How plants participate in politically contested ecologies? Species, vegetation cover and crops in the conservation of the *páramos* in Colombia

Camilo Castillo Estupiñan[1]

University of Gothenburg, Sweden

Abstract

This article examines the role of plants shaping the political ecology (PE) of the conservation of the Andean *páramos* in the Sumapaz Region in Colombia. Due to their rich biodiversity and role in the water cycle, *páramos* have gained major importance in the conservation agenda of Colombia. However, despite the importance of plants in scientific and policy accounts of *páramos*, plants have been usually taken by scholars as secondary elements in the PE of *páramos* conservation. Based on an ethnographic work with geographers, biologists and *campesino* communities (small-holder farmers), this article analyzes the material multiple becoming of plants as participants in conservation and their political effects through three practices: i) organizing herbarium collections, ii) mapping a *páramo* and iii) crop cultivation. It also discusses existing scholarship on the 'distinctive capacities' of plants and argues for the need to understand those capacities as they emerge in events where plants shape hierarchies, asymmetries and ways of living in conservation. In this way, the article contributes an empirical study that nurtures and invites us to develop further the current scholarship on the implications of other-than-human capacities in the PE of conservation.

Keywords: other-than-human, agency, *páramos*, conservation, plants, multiplicity, materiality, political ecology, science and technology studies, plantiness

Resumé

Cet article examine le rôle des plantes dans la formation de l'écologie politique (EP) de la conservation des *páramos* andins dans la région de Sumapaz en Colombie. En raison de leur riche biodiversité et de leur rôle dans le cycle de l'eau, les *páramos* ont acquis une importance considérable dans le programme de conservation de la Colombie. Cependant, malgré l'importance des plantes dans les comptes rendus scientifiques et politiques sur les *páramos*, celles-ci ont généralement été considérées, dans ces comptes rendus, comme des éléments secondaires pour l'EP de la conservation des *páramos*.

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[1] Camilo Castillo, Postdoctoral Researcher, School of Global Studies, University of Gothenburg, Sweden. Email: csarcamilo "at" gmail.com. The author would like to thank SINTRAPAZ for its collaboration facilitating this research alongside the *campesino* communities in Sumapaz. The generosity of the biologists and geographers that shared and explained their knowledge practices were also crucial. Earlier versions of the text benefited from advice from by members of the Social Studies of Science and Technology Seminar (SSST) at Lund University, the Technologies in Practice (TiP) seminar at the IT University of Copenhagen and the comments and suggestions by four anonymous reviewers. Finally, the author extends his gratitude to the Swedish Research Council for providing the financial support for the fieldwork and writing of this article. In 'Understanding political ecologies of wildlife conservation through non-human lives.' Eds. Sayan Banerjee, Jared Margulies & Paola Velasco Santos. Special Section, *Journal of Political Ecology* (2026).

Basé sur un travail ethnographique mené auprès de géographes, de biologistes et de communautés paysannes, l'article analyse le devenir matériel multiple des plantes en tant qu'actrices de la conservation et leurs effets politiques à travers trois pratiques: i) l'organisation de collections d'herbiers, ii) la cartographie d'un *páramo* et iii) la culture agricole. L'article examine également les travaux universitaires existants sur les 'capacités distinctives' des plantes et plaide en faveur de la nécessité de comprendre ces capacités telles qu'elles apparaissent dans les événements où les plantes façonnent les hiérarchies, les asymétries et les modes de vie dans le domaine de la conservation. Ainsi, l'article apporte une Contributions empirique qui nourrit et invite à développer davantage les travaux universitaires actuels s'intéressant aux implications des capacités non humaines dans l'écologie politique de la conservation.

Mot clés: non-humains, agence, *páramos*, conservation, plantes, multiplicité, matérialité, écologie politique, études scientifiques et technologiques, végétalité

Resumen

El artículo examina el rol de las plantas moldeando la ecología política (EP) de la conservación de los páramos andinos en la región del Sumapaz en Colombia. Debido a su rica biodiversidad y rol en el ciclo hídrico, los páramos han recibido una atención destacada en la agenda de la conservación en Colombia. Sin embargo, a pesar de la importancia de las plantas en reportes científicos y políticos de los páramos, éstas han sido usualmente tomadas por investigadores como elementos secundarios en el análisis de la EP. Basado en un trabajo etnográfico con geógrafos, biólogos y comunidades campesinas, el artículo analiza la configuración material múltiple de las plantas como participantes en la conservación y sus efectos políticos a través de tres situaciones: i) la organización de las colecciones en un herbario, ii) el mapeo de un páramo y iii) el mantenimiento de cultivos. También se discute la literatura existente acerca de las ' capacidades distintivas ' de las plantas y argumenta la necesidad de entender dichas capacidades según emergen en los eventos donde las plantas contribuyen a moldear jerarquías, asimetrías y formas de vida en la conservación. De esta forma, el artículo contribuye con un estudio empírico que nutre e invita a desarrollar investigaciones interesadas en las implicaciones de las capacidades de agentes aparte-de-los-humanos en la EP de la conservación.

Palabras clave: no-humanos, más-que-humanos, agencia, páramos, conservación, plantas, multiplicidad, materialidad, ecología política, estudios de ciencia y tecnología, vegetalidad

1. Introduction

Over the last decade, political ecologists have explored the analytical and political importance of including other-than-humans in their studies. In the second edition of his influential book *Introduction to Political Ecology*, Paul Robbins (2012, p. 131) dedicated a whole chapter to discussing the implications of expanding the range of actors involved in political ecology (PE). Recent dialogues with more-than-human and posthuman geographies have animated political ecologists to include the other-than-human dimension in their analyses (Durand & Sundberg, 2019; Margulies & Bersaglio, 2018). At stake for researchers is the intellectual and analytical opportunity to rethink justice and socio-ecological transformation (Castree & Nash, 2006; Hinchliffe, 2007; Lorimer, 2015; Whatmore, 1999).

Some scholars within PE have been critical of the recent enthusiasm for other-than-humans, pointing to the historical and political limitations of such studies (Büscher, 2022; Hornborg, 2021). These critiques, however, often stop short of proposing new conceptual or methodological approaches that take seriously the role of other-than-humans in PE. This article seeks to contribute to that debate by arguing for the importance of incorporating other-than-humans into PE. Doing so requires an analysis that avoids essentialisms by recognizing how other-than-humans are constituted in practice

and what effects they produce in domains such as resource management, environmental governance, and biodiversity conservation.

I will develop my argument through an empirical case in Colombia, where the conservation of the high Andean *páramos* has been a contentious matter for *campesino* communities[2] and environmental authorities across different regions of the country (Mendéz Polo, 2019; Pachón, 2018). According to biologists and ecologists, *páramo*s are high mountain ecosystems typically located at altitudes between 2,800 and 3,500 m (Hofstede *et al.*, 2003). *Páramos* (often translated as 'mires' in English) are also recognized by hydrologists and botanists for their rich biodiversity and role in the hydrological cycle (Buytaert *et al.*, 2006; Cleef *et al.*, 2008). These reasons have made *páramos* a flagship of Colombia's biodiversity and one of its most important sources for the provision of water in the country.

Since the 2010s, the Colombian government has advanced the "*páramos* demarcation policy" to conserve these important places (Cortés-Duque & Sarmiento, 2013). Its goal was to map *páramo* boundaries and ban human activities such as agriculture and mining. As PE research shows, this conservation model often creates conflicts with local communities, in this case, *campesinos* inhabiting *páramo* areas. One such area is the Sumapaz region, 87 km south of Bogotá, where the *páramo* was officially demarcated in 2017 (Colombian Ministry of Environment and Sustainable Development, 2017). The decision sparked conflict between environmental authorities and *campesino* communities, who viewed the prohibition of agriculture as a direct threat to their livelihoods and territories. For *campesinos* from Sumapaz, this was not a new story: their long history of political organizing and agrarian struggles has been central to shaping the region's agrarian context in Sumapaz where conservation takes place.[3]

Central to that conflict is the role of plants. Firstly, because plant types were the main criterion for demarcating the transition between the *páramos* and the neighboring Andean Forest (Sarmiento & León Moya, 2015). To identify that transition, plants were the main indicator since according to science, *páramos* are characterized by low vegetation such as shrubs, tussock grasses, cushion plants and *frailejones* (Espeletia, a succulent). Secondly, for *campesino* communities living in *páramos*, plants are vital as part of cultivating crops for the subsistence of their worlds. Although social scientists, including political ecologists, have recently paid significant attention to *páramos* (Amador-Jimenez & Millner, 2023; Blake et al., 2023; Parra-Romero, 2023; Ungar, 2021) the role of plants in *páramos* conservation remains underexamined. Key questions for PE thus remain: what comes to count as plants in the conservation of *páramos*? How do they become participants in conservation? And what are the political effects of their participation?

This article addresses those questions and opens the analytical space for reflexively examining the role of plants in PE. Conceptually, it connects science and technology studies (STS) with PE concerns with other-than-humans. Methodologically, it reports on an ethnography of 18 months with geographers, biologists and *campesinos* in Colombia's Sumapaz Region, analyzing how plants emerge and participate in the PE of conservation. The second section offers a brief critical review of PE literature on other-than-humans, particularly plants, in dialogue with STS. The third outlines the empirical case and materials. Then the rest of the article develops the empirical analysis and situate plants as central to understand the PE of conservation through: the legislation that regulates the

[2] *Campesino* is a Spanish word that refers to small-holder farmers. In the context of Colombia, *campesino* communities have been struggling to secure similar collective rights as those that Afro-descendant communities and indigenous people have in legislation.

[3] See Valera & Romero (2007), Londoño (2011) and Morales-Acosta (2017) for a historical perspective of the agrarian context in Sumapaz and the role of *campesino* organizations in the history of the region.

conservation of *páramos* in Colombia (Section 4), the organization of plants in the herbarium (Section 5), vegetation mapping via chlorophyl indicators (Section 6) and plants as crops in the lives of *campesinos* (Section 7). The conclusion shows how the case broadens the relevance of other-than-humans in PE and points to future directions.

2. Other-than-humans in political ecology

Attending to the role of plants for understanding the PE of *páramos* conservation in Colombia deserves a brief review of how other-than-humans have been addressed in PE. As mentioned above, other-than-humans are not a recent discovery for political ecologists. The work of Jessica Dempsey (2010) showed that it was possible to follow the traces of other-than-humans such as grizzly bears to spell out their agency and effects in the PE of land-use planning and conservation. That line of research has been developed more actively by those studying human-wildlife-conflicts. The main emphasis of those works has been that, animals such as elephants, bears or wolves can be agents with the ability of changing socioecological dynamics that have politically relevant consequences. For example, De Silva and Srinivasan (2019) examined people-elephant conflicts in Sri Lanka to understand the more-than-human ramifications of social natures causing conservation conflicts. In a similar way, Evans and Adams (2018) used spatial data to argue for the importance of conceiving elephants as actors. They argue that conflicts emerge from situated interactions in specific landscapes between individual elephants and people. In a different case, Donfrancesco (2024) studied the return of wolves in Tuscany, Italy, and demonstrates that these animals do not only shape conflicts with humans, but also influence the composition of farming landscapes and processes of agrarian change.

But not all the scholarship on human-wildlife-interactions embraces the same enthusiasm about the agency of other-than-humans. For some authors, who have studied the agency of brown bears in Bulgaria (Toncheva & Fletcher, 2022) and wolves in Finland (Komi & Nygren, 2023), it is of course fruitless to neglect the role of animals' agency in conservation. However, based on their studies, they argue that the ability to decide what counts as 'wolves' or 'bears' and the responsibility of what policies to implement for regulating their interactions resides with humans.

Political ecologists have also considered other scenarios other than policy and decision-making. In the case of México, Gonzalez-Duarte and Méndez-Arreola (2024) studied the temporalities of butterflies to appreciate the reciprocal relationships that sustain territories and the beings that inhabit them. As they argue, other-than-human dynamics helps to situate the efforts of communities to reclaim land management and Indigeneity as future-making projects (González-Duarte & Méndez-Arreola, 2024, p. 230). In Colombia, Garrido Corredor *et al*. (2021) argue that human-bear conflicts are also part of an ontological conflict between interconnected and yet different life-worlds, where both bears and humans transform their multispecies landscapes through their mutual affective relations. This perspective puts a slightly different emphasis on other-than-humans, giving special attention to the conditions under which other-than-human agency emerges. For example, Ampumuza and Driessen (2021) explain how the ability of gorillas in Uganda to act and participate in the landscape, tourism economy and conservation policy is part of a process that builds those relations and transforms all of those involved, including both gorillas and humans such as communities, policy-makers, scientists and tourists. As Chao (2022) analyzes in West Papua, apart from mutually-supporting relations, plants also participate in dispossession relations that also form the worlds of other plants and Marind people.

Notwithstanding the importance of studies introducing actors such as wolves, bears, butterflies, gorillas, elephants and others into PE analysis, we as researchers risk modelling other-than-human analysis to human-animal encounters. This 'animal emphasis' (Fleming, 2017), may narrow the

critical thrust in the field and overlook the broader political significance of other-than-humans. Said differently, if PE associates other-than-humans only with animals, we might miss the richness of other-than-humans such as plants, which raise distinct yet vital questions in cases where reliance on 'the human' backgrounds important elements at play in the PE of conservation.

Arguably, one could say that political ecologists have not neglected the role of plants in conservation and resource management politics. In their classic study, Fairhead & Leach (1996) analyzed how ideas about forests were connected to unfair mapping and conservation practices in Guinea. Also in the 1990s, Rocheleau and Ross (1995) addressed the role of trees as 'instruments of power and as tools of empowerment' embedded in struggles between state agencies, NGOs and rural people's movements in the Dominican Republic. Similarly, Scott Prudham (2003) in his study of the historical political economy of tree improvement in Oregon and Washington, dedicates a section to analyze how the characteristics of plants became inscribed in the social organization of projects to capitalize plantation forestry projects.

These studies were not necessarily engaged with a wider reflection about the place of other-than-humans in PE analysis. It has been only until recently that the recognition and understanding of plants' material and political status has caught the attention of political ecologists. For Kull and Rangan (2015), a focus on landscape transformation could allow political ecologists to investigate how the movement of plants and human activities come together to rework social relations. Robbins (2007) also studied the American lawn as an environmental actor able to force behaviors, adaptations and adjustments on individuals, municipal economies and companies. Other political ecologists have borrowed the 'plantiness' concept, originally proposed in human bio-geography to analyze the characteristics and capacities specific to plants that shape how they act in their worlds and prefigure relations with people (Head *et al.*, 2012, 2015). This idea is crucial for attending to plants' capacities to form contingent and unevenly experienced associations with groups of humans able to mediate social life (Brice, 2014).Within PE, these concerns have animated debates on 'vegetal political ecology', which seeks to spell out the capacities of plants to alter human-plant encounters and their impact on environmental disputes, such as those taking place in conservation and resource management (Fleming, 2017).

This approach has ripened in contributions that include the agency of weeds and their impact in the PE around unwanted plants in agriculture (Argüelles & March, 2022). Fleming also describes the capacity of trees to facilitate modes of partnership with humans to sustain forms of politics away from hierarchies and state control (Fleming, 2017). In India, Barua (2023) studied the PE of Mikania (a fast-growing weed) and their agency put into circulation by the plantation economy. The case of the scientific discovery of a new tiny flower in Mexico reported in this journal also shows the effects of plants in processes of knowledge production, environmental politics and identity formation (Durand & Sundberg, 2022). Overall, these works share an interest in identifying how the attributes of plants (plantiness) have an effect in configuring more-than-human political ecologies (De, 2024).

The emphasis on 'plantiness' by political ecologists has articulated ways of addressing the vegetal agency of plants and their role in the politics of topics such as conservation. Nevertheless, most of the PE studies mentioned above seem more concerned with identifying the capacities of plants, rather than examining the practical material conditions that make possible the multiple ways in which plants can collectively act. Neglecting this socio-material aspect might re-inscribe essentialisms about plants in politically disputed ecologies. This essentialism can foreshadow the politics through which 'plantiness' comes into being and features in human-plant relationships. Debates on STS around other-than-human agency could contribute to stimulate further conversations, in which 'plantiness' do not refer to 'essences', but to historical and practical layered contingences (Head *et al.*, 2012, 2015).

In STS, the importance placed on other-than-humans is related to the formation of collectives that assemble new entities and relations not yet gathered together (Callon, 1986; Law, 1992). These insights have been received and discussed by political ecologists in general (Goldman *et al.*, 2011; Lorimer, 2015). For some in STS, it has been crucial to invent ways to bypass the subject-object dualism, so technological objects and other-than-humans are not to be explained as out-there, and given elements that are either used by humans or imposed over them. One possibility has been to treat other-than-humans as potential actors able to remake social relations (Latour, 1999). This 'potential' is not inscribed in given attributes of those other-than-humans. Rather than this, if they are able to act, that should be taken as an outcome of the translation work that transforms relations, capacities and entities when forming an association (Latour, 1999). In these associations, action is not an exclusive property of humans, but of the whole collective formed by the associations, where of course other-than-humans could in principle occupy a role.[4]

However, for others in STS, including other-than-humans in the analysis should not exorcize sources of uncertainty and instability in order to provide a satisfactory description of other-than-humans effects (Woolgar & Neyland, 2013). This means that when analyzing the role of other-than-humans in PE, we should not take for granted the attributes and status of those that count as other-than-humans. Otherwise, we could miss the political process under which other-than-humans acquire and maintain their status in practical and mundane situations, that is, their ontological[5] constitution (Woolgar & Neyland, 2013). We could resituate the analytical strategy of the sociology of technology in PE, so we are able to attend to the social negotiations and the interpretative activities that grant the relevance of other-than-humans like plants, rather than taking such relevance from definitive and often essentialist accounts of their capacities and effects (Grint & Woolgar, 1997). This post-essentialist approach to other-than-humans could expand the sensibilities of PE to analyze the relational and politically disputed place of plants in conservation.

3. Methods and materials

The research for this article took place in the region of Sumapaz, located 87 km to the south of Bogotá, the capital of Colombia. Due to its location in the tropical Andes, Sumapaz comprises a vast geography constituted by rivers and valleys in the lowlands, and high Andean forests and *páramos* in the highlands. The importance of the region in terms of its fauna, flora and role in the water cycle has been exhaustively acknowledged by scientists (Cleef *et al.*, 2008; Humboldt Institute, 2015; Rangel, 2000). In terms of its agrarian context, Sumapaz was also the epicenter of a strong *campesino* movement that fought for access to land, which in the 1920s was concentrated among a few big landowners (Londoño, 2011). The agrarian movement in Sumapaz successfully abolished the *hacienda* land-tenure regime and obtained land ownership in the region (Varela & Romero, 2007). However, due to their political activity, *campesinos* from the region were persecuted by the Colombian government in the 1950s and over subsequent decades (Comisión de la Verdad Colombia, 2022). Despite stigmatization and political persecution, *campesinos* in Sumapaz still keep a strong

[4] This point has become very polemical among social scientists, in particular because for some, it could neglect the existence and importance of power relations. The fact that ANT accounts do not take power relations as given does not mean that it is unable to address them. In my opinion, ANT can attend to power relations, particularly to their formation and effects.

[5] Here 'ontological' refers to the local and practical process of making and sustaining realities (Mol, 2002; Woolgar & Neyland, 2013), which should not be confused with conventional ways of understanding ontology as the investigation of the essence of things or as theories about the nature of reality.

organization with the capacity to defend their territories, negotiate with public authorities and push for their own agendas of agrarian change.

This article reports on an 18-month ethnography with *campesino* communities from Sumapaz, biologists and geographers that participated in the demarcation project to conserve *páramos*. The material comprises five in-depth interviews with biologists, who were selected for their trajectory of working in the Colombian Andes, their publications on *páramos* and their participation surveying the *páramo* for the demarcation project. With biologists I also visited a herbarium to understand the process of plant curation. I additionally conducted three in-depth interviews with a geographer, who was chosen for his privileged role as the coordinator of the team in charge of developing the map-making plan for demarcating the *páramos.* Regarding *campesinos*, contacts were made through SINTRAPAZ, one of their representative organizations, with which I agreed to return all knowledge produced during the research and collaborate in analyzing *páramo* conservation policy. SINTRAPAZ introduced me to *campesino* families, enabling snowball sampling and visits to farms within the demarcated *páramo*. Twelve families invited me to join their daily activities in their fields and their political meetings where the *páramo* conservation was discussed. The composition of families was mainly nuclear, consisting of a husband and wife in their 50s, sometimes with sons and daughters aged 18–25. These settings fostered interactions later recorded in a fieldwork journal, the main source for the ethnographic vignettes in this article.

The analysis compared by contrast[6] (Mol, 2002) how plants and their capacities emerged in legislation documents, biodiversity databases, map-making and crop cultivation. Contrasts were identified when the category 'plant' by itself was surpassed in practice by plants seen as embedded with different practices and concerns. Using inductive codification, contrasting versions of plants were identified with the categories 'plants: *species*', 'plants: *vegetation-covers*' and 'plants: *crops*' to capture how plants appeared differently across settings. Then, the analysis continued by spelling out the consequences of those contrasts within the PE of conservation and the constitution of plants as relational agents. Those contrasting versions of plants were not taken as ideas or representations of a given reality of plants with different interpretations. As the following sections will show, the participation of plants in the PE of conservation is a collective achievement, where humans and other-than-humans organize the multiple ways in which plants and their capacities emerge and intervene in affairs such as conservation.

4. Plants in the legislation of *páramos* conservation

The area officially known as 'Sumapaz *páramo*' was demarcated by the Colombian Ministry of Environment in 2017, following a 2010 Mining Code mandate to exclude *páramos* from mining by defining their limits (Republic of Colombia, 2010). The policy did not specify how the demarcation should be conducted, it only established the scale of the maps at 1:25,000 and with a further prohibition of agriculture (Republic of Colombia, 2011). It was only until 2018 that a legislation exclusive for *páramos* was enacted, known in Colombia as 'The *Páramos* Law' (Republic of Colombia, 2018). It stated that *páramos* were 'strategic ecosystems', which according to the legislation were essential for the provision of water and central for the conservation of biodiversity in the country (Republic of Colombia, 2018). It also defined *páramos* as areas dominated by vegetal associations such as grasslands, shrubs, *frailejones* and meadows (Republic of Colombia, 2018).

[6] Like the *counterpoint optic* presented by Chao (2002), 'comparing by contrast' allows identification of how things and beings acquire their form and capacities through their differential juxtaposition. It is important to mention however, that 'comparing by contrast' and 'counterpoints' are not methods, but rather analytical tools to analyze juxtaposed practices and their differences in qualitative research materials.

According to the legislation, the Alexander von Humboldt Biological Resources Research Institute (Humboldt Institute) was tasked with providing the reference area for *páramo* demarcation. As the Ministry of Environment's technical branch, the Institute brought together scientists from multiple disciplines, however, biologists and geographers occupied a prominent role. The biologists' understanding of plants was crucial for the demarcation, since they were historically devoted to the study of plants and vegetation in *páramos*. Geographers, translated biological knowledge into a computational model to demarcate the *páramo* through map-making technologies such as geographical information systems (GIS).

The legislation alone was not enough to make the *páramo* emerge as a demarcated area. The legislation did not underscore the central role of plants in that process. It is true that the Páramos Law refers to certain kinds of plants as specific to the *páramo*, but it treats them as self-evident 'vegetal associations' without specifying how to recognize them, which plants belong, which do not, or the consequences for different collectives. What the legislation actually does, is create a hierarchy in which 'vegetal associations' define the *páramo* for conservation, rendering agricultural plants incompatible. As the article shows, this institutionalized hierarchy ignores the unstable status of plants and the practical mechanisms through which they enter politically charged affairs like biodiversity conservation. Thus, attending to other-than-humans in PE also concerns how the capacities of certain humans and other-than-humans, here plants, are constituted, contested and negotiated in conservation.

5. Plant as *species* in the herbarium

When I met Maria, she was an established biologist and director of a regional university's herbarium in Colombia. Plants as she admitted, were her passion, a feeling that would arise in the herbarium, a place that she explained to me as:

> …a library, a dynamic entity that is always open and can show us a lot of things that will depend on the vision of whoever wants to see them (…) that requires always to be studied (…) and constant updating" (Interview with Maria, September 24, 2020)

Maria would invite me to the herbarium, where I was welcomed by Luis, one of her former students who was at that time in charge of supervising the collections curating process. While we were in front of some dried plant leaves attached to a cardstock lying on a table in front of us, he told me:

> Luis: This *is a species*, and here is where we can go to the context of conservation, it is a species at the edge of extinction.
>
> Author: This one? (I interrupted while pointing with my camera.)
>
> Luis: This one, Espeletia paipana, according to IUCN, this is a species in critical danger.
>
> (Conversation with Luis in the herbarium, December 23, 2021)

But to become and participate as Espeletia paipana in our conversation, the plant first had to be part of the material transformations to count as a *species*. That is a process that begins in the field,

where scientists collect plants samples that can collaborate with them in the herbarium.[7] For biologists every plant collected is just 'dead leaves' unless they are identified and registered as collections of the herbarium. A piece of paper, as can be seen in the bottom right corner of Figure 1, grants plants an afterlife in the herbarium. That is the label, which as Luis explained to me, contained the name of the plant species, its family and other relevant information for biologists such as the place and conditions where the plant was collected.

Figure 1: Espeletia paipana in the herbarium. Photo by Author

The label was part of a process, that among other activities, involved the complicated task of identifying the scientific name of the plant. That is a time-consuming task, which according to Luis was often ignored by policy makers and funders. The identification is an authentic challenge for taxonomers, since the materiality of the dried plant do not always offer the information that the taxonomic keys require to guide identification. Sometimes help from colleagues in other herbariums is required, or on other occasions databases are consulted by taxonomers to facilitate the task of giving a scientific name to a plant sample. Species names are important in the herbarium for organizing the relations in which plants become relevant, which can occur only until they become differentiated *species.* In the case of Espeletia paipana, that organization was translated into having its own place in a cabinet, which was organized according to the taxonomic system developed by Arthur Conquist[8] (1981).

[7] Collecting plants and other specimens in the field is a very organized practice, which has its own history and practical challenges (Castillo Estupiñan, 2023a; Hughes, 2022; Martínez Medina & Hernández-Manrique, 2020). Normally a plant sample is the result of combining separated parts of the same or a similar plant.

[8] Not every herbarium uses the same classification system to store plants. It is also important to remind readers that those classifications are more than a reflection of a transcendent nature, are in fact informed by the historical embodied field experiences of other botanists and ecologists with plants (Hughes, 2022).

Consequently, s*pecies* do not indicate standalone or discrete objects. Rather they are collectives, in which plant *species* are more important for what they can collectively accomplish with microscopes, cabinets, classification systems, biologists, affects, theories, other plants, etc. It is as *species* that plants can also become entries in datasets and herbarium collections. This situates 'plantiness' not as given attributes residing solely among plants, but as a relational outcome in which plants exchange properties with other elements of the collective that sustain them as *species.* That is what enables plants, once collected, curated and identified, to become part of datasets and herbarium collections. It is through those transformations that plants acquire the properties necessary to be part of the datasets where they become capable of participating in re-organizing future conservation and biodiversity management research (Martínez Medina & Hernández-Manrique, 2020; Nadim, 2021).

According to Victor and Andrew, two experienced field biologists, datasets are important for the quantitative data that allows them to:

> Summarise a lot of information in a single numerical value, and from that summary, elaborate analyses, conclusions and make decisions. (Interview with Victor and Andrew, August 15, 2020)

These 'numerical values', are at the heart of their work, because numbers can be combined with other techniques employed by scientists to measure biodiversity and establish indicators about "the number of species in a site or a region" (Villareal *et al*., 2004). For scientists dealing with biodiversity datasets, plants can circulate as biodiversity indicators only when they become numbers amenable to inclusion in the spreadsheet that organizes a biodiversity dataset. The *species* name is crucial there, because it is what enables a plant to circulate as an entry into a dataset and subsequently as a numerical value in a biodiversity measurement. That transformation is what allows plants to collectively become something else (and be transformed) across the different sites where they, together with biologists, datasets and numbers can shape what counts as biodiversity (Nadim, 2021). Then, in the context of conservation and its PE, plants seem to be more important for their acquired capacities when they circulate as numbers, entries, species names, and summaries and not only for their status as living beings growing from the soil.

Figure 2 is an example of a similarity index visualization, used by scientists to calculate how similar the distribution of species is across different transects of the Andean mountains. In the case of Figure 2, Luis, the biologist we met in the herbarium, told me that a low similarity between transects data could suggest that some species from the dataset may be only present in a specific area. If that is the case, then there is a chance that in those areas some 'endemic species' or unique species are present. That is the kind of species that are central in the accounts of the *páramo* as a 'biodiversity hotspot' (Madriñán *et al*., 2013). That is, a space that simultaneously concentrates a high number of endemic species and is undergoing a loss of habitat (Myers *et al.*, 2000).

There is something else at stake here, because through datasets, plants can be separated from humans living nearby and those that collect them, like *campesinos* and biologists. A biodiversity dataset, dendrogram or other similar device makes it almost impossible to account for the existence of *campesinos* or other human beings. In biodiversity reports, *campesinos* appear mainly in written accounts where their presence is usually generalized as intrinsically negative to the *páramo* landscape (van der Hammen *et al*., 2002).

In conservation, the separation between humans and plants as *species* does not reside in any essential biological characteristic of plants. What becomes the unique attributes of plants in conservation, that is, their 'plantiness', is a collective outcome of how the practices of the herbarium

reorganize plants and their relations with their world. In the PE of conservation, the relationships between plants as *species* and *campesinos* were rendered incompatible. First, because the very material organization of the biodiversity datasets only admits the presence of plants as *species* and other quantitative data collected about them. Second, this creates the basis for conservation constituting a *páramo* as consisting mainly of plants as *species* as we saw in Section 4. That is not problematic by itself, but it certainly opens the way for asymmetries if the only relevant and important criteria to design and implement conservation relies on plant *species*.

At this point, it is important to acknowledge that all the biologists that I interviewed did not ignore *campesino* presence in the *páramo*, in fact, *campesinos* and scientists often worked together during expeditions to collect plants. However, those events disappeared from biodiversity datasets, because they are not designed to account for the relationships that produced them in the first place. Worst, for *campesinos*, there seems to be no way to make visible those relationships in which they collaborate, or at least, for making evident their existence in *páramos* in the same way as *plants as species* appear. That asymmetry has serious consequences in what can count as *páramo* for conservation, and naturally, for what deserves to be protected.

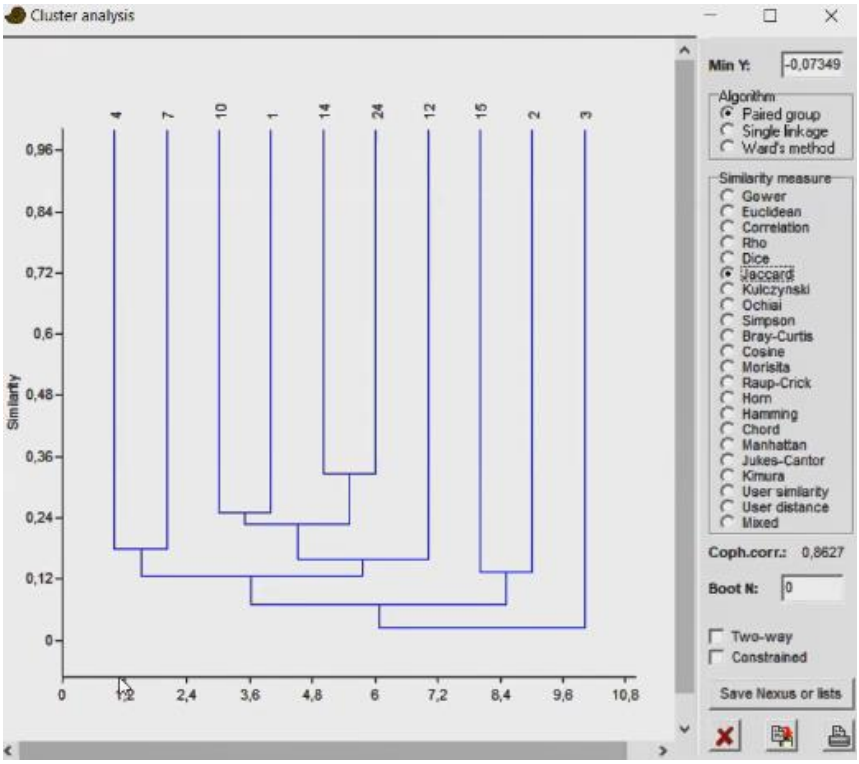

Figure 2: Similarity dendrogram provided by Luis during interview. (October 26, 2020)

So, the apparent contradiction between the existence of *campesinos* and the *páramo* in Sumapaz, besides being connected to a political economy of dispossession and territorial control (Grajales Urrego, 2020; Paéz, 2019), is also related to a PE of what can exist in the *páramo*. In such a politics, plants are not given objects, but the entry point to locate the practical conditions that created the separation and contradiction between the *páramo* and *campesino* communities. That contradiction

became more problematic when the Colombian government decided to demarcate *páramos* through maps.

6. Plants as *vegetation cover* in map-making

By themselves, the herbarium and datasets do not fully explain why the conservation of the *páramo* emerged as a conflictive concern for *campesinos*. This is why the role of map-making is crucial to understand first, how plants participate in the delineation of *páramo* maps, and second, the PE that those maps configure around the conservation of the *páramo* in Sumapaz. As I was told by Jules, the coordinator of the team in charge of demarcating the *páramos* in Colombia, for his team it was central to address the question of the distribution of plants. Since the 19th century this has been a question for botanists, who developed theories to explain plant distribution in relation to climate and geographic conditions. So, patterns of plant distribution were conceptualized as 'zones' or 'bands' located at different altitude levels (Caldas de, 1803; Humboldt & Bonpland, 1807).

For *páramo* conservation in Colombia, legislation required demarcating their limits on maps of 1:25.000 scale (Republic of Colombia, 2011, 2018). Due to his previous experience as mapmaker for the National Parks Service in Colombia, Jules was appointed to lead a team that, given its limited time and resources, chose to demarcate *páramos* by mapping plant distributions. Plants were crucial for making those maps, because the model developed by Jules and his team assumed that the *páramo* could be demarcated by identifying the vegetation transition between the forest and the *páramo*. So, the aim of the model was to identify the point where low grasslands typical of the *páramo* replaced the trees from the forest (Sarmiento & León Moya, 2015). As Jules described to me, surveying satellite images was one of the strategies for such a task[9]:

> What we [map-makers] take advantage of, is *the capacity of images to distinguish the vegetation transition* that occurs between the forest and the *páramo* (…) That's why we studied a lot the capacity of satellite images to collect that data, we made samplings over satellite images, we used that information and run the models [to map *páramos*]. (Interview with Jules, March 5 2021. Emphasis added)

When working with *vegetation transitions* as recounted by Jules, mapmakers were no longer engaged in the same taxonomic and botanic practices of biologists as presented in the previous section. Vegetation refers more to the study of plants associations, which has a relatively recent history based on a strong visual culture (Hughes, 2022). So, to distinguish the *vegetation transitions* to demarcate the *páramo*, plants had to be materially rearranged as *vegetation covers*, that is, portions of soil covered by plants and identifiable by map-makers through satellite images. Those images were generated by remote sensing satellites orbiting the planet with optical devices able to translate plants' wavelength data response into images usable by mapmakers. Two of the standards used for the demarcation of *páramos* were the Red Green Blue (RGB) and the Normalized Difference Vegetation Index (NDVI). The first one creates color images combining three hues of wavelengths reflected by plants. The second one combines RGB images with infrared bands of radiation gathered by satellites to visually estimate vegetation density in satellite imagery.

[9] Surveying satellite images was just one part of constructing the model to demarcate the *páramos*. On the consequences of biodiversity spatialization in conservation see Castillo (2023b).

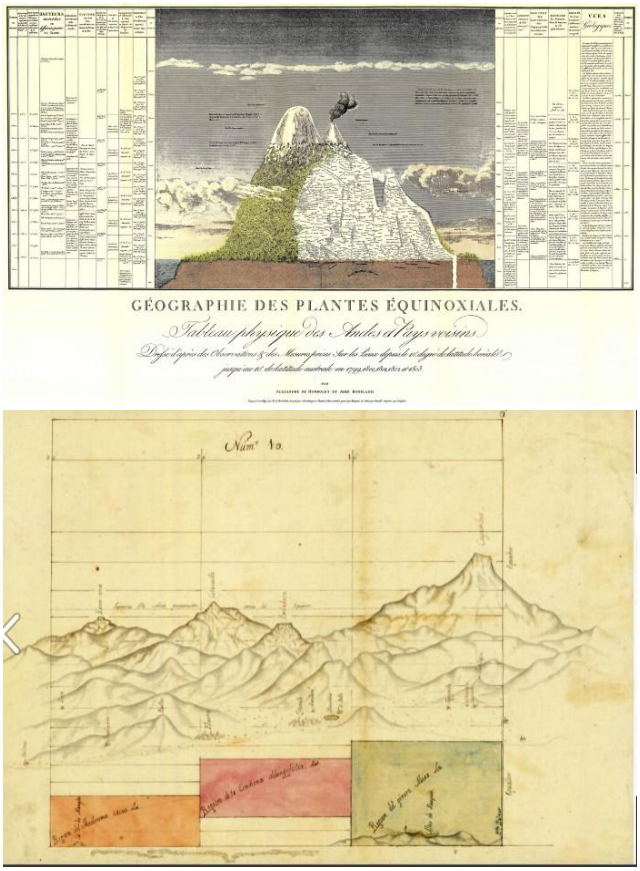

Figure 3: Illustrations from early botanists. The one on top corresponds to Humboldt (1807) and the one at the bottom to Caldas (1803). In both, they draw an Andean mountain and located different plants according to the altitude levels where they found them.

As Jules thoroughly explained to me, both standards rely on the assumption that chlorophyll concentration in plants produces a distinct response to remote sensing, which can then be translated into images (Lillesand *et al.*, 2015). So, plants with bigger leaves, like trees, should contain more chlorophyll expressed as bright green pixels in images, whereas vegetation with smaller leaves and less chlorophyll would produce weaker responses, translated as orange to red pixels in the image. This color contrast became the basis for mapmakers to produce the limit of the transition between the *páramo* and the high Andean Forest. As this situation illustrates, *vegetation cover* in map-making is not given, but emerges from the collective that plants help to constitute when they literally travel (as chlorophyll responses) and reach outer space in the exosphere to then return down to Earth in the form of images. Outside this collective of satellites, pixels, images, chlorophyll and map-making practices, plants do not necessarily exist by themselves as the *vegetation covers* organized to map *páramos*.

Then, plants in map-making can make a difference because they act through the images that acquire the 'capacity' mentioned by Jules, in which plants become discernible *vegetation-covers* that can help to differentiate ecosystems' transitions. It is through chlorophyll that plants are identified in satellite images. However, chlorophyll can be measured and used for many purposes (Ali *et al.*, 2020).

So, techniques to measure and make chlorophyll count are also consequential for the ability of plants to act in the map-making of *páramos*. Plants actions and their unique attributes (plantiness), then become relational outcomes of the circumstances, techniques and negotiations at play when constituting a collective in which plants are deemed to be a fundamental part. In this case, chlorophyl took the form of wavelength responses, which in turn made plants become *vegetation-cover* images in the screens of mapmakers like Jules and his team, where both the future of maps and conservation of the *páramos* was delineated.

But as Jules recounted to me, maps are abstractions that delineate things that do not have a dimension across space, like for example the borders of states or regions. For Jules, maps were not to be taken at face value, and plant associations can be more than lines in a map. Even when plants acted as *vegetation-covers* in a satellite image, this did not generate a discrete polygon in the map, but countless pixels separated from each other, which instead of a polygon, formed a rather chaotic stripe:

> As we had to take that information [the map] to territorial ordering decisions (…) We said ourselves, let's group that chaos in the best possible way and then define that upper to the line there is something, and another thing lower to the line (…). So we took *the result of that stripe*, whose border were small dispersed points and then we looked for the level curve that could better represent and give shape to that stripe. (Interview with Jules, February 26, 2021. Emphasis added)

As mentioned by Jules, decision-making usually requires clear-cut limits, and the conservation of *páramos* policy was no exception (Republic of Colombia, 2018). It was from there that the requirement of a map with a discrete polygon formed by a line came. In tracing such a polygon, plants as *vegetation-covers* gained relevance in the making of conservation, since they were aligned with the making of a hybrid line in a map that associated chlorophyl measures, wavelength responses, standards, legislation, plants and of course mapmakers using curve levels of altitude that formed a discrete line out of the dispersed pixels marked by the vegetation model as shown in Figure 4.

Rather than a representation of plants, the purple stripe in Figure 4 works more like the means through which plants can articulate mapmakers and images to constitute the limits of the *páramo.* Without plants, map-makers would not have had the elements (the plant distribution models) for making a map of *páramos*, and without mapmakers, plants would not have become *vegetation cover* able to organize the criteria to demarcate a *páramo*. It is important to remind then, that the limits of *páramos* are not a given attribute of these ecosystems, but a recent historical and practical production derived from the conservation policy, where plants as *vegetation-covers* became central for producing the current official limits of *páramos*.

Then, the task of demarcating the *páramos* for conservation posed a situation that according to Jules, required definitive and clear-cut accounts of the *páramo* by authorities. That is why *vegetation cover*, map-making and decision-making are enmeshed in a PE through which hierarchies of plants become functional for establishing that in conservation, *páramos* are clear-cut areas dominated by smaller *vegetation-covers*. Maps were an important means for making *páramos* come into being as discrete polygons, and maps ultimately allowed plants to circulate and make possible the demarcation of *páramos*. It is worth mentioning though, that Jules reminded me that if maps of *páramos* performed something, *it was not certainly settling once and for all what a páramo is*:

> Ultimately, the line does not express where the *páramo* is and where it is not. The *páramo* border is chaotic, the line reflects instead, where we are going to apply the decisions [legislation] of being *páramo* or not. (Interview with Jules, February 26, 2021)

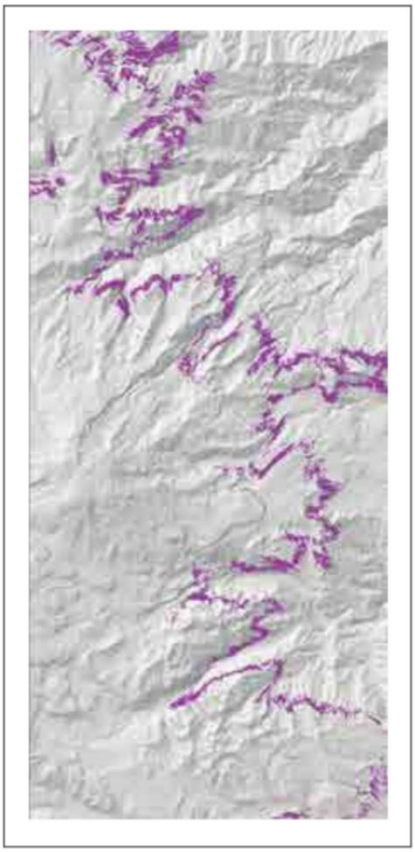

Figure 4: The transition zone between *páramo* and forest, or "the stripe" (purple) mentioned by Jules, made through the models of vegetation distribution. Source Sarmiento & León Moya (2015)

Those clarifications help to better situate the PE of plants and *páramo* conservation. They suggest that the dispute and conflictive negotiation around the conservation of *páramos* is not entirely about the *páramo*, but about the consequences of what counts as such. However, for authorities the *páramo* is often indistinguishable from the limits established on the maps. In that form, conservation was enforced as a matter of absolute prohibitions, which Paula Ungar (2021, p. 119) conceptualized as an "authoritarian centralized scheme of *páramos* conservation." I would add that that the scheme is sustained at the expense of precluding, explaining away and limiting the material variability of plants. So, when in conservation, the capacities of plants only count in function of facilitating map-making and monitoring, then plants acting as *vegetation-covers* (through chlorophyll indicators in satellite imagery) gain a privileged place in policy and planning. That is why 'plantiness' should not

be essentialized as given attributes of plants, but as a relational outcome. As presented here, it is the situations, events and collectives where plants become relevant that provides the conditions to configure their 'plantiness' and capacity to sustain diverse ways of being and living in the world. It is in that way that 'plantiness' becomes multiple (Mol, 2002) This invites us to consider the role of 'plantiness' or plant capacities in shaping institutionalized hierarchies and classifications. To develop this point and its implications for the PE of conservation, now we will move to *campesinos*' farms where plants do something different.

7. Plants as *crops* in *campesinos*' farms

Plants live other lives and inhabit other worlds when planted and growing from the soil. I started noticing this during my engagements and conversations with *campesinos* in Sumapaz. One of them was Gabriel. I met him while he was working in his potato field, a terrain smaller than one hectare, located in a demarcated area of *páramo*, where despite the open sky and the bright sun, one could easily begin to shiver if not doing any physical activity. That day Gabriel was performing a task called *gusgunia*. As he showed me, it consisted of carefully holding a potato plant from the branches with one hand, and then piling some soil and manure using a hoe around the stem of each plant in the field. When I asked Gabriel how he knew it was time for the *gusgunia*, he took me a few steps from the furrow and looked at some bigger potato plants and told me, while pointing with his finger signaling some small white flowers blooming from the potato plant:

> If I do the *gusgunia* to these plants, and they have already those buttons (the flowers), then it's better not do it, that will delay their growing. (Conversation and working with Gabriel, July 21 2021)

The task was essential for the lives of these plants when they start growing, that is, before flowers bloom, because as Gabriel explained to me:

> These plants also get stressed, when there is too much rain, when there is too much wind, like for example this wind right now stresses them a lot. (Conversation and working with Gabriel, July 21 2021)

Days later I would see Gabriel again, and coincidentally, the weather was very rainy that week. Gabriel could not be more glad about that, and as he told me, those rainy days right after the *gusgunia* were perfect because the wet soil would facilitate the absorption of nutrients from the manure and the potato plants would "get stronger." It became clearer to me that plants were participating differently in the lives of *campesinos* like Gabriel. This difference was marked by the material constitution of plants as agents that could 'stress', 'get stronger' and 'grow.' Those capacities are not suggesting that *campesinos* are anthropomorphizing plants, but as a recognition of the agency of plants, that is, their responsiveness and involvement in activities such as agriculture. In the case of *crops*, the capacity of plants to produce food must be collectively maintained and sustained. To further develop this point, let us consider the moment when *campesinos* prepare the soil for planting potatoes and other tubers (Figure 5):

> In the afternoon we began to cultivate. Mark ploughed the soil with the two-wheel tractor, Eric dug small holes in the furrows and Gregor applied lime on them. In the meanwhile, Robert and I began to plant medium sized potatoes on the holes until we covered the four descending furrows. (Fieldwork Journal, March 18, 2020 p. 30)

Figure 5: Cultivation of potato on a *campesino* farm in Sumapaz. Photo by author

If we take the events with Gabriel and the cultivation from this vignette, it becomes easier to understand that to act *as crops*, plants meet in action with other agents, like winds, *campesinos*, water, and the soil. A soil ploughed by *campesinos* with their two-wheel tractors in furrows facilitates ulterior tasks necessary to take care of the *crops*. So, the ability of those plants to 'stress', 'get stronger', 'grow' and ultimately becoming food, is to be understood within the collective sustained in *campesinos'* farms. But that does not mean that *campesinos* are in full control. Winds can cause too much stress to plants, without *campesinos* plants could grow without necessarily producing food, or pathogens could cause disease to vulnerable plants, and *campesinos* without potato crops would lack an important element in their lives. Plants, then, are not disconnected from the actions of other agents. Nor are they disconnected from the activities of other collectives involving plants, as in the case of the *páramos* conservation.

Throughout this article, I have argued that in conservation, the capacities of plants are materially variable. Plants can be *species* in an herbarium collection, or make up *vegetation cover* in map making. So, more than acknowledging that plants actually act, as has been previously argued by political ecologists, I have indicated how that ability is situated and emerges from human and other-than-human articulations that shape each other and their distinctions. But *crops* were not a form through which plants were admitted by the legislation regulating *páramos* conservation in Colombia (Section 4). As noted in the previous section, *vegetation cover* was the form in which plants agency

(as chlorophyll responses through satellite images) aligned with the legislation's requirement for maps. As Head *et al.* (2012) observed in the case of wheat in Australia, crops absent from maps of vegetation or invasive species are excluded from ecosystem dynamics and from consideration in conservation. *Páramo* maps erased other plants that were not *vegetation cover* (mainly crops), and the relations through which plants, other beings and humans participate in the making of ecosystems such as the *páramo*.

This is why plants became an important element in the PE of *páramos* conservation. Mainly, because for *campesinos*, the prohibition of agriculture within *páramos* was simply another means to disallow their existence. This bring us to a politics of 'what can exist' in conservation (Blaser, 2013; Burman, 2017), in which plants are central for specific realities that depend on the association of particular humans and other-than-humans. For *campesinos* this was crucial, because growing crops and practicing agriculture was not separated from their political concerns around conservation. Let us return to the cultivation of potatoes, this time paying more attention to the events afterwards to better develop the previous point:

> We went back home and had a brief meeting with other *campesinos*. I told them about my interest regarding the politics of the *páramo* conservation. Some of the *campesinos* engaged in that discussion. One of the oldest *campesino* said that he was worried about future displacements from their lands, another one expressed his dissatisfaction with their lack of participation in a process that was mainly based on satellite imagery, and a young *campesino* argued that the area where we were working that day was no *páramo* at all despite it being included in the official demarcation. (Fieldwork Journal, March 18, 2020 p. 32)

Taking care of crops offers a window to the ways that *campesinos* organized their collective political agency along with plants. One way was through *convites,* a form of collective work that consists of forming a group of *campesinos* that help with someone's farm activities for a day. In return, the host provides meals and joins the group each week until they complete a day of work on everybody's farm. These *convites* are also an organizational means for *campesinos* to discuss collective matters. So, in a few minutes, we went from planting potato to discussing the negative effects of *páramo* conservation. In that kind of event, the political relevance of crops for *campesinos* became more evident to me. First, because as a collective, *crops* required the presence of *campesinos* to maintain their lives, preventing them from getting too stressed and facilitating their appropriate growth for producing food. Second, because for *campesinos*, their presence and existence in the *páramo* was mediated by the existence of *crops* as the ones we cultivated that day. In that way, meeting and working to cultivate a potato crop was both a means for *campesinos* not only to produce food but also to engage in the embodied interactions with plants and other humans that collectively bring forth and defend their world (Chao, 2022).

As illustrated by the previous vignette, there is of course a dispute about the control over land in the *páramo*, but the concerns of *campesinos* with land were also concerns about their very existence within the area demarcated as *páramo*. Throughout their engagements with crops, *campesinos* become also relational agents in a collective where plants were more than *vegetation-covers* and *species*:

> Miguel was a bit hesitant when I insisted on helping to harvest potatoes that morning. He invited many of his neighbours that day. Despite Miguel destined most of the produce for sale, he was quite generous with everyone helping, providing them with as many potatoes as they needed. Before I left, he handed me an empty sack and told me to take as many potatoes as I needed. Very soon those potatoes became a soup that we enjoyed at the family's farm where I was staying. (Fieldwork Journal, April 29, 2021 p. 83)

Potato crops were more than an economic income for *campesinos* in Sumapaz.[10] Harvesting (Figure 6) was just one of the events for *campesinos* to engage in collective work, to spend time together and maintain the collective they were forming with their neighbours and potato crops. Some of those potatoes would end up in a *campesino* kitchen, or in the storage room to provide an important ingredient in the diet of *campesino* families. In this way, *crops* become politically relevant depending on where they grow (*páramo* or not), with whom they grow (*campesinos*), their transformations (into food, as prohibited activities, etc). In the case of the *páramo*, *crops* were a fundamental part of the existence and lives of *campesinos*. This included, as presented above, collective activities facilitated by f'arming and interactions with plants in which *campesinos* could get together and maintain their agency and ability to discuss collective matters of concern like the conservation of *páramos*. But to exist as a *crop*, plants also required the presence of *campesinos* with whom plants shaped their lives, so the harvesting would be possible. However, the existence of *campesinos* and *crops* in the *páramo* was at odds with the conservation of the *páramo*. In the hierarchy generated by the legislation, not every plant deserved the same care and protection, and most importantly, not every plant was deemed to be compatible with *páramo* conservation. It seems as if in conservation the existence crops and vegetation was a zero-sum game, where the existence of one necessarily compromised the existence of the other.

[10] *Campesinos* do not establish relations with plants only as crops. Other relations also allow *campesinos* together with plants to retain water in some areas, prepare medicines, produce knowledge about agriculture, and more. The implications of those relations for the politics of conservation cannot be fully developed in this article.

Figure 6: Potato harvest. Photo by author

6. Discussion

This article has analyzed the relevance of other-than-humans such as plants in PE research. By examining the case of *páramos* conservation in Sumapaz, Colombia, I have showed that in conservation, plants can acquire the capacity to participate in shaping hierarchies and classifications with consequences for the lives of humans and other-than-humans. The case illustrates how the material constitution of plants as *species* and *vegetation-covers* aligned with the goals of the policy. Mainly, because in that form plants were separated from human affairs involving agrarian matters such as land tenure, agriculture transitions and the welfare of *campesino* communities. By erasing and marginalizing plants as *crops,* the *páramos* conservation policy also sought to perform a double purification; first of the *páramo* as an essentially non-human landscape and second of plant's agency as not involving any relational mediation. Contrary to this, the article shows that *species* and *vegetation-covers* gain the ability to act and circulate in conservation practice, due to the material mediation and interferences between humans, plants, technologies and embodied practices. Future work will be necessary to establish in detail how exactly and why some forms of plants become institutionally dominant in conservation.

The case also underscored the political relevance of other-than-humans in PE to extend the current discussion on the topic. By highlighting the multiplicity of plants, the article emphasized that 'plants' do not indicate a singularized entity that scientists, mapmakers and communities apprehend differently. Instead, the article demonstrates that the capacities of plants shape and are shaped by the collectives in which they gain the ability to act, be it as *species, vegetation-covers* or *crops.* So, in relation to the previous PE literature on plants capacities, the article argued that plants should not be taken as ontologically singular. This means that plants and their capacities are multiple and collective in the sense that plant samples, chlorophyl indices, and crops are practical arrangements through

which plants can collectively achieve the material articulations necessary to produce the reality of biodiversity datasets, maps and food.

The article opens new analytical directions in the study of plant capacities and their political consequences. So, it is important to examine other-than-humans and their capacities as collective outcomes, without presuming that the capacities of plants should be modelled *exclusively* by botanical and morphophysiological knowledge. By this I mean that we should not displace plants from the practical settings where their capacities are negotiated and accomplished. We should be able to follow plants in their multiple transformations and circulations to acquire new capacities able to shape the affairs where plants become relevant. Plants then should not become a vehicle for new god-tricks (Haraway, 1988) that impose in advance their ontological character and capacities. As the case showed, plants made a difference in supporting hierarchies where *vegetation-covers* and *species* became more important to constitute the *páramo* in the conservation policy while creating an incompatibility with *crops* and *campesinos*.

The text also argued that addressing the relevance of other-than-humans in PE should not rest in reinscribing the subject-object dualism to understand the collectives formed by humans and other-than-humans (Latour, 2004). In my view, we as researchers should both slow down and advance when analyzing the relevance of other-than-humans in PE. By slowing down, I mean that other-than-humans, including their attributes and capacities in PE, should be understood in their dynamic becoming without assuming their capacities independent from any empirical setting or that the capacities described in scientific literature are identical to the capacities of plants in practical action. By 'advancing' I mean that beyond extending the repertoire of actors, other-than-humans are important to get to grips with the relational making of ecologies and their disputed character. So, more than only attributing agency to other-than humans or asking who controls them, the point is, how do they become relational agents, with whom, for what and with which consequences? This will certainly help us to be more sensitive to the collectives and practices that establish the basis for the disputes in politically contested ecologies such as the *páramo*.

Within collectives, the human and the other-than-human are not distinct ontological domains, but the result of how different agents are constituted in political situations such as the conservation of *páramos*. The dynamics of that process, and their political consequences are still to be explored in more detail by political ecologists. For now, some researchers have already shown us that other-than-humans like Earth-beings, ancestral spirits and their human fellows are usually not allowed to exist in ecological disputes, and this includes some critical scholars and activists (see the work of Burman, 2017 and De la Cadena, 2015). So, a non-essentialist understanding of other-than-humans in PE could be a promising route to stop conflating other-than-humans with 'nature' or humans with 'subjects.' If other-than-humans can teach us something in PE, it is that they are an invitation to examine the realities at stake in the diverse disputed ecologies in which we participate through our work.

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