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The Influence of National Forestry Policy on Rural

Development in Colombia:

Case Analysis Sierra Nevada De Santa Marta,

Department of Magdalena

MASTER'S THESIS

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Declaration

I hereby declare that I have done this thesis entitled **The Influence of National Forestry Policy on Rural Development in Colombia: Case Analysis Sierra Nevada De Santa Marta, Department of Magdalena** independently. All texts in this thesis are original, and all the sources have been quoted and acknowledged using complete references and according to Citation rules of the FLD.

In Prague date 04/12/2021

.....
Luis David Villarreal Patiño

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I want to thank my family for the support and care throughout my study period. Also, would like to express my gratitude to all the people that cheer for me during the writing of this project, to my supervisor doc. Ing. Miroslav Hajek, Ph.D. for his patience, and guidance to help during these hard times, to the ECOLSIERRRA network of small farmers for providing me with needed information to carry out this research successfully, most especially to the CEO Ing. Victor Cordero, and Finally to all the Teachers and Workers from the Czech University of Life Sciences, that made me feel that the campus is like a second home while far from mine.

Abstract

Analyzing the Colombia's national forest policy based on local environmental governance models, using qualitative and quantitative method, through bibliographies, complemented with jurisprudential, regulatory normativity, and actual forest policies in order to have an objective point of view, in combination of socio-ecological systems methodologies and rapid evaluation approaches of innovation systems in agriculture and that through a competence work with the civilian population and official expenditures in the discussion of public and environmental affairs, and through programs for forest policy purposes, they can be executed by the population concerned of socioecological and economic projects, initiating with A fair and inclusive vision with Dem Order Hide to build and creating new legal forms in terms of management of common goods with forest resources of the Colombian nation. And likewise, it is based on a development of discovering, creating legal treaties, and even with the help of international agreements.

We consider too important that within the international policy on environmental legislation, the country's authorities can know the population culturally their level of awareness and knowledge in environmental management and forestry policy which is of relevance in the Creation of communication projects between representatives of the State and the population with the same guidelines, and thus create the interaction between the actors in public policies related to the issue of National Forestry and also with environmental governance models.

Keywords: Forestry Resources; Conservation; Socio-Economic Development; Forestry Benefits, Environmental Regulation, Forestry Policy, Environmental Public, Socioecological Systems.

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List of the abbreviations used in the thesis

Agustín Codazzi Geographical Institute (IGAC)

National Environmental Licensing Authority (ANLA)

Colombian American Agricultural Technical Service (STACA)

Forest Incentive Certificate (CIF)

Institutional Analysis Guide (IAD).

Intersectoral Pact for Legal Timber (PIML)

Ministry of Environment and Sustainable Development (MADS)

Municipal Agricultural Technical Assistance Unit (UMATA)

National Council for Economic and Social Policy (CONPES)

National Strategy for Prevention, Monitoring, Control, and Forest Surveillance (ENPSCVF).

Observatory of Redistributive Environmental Conflicts (OICAR)

Sustainable Development Objectives (ODS)

Organization for Economic Co-operation and Development (OECD)

Rapid Appraisal of Agricultural Innovation System (RAAIS)

Socio-Ecological Systems (SES)

Upper Middle-Income Countries (MIC)

2. Introduction and Literature Review

2.1. General introduction

The Forest policies of the Colombian State must be oriented towards the use of the potential offered by the ecosystem and guided towards the contribution for the solution of global level problematics such as Climate Change and Deforestation of the Amazonia. Such Policies were consigned on the United Nations Framework Convention on Climate Change (UNFCCC, 1994) and The Colombian National Forestry Regulatory Framework was created as a response to implement such solutions and create activities that allow the strengthening of the environment as a socio-ecological and economic strategy.

Colombia is known as the second most biodiverse country in the world, having at the same time a tremendous responsibility for possessing 4% of the world forest, (Represented in Tropical Forests, Both Dry and Humid), that contribute significantly to the reduce global emissions and maintaining the habitats of innumerable species in biodiversity terms.

In other words, the forest problem in Colombia is linked to the means of production and the forms of use of wood, with which we must question how to have a sustainable development, positioned in the current regulations and laws of the country. In this research, an attempt will be made to demonstrate the different approaches to the gaps in the regulations in terms of forest policy, through the participatory process of the communities with the State with different mechanisms such as workshops, meetings of the university society with inhabitants of the sector, and social institutions, and compile community standards, supported by new proposals and methodological tools. In this way, it is intended to deliver a work with concepts or tools that together with jurisprudence allow to overcome inconveniences that are useful for forestry policy activities, considering that many of them derive from the coexistence of laws or decrees.

2.2. Literature review

The institutional analysis of the stakeholders that serves as the basis for understanding the interrelation and dynamics between the subjects that influence the analysis of actors, assets, environmental conflicts, and production systems associated with agroforestry systems.

As Freeman (1994) and Mitchell et al. (1997) mentioned, *“The importance of implementing analysis from the actors' approaches can be located in the interest, the position, the level of interaction, the degree of influence, among other aspects, which after analyzing their importance in the cases analyzed, serve as a basis for defining assessment and evaluation criteria”*. In accordance with the previous quote, is stated that, the analysis of Colombians forest policy, should be based on the instruments and normative legislation, which determine the authority's powers, the forest incentives, and the National Planning Department (CONPES) Forest Policy Documents.

Based on the above, we should research how Colombian forest policy models are created, and how these benefits the individuals who carry out reforestation activities through the CIF (Forest Incentive Certificate) Based on the Decree 130 of 2020.

2.2.1. Agroforestry as a new policy for social innovation

The Colombian forestry policies can be determined from financial and economic instruments such as the CIF allowing the creation, promotion and the execution of continuous new forest projects and plantations owned by the State, and the protection of Reserve Territories that otherwise would become forest plantations; In other words, involving the population trough to obtain these certificates; they create forest protected areas and usable forest areas.

With this normative forest crops and usable forest areas can be use on social activities as also commercial activities, that can be regulated with the CIF; Creating the potential for commercial plantation to innovate, such as the production timber for the industrial sector, the capture of CO₂, the protection of riverside forest (Flood and landslide protection) and preventing illegal logging of forests, therefore Colombian congress, having as main objective the sustainability, promotes the Decree 1824 of 1994 and the

Law 139 of 1994 that creates the Forest Incentive Certificate (CIF), giving recognition by the State to initiatives and project, investing directly in new forest plantations.

Likewise, Article 6 of the Law 139 of 1994 creates the Fund for the Financing of the Agricultural Sector (FINAGRO) as the institution that administers CIF and designate the CONPES as the Supervisor organism that administrates where to invest the Funds. The decree 1824 of 1994 regulates Law 139 of 1994, recognizing the execution and imposition of the CIF throughout the Colombian territory. However, it is highlighted that the CIF is not universal since not everyone has access and depends mainly on the policies and destinations that are set by the Ministry of Agriculture and Rural Development.

To provide a context about the national forest policy governance, it is necessary to point out that Colombia is a country with a forestry vocation in accordance with Decree 900 of 1997, the Law 139 of 1994, the paragraph of article 250 of Law 223 of 1995, where the forest stimulus with conservation objectives has been decreed for those areas where the biological and natural systems should be more important than the exploitation such forests, also should be noted that with the approval of Law 1993, the Ministry of the Environment was created (Today the Ministry of Environment and Sustainable Development), whose competence is to order the public sector in charge of the management and conservation of the environment and renewable natural resources, articulating policies within the National Environmental System (SINA).

2.2.2. Theoretical advances on the concept of forest policy

Forest policy in research has had evolution and primarily normative in the historical environmental development in the Colombian countryside, and we could differentiate the concepts of forest policy and forest governance. In relation to forest policy, it involves the participation of the population as local and regional actors in the plan of goals and environmental decision-making, including without distinction of race, sex, or socio-economic stratum; and given this democratization, local communities have achieved virtual space in sectors affected by the exploitation of extraction, unequal distribution. Furthermore, as far as the forest governance on environmental diversity legislation that there is on the investigation of the provisions of forest governance has important reasons of biodiversity that it shares at the southern continental level. Given

that, if we compare cases between countries such as Ecuador and Peru, it means that governance must be guided by standards of environmental biodiversity and areas with strategic protection, with international recognition by multilateral entities such as UNESCO. Furthermore, in the case of San Andrés Island and Amazonas as an example, protection has been given more intensity in our country in terms of sustainability, as forest governance ranks first at the level of species biodiversity.

The passivity of the current forestry policy induces large segments of the mineral resource extraction economy to increase in sectors that ignore environmental justice. Although its habitat is close to cities and mining centers, some actors in the environmental conflict, including local ones, often prefer to deforest to survive in that sector, in which there are no limits to sustainability. Therefore, forest policy should not always lead exclusively to prohibition, but rather take additional measures to promote concrete actions such as reforestation or the development of agroforestry projects; it should deploy measures to protect the natural systems of trees that remain and promote other forest areas, and at the same time, deploy strategies to conserve natural forests.

According to the above, the problem with reforestation policies is that it is seen as an end in itself; and the reality today is the existence of problems such as the degradation and deforestation of forest resources which also involves a dimension of ethics and much awareness. Moreover, as a result, one of the systems used by the Colombian government to promote reforestation is environmental education training and local forest governance models that have been lacking in the implementation of public policy. The forest policy models seek to highlight the need for the importance of conserving these natural assets.

2.2.3. Forest policy models.

Colombia began to structure itself in administration and forest protection with the 2nd Law of 1959, "The Nation's forest economy and renewable natural resources conservation," where seven forest reserves were decreed. Moreover, following this legislative structure, these principles were added to the 1991 Constitution and strengthened with the Law 99 of 1993, with the principles that forest can be used for: the enjoyment of a healthy environment, socio-economic and cultural development, the strengthening of environmental systems, the preservation of the quality of life, and the

protection of State property. In the same way, with the issuance of (Decree-Law 2811 1974) of renewable natural resources and the environment, a System for the establishment of the National Natural Parks regulation, through criteria and categories, five classes of areas were established: **National Park, Natural Reserve, Unique Natural Area, Flora and Fauna Sanctuary, and Via Parque**. Also Decree 877 of 1976 was also crucial for the country's forestry policy, prioritizing uses of the forest resource, its use, and the designation of licenses.

In 1992 Colombia signed the Declaration of the Rio de Janeiro, prioritizing the principles **1 and 4**:

Principle 1: "They have the right to a healthy and productive life in harmony with nature." And Principle 4: "In order to achieve sustainable development, the protection of the environment must be part of the development process and cannot be considered separately."

Product of these principles in Colombia was created the Law 99 of 1993, that stipulate "The State in matters of national forestry management is an agreement between interested parties based on objectives with a vision for landscapes forested areas in which the government must approve and provide plans, focused on initiatives of a social nature involving all sectors with ideas for the land use and the best way to take advantage of the jurisprudential framework regarding natural resources, always required communication and creation for it use."

Likewise, the need to involve the principal stakeholder is established, and empower the feeling of belonging to encourage the forest policies, considering the various interests involved (profit and forests protection). The legislation establishes the need to reach an agreement on responsibilities to obtain good results, in fact, a program based on a forest policy that should integrate aspects of information and commitments with the community. In the same way, the private sector must commit itself, both with the policy, with its application, and with-it daily practice. It also crucial that there is a commitment from the State to facilitate dialogue so that the policy is implemented and coordinated with other policies based on the incorporation of initiatives and that they adapt over time.

2.2.4. Colombian's Forest policy

The Rio+20 Declaration entitled "The future we want" established the need to consolidate new international Agenda and a new govern policy for the countries to fulfill the Sustainable Development Objectives (ODS) (UN, 2012).

The purpose of the United Nations Conference on Sustainable Development (UNCSD) that was held in Rio de Janeiro, Brazil 2012, was to guarantee the political obligation for sustainable development, evaluate progress, identify remaining gaps in the implementation of the results of the central high-level meetings on development and the environment, as well as discuss new challenges in terms of sustainability and economic growth. The exhibition was based on three arguments: the legislative on the institutional for sustainable development; the administration of resources with a green economic idea, focus on the environment and the elimination of world poverty; these issues would be made up the Action Framework (UN, 2012).

The Sustainable Development Goals (SDG) are also known as global goals compromised to end poverty, focused mainly on the importance of peace and justice. They are a universal call-in favor of protecting the planet and guaranteeing a balance between the socio-economic and the environmental. These goals are found in the so-called 2030 Agenda, and it contains 17 SDGs. Today, it is the most important guiding document to achieve a sustainable world, and are focus on these 3 points:

- First, a horizontal dialogue was incorporated between governments, the private sector, academia, and civil society.
- Second, it is based on human rights: importance is given to vulnerable and excluded groups.
- Third, integrating and recognizing the needs of socio-economic arguments and sustainable development, exercising a cry for activity in favor of the human population, the planet, and well-being.

The Colombian State was highlighted for is work since the United Nations Conference on Sustainable Development (UNCSD Rio + 20 in 2012), standing out for being a leader in the placement of the Agenda, is improvement plans and the national planning of environmental policies based on these Sustainable Development Goals (SDG).

2.2.5. Alternatives based on forest policy and governance models

There is big incentive in making decisions that strengthen environmental policies in terms of afforestation, as well as strengthen the institutions that enforce those decisions in the different sectors. With the project "Forests, a space for empowerment for the construction of peace" according with the CONPES 2836 of 1996, the state allows 40 Environmental Authorities to implement 11 Forest Governance instruments from previous projects and implemented advances on the National Forest Policy.

Subsequently an association between Colombia and the European Union, focused on the deforestation problematic, because accordingly to the CONPES 2836 of 1996 on forest policy, the Colombian State has one of the five highest of deforestation of humid tropical forests rates in the world giving the forest issue a great relevance to the country in terms of environmental problems (CONPES, 1996).

Additionally, it results in more significant environmental impact, since Colombia, due to its geographical location, its biodiversity, mountains range varieties and natural groves that occupy a large part of its continental extension. The Degradation and deforestation are the fundamental drawbacks to the forest policy mission. To this great inconvenience, there are other problems such as the significant deficiency and disorganization of the entities with a low level of production and competition in terms of forest policy activity. Since fifty percent of the natural mountains and groves of the country are centered in the fields of aboriginal, Afro-descendant, and

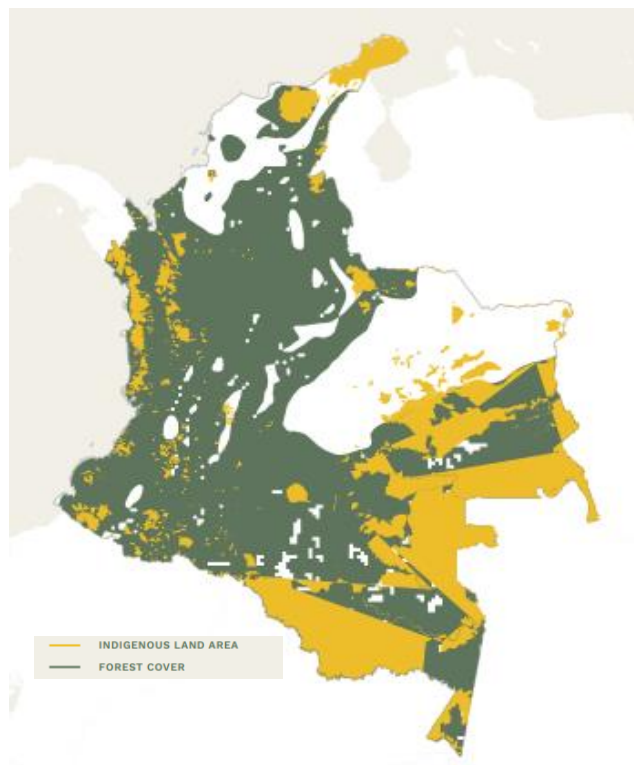


Illustration 1 Indigenous Land Area Map (Global Forest Watch, 2019)

peasant groups. Moreover, in these territorial sites, poverty generally stands out, and by order, the lack of presence of the causal State of armed violence, that is, illegal forestry activity in the Colombian State can be classified respectively high.

It is essential to highlight that it must contribute to overcoming environmental problems and thus generate goods and services where it must become an effective strategic socio-economic sector for environmental development, as well as a protector of nature in sustainable use and, creator or generator of employment, wealth, and welfare factor for the implementation of peace.

2.2.6. The legal framework of forest policies

To contextualize the title of this section in terms of forestry policy, we find that the Law that ratifies the International Treaty of Tropical Timber and FAO in matters of legal instruments. Within the framework of FAO, the following has been mentioned regarding the forest policy of each country *“A national forest policy —which has been approved by the government— represents a shared vision of forests and trees and their use, which has been negotiated by the government and stakeholders. Many countries develop or revise their forest policies to keep ahead of changing circumstances and realize the value that forests represent to society. The number of countries that have issued forest policy statements in the 2000s is almost double that of the 1990s”* (FAO,2010).

In the same way, with the issuance of (Decree-Law 2811 1974) of renewable natural resources and the environment, where the System of National Natural Parks establishes its own regulation through criteria and categories, the five classes of park areas are established National parks: National Park, Natural Reserve, Unique Natural Area, Flora and Fauna Sanctuary, and Via Parque. Decree 877 of 1976 was also crucial in terms of the country's forest policy, and uses of forest resources are prioritized, their use, and the designation of licenses.

Likewise, Colombia ratified the second "International Tropical Timber Agreement in 2011 (Law 1458 of 2011) (CRC, 2011), which was adopted in Geneva on January 27, 2006. The International Tropical Timber Council is the highest body of the International Tropical Timber Organization (ITTO). It is an international body made up of 60 States of the Organization: 33 of them are producers, and 26 countries are consumers. ITTO

partners make up 90% of the universal tropical timber trade and own 80% of the planet's tropical forested landscapes and meet twice a year. In addition, the members with their representatives reached an agreement on the lists of tree species included in Appendix II of the Convention."... *international trade in endangered species of wild fauna and flora (CITES), the certification of tropical timber-producing forests, and the illegal exploitation of timber, its associated trade and the application of forest legislation*" (FAO, 2011).

The International Tropical Timber Organization (ITTO) is the only body that has proposed the need to produce and have the capacity in relation to CITES compliance, in accordance with the policy seeking the development of projects, to consolidate the ability to pay for these forest commons, then based on the multilateral organism of the United Nations Organization UN, we can define forest governance as: "*Set of processes, mechanisms, and organizations to through which political and social actors influence environmental actions and results, including actors such as the State, communities, companies and civil society organizations.*" (Montoya and Rojas, 2016, p.2). This consideration of environmental governance was disseminated by the United Nations Environment Program (UNEP) and the United Nations Food Organization FAO. On the other hand, at the United Nations Conference on Environment and Development "Rio + 20" held in Rio de Janeiro, Brazil in June 2012, crucial points were developed on the international Agenda that are part of the integration of principles that States must assume governance matters (UN, 2012).

It was establishing the incentive to create the link for making decisions that promote or strengthen environmental policies in terms of afforestation, together with efforts to coordinate and fulfill mandates that involve various social sectors.

Colombia is undoubtedly a forest country due to its biophysical and ecosystem characteristics. Forestry lands currently comprise approximately 65% , and during the last ten years, it has not been able to reduce its deforestation rate, despite the fact that the nation has the Pact for Legal Wood and has been incorporated into the Plan National Development 2014-2018, within which it is stated that forest governance to contribute to the policy of reducing deforestation by providing the instruments at the head of the environmental authorities and to achieve compliance with forest management in cooperation with local actors.

Adding to the previous idea, a specific definition of forest governance has to do with “... *the effectiveness, quality and good orientation of State intervention, which provides it with a good part of its legitimacy. It also has the connotation of a more transparent, efficient and participatory interrelation between the State and civil society, the private sector, trade unions and other actors*” (Saile, 2008). In accordance and adding to the foregoing, the States agreed at the Rio + 20 Conference, together with other participants and leaders of the private sector, NGOs, the urgent need to reduce the high indices of misery, project social justice plans and guarantee the defense of the environment on Earth, with a growing population. The Rio +20 Declaration entitled “*The Future We Want*” has established the practical and well-defined sense to consolidate new aspects that govern the international Agenda and the national policy of the countries through the fulfillment of the objectives on sustainable development (ODS) (UN, 2012).

The purpose of the United Nations Conference on Sustainable Development (UNCSD, for its acronym in English and known as Rio + 20) that was held in Rio de Janeiro, Brazil, from June 20 to 22, 2012, was to guarantee the political obligation for sustainable development, evaluate progress, identify remaining gaps in the implementation of the results of the central high-level meetings on development and the environment, as well as discuss new challenges in terms of sustainability and economic growth. The exhibition was based on three arguments: the legislative on the institutional for sustainable development; an administration of resources with a total economic idea in terms of green in the context of the environment and the elimination of poverty; and the areas of issues that would make up the Framework for Action (UN, 2012).

The Sustainable Development Goals (SDG) are also known as global goals and outline commitments to end poverty and give recognition and importance to peace, justice. They are a universal call at the 2012 summit and in favor of protecting the planet and guaranteeing a balance between the socio-economic and the environmental. These goals are found in the so-called 2030 Agenda, and it contains 17 SDGs today; it is the most vital document to achieve the world we want. The claim of these Sustainable Development Goals (SDG) says in three points.

First, a horizontal dialogue was incorporated between governments, the private sector, academia, and civil society. Second, it is based on human rights: importance is given to vulnerable and excluded groups. Third, integration: recognizing the needs of socio-

economic arguments and sustainable development, exercising a cry for activity in favor of the human population, the planet, and well-being.

The Colombian State was highlighted by one of the first states in its design since the United Nations Conference on Sustainable Development (UNCSD Rio + 20 in 2012) and stands out for being a leader in the placement of the Agenda in its planning documents, such as improvement plans, of the need to articulate with the national planning of environmental policies based on these Sustainable Development Goals (SDG).

Governance as a concept implies bringing the implementation of decision-making and alternative solutions closer to all social actors such as communities, academics, entities, and the private sector. Governance can be defined as the coordination of the participation of civil society in the discussion of public affairs, generated by the communities and accompanied by other actors such as the government. Through governance, it seeks to promote and reaffirm democracy as the Rule of Law with all its results, such as the protection of sustainable development and the elimination of misery or the eradication of poverty and hunger, and where governance structures are responsible for the tenure of land, fisheries, and forests (UN, 2012).

However, going beyond the definitions by a multilateral international organization such as the UN, in Colombia with the Ministry of Environment and Sustainable Development, progress has been made in a series of agreements within the international framework where *“actions that will strengthen forest governance will be carried out. and the legal timber trade in 2016 until 2020”*. This is how representatives of the forest sectors of Colombia prioritized three lines of work that will strengthen the mechanisms for decision-making on forest management, with the support of the Ministry of Environment and Sustainable Development, the European Union, and the Organization of the United Nations for Food and Agriculture, FAO (FAO. 2014).

Consequently, there is an incentive to have decisions that strengthen environmental policies in terms of afforestation as well as that reinforce the institutions to comply with these mandates and incorporate various sectors fully. The project presented at the event *“Forests, a space for empowerment for the construction of peace”* allows 40 Environmental Authorities of the country to implement 11 Forest Governance

instruments, previous built-in projects, and whose implementation would advance the objectives of the National Forest Policy.

2.2.7. Study area

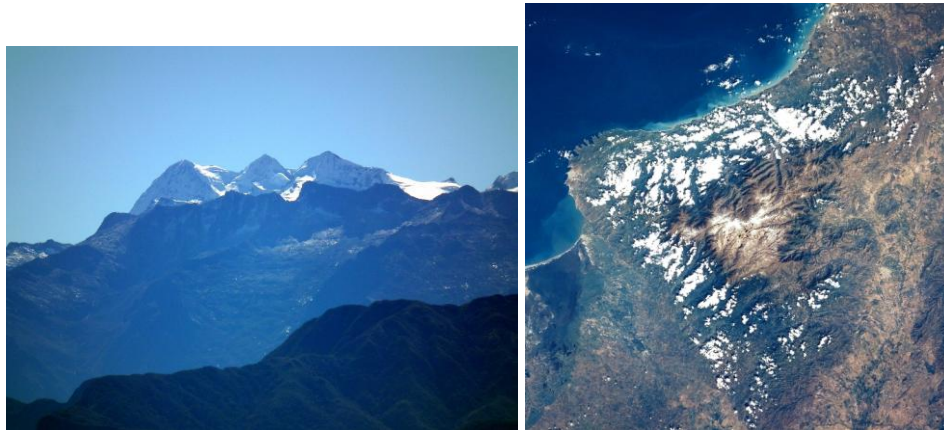


Illustration 2 The Sierra Nevada was declared by UNESCO as a Biosphere Reserve and World Heritage Site in 1979; Sierra Nevada saw from Space (NASA, 1990).

“The Sierra Nevada de Santa Marta is the highest snow-capped mountain on the planet located by the sea, rising from sea level to 5,775 meters high, containing each of the American tropical ecosystems.” (Zhigoneshi-Indigenous Communication Center-Sierra Nevada de Santa Marta).

It has 17,000 km², located on the shores of the Caribbean Sea between the outer delta of the Magdalena River and the Serranía del Perijá.

It is an isolated igneous-metamorphic massif, originated by diastrophism forces during different geological ages that consolidated the relief from steep peaks, ridges, and hills to slopes and valleys, generating at the same time the variety of climates existing there. Proof of this is the temperature that varies (depending on the height) between -4°C and 27°C and the rainfall that registers an average of 3000 mm/year, but, it goes from 500 mm per year on the driest eastern face to 4000 mm per year on the west flanks of the north face. Finally, the rainy seasons and winds in this area are governed by the movement of the Intertropical Convergence Zone (ITCZ) that determines the two rainy periods of April-June and August-November, alternated by two dry seasons, from December to March and June to August (Uhlig, and Mertins, 1968).

According to IGAC (1985), the Sierra Nevada de Santa Marta's soils correspond to Orthents, Troorthents and Andepents are made up of volcanic deposits. Heterogeneous materials little evolved, generally superficial, well-drained, of low-moderate fertility, susceptible to erosion.

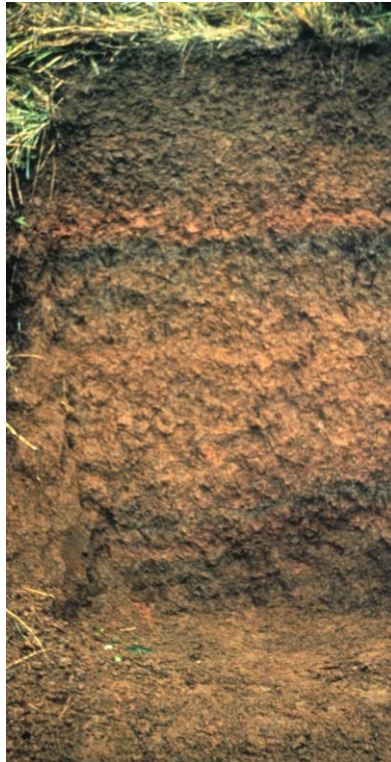


Illustration 3 Andepents soils IGAC, 1993. “Horizon O” with the presence of organic matter, can appreciate the “Horizon A”

Concerning biodiversity, according to the ecosystem classification (Hernández and Camacho, 1990), in Colombia, there are nine biomes. In the Sierra Nevada de Santa Marta, there are examples of all of them, from the humid tropical to the snowy. According to an analysis by the Fundación Pro Sierra Nevada de Santa Marta, flora and fauna have been affected by their geographical processes, and speciation has been determined by the lack of genetic exchange between lowlands highlands thus stimulating endemism by 60 %. As Carlos Uribe (1987) points out, this is an almost unique portent in the world from an environmental point of view and to describe it entirely is a difficult task. In its foothills, the sacred lagoons drain to originate streams and rivers that provide a constant water supply. There are approximately 30 hydrographic basins that supply close to a million and a half inhabitants.

There are 3 large macro-basins: the western one, which includes the Córdoba, Toribio, Gaira, Manzanares, Piedras, Mendihuaca, Guachaca, Buritaca, Don Diego, Palomino, San Salvador, Ancho, Cañas, Maluisa, Jerez, Tapias, Camarones and Ranchería rivers; the eastern one that tributes to the Cesar river and includes the Badillo, Guatapurí, Azúcarbuena or Cesarito, Los Clavos, Diluvio and Ariguaní rivers and the basin formed by the rivers belonging to the western flank that discharge their waters to the Ciénaga Grande de Santa Marta, north to the south are: Rio Frío, Sevilla, Tucurinca, Aracataca and Fundación. For the case of this analysis, the study place is in the latter basin, in the foothills of the Sierra Nevada de Santa Marta, between 700 and 2,000 m of altitude, in the Department of Magdalena, in the municipalities:

- **Ciénaga:** Siberia de la Sierra district (townships Nuevo mundo, Palmichal, Planadas, near the San Pedro farmhouse), San Javier district, (Veredas Cerro Azul Páramo, La Libertad, near the San Javier farmhouse), Township of Palmor (townships Cuatro Caminos, Pausedonia, Makenkal, Palestina, near Palmor)
- **Fundacion:** Districts of Santa Clara (Veredas El Cincuenta, El Berlín and the vicinity of the Santa Clara)
- **Aracataca:** Area La Fuente, El Volante and Palestina.



Illustration 4 Map of Research Interest Points San Javier, Palmor and Siberia

It should be explained that today in this area, there is a cultural symbiosis that keeps alive the worldview of the indigenous peoples together with the peasant traditions of the settlers who arrived from all over the country, generating a unique culture adapted to that environment that in pre-hispanic times only the Tayronas peoples inhabited, who achieved advanced technological development in the management of the fragile

ecosystem. Most of these indigenous groups were defeated during the Spanish colonization and forced to take refuge in the depths of the mountains, currently surviving only the Ika, Kogi, Wiwa, and Kankuamo ethnic groups (Zhigoneshi-Indigenous Communication Center-Sierra Nevada de Santa Martha).

3. Aims of the Thesis

3.1. General Objective

Propose strategies for the implementation of local environmental governance processes of agroforestry systems in national forest policy, with the participation of local institutions.

3.2. Specific objectives of the study

- Analyze the advance or retreat of national forest policy about the recognition or ignorance of local governance processes in agroforestry systems.
- Implement approaches of the method of socio-ecological systems and tools of interviews and dialogue sessions for the diagnosis, analysis, and alternatives of forest policies based on local governance of agroforestry systems.

3.3. Determination of Hypothesis

- How should strategies based on governance processes with the participation of local institutions in agroforestry systems be implemented within the national forest policy.
- What are the potential developmental projects that participatory national forestry policy implementation will bring to the rural communities?

4. Materials and Methods

4.1. Materials

The materials that were applied in this research come from the ECOLSIERRA small farmers network, and by local producers who provide the necessary materials and information. Also, the ECOLSIERRA network collected the information of the field trips, inside their yearly census for coffee producers, which due to the current COVID-19 pandemic situation, was complemented with phone calls, video calls and emails.

4.2. Methods

In this research, the qualitative and quantitative method of social research will be used as the general framework from which the case under study will be approached. Based on this methods, other specific approaches were be applied, among which the identification of actors, their interests, position in the face of the problems and conflicts that can be identified (Freeman, 1994 and Mitchell et al., 1997). Likewise, it has been specifically applied to the case of the communities, their perception of the interrelation with other actors that they consider key to try to solve their most priority problems. The importance is skipped from the local point of view because it serves to understand the interrelation and dynamics between subjects (groups and individuals), the relationship with agroforestry and environmental assets related to them, as well as the perception of environmental conflicts and local production and co-production systems. The importance of implementing analysis from the actors' approaches can be located the interest, the position, the level of interaction, the degree of influence, among other aspects, which after analyzing their importance in the cases analyzed, serve as a basis to define the assessment and evaluation criteria (Ortega, 2011).

The primary approach used in development is the analysis of complex adaptive systems, and within these, the socio-ecological systems (SES) approaches for the identification of the elements of institutional analysis and environmental goods and services and the evaluation approach of the agricultural innovation system (RAAIS), for the analysis of

the innovation of agroforestry and silvopastoral systems and the possible impacts with the same goods and services on the landscape unit.

Complementary methodologies will be used based on the quantitative aspects of regulatory services, as well as the technical and financial feasibility of agroecological restoration activities.

The analysis of complexity has been widely studied in the approaches that overcome rational choice and that focus on the need to establish a dialogue of knowledge between different actors for decision-making and to adopt measures that affect actions to face problems in the search for alternatives.

Returning to McCay (2002), it is about observing what the available knowledge is, the conditions in front of the levels of uncertainty and risk to face situations acting with determination, the reality compared to whether the communities have real access to the goods and how they can interact with other actors or forms of social regulation (institutions made up of rules, values, community organizations, non-governmental organizations, negotiation with state actors, independent scientists, the participation of private companies.). Decision-making, in this case, includes how to avoid problems in a perspective environment from a dynamic and complexity analysis (interdisciplinary and dialogue of knowledge that responds to a time, biophysical space, place, territory, landscape, context). The alterations of environmental conditions such as ecosystems and the practices and regulations by the actors imply accounting for the constant transformations that vary over time and that are not permanent or static, but changing and dynamic. As Botkin (2012) highlights, the dynamic changes of the systemic approach in complexity it is fundamental, and it is manifested in a series of scientific devices, but also in the forms of regulation through social aspects such as policies, legal norms, and cultural practices of both social and ecological aspects that are manifested in the dynamics and interrelation of natural and cultural elements.

Furthermore, given this, it is quite complex, and with problems, with a high degree of awareness of forest policy and governance where truths that confront the participants are disseminated, then it is necessary, the recognition of all the aptitude of training and solidarity to deliver plans and ideas of new alternatives. The population constitutes cultural connection points with variation devices, where the consequences of acts of encounter and communication that are led to create classes of regulations and other

entities with the objective of participation and deliberation with various sectors, among others, such as organizations, with much experience and with high levels of research, which create ideas in political requests and power of determinations regarding the administration, supply, direction, protection and sustainable use of environmental goods and services (McCay, 2002; Fischer, 2003, 2009).

In this way, orientations of the projects or socio-ecological systems will be taken with the idea of creating the knowledge or discernment of nuances in terms of institutional and legislative, as well as description or registration of assets or wealth and environmental services that recognize ordering possibilities for institutional change. Works such as those by Berkes, Colding, and Folke (2003), Folke (2006), and Ostrom (2009) report the modes of socio-economic, political, legal, and cultural institutions that are connected to ecosystems, creating an analysis regarding the regulations on the environment (ecosystems subdivided into units of goods, institutions such as people, communities or organizations, forms of government power, rights and benefits, modes of ownership, possession or possession, conflict situations). In order in which methods and arrangements are devised in the Community, it is the consequence of the alternatives from institutions, which will serve to establish the dynamics of interaction, control, and gains on which it will be determined if the system is sustainable in the time.

On the other hand, the RAAIS system is essential to accommodate the methodical addressing of the problem appropriate to the various forms of agroforestry transformation or innovation. This system is born from the studies of socio-ecological models and of inter-scale and multi-level studies, which was developed by Schut et al. (2015) for the analysis of transformation or innovation in agriculture, starting from a study of the interaction between subsystems:

- Government
- Sufficiency of innovation in agriculture
- Technology. This direction forces the characterization of the stakeholders and the types of the complexity of the systems in agriculture.

In all the aspects that are going to be faced, of the peasant population and producers of the municipalities of Cundinamarca, qualitative methodological devices were used, stable in the formation and awareness of the environmental context in the similarity of

the population with the ecosystems, through of semi-structured interviews, and conversation sessions, which lead us to determine the participatory ways and issues as well as the ways of pre-existing community norms, with the use of an institutional analysis guide (IAD) proposed in the direction of socio-ecological methods. In this objective, the formation of systems is essential at the various levels because from them; it will be possible to raise exploratory aspects that can refute these effects, in other equal spaces, from the results obtained.

From this, instruments of complex adaptive systems and legal-social systems were used, which establish the classification of regulatory norms and practices (values, principles, rules, and procedures). Finally, through the analysis of governance levels, the forms of regulation that must be strengthened through strategic social direction and those that must be discarded or abandoned in the cycle of the evolutionary and adaptive model will be addressed. The topics to be discussed are environmental management problems, and environmental impacts of agricultural and livestock production with unsustainable models, social problems such as poverty, absence of training processes and interaction with higher education institutions, also evidence an environmental history with degradation and deforestation, use of chemicals; in the case of Palmor, also, due to the pressure on strategic sub-paramo ecosystems, due to agricultural practices and deforestation that affect the region.

Field trips will be carried out in the communities of Palmor, Siberia, and San Javier. In the activities, the information will be collected with the methodological instruments advancing in the preparation of the field record. In community meetings, the RAAIS method will be applied as follows:

- Identification of restrictions
- Categorization of restrictions
- To Explore the entry points for innovation.

A workshop will be held per Community, applying a semi-structured interview and questionnaire with a methodological instrument. This will also be complemented with dialogue sessions and semi-structured interviews with actors.

4.3. Description of the Methodology

The methodology in this work will be a review of both theoretical literature and secondary information sources in the cases. Regarding secondary information, this was used mainly in the description of the context of the cases addressed. Based on the study of actors, a strong semblance is the meaning of the orientation made according to the topics of analysis (Mitchell et al., 1997), with the knowledge of which levels of study with actors were required, to demarcate the importance of the actors who are involved with a delimited environmental problem or conflicts.

The characterization of actors begins at different levels of study: global, regional, national, and local (Cash et al., 2006). With the study of the interaction between actors, results are taken for the analysis of projection of subjects or interested parties, which is valid to understand the interrelation and variables between the actors that are observed in the study of the problems to create how outputs should be found versus making determinations.

Using the approaches of Freeman (1994) and Mitchell et al. (1997) can be located the achievement, the focus, the degree of interaction, the level of importance, among other perspectives. To carry out the characterization of the actor subjects, the approach of "who and what counts" is used (Freeman, 1994, p. 411).

On the specific subject of agroforestry systems, as indicated above, the method of characterization of the exciting subjects will be elaborated through a 'narrow or reduced vision' that we also assume to call direct analysis of actors (Freeman and Reed, 1983) (Mitchell et al., 1997). The definition of low vision provided by Freeman and Reed (1983, p. 46), Mitchell et al. (1997), and Clarkson (1995, p. 4) allude to the "survival" of the "organization" and "the risks" reached by group sectors that "bear some form of risk because of having invested some human capital or financial, with a certain type of value."

In the identification of the actors, the classification based on research that is a reference in the literature in Colombia, such as the work of OICAR (2014), was considered. However, considering the conditions in each case and the methodological approach focused on the main actors, the following stakeholders were defined:

- a) Community organizations: mainly local communities of farmers or local producers, urban and peri-urban communities, community action boards, social movements with community causes.
- b) Academic sector: academic actors such as researchers, professors, students from higher education institutions, who have an interest in activities not only of research but also of social appropriation of knowledge to generate impacts that have an impact on contribution to alternatives solution of local environmental problems related to the landscape units defined in geographical terms of the forest and agroforestry systems.
- c) Governmental (State): state actors according to the legal and administrative organization such as ministries, agencies, public entities, environmental authorities, and other authorities at different scales (national, regional, departmental and local).
- d) Private organizations and non-profit organizations: merchants, businessmen, companies, societies, trade associations, transnational companies, companies, environmental NGOs, environmental groups, and environmentalists, among others, international intergovernmental organizations accredited as observers (IGO) (e.g., UN, OAS), private international non-governmental organizations (NGOs) and international financial organizations.

Based on this classification, local actors will be approached as far as possible during the project development time, during the contingency due to the COVID19 pandemic, and interviews will be conducted through virtual means. Interest groups that are essential to carry out the various interviews will be addressed. Subsequently, the analysis of the interactions between these will be established, as mentioned by Colding, and Folke (2003), Folke (2006), and Ostrom (2009), social, economic, political, legal, and cultural forms and institutions are created that are related to ecosystems, generating an analysis regarding regulations on common and environmental goods.

Applying the qualitative methods of social research and the RAAIS approach, four field trips were carried out of the 13 in total that was planned, of which, in 3 interviews and workshops were carried out (Palmor, San Javier and Siberia), and one of these outings in which the local actors who own the properties did not access interviews or application of a methodological instrument for collecting information (Palmor: Los Exploradores Group).

From these approaches within the instrument for collecting information and analyzing data collected, the following aspects were included:

- (1) identification of problems,
- (2) prioritization of problems,
- (3) identification of local actors with influence in the communities,
- (4) analysis of the relationship between actors and problems.
- (5) identification of initiatives or alternative solutions,
- (6) evaluation of the results of the initiatives.

Additionally, in the second phase of data analysis, the following aspects have been applied:

- (1) identification of constraints, (2) categorization of constraints, and (3) exploration of specific and generic entry points for innovation.

The results were analyzed from some initiatives implemented by local actors with impacts on communities, and fundamentally in the social innovation that is established in the institutional agreements and strengthening the organizational process, both same communities and in the interaction with different local actors to promote, maintain and adapt to changes regarding these same initiatives or against new initiatives that may be suggested.

Phase 2 of field trips, where it was sought to expand the information with specific actors, was postponed regarding activities with communities, but it was possible to conduct interviews through virtual means with other actors to deepen the perception of institutional analysis, innovation, governance, problems environmental and environmental regulation. Semi-structured in-depth interviews with key actors were used, applying the previously defined questionnaires in conjunction with the research group. The actors approached, went to the academic sector, the government sector, and the private sector, it was possible to carry out this type of semi-structured interviews of the second phase, with some interviewees who accessed them using virtual means such as videoconferencing.

Questions were asked about the identification of local institutions to expand the governance aspects, the perception of environmental problems, the initiatives or

alternative solutions, the need for institutional change, innovation, agroforestry, and environmental policies, environmental education, sustainability aspects, and environmental regulation.

Phase 1. Diagnosis of environmental problems and conflicts in forestry and agroforestry systems

Here the methodological instrument of Phase 1 was applied for the respective diagnosis and identification in the cases of San Javier, Siberia, and Palmor, from which preliminary information is collected.

In this, semi-structured interviews, and dialogue workshops with the local communities of the cases under study were carried out.

From these field activities, local actors were identified in each one, where we found repeated patterns concerning the generality that differ in terms of anthropic processes of historical environmental deforestation, and that ends up being more critical in one than other cases.

Following the Ecolsierra Internal Inspection (2020), the following activities were carried out in each of the cases:

- 1) Video Call Interview session with Victor Cordero, CEO of the Ecolsierra Network of small organic coffee producers, regarding the characteristics of participants, the current situation of environmental problems in the territory of Santa Marta (Magdalena) (Support: Authorized Signed Letter).
- 2) In all cases, the information informed consent in which the participants are made aware of the research activities and use of the information for exclusively investigative purposes, as well as the reservation of the research source and voluntary participation (Support: Signatures of informed consent signed voluntarily by the participants, list of participant attendance in the custody of the Principal Investigator of the Project).
- 3) In all cases, conducting semi-structured interviews and workshops to identify actors, institutions, initiatives, governance, problems, conflicts, and innovation from a group session through brainstorming and an open dialogue technique

based on questions for the collection of the information collected in the methodological instrument of Phase 1: Diagnosis and identification: Siberia, San Javier, and Palmor Case Analysis.

Phase 2. Data analysis and information expansion with specific actors

In this part, the methodological instrument is developed from the data to be able to define more information from the subjects approached, including communities, producers, as well as to provide feedback as required with the participating population. Following the above, it would deepen the matters of forest policy, knowledge of environmental problems, decisions or powers of the solution, the need for government transformation, discovery, agroforestry and environmental management, training regarding the environment, sustainability attributes, and environmental legal regulations.

Due to contingency measures, isolation, and mobility restrictions, it was not possible to carry out this phase with the communities. On the other hand, semi-structured interviews were carried out with focal actors from the government sector and the private sector (social organizations). In this regard, the following steps were applied:

- 1) Definition of the questionnaires for semi-structured interviews.
- 2) Sending, signing, and confirming informed consent to each of the interviewees.
- 3) Conducting semi-structured interviews with each of the interviewees representing the focus groups of actors through videoconference.
- 4) Analysis of the data collected through the interviews.

4.3.1. Field Trip

The first phase of diagnosis includes the first field trips, with a total of 4 trips to each of the cases: Palmor (Magdalena) (November 03, 2020), San Javier (Magdalena) (November 10, 2020), Siberia a Community in the town of Santa Clara (December 09, 2020), and Owners and Members of the Los Exploradores (January 28, 2020).

In total, there were supposed 13 field trips, among which three have been carried out with workshops and application of the methodological instrument of the diagnostic phase in San Javier, Siberia and Palmor. On the other hand only four field trips, had been made. However, in the case of the Palmor: Los Exploradores, the property owners did not give access to the interviews.

Due to the difficult of the research, it was decided by the ECOLSIERRA network due to the COVID19 pandemic and the mobility restrictions, only the four exits of the first phase were made.

The research project was based on the interaction with local actors and the application of the field methodology, additionally, to the extent that most of these remain.

The analyzes have been carried out with the results with the primary information that could be collected in this first phase together with the research group.

4.3.2. Interviews

Fifty-five semi-structured interviews were conducted with different actors, which were carried out within the project, including 47 interviews with people from the communities of San Javier (27), Siberia (15), and Palmor (5), six interviews with people from the Hierarchy sector within the ECOLSIERRA network, one interview with a civil servant from the Government and one interview with a leader of a social-environmental organization.

In all the interviews, most of the questions were open, encouraging participation and dialogue on the part of the participants. Another part of the interviews included closed questions using three response and evaluation scales:

- 1) Qualitative scale,
- 2) Quantitative scale,
- 3) Ordinal, Ordering, or Direct classification scale.

The interviews in the first part were of the open, semi-structured type and were integrated with the data collection instruments using a perspective of dialogue with actors (Blanchet, A. et al. 1989).

The interviews and the methodological tool focused on a first factor concerning the problems in each of the topics, the second factor of institutional study related to the characterization of local subjects and their interrelation, and a third factor connected with the methods of organization, governance, and initiatives and alternative solutions. The latter had the purpose of establishing the degree of impact and consequence of the initiatives during analysis, as well as creating the basis for making the first diagnosis from possible transformations and changes in forest and agroforestry problems.

The determined subjects that are important in the governance model were identified to try to solve the problems identified. Hence, the need for a transformation in the governmental and institutional is identified to influence decision-making to stop agroforestry projects, in environmental problems, sustainability aspects, and environmental legal regulations.

The importance of innovation, forest policy, governance, and institutional study is carefully highlighted.

Likewise, it was sought to advance in the issues of forest policies based on local governance models and about legal aspects of environmental regulation on the forest issue. It was possible to make progress in identifying the more general aspects of regulation because in the second and third phases of both the objective and the field trips that were postponed, said the collection had to be addressed and the aspects of impacts of forest policies at the local level and regulation by the different actors.

4.3.3. Research thesis

Forest policy in the Republic of Colombia should be aimed at solutions to climate change problems, taking advantage of all financing opportunities arising from alternative actions that allow the region to have a socially compatible and sustainable economic viability. In this sense, from the identification of the problem, it is based on the socio-economic and ecological situation of the population to face the control of the environmental problem through the path of legal regulations such as creating limitations and sanctions.

Despite this, it is possible to affirm in general terms that these policies have not been adequate because the nation does not have the sufficient capital nor the implementation

methods for that control and that it provides good security results regarding afforestation policies and prevention of deforestation.

However, through processes of forest and environmental policy, it seeks to generate a change within this concept and application, to find the validity, perfection, and the proper orientation of the intervention of the State, providing legitimacy and effectiveness through participatory models that ensure a sustainable environment. Thus, to preserve environmental quality and, of course, to implement forest and environmental policy processes, a procedure for national parks and forest reserves has been established that dominates approximately a good part of the country. The foregoing to give a justification with a legal system, seeking to balance the link between economic and environmental development. Given the situation in which there have been production and consumption models based on environmentally unsustainable practices that led to environmental degradation in various aspects, new alternatives are sought from legal and policy instruments. Pollution, resource depletion, deterioration of natural systems and their associated services, and climate change are specific symptoms of environmental change.

Therefore, we consider it very important that within the international policy on environmental legislation, the country's authorities can learn about the population culturally and their level of awareness in environmental management and forest policy, which is relevant in the creation of communication projects between representatives of the State and the population with the same guidelines, and thus the favoring between the actors in the question of public policies related to the issue of national forest policy and with models of environmental governance.

In the case of Colombia, with its constitutional change starting in 1991, it was established under the form of the political organization of the social State of Law, where a period of the social economy also began, which has decentralization as its main characteristics, prioritizing private property and giving importance to the provinces in departments and their municipalities, with consequences of a reduced budget to supply social spending. Thus, social classes arose where they gained spaces for civil participation, and with a new ideological formation of a population with more democratic initiatives, it demands participation in the management of public affairs and the creation of more inclusive and fair society participation. Consequently, groups of

activists organized with environmental awareness and with initiatives to summon the communities are born due to the deficiencies in the presence of the State in protecting the environment.

On the other hand, from the international point of view, it has been emphasized that "national forest policies should cover not only matters that concern the forest administration and its bodies but also contribute to the implementation of general policies, mainly those of national development or strategies related to the economy and poverty" (FAO, 2010). Given the previous concept by FAO, we highlight that forest policy has elements in common that have been addressed by authors from the United Nations (UN), according to which "forest policy allows the participation of various local, regional and global in the development of projects and environmental decision making without discriminating by race, sex or socio-economic status; It is thanks to this element that people and local communities have acquired a fundamental place in areas affected by extractivism, unequal distribution of resources, among other factors that have direct repercussions on them" (Douglas Molina, 2014).

The environmental impact of the modes of production and consumption have led to a questioning of the hegemonic development model and the emergence of the concept of sustainable development, positioned today as the guiding principle of the country's long-term development is a fundamental aspect from which Sustainable alternatives of forest systems are proposed, based on actions and strategies that are built from the local level. In this sense, from the identification of problems, conflicts, starting from the interaction between the academy and local communities, entities, and organizations, to provide solutions to their environmental problems and projects that also contribute to the achievement of national goals. Thus, under national socio-economic and environmental policies, they must seek to determine or guide actions and decisions that generally take into consideration, presuppose an agreement of different forest interests, goals, and objectives, understood by national forest policy an agreement government negotiated between interested parties (in other words those who regulate, who decide, who depend on and benefit from forests, who control those resources).

The great challenge for public policies has been that for a long time; there were regulatory deficiencies, the lack of promotion and inclusion with the different local actors from a community perception and public participation, which is why the present

research work seeks to contribute to proposals that are seen as possible solutions to obstacles arising from the population's own needs for making better decisions in administrative, judicial and functional components that cause regulatory ineffectiveness, generating profound implications of environmental and social degradation.

It should be noted that in local governance issues, joint inter-institutional construction is necessary for which clarity is given of the roles played by the different local actors, both in the short, medium, and long term. In this average, various factors make the impact and lack of protection of natural ecosystems evident and perceptible, determine the need for greater citizen participation, better institutional articulation with adjustments in guidelines, in national environmental policies aimed at better regulating ecosystem services, environmental sustainability, the use, protection and recovery of natural assets.

Although it is true that in Colombia, the regulations provided by agroforestry systems in the highland tropics are established, there is still a lack of interrelation and dynamics between the subjects that influence the analysis of the actors, assets, interrelationships, and existing conflicts. More significant incentives are lacking to reduce the pollutant load generated by companies in production processes and, on the other hand, consolidate good environmental practices, which are supported by investment in technology, equipment, and materials for clean production in the peri-urban and rural sectors, concentrating beyond the goals of the minimum environmental standard to guarantee the right to a healthy environment, or what the environmental authorizations allow. In this way, it is necessary to direct a policy focused on making up for the lack of support or official incentives for the implementation and certification process for SMEs or family businesses that allows incorporating the institutional, organizational part based on community entrepreneurship approaches.

Undoubtedly, this is the need of the study, through this research project, intends to be a contribution in the construction of impact for the benefit of the same actors that are part of the communities, generating a legal instrument that evidences the need for inter-institutional articulation participation of civil society and private, which are instruments that tend to reduce environmental conflicts that are presented in these areas, case studies; and in which, the communities can count on more formal spaces for interaction and mechanisms to develop alternatives for the management and management of ecosystem conservation.

Thus, to be articulated in the technical and operational decision-making and in the formulation of programs as people who live in the territory, seek the results benefits both environmental policies and rural development.

4.3.4. Legal and regulatory standards of forest policies

The following standards are the most relevant that have been identified in forest policies at the national level.

- Decree 1071 of 2015, Unique Regulatory Decree of the Agricultural, Fishing and Rural Development Sector, related to the Certificate of Forest Incentive-CIF".
- Decree 1824 of 1994 regulates Law 139 of 1994, and this Law created the Forest Incentive Certificate (CIF).
- Article 6 of Law 139 of 1994 determines that FINAGRO is the entity that manages the CIF resources, and its paragraph establishes that annually the CONPES will determine the distribution of the available resources.
- Decree 1824 of 1994 regulates Law 139 of 1994, thus allowing the implementation and promotion of the CIF at the national level.
- Decree 900 of 1997.
- Law 139 of 1994.
- Paragraph of Article 250 of Law 223 of 1995 regulates the forest incentive for conservation purposes.
- 1993 with Law 99, the Ministry of the Environment was created, today the Ministry of the Environment and Sustainable Development.
- Law 99 of 1993, which later began to forge processes aimed at prioritizing environmental management in the country, and the National Planning Department developed the forest policy, which was approved by COMPAS.
- Decree 1791 of 1996, through which the forest exploitation regime for Colombia is established, forest exploitation and commercial reforestation, assigned under Law 101 of 1993 and Decree 1172 of 1999.

5. Results

The recognition of conflicts and environmental problems from the analysis and qualitative method of social research, socio-ecological systems, and the RAAIS method of study of transformation or state innovation where it was divided between various components of problems from the socio-ecological approach. Among the problems corresponding to the ecological aspect, deforestation, degradation and soil erosion, scarcity of water sources, and generalized contamination are among the most important. In terms of social issues, problems were found such as lack of income and employment, migration from the countryside to the city.

Given the investigation of the study areas, continuous patterns of deforestation are shown, the town of San Javier being more prominent compared to others such as Siberia and Palmor. There are also a lot of environmental problems in which local subjects are involved. The Sierra Nevada coffee region shows the most significant abandonment of the population in terms of public policies. Moreover, in San Javier region, it stands out that there is a greater degree of organization on the part of the productive sectors where it has created self-organization projects through the association of coffee producers. Nevertheless, there are also cases of environmental problems with other actors, such as the environmental authority, mining extraction organizations, and government entities.

5.1. Characteristics of the inhabitants and land ownership

The inhabitants that have been determined in the research are primarily peasant populations with direct influence on forestry or agroforestry. At present, they work because of the transformation of methods of changes in the technical and social. The population of the rural sector has evidenced social phenomena such as the aging of the population. Additionally, this population depends economically on agricultural work, most of which are owners of their land, but some inhabitants have difficulties in terms of legalizing their lands. This issue is clear to study the legalization of land concerning models of governance and forest policy. Based on the studies that have been created on issues of common forest wealth, together with the application of research methods, it is observed that despite these problems in the face of the regularization and formalization

of some sectors, in practice, they have been able to generate practices that must be strengthened as informal community legal regulations, which is expected to generate good results in maintenance factors and sustainable forest use (e.g., in the case of vacant properties) (Willy, 2000; Ortega, 2018).

About the normative reality of land possession, it is evident that they prefer to move towards legalization with due title and with a state guarantee. Next, one of the cases is verified that concerning the identification of the inhabitants, according to the information collected, as follows (example case Siberia):

Table 1 Socio-economic characteristics of the producers in Siberia

Category	Variables	Number of Producers	%
Gender	Masculine	17	63
	Feminine	10	37
Age	<40	5	18
	40-50	6	22
	50-59	7	26
	>60	9	33
Lives in the Farm	Yes	21	78
	No	6	22
Ownership of the Land	Title	15	56
	Prove of ownership	4	15
	Inheritance	2	7
	Without Prove	4	15
The motivation for Working in Agroforestry (Coffee and Trees association)	Generation of family income	10	37
	A secondary source of income	9	33
	Family tradition	8	30
	Personal Reasons	6	22

Furthermore, from the identification of the inhabitants in the subjects under analysis, it is seen that all of them survive from agricultural work; it is necessary to indicate the importance of creating transformations towards agroforestry systems.

5.2. Identification of environmental problems

The identification of environmental problems is essential to find an explanation and to be able to establish recommendations and contributions to the alternatives. Characterization of the diagnosis is essential. This work, which was carried out with interviews and workshops, is very relevant in establishing the knowledge that the zonal population has regarding problems and conflicts in their environment. With this exercise, it is concluded that the communities have an accurate perception of the problems that they perceive both in the social and ecological aspects. The workshops and the management of the research information were addressed by the actors who gave the answers to each of the questions suggested in advance about the environmental problems and conflicts. Table 2 below shows the identification of the problems that were identified in said interviews for the three regions where they were held, including workshops with the communities of:

Palmor, San Javier, and Siberia. It is reiterated that in the Palmor (Los Exploradores, Group), the owners of the land near the wetland did not attend the interviews. With this identification, a classification of ecological partner conflicts was made.

From the socio-ecological s classifications method, two components were carried out to classify the subsystems in related ecosystems divided into units of everyday use goods, and, on the other hand, the social subsystem, given that it is significant to make a classification in social entities and institutions and regulations such as policies, legal norms, economic regulations, and on the other hand, to be able to characterize the subjects that access the goods for their benefit.

Table 2 Problems and Environmental conflicts Ordering, accordingly to Local Communities (Local Producers)

San Javier's Case	
Social Problems	<ol style="list-style-type: none"> 1. Employment and income 2. Access to technology 3. Prices of agricultural products

-
4. Migration
 5. Land (property, tenure, and rent)

-
- Ecological problems
1. Landslides
 2. Climate
 3. Pests and deceases
 4. Soil Erosion
 5. Seeds

Siberia's Case

-
- Social Problems
1. Economic income
 2. Migration
 3. Industry, innovation, and technology
 4. Financing
 5. Empathy (lack)

-
- Ecological problems
1. Flood
 2. Soil erosion
 3. Deforestation
 4. Pollution
 5. Agrochemicals (impacts)

Palmor's Case

-
- Social Problems
1. Migration
 2. Education focused on agriculture
 3. Employment and income
 4. Landfill
 5. Territorial and Environmental planning of the territory
-

-
- Ecological problems
1. Contamination from the landfill
 2. Soil erosion
 3. Deforestation
 4. Flood
 5. Pests (coffee rust)
-

Note: To identify the problems and local conflicts, it is important that the local communities recognize the main issues and classify the five (5) major social issues and the (5) major economic issues that are present in its location. Using the standard or direct classification scale, where the agreement with numbers 1 to 5 is presented, the tenderer may enter an import order which considers the cases entered in each case. For the Palmor case (Los Exploradores), an agreement was reached, the information was obtained in 4 working months. Moreover, according to the need to strengthen the agricultural model from the forestry point of view, new models of agroforestry systems should be promoted. The population of the communities and other actors must be obliged to strengthen community associations and seek various forms of organization based on collaborative practices. The probability of creating sources of production or employment will occur in the medium term, but it depends on the strengthening of the forms of organization.

In the region or population of Siberia, there is a difference in the knowledge of employment since the inhabitants are lined up in the inconveniences of money inflows. Two reasons may be seen based on the study carried out because of the information collected: the first is related to the work of a job with peasant functions, given to their daily lives; and the second is that they have knowledge in company-type organizations creating communication between the subjects and the ranchers who have significant training in the activities of the union members stand out.

Likewise, social problems are evident, and not only in these areas or regions that are the object of this study is a national problem, and it is that of migration from the countryside to the city, mainly in the young population, it is due to the lack of opportunities, illustrated in a framework in theoretical works such as those of Sen (2000). The lack of opportunities for the population with little academic knowledge does not find better job training plans, and that they can join. In the Michael Alto region, the phenomenon of migration is fully known by the inhabitants who perceive it as worrying. In the San Javier region, problems are defined as lack of access to technology, prices of agricultural products, and legal inconveniences of the possession of the land or problems of resolution of land ownership. In Siberia, the population affirms their concern regarding issues of promotion of industry, innovation, and technology, lack of financing, and communication difficulties due to the lack of

cooperation and solidarity. The production is focused on the extraction of products. In the Palmor region, there are two problems. The first related to the inconveniences caused by the sanitary landfill that increases the contamination and proliferation of pests both with the operator and with the government authorities with the power of the administration, but the most significant conflict is generated by the breach of the operator of said landfill against the population. The second drawback is that of migration from the countryside to the city due to lack of opportunities such as educational training with an emphasis on agriculture. Regarding the ecological difficulties highlighted by the population, it is the lack of water availability and drought, soil degradation (erosion), and deforestation.

The issue of deforestation is also knowledge of the population with consequences for the ecological part in the two regions, which are Siberia and Palmor it is because of the changes and threats to the remains of natural and agroforestry forest complexes by different actors, as well as the increase in agricultural production.

Given the result, the knowledge of deforestation in the San Javier region is unique because it has been historical, and it has been assimilated by the inhabitants as a permanent issue that perhaps is not currently perceived as a problem. That is why the results show that there is no identification by the communities. On the other hand, the inhabitants who survive by grazing cattle and subsistence crops do identify other problems that are associated with these productive tasks (e.g., pests and diseases, intense changes in the climate).

In the San Javier region, the shortage of certified seeds for the coffee, subsistence crops, and other products is identified, and in terms of climate, information on El Niño problem has been affecting their harvest. To this extent, the above problems are related to the lack of forest cover, since in these cases, it could mitigate its effects. In the Siberia region, contamination by agrochemicals is determined. Seen with investigative and academic criteria, most of the inconveniences given by the inhabitants is the affectation of what remains of the natural forest complex due to the tremendous pressure of anthropic activities. In the Palmor (Los Exploradores) area, difficulties and conflicts were referred from interviews with the social leaders. These conflicts have been characterized such as problems of land use and environmental management.

5.3. Innovation as a relevant aspect of forest policies

It is essential to promote these models of innovation that are of order and knowledge in environmental matters from a broad conception, promoting environmental conservation. The innovative objective must include a vision of sustainability; therefore, there is a need for totally innovative ideas from the environmental point of view. Technology and access to information should be included in innovation. Also, the role or function of education or academia is essential to institute models of knowledge in technology that allows creating, contributing with studies in which there is a social appropriation of knowledge by the population, and in this way, it can be used in everyday life. To conclude, progress must be made towards models of change that can focus on forest governance and policy involving different actors.

6. Discussion

6.1. Institutional analysis of forest policies: Local organization

Based on the above, the notions of forest policy and governance are evident to illustrate a model for institutional change. And then, it would lead to changes to correct weaknesses in the organizational processes on the part of the population and move towards these models with polycentric approaches that interfere and compromise all subjects and sectors. As more subjects or actors are committed, projects can be unified in the medium term, with greater recognition for their evaluation. Likewise, the objective of democratization must be intruded against objectives that originate from the population, mainly from the education sector, handling the same research studies. This concept of democratization is where socio-ecological systems find the content of accommodation in the face of transformations of socio-ecological systems.

With the fieldwork, the characterization of the zonal protagonists is reached, daily models are exposed that share disadvantages in environmental deforestation issues, but the situation of the San Javier region is more susceptible compared to that of Siberia. Given that there are a variety of environmental problems and conflicts in which local actors also intervene. In the San Javier region, there is abandonment or non-communication among the population. In the Siberia region, it is evident that there is organizational knowledge on the part of the zone workers and the population where they have created organization projects through associations.

According to the environmental perception of the communities, they consider that the most relevant actors to seek alternative solutions, and that, therefore, they are fundamental in terms of achieving institutional changes based on models of local environmental governance from forest systems and agroforestry is the following:

Table 3 Analysis of the Direct Institutions and Stakeholders Relation according to the Problematic identified by the Communities

Case	Problem	Problem Classification	Stakeholders
San Javier	Social Problem	1. Employment and income 2. Access to technology 3. Prices of agricultural products 4. Migration 5. Land (property, tenure, and rent)	(1) = Umata (Municipal Agricultural Technical Assistance Unit (L), SENA (L), Agrarian Bank (M), Coffee Producers Association (H), Cenicafe (L), Magdalena Government (L). (2) = Municipality of San Javier (L). (3) = Producers Association (L), Cenicafe (L), Umata (Municipal Agricultural Technical Assistance Unit) (L), Magdalena Municipal Mayor's Office (L), Agrarian Bank (L), Wood processing Companies (L). (4) = Municipal Mayor's Office of San Javier (L), Magdalena Government (L), SENA (H), Umata (Municipal Agricultural Technical Assistance Unit) (L). (5) = Landowners (L), Cadastre (L), IGAC (Agustín Codazzi Geographical Institute) (L).
	Ecological problems	1. Floods 2. Climate 3. Pests and diseases 4. Soil	(1) = Umata (Municipal Agricultural Technical Assistance Unit) (H), CAR Magdalena (L). (2) = Umata (Municipal Agricultural Technical Assistance Unit) (H), CAR

		erosion	Magdalena (L).
		5. Seeds	(3) = Umata (Municipal Agricultural Technical Assistance Unit) (H), CAR Magdalena (M), SENA (L). (4) = Owners (L), CAR Magdalena (L) (5) = SENA (L), Umata (L), Producers Association (L), Agrarian Bank (L), Owners (L).
Siberia	Social Problem	1. Economic income 2. Migration 3. Industry, innovation, and technology 4. Financing 5. Empathy (lack)	(1) = Road Concession “Via al Sol” (M), Cityhall of Siberia (H), Asocafe (H), Coficosta (H), Magdalena Government (H), Municipal Secretary of Agriculture (M). (2) = Mayor of Siberia (H), Municipal Council of Siberia (H), SENA (M), University of Magdalena (L). (3) = Mayor's Office of Siberia (H), Municipal Council of Siberia (H), SENA (M), Asocafe (H), Coficosta (H), Magdalena Government (M), Municipal Secretary of Agriculture (M). (4) = Cityhall of Siberia (H), Municipal Council of Siberia (H), SENA (M), Agrarian Bank (M), Magdalena Government (H), World Bank for Women (H), Bancamía (H), Popular Bank (H).

		(5) = Mayor of Chipaque (H), Asocafe (M)
Ecological problems	1. Floods 2. Soil erosion 3. Deforestation 4. Pollution 5. Agrochemicals	(1) = Corpamag (H), Cityhall of Siberia (H), Municipal Council of Siberia (H), Asocafe (H), Caficosta (H), Magdalena Government (H), Municipal Secretary of Agriculture (M), Umata (Municipal Agricultural Technical Assistance Unit) (M). (2) = Corpamag (H), Cityhallr of Siberia (H), Municipal Council of Siberia (H), Asocafe (M), Coficosta (M), Magdalena Government (H), Municipal Secretary of Agriculture (M), Umata (M). (3) = Corpamag (M), Cityhall of Siberia (M), Municipal Council of Siberia (M), Asocafe (M), Caficosta (M), Magdalena´s Government (M), Municipal Secretary of Agriculture (M), Umata (Municipal Agricultural Technical Assistance Unit) (M). (4) = Corpamag (M), Mayor of Siberia (M), Municipal Council of Siberia (M), Asocafe (M), Costacofi (M), Government of Magdalena (M), Municipal Secretary of Agriculture (M), Umata (Municipal Agricultural Technical Assistance Unit) (M). (5) = Corpamag (M), Mayor of Siberia (M), Municipal Council of

			Siberia (M), Asocafe (M), Caficosta (M), Magdalena Government (M), Municipal Secretary of Agriculture (M), Umata (Municipal Agricultural Technical Assistance Unit) (M).
Palmor	Social Problem	<p>1. Migration</p> <p>2. Education focused on agriculture</p> <p>3. Employment and income</p> <p>4. Sanitary landfill (operator non-compliance with communities)</p> <p>5. Territorial planning and environmental planning of the territory</p>	<p>(1) = Cienaga City Hall (L), Palmor Local City Hall (L).</p> <p>(2) = Cienaga City Hall (M), Palmor Local City Hall (M).</p> <p>(3) = Sanitary landfill concession company (L), Cienaga City Hall (M), Palmor Local City Hall (H), District Secretariat for Economic Development (M).</p> <p>(4) = MADS (Ministry of Environment and Sustainable Development) (H), Sanitary landfill concession company) (H), Cienaga City Hall (L), Palmor Local City Hall (L), Special Administrative Unit of Public Services (M) , ANLA (National Environmental Licensing Authority) (M), District Secretary for the Environment (M).</p> <p>(5) = MADS (Ministry of Environment and Sustainable Development) (H), Cienaga City Hall (H), Palmor Local City Hall (M), ANLA (H), District Environment Secretariat (M).</p>

Ecological problems	<ol style="list-style-type: none"> 1. Contamination of the landfill 2. Soil erosion 3. Deforestation 4. Flood 5. Pests (vectors) 	<p>(1) = MADS (Ministry of Environment and Sustainable Development) (H), Sanitary landfill concession company (H), Cityhall of Cienaga (H), Local Cityhall of Palmor (M), Special Administrative Unit of Public Services (H), ANLA (H), District Secretary for the Environment (H).</p> <p>(2) = MADS (H), UMATA (M), ANLA (L), District Secretary for the Environment (H).</p> <p>(3) = MADS (L), Cienaga City Hall (L) Palmor Local City Hall (M), ANLA (P), District Secretary for the Environment (H).</p> <p>(4) = MADS (H), Cienaga City Hall (H), Palmor Local City Hall (H), ANLA (M), Magdalena Water, Aqueduct and Sewerage Company (AAA) (H), District Secretary for the Environment (M).</p> <p>(5) = MADS (L), Sanitary landfill concession company (H), Cienaga Cityhall (H), IDPYBA (District Institute for Animal Protection and Welfare) (M), Palmor Local Cityhall (L), Public Services (M), ANLA (M), District Secretary for the Environment (M).</p>
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Note: The level of influence of each Stakeholder Institution, in regard the possible solution of each of the environmental problems, from the perception of the communities, was rated by the interviewees on a qualitative scale according to two options: High influence (H) Medium influence (M) or Low influence (L). In the case of Palmor (Los Exploradores), it was not possible to access the interviews with property owners due to their refusal to participate in the interviews and workshops.

On the other hand, the evaluation of the results of the alternatives that, so far, have been implemented in each of the cases is presented below: On the other hand, the evaluation of the results of the alternatives that, so far, they have been implemented in each of the cases:

Table 4 Evaluation of Alternative Solutions Implemented.

Case	Alternative Solution	Highlights of the alternative solution	Impact results qualification
San Javier	Creation of producer cooperatives	These association initiatives have made it possible to improve financing possibilities and improve the household economy.	1
	Living fence project with trees	An improvement has been perceived in terms of reforestation and forest conservation.	2
	Mountain slope protection training	Due to these trainings, landslides have decreased since the measures were implemented in the communities.	1
	UMATA Reforestation Project	Due to project execution problems, such as contracting and budget problems, there was a problem in delivering the trees to the communities.	3
	Seed protection and improvement program	Reduction of pests, although the seeds are Expensive.	2

	Training in home gardens and food safety	It allows to generate other income through different activities for the communities	2
	Automotive mechanics course	Mechanical course It allows the arrangement of vehicles for the transport of products and agricultural machinery	2
Siberia	CORPAMAG Fertilizer Training Project	It has made it possible to improve soil management and the transformation of by-products into fertilizers.	1
	Riverbank protection project. Municipal Secretary of Agriculture	Project execution issues, including contracting and budget issues	4
	UMATA Reforestation Project	It was not implemented for all stakeholders, only a few producers were benefited, so there were coverage problems generating expectations in the communities and individuals who could not access	3
Palmor	Residual Water Treatment Plant System. ECOLSIERRA	Establishes protection of the water sources of local communities	2
	UMATA Reforestation Project	Low Responses, due not every producer was able to access this initiative	4
	Caficosta Training	-	5
	Training in home	It allows to generate other income	3

gardens and food safety	through different activities for the communities
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Source: ECOLSIERRA Internal Inspection and evaluation of Community Benefit Projects 2020. Note: Regarding the rating, it was applied on a qualitative scale from Excellent (1), Good (2), Fair (3), Bad (4), Not Sure or Not Responding (5).

Based on these results, it has been observed some crucial factors must be considered in forest environmental governance models. The concern expressed by the actors addressed, as well as other recommendations that arise from the group of researchers, from the academic sector, is the need to involve innovation systems, from the social to the technical in the forestry part, this increases the possibilities of the effectiveness of the policy to counteract phenomena such as deforestation and the expansion of the agricultural frontier. In this way, agroforestry systems should be promoted since they allow generating changes in the conventional models of local production. It will be essential to involve the interaction between scales, of policy and financial instruments from the international level, as in the case of projects, initiatives, and actions in the framework of climate change, through the application of policies at a regional and local level in the matter conservation and sustainable use of forests, forestry, and agroforestry systems. Another critical aspect, as mentioned, is to link a more significant number of actors with whom it is possible to reach agreements and forms of community legal regulation, but additionally, it allows tremendous success in organizational terms and in achieving common goals and purposes. For this reason, governance models must be incorporated into national forest policies and not be seen solely as bureaucratic or technical instruments without recognition of social realities. This aspect must also be strengthened since, from the identification of critical problems, it is possible to advance in the construction of participatory agendas. From these models, with support from the academy, it will be possible to generate changes that allow the generation of adaptation processes and allows to solve other problems or reduce their adverse impacts, to achieve a model of environmental sustainability from the local.

7. Conclusions

In the Colombian State, some problems affect landscapes, one of the main problems being forest loss that leads to a reduction in biodiversity. For this reason, the pressures exerted by activities of conventional agricultural models imply changing the model towards forest policies that involve fundamental aspects of forest environmental governance. Thus, there is a need for scholarly communication regarding the problem of deforestation and determine that policies focused exclusively on the development of forest plantations should not be approached from responsible integrity but rather seek to consider the complex issues. Social causes and find mechanisms of an economic nature provided by the State for the cultural awareness of the environment regarding reforestation. Government decisions that have been made from the public administrative sector have been ineffective since they are for bureaucratic purposes with monocentric decision-making. Faced with this situation, alternatives are proposed to change the governance perspective to generate institutional transformation based on forest policy models in our country. In this analysis, it was possible to advance towards an investigative development of the perception of the leading local environmental problems and conflicts. This was the first step to establish the prioritization of these problems. Some of these have been subdivided into social and ecological problems. After prioritizing, it was found that the main social problems from the perspective of the communities are unemployment and economic income, migration from the countryside to the city, lack of access to technology, innovation, among others. Concerning ecological problems, the most important that the communities highlighted were the availability of water and drought, the processes of erosion and soil degradation, pests and diseases, and pollution. Likewise, it has been possible to identify reciprocity in the interactions between zonal subjects, which vary from low to medium, but also, those that are key to strengthening state agreements have been identified that allow reaching the consolidation of forms of solution. Then the conclusion is the indispensable transformation of a monocentric type by a polycentric one that includes broader participation of the various, specifically from the population and the role that the university community plays. Regarding the decisions, there are several that have been carried out from plans, programs, training, organizational processes, elaboration of

foundations for essential services, but the majority, in conjunction with the results obtained in the face of the impacts as a solution of problems, have been scarce, due to the number of objects, among which the lack of continuity and follow-up, lack of protection towards the created possibilities and in some cases the high implementation values are emphasized.

This means that they are to establish environmental services. Also, with the inclusion of the forestry sector in local economies of these environmental services, the best management and stimulus is constituted, then it would be the possibility of choosing the use of forests that can be worked within an orderly and deep exposure in terms of sustainability, can generate socio-economic and environmental effects rescuing positive aspects, and to become an important engine of development for the country where socio-political problems are immersed in poverty and then in an attempt to obtain a forest policy in Colombia that should be directed towards the use of financing, born from the options of a solution to the problem of climate change, following the international framework as a possible viable choice for the participation of the Colombian State that allows the confirmation of the sector through strategies of regulation and socially compatible sustainable use and ecologically balanced.

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