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Intersections of Conservation, Cattle, and Culture in Ecuador's *Páramo* Grasslands

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Páramo is a biodiverse, high-elevation humid grassland ecosystem mainly found in the northern Andes. Since Spanish colonization, *páramo* lands in Ecuador have been used locally for grazing cattle that roam freely, known as

ganado bravo. At present, much of the ecosystem in Ecuador's northern Andes is managed collectively by indigenous communities that gained property rights to expropriated hacienda lands during historic agrarian reform measures. Scholars and conservation practitioners now recognize *páramo* lands as important for regional hydrological systems that are vital to sustaining the water needs of montane communities and urban areas. As such, several initiatives focusing on *páramo*

conservation have begun offering incentives to local communities to remove ganado bravo. In a case study situated on the slopes of the Cayambe volcano in Ecuador, I examine the local contextual factors, aside from conservation agreements, that have affected the community dynamics of maintaining cattle in the *páramo*. Many communities have reduced the number of cattle in the *páramo* but are reluctant to pursue their complete removal. This article highlights the importance of recognizing how local cultural practices intersect with conservation initiatives and outlines the implications of removing ganado bravo for the sustainable management of *páramo* grasslands.

Keywords: Andes; chagra; pastoralism; ecosystem services; water fund; ganado bravo.

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Introduction

Over the past quarter century, conservation efforts in Ecuador have increasingly focused on the montane humid grassland ecosystem known as *páramo*. Forming at around 3400 masl (Sklenar and Jørgensen 1999), it is home to various forms of endemic vegetation and animal species that are the subjects of international conservation interest, including the Andean bear (*Tremarctos ornatus*) and Andean condor (*Vultur gryphus*) (Clark 2004; Crespo-Gascón and Guerrero-Casado 2019). The ecosystem garners further attention for its role in the provision and regulation of regional water resources that supply both rural and urban populations (Buytaert, Deckers et al 2006). Ecuador's capital city of Quito, as a notable example, is dependent on *páramo* for its hydrological services, deriving about 85% of its water supply from the ecosystem (Buytaert, Cellari et al 2006). The widespread recognition of the biological and hydrographic importance of *páramo* has spurred the creation of protected areas, with estimates placing 40% of Ecuador's total *páramo* lands under protection (Beltrán et al 2009).

While Ecuador's protected area network continues to enclose more of the ecosystem (Himley 2009), *páramo* outside of protected areas is a target for a variety of incentive-based payments for ecosystem services (PES) conservation programs, including water funds and the state-led program of SocioPáramo (Farley et al 2011; Goldman-Benner et al 2012; Bremer et al 2014). These programs transfer cash or in-kind payments to individual or collective land managers in

exchange for their activities in stewarding lands critical to ecosystem service production. Incentive-based conservation programs are often lauded by scholars and practitioners as an efficient, noncoercive form of environmental governance, compared to more traditional top-down policy approaches such as protected areas (Muradian et al 2013).

Though ecologically significant, Ecuador's *páramos* are also a cultural landscape that holds importance for local indigenous populations as a productive space (Farley and Bremer 2017). Evidence indicates that humans have a long history of interaction with *páramo* lands and have contributed to shaping their ecology (Sarmiento 2012). While pre-Colombian populations used *páramo* lands for military fortifications, *páramo* was consistently used for livestock grazing during Spanish colonization (Ramón 2009). From the European stock brought in the mid-1500s, a distinct "creole variety" of free-roaming cattle known as *ganado bravo* developed in the Ecuadorian highlands. *Ganado bravo* are well adapted to the harsh climatic extremes of *páramo* and have significantly contributed to local subsistence over the past several hundred years (Cevallos-Falquez et al 2016).

Spanish colonization also largely altered indigenous property regimes and instituted a *huasipungo* system, a debt-peonage arrangement in which the lands of indigenous people were appropriated into large haciendas. The indigenous people were allowed to remain on the land and cultivate small subsistence plots as long as they continued to do unpaid labor supporting the hacienda. Agrarian reform

laws in 1964 outlawed the *huasipungo* system and initiated the transfer of property ownership to cooperatives of indigenous farmers that had formerly worked them. Reform, however, proceeded unevenly, and the state favored expropriating properties located in less arable, high elevations of *páramo* (Recharte and Gearheard 2001).

The Land Development Law ended agrarian reform in the 1990s, and the cooperatives became recognized communities with large areas of collectively managed *páramo* (Medina and Mena-Vásconez 2001). Historically significant to community survival, the *páramo* is a traditional source for meat and income from *ganado bravo* as well as for medicinal plants, water for consumption and irrigation, and fuel. Research examining the perceptions and values of *páramo* in Ecuador ties the ecosystem to indigenous identity via the shared struggles for agrarian reform and ongoing practices of collective land management, including livestock grazing (Farley and Bremer 2017). Closely associated with the *páramo*, *ganado bravo* therefore have particular importance to indigenous and mestizo communities.

Intensive *páramo* grazing, however, can damage the ecosystem by reducing vegetation cover and facilitating soil compaction and erosion, thus reducing the ability of the soil to retain moisture and negatively affecting stream flows and water availability (Podwojewski et al 2002; Sarmiento 2012). Conservation practitioners also criticize *páramo* grazing for its association with traditional burning practices used to encourage new grassland growth and remove woody shrubs (Sarmiento 2012). PES conservation programs focusing on Ecuador's *páramos* have therefore largely directed efforts toward incentivizing communities to remove cattle from them and cease burning practices (Farley et al 2011). While there have been reports of reduced grazing in the *páramo* associated with PES programs across Ecuador (eg Hayes et al 2017), resistance to removing cattle altogether from the ecosystem remains in many communities.

In this article, I discuss a case of one such community targeted for an incentive-based conservation program. This case study examines how a PES program's aim to remove cattle from the *páramo* can interact with community goals and a shifting economic context. It particularly highlights how culture and local environmental beliefs have shaped the community response to conservation efforts to remove cattle from the *páramo*.

Methods and case study

This article comes from a long-term study of Quito's water fund PES program (*Fondo para la Protección del Agua*, FONAG). Over the course of this study, I visited 8 communities that had agreed contracts with FONAG to conduct interviews, engage in participant observation, and collect relevant documents. According to project reports written between 2008 and 2013, FONAG made 13 conservation agreements with local communities and required *páramo* livestock removal and/or the cessation of burning practices in 11 of them. This particularly reflects the program's emphasis on eliminating grazing as a *páramo* use.

I focus here on the economic and social dimensions of cattle removal, particularly within one community called Paquiestancia, which had multiple conservation agreements with FONAG between 2007 and 2011. I examined

ethnographic data collected during field visits to the community between 2012 and 2017. During that period, I toured local farms and community lands, shared meals, participated in celebrations, and engaged in interviews about FONAG's influence on conservation practices and their intersection with local livelihoods. In addition to the coded field notes from participant observation and interviews, I used written contract agreements between FONAG and the community to identify major themes surrounding cattle and *páramo* management to inform the analysis. Although I concentrated on Paquiestancia, the findings regarding cattle removal from the *páramo* are relevant to other communities in the region.

People of Kayambi indigenous descent established Paquiestancia through agrarian reform on the slopes of Cayambe, an impressive snow-capped volcano that straddles the equator. Today, it is a community of around 250 households located approximately 115 km north of Quito in the province of Pichincha (Ayala et al 2016). The volcano also lends its name to the *cantón* in which Paquiestancia exists. As the smallest area of government administration, Ecuadorian *cantónes* represent an economic, political, and social microregion. Cayambe *cantón* has roughly 58,700 ha of *páramo*, covering about 50% of its total area (Recharte and Gearheard 2001). Much of Cayambe's *páramo* exists within Cayambe Coca National Park, though the grasslands extend across protected area boundaries and into the collectively managed properties of many adjacent communities, including Paquiestancia.

Cayambe *cantón* is mostly rural, and the majority of individual properties are small farms (*minifundia*) of about 2–4 ha in size (Recharte and Gearheard 2001; Ayala et al 2016). In 2007, approximately 42% of the gross value of production in the *cantón* came from dairy, 35% came from the flower industry, and 22% came from annual crops, especially potatoes and onions (Chiriboga and Chehab 2007). While the economic output of the flower industry has likely increased in the *cantón* as international flower exports have continued to grow over the past decade, both dairy and floriculture continue as major sources of household income in Paquiestancia and neighboring communities.

In Paquiestancia, elevation ranges from about 3200 masl to 3800 masl, with homes concentrated in the lowest elevations of the territory. Because Paquiestancia collectively manages 800 ha of *páramo* abutting the Cayambe Coca National Park, FONAG made it one of the first targets for a conservation contract agreement. Like other communities in the area, Paquiestancia's contracts with FONAG emphasized removing cattle from the *páramo*. In exchange, FONAG gave in-kind material support to a group of community members to raise guinea pigs, vegetable gardens, and even improve pastures for dairy cattle in the lower elevations of the community.

Reports from FONAG and interviews with community members indicated that few cattle remain in the *páramo* area managed by Paquiestancia. During a 2012 interview about reducing cattle numbers in the *páramo*, the then-community president supported the efforts and indicated that the activity fit with ongoing plans for the community's *páramo* management. However, when asked about completely removing cattle from the *páramo*, she indicated that this would be undesirable. This sentiment appeared in various interviews within Paquiestancia, but also across interviews in

FIGURE 1 Woman in Paquiestancia herding a dairy cow and calf in pasture adjacent to her home (August 2014). (Photo by Audrey Joslin)



other communities involved with FONAG in Cayambe cantón.

The dynamics of cattle removal and resistance

The community of Paquiestancia supported FONAG's conservation contract agreements requiring the reduction of livestock, primarily *ganado bravo*, from the páramo. However, eradication of *ganado bravo* from the páramo is largely unsupported in Paquiestancia, as well as in neighboring communities of Kayambi affiliation. In the following subsections, I identify and discuss several factors that work with or against conservation efforts focusing on cattle removal.

Local industry

Floriculture and dairy are 2 major industries that have shaped the region's present economy over the past 40 years. The modern flower export industry in Ecuador was established in the 1980s and is currently worth over US\$ 700 million (Knapp 2017). Cayambe's valleys are key production sites for this industry. Flower farms are typically owned by large partnerships, but they employ a tremendous amount of off-farm labor from local communities (Knapp 2017). While Paquiestancia's lands are not dedicated to floriculture, an estimated 30% of the community commutes to work on nearby flower farms (Ayala et al 2016).

Furthermore, government subsidies targeting the northern Andes in the 1980s and 1990s helped to establish it as a national center for the dairy industry (Recharte and Gearheard 2001; Jampel 2016). Cayambe cantón is the fourth largest dairy producer in Ecuador, according to the last agricultural census, performed in 2010. Following this

regional pattern, about 70% of the households in Paquiestancia own dairy cattle (Sinchiguano Almeida 2017). There are about 2000 dairy cattle in total owned in the community, with most households owning fewer than 10 animals (Ayala et al 2016). A milk transport station is easily accessible in Paquiestancia, and those living on even small agricultural plots of 2–3 ha own dairy cattle (Figure 1). Illustrating the importance of dairy to the local economy and particularly small landholders, a local community member commented, "Here, we live off of milk, and that is about it."

While the dairy industry also involves cattle, dairy cattle differ notably from *ganado bravo*. Dairy cattle come from recently imported European stocks, primarily Jersey or Holstein varieties. A resident of Paquiestancia explained on a tour of her property that dairy cattle must be kept near the home. Dairy cattle cannot be left alone in the páramo because they need daily maintenance for milking and are susceptible to damp and cold conditions. As dairy cattle are expensive and valuable, they are also a target for theft (Ayala et al 2016).

In contrast, interviews with local people indicated that *ganado bravo* are primarily used for their meat. Raised on the tough grass and steep mountain terrain, the lean beef from *ganado bravo* is tough and does not typically fetch high prices when pastured beef from lowland areas is available in markets. According to several interviews, *ganado bravo* have very little economic value today. Although the cost of maintaining them is low, because, as one community member expressed, "the mountain cares for the *ganado bravo*," there is not much of a market for them (Figure 2). Recognizing that dairy cattle are not kept in the high páramo elevations, FONAG's conservation agreements have

FIGURE 2 A lone *ganado bravo* roaming freely in the *páramo* on Cayambe volcano (July 2012). (Photo by Audrey Joslin)



supported projects in various communities in the region to improve and intensify dairy production. In Paquiestancia, this included a proposal for a pasture-seeding program to allow more intensive grazing on smaller properties near homes at lower elevations (FONAG 2011). In other Kayambi communities, it has included the support of improved pastures as well as veterinary care.

Attempting to expand economic opportunities in the community further, Paquiestancia has endeavored to develop ecotourism. In 2001, the community developed a trail called the “Camino del Condor,” where tourists can hire local guides to lead them on horseback to view Andean condors in the *páramo*. In discussions with Paquiestancia community members about their views on tourism, many stated that tourists did not want to view cattle in the *páramo* as tourists considered cattle to be unnatural elements in the landscape.

Thus, decisions to maintain *ganado bravo* in Paquiestancia’s *páramo* are influenced by the larger regional shifts in industry and the expansion of economic options. Reliance on subsistence-based agriculture around the Cayambe volcano, of which *páramo* grazing is a key practice, has furthermore dwindled given the off-farm employment opportunities in the flower industry (López-Sandoval and Maldonado 2019). The lack of economic incentive for maintaining large numbers of *ganado bravo* in the *páramo* combined with the potential negative economic impacts to ecotourism thus appear to have also encouraged the community to reduce cattle numbers in the *páramo*.

Culture and identity

Ganado bravo are linked to the history and identity of the communities around Cayambe, including Paquiestancia. Cattle were integrated into the production systems of the northern Andes in the 1500s and required the development of skills associated with managing livestock (Recharte and Gearheard 2001). This new form of production gave birth to the *chagra*, a person recognized for their equestrian skills, roping abilities, and deep knowledge of the *páramo* landscape. In caring for cattle, *chagras* played an important and respected role in former haciendas and became ingrained as a cultural feature and a way of life associated with the *páramo*.

Following agrarian reform, indigenous communities in the Cayambe region assumed and maintained the *chagra* practices and culture, whereas the haciendas lost access to the highlands and focused practices on floriculture in the valleys. Thus, indigenous communities primarily continue to manage *ganado bravo* in the *páramo* (Ordóñez Checa 2011). Despite its mixed origins, the term *chagra* originates from Kichwa and is associated with rurality and indigeneity, particularly around Cayambe. The continuation of *chagra* tradition represents a reclamation of *páramo* spaces from the haciendas and an assumption of power. Furthermore, the practices of the *chagra* involve imparting knowledge about *páramo* ecology and livestock management to younger generations, reinforcing connections to the land, social relationships, and aspects of identity.

The *chagras* are important to annual celebrations and play a crucial role in the broader reproduction of local

FIGURE 3 A *toros del pueblo* event in Paquiesticancia begins with a traditional blessing done by the leader of the community (June 2014). (Photo by Audrey Joslin)



cultural identity and community cohesion. Indeed, the yearly summer festivals in the region, including San Pedro, San Juan, and Inti Raymi, feature competitions of *chagra* skills and *ganado bravo* in a series of events. Known colloquially as *toros del pueblo*, these events often begin with local indigenous traditional ritual blessings (Figure 3). Although many people

in Paquiesticancia no longer casually don traditional clothing, many choose to dress traditionally during special events. For *chagras*, the traditional clothing includes a hat, a scarf, a poncho, and wooly chaps for protection from the harsh *páramo* weather (Figure 4). Often, the colors they wear carry symbolism and represent *páramo* animals such as the condor.

FIGURE 4 A roping competitor in traditional *chagra* attire (June 2014). (Photo by Audrey Joslin)



The woolly chaps, *zamarro*, are of pre-Colombian origin, and men also wear them with costumes for dancing during festivals (Castillo 2018). *Ganado bravo* are featured in roping competitions, which include teams of 3–4 individuals on horseback. In another event, competitors try to obtain a decorative collar tied onto a *ganado bravo*'s neck. While most popular with young men, versions of this event in Paquiestancia also include women and children. Meanwhile, community members gather around the competition field to cheer on friends and neighbors while sharing food and beverages. While these events serve as entertainment, they bring together people of the community to socially reinforce belonging and a shared community history. Without *ganado bravo*, the *chagra* would cease to exist. The importance of *ganado bravo* to the community festivals underscores a main reason for local resistance to removing cattle from the *páramo* altogether in Paquiestancia and other Kayambi communities.

Ecological beliefs

Shifts in local and regional economic activities no longer encourage grazing livestock in the *páramo*, while local cultural traditions associated with history and identity do. Local ecological beliefs also mediate discussions of *páramo* grazing. These beliefs tend to support reducing large numbers of cattle in the *páramo*, but not eradicating cattle in the *páramo* altogether.

First, concerns about protecting water resources and recognizing the *páramo* for water capture are very prominent within interviews and discussions regarding *páramo* management and the removal of cattle. In Paquiestancia, as well as neighboring Kayambi communities, people identified the *páramo* as the main water source and as an ecosystem to be maintained and protected. They often described themselves as caretakers or stewards of the *páramo*, and they described water as the primary source of life.

Of note, narratives from Paquiestancia and neighboring communities also recount issues with overgrazing following agrarian reform. Several community members commented that the worst overgrazing occurred in the early 1990s and affected local water supplies. One community member remarked that the land had appeared like a “*cancha de futbol*,” or shortly trimmed soccer field. In the late 1990s, after much discussion, the community decided to demarcate grazing boundaries and reduce the overall number of cattle on the land in favor of maintaining water sources for consumption and irrigation. Across the region, the organizational body of Kayambi communities known as the Pueblo Kayambi encouraged the recognition of *páramo* lands as a water source requiring prioritized and organized management. Thus, Paquiestancia and other Kayambi communities began adapting management toward water resource protection by reducing cattle numbers within their *páramos*.

While there is widespread recognition that overgrazing harms the *páramo*, there are mixed beliefs about the general impact of cattle in the *páramo*. While some argue that cattle damage soils and vegetation, others view cattle and the associated practice of burning as encouraging new growth and greater plant diversity. Some community members also believe that cattle support Andean condors, commenting that condors prey upon calves and scavenge the bodies of livestock that occasionally die in the *páramo*. Thus, some were

concerned that totally removing cattle from the *páramo* would cause the condors to leave. Although not funded, part of a proposal budget that Paquiestancia wrote for a FONAG conservation agreement even included regularly transporting a beef carcass to the *páramo* for the condors to consume.

Among community members of Paquiestancia, *ganado bravo* were described as both a natural and unnatural part of the *páramo*—an animal that was simultaneously wild and domesticated. It also represented both harm and good within the ecosystem. Thus, ecological beliefs could work either for or against their continuance in the *páramo*.

Conservation implications

The work of the FONAG water fund PES program near Cayambe in Ecuador appears to complement ongoing local efforts to reduce the number of cattle in the *páramo*, mainly for the purposes of water resource protection. The shift away from smallholder economic reliance on *ganado bravo* further discourages the maintenance of large numbers of cattle in the *páramo*. However, *ganado bravo* remain a part of the heritage and culture of local people in the region, and communities are reluctant to remove cattle completely from the *páramo*. As this article demonstrates, local economic context and cultural dimensions of a landscape intersect closely with conservation activities.

Removing cattle from *páramo* grasslands may be an attractive focus for PES efforts because it yields a quantifiable measurement for reporting. However, the overall impact of small numbers of *ganado bravo* in the *páramo* ecosystem remains largely understudied. Contrary to popular beliefs about the absolute detriment of fire to water services, recent research has demonstrated that periodic burning does not reduce the moisture retention abilities of *páramo* soils (Farley et al 2013). Occasional, intermediate burning to reduce woody vegetation may even enhance water retention in *páramo* soils by promoting the dominance of grasses (Harden et al 2013) and could promote floral diversity (Farley and Bremer 2017; Bremer et al 2019). Likewise, evidence suggests that combined light grazing and burning may increase biodiversity rather than reduce it (Suárez and Medina 2001). Because the harmful extent of *páramo* grazing is uncertain, and collective livestock management promotes a cultural connection to *páramo* potentially supportive of long-term conservation goals, strict policies of livestock removal in *páramo* grasslands may be inappropriate.

Finally, it should be noted that the continued maintenance of small numbers of *ganado bravo* in the *páramo* represents a contribution to global agrobiodiversity that may support food system resilience. Creole livestock variants are more adaptable to environmental changes than high-output varieties and are critical to maintaining food security, especially in developing countries (Hoffmann 2010). Given the uncertainty of the effects of climate change and the influence of variability in global markets on off-farm employment opportunities, greater diversity may help to insulate smallholders against future vulnerability. While research is needed to clarify the ecological impacts of limited *ganado bravo* *páramo* grazing, conservation objectives should

also fully consider the potential long-term cultural and socioeconomic impacts of eliminating it altogether.

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