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Agroecology and local development in coffee communities of the Colombian Coffee Cultural Landscape

Agroecología y desarrollo local en comunidades cafeteras del Paisaje Cultural Cafetero Colombiano

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ABSTRACT

This article delves into the sociocultural determinants driving local development, focusing on coffee-growing communities in southwestern Colombia. Through interviews, focus groups, and participant observation, a detailed analysis is conducted in a region globally recognized for its cultural and environmental significance. The findings highlight the benefits of traditional agroecological systems, which contribute to environmental conservation, economic development, and community strengthening. Based on our findings, we can conclude that agroecology and cultural identity are key elements for the sustainability of the coffee cultural landscape, reinforcing the relevance of collaboration among local actors and the design of public policies focused on these practices.

Keywords: Agribusiness; agrochemicals; climate change; family farming; public policies; sustainability; territory.

RESUMEN

Este artículo explora los determinantes socioculturales que impulsan el desarrollo local, con un enfoque en las comunidades cafetaleras del suroeste de Colombia. A través de entrevistas, grupos focales y observación participante, se realiza un análisis detallado en una región reconocida globalmente por su importancia cultural y ambiental. Los hallazgos destacan los beneficios de los sistemas agroecológicos tradicionales, los cuales contribuyen a la conservación ambiental, el desarrollo económico y el fortalecimiento comunitario. Con base en nuestros hallazgos, podemos concluir que la agroecología y la identidad cultural son elementos clave para la sostenibilidad del paisaje cultural cafetero, reforzando la relevancia de la colaboración entre actores locales y el diseño de políticas públicas enfocadas en estas prácticas.

Palabras clave: Agricultura familiar; agronegocios; agroquímicos; cambio climático; políticas públicas; sostenibilidad; territorio.

INTRODUCTION

Modern agribusiness has experienced unprecedented growth, driven mainly by the intensive use of agrochemicals and genetically modified crops. While this production model offers short-term yield benefits, it generates increasingly concerning environmental and social impacts. Dependence on nitrogen fertilizers and the expansion of monocultures significantly contribute to soil degradation, biodiversity loss, and water pollution, positioning the agricultural sector as one of the largest greenhouse gas emitters (Myhre *et al*., 2013; Zou *et al*., 2022). These practices jeopardize ecosystem sustainability, threaten rural community health, and undermine global food sovereignty (Aparicio *et al*., 2023; Da Silva *et al*., 2020; Gonzalo Mayoral *et al*., 2022).

In response to the challenges of industrial agriculture, agroecology emerges as a sustainable and adaptable alternative, integrating ecological principles with the traditional knowledge of farming communities (Sidhu & Manickavasagan, 2023). This approach enables diversified production, reduces dependence on external inputs, and protects natural resources, promoting low-impact environmental practices (Ben Hassen & El Bilali, 2022; FAO *et al*., 2021; Steensland, 2022). In Latin America, agroecology has gained particular relevance, offering solutions based on local knowledge and a resilience-based approach to climate change, essential for the development of family and community farming (Altieri & Nicholls, 2020; Bedeke, 2023; Bhardwaj *et al*., 2022; Clapp, 2023; Rosa, 2022).

In Trujillo, Valle del Cauca, Colombia, family farming focused on sustainable coffee cultivation has created a unique cultural identity (Molano, 2007). Collaboration among government, academia, and communities has enabled the exploration of new local development paradigms centered on socio-ecological awareness, corporate social responsibility, and integrated agricultural management systems (Fabinyi *et al*., 2014; Sánchez & Reyes, 2015; Taboada *et al*., 2021).

Despite the growing interest in agroecology, the transition to this model in Trujillo faces significant challenges. The absence of strong public policies and limited access to financial and technological resources make it difficult to implement agroecological systems. Additionally, generational transition is a concern, as many young people perceive traditional farming practices as less profitable or prestigious than urban options. However, agroecology could revitalize the sense of belonging and open up new economic and social opportunities for future generations (Fabinyi *et al*., 2014; Palacios, 2009).

This research is relevant in a context where the need for sustainable models is increasingly urgent (Darmaun *et al*., 2023). Promoting agroecology in Trujillo and reducing the environmental impacts of coffee production would strengthen the region's cultural identity and offer local development opportunities. Collaboration among academic institutions, governments, and rural communities is essential to building a regulatory and educational framework that facilitates the agroecological transition, tailored to the region's socio-cultural and economic specificities.

Certified organic agricultural products aligned with family farming preserve biodiversity and cultural traditions and diversify the supply of products and services (Goulet, 2020; Ruzzante *et al*., 2021; Takahashi *et al*., 2020). This approach contributes to the socio-economic and political development of family farming and agroecology as a social movement (Fabinyi *et al*., 2014; Giraldo & Roset, 2017). The article highlights the research findings, emphasizing the economic, social, and environmental advantages of traditional agroecological systems and their connection to the cultural identity and spiritual values of rural communities, proposing a transition towards a more sustainable society (Guzmán Luna *et al*., 2019; Karytsas & Theodoropoulou, 2022; Soeiro & Ferreira Dias, 2020).

In summary, the study reveals that cultural identity in Colombia’s Coffee Cultural Landscape (CCL) is built on the connection between individuals, community, and territory, playing a crucial role in psychological well-being. Agroecology presents itself as an essential tool for "development," challenging subordination to globalization and the sustainability of extractive and exclusionary capitalism. Local complexities, derived from governance issues and external pressures on coffee cultivation systems, underscore the urgent need for regional development strategies that combine agricultural transformation and community autonomy with improving quality of life, preserving knowledge, and promoting equity in the region.

Agroecology is both technically viable and politically mobilizing. Collaboration among local actors and the recovery of territorial identity are essential components in this socio-political and cultural process. Social capital is crucial in driving productivity and cohesion in rural CCL communities.

The coffee tradition, deeply rooted in the history and culture of many communities, is at a crossroads. On one hand, youth disinterest and rural migration threaten its continuity. On the other hand, child labor protection measures have led to exclusion that disregards their cultural connection to these activities. However, as Bedeke (2023) points out, the cultural identity and sense of belonging associated with these practices offer an opportunity to develop educational programs that combine theory with practice, thus fostering the continuity of coffee traditions and their adaptation to 21st-century challenges.

Coffee growers, deeply connected to their territories, value quality of life, safety, and friendliness as essential aspects. Despite advances in infrastructure and crop technology, challenges persist, such as the lack of machinery and standardization in coffee processing (Palacios, 2009). The UNESCO designation of the CCL boosts the regional economy by diversifying income through tourism and valuing products as cultural heritage, highlighting the interdependence between society and nature in the management of common heritage.

Agroecology is consolidated as a link between cultural identity, the CCL, and rural development. Through local practices, it promotes the preservation of the cultural coffee landscape as part of the heritage. Identifying needs in agroecology highlights the importance of understanding each territory's particularities, strengthening cultural identity, and empowering new generations. The social dimension of agroecology implies a deep analysis of rural realities, integrating traditional knowledge that influences sustainable processes and fosters a harmonious coexistence with nature (Barrios *et al*., 2020).

The challenges faced by coffee farming, such as climate variability and the need to adapt to new production scenarios, require innovative solutions. Agroecology, by combining traditional knowledge with sustainable farming practices, offers a comprehensive response to these challenges. The CAFINNOVA project, analyzing the impact of climate and soils on coffee production, underscores the importance of adopting an agroecological approach (Apablazza *et al*., 2023). As Barrios *et al*. (2020) note, agroecology, through practices such as agroforestry and crop diversification, enables the construction of more resilient, equitable, and sustainable production systems.

The rootedness of coffee-growing communities in their territories, strengthened by cultural identity and favorable environmental conditions, is a key driver of rural development (Perafán Cabrera & Restrepo Jiménez, 2023). Development plans should prioritize agroecological systems linked to this identity, fostering social fabric and governance. This approach, by promoting inclusive and pro-environmental discourses, helps address current challenges and strengthens the resilience of communities.

MATERIALS AND METHODS

To assess the impact of agroecology on coffee-growing populations in southwestern Colombia in terms of local development and cultural identity, alternative local organizational processes involved in community intervention were adopted. The selection of a case study was based on its effectiveness as a method that "measures and records the behavior of individuals involved in the phenomenon studied" (Martínez Carazo, 2006, p. 167).

The active participation of the local population was crucial, incorporating social diagnostics to highlight events that affect their territory. Collective issues were prioritized, and strategic actions were designed to visualize and propose new conditions aimed at collective well-being, with an emphasis on territorial appropriation. This approach emphasizes agroecology as a catalyst for local development in coffee-growing communities in Valle del Cauca.

Information was gathered through a combination of qualitative and quantitative sources, including interviews, documents, archives, direct observation, and material spaces and objects (Martínez Carazo, 2006, p. 167). Methodologies such as semi-structured interviews, surveys, document reviews, and participant observation were used to understand how agroecology fosters connections between collective identity, territory, and competitive advantages for coffee communities.

The research on the impact of agroecology on coffee-growing communities in southwestern Colombia utilized both qualitative and quantitative methods (Martínez Carazo, 2006, p. 167). Semi-structured interviews were conducted to explore perceptions of cultural identity and agroecological practices; surveys were applied to gather sociodemographic and production data; and participant observation documented on-farm practices. Additionally, focus groups were held to foster discussion among producers and community representatives, and local historical and organizational documents were reviewed to contextualize the evolution of the sector. Data were analyzed using statistical tools and thematic coding, providing a comprehensive understanding of agroecology as a driver of development and cultural cohesion in these communities.

This research is part of the CAFINNOVA project, funded with state resources, which aims to strengthen the competitiveness of specialty coffees in central Valle. Through an interdisciplinary approach, the project has conducted fieldwork on 48 coffee farms, prioritizing those implementing agroecological systems. It has also involved key actors such as CENICAFÉ, Caficentro, and various community organizations, thereby strengthening the articulation between research, production, and society.

Within the research framework, views on the preservation of cultural traditions

among coffee-growing families were explored, examining how these contribute to environmental conservation and social well-being. The survey collected information on gender, monthly income, education levels, marital status, and characteristics of the coffee produced to understand the situation of the coffee-growing population. The investigative work also included a documentary review of national and local archives, including institutional and organizational bulletins and reports, to contextualize the formation of the coffee sector and its economic impact on local farmers.

RESULTS AND DISCUSSION

Generational changes and cultural identity in coffee cultivation. Family traditions and generational changes play a crucial role in the dynamics of coffee cultivation. This practice, deeply rooted and passed down through generations, holds profound symbolic significance within the community (Gadea, 2018; Iyabano *et al*., 2023). However, in Trujillo alone, 15% of coffee-growing areas have been lost over the past 10 years, equivalent to 655.3 hectares (FNC, 2023). Survey data reveal an aging workforce, with an average age of 53.6 years. The decline in interest among young people, driven primarily by economic factors, has led to significant migration to urban areas (Dobkowitz *et al*., 2020; Palacios, 2009). Farmers' testimonies highlight a worrying trend: discouraging children from working in the countryside, resulting in a tangible loss of valuable knowledge and skills.

The role of public policy and agroecological systems. Public management has a crucial role in preserving cultural identity and promoting sustainable agricultural practices. The connection between coffee-growing communities and their territories, as Perafán Cabrera & Restrepo Jiménez (2023) point out, is deeply rooted in cultural identity. By prioritizing agroecological systems linked to this identity, rural development plans not only strengthen the social fabric but also contribute to cultural heritage conservation and climate change adaptation (Dobkowitz *et al*., 2020; Cañedo Villarreal *et al*., 2021; Bedeke, 2023).

The analysis of local development in southwestern Colombian coffee-growing communities shows the deep connection that coffee growers establish with their territory. It emphasizes the idealization of their environment, prioritizing aspects such as security and friendliness among its inhabitants. Changes observed include improvements in infrastructure, technological advances in crop management, and the implementation of training and incentive programs. However, challenges remain, especially the lack of machinery and standardization in coffee processing.

The analysis reveals a deep connection between local development, cultural identity, and the implementation of agroecology in specific contexts. This interrelationship not only fosters a deeper cultural identification of the community with its territory,

customs, and lifestyles but also generates momentum for local development (Sylvester & Little, 2021). The sense of belonging to the territory stimulates not only regional economic growth but also recognizes distinctive elements that shape society's beliefs, values, and traditions.

Economic and social impacts of the coffee cultural landscape. The designation of the Colombian Coffee Cultural Landscape as a UNESCO World Heritage Site in 2011 revitalized the regional economy, diversifying income sources through tourism (Cabell & Oelofse, 2012). Recognizing products as heritage assets promotes an exploration of history, knowledge, and ancestral values within communities, fostering sustainable agricultural practices (Dobkowitz *et al*., 2020). The interdependence between society and nature emerges as a crucial aspect within the context of common heritage assets (Table 1).

In the context of the coffee-growing community, territory is recognized as a unique component that shapes knowledge, identity, and perceptions (Palacios, 2009). Communities with a strong cultural identity tend to attribute heritage value to their territory, promoting sustainable and agroecological agricultural practices in pursuit of environmental sustainability (Rincón, 2016). Through participant observation on coffee farms, agroecological practices were documented, such as the direct use of mucilage on trees or as a compost input, planting shade trees, and crop diversification, mainly with plantain, corn, and beans.

Table 1. Economic and Social Impacts of the Coffee Cultural Landscape as a World Heritage Site.

Impact	Description
Economic Diversification	Increase in tourism and generation of additional income in coffee-growing communities.
Cultural Preservation	Promotion of sustainable agricultural practices and appreciation of cultural heritage.
Strengthening Identity	Recognition of coffee as a cultural and economic symbol in the region.

Source: Own elaboration based on the works of Cabell & Oelofse (2012); Dobkowitz et al. (2020).

Adapting to climate change. Climate change adaptation in southwestern Colombian coffee-growing communities is driven by factors beyond theoretical considerations. The deep-rooted cultural identity that producers feel toward their territory and traditions constitutes a fundamental motivating force. At the same time, the transition to agroecological production systems requires strengthening the bond of new generations with these traditions, thus ensuring the continuity of sustainable practices. As interviewees noted, coffee is more than just a crop; it is part of their family and cultural heritage. However, it is necessary to reconcile this reality with

child labor regulations by implementing policies that recognize the educational value of agricultural activities and offer young people comprehensive training that allows them to participate in farm life in a safe and enriching way.

Agroecology as a catalyst for sustainability and local development. Cultural identity is a fundamental pillar for sustainable local development in the coffee-growing communities of Valle del Cauca. By recognizing and valuing their cultural diversity, a stronger connection to the territory is fostered, promoting agricultural practices such as agroecology that contribute to improving quality of life and adapting to climate change. This holistic approach, linking cultural identity, local development, and sustainability leverage the region's competitive advantages and build a more prosperous future for its inhabitants (Alfonso, *et al*., 2023).

Institutional support and the agroecological transition. The process of converting to agroecological systems must be a local initiative, led by the community and supported by the government and various institutions. In Southwestern Colombian communities, organic coffee farming aligned with agricultural customs contributes to local development by preserving cultural traditions and values.

Agroecology emerges as a key strategy for preserving cultural heritage and biodiversity in rural regions. By shifting perspectives on the environment, agroecology fosters practices that value nature as a common good. Rural communities, rooted in their territories, have developed agroecological production systems that help maintain cultural identity and adapt to climate change. Practices such as agroforestry and crop diversification are essential to ensuring the sustainability of productive systems and ecosystem resilience (Apablazza *et al*., 2023).

Agroecological conversion reinforces cultural identity in these regions and requires committed support from institutions such as the National Federation of Coffee Growers, government organizations, and NGOs. As summarized in Table 2, the agroecological transition faces challenges such as inadequate infrastructure and resistance to cultural change but also presents opportunities like technology incorporation and educational programs.

Table 2. Challenges and Opportunities in the Agroecological Transition.

Aspect	Challenges	Opportunities
Infrastructure	Lack of adequate machinery	Incorporation of new technologies.
Training and Education	Resistance to cultural change	Educational programs and knowledge transfer.
Public Policy	Lack of specific incentives	Integration of rural development policies.

CONCLUSIONS

This study on Colombia's Coffee Cultural Landscape (PCCC) and the implementation of agroecological practices provides insight into how cultural identity and sustainability converge in an integrated rural development model. It concludes that cultural identity in the PCCC is deeply connected with relationships among people, the community, and the land and that these connections are essential for the psychological well-being of residents and social cohesion in coffee-growing communities.

Moreover, agroecology stands out as a fundamental tool for sustainable development, challenging the perception that traditional coffee production must yield to global forces. Coffee farming systems face complex challenges, such as lack of governance and increased exposure to external pressures, highlighting the need for local development strategies that integrate agricultural transformation and community autonomy.

Agroecology as a tool for change. The analysis confirms that agroecology is not only technically viable but also politically significant, serving as a means of social and community mobilization in the PCCC. Collaboration among local actors and the resurgence of territorial identity emerge as essential components for strengthening social capital and cohesion in rural communities. This approach reinforces the idea that agroecological systems can improve productivity, equity, and quality of life in the PCCC.

The importance of cultural identity for sustainability. Although coffee cultivation has traditionally been passed down from generation to generation, it is at risk due to youth migration to urban settings, raising concerns about its continuity. However, cultural identity, rooted in family traditions and community values, is recognized as a valuable heritage that not only strengthens a sense of belonging but also fosters sustainable agricultural practices. This enables coffee farmers' life projects to actively contribute to climate change mitigation and local biodiversity conservation (Mees, 2022; Perafán Cabrera & Restrepo Jiménez 2023).

Challenges and opportunities in valuing the PCCC. Despite advances in infrastructure and crop technology, significant challenges remain in standardizing coffee processing and the lack of suitable machinery. The PCCC's UNESCO designation has diversified income sources through tourism, but this dynamic also requires a heritage product management approach that balances social needs with respect for nature. This reinforces the importance of understanding and preserving the interdependence between cultural identity and the ecological environment.

Agroecology, rural development, and empowerment of new generations. Agroecology offers a unique opportunity to connect the cultural identity of the PCCC with sustainable rural development. However, it is crucial to adapt this approach to the specific needs of each territory, strengthening the cultural identity of new generations and promoting

the conservation of the coffee cultural landscape. In this regard, it is essential to design educational programs that allow children and adolescents to actively participate in agricultural activities, combining academic training with traditional knowledge (Levidow *et al*., 2021; Thomas *et al*., 2021). This approach ensures the transmission of ancestral knowledge and fosters harmonious coexistence with nature.

Recommendations for public policy and rural management. The findings of this study suggest that public management in the PCCC should prioritize agroecological systems linked to cultural identity (Cepeda Ortega, 2018; Van der Ploeg, 2020). This would not only benefit the social and institutional fabric of communities but also foster inclusive and environmentally friendly governance practices, promoting discourses and actions that address environmental needs and the challenges of the current climate crisis. Public policies should therefore support the education and empowerment of rural youth, emphasizing agroecology as a pathway toward sustainability and heritage preservation (Borras, 2023).

In summary, this study concludes that agroecology and cultural identity are fundamental pillars for sustainable development in the PCCC. The implementation of agroecological practices, supported by a strong territorial and cultural identity, enhances coffee farmers' quality of life and contributes to biodiversity conservation as resilience resources against climate change. Collaboration among local actors, the training of new generations, and the implementation of public policies focused on agroecology are key elements to ensure a sustainable future in Colombia's Coffee Cultural Landscape.

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