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Critical overview of the expansion of Hass avocado plantations in Salamina, northern Caldas, Colombia

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ABSTRACT

This paper sheds light on the broader impacts of high-value commodity crops in the tropics by examining critically the rapid expansion of Hass avocado plantations (HAP). Using Salamina as a case study, this paper provides empirical evidence of local impacts and highlights the need for more sustainable and equitable governance strategies to manage emerging socio-economic and environmental challenges. HAP are transforming Salamina's traditional landscape by seizing considerable areas for avocado cultivation in response to the ongoing coffee sector crisis. Since 2018, the region has transitioned from a coffee-centered economy to one dominated by capital- and labor-intensive avocado production. While HAP has become a significant economic driver, it has also exacerbated social grievances and inequalities among local communities. This paper stresses the economic shift, environmental disturbances, and comments on governance policies for inadequately addressing sustainability and social issues.

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Introduction

The rapid expansion of Hass avocado plantations (HAP) in Salamina, Colombia, illustrates the swift changes occurring in local agricultural landscapes from the global South. Since 2018, this region has undergone a profound transformation, shifting from a traditional economy centered on coffee cultivation to one dominated by the capital-intensive production of avocados. Previously, large areas were dedicated to pastures and small coffee plots, reflecting the longstanding land tenure of the region. However, today, corporate-led avocado cultivation has emerged as the predominant agricultural activity. While HAP is now acknowledged as a significant economic driver, its impact is multifaceted, with mixed outcomes. Notably, the sector has created employment opportunities, but it also presents various challenges and complexities.

The resource-intensive (including labor-intensive) HAP has emerged as a counter-strategy to the recent crisis affecting the Colombian coffee sector (particularly in Caldas). The export of avocados, mainly to countries in the Global North, is one of the main strategies in Colombia (Arias et al., 2018).

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However, HAP expansion is a major social and environmental disturbance in the Global South (Bolados et al., 2018; Eldrige, 2024; Esteve-Llorens et al., 2022). Considering second sources of information, this paper seeks to provide a critical overview of the rapid expansion of HAP and its effects by considering the municipality of Salamina, located in northern Caldas, Colombia. This paper also argues that while policies and governance strategies attempt to promote sustainability in HAP, they fail to address the overarching implications of this intensive process of land use change.

Study area

Caldas is divided into six sub-regions and 27 municipalities, of which the northern sub-region faces the greatest increase in HAP. Salamina (Figure 1), located in northern part of Caldas was selected for this discussion because, in addition to representing an important increase in area and production in the context of Caldas, it is a municipality with several competing claims against avocado corporate growth.

Economies of scale drive HAP expansion in northern Caldas, necessitating vast tracts of land. According to the Public Rural Agricultural Planning Unit Agency (UPRA in Spanish), Colombia possesses significant potential for avocado cultivation, with approximately 3.19 million hectares deemed suitable (Fonseca et al., 2018). Land suitability refers to the ability of a particular type of land to sustain a specific use, assessed by evaluating multiple factors. In the context of Hass avocado farming, 22 criteria were identified: nine physicals, five socio-environmental, and eight socio-economic (Fonseca et al., 2018). In Caldas, UPRA identified over 120 thousand hectares as suitable for avocado cultivation. In Salamina, 23.3% of its rural land is suitable for growing Hass avocado, encompassing 9,027 hectares categorized into low, medium, and high suitability (Figure 2). Within these 9,027 hectares, 39% are highly suitable, 59% are moderately suitable, and 1% has low suitability.

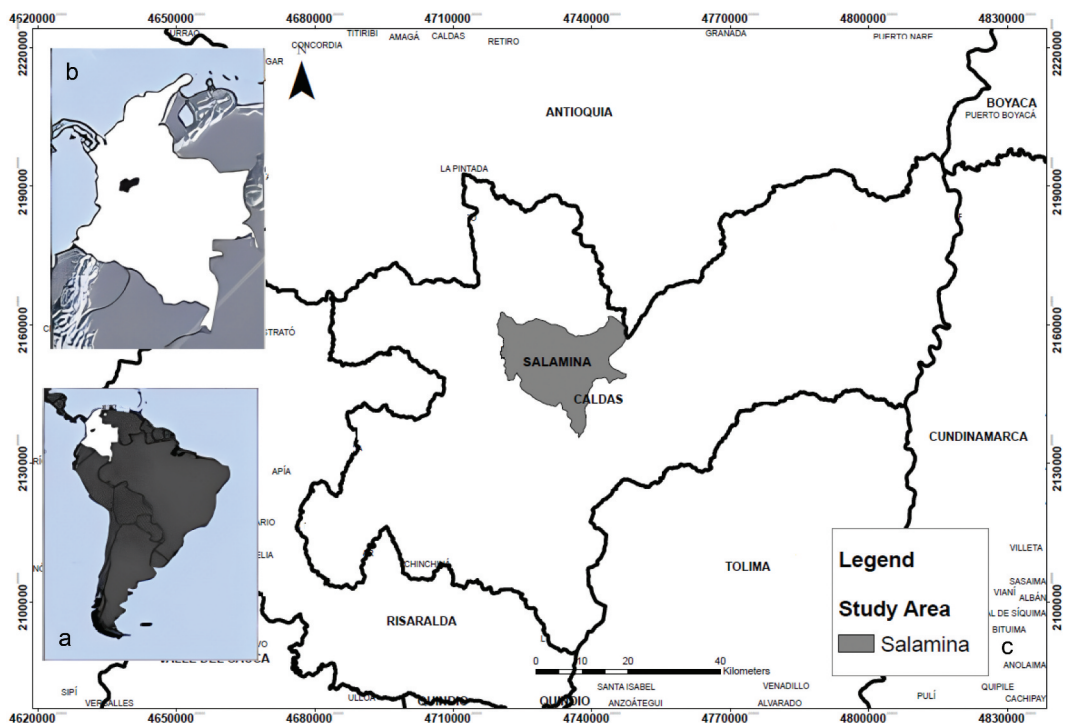


Figure 1. Location of Salamina. a. South America; b. Colombia, c. Department of caldas and Salamina.

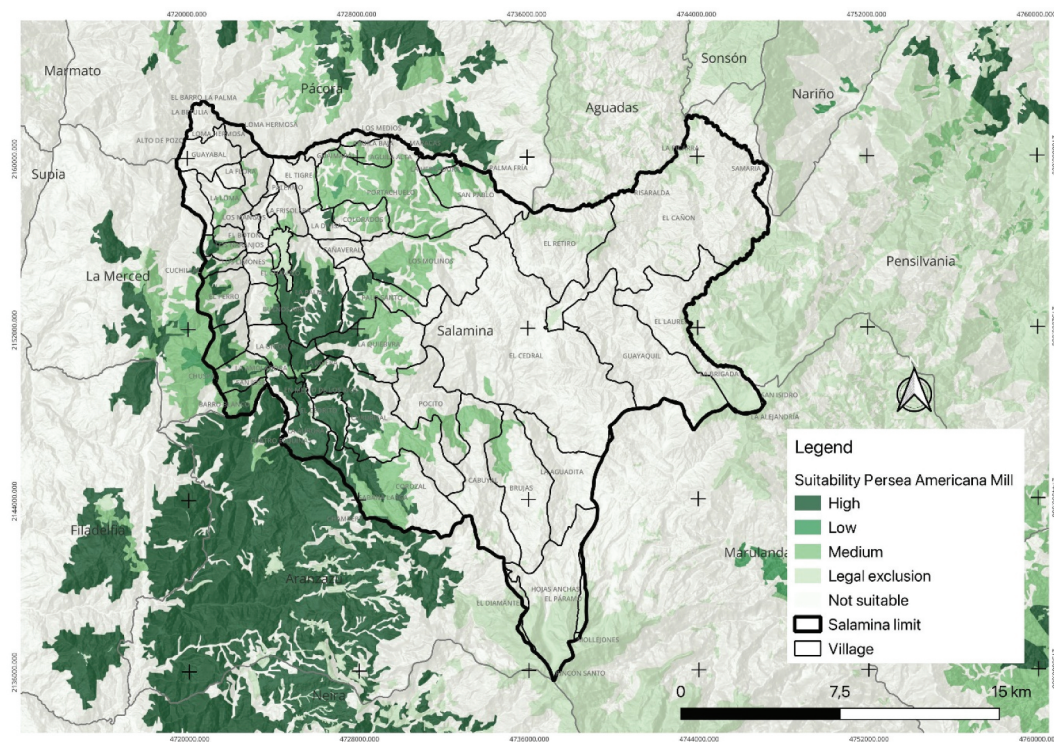


Figure 2. Hass avocado suitability in Salamina. Source: Author based on SIPRA (<https://sipra.Upra.gov.co>).

Despite current plantations covering over 2,000 hectares, substantial untapped potential remains, with approximately 3.3 times the current extent available for expansion. This study examines the implications of HAP expansion in Salamina and introduces a critical approach to understanding HAP in Colombia. While focusing on a specific case study, the dynamics observed here reflect broader global trends in agricultural expansion and development.

HAP and land use change

Salamina, a small municipality with around 19,923 residents, grapples with significant socioeconomic challenges. Roughly 38% of its population lives in rural areas, where 10.3% experience unmet basic needs and 1.4% live in poverty. Multidimensional poverty among rural residents is 40.8% (PDM Salamina, 2020). A long-standing economic crisis in the coffee sector has put even more pressure on the area. Decreasing coffee prices and rising production costs have led to a significant decline in the coffee cultivation area, with a reduction of over 670 hectares (approx. 28%) between 2007 and 2022¹. The crisis not only threatens coffee farming in the region but also facilitates the introduction and expansion of HAP. Surplus labor, previously engaged primarily in coffee picking, is now available for working in HAP (UMATA Salamina, 2023).

In 2018, avocado represented 7% of the total area planted with different agricultural products in Salamina, but by 2020, this area reached 33% of the total area. During the same period, there was a decrease of 119 hectares in coffee areas and a 19% decrease in livestock production systems between 2019 and 2022; i.e. from 618 to 500 farms.¹ The reduction in livestock systems decreased over 27,000 livestock units in 2019 to 25,000 in 2022. When comparing trends in permanent crops in Salamina, it is evident that most important crops decreased, except plantain, which is mostly for self-consumption, and Hass avocado, which has seen a boom (Figure 3). Notably, while Hass avocado

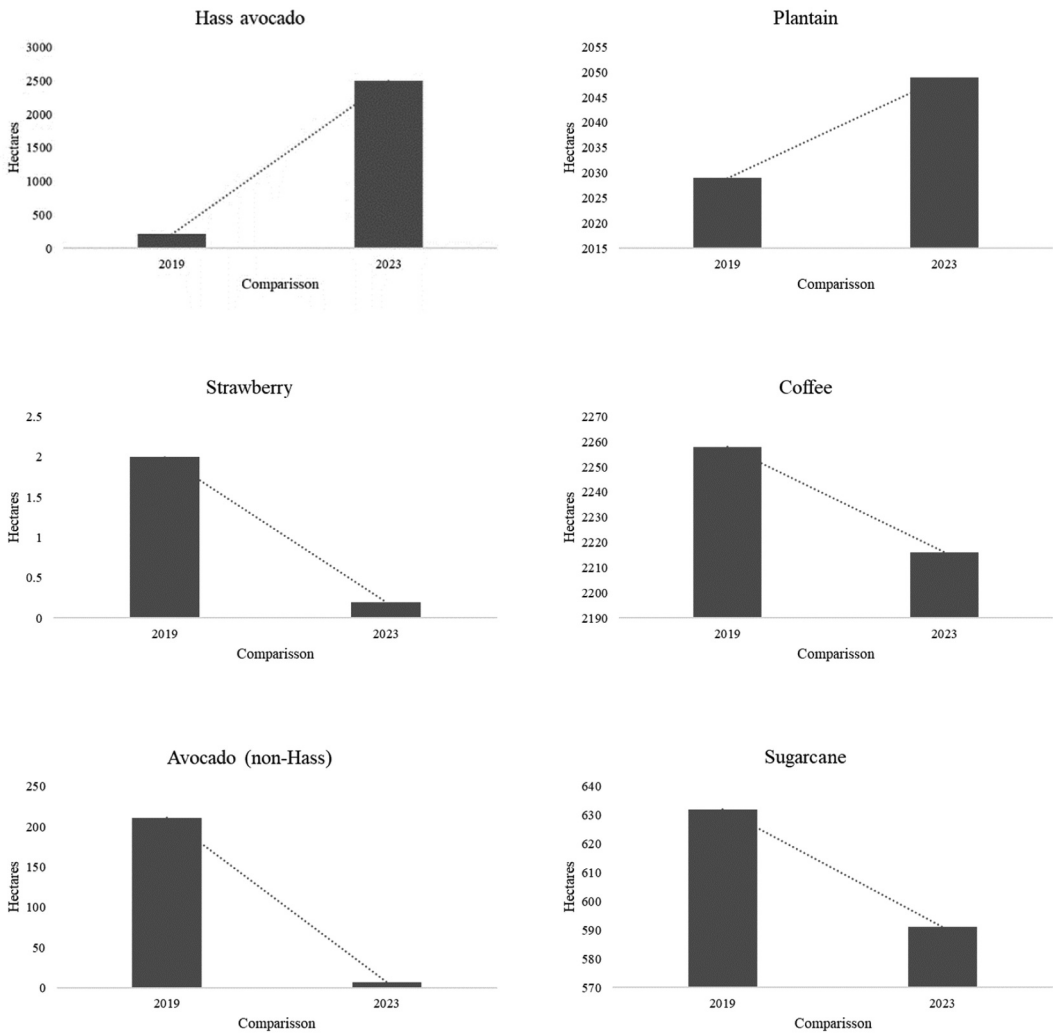


Figure 3. Comparison of areas under permanent crops in salamis between 2019 and 2023¹.

increased over 500%, plantain increased by only 0.25%. Coffee decreased by 1.86%, strawberry by 90%, sugarcane by 6.4%, and other varieties of avocado by 96%.

Traditionally, coffee, plantain, and livestock were prioritized. Recently, the focus has shifted toward HAP, with promotion at the national, regional (Caldas), and municipal (Salamina) levels (Supplementary material 1). National entities promote Hass avocado as the key to advancing Colombia’s rural sector. Regionally, developmental and environmental authorities are also crucial. Caldas, now Colombia’s second-largest avocado producer, has expanded cultivated areas and increased productivity through policies like Ordinance 734 of 2014. In 2018, the agriculture secretariat issued Resolution 6509, which provided guidelines for HAP to prevent deforestation by promoting expansion in extensive pasture areas, significantly impacting local land use.

The significant growth in plantations (500%), represent an increase of over 2,000 hectares in four years through the conversion of pastures to HAP. In Salamina, land ownership is divided into extensive pastures owned by wealthy farmers and peasant-managed farms cultivating coffee and plantains on hilly areas with limited resources. Most coffee farms range from one to 3.4 hectares

(Lince et al., 2018). Non-mechanized coffee farming on steep slopes, integral to rural income and cultural identity, defines Salamina's landscape. Located in the UNESCO-recognized coffee cultural landscape, this region's coffee cultivation is now threatened by the expansion of HAP.

Concerns about HAP expansion

The pressing issue of land distribution in Salamina mirrors broader challenges within Caldas, which ranks fourth among Colombia's 32 departments in the GINI land index reaching 0.84.² According to the Government of Caldas (2020), Salamina has a GINI land index ranging from 0.76 to 0.84, primarily due to pasture farms dominating the landscape. Historically, this concentration of land ownership has not only been used for livestock exploitation but also as a capital reserve strategy. Pasture coverage in Salamina spans over 20 thousand hectares, accommodating more than 25 thousand livestock units, reflecting a low-intensity grazing system with approximately one cow per hectare. These pastures cover a significant 53% of the municipal area, presenting substantial potential for plantation expansion. However, the transition from pasture to HAP often involves elite-to-elite land ownership transfer, further consolidating land holdings. While this transformation facilitates HAP expansion, it intensifies land ownership inequality and increases foreign land ownership.

Avocado production in Salamina has evolved over the past 16 years, starting with small-scale farming by local smallholders, typically cultivating 1–2 hectares of land for the local market. A significant change occurred in 2016, when international large-scale corporations were introduced. This shift included the acquisition of land³ and the adaptation of crops to the industrialization of avocado farming. Since 2018, this trend has intensified and there are currently seven corporations operating in Salamina, covering more than 2.6 thousand hectares. There are also plots where coffee farms concentrate, and these rarely exceed 4 ha in size. Small avocado growers target local markets and corporations international. The majority of these companies are from Chile and Peru, and one is Colombian but foreign to Salamina.

Among these large-scale avocado companies, four occupy a significant portion of the land, totaling 1,613 hectares across 21 properties. Current avocado properties have an average size of 158 hectares (ranging from 46 to 748 ha). Notably, one company exploits 133 hectares (18%) within a protected area named 'El Gigante,' which is critical for Salamina's urban water supply (Corporación Autónoma Regional de Caldas y WCS, 2020). As part of an experimental initiative, a company is cultivating avocados over 278 hectares at an elevation of 2,950 meters above sea level, aiming to expand the cultivation area beyond the agro-ecological optimal zone. However, this area is considered unsuitable for the Hass cultivar.⁴ What is concerning is that many of the pastures acquired by the corporations include crucial water sources, intake areas and delimited water supply areas, particularly focusing on elevations ranging from 1,800 to 2,100 m above sea level where essential water springs are located.

Rural Salamina encompasses 49 villages (see Figure 2). Despite this number of villages, corporate HAP mainly consolidates in five villages. This consolidation varies significantly, ranging from 11% in Corozal to 82% of the total area in Pocito (Geoambiental Corporación, 2023). This distinctive concentration pattern highlights the localized impact and dominance of HAP in specific areas (Figure 4).

Among the land consolidation process driven by HAP, extensive pasture areas have been transformed into orchards. Constructing ditches and roads to adapt the land for avocado has resulted in elevated sediment levels in water sources intended for human consumption. Consequently, local peasants have voiced grievances due to the adverse effects on their livelihoods (Table 1). In response, these communities have appealed to the environmental authority, prompting Corporación (environmental authority) to impose penalties on certain corporate growers. As a result, Salamina's corporations have incurred in the highest number of legal sanctions (13 sanctions or preventive measures) and rank second in complaints (6 complaints) in Caldas in 2022.

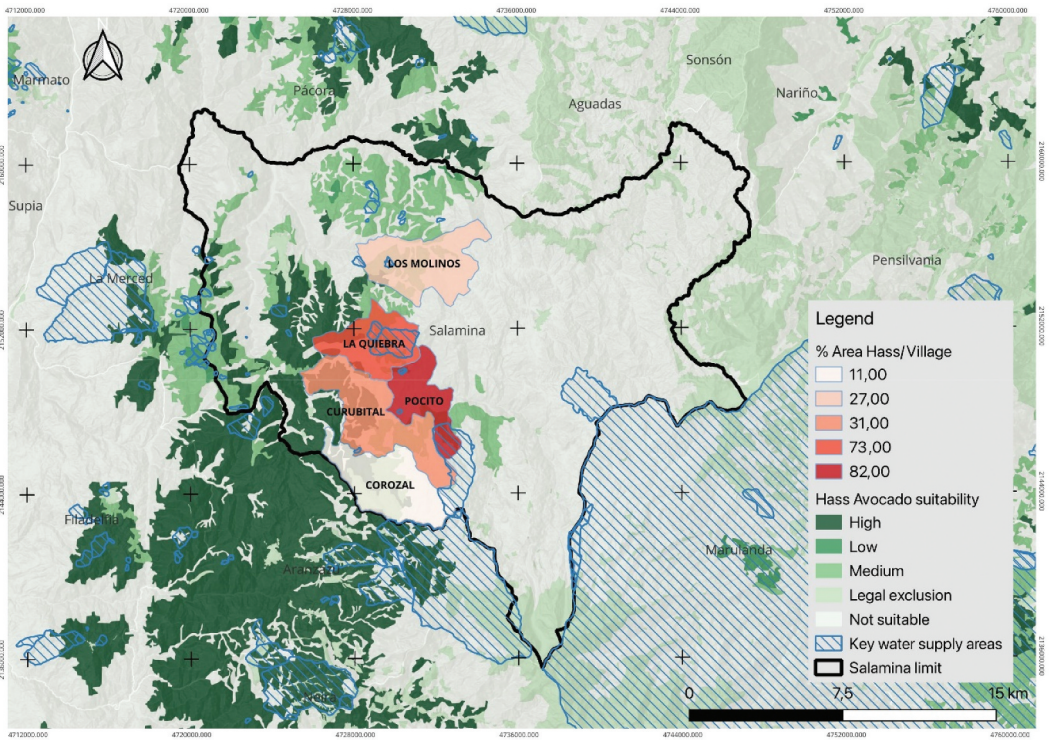


Figure 4. Concentration of Hass avocado farms in five villages in Salamina. Currently, avocado farms occupy 17% of the area of the municipality’s main water supply areas.

Complaints and requests for environmental assessment against avocado growers in Salamina highlight complex socio-environmental issues.⁵ Beyond quantifiable impacts, these actions reveal deeper concerns. Calls for assessment indicate a lack of trust between growers and communities. Allegations of violating protected areas show the cultural significance of landscapes. Petitions addressing contamination and landscape changes stress community rights to clean water and land protection. Concerns about village changes signify disruptions to traditional land use and community identity. The occupation of watercourses, unauthorized logging, and sedimentation from road construction harm the environment. Agricultural burns threaten protected zones and water sources. Allegations of stream contamination and excavation waste disposal pose direct threats to water quality and access. Unauthorized tree felling intensifies deforestation concerns and impacts water bodies. Although various sanctions have been implemented since 2022, the conflicted dynamics in Salamina remain.

Challenges in governing avocado consolidation

With the significant HAP expansion and regional policies promoting their cultivation in Caldas, Corpocaldas plays a crucial governance role. Acting as an advisory and coordinating body, Corpocaldas provides sustainability guidelines that directly influence land use changes in Salamina. Among these changes, conflicting scenarios arise where public and private interests intersect, particularly regarding the use of the agricultural landscape in the context of the considerable land suitability for HAP.

Public organizations develop sector-specific agendas that enable avocado corporations to negotiate land use during planning. These corporations engage in direct negotiations to align

Table 1. List of complaints and concerns filed against avocado companies.

#	Details of the complaints
1	Petition: Request for information and visit to avocado farm for environmental assessment
2	Complaint: Water contamination by avocado plantations
3	Denouncement: Violation of protected areas as ecological heritage by avocado growers
4	Right of petition: request actions for contamination and dewatering because of avocado plantation
5	Right to petition- protected areas-damage to avocado growers and water source presents coloration
6	Right of petition: The geography of several villages is being altered by avocado cultivation
#	Details of legal sanctions
1	Occupation of several watercourses and forest harvesting without a permit, and sedimentation and impact on water bodies with material left over from the opening of roads.
2	Agricultural burns that endangered the environmental protection zone and the Curubital aqueduct zone in Salamina.
3	Alleged affectation of the Chagualito stream because of the disposal of material from road excavation, contamination of drainage, and affectation of the water supply to the municipal capital of Salamina.
4	Sediment contribution to the Curubital creek due to the absence of trenches or structures to control mass movements coming from the road.
5	Impact on water sources supplying the La Frisolera micro power generation plant because of the opening and use of roads and the disposal of debris over bodies of water.
6	Felling of trees without a logging permit and possible impact on a water body.
7	Alleged agricultural burning on the Riobamba property.
8	Inadequate disposal of waste from road construction, deterioration of the protective forest strip, and occupation of watercourses without authorization from Corpocaldas.
9	Alleged damage to protective forest strips, lack of protection of springs, occupation of watercourses, and related activities.
10	Opening of internal roads within the area that corresponds to the protected forest area and inadequate disposal of debris.
11	Opening of internal roads, inadequate disposal of debris from water sources, waterway intervention without permission, and impact on the protective forest strip. Damage to vegetation cover and watercourse and intervention of forest areas protecting watercourses due to road construction.
12	Impact on vegetation cover and watercourses and the intervention of forest areas protecting watercourses due to road construction.
13	Impact on vegetation cover and watercourse and the intervention of forest areas protecting watercourses because of road construction, the use and exploitation of natural resources, and the generation of discharges because of activities carried out on the property without the respective environmental permits.

Source: Corpocaldas.

productive activities with ecosystem conservation, facilitated by initiatives like the inter-sectoral Hass avocado-working agenda in Caldas. This agenda operates regionally but affects municipalities where avocados are produced, and is supported by an 'inter-institutional avocado roundtable' in Salamina. From 2020 to 2023, the local government launched the 'Agreement of Wills for Good Agricultural and Sustainable Practices of Avocado Cultivation in the Municipality of Salamina' to address environmental concerns associated with HAP. The agreement established a consensus space to mitigate environmental impacts and outline obligations for stakeholders in the avocado chain.

The agreement emphasized active community participation to mitigate the impacts of avocado production and conserve water resources. An inter-institutional avocado roundtable following face-to-face dialog, including local and regional authorities, avocado producers, and local communities, was established to coordinate and monitor actions. However, power dynamics favoring corporations over those affected by the avocado boom hindered fair negotiation outcomes. This imbalance limited the peasantry's ability to raise concerns and achieve equitable resolutions.

Conclusion

This paper highlights significant concerns regarding HAP's in a traditional agricultural landscape. Critical questions persist about the land consolidation processes driven by corporations, the use and enclosure of resources such as water, and the resulting dynamics of inequality, as evidenced by the GINI coefficient of land in Salamina. Uncertainties also remain about labor migration to HAP and the maintenance of the coffee sector as both an economic activity and a driver of the cultural coffee

landscape. Furthermore, it is essential to consider the complaints and grievances of the affected local farming communities.

More generally, the paper draws attention to the role of corporate agricultural intensification in transforming social and physical conditions in traditional tropical landscapes, ostensibly for economic development and employment opportunities. Although the dynamics presented reflect impacts driven by commodity-oriented agriculture, this case provides valuable insights into the conflicted dynamics related to local agricultural crises (such as the coffee crisis), land suitability and availability (pastures), labor availability, and institutional articulation. To safeguard the local peasantry and the cultural landscape, it is imperative to enhance coordination efforts to address the challenges posed by corporate-led HAP. This includes developing strategies that prioritize the well-being of local communities and preserve the cultural heritage embedded in traditional agricultural practices.

Notes

1. EVAS-Evaluaciones agropecuarias municipales 2007-2022. Raw statistics of the agricultural sector in Colombia. <https://upra.gov.co/es-co/Paginas/eva.aspx>
2. The Gini coefficient of land represents how evenly or unevenly land is distributed among landowners. It is measured between zero and one. The higher the value, the more unequal the land. If a perfect land equality is a GINI= 0, Salamina is highly unequal.
3. The value of one hectare of pastures in 2018 was approximately 5 million COP (1,305-USD).
4. The area is unsuitable mainly for two reasons. First, it is outside the optimal altitudinal range of 1,800 to 2,200 meters above sea level. Second, according to the UPRA's land suitability report for the Hass avocado cultivar, where the orchard is located is labeled as unsuitable in Salamina.
5. Response to author's request for information in 2022.

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