Ecosystem Services Inequality Driven by Agroextractivism in Salamina, Colombia: A Critical Institutional Analysis

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Abstract

By integrating frameworks of ecosystem services (ES) governance and the critical institutional analysis and development (CIAD), I offer insights into the emergence of ES inequality within the context of rapid agricultural landscape transformation and the constraints posed by agroextractivism, embodied by the expansion of Hass avocado plantations in Salamina, Colombia. This study examines the disparities between the intended rules-in-form and the actual rules-in-use at the local landscape level, emphasizing the interplay between social structure and human agency in the governance of ES as commons. The findings reveal that the Hass avocado industry in Salamina has both deliberate and unintended outcomes. On one hand, it perpetuates the agro-capitalism model and aligns with the global corporate-food regime, driven by large-scale growers and increasing consumer demand for healthier food options. On the other hand, it inadvertently exacerbates inequality in the distribution of ecosystem services because of a governance system that lacks mechanisms for ensuring equitable access to them.

Keywords: Institutions, Critical realism, Governance, Inequality, Structure, Agency.

1. Introduction

In this paper, I use a mix of frameworks, such as the Governance of Ecosystem Services (Primmer et al., 2015), a conceptual framework to understand new commons (Duraiappah et al. 2014), and the Critical Institutional Analysis and Development (Whaley 2018) to address the phenomenon of ecosystem services inequality produced by agroextractivism. With this approach, I present a meta-reflection on a case study in Salamina, a municipality in Colombia, grappling with a range of challenges stemming from the expansion of Hass avocado plantations. These challenges encompass both ecological and social implications, primarily driven by a current agrarian change led by the rapid growth of these plantations, which have triggered a swift transformation in a traditional agricultural landscape centered on coffee and plantain cultivation. I claim that the current governance arrangements, which establish the management of ecosystem services as common pool resources, allow the reproduction of ecosystem services inequality. This meta-reflection is based on fieldwork conducted in 2022, including in-field observations, analysis of secondary information sources, and the utilization of semi-structured interviews with various stakeholders in the municipality of Salamina. It also draws upon previous research findings that have linked phenomena such as agroextractivism with the rapid expansion of Hass avocado plantations in Colombia (Suarez et al. n.d.).

I use the Ecosystem Services Governance framework (Primmer et al. 2015) and the new commons framework (Duraiappah et al. 2014) as heuristic tools, delving into the intricate multi-scale governance processes of ecosystem services in a Colombian region, focusing on the municipality of Salamina. This step serves as an entry point for a general understanding of the governance structure in the area. Subsequently, I undertook a critical institutional analysis (Whaley 2018), primarily examining the agrarian change produced by the expansion of large-scale plantations and its impact on commons such as ecosystem services, as well as its consequences for the local peasant population. Finally, I provide concluding insights and outline potential avenues for future analysis.

2. Ecosystem Services and Governance

Researchers widely use the concept of ecosystem services (ES) in the literature, as it serves as an interface between the generation of scientific knowledge and supports decision-making in various contexts. However, this concept has faced discussions, criticisms, and counterarguments (Schröter et al. 2014). One major critique revolves around the definition of what ES truly is. While some authors emphasize the practical use of ES in specific contexts, setting aside their definition (Danley and Widmark, 2016), others have drawn attention to the weak foundation related to the ES definition and its impact on the ineffective application of the concept in practice (Nahlik et al., 2012). Therefore, it is crucial to clarify the theoretical approach taken regarding the definition of ES, as this can have various implications (Danley and Widmark, 2016).

For this research, the definition of ecosystem services (ES) as proposed by Fisher et al. (2009) will be employed: ES are

the components of ecosystems that contribute to human well-being, either actively or passively. This definition emphasizes that ecological processes produce ecosystem services, which society does not necessarily have to consume directly. Complementing this perspective, Boyd and Banzhaf (2007) introduce the concept of final ecosystem services, which are elements of ecosystems directly used or enjoyed for human well-being. Notably, final ES maintain a vital link with the underlying ecosystem functions, processes, and structures that give rise to them (Potschin et al. 2016). Recognizing the non-linear nature of ecosystem complexity, there is a process intricately linked to ES generation. It begins with the presence of one or more ecosystem structures, each serving a multitude of ecological functions (Maes et al., 2012). These functions, in turn, yield various types of final ecosystem services that provide societal benefits and enhance human well-being. Consequently, as Kandziora et al. (2013) point out, the ecosystem services cascade approach offers a deeper understanding of the intricacies within human-environment systems. This is where the ES cascade concept becomes a valuable conceptual framework for practical implementation, as it dissects the concept into quantifiable entities (Boerema et al., 2017).

One interesting aspect of ecosystem services is that they have been interpreted within the framework of the commons (Kluvankova et al. 2019), as ES possess characteristics of both public and common-pool resources (Muradian and Rival 2012; Falk et al. 2018). Therefore, the common-pool resources perspective on ES has been framed with two components: (1) the natural capital and (2) the flow of benefits, which includes ecosystem services (Lant et al. 2008). This understanding paves the way for the development of governance arrangements aimed at the sustainable management of ES provision.

Governance then relates to the creation, enforcement, and adaptation of norms, rules, and practices (Tucker et al. 2023), which involves the exercise of authority in specific areas like territories, populations, or formal/informal organizations. One entity or multiple entities, including governments, networks, organizations, or various groups, can conduct it. Now, when considering ES governance, Primmer et al. (2015) proposed four modes to understand ES governance (Figure 1): (1) governance with a hierarchical structure; (2) governance guided by scientific and technical expertise; (3) collaborative governance with an adaptive approach; and (4) governance aimed at regulating strategic behavior. This framework serves as a basis for empirically studying ES governance, considering the decision-makers and the various rationales used in policy implementation.

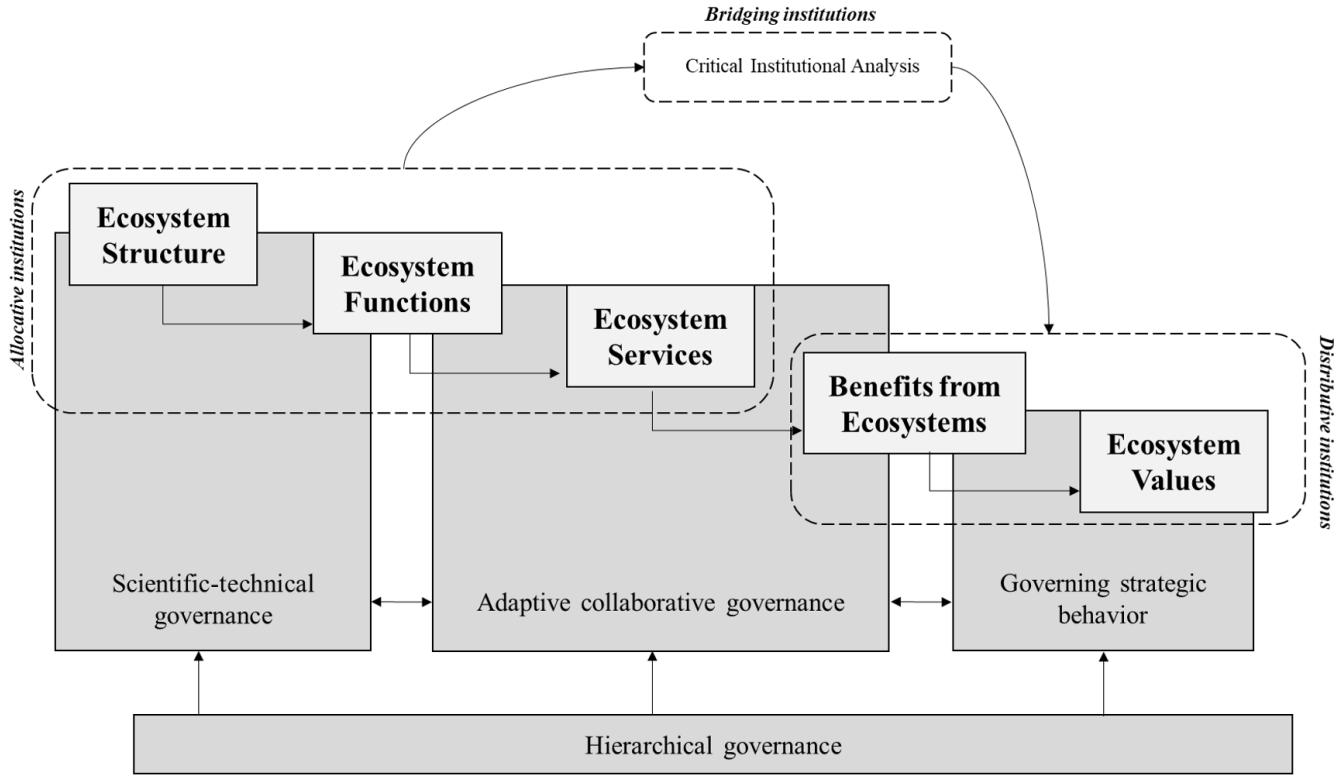

Figure 1. A mixed framework for analyzing governance of ecosystem services. Adapted from Primmer et al. (2015) and Duraiappah et al. (2014). This figure includes the special focus of this paper related to the analysis of collaborative governance in ecosystem services access through a bridging institutional analysis.

In this framework, I have incorporated various institutions that play a mediating role throughout the ES cascade, drawing from Duraiappah et al. (2014). The aim is to gain a more comprehensive understanding of the governance and institutional aspects related to ES. It is crucial to align these frameworks to explore the conditions required for establishing bridging institutions that can effectively cover the entire ES flow within the ES cascade. This is where critical institutional analysis proves to be a valuable tool (Section 3).

2.1. Governance and Institutions in Salamina

Following Primmer et al. (2015), governance plays a pivotal role in mediating between ecosystem functions, the benefits ecosystems provide, and issues of inequality. I will delve deeper into these topics when discussing institutional analysis. To set the stage, I begin by outlining the different dimensions of governance found in Salamina.

- *Hierarchical governance*: This type of governance in Salamina represents the convergence of diverse regulations and public policies aimed at conserving Colombia's ecosystems, the regional ecosystems, and those specific to Salamina itself. These policies incorporate various international agreements and harmonize them with the Colombian context through regulations and laws. Of particular note is the national policy for the integral management of biodiversity and its ecosystem services - PNGIBSE (MADS, 2012), which adapts ES management to different scales from the national to the local, and includes all the elements in the ES cascade. In terms of governance, the policy emphasizes

strengthening the State-citizen relationship in comprehensive biodiversity and ES management. The goal is to place biodiversity conservation as an irreplaceable benefit, enhancing the quality of life across different levels. Strategic lines include enhancing local social participation, improving institutional adaptive capacity, promoting coordination between organizations and sectors, and enhancing public agencies' conservation capacity through public value creation (MADS, 2012).

- *Scientific Technical Governance*: The hierarchical governance informs this mode of governance, but with general arguments (Primmer et al., 2015). Therefore, in our case, this scientific governance adapts the guidelines of PNGIBSE and other related regulations, thus creating specific regional (Caldas Department) and local (Salamina) guidelines supported by technical work that generates information about the state of ecosystems and their capacity to support ES as a basis for ES allocations (ecosystem structures and functions). This approach is called the Main Ecological Structure and constitutes a binding aspect in local land use planning.
- *Governing Strategic Behavior through Distributive Governance*: The guidelines, considering hierarchical and technical aspects, directly influence changes in local land use (e.g., Salamina). In this context, various conflicting scenarios emerge where public and private interests collide when it comes to benefiting from and valuing ecosystems. Public organizations create sector-specific work agendas that allow them to negotiate land use when they develop territorial planning. They negotiate practices and strategies to harmonize productive activities with ecosystem conservation and its main ecological structure. This is particularly the case with the inter-sectoral Hass avocado-working group, which operates at the regional level but has implications for municipalities where avocado is produced, including Salamina.
- *Adaptive Collaborative Governance*: Up to this point, I have discussed governance on broad spatial scales, even though I have mentioned the local level of Salamina. The argument of this article, therefore, focuses on the discussion of collaborative governance at micro-scales, where everyday land use, ecosystem transformations, and access to ES are experienced. Governing ES at such scales requires greater coordination efforts (bridging institutions) because the other modes of governance do not govern the way actors experience everyday life in the field and the way allocation-distributions interplay. As the way these decision-making structures operate does not reach that micro-scale, it is necessary to understand the specific rules and norms governing access to ES in the area, particularly by analyzing the arrangements between peasants and large corporations in traditional agricultural landscapes.

3. Critical Institutional Analysis and Development (CIAD)

In my examination of ecosystem services inequality stemming from agroextractivism, I used the Critical Institutional Analysis and Development (CIAD) framework, as introduced by Whaley (2018), to discuss the context for institutional bridging (Figure 1). This framework builds upon the original Institutional Analysis and Development (IAD) framework (Ostrom 2011), and the politicized IAD framework (Clement 2010), while incorporating elements such as political economy, discourses, and the structure-agency dualism. The CIAD framework, influenced by Critical Realism, delves into the ontological depth of social phenomena and places a strong emphasis on the interplay between social structures and human agency (Archer, 1995; Bhaskar, 2014). It recognizes that social structures both shape and constrain human agency in defining, applying, and enforcing rules and norms. Simultaneously, it acknowledges the significant role of

human agency in shaping and transforming social structures.

According to Whaley, the CIAD framework directs attention to the workings of broader power structures and temporally situated social dynamics (Figure 2). It is rooted in critical institutionalism and focuses on the systematic analysis of the complex embeddedness of institutions (Whaley, 2018). By adopting this framework, I aim to uncover the underlying power dynamics and social processes that influence ecosystem services governance and its current outcome, inequality. In Figure 2, I introduced slight modifications regarding the placement of differentiated powers. Building on Bhaskar (2008a), I included "*power1*" as the generative forces inherent in social structures, and "*power2*" as the transformative capacities of human agency. This adaptation aims to establish a distinct analytical demarcation between the powers interweaving throughout the entire process.

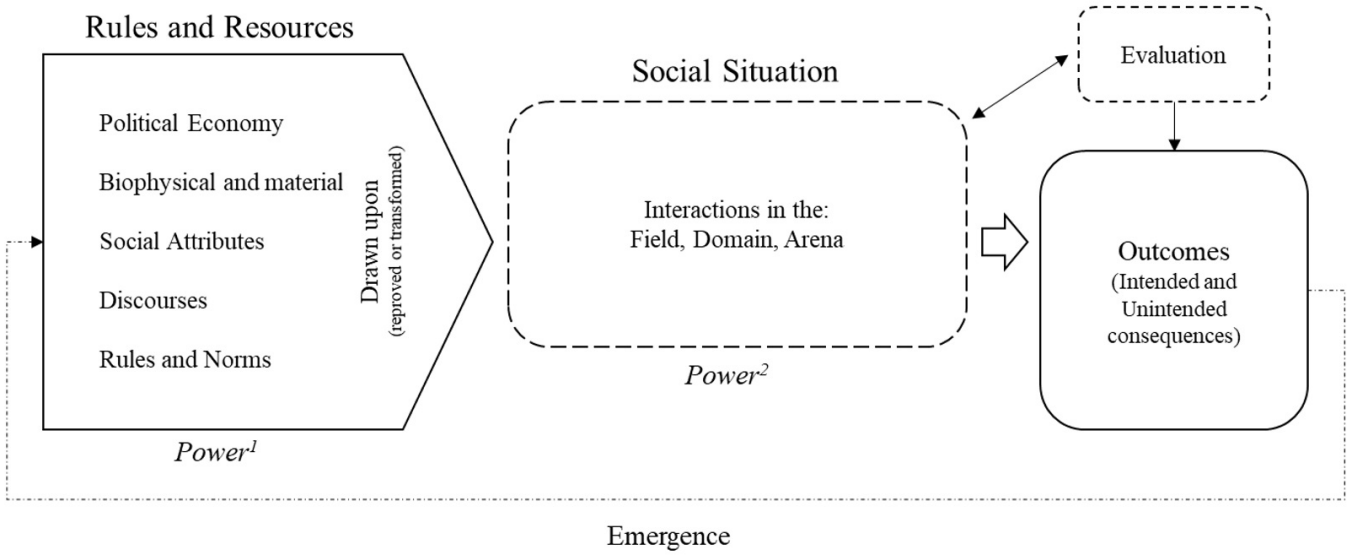

Figure 2. The CIAD Framework. Adapted from Whaley (2018). One differential element in this framework is the use of Social Situation instead of Action Situation (Ostrom, 2011), and Action Arena (Clement, 2010). This social situation, according to Whaley, better addresses the structure-agency interplay at different levels.

Rules and resources (biophysical, political economy, social attributes, discourse, and rules and norms) then make up the framework that influences a social situation, which unfolds how social structure (*power1*) interacts with human agency (*power2*) at different levels (field, domain, and arena). The intertwined process produces intended or unintended consequences that, when evaluated, have the potential to reshape rules and resources. This interaction then reproduces or transforms the rules and resources because they are the medium and outcome of human agency (Whaley, 2018).

3.1. Rules and Resources

3.1.1. Political Economy

From a political economy perspective, the expansion of Hass avocado plantations in Colombia can be understood due to various factors and policies that shape the production and export dynamics of the crop. First, the increased demand for

healthy natural products and expanding markets in Europe, Asia, and North America have driven the growth of avocado plantations. This demand, coupled with rising avocado prices, has made avocado production a promising venture for producing countries like Colombia. Second, the prioritization of the Hass avocado value chain in the previous National Development Plan 2018-2022 and the rural capitalization incentives provided by the Ministry of Agriculture and Rural Development through Finagro[1] have played a significant role in promoting avocado production at the national level. The creation of the first private capital fund for Hass avocados in 2020 has further facilitated investment and expansion in the sector.

Over the past five years, Colombia has experienced substantial growth in avocado production, with an increase in both cultivated areas and yield. This growth has propelled Colombia from the sixth to the third position among exporting countries in terms of production and cultivated area. Although still trailing behind Mexico and Peru in terms of export volume, predictions suggest Colombia has the potential to reach the second position, significantly increasing its share in the global market (Escobar and Betancur 2021).

The expansion of cultivated areas, harvested areas, and avocado production has accompanied this increase in exports in tons between 2015 and 2020 (MADR 2020). Colombia currently has a significant land area dedicated to Hass avocado cultivation, with the departments of Antioquia, Caldas, Quindío, Risaralda, Valle del Cauca, Tolima, Huila, and Cauca being the largest producers. The avocado industry in Colombia supports a substantial number of producers operating in many production units, and generating a significant number of jobs.

The department of Caldas has witnessed significant growth in avocado production, becoming the second-largest producer of Hass avocados in Colombia by 2020. This growth can be attributed to the department's interest in expanding the planted area and increasing productivity levels, as outlined in its public policy for agricultural development defined through Assembly Ordinance 724 of 2014. This policy reflects the department's commitment to promoting avocado production as a means of economic development.

To regulate and guide the expansion of avocado production, the Departmental Agriculture Secretariat issued Resolution 6509 in 2018. This resolution establishes environmental and technical guidelines for Hass avocado production in Caldas, aiming to ensure sustainable practices in the sector. Agreements have been made to promote good agricultural practices in the industry. However, controversies surrounding avocado plantations persist in the department. Complaints have been raised regarding issues such as displacement, land grabbing, and damage to water resources. These concerns highlight the social and environmental impacts associated with the expansion of avocado production.

In response to these concerns, the environmental authority in Caldas has implemented precautionary measures and imposed sanctions on companies responsible for environmental damage. This demonstrates the efforts to address and mitigate the negative consequences of avocado plantations on the environment and local communities. In Caldas, there is one municipality characterized by these conflicts, and that is Salamina, which has the highest number of complaints against corporate growers (Suarez et al., n.d.).

3.1.2. Biophysical and Material

Salamina, a municipality known for its rich biophysical and material features, is home to a diverse range of ecosystems and abundant water resources (Appendix 1). According to the EOT Salamina (2021), the area possesses 15 hydrographic micro-basins that supply water to the region. Vast expanses of pasture predominantly characterize the landscape of Salamina, covering an impressive 20,603 hectares, which accounts for 53.3% of the total municipal area. Forests occupy 17% of the municipality's land. This prevalence of pasture is a common trend in regions that have traditionally relied on a livestock-based economy. Permanent and transitory crops are relatively low in Salamina. The municipality has over two thousand hectares of permanent crops and a mere 11 hectares of annual and transitory crops, representing 7.1% and 0.03% of the total municipal area, respectively (EOT Salamina, 2021).

While the soils in Salamina hold potential for crop production under specific conditions, it is crucial to acknowledge that 83.7% of these soils possess characteristics that require careful management and adaptation for agricultural use. Some of these soils may have limitations, such as poor drainage or erosion issues, which need to be addressed to ensure their optimal utilization in agriculture. While it is feasible to use these soils, it necessitates meticulous management and implementing specific agricultural techniques to overcome the limitations and maximize production (EOT Salamina, 2021). Currently, over 15 thousand hectares in Salamina face land use conflicts due to overuse, underscoring the urgent need for sustainable land management practices[2].

The ecosystems and agroecosystems in Salamina have played a vital role in providing a wide range of ecosystem services to both urban and rural populations. The people of Salamina highly value ecosystem services related to water supply and regulation, soil fertility, and food production, as evidenced by some studies (Suarez et al., 2022; Corpocaldas and WCS, 2020). However, the issue lies not in the disappearance of ecosystems themselves, but in the transformation of dynamics surrounding access to ecosystem services. The introduction of Hass avocado plantations has altered the landscape dynamics and disrupted access to resources that have traditionally been vital for the local community. In rural areas, small hydrographic micro-basins, which provide water through gravity, typically supply village aqueducts. The management of these aqueducts is the responsibility of the community. However, the incursion of Hass avocado plantations has changed the dynamics of how people benefit from traditional non-formal water sources and the landscape amenities they provide (Suarez et al. 2022).

3.1.3. Social Attributes

Salamina, a small municipality with around 19,923 residents, grapples with significant socio-economic 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 stands at 40.8% (PDM Salamina, 2020).

Historically, Salamina's economy revolved around coffee cultivation, typically on farms ranging from three to 3.4 hectares (Garcia, 2018). Land ownership was traditionally divided into two categories: extensive pastures held by wealthy individuals and farming systems driven by peasants, primarily focusing on coffee and plantain cultivation in hilly areas with limited technological and financial resources. Non-mechanized coffee farming on high slopes, with coffee serving as a

primary source of income and cultural identity for rural communities (UTP et al., 2021), has long shaped Salamina's cultural landscape. In 2014, coffee represented 36% of the agricultural production units in Salamina (PDM Salamina, 2020).

Over the past two decades, an enduring economic crisis in the coffee industry has posed a significant challenge to Salamina's existing coffee production system. The combination of falling coffee prices and increasing production expenses has resulted in a substantial reduction in the cultivated coffee area, amounting to over 670 hectares (representing about 28%) from 2007 to 2022 (Suarez et al., n.d). These changes have led to a significant increase in avocado plantations, from 380 hectares in 2018 to 2,500 hectares in 2022, while coffee production areas decreased by 119 hectares, and livestock production systems decreased by 19% between the years 2019 and 2022 (Suarez et al., n.d). This shift in land use has implications for water resources and the overall landscape of Salamina.

Avocado production in Salamina began with small-scale farming (1-2 ha) and evolved into large-scale production of the Hass cultivar, driven by international companies starting around 2018. These companies have shifted land utilization from pastures to Hass avocado production. In this context, according to Hasudungan and Neilson (2020), obtaining community consent was pivotal, particularly when dealing with a specific group of customary elites, such as livestock and pasture owners, which streamlined the process of land access. Negotiating with multiple small traditional producers, like coffee or plantain growers, would have been time-consuming, costly, and uncertain. Consequently, a significant portion of pastures, including areas with crucial water sources, have been acquired by large avocado companies, focusing primarily on elevations ranging from 1,800 to 2,100 meters above sea level, precisely where vital water springs are situated (Corpocaldas and WSC, 2022). This transition has allowed for the purchase of land by foreign entities and has encompassed regions with critical water sources.

3.1.4. Discourses

Applying Clement's (2010) argument on discourses, in the context of Salamina, there is a confluence of discourses, which integrate ideas and concepts on different scales. Although the current process of increasing avocado plantations is presented as a win-win discourse, this is far from being the case (c.f. Benjaminsen & Svarstad, 2009). On one hand, the philosophy of capitalism presents discourses that portray the accumulation of capital as the norm and the goal in occupying rural territory, along with the neoliberal ideology of individualism and self-determination without state intervention. Here, ideas embedded in the belief of rural backwardness and poverty as a lack of monetary resources are identified. Therefore, large-scale plantations emerge as the sole alternative to fulfill those objectives of rural development, employment generation, and economic growth. Then, agribusiness companies often create a narrative emphasizing the limited capabilities and productivity of smallholder farmers to gain land and establish control over resources (Hasudungan and Neilson 2020).

Conflicting discourses also emerge, embedded in the intentions of sustainable development, which, while still reproducing growth as the primary driver of development, also seeks environmental conservation and social justice, creating important contradictions (Næss 2006; Giraldo 2019). This is reflected in the various policies implemented at the national, regional,

and local levels, as they strive for economic growth and employment generation while adhering to the principles of sustainable development.

One aspect that reinforces the discourse of sustainable development embodied in plantation agriculture is related to export certifications. In Hass avocado production in Salamina, with an aim for international markets, growers need to meet accreditation requirements that 'certify' the environmentally and socially sustainable practices. These certifications include Global G.A.P (Good Agricultural Practices), SMETA (Sedex Members Ethical Trade Audit), the Rainforest Alliance, and others. When corporations successfully complete these certification processes, they not only strengthen the discourse about the legitimacy of their plantations but also propel it forward because of the prominence of these labels. This aligns with the concept of 'certification fetishism' (drawing from the Marxist perspective of commodity fetishism), which conceals the underlying dynamics behind the certified product itself. These discourses together, as posed by Dryzek (2005), represent the unspoken conventions that shape the backdrop for social engagement, holding a similar importance to formal institutional regulations.

3.1.5. Rules and Norms

As an established democracy, Colombia's formal institutions, guided by its national Constitution and comprehensive regulations, uphold the fundamental right of every citizen to access a healthy environment. The Constitution incorporates diverse participatory mechanisms to ensure the application of these rights. Furthermore, it underscores the right to private property, with the core expectation that private property should concurrently serve both societal and ecological interests. In light of these principles, it is expected that the agricultural development in Salamina, including the allocation of property rights to various stakeholders, should adhere to a set of rules that align with these overarching constitutional ideals.

In order to become a binding institutional arrangement, it is imperative that monitoring and enforcement processes are incorporated to ensure compliance with established formal rules and regulations. Colombia exhibits an extensive policy and regulatory framework and an environmental sanctioning regime that aims to guarantee adherence to sustainability-oriented actions. The regulations pertaining to rural land use outline the conditions for the occupation and utilization of ecosystems and natural capital (allocation institutions), and finally present the conditions for ES governance. However, as presented by Hasudungan & Neilson (2020), firms shape the global value chain in interaction with external actors like governments.

These regulations overlook aspects that, although not visible, are real and have causal powers (*power1*) in the way they generate ES governance processes in agricultural landscapes. In this sense, enforcement and monitoring strategies follow an 'institutional epistemic fallacy', as they conflate the real with aspects of the actual, as critical realism suggests (Bhaskar 2008b). Formal rules do not present strategies to confront structural constraints that arise from various social and power structures (the real), which transcend the local scale and, not being contained by said formal arrangements, reproduce structures of inequality and unsustainability.

An additional concerning aspect is the absence of comprehensive legislation regarding land appropriation in Salamina. This regulatory gap has created fertile ground for land grabbing, where powerful entities exploit the lack of control and

oversight, leading to detrimental social and ecological consequences. The absence of robust regulations to govern land appropriation exacerbates the overarching implications of this issue, further compromising the sustainability and equitable distribution of resources in the municipality (distributive institutions).

Informally and unintentionally, a scenario has unfolded where various disparities have emerged in how the rules are put into practice by agents with particular agendas. The existing institutional framework in Salamina has been infiltrated by agro-capitalism, resulting in the reconfiguration of rules that disadvantage the agricultural landscape and ES management, at least for the agents with fewer powers and influence. Extensive corporate-owned plantations have obscured the traditional role of property, which should yield both social and ecological benefits, leading to land grabbing and exacerbating ecological imbalances.

3.2. Social Situation: Focus of Interest to Institutional Analysis

3.2.1. Field Description

Salamina's traditional coffee-centric landscape has undergone rapid transformation in response to global dietary trends and strategic policies. This shift towards agro-capitalism and specialization, exemplified by the emergence of Hass avocado plantations, has led to simplified ecosystems dominated by the lucrative Hass cultivar, resulting in substantial changes in land use, socio-economic dynamics, institutional arrangements, and environmental conditions. At the local level, proponents of Hass avocado cultivation have driven the reshaping of cultural and policy frameworks related to coffee, livestock, and small-scale production, contributing to significant shifts and the emergence of agroextractivism.

In Salamina, Hass avocado production aligns with the stability inherent in the corporate-driven food regime, connecting the region to the predominant pursuit within the global food system. The adoption of crops like the Hass cultivar fuels structural changes in global agricultural development, and these changes have far-reaching social effects, influencing interactions among producers, consumers, laborers, and stakeholders at various scales. The established food regime shapes and influences the land use of Salamina, affecting social interactions.

In exploring this complex scenario, two key contradictions become apparent. First, the involvement of external companies from Peru, Chile, and Colombia in Salamina's rapid land acquisition (exogenous to the region) exemplifies the interplay between economies of scale and the drawbacks of spatial expansion. This dynamic, as conceptualized by Bunker & Ciccantell (2003), reflects multinational corporations' pursuit of increased Hass avocado production by venturing into new areas for resource exploitation. This can be seen as part of the phenomenon where extractive practices shift to new domains and locations when resources near depletion (Ye et al. 2020).

The second contradiction pertains to the approach taken in utilizing nature within these plantations. While some advocate for channeling capital through natural systems to enhance productivity and capital accumulation, this approach often leads to a regressive pattern in nature's utilization, resulting in simplified landscapes and biodiversity loss, particularly in the Global South (Suarez and Gwozdz 2023). This contradiction is deeply rooted in the tension between profit-driven

economic systems and long-term environmental sustainability (Næss 2006; Giraldo 2019). It is crucial to acknowledge that this contradiction permeates policy interventions, which, paradoxically, both strive to guide plantations towards sustainability and advocate for them as a strategic path for Salamina's development.

The shifting priorities from local-based initiatives to external corporate-led plantations reflect the Global South's compulsion to conform to the trend of increased foreign investment in land acquisition and resource access (Veltmeyer and Lau 2020). In Salamina, this marks a departure from traditional production systems led by local peasants and cattle ranchers, aligning more with external extractive strategies aimed at facilitating capital accumulation. This transition has led to a rise in land (re) primarization and increased local labor participation in agroextractivism (Petras, 2020). However, it is important to recognize that, amidst this complexity, there is potential for Salamina to harness local initiatives aimed at empowering the local peasantry. Currently, the focus in Salamina seems to revolve around streamlining swift capital and land accumulation driven by corporate entities, rather than fostering progressive development of local capacity.

In this vein, Salamina is currently undergoing a process of agroextractivism (McKay et al., 2021), primarily driven by corporate plantations with a focus on international markets. These endeavors have received policy and financial support at various levels (national, regional, local), and there is a promising outlook for future growth, thanks to the availability of pastureland and regional policies. Interestingly, the local consumption of Hass avocados is minimal, but their cultivation has had significant repercussions for the prices of essential commodities like meat and milk.

This surge of agroextractivism has ushered in international capital, facilitating the acquisition of extensive lands and their adaptation for Hass avocado cultivation. In this context, employment dynamics take center stage, with approximately 800 direct jobs in Salamina (Suarez et al., n.d.). While large-scale avocado-growing companies contribute to employment, the conditions for workers can be precarious. This process has resulted in land accumulation and an increase in foreign ownership, leading to shifts in access to water, changes in the landscape, and soil fertility. The expansion of Hass avocado cultivation has even seen permits for water usage granted, and the cultivation extending to higher elevations than normal, increasing the frontiers for land exploitation (Suarez et al., n.d.). Significantly, introducing a technological package for Hass avocados has disrupted traditional knowledge associated with water management, landscape preservation, cattle breeding, and traditional coffee-plantain cultivation.

The extensive use of land for Hass avocado cultivation has led to a transformation of the local landscape. This transformation has resulted in elevated sediment levels in water bodies, leading to regulatory penalties and public complaints against corporations. To add a final layer to this complex narrative, international investment in Hass avocados has caused shifts in property regimes, extensive land acquisitions, and changes in ownership patterns. While this expansion has positively affected the local economy (at least in terms of employment opportunities), it has also triggered challenges, including inflation and difficulties in land access and housing affordability.

3.2.2. Domain Description

Given the context of agroextractivism in Salamina, there is an emerging process of inequality in ecosystem services access. This inequality unfolds as a gradual erosion of access to ecosystems and the associated benefits they provide

(Laterra et al. 2019). The brunt of this decline falls heavily upon the region's peasant communities, who, due to their heavy reliance on these ecosystem services, find themselves ill-equipped to adapt to the shifting environmental landscape. In stark contrast, corporate growers possessing both substantial financial resources and advanced capabilities exhibit a distinct advantage in harnessing and capitalizing on these natural resources with a higher scale and intensity.

For instance, the ramifications of losing access to the advantages furnished by natural capital, including access to ecosystem services, loom large. This is prominently exemplified in the concerns expressed about the gradual deprivation of local communities' access to clean water due to environmental pollution (Suarez et al., n.d). The loss extends to intangible benefits offered by nature, such as the appreciation of the natural landscape and recreational opportunities. Another dimension to consider pertains to the revenue-sharing model. Corporate growers maximize the land's potential for Hass avocado cultivation, capitalizing on factors like soil fertility and heightened food production. In contrast, rural residents frequently find themselves transformed into rural laborers. In this regard, the domain reflects how the current governance arrangements establish the management of ecosystem services as common pool resources, and the inequality resulting from this arrangement.

3.2.3. Arena Description: Difference Between Participants

Natural capital plays a pivotal role in sustaining Hass avocado plantations in Salamina, providing essential ecosystem services like water regulation, soil enrichment, and scenic beauty preservation. However, access to this crucial natural capital is influenced by asymmetries in knowledge, property ownership, financial resources, authority, and negotiation capabilities (Laterra et al. 2019). Structural biases in the region enable the exploitation of this natural capital, with policy support amplifying the impact of corporate growers (Table 1). This interaction with land use has resulted in an unequal distribution of the benefits, widening the disparities between corporate growers and local peasants.

Table 1. Characteristics of the participants in the Social Situation

Positions	Participants	Characteristics	Practices*
Producers	Peasants	Small scale, less than 5 ha farms.	Extractive± practices are mainly coffee and plantain growing. Maintenance of traditional agricultural activities, self-consumption, local market engagement, and community ties at the micro level (farm-village), small-scale landscape transformation.
	Cooperative farmers	Grouping of people engaging in commercialization of avocados, different sizes.	Local and regional market engagement. Small-scale landscape transformation.
	Corporate growers	Mostly international corporations recently introduced to Salamina to grow Hass avocado.	Extractivist± practices focus on Hass avocado growing. Large-scale landscape transformation, international-oriented market, community engagement at the municipal level given the employment.
	Livestock farmers	Traditional owners of large tracts of land dedicated mainly to pasture and livestock.	Cattle production, land ownership as a source of wealth.
Laborers	Rural inhabitants	Labor force available to work in the agricultural sector of Salamina.	Engaging in seasonal or permanent activities related to agriculture work according to the possibilities available.
Monitoring/enforcement	Corpocaldas	Environmental authority that promotes environmental conservation and sustainable use of ecosystems.	Rule of law, monitoring environmental degradation, promotion of sustainable practices. Sanctioning power.
	Municipality of Salamina	Local administrative authority that deals with land use management and planning.	Rule of law, monitoring land use development, follow regional environmental guidelines. Partial sanctioning power.
	Rural citizens	Monitoring transformations and environmental degradation in Salamina.	Monitoring and reporting to different instances the state of the ecosystems.
Promotion	Municipality of Salamina	Local administrative authority that deals with the municipality's development.	Development promotion. Financing of rural development, advisory services for agricultural activities (at local level).
	Government of Caldas	Regional administrative authority that deals with the region's development.	Development promotion. Financing of rural development, advisory services for agricultural activities (at regional level).
	Other national-level organizations	Different organizations that promote the development of the agricultural sector and mainly the Hass avocado.	Advisory services for agricultural activities (at regional level and local level), funding activities, promoting development.
	Corpocaldas	Environmental authority that promotes guidelines to fit development and environmental concerns in the region.	Promoting sustainable development through guidelines is not always compulsory for rural development.

** Routinized behavior according to each participant's position.*

± Extraction and extractivism are different concepts, with the latter related to unsustainability (Gudynas 2018).

Following Therborn's (2013) reflections, ecosystem service inequality in Salamina is rooted in differential access to resources, with a deeper process of spatial separation at play. Then, three causal mechanisms explain the inequality: Distanciation, Exclusion, and Hierarchization. Distanciation, following Therborn (2013), highlights how corporate entities like corporate growers can outpace local peasants by not merely taking advantage of them, but by distancing themselves. Exclusion, the second mechanism, becomes apparent as corporate growers engage in activities like land accumulation

and landscape transformation, actively excluding peasants from comparable opportunities. Hierarchization further underscores the disparity as corporations assume a pivotal role in Salamina's rural development, relegating peasantry to a secondary position. These mechanisms interact to perpetuate inequality in access to ecosystem services.

What becomes clear is the stark disparity between the "rules-in-use" and the "rules-in-form", which has resulted in the pervasive emergence of inequality in the provision of ecosystem services in Salamina (Table 2). While the formal institutional framework establishes strategies to ensure compliance with environmental regulations and social participation, it is crucial to acknowledge the influence of various factors that hinder effective enforcement. The lack of adequate resources for enforcement, coupled with the prevailing hegemonic discourses in the region, contributes to the perpetuation of unsustainable dynamics. The resistance from social structures (*power1*) further reinforces the development of plantations, exacerbating the challenges faced in achieving sustainable and equitable resource management in Salamina.

To gain a deeper understanding of the dynamics at play and the factors contributing to inequality, it is essential to examine the rules-in-use that perpetuate this disparity among participants. Regarding position rules (Table 2), the corporate food regime (*power1*) creates significant stratification in the agricultural landscape of Salamina, diverging the roles and power dynamics between corporate growers and peasants (unequal *power2*). Corporate growers, backed by substantial financial resources and advanced technologies, occupy a privileged position, facilitating distanciation. They engage in large-scale, profit-oriented practices, such as Hass avocado plantations, for global markets, while peasants are limited to local markets. Peasants often lack the means to transition to "high-value" crops like Hass avocados and continue with traditional, low-technology farming practices like coffee or plantain cultivation. These practices are an integral part of the region's heritage, but peasants face challenges in accessing capital, technology, and market networks, alongside potential impacts on water and fertile land.

Table 2. Rules-in-use and mechanisms of ecosystem services inequality. Rules based on (Ostrom, 2011).

Different rules	Rules-in-use (Reproduced by agro-capitalism)	Mechanism activated
Position rules	The corporate food regime positions corporate growers differently from peasants and small-scale farmers when taking part in the agricultural landscape from Salamina.	Distanciation, Hierarchization
Boundary rules	Both corporate growers and peasants can take part in the agricultural landscape from Salamina, yet the level of participation is not fair, given the positions they occupy.	Exclusion, Hierarchization
Aggregation rules	Within the agro-capitalist context stimulated by the corporate food regime, corporate growers enjoy greater access sources to exploit the natural capital.	Distanciation, Exclusion
Information rules	Information related to the implications of plantations on land and ecosystems in the agricultural landscape of Salamina is often obscured or neglected.	Exclusion
Payoff rules	Costs and benefits are distributed unevenly, with corporate growers reaping more benefits while peasants bear the costs of depleting the agricultural landscape from Salamina.	Distanciation, Exclusion
Scope rules	Unequal outcomes to all participants given landscape governance.	Distanciation, Exclusion, Hierarchization

Concerning boundary rules, participation in Salamina's agricultural landscape is open to both corporate growers and peasants, but the fairness of this participation is skewed. Corporate growers wield more influence, leading to hierarchization, while peasants, due to limited resources and smaller landholdings, often face marginalization, leading to exclusion. Within the context of agro-capitalism under the corporate food regime and considering aggregation rules, corporate growers strategically position themselves to gain extensive access to the resources needed for exploiting the region's natural capital, leading to exclusion. This positioning empowers corporate growers to influence land use decisions, particularly in cultivating Hass avocados, causing a transformation of the traditional agricultural landscape. This concentration of power and resources intensifies disparities between corporate growers and rural peasants, contributing to distanciation.

Hidden information regarding the environmental consequences of extensive plantations, especially those focused on Hass avocados, often remains concealed. This pertains to information rules. It relates to the far-reaching environmental degradation from the rapid expansion of such plantations, which affects land and ecosystems and remains hidden from the general population of Salamina, reinforcing exclusion. Concerning payoff rules, the distribution of costs and benefits in Salamina's agricultural landscape is imbalanced, with corporate growers benefiting more while peasants bear the costs, contributing to distanciation. This is evident in Salamina, where corporate growers exploit natural capital, depriving peasants of access to ecosystem services, and often leading to their displacement and employment as plantation laborers.

3.3. Outcomes and Evaluation

In Salamina, I can discern both intended and unintended consequences stemming from the structure-agency dialectics related to the Hass avocado plantations phenomenon (*power1* vs *power2*), and its implications on ES governance and institutions. The intended outcome is the perpetuation of the agro-capitalism model (agroextractivism), driven by the heightened production of agricultural commodities such as Hass avocados, aimed at capital accumulation. Simultaneously, albeit unintentionally, this process contributes to the perpetuation of the prevailing global corporate-food regime. Corporate growers embody the agency behind these dynamics, and public and private organizations actively promote the consolidation of a specific product (the Hass cultivar) through a particular strategy (large-scale plantations). These actions are further bolstered by the increasing demand from Global North consumers for healthier dietary options, which in turn induce transformations in the agricultural landscapes of the Global South. An additional unintended consequence arises from the perpetuation of inequality in ecosystem services due to biased agricultural landscape governance, which does not ensure the equitable distribution of ecosystem services (weak bridging institutions).

4. Final Thoughts

Some observe that ecosystem management, typically intended to support the provision of public goods and common pool resources, often faces pressures to shift towards mainly providing private goods (Falk et al., 2018). However, the situation in Salamina is not as straightforward. While various governance arrangements (Figure 1) aim to sustain and generalize

the provision of ecosystem services (ES) for the rural population, agrarian changes have micro-level implications, affecting how peasants benefit from locally situated ES within productive landscapes. Transformations like land-use changes, e.g., from livestock to Hass avocado, often supported by property rights and rural development policies, affect the maintenance of ES not at the regional or municipal scale, but at the village and property level. Here, differences arise in how large-scale producers benefit or can afford to forego benefits compared to how peasants experience the same dynamics. Thus, this finding aligns with the attention called for by Hoogesteger & Rivara (2023) regarding agrarian change and its institutional impact.

As I emphasized earlier, bridging institutions are essential for mediating at the interface between allocative and distributive governance (Duraiappah et al., 2014). My argument is that at this locally specific level, where dilemmas regarding ES access arise, a more nuanced understanding of the fuzzy nature of ES and their delocalized benefits is required. For instance, consider the case of spring water sources that have traditionally served as community water supplies. However, when land use changes to a more intensive activity like Hass avocado plantations, it not only affects the on-site generation of the ES but also implicates benefits gained beyond the boundaries of the productive exploitation. Here, bridging institutions could play a crucial role in alleviating ES-related inequalities.

In this context, the development of new rules and norms should aim to counteract the existing rules-in-use that perpetuate mechanisms leading to ES inequality (Table 2). This alternative approach should prioritize fair rules that mediate between allocation and distribution at the local level, where dilemmas arise within agricultural landscapes (Table 3). Institutions that can effectively manage the provision and regulation of ecosystem services in a fair and efficient manner are those that bridge the gap and account for spatial, temporal, and functional fit (Duraiappah et al. 2014).

Table 3. Equalizing mechanism. Based on Ostrom's rules (Ostrom 2011), and Therborn Equalizing mechanisms (Therborn 2013).

Different rules	Equalizing rules	Mechanism to activate
Position rules	All participants have the freedom to become part of and occupy the best position they expect in the agricultural landscape from Salamina.	Approximation, De-hierarchization
Boundary rules	All participants have a fair option to be part of the agricultural landscape from Salamina, and benefit fairly from ES provision.	Inclusion, De-hierarchization
Aggregation rules	All the participants have a fair level of control in the ecosystem services governance.	Approximation, Inclusion
Information rules	The information on ES is freely available for all participants in the agricultural landscape from Salamina.	Inclusion
Payoff rules	The participants in the ES governance distribute the cost and benefits according to capacity and influence in the agricultural landscape.	Approximation, Inclusion
Scope rules	Fair outcomes to all participants given ES governance in the agricultural landscape.	Approximation, Inclusion, De-hierarchization

To accommodate the recommendations outlined in Table 3, it is essential to consider the concept of 'institutional bricolage' (Cleaver & De Koning, 2015). This approach argues that the combination, layering, and assembly of institutions

can create ‘institutional thickness,’ explaining their persistence through adaptive evolution, while also considering the constraints imposed by structural dynamics (*power2*). In this regard, it is necessary for institutional arrangements in their various forms of governance (Figure 1) to be adjusted not only at the regional or municipal levels but also to consider micro-level contexts, where social dilemmas related to fair access to ecosystem services become apparent. By focusing on the micro-scale, aspects of institutional arrangements can bridge the guidelines set by both allocative and distributive institutions.

In conclusion, the findings in this paper undeniably illustrate that the agrarian transformation driven by agroextractivism in Salamina has resulted in significant disparities in the provisioning of ecosystem services. It is my firm contention that the current governance arrangements, which treat ES management as common pool resources, play a substantial role in perpetuating these inequalities. These institutions and mechanisms are clearly inadequate to grapple with the challenges posed by agrarian change and its far-reaching effects on ES.

Appendix 1

Type	Description Ecological characteristics (Ha)	Salamina
Local interest areas	Aqueduct supplying areas	1156
	Hydraulic environmental protection zone	158
Regional interest areas	Protective forest belt	7699
	Other Areas of Departmental Environmental Interest	175
	Indirect water recharge of high importance	-
	Indirect water recharge of medium importance	3434
Soil Conservation District	El Gigante	729
Strategic ecosystems	Dry forest	99.2
	Nevados national park	727
	Sonsón (paramo)	708
Cultural heritage	Cultural coffee landscape	2,404
National heritage	Municipality heritage	662
Forest reserve (Law 2/ 1959)	Central forest reserve	1,826
Rural Civil Society Reserve	La Gloria	-
	La Virginia	-
Protective forest reserve	El Diamante	650
	Tarcará	-
Soils for conservation	Soils class VIII	1,090

Footnotes

[1] MADR. (2021). *Incentivo a la Capitalización Rural - Programa DRE*[*Incentive for Rural Capitalization - DRE Program*].

Retrieved from https://acortar.link/RrsU6i

[2] At the time of the published report on land use in Salamina, the avocado plantations had not yet started to develop on a large scale.

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