Comprehensive Analysis of the Institutional Landscape in Colombia:

Examining the Dynamics of Food, Land, and Water (FLW) Arenas

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1. Introduction

Public policies play a crucial role in advancing global and national development objectives, encompassing vital areas such as food security, poverty reduction (Babu, 2014) , gender equality (Vujadinović, 2023), climate change adaptation and mitigation, and environmental conservation (Runhaar, 2006). At the national level, these policies serve as the foundation for translating international agreements into actionable frameworks, facilitating sub-national, regional, and local policymaking. Despite their significance, creating a unified policy landscape that avoids fragmentation remains a commonly overlooked challenge.

The coherence within and across policies and sectors is paramount for achieving effective outcomes and fostering synergy in policymaking, particularly within food, land, and water (Nilsson, 2012). This coherence is essential due to the interconnectedness of these areas in rural economies and broader sustainable development. However, achieving this cohesion is not automatic and requires careful consideration of potential tradeoffs between these sectors and other development goals (Arfa, 2021).

Various overarching themes, such as climate change and socio-economic factors, exert reciprocal impacts on the food, land, and water sectors. For instance, climate change affects food production, water supply, and land suitability, while land use decisions and agriculture significantly contribute to greenhouse gas emissions (Seymour, 2016). Social issues, such as unequal land distribution, can also have profound consequences on agricultural production and land use, underscoring the need to comprehend the broader policy landscape.

Within this context, policies form a diverse spectrum, encompassing laws, regulations, plans, programs, norms, and directives. The selection of policies for scrutiny utilizing the Institutional Landscape Framework is guided by criteria that ensure they are multidimensional, involve diverse institutions in both their design and implementation, have the potential to impact various sectors, hold national relevance, and have been enacted or implemented within the last five years.

This report will specifically focus on examining the intricate relationships among different stakeholders in Colombia's policy domains of food, water, and land. The emphasis will be on understanding the roles of various institutions and stake holders in these domains and their contributions to the policy process stages—design, implementation, and evaluation. The analysis aims to provide valuable insights into how these stakeholders interact within the institutional landscape, shedding light on the dynamics and effectiveness of policies shaping the realms of food, water, and land in Colombia.

Knowledge gap

Deep policy analysis is a rather recent effort in Colombia (Sanabria-Pulido, 2020). This has become more pertinent after the signing of the peace agreement in 2016 and the election of Gustavo Petro in 2022, the country's first left-leaning president. Furthermore, in the context of increasing international attention on issues like climate change, sustainable development, deforestation, and social inclusion, there is a noticeable gap in the analysis of national policies concerning food, land, and water, which are of substantial significance in the international arena.

NPS initiative

In this context the National Policies and Strategies for Food, Land, and Water Systems Transformation (NPS) was conceived as a CGIAR initiative. It aims to comprehend different dimensions of policy coherence across a sample of national-level policies in the food, land, and water sectors across six pilot countries—Kenya, India, Laos, Nigeria, Egypt, and Colombia. The NPS initiative aligns with numerous Sustainable Development Goals (SDGs), including no poverty, reduced hunger, good health and well-being, gender equality, clean water and sanitation, and climate action, among others. The main expected impact areas of NPS include nutrition and food security, poverty reduction, livelihoods, and jobs, gender inequality, youth, and social inclusion, climate adaptation and mitigation, and environmental health and biodiversity.

The initiative is guided by three overarching goals : 1) build policy coherence, 2) integrate policy tools, and 3) respond to policy demand and crises. These goals will be realized by applying the PILA framework to a sample of six to seven national policies, aiming to comprehend cycles of policy flux and influence future policymaking. The findings of this initiative have the potential to enhance both coherence within policies by addressing defined

problems and stated objectives, as well as coherence across policies to ensure that the policy landscape is synergistic and complementary.

2. Background : Colombia

General Context of Colombia

Colombia, located in northern South America, is the world's second most biodiverse country (Gori, 2022), encompassing diverse ecosystems such as the Caribbean coast, Pacific coast, Andes mountains, and Orinoco plains, with 10% of the Amazon Forest (Álvarez, 2020). While rich in water resources, climate change has led to water stress for one-third of the population. Agriculture, though contributing 6.3% to GDP[1], is culturally significant, with key crops like coffee, livestock, and rice shaping the country's identity. Cattle ranching, vital economically, contributes to deforestation and 26% of greenhouse gas emissions (Tapasco, 2019).

The nation, marked by a complex history of armed conflict, signed a peace deal in 2016 with the FARC but faces ongoing challenges from other armed groups. Land distribution inequality is a core issue, with a small percentage owning the most productive land (Del Cairo Silva, 2012). Displacement, driven by threats and violence, disproportionately affects Indigenous Peoples (Maldonado, 2016). Land tenure reform is crucial for peace implementation, deforestation, and community livelihoods, particularly focusing on gender considerations (Rodríguez-de-Francisco, 2021).

Colombia's vulnerability to climate change is evident, impacting regions and populations differently (Pardo Martinez, 2018). High-poverty areas face challenges in adapting to climate change. El Niño exacerbates climate risks, with predicted reductions in rice and sugarcane yields (Núñez, 2018). Addressing legal ambiguities in land restitution and managing the impacts of climate change is critical for the country's sustainable development.

In addition, the intricacies of land tenure in Colombia involve a complex process with eight government ministries granting land, posing challenges for restitution efforts. Legal ambiguity, confusion over governing institutions, and inconsistent land policies hinder effective post-conflict land restitution. Addressing these issues is crucial, but careful consideration is needed to avoid unintended consequences, such as potential conflicts with the management practices of Indigenous reserves if national park land laws take precedence (Graser, 2020). Moreover, the impact of secure land tenure on women's livelihoods remains largely unexplored in the Colombian Amazon, emphasizing the need for a comprehensive understanding of the gender dimension in land-related policies (Unruh, 2019). As Colombia navigates its post-conflict era and grapples with climate change, resolving these issues will be pivotal for achieving sustainable development, ensuring social justice, and promoting resilient communities.

3. Methodology And Data Production

General Context of Colombia

To evaluate the policy framework pertaining to the food, land, and water sectors in Colombia, we will employ two complementary analytical and methodological approaches: (1) institutional mapping and (2) policy mapping. The subsequent sections provide a detailed description of each of these approaches.

3.1 Institutional Mapping

The conceptual approach proposed for this study is based on the Policies and Institutional Landscape Analysis (PILA) Framework. Originating from the neo-institutional approach, PILA draws on the works of (March J. G., 1983) , (March J. G., 1984) , (North, 1994), and (Ostrom, 2009). The approach centers on institutions as the "rules of the game in a society" and involves analyzing political contexts, power systems, and policy landscapes.

1 https://www.ifad.org/en/web/operations/w/country/colombia

The dual objectives of PILA are to establish a consensual approach to political context analysis and to provide a common framework for comparative analysis across multiple political subsystems. (Breisinger, 2023) and (Nicol, 2023) expands on this by emphasizing the enrichment of understanding the political cycle and the identification of "windows of opportunity" for engagement with political actors.

The conceptual framework enables a two-level analysis of policies and their institutional context: **formal** rules dictated by regulations and **informal** rules influencing political behavior. Integrating institutional and behavioral data is crucial, highlighting that institutions are not solely independent variables but actively shape and are shaped by the political process (Primi, 2009). The framework also contributes to comprehending the formal and informal institutions' role in constraining or facilitating action and change. This understanding is pivotal for accelerating the transformation of food, land, and water systems, shedding light on the reasons behind the existing political landscapes.

The study contrasts the classical model of the policy cycle with PILA, emphasizing stages such as problem definition, agenda construction, solution formulation, decision-making, implementation, and evaluation. Ostrom's concept of an "arena of action" captures the interplay among individual and collective actors within the specific institutional arrangement of the political process, as observed in the Colombian context of land, water, and food systems. The conceptual framework further enables the development of a two-phase methodology: identification of institutional actors with mandates related to policies and an analysis of their positions and behavior. This approach allows for the examination of formal institutional structures, informal actor behavior in policy processes, and the coherence between formal mandates and actual institutional roles in shaping policy outcomes.

Methodology

Building upon the established conceptual framework, the methodology for this phase of the study unfolds in three key stages. First, the identification and prioritization of government actors comprising the institutional structure of the Government of Colombia responsible for land, water, and food policies. During this stage, the primary institutional actors within the executive branch, tasked with formulating and/or implementing food, water, and land policies, are gathered and systematized. The criteria for selecting these actors are based on regulations that explicitly outline the government entity's contribution to the processes of policy formulation, implementation, and/or evaluation. The outcome of this initial stage is an organizational chart featuring the institutions prioritized for analysis.

Secondly, the systematization of each government actor's role is carried out in accordance with state regulations, outlining their relationship with land, water, and food policies. This stage delineates the formal role of each actor at a general level and specifies their technical and financial involvement in water, land, and food policies, elucidating their formal relationship with these policies. The result of this stage is a set of tables depicting actors alongside their respective functions, both at a general level and specifically concerning land, water, or food.

In the third stage, the focus shifts to a power analysis concentrated on the behavior of government actors in the realm of land, water, and food policies. Consequently, **Table 1** below presents an overview of the general stages of the methodological process, synthesizing the sources, the process, and the products for each phase.

Table 1 Methodological Stages for Institutional Mapping

Stages of the methodological process			
Stage	**Sources**	**Process**	**Product**
Stage 1 Identification and prioritization of institutions (Formal level)	Manual of Structure of the Colombian State https://bit.ly/3OUYsr0	Review of literature and official government sources	List of the main formal institutions in charge of land, water, food policies. Organization chart
Stage 2 Preparation of tables by type of institution	Manual of Structure of the Colombian State https://bit.ly/3OUYsr0	Systematization of the role of each actor and their specific relationship with land, water, food	Tables by type of government actor completed
Stage 3 Analysis of the main topics of institutions (Informal level)	Tables prepared in Stage 2. Literature review	Information processing and analysis of policies and institutional landscape	Analysis of the institutional landscape in food, land, and water policies

3.2 Policy Mapping

Analyzing the policy landscape in Colombia's food, land, and water sectors involves a multi-step process known as policy mapping. To initiate this analysis, it is essential to first define the scope and objectives, geographical extent, time frame, and which policies will be scrutinized. These policies may encompass laws, strategic plans, development programs, and institutional frameworks. Secondly, leveraging this policy database, the identification of key actors in the food, land, and water sectors is imperative. These actors may include government agencies, civil society organizations, farmers' associations, indigenous groups, and private sector entities. Subsequently, an in-depth analysis of their roles, interests, and power dynamics will be conducted.

In the final stage, we propose to execute a network analysis of actors engaged in public policies related to land, food, and water. This analytical methodology delves into the relationships, interactions, and structures among actors involved in formulating, implementing, and evaluating public policies. The emphasis lies in comprehending how various actors, including government agencies, interest groups, non-profit organizations, and individuals, are interconnected and how these connections influence policy processes and outcomes. Through this holistic approach, we aim to gain insights into the intricate dynamics shaping policies within the realms of land, food, and water in Colombia.

Methodology

The research methodology adopted for this study entails a network analysis of public policy. This analytical framework serves to examine the intricate relationships, interactions, and structures among actors immersed in the formulation, implementation, and evaluation of public policies within the agri-food sector. The methodological process unfolds through a sequence of strategic steps designed to unravel the complexities inherent in this multifaceted domain.

Firstly, the identification of key actors within the agri-food sector assumes precedence. This entails discerning and categorizing pertinent entities, including government agencies, non-profit organizations, private sector representatives, and other stakeholder's integral to the policymaking landscape. After actor identification, the methodology involves the systematic collection of data elucidating relationships and interactions among the identified actors. This empirical foundation is pivotal for unraveling collaborative endeavors, information exchange dynamics, and overall engagement within the intricate network.

Building upon the insights garnered from the network analysis, the study endeavors to proffer nuanced policy recommendations. These recommendations are intricately crafted to augment environmental policymaking's effectiveness, inclusiveness, and transparency within the agri-food sector.

Noteworthy is the utilization of policy-level data in this methodological approach. A comprehensive inventory of public policies associated with the water, food, and land sectors forms the cornerstone of the study. This policy

repository is subsequently synthesized into an information matrix, delineating the instrument's characteristics, impact areas, and institutional and financial dimensions. The resultant database is instrumental in discerning the various states of policies, i.e., formulation, implementation, and evaluation, and underscores the pivotal role played by diverse actors across sectors.

4. RESULTS

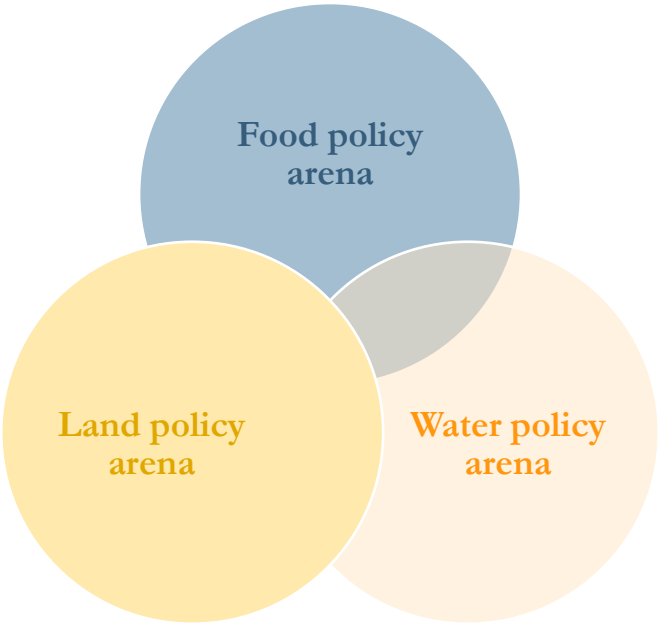
This section presents the preliminary findings pertaining to the stakeholders engaged in shaping the realms of food, land, and water policies in Colombia, delineated across two distinct dimensions: i) institutional mapping, elucidating the formal framework structured by the regulations of the Colombian State, capturing the de jure roles ascribed to entities responsible for formulating, implementing, or evaluating policies in the domains of food, land, and water, and ii) policy mapping, delving into the informal landscape characterized by political behaviors, levels of influence, and preferences—the de facto roles shaping outcomes in Colombia's food, land, and water policies. Additionally, iii) a comprehensive analysis is presented, unraveling the complementarities and overlaps between the institutional and policy dimensions across the triad of systems: food, land, and water. The ensuing results, emanating from the institutional mapping, are detailed below.

4.1 Institutional Mapping: Actors related to Colombia's food, water, and land policies.

The institutional landscape of the Colombian State, concerning the spheres of food, land, and water, encompasses government entities entrusted with the formulation, implementation, and evaluation of policies within these crucial domains. Notably, certain institutions bear responsibilities spanning all three sectors, while others are distinctly characterized by their emphasis on either predominantly economic activities—typically within the food sector—or primarily environmental pursuits, with a heightened focus on the land and water sectors.

This distinction provides a valuable framework for classifying the diverse government entities involved in shaping policies for food, land, and water in Colombia. Furthermore, recognizing the interrelated nature of these sectors, the food, land, and water systems are depicted as integrated and interdependent systems. Following Ostrom's conceptualization of an "arena of action" (Ostrom, 2009), this portrayal emphasizes the intricate interconnections and overlaps inherent in the dynamic interplay among the three sectors, challenging the conventional depiction of three separate arenas. Refer to **Figure 1** for a visual representation of this interconnected system.

Figure 1 Food, Land, and Water interdependent arenas.



The results of the institutional mapping underscore the existence of 31 pivotal government actors or institutions. In accordance with the legal framework established by the Colombian state, these entities are designated as the principal drivers responsible for the formulation, implementation, and evaluation of issues pertaining to food, land, and water policies. Each actor assumes a formal role, delineated by a set of functions aligning with one or more of the following categories: i) formulation of food, land, and water policies; ii) implementation of food, land, and water policies; iii) monitoring and evaluation of food, land, and water policies; iv) provision of financial support to food, land, and water policies; and v) facilitation of knowledge transfer involving scientific evidence to support policies within these domains.

Further categorization reveals that these institutions collectively fall into eight distinct categories: i) Ministries (6); ii) Special Administrative Bodies (5); iii) Administrative Bodies (2); iv) Public Establishments (4); v) National Agencies (3); vi) Scientific Institutions (3); vii) Financing Institutions (5); and viii) Other Actors (3), such as scientific institutions. This delineation provides a nuanced understanding of the diverse roles and classifications inherent in the network of actors steering the trajectory of Colombia's food, land, and water policies.

At the apex of government involvement in the realms of food, land, and water policies stand central Ministries tasked with formulating, implementing, and evaluating these critical policies. Noteworthy among these is the Ministry of Agriculture and Rural Development (MADR), primarily dedicated to the formulation and implementation of policies concerning food and land. Similarly, the Ministry of Environment and Sustainable Development (MADS) takes a central role, concentrating its efforts on the safeguarding of land and water resources. The Ministry of Mining and Energy, Ministry of Science, Technology and Innovation, Ministry of the Interior, and Ministry of Housing, City and Territory significantly shape policies in these domains.

Table *2* provides a comprehensive overview of these Ministries, delineating their formal roles ('de jure') and elucidating their specific relationships with food, land, and water policies. This classification offers a structured insight into the strategic roles undertaken by each Ministry in steering the policy landscape within the interconnected arenas of food, land, and water in Colombia.

Table 2. Ministries related to food, land, and water policies.

Ministries related to food, land, and water policies

Government actor	Formal role	Relationship with food, land, and water
Ministry of Agriculture and Rural Development (MADR) **Policy Domains: Food+Land+Water**	This ministry directs the formulation of plans, programs and projects that require the **development of the fisheries, agricultural and rural development sectors** in rural areas of the country. It also presents plans and programs in this sector that should be incorporated into the country's National Development Plan.	MADR is the primary ministry charged with the management and development of **policies pertaining to agriculture,** including cultivated and wild **food** from marine and freshwater sources, such as **aquaculture** and **fishing**. MADR is also in charge of **rural development** more broadly, and therefore has relevance in the **land** and **water** sectors as well.
Ministry of Environment and Sustainable Development (MADS) **Policy Domains: Land+Water**	This ministry manages the **environment** and renewable **natural resources,** while regulating the country's environmental legislation and defining policies and regulations that are subject to the sustainable recovery, conservation, protection, regulation, management and use and benefit of renewable natural resources and the country's environment to finally ensure sustainable development, without sacrificing the assigned functions of other sectors.	MADS has a clear link with natural **ecosystems** on **land** and in **freshwater** and marine areas. It develops policies related to the management of land and **use of territory** to ensure sustainable use of natural resources. In this vein, MADS is also in charge of the restoration and recuperation of natural resources. MADS coordinates with other ministries that may have an adverse impact on the environment.
Ministry of Mining and Energy (MME) **Policy Domains: Land+Water**	The goals of MME are to formulate and adopt opportune policies, plans, programs, projects and regulations for the mining and **energy sector**. Efficiently meet the requirements of citizens, industry, and stakeholders, for the development and strengthening of the mining and energy sector at the national level.	MME is likely to have a strong impact on the **land** and **water** sectors, due to its use both in mining and energy activities. Hydropower, a significant source of energy in Colombia, has implications for water use and water availability for both human use and native ecosystems. Furthermore, hydropower may also render previously fertile land worthless through inundation.
Ministry of Science, Technology, and Innovation (Minciencias) **Policy Domains: Food+Land+Water**	Minciencias as the governing body of the country's **Science**, **Technology, and Innovation sector,** seeks to generate capacities, promote scientific and technological knowledge, contribute to the development and growth of the country, and anticipate future technological challenges, always looking for the well-being and consolidating a more productive and competitive economy and a more equitable society.	Minciencias has projects and policies related to improving capacities of young people (including for **agricultural** purposes), as well a project on improving knowledge on **biodiversity** to improve ecosystem services, as well as a project relating to improving bio tourism, strengthening the bio-cultural resources that could be used to improve **tourism in rural areas.**
Ministry of the Interior (Mininterior) **Policy Domains: Land+Water**	Mininterior is charged with formulating and adopting policies in matters relating to internal **public order;** political affairs; peace, citizen coexistence and fundamental rights and freedoms; to citizen participation; to matters relating to ethnic groups; to relations between the Nation and the territorial entities of the Republic and other matters relating to them. To promote territorial ordering and autonomy, dynamizing the relations between the Nation and the territorial entities in the matter decentralization and institutional development.	Due to Mininterior's focus on the social aspects of rural development, there is significant relevance to all three sectors, but most notably **food** and **land**, due to Mininterior's charge with peace, decentralization, territorial planning, and the territorial cadaster.

Ministry of Housing, City and Territory (Minvivienda) **Policy Domains: Land+Water**	Minvivienda aims to formulate, direct and coordinate policies, plans, programs and regulations on housing and housing financing, urban development, land use and land use within the framework of its competences, drinking water and basic sanitation, as well as the normative instruments for its implementation.	Minvivienda has specific relevance to the **land** and **water** sectors, considering it relates more to urban life and well-being of urban residents relating to land planning, sanitation and drinking water. Considering that urban water provision has implications for rural water use and supply, this ministry has significance for the water sector.

Subsequently, the landscape is further shaped by five Special Administrative Bodies, each wielding influence in the intricate tapestry of food, land, and water policies. Under the Ministry of Agriculture and Rural Development, the Rural Land Planning, Land Adaptation and Agricultural Uses Unit (UPRA), and the Special Administrative Unit for the Management and Restitution of Dispossessed Land (URT) assume pivotal roles. Simultaneously, the Ministry of Environment and Sustainable Development oversees the National Environmental Licensing Authority (ANLA) and the System of National Natural Parks of Colombia (PNN), emphasizing the environmental dimensions of policy considerations. Additionally, the Ministry of Housing, City, and Territory houses the Commission for the Regulation of Drinking Water and Basic Sanitation (CRA).

Table 3 systematically presents these Special Administrative Bodies, elucidating their formal roles ('de jure') and delineating their nuanced relationships with food, land, and water policies. This tabulation enhances our understanding of the distinctive contributions made by each Special Administrative Body, thus enriching the comprehension of their roles in the overarching policy framework.

Table 3. Special administrative bodies related to food, land, and water policies.

Special Administrative bodies related to food, land, and water		
Government actor	**Formal role**	**Relationship with food, land, and water**
Rural Agricultural Planning Unit (UPRA) **Under MADR** **Policy Domains: Food+Land**	UPRA is a special administrative body under the Ministry of Agriculture. UPRA works in the agricultural sector to plan and implement a model of agricultural territorial planning, which uses as main elements the management and analysis of information, guidelines and instruments for productive planning, the social planning of property and information systems, applicable in the national and territorial level through the orientation of public policies.	UPRA has the most relevance to the **food** sector considering its role in the planning of agriculture. However, UPRA is also charged with legislation regarding agricultural **land planning**, and therefore also has significant relevance to the **land** sector.
Special Administrative Unit for the Management and Restitution of Dispossessed Land (URT) **Under MADR**	URT is responsible for administering the registry of dispossessed lands, processing restitution claims on behalf of and in favor of the victims before the agrarian judges and in case restitution is not possible, compensating the victim and the second occupants who demonstrate good faith exempt from fault; in accordance with the principles of gradualness and progressiveness.	URT is mainly related to **land** sector considering its role on the restitution of land to the victims of the armed conflict and the formalization of the agrarian structure in Colombia.
National Authority of Environmental Licensing (ANLA) **Under MADS**	The National Authority of Environmental Licenses ANLA is responsible for ensuring that the projects, works or activities subject to environmental licensing, permits or procedures comply with environmental regulations, in such a way that they contribute to the sustainable development of the country.	ANLA is a special administrative body under the Ministry of Environment and Sustainable Development, with a special focus on providing environmental licenses to a range of activities. In this way, it is most relevant to the **land** and **water** sectors, considering that it reviews environmental impacts to ecosystems (which are made up of land and water) rather than to agricultural systems (which pertain to food).
System of National Natural Parks (PNN) **Under MADS**	The PNN is a special administrative body responsible for the administration, protection and enforcement of National Natural Parks in Colombia.	PNN also falls under the purview of the Ministry of Environment and Sustainable Development, and has relevance mostly to the **land** sector, specifically in terms of land use regulations and the preservation of natural ecosystems within National Natural Parks.
Commission for the Regulation of Drinking Water and Basic Sanitation (CRA) **Under Minvivienda**	The CRA aims to regulate monopolies in the provision of public services, where competition is not, in fact, possible; and, in other cases, to promote competition among those who provide public services, so that the operations of monopolies or competitors are economically efficient, do not involve abuses of their dominant position, and produce quality services. (Art. 73 Law 142 of 1994).	The CRA is primarily concerned with the **water** sector and the efficient, high-quality provision of water to Colombians. It specifically ensures that provision of water and other public services remain efficient and high-quality.

Colombia also has several special departments and administrative bodies involved in the formulation, implementation and evaluation of policies related to food, land, and water in the country. The two departments include the National Planning Department (DNP) and the National Administrative Department of Statistics (DANE). **Table 4** shows the list of the administrative bodies, their formal role 'de jure' and their relationship with food, land, and water policies.

Table 4. Administrative bodies related to food, land, and water policies.

Administrative bodies related to food, land, and water policies		
Government actor	**Formal role**	**Relationship with food, land, and water**
National Planning Department (DNP) **Policy Domains: Food+Land+Water**	The DNP is the center of thought of the National Government that coordinates, articulates, and supports the short-, medium- and long-term planning of the country and guides the cycle of public policies and the prioritization of investment resources.	DNP may have relevance for all **three sectors,** but DNP likely has more relevance for the food sector considering the focus on investments.
National Administrative Department of Statistics (DANE) **Policy Domains: Food+Land+Water**	The Government of Colombia's National Administrative Department of Statistics (DANE, for its acronym in Spanish) is responsible for planning, compiling, analyzing, and disseminating official statistics for the country.	DANE is a **cross-sectoral** statistical body that has relevance for all three sectors.

Other public establishments include the following five bodies: the Colombian Agricultural Institute (ICA), under the Ministry of Agriculture and Rural Development; the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), under the Ministry of Environment and Sustainable Development; the Geographic Institute of Agustín Codazzi (IGAC), under the National Planning Department and the Institute for Planning and Promotion of Energy Solutions for Non-Interconnected Areas (IPSE), under both the Ministry of Mines and Energy and the Ministry of the Interior. **Table 5** shows the list of public establishments, their formal role 'de jure', and their relationship with food, land, and water policies.

Table 5. Public establishments related to food, land, and water policies.

Public establishments related to food, land, and water		
Government actor	**Formal role**	**Relationship with food, land, and water**
Colombian Agricultural Institute (ICA) **Under MADR**	ICA falls under the purview of the Ministry of Agriculture and is charged with the technical aspects of agricultural systems, such as preventing agricultural diseases and blights, as well as regulating the import and export of agricultural goods. It is also concerned with sanitation and safety around agricultural production and genetic varieties of crops.	ICA is primarily related to the **food** sector considering it is concerned with the safety and viability of agricultural systems. Specifically, ICA is involved with ensuring farm animal and pet health, minimizing plant disease, and the use of pesticides and fungicides.
Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) **Under MADS**	IDEAM is under the Ministry of Environment and Sustainable Development, and is responsible for monitoring weather patterns, air quality, hydrology, fires, landslides, and other natural disasters.	IDEAM has relevance to all three sectors considering they monitor natural events that can impact all three sectors in various ways, usually adversely. However, IDEAM has more relevance for the **land** and **water** sector considering its involvement with monitoring weather and other natural disasters.
The Agustin Codazzi Geographic Institute (IGAC)	The Agustin Codazzi Geographic Institute, (IGAC), is the entity in charge of producing the official map and the basic cartography of Colombia; to develop and update the national cadastre of properties; to carry out the inventory of soil characteristics; to carry out geographic investigations as support to the territorial development; Train professionals in Geographic Information Technologies and coordinate the Colombian Spatial Data Infrastructure (ICDE).	IGAC has the most relevance to the **land** sector considering the responsibility of IGAC to update and develop a **land cadaster,** but the soil inventory will also likely have implications for agricultural development. The statistical outputs of IGAC, including land maps and soil maps will likely be of relevance for all three sectors.
Institute for Planning and Promotion of Energy Solutions for Non-Interconnected Areas (IPSE)	IPSE falls under the purview of MinEnergia. Coordinate jointly with the Ministry of Mines and Energy and other State entities in charge of carrying out territorial development projects and projects, the execution of projects identified by the Institute and/or by the communities and territorial authorities, according to the policies and priorities established by the National Government.	IPSE has the most relevance for the **land** sector considering its role in territorial development projects and working with communities and territorial authorities.

Three national agencies support the implementation of food, land, and water policies. National agencies include Rural Development Agency (ADR) and the National Land Agency (ANT) under the Ministry of Agriculture and Rural Development. In addition, the National Mining Agency (ANM) is under the Ministry of Mining and Energy. **Table 6** shows the list of the national agencies, their formal role 'de jure', and their relationship with food, land, and water policies.

Table 6. National agencies related to food, land, and water policies.

National agencies related to food, land, and water		
Government actor	**Formal role**	**Relationship with food, land, and water**
Rural Development Agency (ADR) **Under MADR**	ADR is under the Ministry of Agriculture and Rural Development. ADR works with the producers of the Colombian countryside to turn their dream of rural business into a reality, through the structuring, co-financing, and implementation of Comprehensive Agricultural and Rural Development Plans.	ADR has the most relevance to the food sector considering that it falls under the Ministry of Agriculture and Rural Development.
National Land Agency (ANT) **Under MADR**	ANT is under the Ministry of Agriculture and Rural Development and is responsible for carrying out policies regarding rural property planning. Implement the Rural Land Observatory. Execute the constitutive programs of the social order policy of rural property. Support the physical and legal identification of the lands, in conjunction with the cadastral authority, for the construction of the multipurpose cadastre.	ANT has significant relevance for both the food and land sectors. It is also the agency responsible for land restitution under the peace agreement, which has implications for both agriculture and land.
National Mining Agency (ANM)	ANM sits under the Ministry of Mining and Energy. The new mining authority is a technical entity that seeks to promote the sector with transparency, efficiency, environmental, social, and productive responsibility.	ANM has the most relevance for the **land** sector.

Scientific institutions include the Amazon Institute of Scientific Research (SINCHI) and the Jhon Von Neumann Pacific Environmental Research Institute (IIAP) and the Institute for Marine and Coastal Research (INVEMAR) under the Ministry of Environment and Sustainable Development. **Table 7** shows the list of the scientific institutions, their formal role 'de jure' and their relationship with food, land, and water policies.

Table 7. Scientific institutions related to food, land, and water policies.

Scientific institutions related to food, land, and water		
Actor	**Formal role**	**Relationship with food, land, and water**
The Amazon Institute of Scientific Research (SINCHI) **Policy Domains: Land+Water** **Under MADS**	SINCHI is responsible for obtaining, storing, analysing, studying, processing, supplying, and disseminating basic information on the biological, social, and ecological reality of the Amazon for the management and use of renewable natural resources and the environment of the region. Support to the Ministry of the Environment and Sustainable Development in the coordination of the management of information on the relations between the economic and social sectors and of the processes and resources of the Amazon.	The focus of SINCHI is primarily on the **land** and **water** sectors. SINCHI organizes and implements research relating to the ecosystems of the Amazon region and provides support to the Ministry of Environment and Sustainable Development.
The Jhon Von Neumann Pacific Environmental Research Institute (IIAP) **Under MADS**	IIAP collaborates with the Ministry of Environment and Sustainable Development in accordance with its guidelines in the promotion, creation, and coordination of a network of research centers, in which the entities that develop research activities participate. It operates under the direction of IDEAM, the Environmental Information System, in coordination with corporations, territorial entities, populated centers and other institutions of the SINA, in accordance with the guidelines set by the Ministry of Environment and Sustainable Development.	IIAP is most relevant to the **land** and **water** sectors because it focuses on biodiversity and natural ecosystems.
Institute for Marine and Coastal Research (INVEMAR) **Under MADS**	INVEMAR falls under the Ministry of Environment and Sustainable Development and aims to obtain, store, analyse, study, process, provide, coordinate, and disseminate basic information on oceanography, marine ecosystems, their resources, and processes for the knowledge, management, and use of marine resources.	INVEMAR has the closest relevance to the freshwater sector but is not closely related to the three food, land, or water sectors.

In addition, there are also five companies for the financing of state-owned enterprises in various economic sectors. These include the National Development Funder (FDN), Territorial Development Institution (FINDETER), the Agricultural Development Trust Society (FIDUAGRARIA), the Agrarian Bank of Colombia (BANAGRARIO), and the Agricultural Sector Financing Fund (FINAGRO). **Table 8** shows the list of the companies, their formal role 'de jure', and their relationship with food, land, and water policies.

Table 8. Financing institutions related to food, land, and water policies.

Financing institutions related to food, land, and water		
Actor	**Formal role**	**Relationship with food, land, and water**
The National Development Funder (FDN)	FDN is a financial corporation, unique in Colombia and one of the few in Latin America, specializing in the financing and structuring of infrastructure projects. It falls under the Ministry of Finance and Public Credit.	FDN has equal relevance to **all three sectors** in that it is a potential source of funding for all three.
The Territorial Development Institution (FINDETER)	FINDETER partners with the National Government and territorial entities for the planning, structuring, financing, and execution of sustainable projects that transform territories.	FINDETER could have relevance for all three, considering all three sectors have development implications. **Food** and **water** may have a little more relevance than land.
The Agricultural Development Trust Society (FIDUAGRARIA)	FIDUAGRARIA is dedicated to designing and structuring fiduciary products and schemes, which fit the needs of natural and legal persons, whether in the private or public sector, providing trust between the parties, taking our clients to the closing of businesses and the administration of their investments where their participants obtain a profit, under BANAGRARIO, the parent company.	FIDUAGRARIA has the most relevance for the **food** sector, as it provides financial solutions for agricultural investments.
The Agrarian Bank of Colombia (BANAGRARIO)	BANAGRARIO is focused on expanding agricultural credits, providing support and expertise, and aiding digital transformation.	Like FIDUAGRARIA, BANAGRARIO provides **loans** and **credits** to the agricultural sector.
The Agricultural Sector Financing Fund (FINAGRO)	The Fund for the Financing of the Agricultural Sector is an entity that promotes the development of the Colombian rural sector, with financing instruments and rural development that stimulate investment.	FINAGRO is most relevant for the food sector but does have some relevance for both water and land as well.

Finally, other important entities that don't fit neatly into any of the other government categories include the National Environmental Fund (FONAM), under the Ministry of Environment and Sustainable Development; the Colombian Agricultural Research Corporation (AGROSAVIA) and the Peasant Family Compensation Fund (COMCAJA) under the Ministry of Agriculture and Rural Development. **Table 9** shows the list of the companies, their formal role 'de jure', and their relationship with food, land, and water policies.

Table 9. Other institutions related to food, land, and water policies.

Other institutions related to food, land, and water		
Actor	**Formal role**	**Relationship with food, land, and water**
The National Environmental Fund (FONAM) **Under MADS**	FONAM is a special system of management of accounts of the Ministry of the Environment, with legal status, independent assets, without administrative structure or personnel and with jurisdiction throughout the national territory. It finances the execution of activities, studies, research, plans, programs and projects, of public utility and social interest, aimed at strengthening environmental management, preservation, conservation, protection, improvement and recovery of the environment and the proper management of renewable natural resources and sustainable development.	As an entity primarily concerned with providing support for activities that strengthen environmental management, conservation, and preservation of ecosystems, FONAM has most relevance for the **land** and **water** sectors.
Colombian Agricultural Research Corporation (AGROSAVIA) **Under MADR**	AGROSAVIA works in the generation of scientific knowledge and agricultural technological development through scientific research, adaptation of technologies, transfer and advice in order to improve the competitiveness of production, equity in the distribution of the benefits of technology, Sustainability in the use of natural resources, strengthening the scientific and technological capacity of Colombia and contributing to raise the quality of life of the population.	AGROSAVIA is most relevant to the **food** sector, through the provision of research and knowledge production in the agricultural sector.
Peasant Family Compensation Fund (COMCAJA) **Under MADR**	COMCAJA is a family subsidy corporation and as a non-profit legal entity, belonging to the agricultural sector and linked to the Ministry of Agriculture; it has a presence in 4 departments and in the rest of the country, offers services through Intercajas agreements.	COMCAJA is most relevant to the **food** sector, considering it is under the purview of the Ministry of Agriculture and provides support to small farmers.

In general, most of the mapped institutions play active roles across the three policy arenas: food, land, and water. This interconnected involvement stems from the fact that institutions with clear mandates in one arena can significantly influence policies in others, reflecting the inherent interdependence of the food, land, and water sectors. For instance, the Ministry of Agriculture and Rural Development primarily focuses on food security encompassing aspects such as food access, distribution, availability, and quality. It inherently impacts land distribution (including land tenure and restitution) and water management for agricultural production.

This result underscores the imperative to approach institutional and policy mapping in Colombia's food, land, and water arenas as a singular, interdependent system rather than distinct and isolated arenas. Results indicate a predominant engagement of actors in the food policy arena, followed by the land policy arena and, subsequently, the water policy arena. This prioritization aligns with the essential role of water and land as fundamental inputs in the agri-food system, which is crucial for food production.

The food and land policy arenas predominantly fall within the purview of the agricultural, fishing, and rural development sectors, primarily executed through the Ministry of Agriculture and Rural Development. Affiliated entities within the Ministry, such as the Rural Land Planning Unit (UPRA), the Rural Development Agency (ADR), the National Land Agency (ANT), and the Colombian Agricultural Institute (ICA), contribute significantly to these policy

arenas. Furthermore, institutions strengthened during the peace process, notably the Land Restitution Unit (URT), play a pivotal role in land policy, specifically addressing land tenure.

Conversely, the land and water policy arenas align more closely with the environmental and sustainable development sector, orchestrated through the Ministry of Environment and Sustainable Development. Administrative units, including the Natural Parks of Colombia, and scientific institutions contribute to these arenas by emphasizing the conservation and sustainable development of natural resources, particularly land and water. Importantly, the interdependence of these sectors is evident, as institutions with clear roles in land-related issues are concurrently involved in water-related matters. These dynamic underscores the comprehensive approach required, where policies are implemented through the Ministry of Agriculture and Rural Development, focusing on land and water for agricultural productivity, and the Ministry of Environment and Sustainable Development, prioritizing the conservation of natural resources, particularly for rural communities.

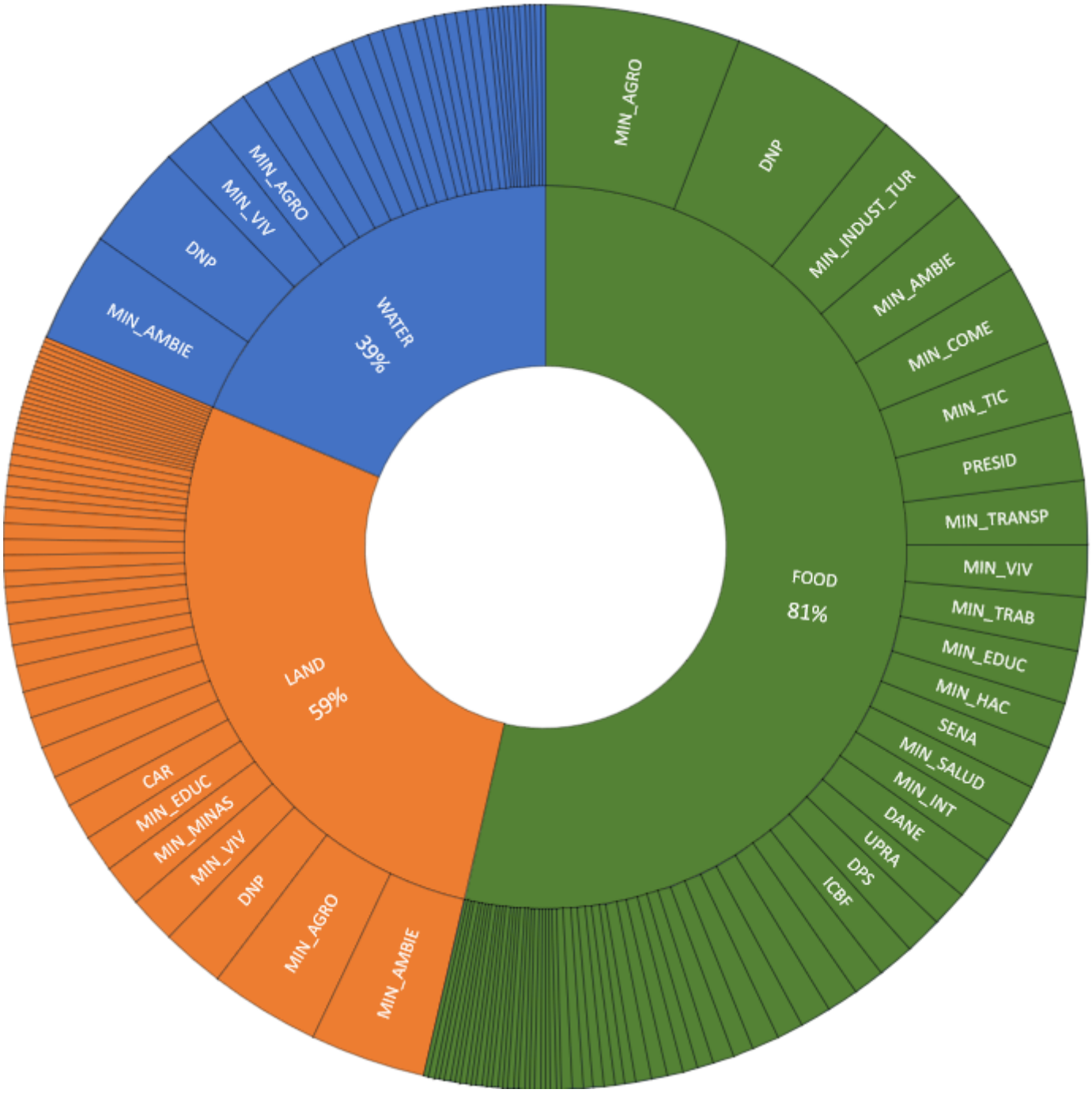
4.2 Policy Mapping: food, land, and water policies in Colombia

The policy mapping analysis delves into the intricate landscape of policies associated with the food, land, and water sectors in Colombia, examining two critical dimensions: (i) the entities steering the outcomes of policies in these domains and (ii) the primary areas of intervention or objectives delineated by these mapped policies. This involved the creation of a comprehensive policy database encompassing laws, policies, regulations, and guidelines pertinent to each thematic area.

Every relevant policy instrument was considered during this search, and a review and analysis of each policy document ensued. The resulting database encapsulates crucial information across various variables, including objectives, year of enactment, reference number, policy phase (formulation, implementation, and evaluation), target population, institutional actors, and thematic and impact areas. In total, 122 public policies were documented, further categorized into 54 in the food sector, 38 in the land sector, and 30 in the water sector. This systematic approach ensures a foundation for a nuanced understanding of the multifaceted policy landscape shaping Colombia's food, land, and water sectors.

Regarding the first objective, based on the information collected, 79 actors involved in the country's food, land, and water sectors were identified. Most actors are control bodies, state agencies, presidential agencies, research centers, and universities contributing to the mapped policies. Figure 3 shows the most important actors and their participation in each sector. Results show that eighty-one percent (81%) of the actors are involved in the food sector, 59% in the land sector, and 39% in the water sector. The Ministries of Agriculture and Rural Development (MIN_AGRO), the Ministry of Environment and Sustainable Development (MIN_AMBIE), and the National Planning Department (DNP) are the top three most important actors in the country's food, land, and water policy arenas.

Figure 2: Participation of actors within the food, land, and water policy arenas. Source: Author's elaboration**.**



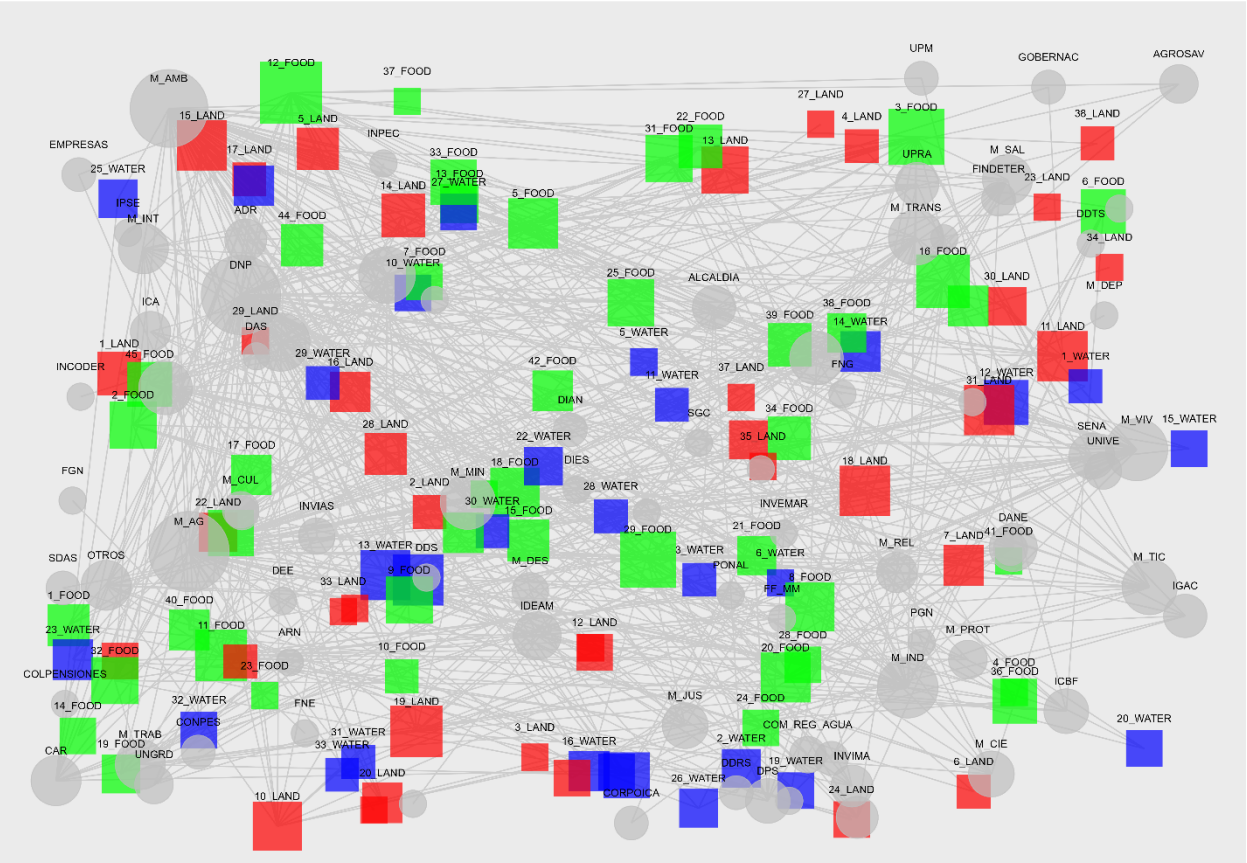
In greater detail, Error! Reference source not found. shows the number of policy instruments that each actor is involved in by sector. For example, the Ministry of Agriculture and the National Planning Department (DNP) participated in more than 20% of the policies analyzed in the food sector. On the other hand, in the land and water sectors, the Ministry of Environment and Sustainable Development (MIN_AMBIE) has the greatest participation in the public policies of these sectors, however, Ministry of Agriculture and the National Planning Department (DNP) also have an important participation, while the regional autonomous corporations, and the mayors have a secondary role (See Figure 3). Consequently, some actors have a greater potential than others to function as a bridge between sector arenas and at different stages of public policies (agenda setting, formulation, implementation, and evaluation).

In addition to the above, in practical terms, there are many barriers and limitations to coordinating public policies in the Colombian agri-food system. For example, budget, geographical focus, and knowledge limitations prevent a deeper articulation between actors and public policies. In this sense, network analysis of public policy can reveal

some barriers and offer insights into possible opportunities to improve coordination among actors. This analysis also reflects which actors are better positioned to connect different sectors in agri-food policies. In this sense, the database also provided information on the actors, institutions, and government sectors participating in each policy. This information makes it possible to create links between actors involved in the food, land, and water sectors.

Figure 3 offers a visual depiction elucidating the relationships between institutions and their associated policies. Of particular significance are the Ministries of Agriculture and Rural Development (MIN_AGRO), the National Planning Department (DNP), and the Ministry of Environment and Sustainable Development (MIN_AMBIE), portrayed with larger nodes. This deliberate sizing signifies their engagement with a substantial number of policies—specifically 66, 64, and 60, respectively. The magnified representation of these key institutions underscores the concentrated influence of a select few actors in steering the trajectory of the country's food system. This visualization emphasizes the pivotal roles played by these institutions, shedding light on the centralized nature of policy influence within the broader context of Colombia's food, land, and water sectors.

Figure 3. Network of the Colombian Agri-food system actors and policies. Note: Policies are represented by squares, while circles depict stakeholders and institutions. The color-coded scheme designates green for food domain policies, blue for water policy domains, and red for land policy domains. The size of the figures and the connecting lines between them indicate the number of interactions each has**.**



Source: Author's elaboration.

Upon conducting a more in-depth analysis of the network, we employed calculations for eigen centrality, closeness, and betweenness indicators. These metrics serve to gauge the significance and standing of actors within their network connections to policies and other institutions. To begin with, the eigen centrality indicator illuminates that the DNP holds the highest prestige in the network, establishing pivotal connections with policies essential to all actors. This underscores the indispensable technical role of institutions like the DNP, complementing the political and financial dimensions of ministries crucial for policy formulation and implementation.

Moving to the second indicator, which identifies the actor or policy facilitating connections with all institutions, the Ministry of Agriculture emerges as the linchpin, registering a noteworthy result of 0.0026. This finding aligns

seamlessly with our earlier observation that this actor is intricately linked to a greater number of policies, providing it with the ability to engage with every institution in the network and facilitating interactions across diverse policies.

Lastly, the betweenness indicator unveils a value of 5353.85, spotlighting actors that function as bridges between policies. In this context, the Ministry of Agriculture assumes a pivotal role as the primary bridge, enabling actors devoid of prior connections to policies to become actively involved in the network. This nuanced examination enhances our understanding of the network's strategic positioning and influence dynamics, shedding light on the critical roles played by key actors and institutions.

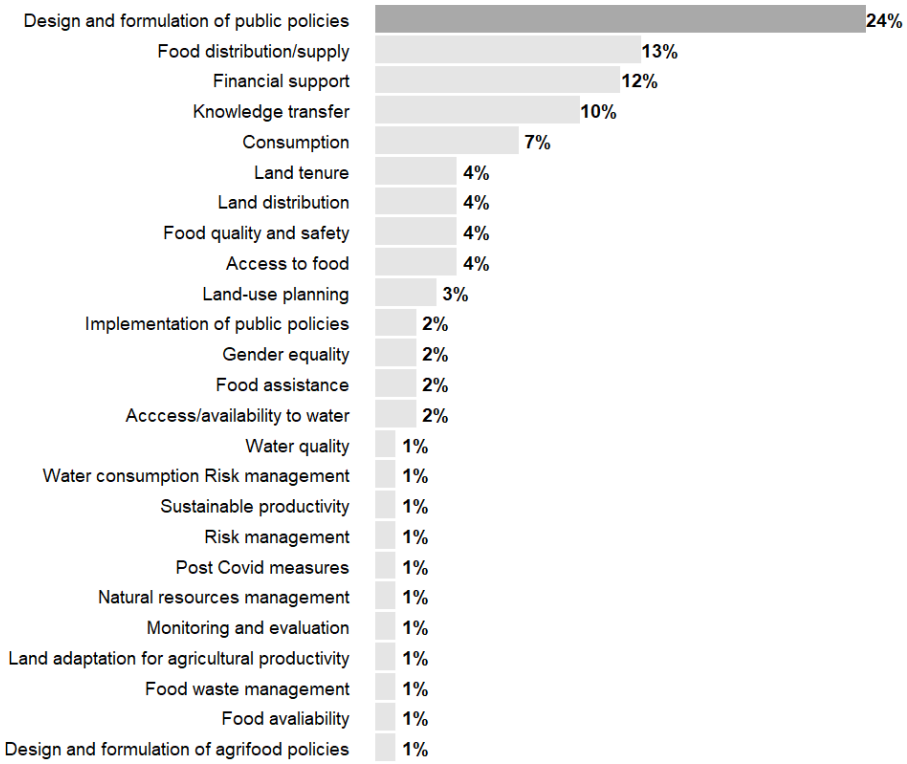
The previously highlighted actors—namely, the Ministry of Agriculture and Rural Development (MIN_AGRO), the Ministry of Environment and Sustainable Development (MIN_AMBIE), and the National Planning Department (DNP)—share a distinctive trait: they possess the authority to oversee and enforce sanctions on others, integral to their formal roles. However, it's noteworthy that these entities are not entirely self-sufficient; they rely on collaborations with other actors to fulfill their functions effectively. In contrast, actors with fewer connections tend to exhibit a more localized or regional scope, including universities, mayors, and governors (See Figure 4). These entities may have narrower networks but play essential roles within their specific geographic domains, contributing to the overall diversity and functionality of the network.

Concerning the second objective outlined in this section, an analysis of 113 mapped policies in the food, land, and water sectors allows for approximating the Colombian government's institutional perspective regarding the nature of the issues and primary solutions within each sector. To achieve this, categories were devised to succinctly capture the core focus of each policy based on its stated objectives.

Beginning with the food sector, examining sixty-four (64) policies reveals a spectrum of twenty-five distinct objectives[2]. The predominant objectives observed in these policies are as follows: the design and formulation of public policies, constituting 24% of the policies; food distribution and supply, accounting for 13.1%; and financial support, representing 12% (See Figure 4). This categorization provides a clear overview of the emphasis on these key areas within the food sector policies, shedding light on the government's strategic priorities in addressing challenges and implementing solutions.

Figure 4. Categorization of the objectives of food sector policies in Colombia.

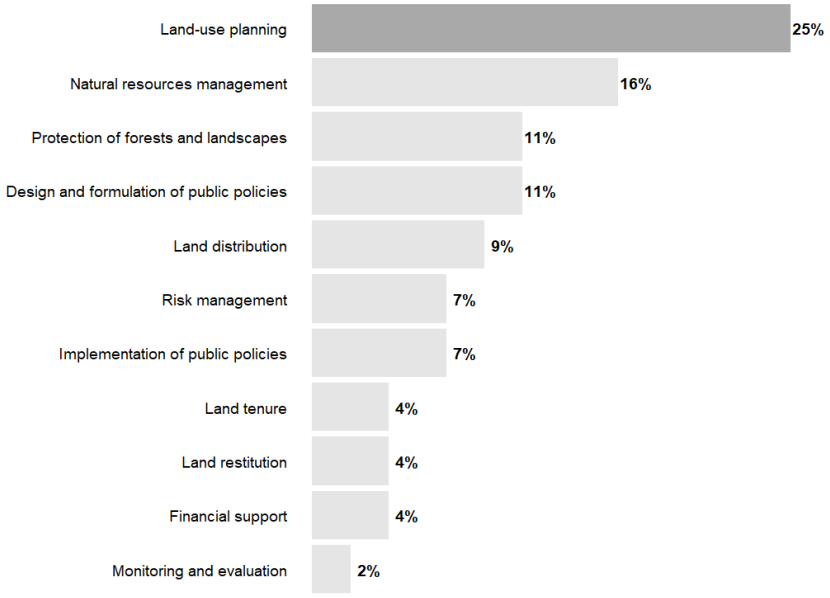
2 Access/availability to water, Access to food, Consumption, Design, and formulation of public policies, financial support, Food Assistance, Food availability, Food distribution/supply, Food quality and safety, Implementation of public policies, Knowledge transfer, Land-use planning, Land distribution, Land tenure, Monitoring and evaluation, Natural resources management, Risk management, Water consumption, and Water quality.



Turning to the land sector, an examination of the 47 identified policies in Colombia reveals eleven distinct objectives[3]. The prevalent objectives within these policies include land-use planning, constituting 25.5%; natural resource management, accounting for 16.4%; and the protection of forests and landscapes, representing 10.9% (See Error! Reference source not found.). Notably, despite previous sections underscoring the significance of access, distribution, and formalization of land as a primary source of conflict in the country, it's striking that the number of policies in the land sector explicitly addressing these concerns—such as land distribution, land tenure, and land restitution—is less than 10% (See Error! Reference source not found.). This observation raises questions about the policy landscape's alignment with the acknowledged challenges and emphasizes potential areas for policy development and refinement in the pursuit of comprehensive land management.

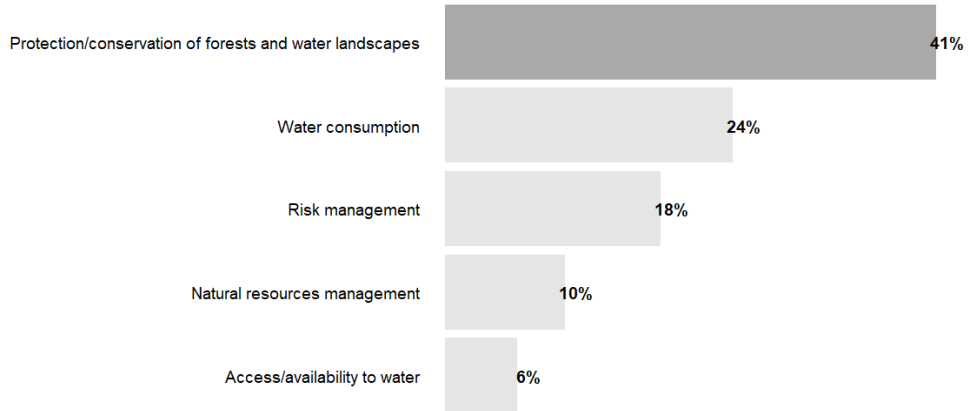
3 Land-use planning, Natural resource management, Protection of forests and landscapes, Design and formulation of public policies, Land distribution, Risk Management, Implementation of public policies, Land tenure, Land restitution, financial support, and Monitoring and evaluation.

Figure 5: Categorization of the objectives of land sector policies in Colombia. Source: Author's elaboration**.**



In the water sector, the examination of thirty-one (31) mapped policies unveils a concentration on five distinct objectives[4]. Among these, the most prevalent are the protection and conservation of forests and water landscapes, comprising 41%; water consumption, accounting for 21%; and risk management, representing 18% (see **Error! Reference source not found.**). This clustering of policy objectives provides insight into the prioritized areas within the water sector policies. The emphasis on conservation and risk management suggests a concerted effort to address environmental sustainability and resilience in the face of potential challenges. This nuanced understanding of policy objectives in the water sector contributes to a comprehensive view of the government's strategic priorities in managing and safeguarding water resources.

Figure 6: Categorization of the objectives of water sector policies in Colombia. Source: Author's elaboration.



The comprehensive analysis of policy objectives within each sector offers valuable initial insights, exposing variations both within and between sectors. Notably, sectors such as food display a higher number of objectives, a reflection

4 Access/availability to water, Natural resources management, Protection/conservation of forests and water landscapes, Risk management, Water consumption.

of their inherent complexity and multifaceted nature. In contrast, sectors like land or water present a more streamlined set of objectives, indicative of their specific operational focus. This nuanced understanding underscores the need for tailored approaches in policy formulation and implementation, acknowledging the unique challenges and intricacies that characterize each sector. Such insights contribute to a more informed and targeted policymaking process, aligning strategic objectives with the nuanced realities of each sector for more effective and impactful outcomes.

4.3 Institutional and Policy Landscape Analysis: Complementarities and Overlaps

The analysis of the institutional and policy landscape pertaining to the food, land, and water sectors in Colombia reveals a harmonious relationship between the formal level—defined by the roles and responsibilities of actors within the institutional structure of the Colombian State, as elucidated in the institutional mapping (Section 3.1)—and the informal level, which encompasses the actual engagement and contributions of these actors in formulating, implementing, or evaluating policies within the mapped domains (as delineated in the policy mapping, Section 3.2).

At the formal level, the institutional mapping results outline the involvement of 31 institutions distributed across various categories, including i) Ministries (6); ii) Special Administrative Bodies (5); iii) Administrative Bodies (2); iv) Public Establishments (4); v) National Agencies (3); vi) Scientific institutions (3); vii) Financing institutions (5); and viii) other actors (3). These entities, as per the regulations of the Colombian State, bear the responsibility for formulating, implementing, or evaluating policies related to the food sector primarily, followed by the land sector and the water sector in second and third place, respectively. This formal alignment underscores the structured and hierarchical nature of the institutional framework governing policies in these critical sectors.

Conversely, at the informal level, the results of the policy mapping highlight the active involvement of 79 actors in the formulation, implementation, or evaluation of 113 public policies related to food (64), land (47), and water (31) sectors in Colombia. In alignment with the institutional mapping outcomes, the policy mapping underscores that 81% of actors are engaged in the food sector, 59% in the land sector, and 39% in the water sector. This correspondence reflects a proportional relationship between the institutions designated with the responsibility of designing and implementing public policies in the three sectors and the practical engagement of these institutions in policy-related activities within the realms of food, land, and water. These findings illuminate the synergy between the formal roles ascribed by the institutional structure and the active contributions of actors in shaping the policy landscape across these critical sectors.

In summary, while most institutions overseeing policies extend across the food, land, and water sectors, there is a notable concentration of actors and policies within the food policy arena. This concentration primarily revolves around economic activities related to agricultural production, often centered in the agrifood sector. In contrast, both the land and water policy arenas exhibit a stronger emphasis on environmental activities, specifically directed towards the conservation of natural resources in their respective sectors. This dichotomy is a defining characteristic across the government entities and policies in Colombia concerning the food, land, and water sectors.

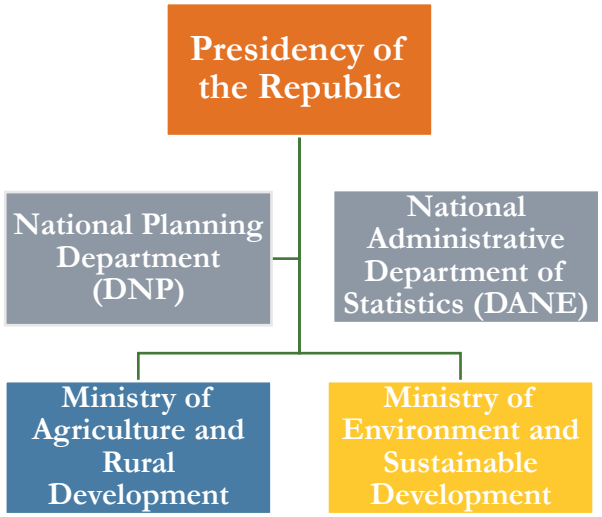
Furthermore, the results indicate a clear interdependence among institutions and policies across these sectors. For instance, food security, encompassing aspects such as food access, distribution/supply, and the quality of food, is intricately linked to land tenure patterns, including the protection of forests and landscapes, land-use planning, land distribution, and restitution, as well as natural resources management and soil conservation. Similarly, water management, covering elements like the protection of forests and water landscapes, access/availability to water, water quality and consumption, and natural resources management, is interwoven with the broader framework. This interconnectedness underscores the necessity of analyzing the food, land, and water arenas as a cohesive and interdependent system, rather than treating them as three distinct entities, for a more accurate institutional and policy mapping in Colombia.

The institutional and policy mapping reveals that two Ministries—the Ministry of Agriculture and Rural Development (MADR) and the Ministry of Environment and Sustainable Development (MADS)—along with two Administrative Departments—the National Planning Department (DNP) and the National Administrative Department of Statistics (DANE)—stand out as the key public institutions playing a pivotal role in formulating, implementing, and evaluating policies related to food, land, and water systems in Colombia (See **Figure**).

The Ministry of Agriculture and Rural Development concentrates its efforts on the economic facets of agricultural productivity, land tenure, and water management, primarily aiming to ensure food security in Colombia. In contrast,

the Ministry of Environment and Sustainable Development focuses on environmental protection and the conservation of natural resources, particularly in the domains of land and water. This division of responsibilities underscores the complementary roles played by these institutions, addressing both economic and environmental perspectives to foster sustainable development in the interconnected realms of food, land, and water.

Figure 7. Main food, land, and water government actors in Colombia



The analysis of Colombia's agri-food system's institutional and policy landscape reveals a notable degree of centrality, where a select few actors wield various sources of power—legal (authority), financial (resources, budget), and technical (assistance). The Ministry of Agriculture and Rural Development and the Ministry of Environment and Sustainable Development emerge as influential decision-makers, shaping the design, implementation, and evaluation of public policies across the food, land, and water systems, leveraging their legal, political, and financial prowess. Concurrently, the National Planning Department (DNP) holds a preeminent position in terms of technical power, steering planning, and resource allocation for policy development, while the National Administrative Department of Statistics (DANE) plays a crucial role in furnishing data to support the implementation of policies in these domains.

In essence, the Agriculture and Rural Development sector takes the lead in food and land policies, emphasizing a production-oriented approach. Conversely, the Environment and Sustainable Development sector concentrates on water and land policies from a perspective rooted in the conservation of natural resources. This delineation underscores the interplay between legal and financial roles of ministries and the technical contributions of the DNP and DANE. Given the interconnected nature of many agri-food policies, effective inter-institutional coordination among these actors becomes imperative for ensuring the comprehensive success and targeted impact of the agri-food system in Colombia. The synthesis below encapsulates the institutional and policy analysis findings within each of the three policy arenas: food, land, and water.

5. CONCLUSIONS

The institutional and policy landscape analysis of Colombia's agri-food system reveals a harmonious relationship between the formal roles assigned by the state's institutional structure and the active participation of these actors in the formulation, implementation, or evaluation of mapped policies. The institutional mapping identifies 31 institutions entrusted with the responsibility of shaping policies within the food, land, and water sectors. The food sector stands out with the highest number of institutions involved in policy formulation, followed by the land and water sectors.

In tandem, the policy mapping illustrates the engagement of 79 actors in the formulation, implementation, or evaluation of 113 public policies across the three sectors. Consistent with the institutional mapping, 81% of actors are engaged in the food sector, 59% in the land sector, and 39% in the water sector. Notably, two Ministries—the Ministry of Agriculture and Rural Development (MADR) and the Ministry of Environment and Sustainable Development (MADS)—along with two Administrative Departments—the National Planning Department (DNP) and the National Administrative Department of Statistics (DANE)—emerge as key players, leveraging their legal, political, financial, and technical resources in steering policies related to food, land, and water systems.

The institutional and policy mapping underscores the interdependence of these institutions and policies, revealing a correspondence between the proportion of institutions tasked with policy design and implementation in each sector and the practical engagement of these institutions in policy-related activities. While many institutions span all three sectors, their work focus can be categorized based on their emphasis on economic activities for agricultural production, primarily in the food sector, or on environmental activities for the conservation of natural resources, with a more pronounced focus on the land and water sectors. The Ministry of Agriculture and Rural Development plays a pivotal role in implementing policies with an economic perspective, emphasizing agricultural productivity, land tenure, and water management to ensure food security in Colombia. This production-oriented dimension encompasses policies related to sustainable land use and water management for agricultural and livestock production.

The environment and sustainable development sector, spearheaded by the Ministry of Environment and Sustainable Development, assumes a pivotal role in Colombia, prioritizing environmental protection and the conservation of natural resources, particularly focusing on water and land. This environmental dimension is manifested through policies dedicated to sustainable development, climate change, and the production, conservation, and restoration of ecosystem services. Notably, the sector actively promotes projects centered on agro-environmental, agroforestry, and silvopastoral systems, thereby strengthening the agro-environmental policy agenda in the country.

The interdependence of institutions and policies across food, land, and water becomes evident. For instance, food security, encompassing aspects like food access, availability, and quality, is intricately linked to land use patterns and water management. While focused on policies spanning multiple sectors, these findings underscore that institutions emphasize the food sector, as evidenced by both the institutional and policy mapping analyses.

The food policy arena emerges as the most developed and interdependent among the three systems, boasting many actors and policy instruments. Led by the Ministry of Agriculture and Rural Development, this sector encompasses food production and agriculture, food nutrition and security, and food trade. The national policy instruments in food policy often involve cross-sectoral collaboration, including environmental and sustainable development sector contributions.

The land policy arena is a complex domain with complementary objectives from the agricultural, fishing, and rural development sectors (focused on land as an input for agricultural production) and the environment and sustainable development sector (emphasizing natural resources conservation). It addresses diverse issues, including economic activities for agricultural production and food security, alongside environmental activities for land and ecosystem conservation.

The water policy arena, intricately connected to the land policy arena, is primarily developed through the environment and sustainable development sector, emphasizing natural resources conservation and sustainable development. Simultaneously, the agricultural, fishing, and rural development sectors, implemented through the Ministry of Agriculture and Rural Development, emphasize water as a crucial input for agricultural production.

In summary, recognizing the interdependence of agri-food policies in Colombia, a systemic approach is crucial for accurate institutional and policy mapping related to food, land, and water systems. This necessitates a holistic vision for coherence and intersectoral articulation with other sectors. An important next step involves understanding how these sectors are integrated into individual policies and goals, evaluating the level of coherence within each policy across the food, land, and water sectors.

References

Álvarez, M. D. (2020). Forests in the time of violence: conservation implications of the Colombian war. In *War and Tropical Forests* (pp. 49-70). CRC Press.

Arfa, I. a.-R. (2021). Assessing policy coherence in the Water-Food-Ecosystems nexus. In *EGU General Assembly Conference Abstracts*.

Babu, S. C. (2014). Introduction to Food Security: Concepts and Measurement. *Food Security, Poverty and Nutrition Policy Analysis*, 7-28. doi:https://doi.org/10.1016/B978-0-12-1

Breisinger, C. a. (2023). CGIAR Initiative on National Policies and Strategies for Food, Land and Water Systems Transformation: 2022 Technical Report.

Del Cairo Silva, C. L. (2012). Environmentalizing Indigeneity: A comparative ethnography on multiculturalism, ethnic hierarchies, and political ecology in the Colombian Amazon. *The University of Arizona*.

Gori, B. a. (2022). Understanding the diversity and biogeography of Colombian edible plants. *Scientific Reports, 12*, 7835.

Graser, M. a. (2020). Peacebuilding in rural colombia—a collective perception of the integrated rural reform (IRR) in the department of Caquet{\'a} (Amazon). *Land*, 36.

Maldonado, J. M. (2016). Indigenous peoples, natural resources, and peacebuilding in Colombia. In *Governance, Natural Resources and Post-Conflict Peacebuilding* (pp. 605-626). Routledge.

March, J. G. (1983). The new institutionalism: Organizational factors in political life. *American political science review*, 734-749.

March, J. G. (1984). Gossip, information and decision making. *Advances in information processing in organizations*, 95-107.

Nicol, A. a. (2023). Policy coherence: Essential to strengthening policy impact across CGIAR initiatives.

Nilsson, M. Z. (2012). Understanding Policy Coherence: Analytical Framework and Examples of Sector-Environment Policy Interactions in the EU. *Environmental Policy and Governance*, 395-423. doi:https://doi.org/10.1002/eet.1589

North, D. C. (1994). Economic performance through time. *The American economic review*, 359-368.

Núñez, J. a. (2018). Assessing the impact of climate change on agriculture in Norte de Santander, Colombia. In *Journal of Physics: Conference Series* (p. 012045). IOP Publishing.

Ostrom, E. (2009). *Understanding institutional diversity*. Princeton university press.

Pardo Martinez, C. I. (2018). Climate change in Colombia: A study to evaluate trends and perspectives for achieving sustainable development from society. *International Journal of Climate Change Strategies and Management*, 632-652.

Primi, A. a. (2009). *Theory and practice of industrial policy: evidence from the Latin American experience*. eclac.

Rodríguez-de-Francisco, J. C.-G.-T.-G. (2021). Post-conflict transition and REDD+ in Colombia: Challenges to reducing deforestation in the Amazon. *Forest Policy and Economics*, 102450.

Runhaar, H. D. (2006). Policy analysis for sustainable development: The toolbox. *International Journal of Sustainability in Higher Education*, 34-56. doi:https://doi.org/10.1108/14676370610639236

Seymour, F. a. (2016). *Why forests? Why now?: The science, economics, and politics of tropical forests and climate change*. Brookings Institution Press.

Tapasco, J. a. (2019). The livestock sector in Colombia: toward a program to facilitate large-scale adoption of mitigation and adaptation practices. *Frontiers in Sustainable Food Systems*, 61.

Unruh, J. D. (2019). Crafting land restitution in Colombia: Optimizing a legal, social and institutional framework. *Land Use Policy*, 403-405.

Vujadinović, D. F. (2023). Gender-Competent Legal Education. *Springer International Publishing*. doi:https://doi.org/10.1007/978-3-031-14360-1

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