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Multistakeholder analysis in cocoa and livestock food systems in Caquetá, Colombia

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Pontificia Universidad Javeriana

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This document presents the structure of actors that drive the cocoa and livestock value chains in the municipalities of Belén de los Andaquíes and La Montañita, in the department of Caquetá, Colombia made in the frame of the WP3 of Mitigte +. This characterization was carried out through the actor mapping technique (ACM), which made it possible to identify the levels of cooperation in the links of the agri-food chains and the social capital available for the exchange of goods and services. Based on this methodology, we identified two elements for each value chain: first, the actors that cooperate in each link with their respective capitals and, second, the typologies of social capital expressed in bonding, bridging, and linking relationships.

The analysis was complemented with the building of social networks obtained from participatory workshops that made it possible to visualize and measure the structure of the relationships among actors. The structure of the networks was analyzed through metrics such as the network size, density, and degree centrality. The size of the network refers to the number of nodes or actors that are part of the network, while the density of the network refers to the number of connections or links between the nodes. The degree of centrality of the network refers to the importance of the key nodes or actors in the network.

Our results highlight how, while in the case of cocoa, both international cooperation agencies and government organizations that promote this sector are multiple and varied, the same does not happen with sustainable livestock farming, where the promotion actors at both the national and international levels are less diverse and permanent. Additionally, despite producers' efforts to make investments to transform production practices, cooperation networks do not guarantee their sustainability. Grassroots producers' organizations are the actors that contribute the most to the sustainability of the value chains and, therefore, their strengthening is crucial to achieving sustainable cocoa and livestock systems.

Introduction

The department of Caquetá, in the Colombian Amazon, has become a region that attracts various national and international institutions interested in promoting sustainable production systems that contribute to the reduction of deforestation, mitigation and adaptation to climate change, and peacebuilding. The justification for this institutional intervention has to do with a history of armed conflict, cultivation of crops for illicit purposes and the significant advance in the arc of deforestation towards the Amazon region, one of the most important biodiversity hotspots in the world.

The specific contributions of this institutional framework translate into investments in technical assistance and training, strengthening of organizational capacities, support to basic and applied research and promotion of the production, commercialization, and transformation of products with high potential in the national and international market. Among the most important products are cocoa (*Theobroma cacao*) under agroforestry systems and milk from livestock under silvopastoral arrangements. In this context, cocoa production under agroforestry arrangements and sustainable livestock farming are shown as paths towards sustainable production and ecosystem conservation.

At the local level, relationship structures have been formed between public and private institutions that support the mission of producing organic food, promoting exports in the case of cocoa and improving the livelihoods of families who today are committed to preserving and improving their economic conditions. This leverage is carried out through grassroots organizations that for years have been dedicated to promoting the production and commercialization of peasant-based agricultural goods.

This document presents the structure of actors that drive the cocoa and livestock value chains in the municipalities of Belén de los Andaquíes and La Montañita, in the department of Caquetá, Colombia. This characterization was carried out through the actor mapping technique (ACM), which made it possible to identify the levels of cooperation in the links of the agri-food chains and the social capital available for the exchange of goods and services. Based on this methodology, we identified two elements for each value chain: first, the actors that cooperate in each link with their respective capitals and, second, the typologies of social capital expressed in bonding, bridging, and linking relationships.

This analysis was complemented with the building of social networks obtained from participatory workshops that made it possible to visualize and measure the structure of the relationships between the actors. In the municipality of La Montañita, 5 people participated in the cocoa value chain (3 women and 2 men) and 8 in livestock (3 women and 5 men), and in Belén de los Andaquíes, 14 people participated (5 women and 9 men). In both workshops participated 25 people. The structure of the networks was analyzed through metrics such as network size, density, and degree of centrality. The size of the network refers to the number of nodes or actors that are part of the network, while the density of the network refers to the number of connections or links between the nodes. The degree of centrality of the network refers to the importance of the key nodes or actors in the network. The networks are accompanied by tables that summarize the roles and capitals provided by the actors.

In the following sections, we present the conceptual framework, the methodology, the context of cocoa and livestock production in the department of Caquetá, and the results of the mapping of actors in the cocoa and livestock value chains, in the municipalities of Belén de Los Andaquíes and La Montañita. Our results highlight how, while in the case of cocoa, both international cooperation agencies and government organizations that promote this sector are numerous and varied, the same does not happen with sustainable livestock farming, where the promotion actors at both the national and international levels are less diverse and permanent. Additionally, despite producers' efforts to make investments to transform production practices, cooperation networks do not guarantee their sustainability. Grassroots producers' organizations are the actors that contribute the most to the

sustainability of the value chains and, therefore, their strengthening is crucial to achieving sustainable cocoa and livestock systems.

Conceptual framework

Actor mapping (ACM) involves the use of schemes and networks to represent the social reality in which entities and groups of people participating in each of the links of the agri-food chains are immersed (Romano & Coral, 2020). The ACM not only consists of building a list of possible actors in a territory, but also knowing their actions, types of relationships and flows.

The ACM is characterized by being an instrument used in institutional analysis, political ecology, and social capital analyses, as it allows identifying “the characteristics of social organization, networks, norms and trust, which facilitate cooperation for mutual benefit” (Putnam, 1995: 67). Cooperation is understood as an essential variable to understand power relations, the influence of actors on others and the networks of work through which social capital flows. This variable is understood as follows:

Cooperation or reciprocity refers to the actions or strategies carried out by a group of actors, aimed at obtaining a common benefit. Putnam (1993; 2000) defines cooperation as the willingness of members of a community to work together to achieve common goals, while reciprocity refers to the tendency of members of a community to respond in a mutual and positive manner to the acts of cooperation and help they receive from other members. In this framework, the active involvement of people in community organizations influences their possibility of participating in decision-making and in management activities of various resources and assets.

Cooperation networks theoretically allows to identify typologies of relationships that are related to the strength of the bonds between actors (Woolcock, 1998; Woolcock & Narayan, 2000; Malecky, 2012; Eklinder, Eriksson & Hallen, 2011; Lozares et al., 2011). There are three types of relationships:

- **Bonding:** built by “union” or “cohesion” ties, which are based on (intra)relationships, i.e., between or within individuals with common characteristics or belonging to the same collective or territory, such as relationships between members of the same organization associated more with trust and cooperation. Family or neighborhood relationships.
- **Bridging:** more diffuse and extensive social capital that “builds bridges” of a horizontal type that occurs between similar groups of power, facilitating changes in the norms of the own group and exogenous alliances, competition, or collaboration, seeking new sources of information and innovation. Relationships between colleagues or associates.
- **Linking:** refers to connections and trust that bridge different groups across various spaces of action and power. These connections create vertical relationships of varying social influence, ultimately facilitating stronger relationships with the state (actors or institutions of authority).

In cooperation networks, the size of the network, the density and the degree of centrality can be measured. The size of the network refers to the number of nodes or actors that are part of the network, while the density of the network refers to the number of connections or links between the nodes. The degree of centrality of the network refers to the importance of the key nodes or actors in the network. Specifically, the degree of a node refers to the number of connections it has with other nodes, while betweenness indicates its connectivity capacity between different nodes in the network. Closeness refers to the distance between a node and the other nodes in the network, which can be essential to understand its influence and accessibility in the network (Carolan, 2013; Wasserman & Faust, 1994).

Methodology

The proposed methodology was aimed at understanding the structure of actors that drive the cocoa and livestock value chains, as well as the strategies for mitigating climate change, conservation and reducing deforestation, based on actor mapping. To understand the cooperation relationships and their typologies, the characterization was developed at the municipal level in Belén de los Andaquíes and La Montañita. Montañita is currently the location where the LL4P "pact for a sustainable territory" is being established.

Social networks were also created to make it possible to visualize and measure the structure of the relationships between the actors in the network and to identify the key actors and relationships that may be important for the development of social capital in each agri-food chain. In these networks, network size, density and degree of centrality were measured.

The characterization was carried out with networks considering two criteria:

- Links in the agri-food chain: production, processing, and commercialization.
- Levels: Interactions at the municipal and regional level at three levels of the value chain (production, transformation, and commercialization)

Networks have the following three attributes:

- Influence of the actors.
- Intervention scale (local, regional, national).
- Flows delivered by each actor (money, knowledge, inputs, technology, among others).



Picture 1. Network mapping workshop. By: Victoria Guáqueta. Belén de los Andaquíes, Caquetá, Colombia. November 2023.

In each link of the value chain - production, processing, commercialization - networks were built to respond to the cooperation variable. The questions addressed by each network are the following:

Criteria	Question
Production link	What are the actors that cooperate directly to promote production processes in the municipality?
Processing link	What are the actors that cooperate directly to promote food processing in the municipality?
Commercialization link	What are the actors that cooperate to develop the commercialization arenas for the raw materials and the processed product?

Networks were also built to explain cooperative relationships in terms of conservation and sustainability actions. It is important to keep in mind that questions about cooperation have to do with current and developing processes, not about possible and desired futures. The guiding questions were the following:

Criteria	Question
Sustainability in the food chain	What are the actors that cooperate directly to promote the sustainability of the municipality's food chain?
Conservation actions	What are the actors that cooperate directly to promote conservation actions in the municipality?
Attention to climatic events	What are the actors that cooperate directly to address climate impacts in the municipality?

To apply the methodology, three workshops with the same structure were held. One aimed at cocoa farmers and another at livestock farmers in the case of Montañita, while in Belén de los Andaquíes only one meeting was held with cocoa farmers. Each workshop lasted one and a half days and took place during November 2023. The network exercise was complemented with semi-structured interviews with key actors from the economic sectors (cacao and livestock), where we asked about factors that influence the value chains, actors that hinder actions in each link, threats and impacts perceived by the actors on the value chains, actors that develop actions to respond to these threats and possible proposals to improve value chains.



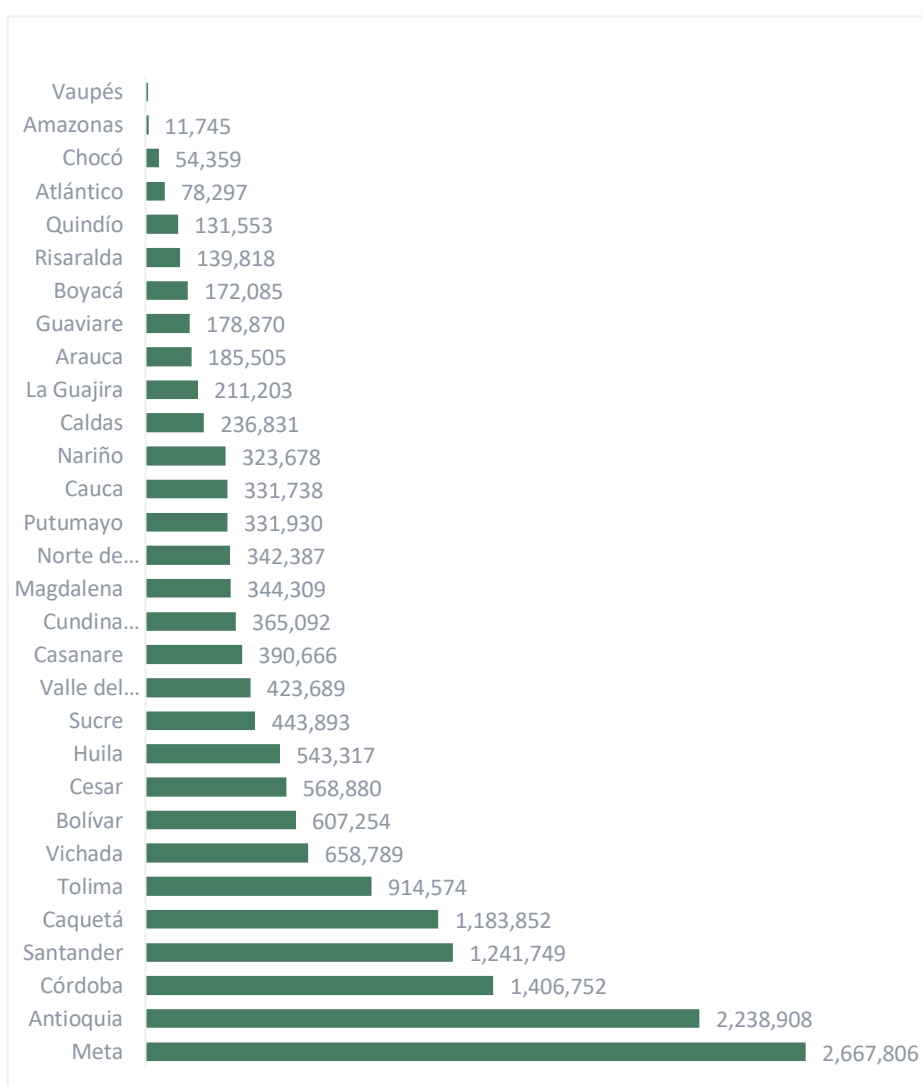
Picture 2. Network mapping workshop. By: Roger Ayazo. Belén de los Andaquíes, Caquetá, Colombia. November 2023

Cocoa

General context of cocoa production in the department of Caquetá.

In the last 20 years, cocoa production in Colombia has become an alternative for socioeconomic development for different regions of the country that have found in cocoa cropping an opportunity to improve the quality of life of rural families, reduce deforestation and promote strategies to replace crops for illicit use and consolidate peace scenarios. In Colombia, the crop has shown a growing trend in the last 10 years with a production of 56,877 tons and a planted area of 190,482 hectares in 2020. The identification of production potential in Colombia emerges from studies carried out in 2013 by the Agricultural Planning Unit (UPRA)¹ that suggest that the country has approximately 114,074,970 hectares with production potential. Of this area, 43% is classified as high suitability, 38% as medium suitability and 19% as low suitability. The department of Meta is positioned as the region with the largest number of hectares suitable for this crop, reaching 2,667,806 ha, followed by Antioquia, Córdoba, and Santander. In last position is the department of Amazonas with 11,745 hectares suitable for production (Figure 1).

Figure 1. Hectares suitable for cocoa cultivation by department.



Source: Authors elaboration based on data from UPRA (2013)

¹ The table of acronyms is found in Annex 1.

In the Amazon region, Caquetá is the department with the largest number of hectares of production in its jurisdiction, reaching 9,010,823 (Table 1). The hectares with high suitability for cocoa cultivation are concentrated in the northwest of the department, mainly in two municipalities: San Vicente del Caguán (52%) and Florencia (11%). Our study municipalities, Belén de los Andaquíes and La Montañita, have medium aptitude.

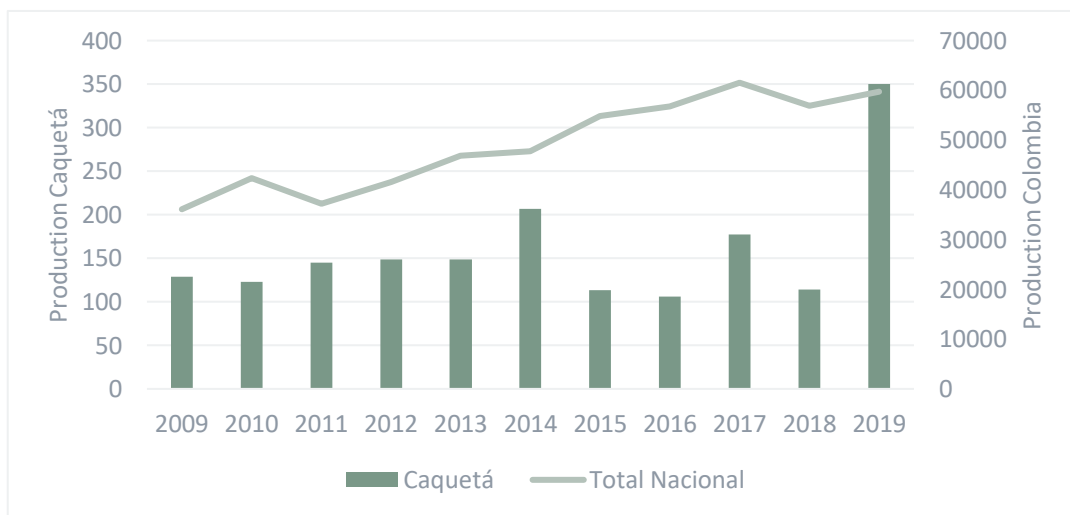
Table 1. Hectares in Caquetá department according to suitability

Department	High [ha]	Medium [ha]	Low [ha]	Total suitability [ha]	Department area [ha]
Caquetá	497,234	684,823	1,795	1,183,852	9,010,823

Source: Authors elaboration based on data from UPRA (2018)

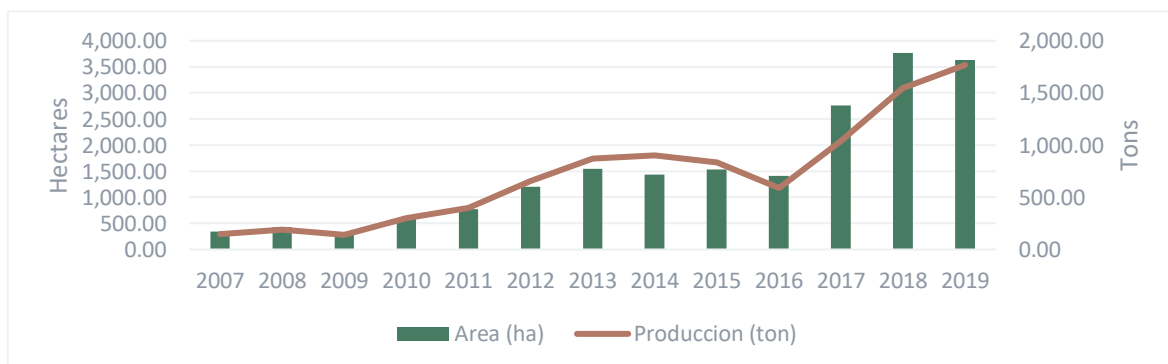
The density of plantations in the department is around 700 to 1000 trees per hectare. In the case of farms dedicated exclusively to cocoa production, an annual yield close to 1500 kg/ha has been identified, however, there are farms where yield does not exceed 400 kg/ha. Cocoa production in Caquetá peaked in 2019, reaching 1,767 tons. This represented an increase of 221 tons compared to the previous year and recovering from the deterioration in production suffered in 2015 and 2016 (Figure 2). The rise in production is proportional to the planting area, which since 2016 has increased by 400 ha (Figure 3).

Figure 2. Cocoa annual production in the department of Caquetá 2009 - 2019.



Source: Authors' elaboration with data from UPRA (2021)

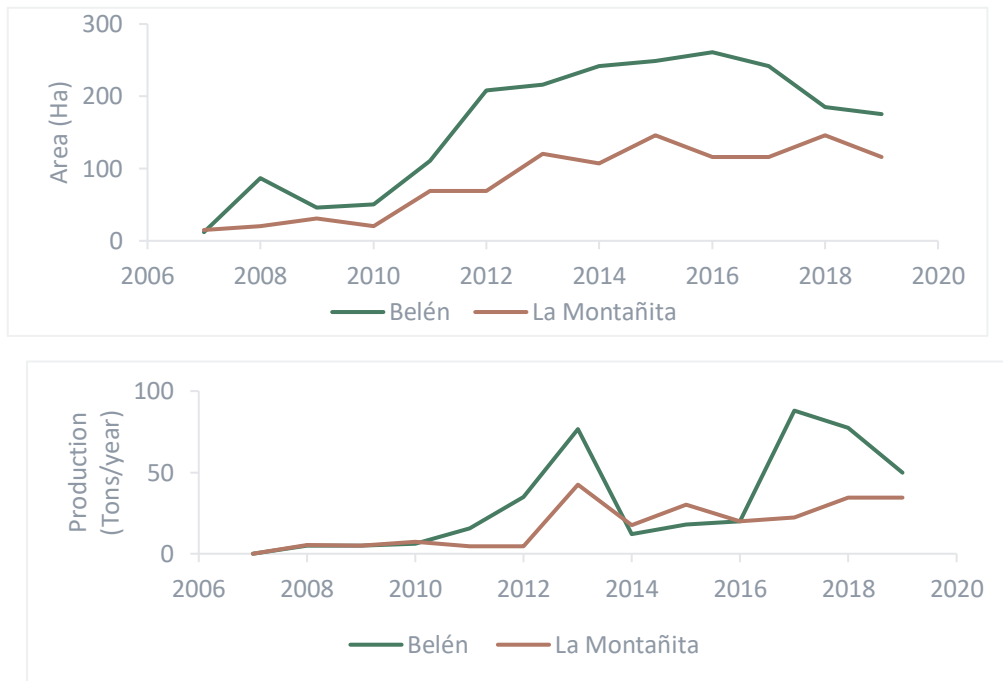
Figure 3. Production and area of cocoa in the department of Caquetá 2007-2019.



Source: Authors' elaboration with data from UPRA (2021)

At the municipal level, Solano tops the list with the highest number of hectares planted, reaching 626 hectares in 2019. The municipalities of San José del Fragua (589 ha), Doncello (537 ha), Milan (532 ha) and San Vicente del Caguán (494 ha) are the ones that follow in this category. El Doncello has a stable production behavior, becoming the third municipality with the most hectares planted with cocoa in 2019, while San José del Fragua was positioned as the main municipality with hectares planted with cocoa in 2016. Belén de los Andaquíes presented an increase in the planted area in 2018 and La Montañita in 2013. Regarding annual production in tons, Belén de los Andaquíes shows an increase in 2012 and 2018 of more than 70 tons while La Montañita increased its production in 2013 and 2015 up to 40 tons (Figure 4).

Figure 4. Hectares planted and cocoa production in the municipalities of Belén de los Andaquíes and Montañita



Source: Authors' elaboration with data from FEDECACAO (2020)

The increase in the area planted with cocoa in the department since 2016 coincides with the signing of the Peace Agreements and the Global Coalition for Food and Land Use (FOLU). In this agreement, Colombia commits to working on a regenerative economy that contributes to peace and sustainable development, creating the "Cacao, Forests and Peace" initiative, which places cocoa as the main strategy for replacing crops for illicit use and reducing deforestation.

Cocoa production has been promoted in regions with a history of armed conflict and development of illicit economies such as the Amazon within a structure composed of various public and private actors to implement this commitment, among which are: the Ministry of the Environment and Sustainable Development (MADS), the Ministry of Agriculture and Rural Development (MADR), the National Federation of Cocoa Producers (FEDECACAO), Casa Luker and the World Resources Institute (WRI). Other actors that adhere to the strategy are Alisos Foundation, Rainforest Alliance, Climate Focus, World Wildlife Fund (WWF), the International Center for Tropical Agriculture (CIAT), the National Chocolate Company, Mariana Cocoa, The Nature Conservancy (TNC), Wildlife Conservation Society (WCS), among others.

The initiative facilitates different types of investment in the Amazon region and positions the departments of Caquetá, Putumayo, and Guaviare as those with the greatest potential, beneficiaries of multiple projects with producer organizations, technical assistance, technological and infrastructure improvements, and promotes scientific research on value chains, promotes organic production, and carries out ecosystem conservation and restoration actions.

The diversity of public and private actors that promote cocoa production has been gradual, and at the municipal and departmental level it has generated important changes in the value chain, forming a structure of actors that support the mission of producing under agroforestry systems, reducing deforestation, strengthen producer organizations and promote the export of cocoa beans to the international market. Within this scheme, cocoa producers from the municipalities of Belén de los Andaquíes and La Montañita have been beneficiaries of different projects and have consolidated different alliances that to date have allowed them to maintain production, each with its own particularities. Furthermore, producers' organizations in Belén de Los Andaquíes and Montañita report a production boom since 2018, the year in which the actions proposed by FOLU materialized, information that is consistent with the years of greatest production and planted area in those municipalities.

Currently, the value chain in the department is driven by different actors at three different levels:

- First level: producer associations and committees at the municipal level.
- Second level: producer associations at the departmental level.
- Third level: departmental committee.

In this pyramid, associations and committees at the municipal level are in charge of the production and commercialization of cocoa beans; departmental level associations represent first level producers at different scenarios; and the departmental committees are the political platform for making departmental production visible at the national level. In the case of this study, Belén de los Andaquíes has the Association of Alternative Agroforestry Producers of Belén de los Andaquíes (ASPROABELEN) and Montañita has the Committee of Cacao Growers in Agroforestry Systems of the Municipality of La Montañita (COMUCAM). These associations establish relationships with different actors at the municipal level and in some cases with the Departmental Association of Cocoa Growers and Timber Species of Caquetá (ACAMAFRUT).

Social networks in the cocoa agri-food system in the municipalities of Belén de los Andaquíes and La Montañita

The actors that drive the cocoa agri-food system are diverse and their role is associated with the productive and organizational needs and particularities of each municipality. However, when grouping the actors by link, the same typology is found in both cases. Institutional support depends on the performance of local producers' organizations that manage alliances and opportunities to promote local production. However, the relationships of the actors who implement interventions in each case study are different, the levels of cooperation vary and the capital that the actors deliver corresponds to the needs of the local contexts.

Results are presented through graphs of actor networks for each municipality and tables describing the actors involved in each link, with their corresponding role and the capital they deliver to enhance the link at each municipality. In the case of networks, each graph is organized in two boards: board A shows the centrality, density and modularity metrics for each network by municipality, while board B presents the capitals that flow between actors in the network.

Production link

This link comprises three types of actors:

1. **Input suppliers** that provide raw materials for crop development and beans transformation processes (Table 2). Suppliers can be classified into two groups: suppliers of plant material (nurseries) and fertilizers and organic inputs; and suppliers of tools and technologies for cropping.

Table 2. Input suppliers in the municipalities of Belén de los Andaquíes and La Montañita, Caquetá

Actor	Role	Capital Belén de los Andaquíes	Capital La Montañita
Nurseries	Centers for the reproduction and sale of plant material.		Plant material (seeds and plants)
Iglesia del Sur	Financing the purchase of organic inputs and tools for sustainable production.	Inputs	
AGROSOLIDARIA	Supplier of organic inputs and training to small producers.	Inputs	Knowledge

Source: Authors' elaboration based on the network mapping workshops, November 2023.

- Cocoa producers** who are in charge of crop management, commercialization and processing (Table 3). In the study areas, they are producers with cultivation areas of no more than 3 ha, dedicated to production under agroforestry systems, with properties where cocoa production is the second economic line after livestock, and with organic production and low use of agrochemicals. These types of actors include producers' organizations that bring together small producers (i.e., committees and associations).

Table 3. Producers and producers' associations in Belén de los Andaquíes and Montañita.

Actor	Rol	Capital Belén de los Andaquíes	Capital Montañita
Producers	Cocoa production under agroforestry systems (AFS).	Raw material	Raw material
ASPROABELEN	Association of the municipality of Belén de los Andaquíes that is responsible for the collection, commercialization, and export of organic cocoa.	Raw material, knowledge, and labor	
COMUCAM	Committee of the municipality of La Montañita in charge of the purchase, collection, and sale of dry cocoa.		Raw material
COPROPENEYA	Committee of the Peneya Union in charge of the purchase, collection, and sale of dry cocoa.		Raw material
COMCAP	Association of the municipality of Doncello in charge of the collection, purchase, and sale of cocoa at a national and international level.		Money

Source: Authors' elaboration based on the network mapping workshops, November 2023.

- Governmental and non-governmental development agencies** that promote production, invest in productive projects and accompany local producers and organizations with technical assistance, plant material, marketing support, improvement of collection centers and development of conservation actions of forests (Table 4). These are international, national and regional entities.

Table 4. Governmental and non-governmental agencies that promote the cocoa chain in the municipalities of Belén de los Andaquíes and Montañita.

Actor	Rol	Capital Belén de los Andaquíes	Capital La Montañita
WWF	Financing of technical assistance on issues related to sustainable production and reduction of deforestation.	Knowledge	
GIZ	Financing fees to technicians in local organizations to provide technical assistance.	Knowledge	
MADR	Support sustainable production and financing inputs purchasing, machinery and productive infrastructure	Money	
Gobernación del Caquetá	Financing of technical assistance and training spaces in harvest and post-harvest management.	Technical assistance	Technical assistance
Local governments	Financing to first-level organizations to provide technical assistance to small producers.	Technical assistance	Technical assistance
WCS	Management and financing of training spaces in sustainable production, creation of conservation agreements at the farm level and development of biodiversity studies on cocoa farms.	Knowledge	
Rainforest Alliance	Accompaniment to organic certification processes.	Certification	
CIAT	Provide technical assistance and productive infrastructure to the most committed producers of local associations.	Productive infrastructure	
BioLatina	Accompaniment to organic certification processes.	Certification	
Fundación Natura	Financing of inputs and plant material to small producers.	Inputs	
Red cacaotera	Provide technical assistance and training spaces to producers in organic production and the acquisition of certifications.	Technical assistance	Rules
REDADELCO	Support for sustainable production processes.		Knowledge
Fundación Carlota	Accompaniment to the improvement of productive activities and search for commercial spaces.		Knowledge
FEDECACAO	Provide technical assistance to small producers.	Technical assistance	

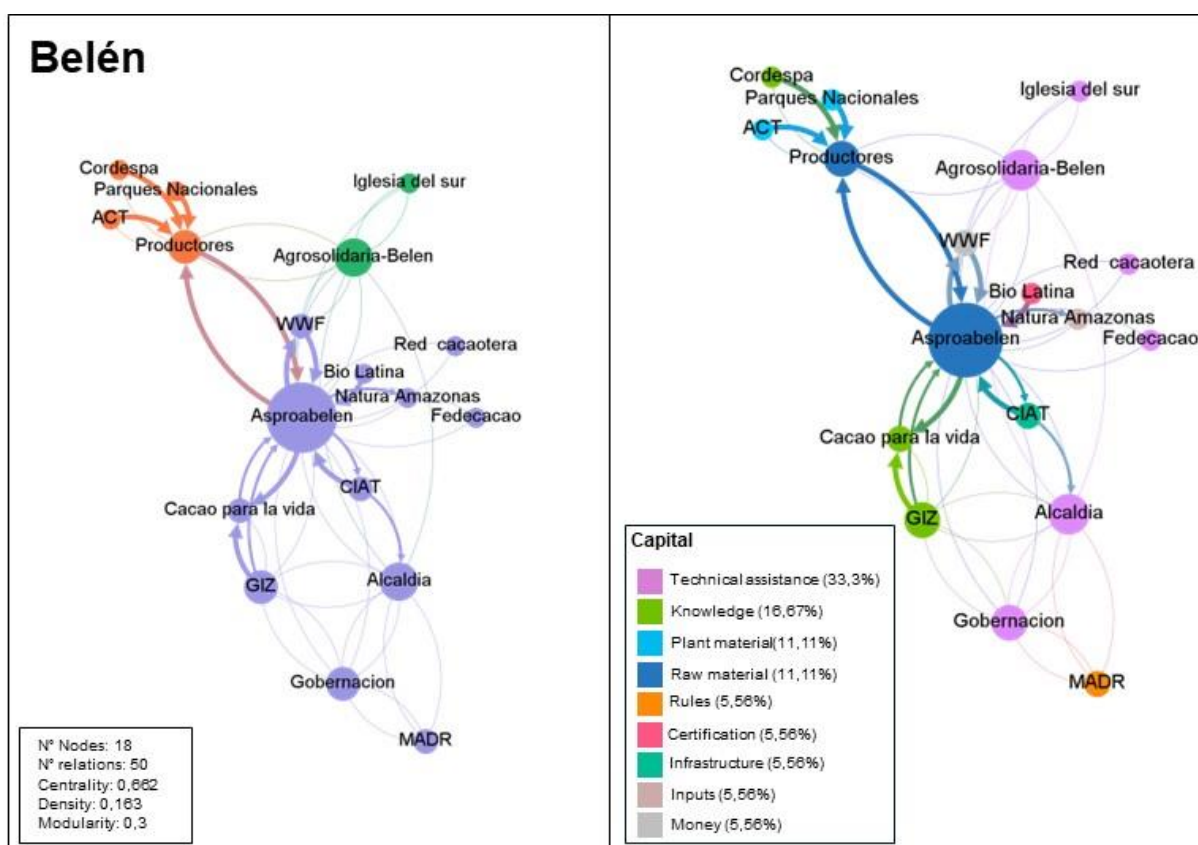
Source: Authors' elaboration based on the network mapping workshops, November 2023.

The structure of relationships between the actors that participate in the productive link can be explained through the levels of cooperation established by groups of actors and by the capital flows that they deliver to the central actors of the network. As can be seen in Figures 5 and 6, although the number of actors participating in the production in La Montañita (14) and Belén de los Andaquíes (18) are different, there are three common elements.

First, the modularity measure allowed us to identify three groups of actors that cooperate based on the role they assume in the link. The groups of actors marked in purple are governmental and non-governmental promotion

actors at the national and international order whose function is to support organizations in improving production and strengthening organizational structures through training, financing for technical assistance and delivery of inputs for the improvement of productive infrastructure. In the case of Belén de los Andaqués, this group of actors is more diverse than in La Montañita and this is due to the long-term role of ASPROABELEN, which has allowed it to create more alliances compared to COMUCAM (Committee of cocoa growers in agroforestry systems of La Montañita). The group of actors marked in orange are also part of the promotion typology, but on a regional scale. These actors more decisively support the technical training associated with production and post-harvest management. Cooperation in this group is established only between actors at the same level and no strong cooperative relationships are identified with development actors on a national and international scale. This finding is interesting because although producers receive benefits from different development agencies, those agencies do not cooperate with each other, if they do not come from the same scale of intervention. Finally, the group of green actors are input suppliers (plant material and machinery). In this case, the cooperation between them and other types of actors is not strong, and their relationship is direct with the producer organizations.

Figure 5. Cooperation networks between actors in the productive link at Belén de los Andaqués



Source: Authors' elaboration based on the network mapping workshops, November 2023.

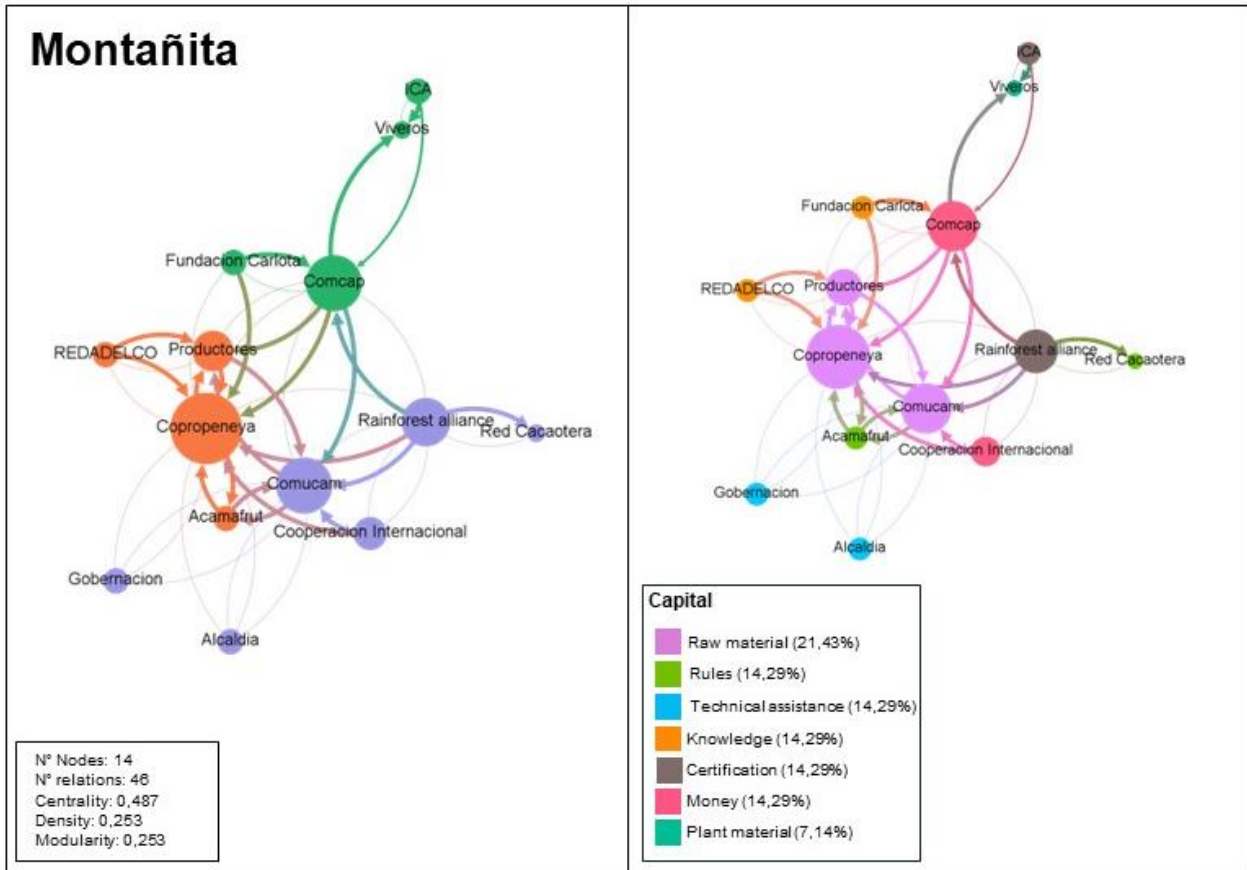
Second, in both municipalities, cooperative relations are driven by producer organizations that appear as central actors. And third, regarding capital flows, technical assistance and knowledge translated into technical training are those with higher flows among actors, while inputs and money are those with lower flows. It is important to mention that in the case of money, it flows only when development entities deliver economic resources to organizations directly so that they can carry out crop improvement actions and hire technical assistants.

Cooperation is thus established only between actors of each type. This allows us to affirm that the type of social capital that predominates in the productive link is "Bonding", that is, relationships between actors with common characteristics and belonging to the same level of power. In this structure, producers and associative groups are the main beneficiaries, but they have no influence on the role assumed by both development groups.

Regarding the differences between the municipalities, Belén de los Andaqués shows a more diverse structure of actors than La Montañita. However, the density metric allows us to affirm that in La Montañita (0.253), although there are fewer actors, the cooperative relationships between them are stronger, especially between the actors

that make up the typology of producers and organizations. This is because COMUCAM and COPROPENEYA establish working relationships with COMCAP (Committee of Doncello producers) from which they take advantage of their productive and commercial experience. It is important to mention that COMCAP supports the organizations of La Montañita in improving organic production and in some cases sells them plant material. In the case of Belén de los Andaquíes, the density measure (0.163) exposes more vertical relationships and less cooperation among the total number of actors. This may be due to the fact that in Belén de los Andaquíes there is only one producer organization that centralizes the demand of development actors (ASPROABELÉN).

Figure 6. Cooperation networks between actors in the productive link at Montañita



Source: Authors' elaboration based on the network mapping workshops, November 2023.

There is a difference in the flow of capital across the networks as in La Montañita, contributions from associated actors predominate in the delivery of raw materials (cocoa), while in Belén de los Andaquíes technical assistance. This confirms the needs expressed by producers in each municipality. In Belén de los Andaquíes, they require building alliances to mobilize funds for organizational revolving funds, as well as inputs and machinery. In Montañita, plant material and money are needed to enable organizations to purchase beans. Another important difference in flows is associated with "certification", which predominates in the case of Belén de los Andaquíes and is related to actors who support the local organization in maintaining organic certification.

Processing link

This link comprises two types of actors:

1. **Producers and organizations** that are trained in cocoa transformation processes (Table 5). The transformation is aimed at the production of table chocolate and chocolate bars.

Table 5. Producers and associations that do cocoa processing in Belén de los Andaquíes and La Montañita.

Actor	Rol	Capital Belén de los Andaquíes	Capital La Montañita
ASPROABELEN	Local association in charge of carrying out feasibility analysis of the processing of cocoa beans.	Knowledge	
Producers	In charge of the processing of cocoa beans on the farm for self-consumption and sporadic sale in local markets.	Knowledge	Knowledge
COPROPENEYA	Promoter of cocoa bean processing strategies.		Raw material
COMCAP	Local association that promotes cocoa production and ventures into cocoa processing to produce table chocolate.		Knowledge

Source: Authors' elaboration based on the network mapping workshops, November 2023.

2. **Local processing promotion entities** (Table 6) that provide knowledge to transform and carry out cocoa organoleptic profiles to evaluate the potential of the bean in the production of chocolates. Actors that encourage beans production and add value with local brands were also identified.

Table 6. Local promotion entities for cocoa processing in Belén de los Andaquíes and La Montañita

Actor	Rol	Capital Belén de los Andaquíes	Capital La Montañita
CIAT	Funding training in value addition and chocolate production.	Knowledge	
Fundación Carlota	Preparation of organoleptic studies and supporting the improvement of productive activities aimed at processing.	Training	
Farmers' markets	Platform to promote the sale of processed products.	Input	
Cooperación internacional	Funding studies to add value to the cocoa bean and strategies for transformation.		Money
AGROSOLIDARIA	Supporting the development of training spaces for beans processing.		Knowledge
ChocoAmazonic	Cocoa processing plant in the municipality of Paujil.		Money
Aliados Bogotá		Money	Money

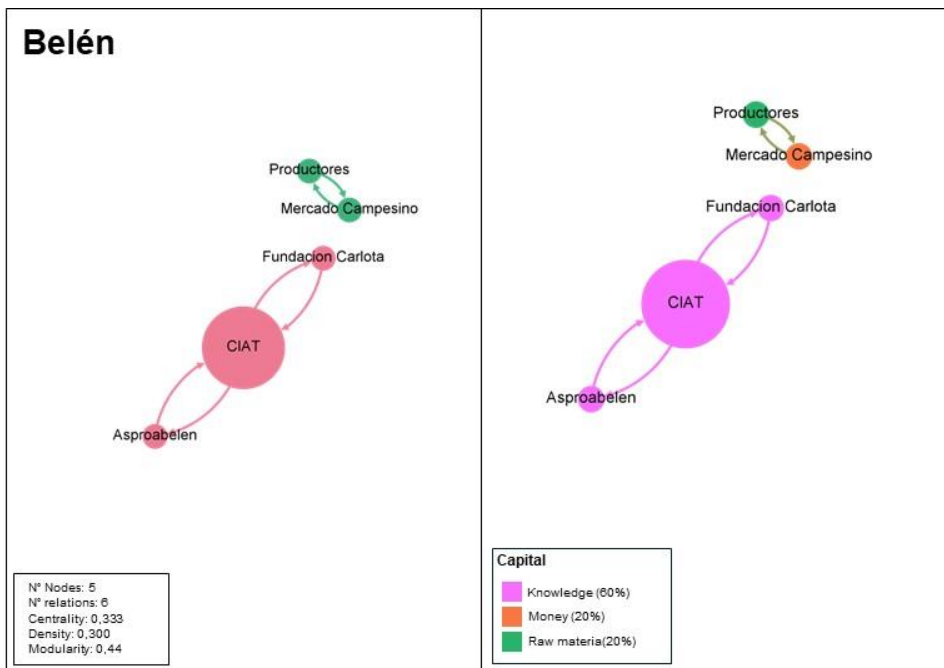
Source: Authors' elaboration based on the network mapping workshops, November 2023.

Cocoa beans processing to get table chocolate and chocolate bars is incipient in both municipalities. In general, the work among the organizational level to undertake and promote other cocoa commercial lines is weak and the cooperative relationships that exist in this sense only revolve around small exercises to study transformation possibilities among producers interested in the process. As Figures 7 and 8 show, cooperative relationships

among actors to encourage processing activity are few, so the density of the networks is very low in Belén de los Andaquíes (0.3) and La Montañita (0.194). As the organizations' main vocation is the purchase, collection and sale of dry beans, transformation is not a line considered as important, and the lack of knowledge and technology to transform beans at the family level prevents the development of this activity.

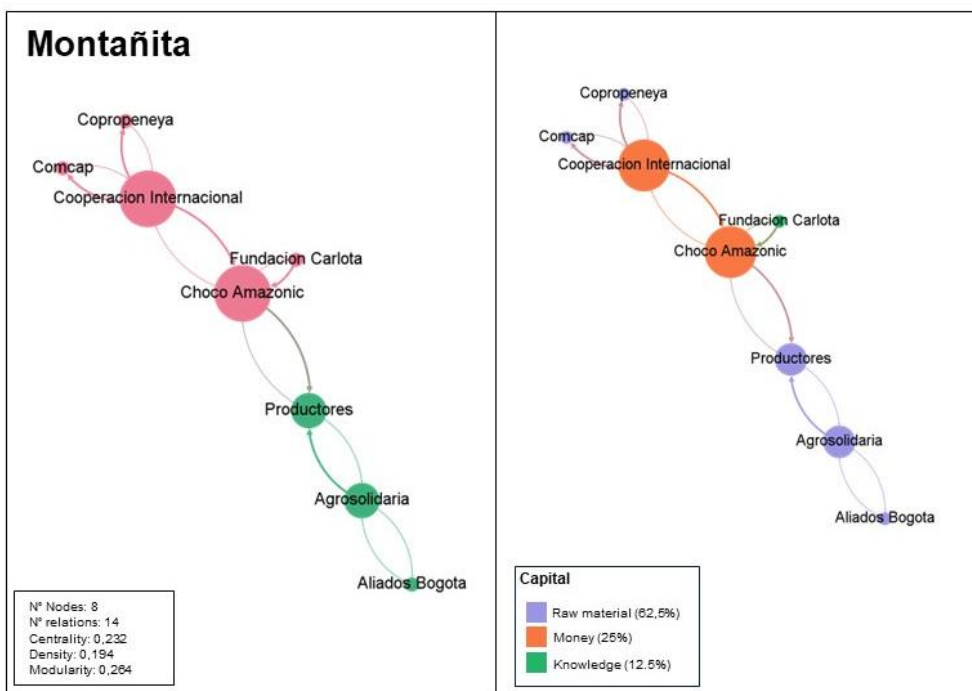
Despite cocoa beans processing is not mainly in the realm of producers and organizations, it is important to highlight that local ventures that seek to enter in this market have become buyers of beans from grassroots organizations, being the most representative example Choco Amazonic from the municipality of El Doncello, but with presence in La Montañita, a company that buys cocoa from COPROPENEYA to produce chocolate bars.

Figure 7. Cooperation networks between actors in the processing link Belén de los Andaquíes



Source: Authors' elaboration based on the network mapping workshops, November 2023.

Figure 8. Cooperation networks between actors in the processing link La Montañita



Source: Authors' elaboration based on the network mapping workshops, November 2023.

The limitations in the processing activity translate into weak cooperation networks in both municipalities. Cooperation among actors is established vertically among groups that offer knowledge to associations to undertake cocoa beans processing. Unlike the productive link where strong relationships were identified between groups of actors who share interests, actors here interact directly with associative groups in a vertical knowledge transfer model. This primarily involves training on selecting optimal beans, drying techniques, and chocolate production. In this case, the social capital of the link is characterized by “Linking” type relationships, i.e., relationships between different power groups of a vertical type where actors who receive information predominate and have little impact on actors with greater power.

The main difference between the networks at the municipal level is that in Belén de los Andaquíes the diversity of actors promoting the transformation is lower than in La Montañita. This is because ASPROABELEN has concentrated its efforts on entering the international market for organic beans while in La Montañita, given that the organizations concentrate the sale of dry beans to COMCAP and Nacional de Chocolates, it appears to be greater interest among producers in entering a market that represents greater value addition. However, this exercise is limited and weak.

Commercialization link

This link comprises three types of actors:

1. **Producers’ organizations** that are in charge of collecting dry beans for sale in the local, national and international market (Table 7).

Table 7. Producers’ organizations that do cocoa commercialization Belén de los Andaquíes and La Montañita.

Actor	Rol	Capital Belén de los Andaquíes	Capital La Montañita
ASPROABELEN	Manage commercialization spaces at a national and international level.	Money	
COPROPENEYA	Promote the addition of value to the cocoa bean and the sale transformed products		Raw material
COMCAP	Dry beans buyer and marketer at a national and international level.		Money

Source: Authors’ elaboration based on the network mapping workshops, November 2023.

2. **Buyers of dry grain at the local, national, and international level** (Table 8). In most cases the buyer carries out transformation activities and in others they are intermediaries who market the dry grain and then sell it to processors at a national and international level.
3. **Governmental and non-governmental entities** that promote commercialization and commercial alliances at the national and international level (Table 9).

The structure of relationships in commercial networks shows significant differences in each of the municipalities studied (see Figures 9 and 10). One of the differences has to do with the number of actors that support the commercial activity in each case. In Belén de los Andaquíes, for example, 21 actors were identified, among which there are governmental and non-governmental development entities and important commercial allies at the national and international level. The main national buyers are Nacional de Chocolates and Casa Luker, which buy traditional cocoa beans from productive units that do not yet have organic certification, while Martius is a client that buys export-type organic cocoa only in the case of Belén de los Andaquíes. Since Belén de los Andaquíes ventures into the international market, a greater number of cooperation agencies were identified that accompany the training process on issues of organic production, post-harvest management and improvement of the collection

process, such as: WWF, PROCAT, the Cocoa Network and Rainforest Alliance. These actors are not present in La Montañita, where conventional buyers are predominant: Casa Luker and Nacional de Chocolates, in addition to local buyers and intermediaries from the region who attend local fairs and markets to buy the product.

Table 8. Dry grain buyers in Belén de los Andaquíes and La Montañita.

Actor	Rol	Capital Belén de los Andaquíes	Capital La Montañita
Compañía Nacional de Chocolates	Dry cocoa buyers.	Money	Money
Casa Luker	Dry cocoa buyers.	Money	Money
Red Cacaotera de Colombia	Commercial showcase for best quality cocoa beans in the region.	Knowledge	
Farmers' markets	Commercial spaces organized locally to encourage the sale of dry cocoa beans and its byproducts.	Knowledge	Money
Martius	Intermediary in charge of the export of organic dry grain.	Money	
AGROSOLIDARIA	Manager of places for dry beans commercialization and processing.	Knowledge	Money
Almacén Primo	Supermarket. Regional dry beans buyers.		Money
Intermediarios	Dry grain buyers who distribute to processing companies nationwide.		Money
Almacén Mío	Supermarket. Regional dry beans buyers.		Money
COMCAP	Buyer, collector and marketer of organic and non-organic dry grains.		
La 14	Supermarket. Regional dry beans buyers.		Money

Source: Authors' elaboration based on the network mapping workshops, November 2023.

Another difference in the structure of the networks is that the relationships between actors mobilize very different capitals in both cases. In Belén de los Andaquíes, for example, a heterogeneity of capital is identified, predominantly money as a result of commercial exchange as well as the knowledge offered by development entities, while in La Montañita the only flows are of money and raw materials. In the case of La Montañita, it is important to highlight that the most central actor in marketing is COMCAP and thanks to them the production and commercialization of grain develops constantly, since the direct sale of grain from the associations to Nacional de Chocolates and Casa Luker is rather uncommon.

Given this result, the centrality metric of the two networks draws attention, especially because in Belén de los Andaquíes (0.716) the most important actor in the commercial process is the ASPROABELEN a local organization in charge of the collection, selection and export process with the allies. In La Montañita (0.564), on the other hand, the central actor is not associated with the organization of local producers but with COMCAP, which is a grassroots organization of producers that has its origin in the municipalities of El Docello and Paujil, and that directly buys dry beans from producers at La Montañita. This finding highlights the need to strengthen the commercial activities of municipal organizations. Producer loyalty depends on it, as they can easily switch to organizations with greater experience and collection capacity, like COMCAP.

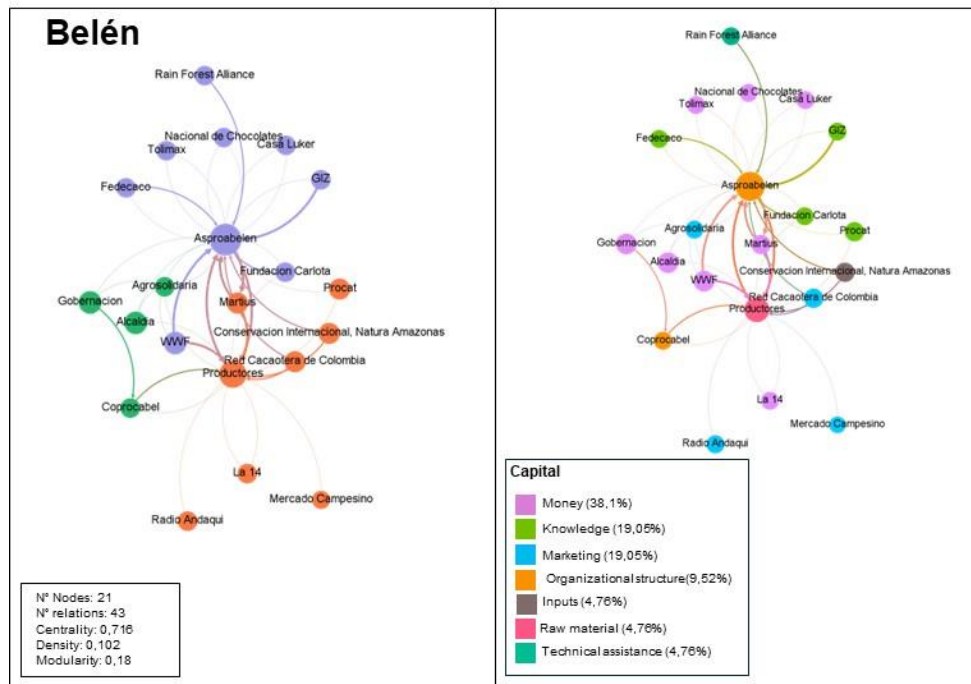
On the other hand, two common elements of the networks were identified. First, the relationships of the actors behave as in the productive link, that is, cooperative relationships are only established between actors who share the same role, but those who have differences in role and scale of intervention hardly cooperate. The only actors who do not establish cooperative relationships with actors in the same role are buyers, who only relate to the producer organization. Second, the characteristics of these networks allow us to affirm that the type of social capital that predominates is "Linking" since a verticality is established between different groups, in this case, buyers and associations, in which there is a clear relationship of dependency.

Table 9. Entities that contribute to the commercialization of cocoa Belén de los Andaquíes and La Montañita.

Actor	Rol	Capital Belén de los Andaquíes	Capital La Montañita
WWF	Funder of exchange spaces and commercial alliances at the national and commercial level.	Money	
GIZ	Funder and promoter of organic certifications.	Knowledge	
COPROCABEL	Commercial ally for the purchase of dry cocoa.	Knowledge	
Conservación Internacional	Financing the implementation of cocoa crops through the delivery of inputs and productive infrastructure.	Inputs	
Local governments	Promote local marketing spaces through the development of peasant markets.	Money	
PROCAT	Funding of training spaces in financial and commercial management.	Knowledge	
Rainforest Alliance	Promote commercial alliances and technologies for the traceability of cocoa and its byproducts.	Knowledge	
Red Cacaotera de Colombia	Promote local and regional marketing spaces.	Money	
REDADELCO	Finance market tours nationwide.	Money	
Fundación Carlota	Promote marketing and value-adding strategies at the local level.	Knowledge	

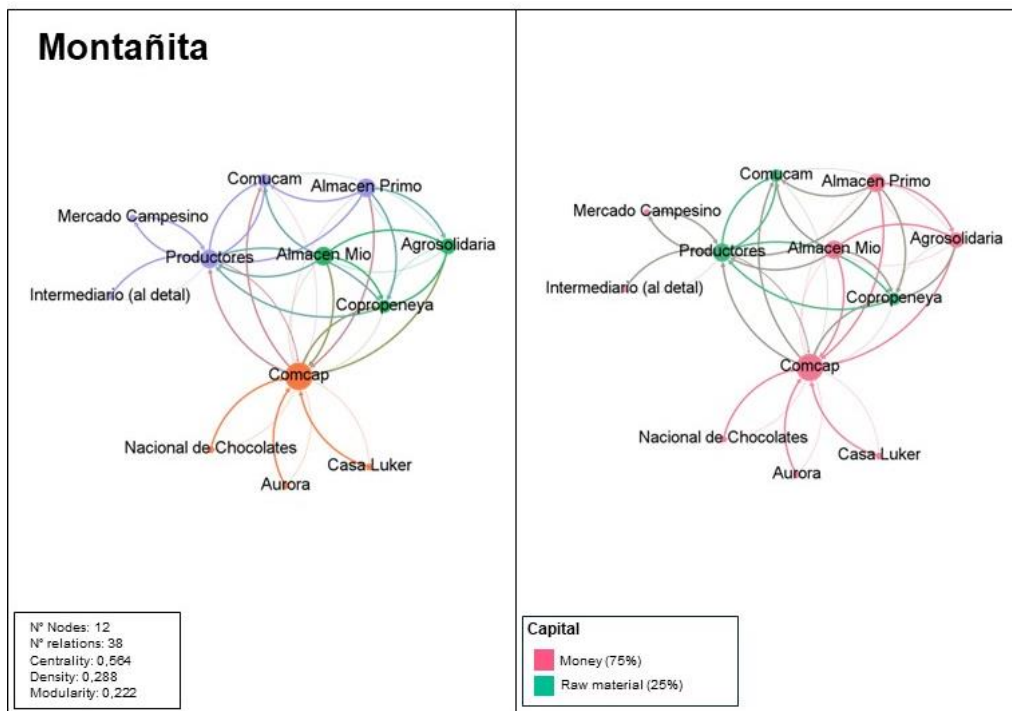
Source: Authors' elaboration based on the network mapping workshops, November 2023.

Figure 9. Cooperation networks between actors in the commercialization link Belén de los Andaquíes



Source: Authors' elaboration based on the network mapping workshops, November 2023.

Figure 10. Cooperation networks between actors in the commercialization link La Montañita



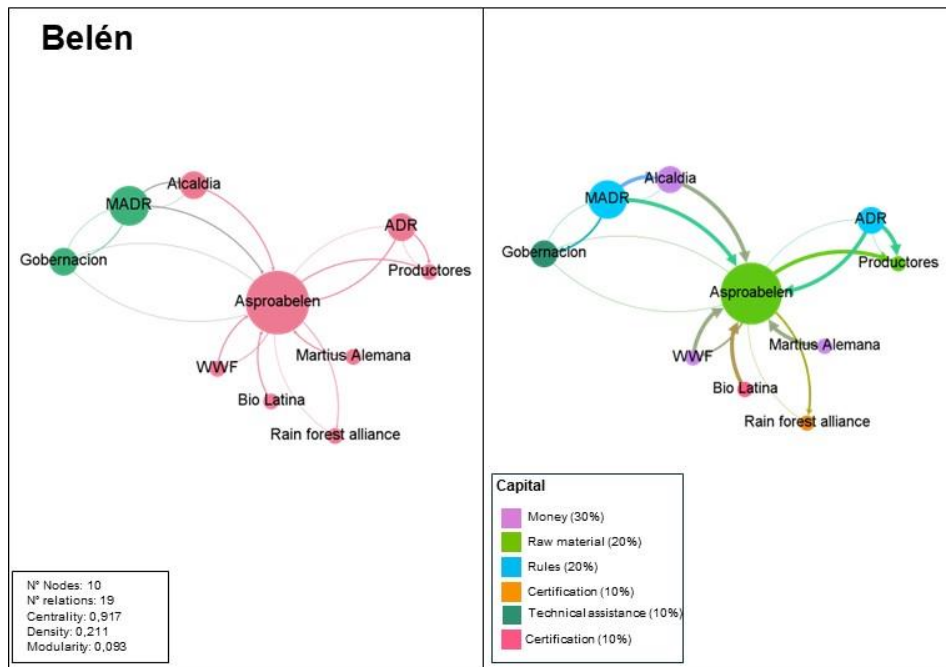
Source: Authors' elaboration based on the network mapping workshops, November 2023

Actors who contribute to the sustainability of the cocoa production chain

The structure of actor relationships that contribute to the sustainability of the chain differs between municipalities. These actors are the same producer organizations and other national and international development entities that, through subsidies, support the organizations at an economic level and allow them to hire personnel to provide

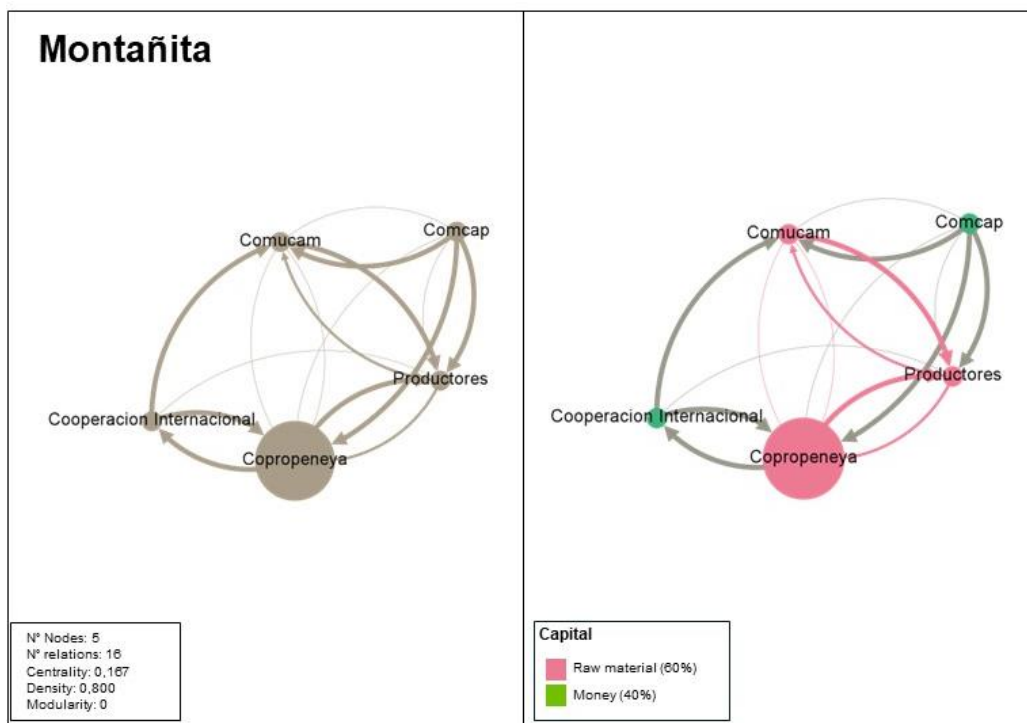
more frequent technical assistance and train associates in productive issues. As can be seen in Figures 11 and 12, there is a greater presence of actors in the case of Belén de los Andaquíes than in the case of La Montañita.

Figure 11. Cooperation networks between actors that contribute to the sustainability in Belén de los Andaquíes



Source: Authors' elaboration based on the network mapping workshops, November 2023

Figure 12. Cooperation networks between actors that contribute to the sustainability in La Montañita



Source: Authors' elaboration based on the network mapping workshops, November 2023

In Belén de los Andaquíes, development actors such as WWF, Rainforest Alliance and other commercial allies such as BioLatina and Martius support the commercialization and exporting processes. Sustainability is translated into the permanent support of the organizations and the commercial drive carried out by the four institutions in the commercialization process, which is key to productive growth. In the case of La Montañita, the actor that

contributes the most to the maintenance of the chain is the COMCAP, however, its contribution is limited to the purchase of dry grain, a situation that draws attention, given that the development of the chains of value depends not only on commercial alliances but on other types of investments at a technological level, technical assistance and training, aspects that are not leveraged by any actor.

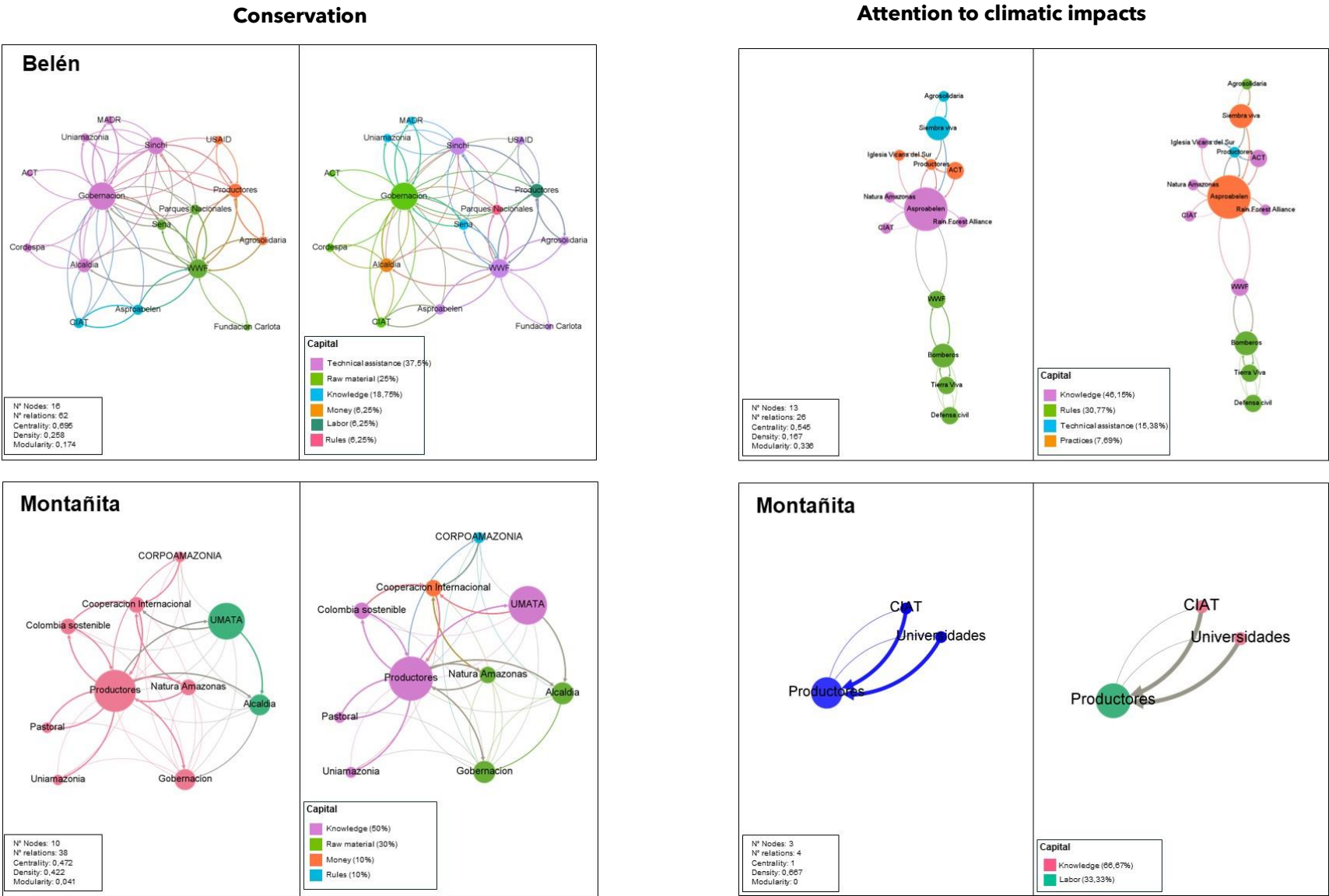
Finally, in terms of the social capital that predominates in this network, there is a prevalence of "Linking" type since a verticality is established between different groups, in this case, development entities and local organizations, in which there is clear relationships of dependency.

Actors who contribute to the conservation of ecosystems and respond to climate events.

In the context of conservation and attention to climate change, a diversity of actors and relationships with local organizations are identified which demonstrates the importance of cocoa as a value chain with the potential to reduce deforestation and address the impacts of climate change. In this case, the networks of actors that address conservation processes are larger than those that directly address responses to climate phenomena. In this regard is it worth noting that representatives of producers' organizations mention to have worked with entities that speak of conservation as an essential action to mitigate the effects of climate change, but there are no clear measures or indicators to measure the contribution of the restoration of ecosystems, conservation agreements and the promotion of sustainable production to reduce the impacts of climate change.

As Figure 13 shows, the networks of actors that promote conservation are diverse in each municipality. In these networks appear actors who have already been mentioned previously in the productive and commercial link, and their roles and capitals do not change significantly since everyone's function is aimed at promoting production, supervising that it is sustainable, stops deforestation and conserve biodiversity. In the case of Belén de los Andaquíes, 16 actors were identified and in La Montañita, 10 actors.

Figure 13. Cooperation networks between actors that contribute to conservation and attention and climate impacts in the cocoa value chain.



Source: Authors' elaboration based on the network mapping workshops, November 2023

In Belén de la Andaquíes, we identified actors such as WWF, USAID, CIAT, ACT Colombia, the Carlota Foundation, SENA, MADR, Cordespa and Parques Nacionales Naturales (PNN), all entities that finance training and technical assistance to producers to improve their productive systems and link them to markets where the conservation of ecosystems and biodiversity add value. In this network of actors, the work of PNN is highlighted, which currently links cocoa farmers to the work of handling and managing the threats due to use, occupation, and tenure into the conservation of the *Alto Fragua Indi-wasi* National Park. This actor is important because it establishes links with organizations such as WWF, Agrosolidaria, Fundación Carlota, Government, mayors and Instituto SINCHI, all entities with different roles and levels of power, but with a common objective.

This draws attention because unlike in production, transformation and marketing networks, the social capital that flows in conservation networks is more horizontal, of “Bridging” type, that is, actors who tend bridges among actors with different roles, but with similar levels of power and that seek to achieve common objectives. In these horizontal relationships, the groups of actors identified that cooperate more frequently are always related to ASPROABELEN as a local organization. However, although cooperative relationships are established between actors, they are only woven among certain types of actors and not among all of them, this explains why the density measure is not high (0.258).

In the case of La Montañita, these “Bridging” relationships are maintained and are more significant than in Belén de los Andaquíes. This can be corroborated with the density measure, which is 0.472, and the low modularity. The above is expressed in a network with fewer types of actors that establish relationships between them (that is, a smaller number of clusters of actors grouped by color) and more links between the total number of actors. In this case, the international cooperation agencies, CORPOAMAZONIA, the government, the mayor's office, the University of Amazonía (Uniamazonía), the producers, and the UMATAS (local technical assistance units) cooperate and establish links between them to define paths of intervention on sustainable production. Now, it is striking that the intervention of the actors in conservation issues in La Montañita is reaching the producers directly without the need for intermediation of producers' organizations that are not identified as central actors in conservation processes. In terms of flows of capitals, knowledge is the most predominant in La Montañita while in Belén de los Andaquíes there is more interest from organizations in providing technical assistance. This flow of capital is very significant in terms of strengthening production since in La Montañita the work of the development agencies is aimed at training producers who do not have an important tradition in cocoa production.

In terms of attention to climate impacts, the networks show notable differences in each municipality: while in Belén de los Andaquíes 13 actors were identified, only 3 were identified at La Montañita. In the case of Belén de los Andaquíes, actors are directly associated with disaster risk management, such as civil defense and firefighters (green nodes), unlike La Montañita where these actors are not recognized, despite the importance they should have given that risks of mass removal during rainy seasons are significant in the municipality. CIAT and WWF are also important actors in Belén de los Andaquíes, which promote restoration actions, and the Rainforest Alliance, which by promoting the organic market seeks to encourage production with low CO₂ emissions. In the case of La Montañita, the only actor identified that addresses climate change issues was CIAT with a role in the generation of local knowledge regarding the issue. CIAT's work in creating a strategy for the sustainability of the cocoa chain in the department is also recognized from a perspective of climate action and peace building.

It is worth mentioning that, although a greater number of actors are identified in Belén de los Andaquíes, it is not clear the direct contribution that they make to addressing the impacts of climate change. Even so, within the framework of the structure of network relationships in each municipality, it was found that the predominant social capital is “Linking”, i.e., vertical relationships of agencies with different levels of power that benefit a local actor (producer associations) which has little capacity to interfere with actors with a higher level of power.

Predominant types of social capital in the cocoa value chain

Cocoa value chain in both municipalities is composed of a Linking type social capital in which local producer organizations establish relationships with regional, national, and international development actors in a vertical manner and focused on the receipt of subsidies translated into different capitals such as knowledge, technical assistance, and money. These alliances are consolidated within the framework of meeting the needs of each association, but do not allow producer organizations to get involved in the planning of interventions nor to transform the type of capital that they are going to deliver. This means that the relationship between development entities and other local actors with producer organizations is unidirectional, that it is difficult to establish

cooperative relationships between actors of the same level of power and that the latter end up assuming a more subordinate role.

Bonding type capital was found in the productive link and in a very diffuse way in the commercial link. It is characterized by relationships that are built among actors who share the same level of power and who distribute their intervention towards actors with a low level of power, such as producer organizations. This capital can be observed in the modularity measures, which are very high and where groups of actors who relate more easily are identified because their level of power is shared even if they deliver different capitals.

Finally, Bridging-type social capital, which theoretically exposes relationships of greater cooperation and more horizontality between actors, was only found in ecosystem conservation networks. In this type of network, it was found that actors with different levels of power and roles establish relationships in terms of leveraging. This is an interesting finding because, apparently, development entities do not always work vertically, but rather establish cooperation links to develop direct interventions and join forces to meet common objectives. This social capital is horizontal, since regardless of the level of power and the role of each actor, they all relate to benefit the ecosystems. Here the explicit and exclusive benefit to producer organizations is less visible and specific benefits to forests, fauna and flora are made visible. Table 10 summarizes the types of capital for each category studied in the characterization of conservation actions.

Table 10. Types of social capital found in the cocoa value chain.

Category	Level	Type of social capital
Value-chain links	Production	Bonding
	Processing	Linking
	Commercialization	Linking
Sustainability	Sustainability of the value chain	Linking
	Conservation	Bridging
	Climatic impacts	Linking

Source: Authors' elaboration based on the network mapping workshops, November 2023

It is important to mention that, although the levels of production and the alliances that producer organizations build with certain actors in each municipality are different, the structure of relationships does not vary significantly and that the typologies of social capital apply in the same way to both cases. In summary, interaction networks of actors are identified that seek to leverage the value chain by establishing ties of dependency in which organizations do not necessarily strengthen their capabilities in the long term, and in which, having little capacity to participate in the decisions made by more powerful actors, they cannot share their experiences to improve interventions. At the same time, development actors hardly relate to other actors at other levels of power at the regional and local level, meaning that interventions are not always aimed at addressing specific needs and end up being duplicated or ending in technical studies carried out several times but by different actors.

Another aspect worth mentioning is that in none of the municipalities did the producer organizations mention a clear and strengthened relationship with the departmental association ACAMAFRUT, nor with the regional committee of cocoa growers. This is important given that it is the committee that represents the political platform that makes visible the needs of the value chain at the national level and who works to generate alliances that benefit small producers in all the municipalities of the department. In the interviews carried out with strategic actors who participate in this political body, it was found that although at the departmental level there is recognition of the opportunities that the committee generates for producers, the direct benefits are not clear. Even so, this is an important platform comprised by different public and private entities that plan actions to strengthen the chain at the departmental level and promote technical studies on the chain such as the [*“Strategy for the sustainability of the cocoa chain in Caquetá: route towards climate action and peacebuilding”*](#) published in 2023.

Livestock

General context of livestock production in the department of Caquetá.

Livestock farming is one of the main productive activities that contribute to the economy in Colombia. According to the latest national agricultural survey, livestock contributes 1.4% of the national GDP and represents 21.8% of the agricultural GDP and 48.7% of the livestock GDP of Colombia (DANE, 2019). Data from 2023 indicate that the livestock herd in Colombia is represented by 29.6 million heads (1.2% higher than in 2022) distributed across 620,807 properties. Although the number of cattle has been increasing, the number of farms has decreased by 2.1% in 2023 compared to 2022. Boyacá occupies first place in the number of livestock farms in the country with 84,676 (13.6%), followed by Cundinamarca and Antioquia with 80,361 (12.9%) and 63,983 (10.3%) properties, respectively. In terms of the extent of land use, livestock farming occupies 39 (78%) of the 50 million hectares registered for Colombia that are under some type of productive exploitation (Contexto Ganadero, 2024). According to the distribution of the livestock herd by department, 69.1% of the cattle are distributed in ten departments, being Antioquia (11.1%), Casanare (7.7%), Meta (7.2%), Córdoba (7.2%), and Caquetá (6.4%) those that concentrate the largest proportion of livestock (DANE, 2019).

In the Amazon region, livestock farming represents a fundamental line in the local economy, with a significant increase in the department of Caquetá. Caquetá has a herd of 2,175,065 heads of cattle (2022 record) of which 88% (1,914,057) are dual-purpose, 9% (195,755) are dedicated to breeding and 3% (65,215) to specialized dairy and fattening. Livestock farming in the department is mainly extensive. Since 2014, the livestock industry has experienced a growth of more than 80% in its herd, going from 1,304,403 heads to 2,379,898 heads in 2019 (Torrijos, 2022). This herd is distributed in 20,267 properties, which occupy approximately 13% of the department's area.

According to the report of the Caquetá Cattle Ranchers Committee (Torrijos, 2022), the municipal distribution of the livestock herd places San Vicente del Caguán in first place with 910,976 heads followed by Cartagena del Chairá with 372,815 and Puerto Rico with 204,908 heads. La Montañita and Belén de los Andaquíes are in fifth and thirteenth place with 83,418 (3.8%) and 33,893 (1.5%) head of cattle respectively. In Caquetá, during the 2017-2021 period, an average of 380,130 heads were sold. Given that 88% of Caquetá's livestock herd is dual-purpose and added 3% dedicated to milk, this department has a good dairy capacity: 1,873,482 liters of milk are obtained daily. Annual milk production has shown an increase in magnitude of 1.13 between 2017 and 2022, going from 600 million liters to 680 million. Fifty one percent (51%) of this milk is collected by the processing industry and 44% by the local cheese factory.

In recent years, the implementation of silvopastoral systems has been encouraged in Caquetá to promote the livestock reconversion of the department. However, the lack of effective policies on the part of the state and the difficulty of producers in the region to be recipients of incentives due to the high risk perceived by financial entities, have not allowed this initiative to advance quickly. The implementation of these livestock systems under silvopastoral arrangements is promoted to encourage productive models that contribute to the national goals of reducing deforestation. An example of this is the technical cooperation project called "Sustainable dairy value chain in Caquetá" administered by the Inter-American Development Bank (IDB) and in which the departmental committee of livestock farmers has made visible the yields and profits generated to the producers who venture into these models. This project makes it visible the department's interest in entering new business models and positioning livestock farming as a line that also contributes to the conservation of ecosystems and biodiversity. However, these efforts are incipient and still require much more leverage not only in investments that promote these systems but in studies and censuses that allow validating the number of producers and organizations that are dedicated to this activity and that are not yet characterized.

At the departmental level, it is known that traditional production systems (extensive livestock's systems) are framed in first-level associative structures in the municipalities and a departmental committee that serves as a political platform to promote conventional and non-conventional livestock development projects. Some actors

committed to improving livestock systems in the region have been the Ministry of Agriculture and Rural Development, which has promoted associative processes in search of better markets. Other actors such as CORPOAMAZONIA, the SINCHI Institute, and SENA have generated training processes through training. FEDEGAN, the National Federation of Livestock Farmers, has provided technical assistance to improve animal health and Nestlé, the main buyer of milk in the department, has provided guidelines to improve the management of dairy products.

Social networks of the livestock food system in the municipality of La Montañita

The characterization of this agri-food system was carried out in La Montañita as this municipality has a greatest productive tradition compared to Belén de los Andaquíes. The actors that drive the system are not diverse as is the case with the cocoa value chain and this draws attention since the department of Caquetá is considered an important point of meat and milk production in the Amazon region. This situation may be due to the fact that the production that takes place in La Montañita is of the silvopastoral type and that this condition can cause the actors that leverage it to be less diverse and less frequent than in conventional production systems. Institutional support in this system has depended exclusively on the management of local producer organizations and the support received has been aimed at improving production systems and the transformation of milk into by-products such as cheese. The livestock producer organizations of the municipality identified in the stakeholder and social network mapping workshop are the following:

- Las Triunfadoras
- Mujeres emprendedoras de San Isidro (ASMUJSAN)
- Asociación de Mujeres emprendedoras del Triunfo (ASOAGROEMPT)
- Asociación de Mujeres Emprendedoras Generadoras de Oportunidades (ASMEGO)
- Asociación de Mujeres Fénix de la Cordillera (ASOMUFEM)
- Comité de Ganaderos de La Montañita (COMOGAN)
- Quesos la Arboleda

According to representatives of producer organizations, during the last five years, livestock associations have diversified, and groups composed of women have emerged who have tried to make visible the work they do in production systems. The birth of most of these organizations occurred within the framework of the project: “Building rural business capabilities, trust and opportunity - Entrepreneur countryside” promoted by the MADR and which sought to form associative groups in PDET territories to promote value chains with potential in the regions to contribute to the reduction of rural poverty and strengthen local organizational structures. These organizations are distributed throughout the municipality and producers confirm that those located in mountain areas are the ones that receive the least attention and support. For this reason, they are organizations that do not have strategic allies and have less loyalty from their associates, unlike organizations that have associates with productive units in flat areas. Associations in the mountains are, at the same time, those located in more fragile ecosystems and some of them lack property rights on land, which calls for the design of specific interventions to the transition of these production units towards sustainability. In general, the associations concentrate on milk production and therefore the characterization is based on this productive line.

Production link

This link comprises three types of actors:

1. **Input suppliers** that provide raw materials for bovine production (Table 11). This type of actors includes veterinary stores and sellers of milking equipment, forage, food supplements, waterers and other tools for paddock maintenance.

Table 11. Livestock input suppliers in La Montañita

Actor	Role	Capital La Montañita
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Private veterinarians and local supply stores	Suppliers of inputs for the care of animals and paddocks.	Inputs Technical assistance
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Source: Authors' elaboration based on the network mapping workshops, November 2023

- Livestock producers and organizations** (Table 12). The producers participating in the workshops have small farms - between 10 and 20 hectares - compared to the average size of the study area, dedicated to production under silvopastoral systems mainly within properties where agricultural activities associated with the production of fruit and cocoa. In the case of organizations, these are groups with between 30 and 40 members.

Table 12. Livestock producers and organizations in La Montaña

Actor	Role	Capital La Montaña
ASOMUFEM	Women's organizations dedicated to the production and marketing of milk.	Rules
ASOAGROEMPT		
ASMEGO	La Montaña ranchers' committee, in charge of strengthening production and managing commercial alliances.	Knowledge
COMOGAN		
Producers	Responsible for the production of milk and by-products for selling and self-consumption.	Raw material

Source: Authors' elaboration based on the network mapping workshops, November 2023

- Governmental and non-governmental development entities** that promote production, invest in productive projects, and support local producers and organizations with technical assistance, genetic improvement, marketing, and development of forest conservation actions (Table 13). These entities are international, national, and regional.

The structure of relationships between the actors that participate in the productive link is determined by at least 13 actors with very limited relationships between them but directed by the associative groups. ASOMUFEM establishes relationships with FEDEGAN, COMOGAN, input vendors and Nestlé. In general, these relationships are made with the objective of improving the production and quality of milk that in some productive units of associates in ASOMUFEM do not always meet optimal handling conditions. In the case of the relationships promoted by ASOAGROEMPT and ASMEGO, it is found that there is a higher level of cooperation with development entities that not only work to improve production but also promote exercises to transform traditional production systems, promote conservation and recovery vegetation in pastures and in strengthening the organizational structure, the main relationships are established with MADR, SENA, UNDP and the University of the Amazon.

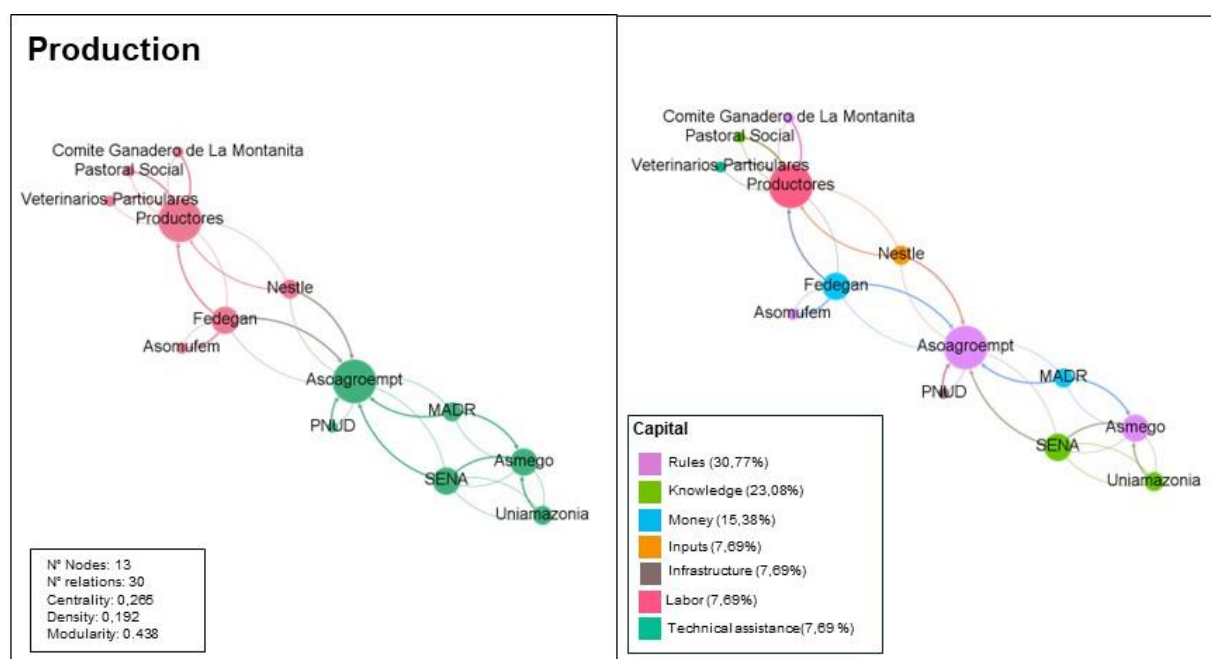
According to the results of the social network (Figure 14), it is identified that the social capital that predominates is "Linking" type since there are vertical relationships among different groups, in this case, development entities and local organizations, in which there are clear dependency relationships where producer organizations have no impact on the strategies created by powerful actors.

Table 13. Governmental and non-governmental entities that promote livestock farming in La Montaña

Actor	Role	Capital La Montaña
FEDEGAN	Financing of municipal technical assistance, vaccination, and genetic improvement programs.	Money
SENA	Training in sustainable production, pasture arrangements under silvopastoral arrangements and accounting management for civil society organizations.	Knowledge
MADR	Support for sustainable production and financing for the purchase of inputs, machinery and productive infrastructure.	Money
Universidad de la Amazonía	Generation of training spaces in livestock farming under silvopastoral arrangements.	Knowledge
PNUD	Financing for top-level organizations to provide technical assistance to small producers and promote conservation actions.	Money
Nestlé	Commercial channel and financing of inputs for the improvement of milk handling.	Inputs

Source: Authors' elaboration based on the network mapping workshops, November 2023

Figure 14. Cooperation networks between actors in the Montaña livestock production link



Source: Authors' elaboration based on the network mapping workshops, November 2023

Processing link

This link comprises two types of actors:

1. **Private businesses dedicated to the production of cheese and other dairy products** (Table 15). These businesses maintain a direct relationship with producers and with associations such as ASMEGO and ASOAGROEMPT with larger milk collection capacity than other organizations.

Table 15. Private companies that process milk to produce dairy products in La Montaña.

Actor	Role	Capital La Montaña
Cheese producers	Purchase of milk for the manufacture of dairy products (mainly cheese) on a local and regional scale.	Money
Nestlé	Purchase of milk from small producers.	Money

Source: Authors' elaboration based on the network mapping workshops, November 2023

2. **Governmental and non-governmental development entities** that promote training activities on issues of improving milk handling on farms and establishments where transformation actions are carried out (Table 16).

Table 16. Governmental and non-governmental entities promoting training in good practices in milk production La Montaña.

Actor	Role	Capital La Montaña
SENA	Training of producers in sanitary practices and food handling.	Knowledge
Territorios de oportunidad²	Support for producers interested in dairy processing.	Knowledge
MADR	Financing of technologies and machinery to improve the handling and quality of milk.	Money
Pastoral social	Psychosocial support for producers and their families with special attention to women and children.	Knowledge
Rutas PDET³	Support to young people and entrepreneurial women with interest in venturing into the production of dairy by-products in the municipality.	Knowledge

Source: Authors' elaboration based on the network mapping workshops, November 2023

The relationships established in this link are determined by the type of association that promotes them. As can be seen in Figure 15, the relationships are grouped into three types: first, producers who establish links with Nestlé and the Quesilleras within the framework of the purchase and sale of milk; second, ASMEGO association establishes links with Social Pastoral, SENA and Opportunity Territories from whom it receives benefits of

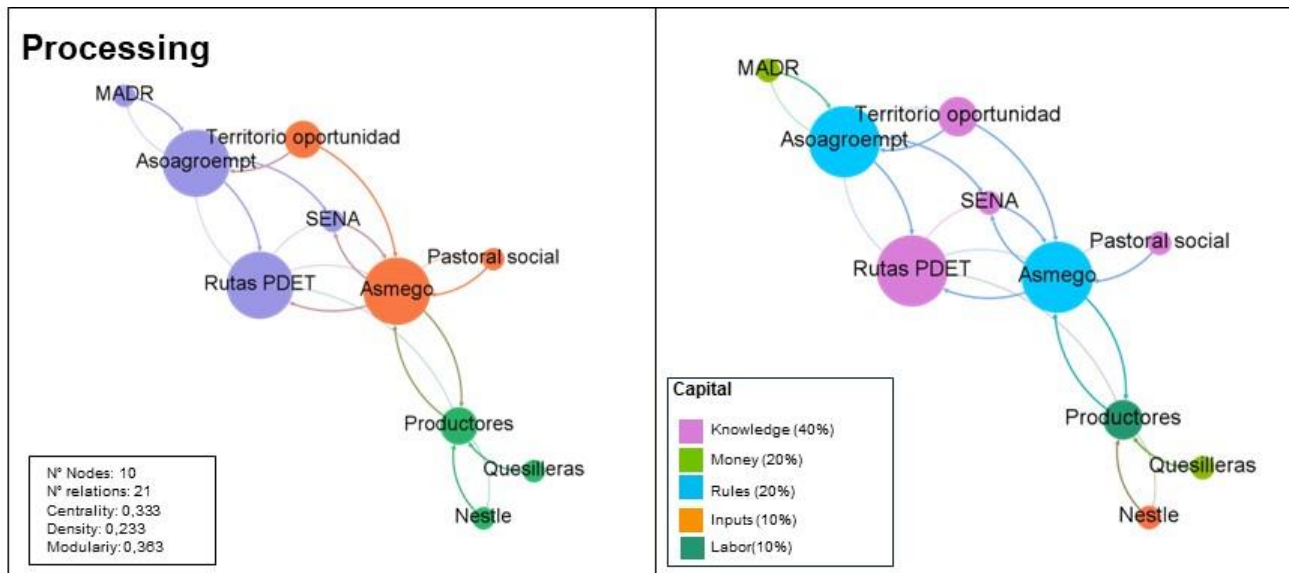
² The program "Territories of Opportunity" is an international cooperation program financed by USAID, focused on strengthening the capacities of communities affected by the conflict so that "they become reliable and effective partners of the government and the private sector to design and implement activities of comprehensive rural development and promote economic development and citizen participation in these processes." This program was implemented in 51 municipalities in nine departments: Antioquia, Caquetá, Cauca, Córdoba, Guaviare, Meta, Nariño, Norte de Santander and Putumayo, from August 2017 to August 2023. Source: https://www.usaid.gov/sites/default/files/2023-03/CDLO_Espanol_FactSheet_2.22.23.pdf

³ PDET Routes is the program financed by the European Union through the European Fund for Peace in Colombia, which is implemented in three departments: Caquetá, Putumayo and Nariño. Source: <https://sicec.eu/article/674/#:~:text=Rutas%20PDET%2C%20es%20el%20programa,su%20ejecuci%C3%B3n%20ir%C3%A1%20hasta%202023.>

psychosocial support and training on transformation issues for its associates; and three, ASOAGROEMPT establishes links with PDET Routes, Opportunity Territories and MADR, through which it receives financing to improve milk handling processes and the purchase of inputs and machinery.

The type of social capital that predominates in this network is “Linking” since a verticality is established between different groups, in this case, development entities and processors in order to promote the creation of dairy by-products.

Figure 15. Cooperation networks between actors of the Montañita milk processing link



Source: Authors’ elaboration based on the network mapping workshops, November 2023

Commercialization link

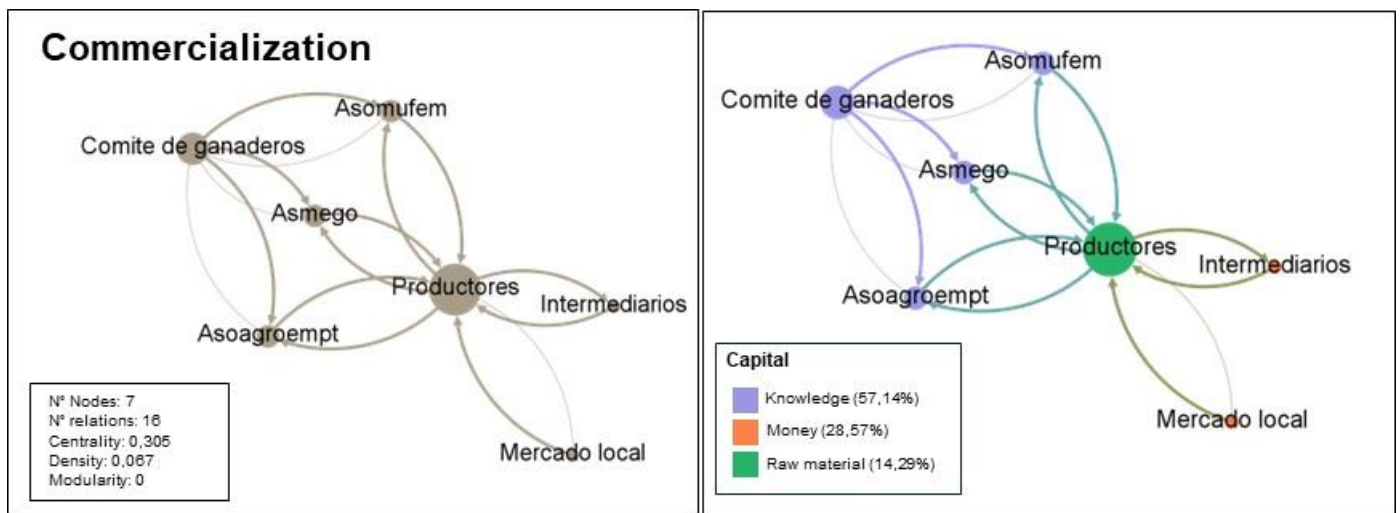
This link is made up of direct buyers of milk from local producers and associations (Table 16). The relationships between actors in this link are not very diverse and are established for exclusively commercial purposes. There is no presence of actors that seek to promote new commercial alliances outside the municipality and even the department, that add value to milk, or that can be produced in silvopastoral systems that directly contribute to conservation of ecosystems and biodiversity. As seen in Figure 17, the actors do not establish relationships between them, vertical relationships predominate and the capital that flows the most is money resulting from the commercial relationship. This situation means that the social capital that predominates is “Linking” type, that is, unidirectional relationships with little linkage of powerful actors and with a high dependence on social organizations and producers.

Tabla 17. Milk buyers from local producers and associations in La Montañita

Actor	Rol	Capital La Montañita
Intermediaries	Private intermediaries who make milk purchases on the farm and sell it to cheese producers outside of Montañita.	Money
National and local markets	National and local milk buyers such as Nestlé and local cheese makers.	Money

Source: Authors’ elaboration based on the network mapping workshops, November 2023

Figure 16. Cooperation networks between actors in milk commercialization in La Montaña

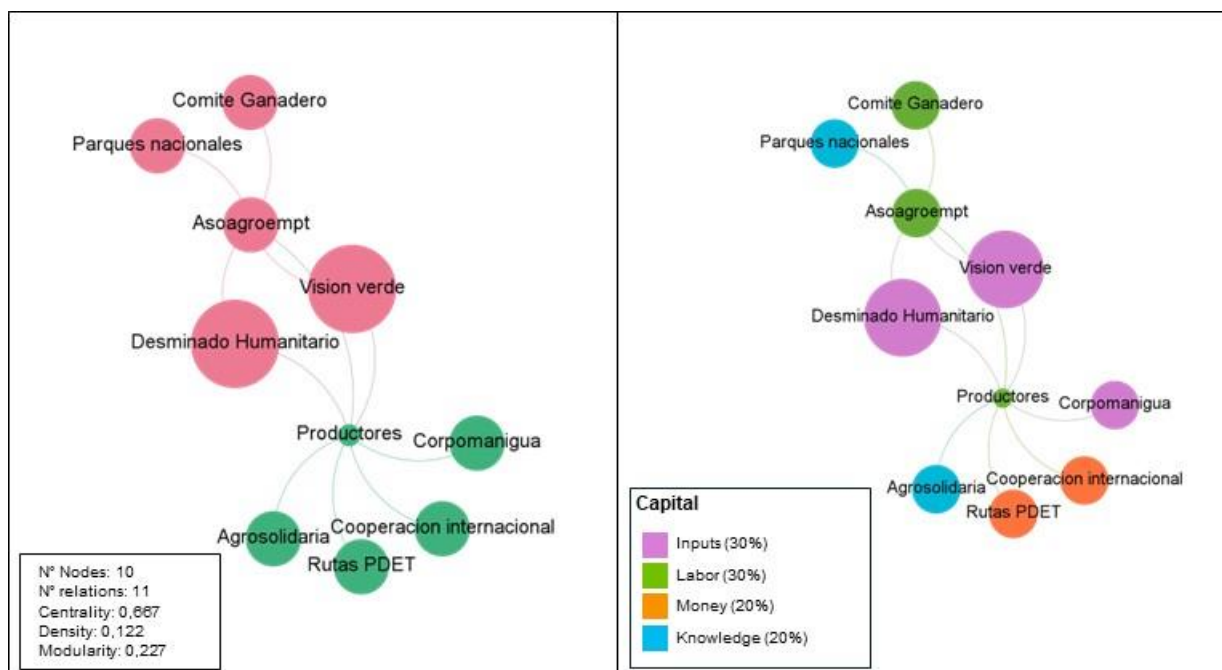


Source: Authors' elaboration based on the network mapping workshops, November 2023

Actors that support conservation and attention to climatic impacts

In the context of ecosystem conservation, the network of actors is not very diverse and present limited cooperation between them, while regarding responses to the impacts of climate change, no actor was identified that is promoting mitigation measures and adaptation. As can be seen in Figure 17, the actors that promote conservation are development entities such as: National Natural Parks, Amazon Green Vision and the PDET Routes that establish direct relationships with the associations of ranchers and producers in charge of executing recovery projects of native vegetation on their properties and to reforest water flows. In general, these entities do not cooperate with each other, and their relationship is vertical, providing inputs for restoration and managing training spaces for producers on sustainable livestock issues. Livestock farmers' organizations are the main beneficiaries, but they do not participate in the design of the projects.

Figure 17. Cooperation networks in conservation and attention to climate impacts in La Montaña



Predominant types of social capital in the milk value chain

The dairy value chain of dairy in La Montañita is composed of a Linking-type social capital in which local producer organizations and producers establish relationships with regional, national, and international development actors in a vertical manner; such relationships focused on technical assistance and money. These alliances that are consolidated within the framework of meeting the needs of each association do not allow producer organizations to get involved in the planning of interventions nor to transform the type of capital that they are going to deliver. This makes the relationship between development entities and other local actors with producer organizations unidirectional, making it difficult to establish cooperative relationships between actors with the same level of power and causing the latter to end up assuming a subordinate role. Table 18 summarizes the types of capital for each category studied in the characterization:

Table 18. Types of social capital found in the milk value chain.

Category	Level	Type of social
Value-chain links	Productive	Linking
	Processing	Linking
	Commercialization	Linking
Sustainability	Conservation	Linking
	Climatic impacts	Linking

Source: Authors' elaboration based on the network mapping workshops, November 2023

The predominance of this type of social capital in the value chain draws attention as it reflects a high level of dependency and a high risk of permanence of local associations that may fail in their productive attempt if the incentives directed at strengthening production in the sector disappear. Likewise, it is striking that entities such as Social Pastoral develop actions that support psychological factors of producers and support families in productive activities. This is important because unlike the cocoa value chain, at least one actor was identified that values the role of the family in production and seeks to create spaces for caring for women and children who usually contribute significantly to production and have little recognition and protection.

Conclusions

Social networks are a technique that allows exploring the structure of relationships and social capital between different actors in a system. In the cases studied, we explore the social networks of actors at different levels of the cocoa and livestock value chains in the municipalities of Belén de los Andaquíes and La Montañita, in the department of Caquetá in the Colombian Amazon. The networks of actors in the production, processing and commercialization links were studied for each of the agri-food systems.

Regarding **cocoa**, we observed that the actors that promote the cocoa agri-food system are diverse, and their role is associated with the productive and organizational needs and particularities of each municipality. The actors at the **production link** are grouped into input suppliers, cocoa producers, and development entities, both governmental and non-governmental. Producers have cropping areas of a maximum of 3 hectares, in agroforestry systems, through organic production and low use of agrochemicals. Cocoa is generally the second line of economic importance after livestock.

The structure of relationships between the actors that participate in the cocoa production link shows several important things. On the one hand, the municipality of Belén de los Andaquíes has a greater presence of

governmental and non-governmental agencies supporting production, which is related to the long-term role of ASPROABELÉN as manager of the interests of local producers. Regarding regional agencies, it is observed that they play an important role in technical assistance but do not have cooperative relations with agencies at other levels, for example, national agencies. Input suppliers do not have cooperative relationships with other development actors, but rather relate directly to producers or producer organizations.

On the other hand, in both municipalities, cooperative relations are promoted by producer organizations that appear as central actors. The capitals that flow the most are technical assistance and technical knowledge, while the capitals that flow the least are inputs and money. In the case of La Montañita, the delivery of plant material predominates, while in Belén de los Andaquíes, technical assistance predominates. This reflects the needs expressed by the participants in the workshops in the sense that it is necessary to build alliances that allow mobilizing money, machinery, and supplies, as well as establishing and strengthening rotatory funds within the organizations, for the implementation of more sustainable production systems. Likewise, certification appears as a stronger capital in Belén de los Andaquíes, due to the role that ASPROABELÉN has played in that sense.

Given that cooperation is established mainly between actors of the same type, it is possible to affirm that the social capital that predominates in the productive link is *"Bonding"*, that is, relationships between actors with common characteristics and belonging to the same level of power. Producers and producer associations are the main beneficiaries, but these central actors have little power to interfere in the decisions of the development agencies. Regarding the differences between municipalities, while Belén de los Andaquíes has a broader and more diverse structure of actors than La Montañita, cooperative relations are stronger in La Montañita, mainly among producers and producers' organizations.

For its part, the **processing link** comprises producers and organizations that are trained in cocoa bean processing as well as local promotion entities which carry out activities such as training, as well as the development of the organoleptic profile of cocoa to evaluate its potential in the production of chocolates. Cocoa processing is an activity with few cooperation networks which have low density, which is mainly due to the fact that the main vocation of producers and producer organizations is the purchase, collection and sale of dry beans. Cooperation among actors is established vertically among the groups that offer knowledge to the associations to promote processing, i.e., the social capital of the link is characterized by *"Linking"* type relationships which are relationships between different power groups of a vertical type, where actors who receive information predominate and have little impact on actors with greater power.

Regarding the **commercialization link**, it is made up of three types of actors: the producers' organizations that are in charge of collecting dry cocoa beans for sale in the local, national and international market; buyers of dry beans at the local, national and international level; and governmental and non-governmental entities that promote commercialization and commercial alliances at the national and international levels. In this link, very important differences between the two municipalities - Belén de los Andaquíes and La Montañita - stand out. In Belén de los Andaquíes most of the dry product is directed to international markets, producers associated with ASPROABELÉN have the production certificate organic, while receiving greater attention from governmental and non-governmental entities in terms of training and process improvement. In the case of La Montañita, on the other hand, national buyers predominate - Casa Luker and Nacional de Chocolates -, in addition to local buyers and intermediaries from the region who attend local fairs and markets to buy the product.

In Belén de los Andaquíes, the central actor is ASPROABELÉN, a grassroots organization of the municipality in charge of the collection, selection, and export process with allies. In La Montañita the central actor is not associated with the local producers' organization but with COMCAP, which is a grassroots producers' association that has its origins in the municipalities of El Docello and Paujil. Regarding social networks, it is observed that the relationships of the actors behave in the same way as in the productive link, that is, only cooperative relationships are established between actors who share the same role, but those who have differences in role and scale of intervention hardly cooperate. Additionally, the type of social capital that predominates is *"Linking"* since a verticality is established between different groups, in this case, buyers and associations, in which there are clear relationships of dependency.

Regarding the **actors that contribute to the sustainability of the cocoa production chain**, these are the same producer organizations and other national and international development entities that through subsidies support the organizations at an economic level and allow them to hire personnel to provide more frequent technical

assistance and train associates on productive issues. There is a greater presence of these actors in the case of Belén de los Andaquíes than in La Montañita. In terms of social capital, the “Linking” type predominates in this network since a verticality is established between different groups, in this case, development entities and local organizations, in which there are clear relationships of dependence.

In terms of the **actors that contribute to the conservation of ecosystems**, these are diverse networks with actors at different scales (local, regional, national, international), which finance training and technical assistance to producers so that they improve their productive systems and get linked in markets where the conservation of ecosystems and biodiversity adds value. Unlike production, transformation and marketing networks, the social capital that flows in conservation networks is more horizontal, of “Bridging” type, that is, actors who build bridges between actors with different roles, but with similar levels of power and who seek to fulfill common objectives. The capitals that flow the most are training and technical assistance.

Finally, cooperation networks between **actors that seek to respond to climate impacts** have a greater presence in the municipality of Belén de los Andaquíes than in La Montañita, although the contribution in terms of attention to climate change impacts is not clear. In the case of Belén de los Andaquíes, there are actors directly associated with addressing disaster risks, unlike La Montañita where these actors are not recognized, despite the importance that they should have given that the risks of mass removal in rainy seasons are significant in the town. Within the framework of the structure of network relationships in each municipality, it was found that the predominant social capital is “Linking”, i.e., vertical relationships of agencies with different levels of power that benefit local actors (producer associations) which have little capacity to interfere with actors with a higher level of power.

In terms of the type of social capital, it can be concluded that the cocoa value chain in both municipalities is mainly composed of Linking-type social capital, in which local producer organizations establish vertical relationships with regional, national, and international development actors, and focused on receiving subsidies translated into different capitals such as knowledge, technical assistance and money. These alliances are formed within the idea of meeting the needs of each association but do not allow producer organizations to get involved in the planning of interventions nor to transform the type of capital that they are going to deliver. This means that the relationship between development entities and other local actors with producer organizations is unidirectional, that it is difficult to establish cooperative relationships between actors of the same level of power and that the latter end up assuming a more subordinated role.

Social capital of Bonding type was found in the productive link and in a very diffuse way in the commercial link. It is characterized by relationships that are built between actors who share the same level of power and who distribute their intervention towards actors with a low level of power, such as producer organizations. Finally, Bridging-type social capital, which theoretically exposes relationships of greater cooperation and more horizontality between actors, was only found in ecosystem conservation networks. In this type of network, it was found that actors with different levels of power and roles establish relationships in terms of leveraging conservation actions. This is an interesting finding because, apparently, development entities do not always work vertically, but rather establish cooperation links to develop direct interventions and join forces to meet common objectives.

Another aspect worth mentioning is that in none of the municipalities did the producer organizations mention a clear and strengthened relationship with the departmental association ACAMAFRUT, nor with the regional committee of cocoa growers. This is important given that it is the committee that represents the political platform that makes visible the needs of the value chain at the national level and who works to generate alliances that benefit small producers in all the municipalities of the department.

In the case of **livestock**, the actors that drive the system are not as diverse as is the case of cocoa value chain, which draws attention since the department of Caquetá is considered an important milk and meat production scenario in the Amazon region. This situation may be due to the fact that the production that takes place in La Montañita is of the silvopastoral type and that this condition may be the cause the actors that leverage it to be less diverse and less frequent than in conventional production systems. Institutional support in this system has depended exclusively on the management of local producer organizations and the support received has been aimed at improving production systems and the transformation of milk into by-products such as cheese.

The **production link** is comprised by input suppliers, producers and livestock organizations, and governmental and non-governmental development entities. The structure of relationships between the actors that participate in the productive link is determined by at least 13 actors with very limited relationships between them but directed

by the associative groups. In general, these relationships are established with the objective of improving milk production and quality, promoting sustainable transformations of traditional production systems, promoting plant conservation and recovery in pastures, and strengthening the organizational structure. The social capital that predominates is of Linking type since a verticality is established between different groups, in this case, development entities and local organizations, in which there is a clear dependency relationship where producer organizations have no impact on the strategies created by power actors.

The **processing link** is made up of private businesses dedicated to the production of cheese and other dairy products, and governmental and non-governmental development entities that promote training activities. The relationships established by the actors, related to promotion and transformation, have to do with the purchase and sale of milk, support and training on transformation issues and financing for the improvement of production processes and purchase of machinery and inputs. The social capital that predominates in this network is "Linking" type since verticality is established between different groups, in this case, development entities and processors to promote the creation of dairy by-products.

Milk **commercialization link** is made up of direct buyers of milk who buy this product directly from local producers and associations. The relationships between actors in this link are not very diverse and are established for exclusively commercial purposes. In general, there is no presence of actors that seek to promote new commercial alliances outside the municipality and even the department, that add value to milk, or that promote production in silvopastoral systems that directly contribute to conservation of ecosystems and biodiversity. Vertical relationships predominate and the capital that flows the most is money resulting from the commercial relationships. This situation means that the social capital that predominates is "Linking" type, that is, unidirectional relationships with little linkage of powerful actors and with a high dependence on social organizations and producers.

The network **of actors for the conservation of ecosystems** is not very diverse and with limited cooperation between them, while regarding **response to the impacts of climate change**, no actor was identified that is promoting mitigation and adaptation measures. In general, the entities do not cooperate with each other, and their relationship is vertical, providing inputs for restoration and managing training spaces for producers on sustainable livestock issues. Livestock farmers' organizations are the main beneficiaries, but they do not participate in the design of the projects.

Regarding the type of social capital of the dairy value chain of dairy in La Montañita, it can be concluded that it is composed of a Linking-type social capital in which local producer organizations and producers on their farms establish vertical relationships with actors at a regional, national and international level, relationships that are focused on technical assistance and money. This makes the relationship between development entities and other local actors with producer organizations unidirectional, making it difficult to establish cooperative relationships between actors with the same level of power and causing the latter to end up assuming a subordinate role.

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Appendix

Appendix 1. Table of acronyms

Acronyms	Full name
MADR	Ministerio de Agricultura y Desarrollo Sostenible
MADS	Ministerio de Ambiente y Desarrollo Sostenible
CORPOAMAZONÍA	Corporación Ambiental de la Amazonía
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund
ACT Colombia	Amazon Conservation Team
CIAT	Centro de investigación en Agricultura Tropical
FEDECACAO	Federación Nacional de Cacaoteros
Rutas PDET	Rutas para el
ACT	Amazon Conservation Team
RED ADELCO	Red Nacional de Desarrollo Local de Colombia

COMCAP	Comité de Cacaoteros de los municipios del Paujil y El Doncello
ASPROABELEN	Asociación de Productores Agroforestales Alternativos de Belén de los Andaquíes
COPROPENEYA	Comité de Productores de Cacao en Sistemas Agroforestales de la Unión Peneya
ACAMAFRUT	Asociación Departamental de Cultivadores de Cacao y Especies Maderables del Caquetá
CORDESPA	Corporación para el Desarrollo Sustentable del Piedemonte Amazónico
COPROCABEL	Comité de Productores de Cacao en Sistemas Agroforestales del municipio de Belén de los Andaquíes
PROCAT	Proyecto de conservación de aguas y tierras
PNN	Parques Nacionales Naturales
COMUCAM	Comité de Cultivadores de Cacao en Sistemas Agroforestales del Municipio de La Montañita
ASMUJSAN	Mujeres emprendedoras de San Isidro
ASOAGROEMPT	Asociación de mujeres emprendedoras del Triunfo
ASMEGO	Asociación de mujeres emprendedoras generadoras de oportunidades
ASOMUFEN	Asociación de mujeres fénix de la cordillera
COMOGAN	Comité de ganaderos de La Montañita
FEDEGAN	Federación Colombiana de Ganaderos
PNUD	Programa de la Naciones Unidas para el desarrollo
SENA	Servicio Nacional de Aprendizaje

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