Multispecies conservation geographies: Relocating the role of the Andean bear in socio-technical water systems of the Ecuadorian *páramo*

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Abstract

Multispecies ethnography explores human and non-human relationships, emphasising interconnectedness, cultural, socio-technical and political meanings, and the impact of multispecies interactions on society. Beyond the protection of emblematic species or ecosystems, which gain conservation status due to the multiple threats they face, there are other relational assemblages that are an index of animal political geographies. This article focuses on human/non-human relations within the Antisana Ecological Reserve, Ecuador, which are intertwined with a technological system that provides drinking water to the city of Quito. Since this infrastructure is located in a protected area close to the Antisana volcano, we examine how the presence of the Andean bear (Tremarctus ornatus) is articulated with conservationist discourses of the *páramo* (*i.e.*, as an ecosystem key to water production), which are often in conflict with human activities in the territories surrounding the protected area. Based on a historical analysis and an ethnographic approach to human-wildlife conflicts, we worked with officials of Quito's drinking water system, park rangers and community members of Pintag, attempting to contribute to a multispecies political ecology that considers the bear as a political subject. Using ethological and ethnographic methods, the aim is to make visible how the infrastructural systems of water and the Andean bear constitute a relational assemblage of the equatorial *páramos*.

Key words: hydraulic infrastructure, multispecies assemblage, territorial policies, ethogram

Résumé

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L'ethnographie multi-espèces explore les relations entre humains et non-humains, en mettant l'accent sur l'interconnexion, les significations culturelles, socio-techniques et politiques, et l'impact des interactions multi-espèces sur la société. Au-delà de la protection d'espèces ou d'écosystèmes emblématiques, qui obtiennent un statut de conservation en raison des multiples menaces auxquelles ils sont confrontés, il existe d'autres assemblages relationnels qui constituent une indication des géographies politiques animales. Cet article se concentre sur les relations entre humains et non-humains dans la réserve écologique d'Antisana, en Équateur, qui sont liées à un système technologique qui fournit de l'eau potable à la ville de Quito. Cette infrastructure étant située dans une zone protégée proche du volcan Antisana, il est nécessaire d'examiner comment la présence de l'ours andin (Tremarctus ornatus) s'articule avec les discours conservationnistes sur le *páramo* (en tant qu'écosystème essentiel à la production d'eau), qui sont souvent en conflit avec les activités humaines dans les territoires entourant la zone protégée. Sur la base d'une analyse historique et d'une approche ethnographique des conflits homme-faune, nous avons travaillé avec les responsables du système d'eau potable de Quito, les gardes parc et les membres de la communauté de Pintag, en essayant de contribuer à une écologie politique multi-espèces qui considère l'ours andin comme un sujet politique. En utilisant des méthodes éthologiques et ethnographiques, l'objectif est de rendre visible la façon dont les systèmes infrastructurels de l'eau et de l'ours andin constituent un assemblage relationnel du *páramo* tropical.

Mots-clés: infrastructures hydrauliques, assemblage multi-espèces, politiques territoriales, éthogramme

Resumen

La etnografía multiespecies explora las relaciones entre humanos y más que humanos, enfatizando la interconectividad, la significación cultural, política y sociotécnica, así como los impactos de las interacciones multiespecies en la sociedad. Más allá de la protección de especies emblemáticas o ecosistemas que adquieren un estatus de conservación debido a las múltiples amenazas que enfrentan, o de las iniciativas conservacionistas de determinados ecosistemas, existen otros ensamblajes relacionales que son indexicales de geografías políticas animales. El presente trabajo aborda el tejido relacional al interior de la reserva ecológica del Antisana, el cual se entrelaza con un sistema tecnológico que lleva el agua potable hacia la ciudad de Quito. En la medida que tal infraestructura se localiza en un área protegida en las inmediaciones del volcán Antisana, es necesario investigar de qué forma la presencia del oso andino (Tremarctus ornatus) se articula a discursos conservacionistas del páramo (*i.e.,* un ecosistema clave para la producción de agua), los cuales suelen entrar en conflicto con las actividades humanas de territorios aledaños al área de conservación. A partir de un análisis histórico y un enfoque etnográfico sobre los conflictos humano-fauna salvaje, se trabajó con funcionarios del sistema de agua potable de Quito, con los guardapáramos y con comuneros de Pintag, intentando contribuir a una ecología política multiespecies que considere al oso como sujeto político. Abrevando de metodologías etológicas y etnográficas se busca visibilizar cómo los sistemas infraestructurales del agua y el oso de anteojos constituyen un ensamblaje relacional de los páramos ecuatoriales.

Palabras clave: infraestructura hidráulica, ensamblaje multiespecies, políticas territoriales, etograma

1. Introduction

Human relationships with different bear species have historically evoked different affections and valuations around these animals, ranging from fear and threat, to kinship, utility, and politics, all intersected by cultural values (Hughes *et al.*, 2020). From polar bears (Ursus maritimus), to brown bears (Ursus arctos) and black bears (Ursus americanus), at different latitudes bear species constitute a fauna capable of evoking empathy and a wide range of emotional and behavioral attitudes in humans (Servheen & Gunther, 2022; Smith & Herrero, 2018). However, the full range of affect has always

been framed within cultural matrices, embodied in representations, paintings, petroglyphs, myths, artifacts, or in certain totemism-oriented ontologies of the Northern hemisphere (Hallowell, 1926). In this framework, political aspects of the bear often overlap with cultural values, in the form of strategies that serve human interests. For example, such interests may translate into conservation efforts that may be accommodated or rejected by cultural values. In any case, because of their similarity to humans (mammals with a rounded head, standing upright on two legs, using their forelimbs to grasp objects, with a highly developed maternal instinct), there is a significant anthropocentric bias in the relationship with bears that limits broader ways of conceiving of the political character of bears.

When cultural values and practices become dominant to the detriment of bears, it is usually in the context of human-wildlife conflict, as people's subsistence and economic activities expand territorially into bear habitat. The conflict, in turn, is usually analyzed from a human perspective in ecological and ethological terms (ecological traps, maladaptive cultural behavior) in terms of survival and reproduction (*i.e.,* an adaptationist vision) (Northrup *et al.*, 2012; Servheen & Gunther, 2022). However, when there is a convergence between conservation efforts and cultural values, an appropriate management of conflicts through compensation and awareness mechanisms is suggested (Dempsey, 2010; Jampel, 2016). However, beyond the anthropocentric bias and the adaptationist view of the human-bear relationship, in which bear's behavior responds exclusively to survival and reproduction, the question remains as to what kind of role do animals, in this case bears, play in conservation efforts beyond ethological narratives, especially in territorial governance policies?

The Andean bear (Tremarctus ornatus) is an emblematic species for various conservation projects in some regions from Venezuela to the extreme north of Argentina, passing through Colombia, Ecuador, Peru, and Bolivia (García-Rangel, 2012; Torres, 2021). Yet the Andean bear has not received as much global attention as the species of the northern hemisphere. In Ecuador, these efforts have led to the creation of protected areas in the higher altitudes (above 3,600 m), where the *páramo* ecosystem of upland mires is located (Figure 1). The conservation value of these ecosystems is due not only to their biodiversity, but also to the cultural richness associated with the populations that have historically inhabited these environments (Salomon, 1986). The Antisana Ecological Reserve, officially declared in 1993, covers more than 120,000 ha and is associated with the Andean condor (Vultur gryphus) and the Andean bear.

The emblematic character of the Andean bear, which attracts locals and tourists in Ecuador, does not mean it has avoided conflict with humans. For example, in Calacalí, to the northwestern part of Quito, an Andean bear problem has been identified in social media, not as a potential threat to livestock, but rather to corn and maize fields, which are periodically visited by bears, decimating harvests and family incomes. Biodiversity conservation management, particularly through the articulation between landscape remnants and connectivity, tries to address the landscape requirements for species like the bear, avoiding these conflicts (Peralvo *et al.*, 2005).

There may be only 20,000 individuals left in the wild, with an estimated population of 5,000 in Ecuador. The bear is expected to move faster toward extinction than any other carnivore in the region (Iturralde-Polit *et al.*, 2017). To prevent this, efforts are underway to create natural corridors to connect small populations. However, in Calacalí, as in other places in Ecuador (*e.g.*, Oyacachi), human-bear interactions elicit a mixture of negative and positive feelings, as the Andean bear is also depicted as a cultural element in a mural in the village.

Figure 1. *Páramo* landscape in the Cayambe-Coca National Park, Ecuador, with Mount Antisana in the background. Photo: Olivier Dangles.

A variety of factors delineate a territorial conservation policy. In 2020, the Ecuadorian Ministry of Environment and Water launched an Action Plan for the Conservation of the Andean Bear, which in turn partially converged with the strengthening of the Municipal Water Company of Quito (EPMAPS) and the Water Conservation Fund (FONAG) in the Antisana region, both concerned with upland water resources. Basically, the Action Plan reaffirmed the Andean bear as an emblematic species of Ecuador, whose care and conservation implied maintaining the ecosystemic welfare of its habitat, namely the *páramo* where the most important water sources are located (Molina & Cisneros, 2020).

Such a strategy reaffirms the anthropocentric bias, a form of human exceptionalism (Srinivasan & Kasturirangan, 2016) that relies on the protection of ecosystems based on key species such as the Andean bear, while also accumulating biological capital – water – a key resource for human populations. We examine this bias in the article. On the one hand, it supports a political ecology beyond the human that seeks to question conservationist discourse as a reductionist form of biopolitics (in terms of the governance of non-human bodies). The discourse obscures different kinds of conflicts

between protected species (*i.e.,* bears) and animals associated with human practices (*i.e.,* cattle and feral dogs). On the other hand, anthropocentrism offers an entry point for understanding the articulation between the *páramo*, bears and hydraulic technology, which shape a relational biopolitics of place with embodied encounters and relational ethics: a 'multispecies technopolitics.'

Field work was carried out in the community of Pintag (Figure 2), with park rangers from the Antisana Ecological Reserve, and with staff from FONAG's water conservation units. We reviewed literature on animal ethology, institutional management plans for Andean bear conservation, as well as historical documents on the relationship between wildlife and human communities. We offer an account of the socio-technical relationships between the hydraulic infrastructure that supplies water to the city of Quito and protected species. We try to answer the following question: how has Antisana's water conservation policy affected Pintag's productive activities? What is the current status of conflicts between wildlife and cattle or feral dogs? How does the Andean bear raise a relational vision of the *páramo* and territorial policies? And finally, how do bears living within a hydraulic infrastructure constitute an animal technopolitics?

In order to achieve the above, we first describe the study area, within which the historical context of the Antisana Ecological Reserve is placed, as well as the evolution of other conservationist efforts and, in particular, the efforts of EPMAPS and FONAG, two institutions dedicated to the care of the *páramo* and water. In this context, we note how different territorial regimes overlap in this area, where there are also some private farms and pastures belonging to the Pintag community. This is followed by a discussion of private properties and participatory conservation models, and how these are reflected in human-wildlife interactions. Adjacent to the protected area in question there is a history of conflicts between cattle, feral dogs and species such as the Andean bear.

While we focus specifically on the Andean bear in the Antisana Reserve in this article, our approach to understanding multispecies conservation geographies in socio-technical contexts is relevant to the much wider geographic range of bears and to other flagship species. In particular, we highlighted the relevance of the theoretical framework of post-humanist approach to biopolitics, combined with inputs from multispecies ethnography, with particular attention to the cultural behavior of bears through the characterization of an ethogram.[2] Finally, we show how the presence of flagship species contributes to the maintenance of a territorial and conservationist regime that supports an animal political geography and a multispecies technopolitics.

[2] Inventory of the species-specific behaviors of an animal.

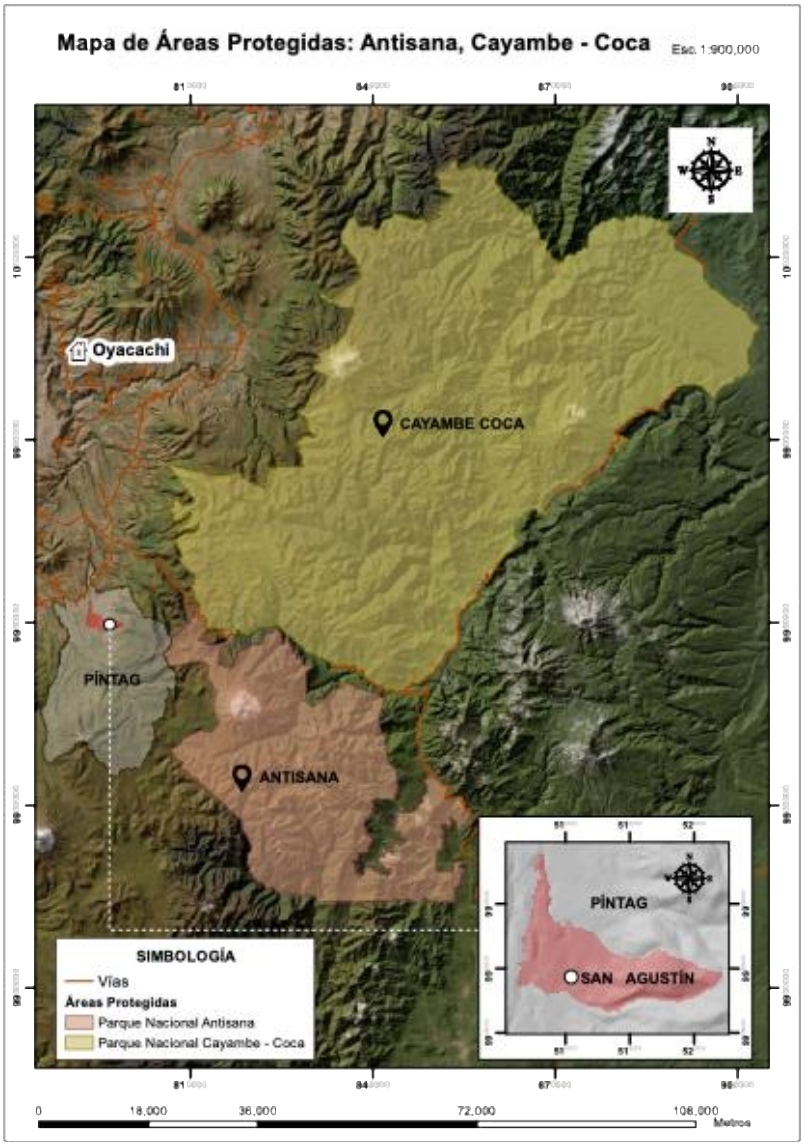

Figure 2. Map of the study region with the presence of the Andean bear, Ecuador.

2. Study area

The Antisana Ecological Reserve is located 70 kilometers from the city of Quito, where different territories converge, including properties belonging to EPMAPS and FONAG, as well as the Sunfohuayco, Antisanilla, Cochapamba and Pullurima farms (Zury, 2014). In particular, the Antisana estate has five water units: Jatunhuico, Santa Lucía, Antisana, Micahuaico and a tributary of the Pita River (Osorio, 2016). Between the Antisana estate and the Ecological Reserve there is hydraulic infrastructure (Figure 3) consisting of the La Mica- Quito Sur system, which consists of a reservoir and a system of interconnected watersheds (Lahuatte & Recalde, 2015). It is important to note that the Antisana Ecological Reserve borders another larger protected area: the Cayambe-Coca National Park, which is home to a large number of bears that eventually enter the Antisana reserve.

Figure 3: Hydraulic infrastructure in the Cayambe-Coca National Park, Ecuador. Photo: Olivier Dangles.

The Andean bear is typically found in a wide gradient of altitudes across the Andes, from the cloud forests in the foothills to the snow line in the *páramos* (Peyton, 1980). It is a rather small bear (130-190 cm in height; 35-70 kg for females and 130-175 kg for males). The Andean bear is mainly active during the day and moves along established trails in search of food and potential mates, which it finds through its acute sense of smell. Though classed as carnivores, these bears are omnivorous and opportunistic feeders, and in reality, are largely vegetarian.

They mainly feed on plants, flowers and fruits, and occasionally on carrion, eggs or small animals (insects, worms, rabbits and rodents), or tapirs and cattle (Cáceres-Martínez, 2020, Figure 4). Due to the large amount of fruit it consumes and its high mobility through the landscape, the bear plays a very important role as a seed disperser (Torres, 2021). Adults are generally solitary and form pairs during the mating season, which can occur any time throughout the year. Today, the Andean bear's distribution is mainly constrained to pockets of habitat that have escaped human development. Yet, even these territories are shrinking rapidly due to the expansion of agriculture and the construction of power lines, pipelines, roads, mines and quarries (García-Rangel, 2012, Rodríguez *et al.*, 2003).

Although Pintag is the closest human settlement to Antisana and dates back to the 16th century, the occupation of the *páramos* has been marked since colonial times by cattle ranching expansion. To the extent that environmental policies incorporate different conservation discourses that mark, or at least attempt to regulate human interactions within these areas, including forms of ownership or resource use, Antisana has historically been the object of different conservation projects with specific

territorial and discursive regimes. The Antisana Ecological Reserve, as part of the Protected Areas System, has been managed by the Ecuadorian Forestry and Wildlife Institute (INEFAN), created in 1991, which has promoted the participation of different stakeholders. The Protected Areas constitute a system of organization for the conservation of nature according to criteria of exceptionality or biodiversity.

Figure 4. Female Andean bear feeding on an *achupalla* (Puya clava-herculis) in the *Páramo* of Antisana, Ecuador. Note the presence of a young cub on the right. Photo: Olivier Dangles

The Antisana Foundation played a key role in the creation of Antisana as a protected area or reserve until 2007, in terms of the management plan and environmental education projects with nearby communities. After that time the Ministry of the Environment took over management of the area. Similarly, the Antisana Foundation acted as a hinge by articulating the participation of other foundations such as The Nature Conservancy, the McArthur Foundation, and more recently, the Quito Municipal Water Company (*Empresa Municipal de Agua Potable de Quito* – EPMAPS) (Rivadeneira, 1997).

The presence of EPMAPS began in 1995 with the construction of the *Mica-Quito Sur* water supply system, and was consolidated with the acquisition of land to create the reserve, initially in coexistence with the *haciendas* present in the region since the 1940s, until the expropriation of more land with corresponding payments to owners in 2012, specifically financed by the Quito Municipal Water Company. Finally, since 2010, the FONAG has promoted a series of actions (e.g., peat bog restoration, livestock exclusion) for the conservation of the ecosystem and, in particular, water conservation (Bustamante, 2016; Osorio, 2016).

The buffer zone of the Antisana Ecological Reserve is surrounded by the EPMAPS property, as well as several private farms and land held by the conservationist Jocotoco Foundation. Although both the reserve and the Jocotoco Foundation explicitly seek to protect and conserve species such as the Andean condor and the Andean bear, other efforts, such as FONAG's, focus on protecting the *páramo's* water resources (wetlands and peat bogs). Added to these conservation efforts are the economic activities of the *haciendas*, especially cattle ranching (Figure 5), whose grazing dynamics conflict with the protection of water and wildlife.

Figure 5. Cattle in the *páramo* of the Cayambe-Coca National Park, Ecuador. Photo: Olivier Dangles.

The actions carried out by FONAG are significant in that, since 2016, they have managed to displace cattle, with implications for the conservation of the Andean bear. The bear has become politicized, through its media presence and as an emblematic species spreading awareness of what causes biodiversity loss and extinction threats in the Andes, some also linked to climate change (Dangles, 2023). Beyond the conservationist narratives that inform the creation of Natural Protected Areas, the presence of bears in the *páramo* enacts vernacular ontologies for communities, both locally and nationally with some unique to Ecuador. Andean bears have assumed a broader role in shaping territorial policies.

3. Beyond private and participatory models: towards a biopolitics of conservation

A discussion that lies at the heart of the history of environmental conservation in Ecuador and other Latin American countries is the role of human populations in the development of protected areas

(Urquiza, 2018). The state opted for the formula of ecological reserves, but incorporating human livelihoods, still guaranteeing a constant supply of water resources from the *páramo* (Bustamante, 2016). Participation in conservation in general has either taken place to generate governance regimes for the commons, or to justify endogenous development projects that take into account local needs rather than those imposed from outside (Murray Li, 2007; de la Mora, 2020).

As a result of the state's attempts to implement a biopolitics of conservation, water resources are regarded as part of the commons. A study conducted at the government institution in charge of urban water, EPMAPS, contrasted the approaches to water management in Oyacachi and Antisana using an expansionist environmental economics, and ecological economics which viewed water resources as irreplaceable (Osorio, 2016). A participatory model based on the latter emerged as the best alternative, with co-management and co-operation mechanisms for water resource conservation. Local populations have a long historical relationship with the *páramo*, and they show a willingness to participate in its use and conservation. For populations on the margins of protected areas, however, participation in conservation lags behind an emphasis on resource use (Osorio, 2016).

The Andean Bear Conservation Action Plan is not entirely in step with efforts to preserve water sources and flows for municipal use. The Andean bear habitat extends beyond human territories. For example, some bears move from the *páramo* to the cloud forest throughout the year, passing through cultivated farms with food potential, bringing them into conflict with humans. Documented conflicts between humans and bears date back to at least the 16th century, but in more recent times, the first Andean bear attack on livestock in Ecuador was in 1995 on the western slopes of the Andes. In the last decades, several incidents of the same type have been reported on the eastern fringe, in communities close to the buffer zone of the Antisana Reserve (Castellanos *et al.*, 2011).

In some conservation action plan documents, there is a consensus that the bear is affected by habitat fragmentation, fires, extractive activities such as mining, and the advance of the agricultural frontier (Ministerio del Ambiente y Agua del Ecuador, 2020). There are some mentions of poaching bears or killing them in retaliation, as well as encounters with packs of feral dogs (Utreras & Laguna, 2020). The role of the bear as a keystone species has been widely acknowledged over the last 25 years. Its role in maintaining ecosystems through seed dispersal is also acknowledged, ranging from the *páramos* to the various montane piedmont forests (Sandoval & Yánez, 2019; Torres, 2021; Dangles, 2023).

However, research on the Antisana Ecological Reserve and its buffer zone focuses on conflict stemming from the supply of drinking water and hydraulic infrastructures on local social cohesion or collateral effects that result in the loss or threat to cultural practices, rather than bears (Osorio, 2016). Conflicts between bears and cattle and feral dogs have not been thoroughly addressed in the neighborhoods that make up the Pintag territory, even though FONAG has reached conservation agreements by removing cattle from the water conservation area. Bear conflicts persist for some community members.

Although the presence of livestock is problematic due to the expansion of the agricultural frontier and the degradation they can cause to water resources, the relationship between livestock, people and the *páramo* forms a task-scape, a type of rural livelihood, or a way of dwelling (Ingold, 1993, 2000; Dangles, 2023). In the *páramo*, dwelling reflects how communities engage with the landscape through daily practices, traditions and experiences. They actively participate in it, establishing relationships with vegetation, soil, water, weather, and each other. Their knowledge of the terrain, rituals and storytelling are integral to their way of life, demonstrating how dwelling is dynamic and evolves over time and through interactions in the face of environmental change.

4. Towards new territorialities for the Andean bear

Issues of human-wildlife interactions are often raised in conservation policies, with places, institutions and historical trajectories often emphasizing the need to control human practices that degrade ecosystems in order to preserve the habitats of iconic species such as tigers and elephants (Lorimer, 2015). However, such discourses obscure human interests that go beyond conservation *per se*, which is essentially a reductionist form of biopolitics that seeks to control animal bodies confined to a specific area, while attempting to manage human practices by keeping them at the margins of conservation dynamics (Margulies & Karanth, 2018).

One strand of animal geographies has extended the reach of biopolitics as the 'government of things' with a posthumanist perspective, incorporating the material assemblages that establish different regimes of governance and that can potentially be articulated in public discussion (Lorimer & Srinivasan, 2013). Such a relational approach to animal geographies seeks to reduce the anthropocentric bias of conservation policies by characterizing certain animal species as 'political subjects', which implies conceiving environmental policy differently, e.g., in relational and performative terms. Similarly, the idea is to stop conceiving animal and plant species as passive, insofar as they have a social life that affects economic and infrastructural systems, which ultimately gives them weight in shaping territorial policies (Dempsey, 2010; Villagómez-Reséndiz, 2023).

The case of the Andean bear in the Antisana region can firstly be understood as a consequence of water conservation policies, which have resulted in new territorialities for the bear. Specifically for the human population, in the territory of Pintag and the *barrios* that comprise it, reports suggest an increase in drinking water supply from 70% in 2010, to 81% in 2015 (Osorio, 2016). The local population have indigenous origins, that during colonial and republican periods gave rise to a peasantry linked to cattle called *chagra* (Rivadeneira, 2016). Pintag is today part of the province of Pichincha and the metropolitan district of Quito. It covers an area of just over 46,000 ha and has 33 neighborhoods, including: La Tola, San Alfonso, Yurac, La Merced, Tolontag, San Agustín, La Comuna, and Pinantura, among others.

The merger of EPMAPS and FONAG has not benefited all Pintag's *barrios* especially those located in the lowlands where there are local drinking water boards that provide services to these communities. Two of these water boards reflect a broader conflict between those communities that have benefited from FONAG's interventions to restore water sources and those that have been neglected by these initiatives, in particular the *barrios* of San Agustín and Tolontag (Pintag), which coexist in completely different regimes. As a result of FONAG's interventions, Tolontag has an abundant water source that feeds the Puroncocha stream that supplies the community, while San Agustín, with its Padrecorral stream, has a poorer water supply according to its inhabitants. With the prior approval and informed consent of Mr. Victor Simbaña, the main member of the Pintag community council, who facilitated research with some members of the community, we went along a dirt road that crosses a tunnel, recently dug by the people of San Agustin in a communal work party. We arrived at the community's social center, where the local authority Mr. Néstor Bautista was waiting for us, along with some members of the *barrio* committee, and a man recognized as the most knowledgeable on bears in the region, Mr. Olmedo Bautista.

They were joined by a group of women who had come together for over '60s activities. A discussion took place on how Antisana's water conservation actions have affected Pintag's productive activities. We also wanted to inquire about the current relationship between the members of the San Agustín community and the Andean bear, especially since cattle have been moved from the water reserve. Several women interrupted their activities to intervene, some of them emphasizing that their relationship with the cattle was of vital importance: "…we are old people and cannot work, raising calves is our only resource." Others argued that the institutions responsible for protecting animals

such as bears and condors "should do something because there are attacks on the calves; the condors that attack the calves by gouging out their eyes and then disembowelling them by the tail."

Other women from the same group said it was already dangerous to go and look after the cows they have on hillsides, as there are stories of Andean bear attacks on people and children. Complaints were interrupted by Mr. Olmedo Bautista, who said that he and his companions travel daily through the 1,200 hectares that make up the San Agustín *páramo*. They see at least two females and one male Andean bear every day. According to Don Olmedo, female bears have even given birth on their land and stayed with their cubs for a long time. In his opinion, the women overestimate the risk of bear attacks, because from what they observe, "the bears only eat the buds of the *achupallas* (Puya clava-herculis), we walk slowly through the Condorruco and Morascunga ravines, and the bears just eat quietly."

Mr. Víctor Simbaña said that when he was young, he almost never saw a bear; but recently he has seen many "right here near San Agustín." Although some inhabitants of San Agustín did not link the perceived increase in bear presence to the removal of livestock from the water reserve, they do say that people have not benefited in any way from conservation bodies, either in terms of solving the inadequate water supply in the area, or in terms of awareness campaigns. On the other hand, Mr. Olmedo and Néstor Bautista claimed that people of San Agustín acknowledge that, although their *páramo* has a high density of cattle, they do not consider this to be the cause of the lack of water. Mr. Olmedo Bautista, however, did recognize that the trampling of the peat bog by the cattle contributes to the drying up of the Padrecorral watershed.

In a way, we can infer from this story that there is an interdependence between the bear, the water and the cows as part of the relationality of the *páramo*. Different types of conflict intersect. In the case of water, the *barrio* committee has lobbied hard for the Pintag presidency to help them get water from somewhere. In particular, don Olmedo Bautista pointed out that the main conflict is with the neighboring community of Yurak, where there is a hacienda where, although it has a spring emerging in the San Agustín *páramo*, they are not allowed to use it because it is conceded to the Yurak hacienda. Another option they see is to apply for a concession for the eastern part of the Antisana, and this was ongoing. In the meantime, as in other areas of the equatorial *páramos*, they rely on rainfall rather than irrigation to meet their water needs for domestic activities and livestock grazing (Jampel, 2016).

It is interesting to contrast the above testimonies with the opinions of the park rangers who protect the Antisana Water Conservation Area (ACH, its acronym in Spanish), an area degraded by sheep grazing before the intervention of FONAG. According to the park rangers, the bears now only pass through the ACH, but do not stay there because there are no *achupallas* or cattle; "although there are deer, they are only hunted by the cougars." However, in the experience of one of the authors (Olivier Dangles), bears used to stay near the lagoon within the ACH (Figure 6), even for long periods, which resonates with the testimonies of San Agustin's inhabitants, who assert that bears do not move from Morascunga Creek and can be found there periodically in the morning and afternoon. The cross-referencing of bear's behavior leads us to think that the removal of cattle and the conservation of *páramo* ecosystems and water sources prompt heterogenous cultural behaviors by bears.

According to some authors (Yarbrough, 2015), wildlife management and conservation have overlooked the ability of individual animals to respond to environmental changes, particularly those caused by humans. Such responses, which in this case related to the bear's persistence near the *páramo* cattle without harming them, have been reported in the ethological literature as cultural behavior. Bears have volition, exercised in dynamic contexts where animal subjectivities can be observed.

Figure 6: Andean bear near a lagoon in the Cayambe-Coca National Park, Ecuador. (Photo: Olivier Dangles)

Speaking to Armando Castellanos, a specialist in Andean bear conservation and conflicts between bears and people, particularly livestock, he says that a recognition of bears attacking livestock has been relatively recent, dating to the late 1900s and early 2000s, as they were previously considered to be exclusively herbivores or scavengers. He also notes that, during this period, another conflict occurred in Intag, near the Cotacachi-Cayapas Ecological Reserve, where a bear began to significantly decimate corn fields. This made bears more vulnerable because staying on farmland to eat meant that they could be killed by farmers.

Since then, Castellanos has been working to address the conflict between people and Andean bears in Ecuador through compensation mechanisms and raising awareness of the value of bears. Compensation has ranged from financial support, veterinary care for livestock, the purchase of calves after a bear attack, and even transport to assist people's daily lives in remote areas. Such compensation mechanisms have been lacking in San Agustín, partly because there is no certainty about bear responsibility for livestock deaths through testimonies which exist for other animals such as feral dogs. The diversity of compensation mechanisms reflects the diversity of bear's behaviors that may result in a conflict with humans (*i.e.*, cattle or maize), as well as the heterogeneity of these behaviors across different territorial assemblages of bears and other animals. However, rather than superimposing individual ethological accounts of each species, multi-species ethnography offers an

alternative to research this entanglement of animals in the *páramo*, based on a commitment to make visible forms of life whose behavior is subtle or less perceptible (Chao, 2021; Kirksey & Helmreich, 2010; Ogden *et al.*, 2013).

5. Multispecies conflict and bear cultures

Along with other proposals, such as "more-than-human anthropology" (Kohn, 2007), the "anthropology beyond the human" (Ingold, 2013) or cosmopolitics (de la Cadena, 2015), multispecies ethnography aims to transcend the nature-culture duality and highlight the circuits, exchange networks, and shared histories through which humans and non-humans become what they are. From this perspective, life and the environment form a collective construction, in which both humans and non-humans are participants and actors with agency in the production of territorialities. However, without resorting to a speciesist vision, the specificity, cultural behavior and sociality of a specific group of animals can be studied to build an ethnographic and political subjectivity. This strategy was applied by Hartigan Jr. (2021) to the study of horses in the Iberian Peninsula, following Lestel's synthesis between ethnographic and ethological methodology (Lestel, 2006). Hartigan Jr. attempted to construct affective narratives derived from the actions of horses in the context of being broken in by humans.

In order to make visible the relationship between action and meaning in animals, we must move away from reified visions of behavior, understood as adaptive (Laland & Brown, 2002), and instead use a relational approach to behavior, embodied and co-produced. Behavior is a thing, a material entity that can be described in terms of causal chains (this is an ethological vision) and also as an ungraspable moment of energy, fluid and evanescent, something that we cannot fully grasp (an ethnographic vision) (Candea, 2019).

Ethograms are a useful tool that, in the case of the Andean bear, help to contrast a general vision with specific actions in a particular place. First, as we have seen, ecologically informed conservationism alludes to habitat and territory requirements, *i.e.*, mobility, as a key factor (Peralvo *et al*., 2005). This is consistent with passage actions in the sense of repeatedly walking along the same path, cyclically. Similarly, the ethogram includes actions such as digging with the claws, grooming with repetitive movements of the claws on a part of the body, arboreal activity, foraging, upright posture, social and seemingly friendly or aggressive character (Renner & Lussier, 2002).

Although most of the behaviors described in the ethogram refer to discrete actions, two of them provide a guideline for thinking about relationality based on behavioral plasticity: the seemingly friendly and aggressive sociality of bears, with an absence of hostility, and the latter interpreted by pawing, vocalizations and teeth. Some people still reject bears, especially because of attacking livestock. Castellanos points out that, in a region near Antisana, in Oyacachi, at least 400 heads of cattle were reported to be killed by bears in 2011. However, the use of telemetry techniques to monitor bear movement (behavior), has shown that not all bears attack cattle, otherwise "there would not be a standing cow" (Figure 7).

It is undeniable some Andean bears can attack large prey such as tapirs (an endangered species), leaving obvious signs of attack with their claws, bites and dragging (Castellanos, 2023). On the other hand, in personal communication, Castellanos confirmed that bears generally prepare to attack livestock and large mammals including tapirs from a tree nest or a cliff to which they drag the carcass, a behavior transmitted from mothers to cubs. However, so far very few bears exhibit this behavior, despite the exponential growth of livestock in the *páramo*, which creates a large food supply for the bear, confirming its opportunistic nature and taking advantage of the situation to feed. In addition, other bears gather around the carcass, giving the impression that they are cattle killers, when in fact

they are not. According to Castellanos, in Oyacachi, many of these bears were killed out of retaliation, but later, people gradually understood that it was crucial to keep the cows closer to the houses and not let them loose in the *páramo*.

Figure 7: Andean bear specialist Armando Castellanos monitoring bears in the *páramo* of Cayambe-Coca National Park, Ecuador. Photo: Olivier Dangles.

At a different scale, the home range, the intersection of habitat and territory with *páramo* cattle ranching connects an apparently local issue to a broader political economy determined by income accumulation as part of an economic strategy (Jampel, 2016). At this scale, interactions with other animals such as condors and packs of feral dogs are key to understanding livestock depredation in the *páramo*. In San Agustín, don Olmedo Bautista and Víctor Hugo Simbaña confirmed with us that there used to be a cattle feedlot that threw all its meat waste into the stream, which led to the proliferation of packs of dogs that fed on it. This situation led to the deterioration of the water in the creek, as well as the creation of a feeding habit in many dogs, so that when the feedlot closed, many of these dogs moved upland in search of livestock.

The wildness of the dogs can be understood in terms of a broad spectrum of domestication. According to Tsing (2018), domestication of animals (*i.e.*, morphological and behavioral control) is deep-seated in the modern world, but it is possible to re-signify it, based on interspecies coexistence through the affection that animals give and receive. One of the marginal aspects of the dynamics of domestication that escapes the standard narratives of 'control' concerns the emotional relationships

between humans and animals, composed of expectation, belief and trust. In the case of feral dogs, they evaded responsibility in this region for a long time, until it was confirmed by the inhabitants that it was the dogs and not the bears that had killed the cattle.

In Natasha Fijn's work on the coexistence of different types of herds in Mongolia (2011), dogs also appear in the narrative. The author shows that dogs' lives are intertwined with transhumance practices, where they are left to their own devices for part of the year and are reunited with their human companions when they return to camp in the yurt in the same taiga region in the Khangai Mountains, without conflict with livestock. Unlike the Mongolian dogs, the conflict with livestock in the Antisana Ecological Reserve depends on the culture of the Andean bear and feral dog, which defines a specific multispecies assemblage as in the case of the San Agustin *páramo.*

Interactions between dogs and Andean bears occur in two ways: directly and indirectly. In the first case, there are reports of feral dog packs attacking bear cubs hiding in the grasslands (Castellanos *et al*., 2018). Indirect interaction occurs through microorganisms that cause disease in the bears. For example, Armando Castellanos reports that a medical examination of a bear revealed canine distemper (Canine morbillivirus), which is transmitted by dogs.

To some extent, the multispecies assemblages in which the Andean bear is embedded, along with feral dogs and livestock, also play a role in conflicts between the people of San Agustín and water conservation policies. At the same time, this entanglement allows us to glimpse the territorial policies that the Andean bear enacts in the Antisana Reserve.

6. Conclusion

In the context of this multi-species conflict, we can observe a variety of behaviors that are characteristic of Andean bear culture, using an ethogram to visualize mobility and foraging patterns, and to take account of the unpredictable and contingent nature of bears in the Antisana region. In the San Agustín *páramo*, the bear's culture has been modified by its interactions with humans, and this has led to different opinions of them, from those who denounce the bears, to those like Mr. Olmedo Bautista who defend their presence. He saw them as valuable because they prevent the cows from spreading further and completely degrading the watershed.

Some authors also support the view of bears as culture-bearers from an evolutionary perspective. Bears have observed inherited behaviors ranging from their foraging locations and techniques to habitat preferences, seasonal patterns, and rejection of or attraction to multiple opportunities, including potential food sources (e.g., Servheen & Hunter, 2022). In San Agustín, a bear culture appears to have developed similar to one near to the Los Llanganates reserve in Ecuador, a region with large areas of maize, where bears have spent long periods of time. According to Armando Castellanos (personal communication), this region experienced a conflict between bears and people, which led to the implementation of a compensation mechanism through a commercial campaign called *Chocloso.* On the one hand, the people were encouraged to continue planting their maize instead of taking prohibitive and punitive measures; on the other hand, they were sold sacks to pack the maize at a lower price. The successful market destination was the coastal city of Guayaquil.

While compensation mechanisms have been key to the successful management of bear-human conflicts, whether over livestock or crops, their use highlights the tension between mobilizing the cultural behavior of bears as political subjects, or reducing the power of bears relative to human interests. In the San Agustín *páramo* we have elaborated a political ecology beyond humans, but illustrating the presence of anthropocentric biases. There is a multispecies entanglement, from bears, water and *páramo*, to cattle, condors, feral dogs and microorganisms such as distemper.

We have also shown that in the San Agustín *páramo,* there is a conflicting overlap between conservationist efforts in the ACH, where cattle have been removed, and human-wildlife encounters. However, the ACH also has hydraulic infrastructure, which is monitored by the same personnel responsible for the conservation of the *páramo*. The entanglement of the *páramo*, bears and hydraulic technology shapes a relational biopolitics of place with multiple purposes and forms of cooperation. There are human-animal interactions in terms of agency, embodied encounters and relational ethics.

Interspecies cooperation occurs when a (wild) animal species plays an important role in shaping the environment in which it lives, particularly when it plays a central role in managing the human-animal interface. The latter requires a particular species to navigate the environment in which it exists with its own interests, while remaining subordinate to a dominant culture that retains control and power (*i.e*., humans) (Yarbrough, 2015). In this sense, the Andean bear has contributed to territorial claims in the *páramo*, which serves as its foraging area for *achupallas* and other plant species. These claims converge with FONAG's interest in restoring degraded ecosystems in order to protect the quality and quantity of water flows that EPMAPS supplies to the city of Quito through various artifacts such as pipelines.

This new form of territoriality embodied by the Andean bear in the Antisana region incorporates diverse regimes of conservation and conflict, but transcends a reductionist form of biopolitics, in favor of a multispecies technopolitics in which the self-constitution of individuals and collectives rather than humans (i.e., animals and material culture) helps to enact different understandings of territorial biopolitics beyond the human (Asdal *et al.*, 2017). Given that the boundaries between humans and things are porous, it is possible to argue that biopolitical rules (of things) could extend to apply to the human domain as well.

A reductionist conservationist stance based on speciesism (*zoe*) conceives of the bear or water sources as discrete entities, but a territorial biopolitics embraces a broader relational fabric (*bios*). However, this should not be understood as a reification or alienation of the human subject and the concomitant subjection of the *zoe*, but rather as an assemblage of forces that constrain the collective of subjectivities, or *bios* (Wolfe, 2013). This distinction is crucial.

A multispecies technopolitics of the Andean bear conceives the hydraulic infrastructure of the EPMAPS as a 'medium', with a feedback loop between its causes and effects (*i.e*., a form of downward causation), where a certain event like a municipal water demand can in turn be the cause of another phenomenon *(i.e.,* a cascade effect). In this way the allegedly human volitional character attributed to the water conservation policies trying to protect the *páramo* ecosystem are blurred, or form a passive background to the bear's status as a protected species. The *bios* turns out to be an emergent rather than a given form, a transactional form rather than an effect of knowledge practices; in this sense, a multispecies technopolitics is linked to material assemblages that establish different governance regimes, for example, forms of governance that promote both water and bear conservation. However, rather than focusing on a regime that promotes the protection of a pristine environment, this study has attempted to describe the relationality that detonates the Andean bear in the Antisana *páramo*.

Similarly, we have attempted to locate the conflict between species historically within a proximate temporality, coinciding with the technological interventions of EPMAPS and FONAG in the region. The attention to temporalities serves as a guide for accounting for non-human practices, just as infrastructures can be a good starting point for understanding the relationship between ontology and materiality. Sometimes non-human entities, such as the bear, serve human infrastructural purposes such as protecting water sources, where such infrastructures enable forms of life and sociality (Tsing, 2018). Similarly, the point is to think about the relationality of bears, cattle, and the *páramo* in terms of juxtapositions embedded in different power relations, which are also mediated by

other more-than-human entities, which can be animals (*i.e.*, condors), plants (*i.e.*, *achupallas*), microbes (*i.e.*, distemper), and artifacts (pipelines). All of which configure a material semiotic web in which the effects of the Anthropocene are nuanced or exacerbated.

Undoubtedly, the consideration of the bear as a political subject includes its presence in the media, connecting it to people beyond conservationists, park rangers and surrounding communities, for example, to a wider public that regularly visits the Antisana. This, in turn, expands the *páramo* relational fabric to include its road infrastructure, which makes part of this relationship possible. According to Armando Castellanos, there could be a new conflict with tourism emerging, which may use baiting to alter a bear's behavior. This is a kind of manipulation that can lead to greater proximity between bears and humans, for example, bears approaching houses seeking food.

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