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National and International Policies and Policy Instruments in the Development of Agroforestry in Chad

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Abstract: The potential of agroforestry to improve livelihoods and mitigate climate change and environmental degradation has been widely recognized, especially within the context of climate-smart agriculture. However, agroforestry opportunities have not been fully exploited because of several reasons, among which are adverse policies and legislations. However, many countries do not have a full understanding of how their policy and institutional environment may affect agroforestry development. We aim to fill this gap by looking at the particular case of Chad. The method used included examining data from: (i) literature reviews of important national and international polices, strategies, and legislation governing access to land and trees, among which are 'La Loi 14', Chad's 2010 poverty reduction strategy paper, draft zero of the National Environmental Policy, (ii) interviews and focus group discussions with NGOs, government officials, and farmers, and (iii) surveys with 100 households. Results show that Chad has no specific agroforestry policy but opportunities for agroforestry can be found in some of the above-mentioned policy documents and government strategies. Most stakeholders interviewed had positive attitudes towards agroforestry, but uptake of the practice is handicapped by poor understanding of the forestry law by farmers and forestry officials. Gaps in existing laws give room for rent-seekers to collect individual (USD 272–909) and collective (USD 36–1818) access fees to trees on both forest and farmland. We propose that the government of Chad should unmask elements of agroforestry in existing policies and policy instruments to demonstrate its importance in responding to livelihood and environmental challenges in the country.

Keywords: climate change; environmental degradation; institutional environment; la loi 14; tree-planting; livelihoods; Sahel

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1. Introduction

It has generally been accepted that climate change is a serious environmental challenge that could undermine sustainable development initiatives with significant effects at global, regional, and local scales. As a result, governments, communities, and civil society are increasingly concerned with anticipating its future effects while searching for strategies to mitigate and adapt to its current effects [1]. Agriculture is one of the human activities most dependent on climate [2] with consequences for food security [3]. Both climate change and climate variability affect food production and supplies, food availability, stability, use, access, and prices [3]. This is especially true in sub-Saharan Africa where most farmers are poor and depend on rain-fed agriculture and are vulnerable to climate change and variability. Moreover, sub-Saharan farmers have limited economic and institutional capacity to cope with and adapt to climate viability and change [4,5].

As challenges to climate variability and climate change continue to negatively affect lives and the environment, the international development and research community is faced with the challenge of finding solutions to mitigate and adapt to the situation. Agroforestry

has been identified as one of the technologies that provide positive benefits to the climate agenda [6–8]. It is defined as a "a dynamic, ecologically based, natural resources management system that, through the integration of trees in farms and in landscapes, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels" [9]. Agroforestry is important to the climate agenda because it delivers biodiversity and ecosystem services [8]. Agroforestry contributes to climate change mitigation in three ways (i) sequestering carbon, in biomass and soil and also by improving soil health (ii) reducing greenhouse gas emissions and (iii) avoiding emissions through reduced fossil fuel energy usage on farms [10]. By mitigating climate change, through agroforestry, practices farmers also increase their adaptation capacity through other benefits among which are increased yields, reduced risks, improved pollinator and wildlife habitats or increased capacity to adapt to climate change including diversifying human diets and economic opportunities [6]. Agroforestry is practiced in many ways ranging from living fences and home gardens to woodlots and multistrata agroforestry. It includes trees on farms and in agricultural landscapes, farming in forests and at forests margins [11] and, farmer managed natural regeneration [12]. In the Sahelian countries, agroforestry fits well with the existing typical savannah park lands landscape [13].

The development and adoption or lack of adoption of agroforestry by farmers and development practitioners is influenced by a range of factors. Some are related to policy and institutions (formal and informal), while others have little or nothing to do with policy, such as climatic conditions, household and farm characteristics (resource endowment, household size) and attributes of the technology, among which is time lag for trees to reach maturity [7,14]. Many countries and organizations in the world recognize the importance of agroforestry to the environment and make attempts to integrate the practice in their climate change mitigation and adaptation policies. However, it is well known that there is often a gap between what is written in policy statements and what happens on the field [15].

Policy generally refers to what organizations do. It denotes a course of action taken by governments, and other organizations etc. [15]. Within the context of agroforestry, policy is defined as strategies that guide action of many seeking to influence rural lives and landscapes [11]. In contemporary discussions of agroforestry especially at the landscape level, the notion of institution is often brought into the debate to make the link with formal and informal rules governing land and trees among which are rights and ownerships and how these influence tree-planting. Institutions are the rules of the game in a society or more formally are the humanly devised constraints that shape human interactions [16]. Intuitions are more than just the rules of the game providing constraints, they are also incentives to what the individual cannot do alone; they are also beliefs and preferences and provide cues to uncalculated actions [17]

Policy and institutions are interconnected in that policies define the destination or objectives to attain and involve several instruments (policy instruments) which are applied following specific rules (institutions) to meet the fixed objectives [18]. If agroforestry is to bring the required change, or if it is to be used to attain specific objectives, then the right policies and policy instruments must be in place [19,20]. In fact, due to its long-term nature, adoption of agroforestry may not take place in a policy vacuum; it must be facilitated by a conducive policy and by national and local institutional arrangements [19] that ensure farmers have an adequate supply of planting material, and plant the right trees at the right place and time [7].

The debate about whether existing national policies address agroforestry and its contribution to climate change is divisive. For example, Buttoud [19] note that potential contribution of agroforestry to the economy and the environment are not fully exploited because the practice is not sufficiently addressed in national policy making, land use planning, and rural development programs. On the contrary other authors report that there is a significant gap between national ambitions and the ability to measure and report on agroforestry [6]. The findings of the latter authors might have been influenced by the fact that agroforestry systems are diverse, vary from one place to another and can be observed

at different scales [19]. To buttress the point, Rosentock et al. [6] note that in most cases where agroforestry has been used to address relevant climate change issues, they risk not being quantified in 60% of the cases as agroforestry because of the way the documents are structured. This in their opinion represents a missed opportunity when the contributions of agroforestry are being quantified and generally, leads to a call for policy change when they may not be needed. Lack of quantification or evidence of the importance of agroforestry to address climate change objectives may also relegate the practice to the background thus reducing its potential impact or buy in from policy makers. The above suggest agroforestry may be hidden in policy documents and instruments and calls for proper analysis of the situation before any action is taken to propose alternative solutions to improve on the institutional environment.

Sahelian countries especially the poorest ones are the hardest hit by climate change because they largely depend on rain-fed agriculture and global warming alter the availability of water resources in such countries [21]. Chad is, one poor Sahelian country, land locked and has been characterized for decades by dramatic indicators in terms of human development (187 HDI out of 189 countries assessed by UNDP in 2019) and has an environmental performance Index of 26.7 (172 out of 180 countries assessed by Yale/Colombia [22]). Chad's agriculture, as with most Sahelian countries, is dependent on good weather. In recent years, the rainy season has been shorter than expected, with rainfall irregular or falling at inappropriate times in crop cycle [23].

The present paper contributes to existing literature by exploring opportunities and barriers to smallholder agroforestry development in Chad from a policy and institution perspective and identifies elements that may be used to advocate changes in subsequent national environment policy and policy instruments' designs and reviews. The research lies on the premise that agroforestry is important for Chad due to its potential to sequester carbon, improve livelihoods, and provide functional links between forests fragments and critical habitat. Additionally, evidence from a few attempts to promote agroforestry through projects in Chad suggests that agroforestry systems have contributed to enhance the adaptive capacity of farmers in the project areas but such interventions need transformative institutions and policies to scale the interventions out to a larger group of potential beneficiaries [24,25].

Three main research questions thus guide the study: (i) what national and international level policies exist in Chad that promote tree growing and management (ii) what specific policy instruments exist that provide incentives or disincentives to tree growing for smallholders and (iii) what are stakeholders' perceptions of existing policies and policy instruments and the consequences on smallholder tree-planting behaviors? Besides assessing the general agroforestry policy context in the country, the paper pays attention to a specific policy instrument-the environment law, colloquially referred to in Chad as 'La Loi 14' and here translated as Law No. 14. We discuss the level of implementation of Law No. 14, its consequences on rent seeking behaviors and unethical practices by forest actors, conversationally referred to as bogo-bogos or unofficial forest guards. Lastly, we assess how different actors perceive and react to the law and how those perceptions relate to household level reflections of constraints to tree growing and choices of agroforestry.

The choice of Chad as a case study is interesting because results will contribute to the knowledge of what works to build resilience to climate change in arid and semi-arid areas, as well as in countries that are experiencing conflict.

2. Materials and Methods

This study used a double approach of analyzing policies at the national level and having field work to confront realities on the field. As such information reported was collected using a combination of: (i) literature reviews and analysis of policies and policy instruments in Chad, (ii) key informant interviews and focus group discussions and (iii) individual household surveys with farmers.

The literature consulted included important policy documents, policy instruments, and related reports. A good number of the documents were collected online, as it was difficult to have them from the relevant government departments. In analyzing the policy documents, we paid attention to whether they mentioned specific agroforestry practices, or tree growing initiatives.

Key informant interviews were carried out with traditional authorities, specifically the Sultan of Goz-Beida through his spokesperson; and traditional leaders of three selected villages where focus groups were carried out: Milessse, Loubané, and Djedidé. The region and villages were the site of an ongoing program to Build Resilience and Adaptation to Climate Extremes and Disasters (BRACED) in some very fragile and challenging countries in the world, among which is Chad, where one of the focuses was to mainstream agroforestry within the national policy environment as a strategy and technology to build resilience against climate extremes including droughts and floods. It was therefore important within BRACED to assess to what extent the existing policy environment was conducive for agroforestry development.

A focus group discussion was organized with farmers in each of the three selected villages. Focus groups were made up of both men and women. Interviews and focus group discussions were also organized with non-governmental organizations (NGO), government officials, and farmers. The government services involved were mostly those in charge of the forest, environment, agriculture, and rural development. They were either from Central government services based in Ndjamena or from decentralized services in Goz-Beida.

Individual interviews were conducted with selected household members who were either the household head or the wife. The objective was to assess Chadian farmers' attitudes and perception of Law No. 14 and its impact on agroforestry. The difference between the individual household surveys and the focus group discussions is that the latter gathered qualitative information about the issues, while the individual household survey quantified and weighed the importance of the problems using opinions of a larger number of farmers.

The following describes the sampling plan-Respondents for the individual interviews were chosen from 10 villages out of a total of 91 that constituted the area of intervention of the NGO working to improve resilience in the region of Sila with headquarters in Goz-Beida. The 91 villages were divided into three segments. Segmentation was based on the principal roads that lead into the different communities departing from Goz-Beida. The logic in the choice of villages was to choose those along each segment that are located at various distances from Goz-Beida-near, midway and far; to cover farmers residing at various distances from the project area. Distance was hypothesized to affect access to agroforestry information with far-away villages that have limited access compared to the ones close to Goz-Beida where most NGOs were located. The choices of the villages were guided by NGO staff who had a good knowledge of the project area. In all, 78 men and 28 women took part in the interview. Thirty percent of the respondents were members of an environmental committee (EC) and 71% were members of other village or farmer organizations. EC are grass roots farmers organization formed to discuss environmental issues. it was postulated that such members would be more aware of agroforestry and tree-planting policies than non-members.

The interviews and focus groups were carried out using a check list of questions. Discussions with government officials and NGOs were focused on the following: broad context of agroforestry policy in Chad; drivers enhancing agroforestry, barriers impeding agroforestry and possible improvements in policy environment. Discussion with farmers and traditional rulers were based on their understanding of informal institutions governing land and trees. Specifically: social and cultural incentives to adopt agroforestry and tree-growing (e.g., cultural values of trees), tree-planting, and management culture etc. Legal impediments regarding agroforestry (e.g., tenure issues, forest and other effects emanating from law enforcement, effects of the bogo-bogos), gender specific issues related to land tenure, tree-planting, and agroforestry. The objectives of talking to both government

and local communities was to ascertain whether current policies and laws regulating the forestry sector, and which have implications for agroforestry, make any sense to both categories of stakeholders in relation to state priorities, and local people's perspectives and priorities.

In the results sections that follows, responses to the review of policies documents, focus group discussions, and individual interviews are clustered into opportunities, constraints, and recommendations for agroforestry development from a policy perspective.

3. Results and Discussions

3.1. General Overview of Chadian Farming Systems and Related Challenges

Most of the arable land in Chad is in the southern region, far from the Sahara, and is characterized by poor soils, a long dry season with daily temperatures over 40 °C and a short rainy season [26]. Most Chadians depend on subsistence agriculture for their livelihood. Traditionally, farmers associate cowpea with cereals and practice crop rotation through a succession of cereals (sorghum, and pearl millet) with sesame and groundnuts. Slash-and-burn agriculture is common in the country and crop rotations are generally practiced for three or four years before the land is left to fallow. The fallows are characterized by woody plants and in the past, they used to last for more than 15 years. Today however, they have shortened to five or six years at most. Factors such as population growth; and deforestation due to increased demand for fuel wood and charcoal have contributed to reduce fallow periods. Traditionally, Chadian farmers maintain trees scattered on their crop fields. This helps them to adapt their crop and livestock production systems to the marginal conditions of their environment [26]. Chad's agricultural production, characterized by low yields and low labor productivity, has good potential for improvement; and improving and stabilizing agricultural production is one of the main objectives of the government of Chad [27]. This is possible if the following issues can be addressed: fragile ecosystems, declining soil fertility and vulnerability to climatic conditions [28]. Other problems faced by Chad include reduced agricultural land due to increased population growth, low water penetration due to hard top soil, which often leads to erosion and crop destruction [28]. Agroforestry, with emphasis on farmer managed natural regeneration (FMNR), conservation agriculture, and improved water and land management techniques, have been proven to be successful to solving similar problems in other Sahelian countries with analogous characteristics [28,29]. In Niger for example, FMNR contributes to improved household income, increased crop diversity and density and is promoted as an inexpensive means to enhance rural livelihoods and an attractive alternative to reforestation efforts that rely on tree-planting [28,29]

3.2. Importance of Agroforestry–Respondents' Perceptions and Tree-Planting Behaviors

- NGOs and Government perspectives

Stakeholders from government ministries and NGOs interviewed attest to the fact that agroforestry is an age-old practice in Chad and there was general agreement among them that it needs to be further developed. These officials recognized that agroforestry allows the combination of best practices from forestry and agricultural systems, therefore promoting maximum use and benefits from the land while minimizing adverse impacts on it. They also ascertain that agroforestry can contribute significantly to mitigate climate change and solve problems related to agriculture, and livelihood in the country. However, they noted that agroforestry technologies and other low-tech methods commonly practiced in some countries, are not well known in Chad. For example, Farmer Managed Natural Regeneration (FMNR) and fertilizer trees that have been proven to be very successful in many Sahelian countries such as Mali, Niger, and Burkina Faso are only recently being developed in the country. This claim can be supported by an article from [30] who in a review of more than 30 articles providing evidence about FMNR in some semi-arid and Sahelian countries in sub-Saharan Africa found only one citation for Chad.

- Farmers' perception of agroforestry, tree-planting behaviors, and gender differences

Farmers were asked to list the importance of trees and interaction of trees, crops, and animals to their livelihoods. Men in all the three villages where focus groups were conducted were quick to list the following: shelter, insecticides, and food. Women on their part gave the same uses of trees as men, and they also added other essential contributions of trees to their livelihoods, such as sources of oil and fruit for children. Additionally, some respondents had observed that crops grown around certain trees (e.g., acacia species) often result in higher yields compared to those that are not grown around trees.

In two out of the three villages where focus groups were conducted, 7 out of 8 farmers in each of them and 5 out of 10 in another had planted at least one tree in the last two years. Fruit trees (guavas, mangoes, etc.) and acacia were those most listed.

Individual survey results indicate that 69% of the respondents had planted an average of 6.19 trees (S.D = 9.88 trees) some time in their lives. The average number of trees planted in the last two years prior to the interview (4.88 trees S.D = 9.14 trees) was larger than the average number planted in the last five years (3.44 trees S.D = 2.95 trees). More farmers were involved in tree-planting in the past one year (45 farmers), and last two years (34 farmers) than in the last five years (21 farmers).

Respondents planted trees either on their farms (54%) or around their houses (46%). There were no statistically significant differences between male and female respondents as to where they planted trees [X2 (1, 69) = 2.126, $p > 0.1$]. However, the data shows that more women (61%) compared to men (41%) planted trees around their compounds, and more men (59%) against women (39%) planted trees on their farms. This may be explained by the fact that men have more access to land to plant trees than women. A comparison of the average number of trees planted shows that members of environmental committees planted more trees (10) than non-members (5) and men seemed to have planted more trees than women, with an average of 7 and 3 trees planted respectively over the past five years prior to the interviews.

The positive attitude to agroforestry as perceived by farmers and government officials provides hope that the practice may expand, if the right conditions for development are in place. The fact that most farmers with NGOs support planted more trees in recent time suggest that even more would be involved in tree-planting as awareness and need increases over time. This result follows Meijer et al. [31] who argue that knowledge, attitudes and perceptions in relations to benefits and challenges of agroforestry are important intrinsic variables affecting agroforestry adoption because once they are known, it is easy to design projects that meet local relevance. Additionally, this result shows that farmers and NGOs are already initiating tree-planting activities which are bases for transformative change of land use management [32].

3.3. Policy and Policy Instruments Governing Access to Land and Trees and Implications for Agroforestry Development in Chad

3.3.1. Overview of National Policies Governing Trees-Opportunities for Agroforestry Development

National policy documents reviewed in this study do not directly mention agroforestry but refer to the sustainable management of natural resources as one of the main objectives that must be met to achieve rural development and climate change mitigation goals in Chad. A few of the documents that address natural resources management and specifically allude to agroforestry are discussed below:

- The National Rural Investment Plan

The National Rural Investment Plan, known by its French acronym as PNISR, is the single strategic framework in Chad for sectorial coordination and planning over the period 2014–2020 and it is in line with several national and international policy documents among which is the detailed plan for Agricultural Development in Africa and the five-year plan for the development of agriculture in Chad. The overall objective of the PNISR is to make

the rural sector an important source of economic growth, ensuring the food and nutritional security of the people of Chad in a context of sustainable development.

Objective 3 of the PNISR specifies the need to sustainably develop the agro-sylvo-pastoral, fisheries and wildlife sectors of the country to add more value to Chadian products and make them more competitive. Section 3.4.3 focuses on the preservation of biodiversity and mentions the introduction of improved varieties, domestication of forest products and integration of trees on farm. Section 3.4.5 elaborates on strategies to intensify and diversify emerging subsectors. Here, emphasis is put on timber and non-timber forest products with focus on Arabic gum, medicinal plants, shea butter, tamarind, and honey as important tree crops that need to be developed.

- Agroforestry training manual

The agroforestry training manual was developed by the directorate of livestock in 1997. The manual deals with tree-planting techniques, nursery development technologies and integration of trees in farming systems and pastureland. The existence of such an extension guide again demonstrates that efforts have been made by the government of Chad to promote agroforestry practices in the country. However, the fact that this document was produced by the directorate of animal production raises questions as to the extent to which other ministerial departments in charge of rural development were involved in its design and if peculiarities related to tree crop integration were considered.

- Ongoing tree-planting initiatives-potentials for agroforestry development in Chad.

Our review found that the tree-planting week was instituted by ordonnance No 29 PR/EFPC. The ordinance in Article 2, specifies that the objective of the tree-planting week is to protect the environment and promote reforestation. Article 5 of the ordonnance states that all trees planted during the tree-planting week will be part of the private domain of the state. Despite the provision of the latter article, which can be considered a disincentive for individuals to plant trees which they will not own, some analyst members in focus groups discussions believe some activities to celebrate the tree-planting week have focused on promoting agricultural production through the planting of *Acacia albida*, *Vitellaria paradoxa* (shea) and other forest species on farmland suggesting it still after all provide an incentive for agroforestry development.

Moreover, millions of trees have been planted in the country as part of the African Great Green Wall Initiative. The vision of the Great Green Wall Initiative was initially limited to tree-planting but has now evolved into an integrated ecosystem approach. As a follow up strategy, the GOC has also set up a National Agency for the Great Green Wall-an initiative to support climate change adaptation policies. To meet its environmental objectives, the GOC has established a special fund for the environment. This is stipulated in Article 99 of Law No. 14/PR/98. The objective of the special fund is to mobilize its own resources through the establishment of specific taxes. This again demonstrates efforts by the GOC to operationalize its environmental policy through tree-planting by raising the needed funds for the project.

Tree-planting also happens at the subnational/local levels. For example, in 2014, The National Rural Development agency (ONDR in French) organized 48 on-farm tree management sensitization sessions in Goz-Beida. The campaigns involved 92 men and 117 women. The training sessions were focused on protection from abusive felling of trees, prevention of bush fires, pruning techniques and other practices which contribute to proper management and growth of trees. The trainings were delivered to both local population and refugees, whose influx into the area contribute to massive felling of trees. The staff of ONDR declared that due to lack of means they cannot distribute improved planting materials to farmers to boost their tree-planting activities.

3.3.2. Regional and International Conventions-Opportunities for Agroforestry Development

The government of Chad has signed international conventions and developed other regional and sectorial policies that may indirectly contribute towards the development of agroforestry. Chad has for example signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and ratified it in June 1994. The country signed the Kyoto protocol in 2002 which was ratified in 2009. By ratifying these conventions, the government of Chad demonstrates its commitment to contribute to the fight against climate change and to develop policies and strategies to mitigate and adapt to the negative effects of it.

The countries' 2015 action plan for the UNFCCC or the Intended Nationally Determined Contribution (INDC) clearly identifies agroforestry as one of the priority sectors that needs to be developed in its adaptation strategy [33]. Although national priorities in terms of adaptation to climate change are applicable to all of Chad, the government has identified priority action zones which are those especially vulnerable to the effects of climate change and in part are host to refugees and displaced populations.

The Climate Change Adaptation Strategy is in line with the country's PNISR covering the period 2014–2020. In the agricultural sector, the government explicitly intends to develop intensive and diversified agriculture using improved inputs (e.g., organic fertilizers including composts, adapted plant varieties), agroforestry and water conservation (implementation of soil restoration works), and preparation and promotion of new cropping calendars. The above indicate that by aligning to these international conventions, the government of Chad has identified agroforestry as an important option for both climate change mitigation and rural development.

There are other international organizations and programs that have developed initiatives to support agroforestry in Chad. For example, the Global Environment Facility (GEF), the support program for the Great Green Wall initiative, West Africa Natural resources management project funded through world vision and promoting FMNR, and the Lake Chad Basin Commission, in which Chad is included, have all committed to scale up success stories, such as that of Niger, where the restoration of large areas of agroforestry parklands has improved soil fertility, reduced soil erosion, increased fodder availability, and enhanced and diversified household income [25,34].

Some tree-planting initiatives such as the tree-planting week and the green belt initiatives are related to the national action plan to fight against desertification. The latter was ratified by the Chadian national assembly in 2000. In the national action plan, all the regions in the country were expected to have regional action plans from which local plans also needed to be developed. As of 2016, only 4 out of an expected 23 regional action plans had been elaborated. However, if properly enforced as intended, tree-planting initiatives will be enhanced in all regions of the country. Lack of resources was often cited as the reasons for not reaching the above targets (based on interview with government officials).

3.3.3. Formal and Informal Institutions Governing Land in Chad-Implications for Agroforestry Development

Access to land and tenure security are important factors for the adoption of agroforestry technologies. In some cases, rights to trees may be separate from rights to land and both land and tree tenure insecurity may discourage people from introducing or continuing agroforestry practices [19]. This section of the paper pays attention to the land policy and instruments in Chad and identifies opportunities and constraints for agroforestry development. Attention is here focused on the interaction between formal and informal institutions governing land and tree resources and looks at gender differences in terms of incentives or disincentives.

Results show that formal rules governing land in Chad are contained in laws no 23, 24 and 25 of 22 July 1967. The law requires land holders to register their land to guarantee ownership and makes provision that landowners may be dispossessed of it for public

utility. Law No. 14 specifies that private ownership of forest must be backed by ownership of land or a title deed [35].

Existence of laws is important, but even more relevant to explain tree-planting and management behavior is farmers' perception of land ownership and how their interpretation of the laws affect their tree-planting decisions. In general, Chad's formal land laws are written in French, and a few have been translated into Arabic, but none are available in local languages. Moreover, the texts of the law have not been disseminated and are therefore poorly known by the population. The general opinion of local communities, interviewed during this study, is that land belongs to the chiefs or the Imams. This suggests that much more than formal laws; customary and Islamic institutions continue to govern access to and management of land in rural areas.

The most common form of acquiring land in the rural areas is by inheritance. In cases where farmland is scarce, leasing is common, usually for an undefined period. Focus group discussions reveal that; land markets are now developing in rural Chad, especially land for horticulture, usually located along riverbeds. The sultan of Sila, for example, recognizes that in the past, land was not supposed to be sold. However, the trend is changing because of increasing population and consequently pressure for farmland and pastures. Focus group discussions also reveal that pressure on land in recent years has been intensified by the influx of Sudanese refugees into the area.

In Muslim communities, and as per Islamic law, land is distributed equally to all the sons, and the daughters usually receive half of what the sons acquire. Women who marry in other communities may cede their land as gifts or they may sell it.

- Farmers' perception of formal and informal institutions governing land implications for agroforestry development

In all the communities visited, access to land was mentioned among the factors that hinder tree-planting, but formal institutions governing land were never raised as an impediment. Based on formal laws, private ownership of land is permitted and needs to be sanctioned by a land title. Focus group discussions reveal that local communities are generally unaware of this provision because the law is not strictly applied. Household surveys show that 53% of those interviewed agreed or strongly agreed that land appropriation by local authorities is among the factors that may limit tree-planting, 42% disagreed and 3% were neutral. The probing was limited to informal institutions because there seems to be limited knowledge about formal institutions governing land, and the community was not familiar with development projects that may expropriate their land. The argument of those farmers who claimed that limited access to both land and tenure security limit tree-planting is that for most of the time, soil fertility rather than land availability was the problem.

With a view to promoting the reconstitution of national forest cover and contributing to the fight against desertification, the GOC has introduced a policy of encouraging individuals and local communities to own land through reforestation (Article 90 of La Loi 14). In this regard, permanent land titles could be attributed to individuals or communities after afforestation or regeneration of bare or heavily degraded land. Such land does not include areas that can be used for agricultural purposes. Although this provision encourages tree-planting on non-agricultural land, it does not inspire the development of agroforestry, because crops may not be planted on such land. In fact, the law does not specify if the reclaimed land can, in the long run, be used for agricultural purposes; in which case, crops can be integrated among the trees. Although this provision is a positive step towards tree-planting, an even better step to enhance agroforestry development would be to allow farmers develop climate-smart agricultural practices on such lands.

Informal institutions according to local traditions are important in managing land and space in rural Chad. These local institutions are also important in settling land claims and disputes and in allocating access to resources such as pasture, and water points. The most common type of conflicts in the area is between farmers and herders. Defaulters are often fined by traditional authorities to pay for damaged crops. There are challenges however to apply such local institutions to pastoralists who are mobile with their livestock. This

category of herders trespass with their animals on farmland and destroy crops and trees planted or regenerated using FMNR.

3.3.4. Overview of Policy Instruments Governing Trees, Controversies and Implications for Agroforestry Development

Existing policies and strategies in Chad as described above set the basis and priorities to develop the rural sector, protect the environment and use forest resources in the country. The main policy instruments to accompany the above-described policies that have direct implication to this study is the forest legislation. The first of such instruments we came across were within the period 1955–1959 when rule No. 510 of 8 August 1955 and ordinance No. 15 (PCR/EPC of 24 July 1959) were signed, both encouraging tree-planting operations in the country. Since then, more than 25 similar laws, rules, decrees and ministerial orders have been instituted governing access, trade and use of forest and forest resources.

The most recent legislation governing the forestry sector in Chad is Law No. 14/PR/2008 of 10 June 2008 on forest, fauna and water resources, colloquially referred to as "Law No. 14" This law lays down the regime for the conservation and sustainable management of forests, wildlife and fisheries resources, in accordance with general principles of environmental protection. In the analysis that follows we present elements of Law No. 14 that may have direct or indirect implications for tree growing and agroforestry development.

Law No. 14 in Article 13 describes a forest as 'areas occupied by plants of tree and shrub origins, excluding those resulting from agricultural activities . . . ' The same article defines forest products as 'products of all kinds from trees and shrubs, as well as all those found within the limits of forests'. The law as defined above fails to recognize that tree products harvested from farms should not be treated as forest products, although the same species may also be sourced from the forest. This legal gap, as will be seen later, is a source of misperception or controversy whether products of tree origin harvested from farms are forest or farm products not only in Chad but in many other countries across the tropics [20,36].

With regards to use rights, it can be argued that Law No. 14 was introduced with the good intentions of protecting the environment and natural resources. The law makes provisions for farmers to exploit and use the forests for personal uses (Article 29), and commercial rights can also be obtained on condition that the laws in place are respected (Law No. 14 Article 30, Text of application, Decree no 579/PR/PM/MAE/2014-articles 95–98). The law also gives opportunities for farmers to exploit the forest for agricultural purposes which means that they can clear limited areas of it to plant crops, provided they do not fell important species and completely uproot the trees (Law No. 14, Articles 53–55). Article 53 specifically states that 'any clearing of a portion of forest above a given area, as laid down by regulation, shall be subject to prior authorization after consultation with the authorities concerned'. Articles 124–128 of the 2014 text of the application elaborate on procedures to clear forests. It specifies that authorization is required to clear state and council forests and taxes need to be paid for any surface area that is greater than one ha.

Articles 71–77 of Law No. 14 are specific to forest exploitation for domestic uses. According to these articles, logging refers to operations aimed at achieving a socio-economic profit through forest products. Logging can be done for domestic, commercial or research purposes. Article 72 is explicit to domestic exploitation. It states that domestic logging shall take the form of traditional harvesting or pick-up rights. According to Article 73, traditional use rights are recognized to the riparian populations. In this regard, the riparian population can collect dead wood, and harvest fruit and medicinal plants. Article 78–87 of Law No. 14 deals with commercial exploitation of the forest. It is clear from these provisions that all logging for commercial purposes shall be subject to payment of fees and charges.

The next section of the analysis describes the perception and awareness of government staffs, NGOs and farmers about Law No. 14; its level of implementation and how the latter affects traditional use rights, tree-planting decisions and agroforestry in general.

3.3.5. Awareness and Perception of Law No. 14 by Government, NGOs and Farmers

Only one out of the nine senior government forest and environment officials interviewed demonstrated high level of understanding of Law No. 14 and had both soft and hard copies of the document. He explained that his awareness is related to exposure working with international NGOs on the subject. There was a consensus among government officials that many employees in the Directorate of Forestry are not abreast with Law No. 14 and its corresponding decree of implementation.

We were informed that in some communities Law No. 14 had been translated into local languages, but dissemination is often limited to members of environmental committees and interpretation of the law by local communities remains an issue. Interestingly, the text of application is both in French and Arabic. However, the number of people in local communities who read and write Arabic is very low. Focus group discussions revealed that in the cases where local communities, especially members of environmental committees, had been introduced to the law most often by NGOs, they seemed to be more environmentally conscious than non-members. For example, members of environmental committees were quick to agree that they would still plant trees in their compounds even if they were asked to seek permission before felling them. Meanwhile, non-members refused to take part in such a venture.

Farmers' knowledge of Law No. 14 was further investigated during surveys including one hundred respondents who were asked to answer by a yes or no if they knew there are laws governing access to and trade in trees and tree products in Chad. In general, 63% of the respondents answered by a yes. A significantly higher number of men (72%) compared to women (39%) claimed to know the law [$X2$ (1, N = 100) = 9.38, $p < 0.05$]. More members in environmental clubs (87%) claimed to know the laws compared to non-members (53%) [$X2$ (1, N = 100) = 10.298, $p < 0.01$], therefore confirming information from the focus groups.

Further analysis examined whether respondents knew how the law is commonly called in their communities. Only 23% of the respondents gave an answer. The names used to describe the law were either one or a combination of the following: law about trees, law on the environment, law on fruit, and law of the government, etc.

In general, most of the respondents agreed that all forest products belong to the state (81%) and that part of the forest must be protected against bush fire (84%). A relatively fewer proportion (50%) were aware of the stipulation that all Chadian forests must be protected against all forms of destruction. About 18% of the respondents were not aware of the fact that they have the right to collect dead trees and branches for personal use. This may be because they have been abusively fined for doing so and may thus deduct it is illegal. Very few knew they can go to prison if they cut a tree without a permit (10%). Significant differences in knowledge about the law were observed among farmers living in different segments of the village with members in one segment described to be very accessible and with more NGO support demonstrating evidence of more knowledge compared to those in segment two and three which are less accessible and have limited NGO support (Table 1).

NGOs constituted the main sources of information for 42% of respondents followed by authorities in charge of forest (30%) and 16% received relevant information from other media (Figure 1). The sources of information vary depending on respondents' sex [$X2$ (4, N = 100) = 12.86, $p < 0.05$]; a significant number of women tended to rely mainly on NGOs (64%), while men had access to information through more diverse sources. For instance, while up to 36% and 6% of men refer respectively to the authority in charge of forest and the traditional authority as their main sources of information about the law, no woman referred to any of these two. The high number of women citing NGOs as their main sources of information may be related to the fact that most of these NGOs try to design inclusive programs and ensure that women and other marginalized groups are sensitized.

Table 1. Proportion of respondents who answered with a yes that they knew elements of the forestry law (%).

Content of the Laws	Total Responding with a Yes	Sex		Adherence to an EC		Segments		
		M	F	No	Yes	Seg 1	Seg 2	Seg 3
All forest product belongs to the state	82	81	85 (0.417) ^{NS}	80	87 (0.410) ^{NS}	80	80 (0.767) ^{NS}	82
All tree planted by an individual belong to the state	47	51	36 (0.159) ^{NS}	49	43 (0.631) ^{NS}	68	30 (0.003) ***	37
All Chadian forest must be protected against any type of destruction	50	51	46 (0.656) ^{NS}	49	53 (0.663) ^{NS}	68	47 (0.007) ***	30
We need a permit to cut a tree	51	50	54 (0.748) ^{NS}	50	53 (0.760) ^{NS}	75	43 (0.001) ***	28
All the part of the forest must be protected against bush fire	84	86	79 (0.356) ^{NS}	81	90 (0.284) ^{NS}	75	90 (0.134) ^{NS}	90
I am not authorized to collect dead trees, branches, fallen fruit and medicinal plant for my personal uses	18	15	25 (0.256) ^{NS}	17	20 (0.733) ^{NS}	28	13 (0.123) ^{NS}	10
I can be fined 250,000–500,000 FCFA if I cut a tree without a permit	22	18	32 0.127 ^{NS}	20	27 0.461 ^{NS}	33	17 0.112 ^{NS}	13
I can go to prison for 2 to 6 months if I cut a tree without a permit	10	11	7 (0.553) ^{NS}	10	10 (1) ^{NS}	8	13 (0.723) ^{NS}	10

NS: not significant * significant at 10%, ** significant at 5%, *** significant at 1%, M = male, F = Female, Seg 1 = segment one and seg 2 = segment 2. Seg 2, Seg 3 = segment 3.

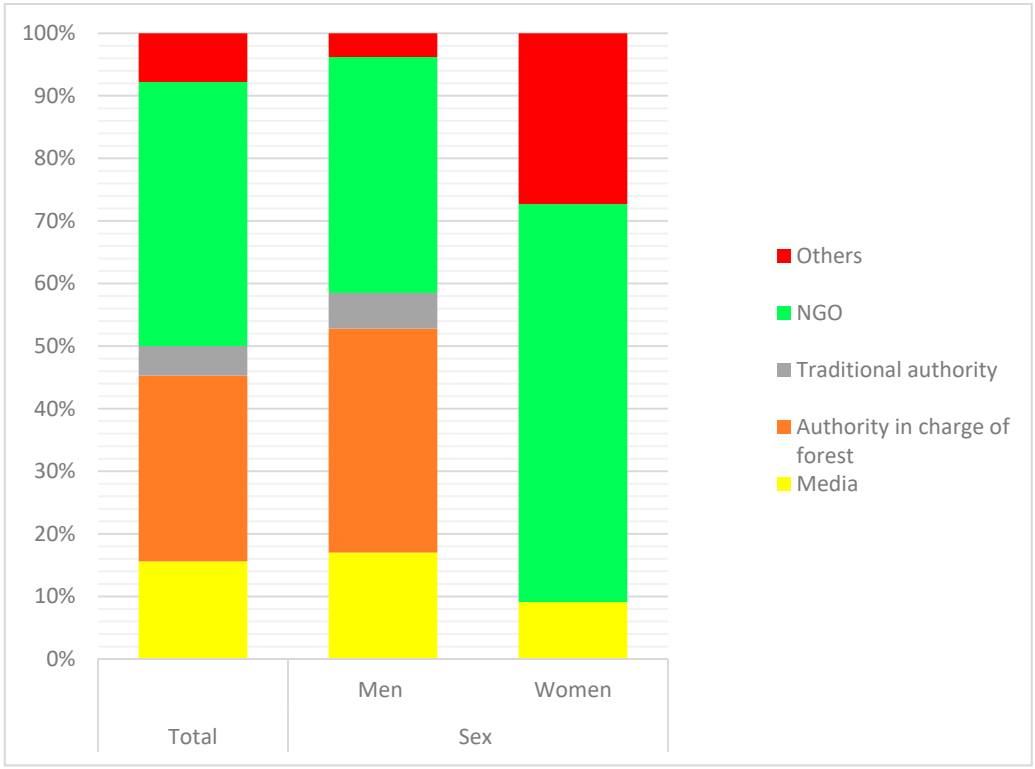

Figure 1. Respondent Sources of information about forestry law segregated by sex.

The above results about farmers' knowledge of Law No. 14 suggest three things: (i) that even though some farmers are aware of the law, their knowledge about it is limited; (ii) a majority do not know the precise content of the law; (iii) more environmental committee members may be aware that the law exists than non-members, but there are no significant differences between members and non-members of environmental clubs in terms of level of knowledge about the content of the law; (iv) some government officials are not well informed about Law No. 14. This implies that much work still needs to be done to improve government and local understanding of the law.

3.3.6. Poor Interpretation and Implementation of Law No. 14

Transformation of policies into specific programs has long been described by scholars and practitioners as fraught with implementation challenges [37,38] and African countries are habitually criticized for having good policies which are seldom implemented. As such we assessed the level of implementation of Law No. 14; the formal and informal bodies enforcing the law and consequences of law enforcement on the sustainability of natural resource base and on the welfare of farmers and the state treasury.

Discussions with both government and community members revealed concerns about who oversees enforcing Law No.14? In the studied villages it is common to hear names such as 'brigade mobile' and 'inspection de forêt' or the 'bogo-bogos', all of whom struggle to enforce the law. The 'Brigade Mobile' is a special force, well trained and armed, that is mobilized in the fight against poaching. The bogo-bogos are volunteers, hired ad-hoc by the Inspection des Forêts, to help them with law enforcement in the villages. They have no official recognition, neither have they been trained or properly informed about the Law No. 14. They are often ex-employees of the army, expanding their influence on local population.

Officially, the enforcement of Law No. 14 is the prerogative of the "Inspection des Forêts" (text of application of Law No. 14. articles 11 to 15). About 87% of the respondents agreed that some agents, either forestry officials/"bogo-bogos", move around the village to identify persons who have cut down trees or branches either from the forest or from farms, without permission. A significantly higher number of women (96.4%) compared to men (84%) reported cases of the activities of forestry agents/"bogo-bogos" on the field, possibly because women oversee fetching wood and thus come across the forestry agents more often than men.

The general perception of the non-forest government departments is that forest officials spend more time harassing and policing farmers rather than training and advising them about how to go about obtaining permits that give them access to trees. The ONDR for example reported that farmers are often in conflict with forest and environment officers and in such circumstances report the cases to them (ONDR). The National Agency for Rural Development oversees sensitizing, training and extension messages to farmers on topics related to agriculture, environment, animal and human health and food security. Due to this important role, farmers see the ONDR as the only official service to lay their complaints to.

There is a general awareness and acknowledgement that existing legislation needs to be properly implemented by the right government arm and some articles need to be clarified. For example, there are doubts whether farmers are supposed to seek authorization to prune branches or fell trees on their own yards or farms. Such arguments even erupted between forestry officials and ONDR staff during workshops organized to present preliminary finding of this study.

3.3.7. Typologies of Fines Imposed to Farmers by Bogo-Bogos/Forest Officers

Officially, fines levied to defaulters vary with regards to the nature of the crime, the type of forest where the damage was caused and the person who instigated the damage. For example, Article 298 of Law No. 14 states that anyone who has pruned, cut, removed trees, or exploited secondary forest products without having been authorized or enjoyed a right of use shall be liable to imprisonment for two to six months and be levied a fine of 25,000–50,000 FCFA, without prejudice to their confiscation and possible damages. Article 307 is focused on punishment related to clearing. It states that anyone who has contravened the provisions of the law or of the implementing regulations relating to clearing will be punished by imprisonment of three months to one year and/or a fine of 30,000 to 250,000 FCFA, without prejudice to the obligation to restore the premises and any damages. Despite the above provisions, in practice, the brigade mobile/bogo-bogos may issue one or a combination of the following fines:

- Collective access fees or authorization to cut trees

In all three focus groups, members reported that households pay collective access fees at a specific time of the year to forest officers who may be bogo-bogos/or brigade mobile (Table 2). After paying the fee, each household is free to prune as many trees as possible in the forest within a given period, usually not more than a month. Quantities of wood collected during this time are meant to meet family needs for the year, among which are for firewood, and for building of fences around the compound and farmland.

Table 2. Sample annual access fees and fines paid by community members.

Name of Community	Collective Authorization to Fell Tree (FCFA)	Collective Fines for Felling Trees (FCFA)	Fines of Bush Fires (FCFA)	Total (FCFA)
Milessé	35,000	N/A	25,000	60,000
Loubané	67,500	150,000	N/A	217,500
Djedidé	60,000	500,000	N/A	560,000
Average	54,000	325,000	25,000	N/A
Projected amount for 100 villages	5,400,000	32,500,000	2,500,000	40,400,000

Source: Focus group discussions-N/B100 villages in this table reflect the estimated number of villages found in the Goz-Beida region; N/A = not available.

- Collective fines

Largely, the bogo-bogos/brigade mobile move around the studied villages to verify if there has been any abusive felling of trees or pruning of branches. In a case where such an incident is identified, the village chief is summoned by bogos-bogos/brigade mobile who in turn sends for the entire village and insists for the culprit to be identified; otherwise, the entire village is indicted. Collective fines reported by communities generally range from 150,000–500,000 FCFA (Table 2).

- Individual fines

Information about fines paid to the bogo-bogos was further investigated through household surveys. In this regard, about 32% of the 100 respondents testified having been fined at least once in the last 5 years; 80% of them declared to know at least one person that had been fined over the same period. All the cases of fines were reported by men, against none by women. This may be related to the fact that men are head of families, and the fines are levied to them rather than to women. It was however strange to discover that more members in environmental committees had been fined compared to non-members. We expected members of environmental committees to be more abreast with the law and thus refrain from infringement than non-members. It may also be interpreted that higher awareness makes them more open/confident to declare that they had been fined. Individual fines paid by farmers to either forest officers or bogo-bogos at any given time was within the range of 18,200 FCFA–75,000 FCFA.

A visit to the office of the forestry inspector in Goz-Beida revealed that some amount of money is paid to the state treasury and are issued receipts. More than 10 of such receipts were presented during our visit. However, community members attest that they are seldom issued receipts. They are often threatened with prison sentences, reason for which they are obliged to pay the requested fines, even without receiving receipts.

3.3.8. Farmers' Perception of Law No. 14-Effects on the Sustainability of the Natural Resource Base

Farmers declared during focus group discussions and interviews that with the introduction of Law No. 14, they are now generally aware that abusive felling of trees is illegal, and that they can only collect dead branches and need authorization before pruning or felling trees. Similarly, focus group discussions reveal that the rate of felling trees has reduced with the enforcement of Law No.14 in 1998. To farmers, this is a positive change because it limits abusive felling of trees, but they disapprove of the fact that forest officials

misapply the law when they cut branches from trees on individual farmlands and homestead for personal uses. About 53% and 50% of the respondents either strongly agree or agree they will not plant trees respectively for commercial or personal purposes if they would need to comply with legal requirements before exploiting the trees. Such seemingly inhibiting regulation to trees on farmers' land is not restricted to Chad. In other Sahelian countries such as Niger it has been proven to inhibit tree-planting on farmland [39]

Some members report that the abusive extension of the law to farmland discourages them to plant or manage trees on farms because keeping the trees may instead land them into trouble. Similarly, other farmers argued that the institution of collective access fees instead promotes abusive felling of trees because once the fees are paid, they tend to collect as much wood as their efforts can permit to maximize the fees paid.

Another revelation from the focus groups discussions is that abusive enforcement of lawNo.14 has negative effects on the expansion of farmland or to the valorization of fallow land because, one would need to seek authorization before felling such trees. This was narrated to be a major disincentive to youths as they cannot start new farmlands, when contradictorily the government encourages them to engage in agricultural activities. One of the implications of this is that villagers are forced to farm unfertile land because fertile soils are often naturally grown to trees which they are not allowed to fell.

3.4. Other Policy Related Challenges-Limited Available Resources, Expertise and Inadequate Extension Efforts on Agroforestry

Despite general awareness of the importance of agroforestry, the Republic of Chad faces several challenges related to human and financial resources. There is no specialized school that trains agroforestry technicians. However, the country has two schools that train agriculture and forestry technicians and senior technicians (Ecole Technique d'Agriculture de Baille, ETA) and the University of Sarh in Doyaba that trains degree holders in agricultural sciences and the environment. The schools are reported to have gone through various difficulties and restructuring. For example, ETA was opened in 1945, closed in 1973, was reopened again in 1988 and closed seven years after due to financial constraints. In both schools, agroforestry is either thought as a topic or as a subject and not as a specialization. The lack of specialized training in agroforestry creates a knowledge gap in Chad, especially because agroforestry technologies have been recognized to be knowledge intensive and rapidly evolving, and thus require the right experts or well-trained staff to disseminate the knowhow [14]

This apart, the few well-trained people in the country seldom work for the government as they seek what is perceived as more gainful employment in national and international NGOs. This leads to the situation whereby most of the staff in the Ministry of Environment do not have the required training on the subject matter.

In the cases where efforts have been made to disseminate agroforestry, understaffing was cited as another serious problem. ONDR for example reported inadequate manpower to carry out sensitization campaigns about tree-planting/agroforestry. Generally, one extension agent is in charge of 8 villages and must carry out 16 sensitization sessions on various topics during each agricultural season. The consequence of understaffing is that only a limited number of farmers can be reached, and, on most occasions, tree-planting/agroforestry is overlooked because importance is frequently given to other agricultural problems considered to be priority.

4. Conclusions and Recommendations

This study has demonstrated that development stakeholders and farmers in Chad have positive attitudes towards agroforestry as an important pillar to address rural development, poverty and environmental challenges in the country. The importance of agroforestry as perceived by the different stakeholders were outlined, among which were fuel, shelter, food and nutrition, and fodder. We reviewed and discussed documents depicting the policy and institutional environment and sought the opinion of different stakeholders with regards to agroforestry development. The following constitute the key findings,

including opportunities, challenges and recommendations for social ecology, resilience and sustainability.

- Chad has no specific agroforestry policy but opportunities for agroforestry can be found in some policy documents and government strategies

The results demonstrate that the government of Chad, as with many other countries in the world, has no specific agroforestry policy [6,19,20]. That notwithstanding, tree-planting and elements of agroforestry are integrated in some policy documents some of which include: (i) The National Rural Investment Plan (PNISR); (ii) The countries' 2015 action plan for the UNFCCC or the Intended Nationally Determined Contribution (INDC) (iii) Other national and international conventions related to climate change and the fight against desertification e.g., Green Belt Initiative. However, we noticed that the agroforestry initiatives described in these policy documents are not well known giving the impression they do not exist. For example, the agroforestry training manual developed by ONDR in 1997 was not mentioned by any of the organizations and agencies we spoke to as a reference document on agroforestry development in the country. These suggests that even though these policy documents exist they may not be used in the field and thus would not attain the expected benefits. This may be because we did not identify any structure or government arm specialized in orientating and developing a clear agroforestry agenda for the country.

- Develop an agroforestry policy for the country

Chad therefore needs an agroforestry policy to follow in the footsteps of countries such as India [40] with clearly defined options to promote agroforestry in different land use systems and not just tree-planting. Such a policy will need to consider the local context which needs to accommodate both animals and trees. The policy will need to address farmers' links to markets for tree products and devise strategies for connection to the private sector, as markets for such products provide incentives for farmers to invest in tree-planting. The above strategy needs to be hosted, and implementation coordinated, by an adequate government structure with a clearly defined mission. Such a structure should ensure harmonization with related government ministries such as environment, agriculture, livestock and forestry.

- Ongoing tree-planting initiatives and the presence of international support are avenues to tap from and develop agroforestry in Chad

The study revealed that a good number of tree-planting initiatives involving farmers, are ongoing in the country. We found that some activities to celebrate the tree-planting week have focused on promoting agricultural production through the planting of high value tree crops and other forest species on farmland and thus should be encouraged. The study demonstrated that some international donors are already assisting the government of Chad to push forward its tree-planting initiatives. For example, the Global Environment Facility (GEF), the support program for the Great Green Wall initiative and the Lake Chad Basin Commission, in which Chad is included, commit to scale up success stories, such as that of Niger where the restoration of large areas of agroforestry parklands has improved soil fertility, reduced soil erosion, increased fodder availability and enhanced and diversified household income. (GEF project review document, 2015).

- Include local authorities in the management of natural resources and develop local conventions

It was the opinion of some of the NGOs and farmers interviewed that local communities are not sufficiently involved in the management of natural resources and in the implementation of Law No. 14. In fact, the constitution of Chad provides for decentralization to create a more equitable and democratic distribution of power down to local levels [35]. Local communities can thus seize opportunities provided by the constitution and participate in the development of agroforestry through councils and local leaders. Local councils are recognized to be at the fore front and are responsible for making policy

a reality. More than 70% of climate change reduction measures and up to 90% of climate change adaptation measures around the world are undertaken by local governments [41]. Projects delivered locally are designed to reflect local circumstances and such tailored solutions allow for effective action. Thus, local councils can be fully engaged compared to national governments. This is especially because, local governments can easily mobilize local communities within their area of action and ensure local people are consulted on policies and policy instruments, such as how to effectively manage trees or how to track and fine defaulters.

- Develop training courses for students and young professionals on agroforestry

The study identified limited available resources, expertise and inadequate extension efforts on agroforestry in Chad. To have a good number of young professionals that master agroforestry, it should be introduced as a major course or specialization option in the training programs of agriculture or forestry schools. Additionally, evidence of adoption needs to be collected and impact studies carried out to persuade policy makers and donors that agroforestry deserves their support. Additionally, there should be significant investment and training for local government staff to carry out sensitization campaigns on agroforestry, including FMNR and the need to reduce abusive felling of trees which hinders this practice.

- Wider dissemination of Law No. 14; better understand the bogo-bogos and find alternative sources of income for them

The study found that Chadian farmers are aware and excited to pick-up agroforestry and some are already making efforts to plant or manage some trees on their crop fields or around their compounds. Despite these positive signs, agroforestry development in Chad is handicapped by misinterpretation and poor implementation of Law No. 14. In fact, huge amounts of money are collected as fines by the forest officials/bogo-bogos. Although we found evidence that some of the collected fines are deposited in the state treasury, it is not clear, at least within the limits of this study, if all the fines that are collected are effectively deposited in the state treasury. We found that the activities of the bogo-bogos may have negative corollaries on a significant number of farmers' tree-planting decisions. However, not much is known about who the bogo-bogos are, who they represent and how best to coordinate their activities. It would be important to dig into their activities and find alternative income for this category of forestry stakeholders. We also found that most farmers and even some government officials do not have a good understanding of Law No. 14 and other agricultural policies. It is imperative that such laws and policies are widely disseminated such that farmers know their rights and obligations and the policies and organizations they can turn to for support.

- Traditional indigenous property rights confer enough tenure security to favor tree-planting

The analysis on the interaction between formal and informal institutions governing access to land and tenure security points to the fact that issues of land ownership and tenure security are less of an issue in rural Chad, especially with regards to the case study communities. This is because customary laws and traditional rights to land are still in place and effectively determine the actions of the rural population about access, management and use. In other words, this suggests that traditional indigenous property rights institutions prevail over formal laws in the eyes of local people in Chad. However, the situation may be the reverse in densely populated areas. Additionally, it seems that traditional indigenous property rights confer enough tenure security to favor tree-planting in the country. This calls for the development of an institutional arrangement that is a hybrid between formal and informal laws governing land and there are already actions in the right direction for such a mélange. For example, the GOC recognized, when it established a Land Tenure Observatory in 2001, that the country is in need for a land policy and laws that take into consideration aspects of customary and Islamic laws, provide guidance on

rights to pastureland and natural resources, allow for the formalization of land rights, set standards for the transfers of land, and establish effective enforceable systems of land disputes resolution [35].

One of the major limitations of the study is that we were not able to assess and compare perceptions of respondents from different agroecological zones of the country. We recommend that to have a more robust opinion covering the national territory, it will be important to extend to other agroecological zones. Subsequent studies interested in the topic should endeavor to fill this gap.

Moreover, this study recognizes that policies are needed to galvanize agroforestry in developing countries but the question we may need to answer in the future is what kinds of policy research is needed to support the development of enabling agroforestry policies.

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