin conservation and agroforestry

Additional to preventing and controlling fire, in 2019 a project with CEJIS was launched to ensure the conservation of the territory, particularly water resources. Entitled “Protection and Conservation of Water Production Forests, for Access to Water for Human Consumption and Improvement of the Quality of Life Lomerío” the project aims to recover surface, underground and spring water sources for human consumption, through conservation of forests, thereby comprehensively managing the basin to improve the quality of life of the communities of Lomerío (CEJIS, 2018).

Thus, fire monitoring is being combined with conservation monitoring, which is a new function being assigned to the fire control volunteers (also known as socio-ecological monitors):

“On the one hand, we have the monitoring of the fires and on the other hand we have seen the importance of conserving water recharge micro-basins. We have articulated this in the functions of the socio-environmental monitors, that they not only control hot-spots in the dry season but also identify water recharge areas and map them to then share this information with the community. Well, the communities know their water recharge zones, but at CICOL we have assumed as a management policy to conserve the water recharge zones and that is where the issue of fire control comes in. We want to avoid that fire reach these zones and that the communities further strengthen their actions to preserve more conservation areas.” (Anacleto Peña, interview extract, Chief General CICOL)

Thus, the fire protocol is now being adapted to include the need to ensure the conservation of water production areas. CICOL is currently working to turn the revised protocol into a “Short Law” (Ley Corta) with the support of a commission of deputies from the National Assembly that deals with indigenous affairs. Apart from regulating land use, the revised protocol seeks to demonstrate to the national authorities the efforts being made in Lomerío in terms of wildfire management and conservation:

“We are not asking for permission, nothing like that, or asking for authorization, but to let them know [the deputies] and ask them for

their support with a short law that shows what we are doing conservations in our terms, with our resources and knowledge. And then, in terms of negotiation, we are also seeking to communicate or inform the state what we are doing in terms of conservation.” (Anacleto Peña, interview extract, Chief General CICOL)

In line with the water management approach, CICOL has also initiated agroforestry activities based on knowledge among elders of diversified and agroforestry production, with the aim of reforesting areas affected by fires with fruit trees and timber and forage species. The later in particular aims to reduce land conversion for cattle grazing.

Furthermore, work is being carried out in some communities with the support of ACBOP, FAO and PROCESO to produce non-timber forest products such the Chiquitana Almond, copaiba palm oil, Cuchi resin, and new varieties of honey, which function as an incentive to protect the forest in Lomerío.

5. Reconnecting with the territory and creating social awareness of fire: Photovoice

The fifth strategy developed by CICOL to manage wildfire risk has been to work with the region’s youth in a process of knowledge revitalization and reconnection with their territory.

As mentioned previously, an important aspect of the challenge to develop and effect long-term fire risk management strategies in Lomerío relates to the increasing disconnection of the Monkoxi youth from their territory. As this age group is increasingly spending prolonged periods of time in urban areas working or studying, they are experiencing a change in their values and knowledge system.

Ensuring that the younger generation stays connected to their territory and their knowledge system, and is capable of managing their lands according to Monkoxi principles is key to ensuring the successful self-governance of Lomerío. The Photovoice project carried out by CICOL, through the collaboration with NUR University, the University of East Anglia and support from National Geographic’s Young Explorers program, was devised as a means to bring the Monkoxi youth closer to Lomerío, to the elders and their stories.⁷

For a period of four months, eight indigenous photographers worked closely with their elders, collecting and documenting stories through photography across four themes: stories from *Casa Grande*, Monkoxi identity, traditional medicine, and climate change. A selection of the photos and stories was published in 2020 in a 124-page book entitled “*Photovoice: Monkoxi Reconnection*”.⁸ Box 3 provides a summary of the photovoice process.

The stories related to fire and climate change that the youth chose to explore through photography included: the cultural significance of forests, the importance of water and its increasing scarcity in Lomerío, honey as a resource under threat due to fires, and fighting forest fires. The Photovoice project permitted the young Monkoxi to document traditional environmental knowledge about each of these themes, the current threats to the way of life of the Monkoxi and their territory due to climate change (see Figs. 3–6 for some examples).

As can be seen from Figs. 4, 5 and 6, the impacts of wildfires took a central role in the photovoice exploration, but so did the agency of the Monkoxi managing the risk of wildfires.

“Forest fires have devastated and killed animals, and we want to show this. There are many things from our territory that are not visible and that is what we wanted to show, the negative consequences that these natural disasters have upon us and also to see how

we as indigenous people and how Monkoxi protect our Big House (Casa Grande), because without it we do not live, the complementarity with mother earth and her with us”. (Eliana Peña, Interview in Las Comadres Radio Programme, Radio El Deber, 7 June 2022)

The information collected through the Photovoice process helped raise awareness among the youth about the current challenges to managing their territory. Furthermore, by being at the centre of the participatory research process, it raised the profile of the youth helping to maintain the self-governance model on Lomerío and the Monkoxi knowledge system alive. The Photovoice book was presented in June 2022 in a General Assembly, in a national book fair in Santa Cruz, and via radio interviews, giving the young photographers the opportunity to talk about their research process and the relevance of the publication to them.

“For us, Photovoice opened many doors to rediscover our roots. The purpose of the Photovoice book was to document and transmit stories of our Monkoxi nation through photography, showing our knowledge, values and, above all, the vision that we have of our *Casa Grande* (literally “Big house”, meaning territory) and about nature. Today young people from the Monkoxi nation have lost that great knowledge of our elders, who for us are living encyclopaedias.... It is a good opportunity to make visible my culture, my identity. It is a start, and we hope to continue advancing with similar works and that the wider population learns from this. Making it known is of great importance to us and above all that these products are made by us as indigenous youth.” (Eliana Peña, Interview in Las Comadres Radio Programme, Radio El Deber, 7 June 2022)

As a result of this process there is now interest among the Monkoxi youth to replicate the Photovoice process in other communities and to establish a long-term project of youth reconnection with their territory.

6. Discussion and concluding remarks

Wildfires are growing in frequency and intensity, and spreading in range, with predictions of a 30% increase in the number of wildfires by 2050 (UNEP, 2022). Given this daunting prospect, it is easy to understand why environmental and land managers might want to imagine a future with less use of fire. Yet, hotter and drier weather, next to changes in land use, rather than fire per se, are considered the main drivers of wildfires (van Montford, Hoodveld, 2022). In fact, in many places, less use of fire has often led to large-scale wildfires (Pyne, 2012). Thus, in recent times it has started to become clear that, like it or not, solutions to the “fire problem” involve continuing to live with fire, which necessarily involves coordinating actions among a wide range of actors.

In some parts of the world, land managers are now drawing on indigenous knowledge and their burning practices to improve fire management strategies, but interventions are largely driven from the outside, and often take place in protected areas where indigenous people are no longer regular inhabitants, like in Australia and the USA.

Yet, the Lomerío case study shows that indigenous peoples also have the capacity to develop their own wildfire risk strategies as an attempt not only to protect their territories from the destructive force of fire, but also as part of a wider political self-determination agenda, and in doing so are changing the terms of the conversation about the role of indigenous knowledge in wildfire management.

Under this approach, rather than indigenous knowledge being included, integrated or incorporated into Western-driven fire management policies, indigenous knowledge and agency are at the centre of the fire management strategy, and modern technical knowledge serves as a complement to it. This is a unique case of intercultural dialogue about fire management being driven by indigenous peoples themselves.

Our case study also shows that due to the multiple causes of wildfires, there are no simple solutions to the “fire problem”. On the contrary, solutions need to be diverse. This is why the Monkoxi are

⁷ Over the last decade, CICOL has been developing different strategies to help reconnect the youth with Lomerío. In addition to the Photovoice Project, these include a Monkoxi historical reconstruction project and a project to revitalize the Besito language.

⁸ Available online: <https://ueaeprints.uea.ac.uk/id/eprint/88010/>

Box 3**Summary of the Monkoxi Photovoice process.**

The Monkoxi Photovoice project took place through a series of workshops that functioned as an introspective process between the young people and a facilitating team. It was important to create an inclusive space for learning and practice that allowed the narratives of the Monkoxi youth to emerge and grow.

The objective of the workshops went beyond a simple photography course. It was to create an experience of reconnection. The training sessions were a space that fostered freedom of expression, trust, security, and active listening. The workshops and activities were divided into three phases. In the first, the team of facilitators taught the basic, technical skills of how to use cameras and their different functions via practical exercises that served as an introduction to establishing a connection with their identity. In the second phase, having gained the necessary technical knowledge, the young people began to immerse themselves in their surroundings, adding to their personal and collective stories. At this point, they began to examine their traditions, context and identity from a fresh perspective. Field trips took on a key role because, through them, the youth explored their territory with fresh eyes and a renewed curiosity. Using photography, they began to establish connections between their knowledge and that of their ancestors. In the third phase, the young people took control of their individual narratives and began to construct their own stories. (Martínez-Burman et al., 2022).



Fig. 3. Photovoice stories concerning the cultural significance of forests “Las Conchas lake and its forest are considered sacred places in Monkoxi culture. This sacred place is home to great biodiversity and a complex ecosystem that includes many different species of birds, reptiles, fish, amphibians, and mammals. It is also a mystical space that is home to the *Jichis*. In the Monkoxi worldview, *Jichis* are the masters and guardians of nature. In this forest the following live: *Nixhi Tux* (water *Jichi*), *Nixhi Kanx* (rock *Jichi*), *Nixhi Yirityux* (mountain *Jichi*), *Nixhi Niunx* (forest *Jichi*), *Nixhi Numukianka* (*Jichi* of the animals).” *Testimony and photos by Eliana Peña Chore and Mary Isabel García Parapaino.*

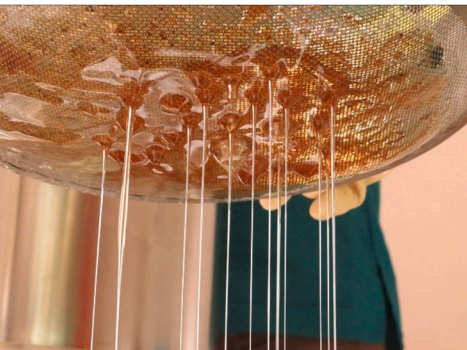


Fig. 4. Photovoice stories of honey as resource under threat by wildfires “Bees depend on the flowering season to feed themselves. However, climate change has modified this cycle, which no longer corresponds to traditional periods of blooming and sowing. Consequently, in less than ten years, the beekeepers have observed that the harvest of honey has reduced from three times a year to one. This is a significant reduction that has also been greatly affected by the forest fires that completely stop the flowering period.” *Testimony and photos by Gabi Irene Ípamo Ipi.*

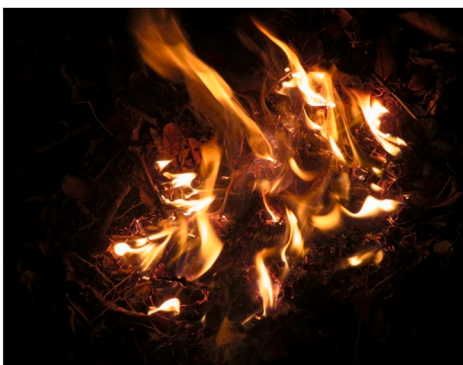


Fig. 5. Photovoice stories of the cultural significance of fire “The communities of the Monkoxi have used fire to prepare the soil for sowing since the days of our ancestors. The use of fire in our communities is indispensable. To prepare land in the *chaco*, we use fire as a natural means of fertilising the soil and controlling pests. To manage the fire, they leave a row without any plants that is at least a metre wide to prevent the fire spreading to other areas. These days, because of the intense droughts and cold fronts, there is a bed of leaves and dry branches, which we call fuel and which makes the flames spread wildly in the *chaco*.” *Story and photos by Jorge Andres Guizada Palachay, Johan Pedriel Rodríguez Cesarí .*



Fig. 6. Photovoice stories of the Monkoxi controlling fire “The intensity of the hot spots, which can result in forest fires, have forced us to restrict burning on the *chaco*, making it difficult to plant certain crops we need for our sustenance. Only by organising ourselves can we continue our ancestral practices of farming and community self-subsistence. Therefore, we have to alert the community before burning and coordinate *chaco* workers so that we all contribute to controlling the fires. Climate change and the aggressive monoculture that surrounds our borders have forced us to organise, not only to keep an eye on the burning of *chaco* plots, but also to control the forest fires that, once they begin, spread rapidly within our territory”. Story and photos by Gabi Irene Ípamo Ipi and Brenda Chuvirí García.

simultaneously developing strategies aimed at regulating controlling, preventing and monitoring fire use, while simultaneously protecting the commons and helping to reconnect the youth to their territory through cultural and knowledge revitalization.

The role of CICOL as stewards of Lomerío Territory has been key in this process, anchoring wildfire management strategies in the customary decision-making structures and knowledge system, and also coordinating collaboration with external organizations that can help with innovative and new technologies to respond to the threats of climate, landscape and sociocultural change. Thus, this is a good example of how indigenous people are currently managing wildfire in their territories as they cope with an increasingly flammable landscape, but also of how contemporary wildfire risk management strategies are accepted in forest-dependent indigenous communities and are being used or adapted in practice.

Results from our participatory research indicate that, given the novelty of the new techniques and methods introduced, such as the burning protocol and fire control program, the Monkoxi wildfire risk management system is still transitioning from the traditional method of using fire to one that integrates different knowledge systems. Furthermore, the system is still very much a process in the making, with ongoing discussions on how to introduce new methods such as prescribed burning around some key environmentally sensitive areas and how to recalibrate the burning calendar, as well as developing strategies to reconnect the youth with their territory.

But the Monkoxi have demonstrated capacity and agency to respond not only to the increasing pressure of climate and socio-cultural changes, as well as to the threat of criminalizing fire use policies in their territory. In so doing, they are creating more symmetrical conditions for dialogue with the Bolivian Forestry Agency (ABT) about the use of fire in Lomerío and challenging anti-fire discourse. Two central aspects of the Monkoxi fire management systems that need to inform a dialogue with ABT about the future use of fire in Lomerío is the negative view that the Monkoxi have for sanctions as a way for regulating fire use in their traditional justice systems, and the central importance given to fire prevention rather than fire suppression in the Monkoxi approach to managing fire risk. Furthermore, the Monkoxi have shown that wildfire management entails actions that go beyond the management of fire itself and must include also efforts to protect common goods and sources of life such as forests and water springs, as well as to reconnect the youth to their territories, which policymakers could do well to support, rather than simply opting to sanction fire use. Another key aspect that deserves closer attention from policymakers is the need to regulate the use of fire in agro-industrial activities outside Lomerío, which currently seems to be the one of biggest threats to the environmental integrity of the territory. Internally, the Monkoxi will need to continue recalibrating their relationship with fire and monitoring how the new methods for monitoring fire and land use are applied in practice, and how effective they

prove to be at preventing wildfires in Lomerío.

CRediT authorship contribution statement

Iokiñe Rodríguez, Mirna Inturias, Elmar Masai and Anacleto Peña contributed to the research conceptualization, methodology and field work and writing/ reviewing. Iokiñe Rodríguez performed writing/ original draft preparation, reviewing and editing.

Declaration of Competing Interest

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

Data Availability

Data will be made available on request.

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